सर्वेषां विकासाय

Proposed Integrated Industrial Estate (IIE) Sitarganj
Part II (B) ASTPL/EC/UK/201111

At Village - Bara, Prahlad Palsia, Kalyanpur; Tehsil :- Sitarganj;
District:- Udhamsingh Nagar; State :- Uttarakhand; India
Plot Area:- 29, 15,600 sq. m (291.56 hectares)
Project Activity -7(c) Category -B

Draft Environmental Impact Assessment Report

Submitted To	**Uttarakhand Environment Protection & Pollution Control Board , Uttarakhand**
Monitoring Period	**December 2020 to February 2021**

PROJECT PROPONENT

State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. (SIIDCUL)

Name of Consultant & NABET Accreditation No

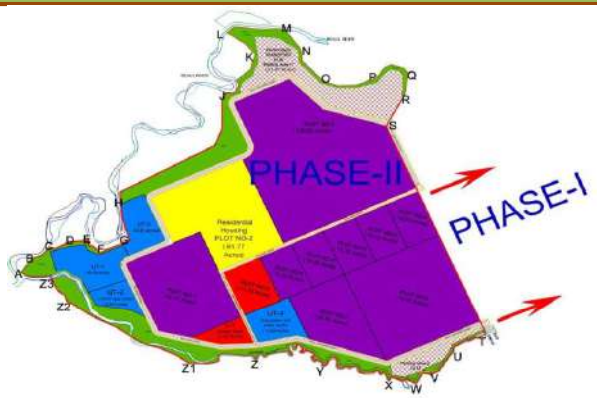
Aplinka Solutions & Technologies Pvt. Ltd. | www.aplinka.in
Corp. Office : A-48, Sector-64, Noida – 201301
NABET Accreditation No: NABET/EIA/2225/RA 0261 REV _02

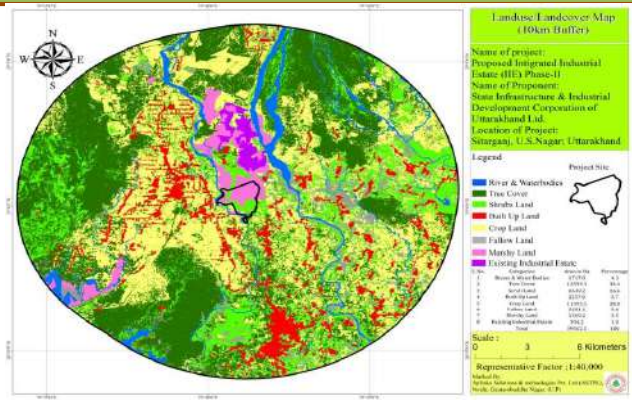
Name of Laboratory & Accreditation Details

Noida Testing Laboratories | www.noidalabs.com
Address : GT-20, Sector-117, Noida, Gautam Budh Nagar Noida – 201301
NABL Accreditation Certificate No: TC-6814

MoEF&CC Gazette Dated & No

31st Aug 2017 - S.O. 2836(E)





EXECUTIVE SUMMARY – ENGLISH

INTRODUCTION

State Integrated Industrial Development Corporation is planning to develop an industrial estate near its existing industrial estate at Sitarganj. The present draft EIA Report is being prepared for public hearing and the final EIA incorporating the issues raised by the public; action proposed to close or minimize them along with budget and timeline will be submitted to SEIAA- Uttarakhand for securing the environmental clearance for proposed industrial estate.

PROJECT DESCRIPTION

Project Proponent Details:

Name and Address of the Project Proponent:

Name : Mr. Rohit Meena

Address : SIIDCUL, 29, IIE Sahastradhara Road, (IT Park), Dehradun.

Phone No. : 0135- 2607292, 2708100

Pin code : 248001

TABLE-1.1 -PROJECT DETAILS

Items	Details
Proponent Name	State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. (SIIDCUL)
Location	Khsara No: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28; 29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47;48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68; 69; 71;72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88;89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107; 122; 122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156; 157; 158; 159; 161; 162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153 at Village – Bara, Prahlad Palsia, Kalyanpur. Tehsil :- Sitarganj; District:- Udhamsingh Nagar; State :- Uttarakhand; India
Latitude	29° 0'12.04“ North
Longitude	79°41'0.67"East
Project area	291.56 ha (720.47 acre)
Land use	Industrial
Green Area	44.49 ha
Road & parking	44.61ha
Utility/ Reserve	24.02ha
Residential	25.00ha
Commercial	8.34ha
Industrial	145.11ha
Nearest Habitat/Town	Sitarganj; 6.1km; S

Nearest Railways Station	Lalkua Junction Railway Station (16.6 km towards NW direction)
Nearest Airport	Pantnagar Airport at Phoolbagh (18.8 km towards NW direction)
Nearest Highway	NH-125–7.2Km towards S Direction
Education Facility	Primary Govt. School 370m; W, Govt. Girls Inter college Shaktifarm1.8km; W
Water Demand and Supply source	During construction phase 0.540 MLD water will be required the same will be met through existing CETP. The total water requirement in operation phase will be approx. 11 MLD. Fresh water (7 MLD) will be obtained from ground water. Rest will be met via CETP treated wastewater (4 MLD).
Seismic Zone	Zone –IV (As per BMTPC)
Proposed Production process	Industries such as Brewery, Bottling and food processing units; Mixed Food products; Auto Industries; Auto components; packaging; Light engineering etc.
Estimated Project Cost	Rs. 130.96/- Crore
Ground water level	In the unconfined aquifer, the depth to water level in pre monsoon and post monsoon varies from 2.09 to 7.08 m bgl and from 1.99 to 6.89 m bgl, respectively. The seasonal fluctuation varies from 0.09 to 3.56 m.(Source: CGWA district brochure- Udhamsingh Nagar)
Working Days	340
Man Power	4000 individuals during construction phase and 12658 individuals during operation phase.
Total Power demand and supply source	123 MW electricity will be supplied by UPCL (Uttarakhand Power Corporation Limited) during operation phase and 60 KW during construction phase through temp connection
Total Goods to be manufactured	35107 tons/day
Total Traffic to be generated (PCU)	30932
Total Waste Generation	22.5 ton/day Industrial process waste 2.75 ton/day Municipal Solid waste
Wildlife Sanctuary	Nandhour Wildlife Sanctuary is 12.6 Km in NE
Ecosensitive Zone	ESZ of Nandhour Wildlife Sanctuary is 6.6 Km in NE
Begul River	50 meter (adjacent to Project site)
CETP Capacity	12 MLD

Source: Detailed Project Report, SOI OSM Map, Wikimapia, Google earth, BMTPC, IMD

STUDY AREA AT GLANCE

The Study area has been covered 10 Kilometer radius around project boundary. Various Physical environmental components, Socio economic, Biological components were monitored in this zone.

Team of experts from ASTPL and laboratory team from Noida testing laboratories conducted the baseline study along with officials of State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. Field studies were conducted for a period of three months December 2020 to February 2021 (winter season) to determine the existing conditions of various environmental attributes. Salient features of study area are as under: -

TABLE-1.2-SALIENT FEATURES OF STUDY AREA (10 KM RADIUS)

S/No	Details	
1.	Demography within 10 km radius (Projected population for 2021 based on Census 2011)	
	Total Population	180626 individuals
	Total Male	93433 individuals
	Total female	87194 individuals
	Total Worker	69837 individuals
2.	Climatology (December 2020 to February 2021)	
	Maximum Temperature (°C)	31
	Minimum Temperature (°C)	4
	Highest Relative Humidity (%)	100
	Lowest Relative Humidity (%)	25
3.	Seismic Zone	Seismic Zone IV (Source:- Building Material technology promotion council)
4.	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Gorhi Neleala Adjacent in E Sukhi Nadi Adjacent in W Bahgul Nadi Adjacent in S Upper Bahgul Canal 300 m; E Kailash Nadi 1.3 km; E Nandhaur Nadi 2.4 m; NE Katna Nadi 5.6 km; W Terha Nala 6.0 km; SW Phawr Nadi 6.9 km; E Dhora Nala 7.0 km; W Seena Nala 7.1 km; E Deoha Nadi 8.0 km; SE Khakra Nala 8.11 km; SE Bhainsiya Nala 8.3 km; NE Sher Nala 9.6 km; NW Bhuta Nala 9.8 km; SW
5.	National Park, Wild Life Sanctuaries, Biosphere Reserves Protected Forest etc. within 10 Km radius study area	There is no national park; WLS eco-sensitive area and critically polluted area in 10km radius from the project site. Kailash RF 1.0 Km in NE Barkoli RF 2.0 km; SW Raikhal RF 3.1 Km: N Ransali RF 3.6 km; E

S/No	Details	
		Shivalik Elephant Reserve 4.3 Km; N Tunikhal RF 4.5 km; NW Saraunja RF 5.3 km; E Kotkharra RF 5.9 km; NW Kalaga RF 7.0 km; NE Horai RF 7.9 km; NW Mailani RF 8.3 km; NW Hanspur RF 8.9 km; NE Nandhaur RF 9.0 km; N Kalega RF9.1 km; NE
6.	State and Interstate Boundary	• Interstate Boundary of Uttarakhand and Uttar Pradesh is at 12.0 Kms in South Direction
8.	National Highway and nearby road	• NH-125–7.2Kmtowards S Direction
9.	Nearest Airport	• Pantnagar Airport at Phoolbagh (18.8 km towards NW direction)
10.	Nearest Railway Line	• Lalkua Junction Railway Station (16.6 km towards NW direction)
11.	Nearest, Habitation/village Town and City	• Sitarganj; 6.1km; S
	School/ college	• Govt Primary school; Nirmalnagar; 0.38km; W • Govt High school; Rajnagar; 1.06km; SE • Govt Degree collage; Sisona; 1.74km; SE • Govt Inter collage; Shaktifarm ; 1.90km; S • Govt Primary school; Ukrauli; 2.34km; N • Govt Inter collage;Rudpur; 2.74km; N
	Medical facilities and Hospitals	• Prayas hospital and research center; 0.97km;E • Health and wellness center ;Nakulia; 4.00km;SE • Govt. Hospital Deorakala; Sitarganj; 7.18km; S • Triveni clinic ; Sitarganj; 7.24km; S • Satya Eye hospital , Sitarganj; 7.56km;S • Dr.Turna Max Surgical hospital, Sitarganj; 7.84km;S
	Police station	• Police fire Station SIDCUL; Sitarganj; 1.64km; N • Police Station; Sitarganj; 7.00km; S

Source: - Site Visit and Survey of India Toposheet

TABLE-1.3-ENVIRONMENTAL MONITORING RESULTS

PARAMETERS	DESCRIPTION	
	Monitoring Period	December 2020 to February 2021

PARAMETERS	**DESCRIPTION**	
	Monitoring Period	**December 2020 to February 2021**
Ambient Air Quality Monitoring (10 locations)		1. As per the analysis the minimum concentration of PM_{10} was found 21.0 µg/m³at AAQ8 (Near Karhapani Nursery) and maximum concentration found 89.5 µg/m³ at AAQ7 (Sitarganj) due to highway road, dense market, construction activities in town. However at the other places the monitoring results of PM_{10} are within the prescribed limit 100 µg/m³ as per CPCB respectively. 2. The monitoring results of $PM_{2.5}$ reveal that the minimum concentrations of 12.5µg/m3was found at AAQ8 (Near Karhapani Nursery) while the maximum concentration of 51.0µg/m³ is found at AAQ7 (Sitarganj). However at other places the monitoring results of $PM_{2.5}$ are within the prescribed limit 60 µg/m³ as per CPCB respectively. 3. The gaseous pollutants SO_2 and NO_2 are well within the prescribed CPCB limit of 80 µg/m³ for Industrial, residential and rural areas at all monitoring stations. The minimum concentration & maximum concentrations of SO_2 were found to be 3.5 µg/m³ at AAQ8 (Near Karhapani Nursery) & 17.4 µg/m³ at AAQ7 (Sitarganj) respectively. The minimum & maximum concentrations of NO_2 were found to be 5.1 µg/m³at AAQ8 (Near Karhapani Nursery) & 27.5µg/m³ at AAQ7 (Sitarganj) respectively. In Sitarganj gaseous pollutants concentration has been slightly increases due to heavy traffic, connecting road, dense population & dense urban area. 4. CO concentration ranges between 0.1 to 1.9 mg/m³ at AAQ8 and AAQ7 respectively. 5. Ozone concentration ranges between 13.0 µg/m³ at to 25.0 µg/m³ respectively. 6. The other pollutants like Ammonia, Heavy metal (Pb, As & Ni), Benzo@pyrene were found not detected at all the monitoring locations.
Noise Level Monitoring (10 locations)		As per selected monitoring station for noise level, it is observed that the maximum concentration were reported at ANQ7 (Sitarganj) 63.5 dB(A) in the day time monitoring period & minimum concentration were reported at ANQ8 (Kahra Pani Nursery) 45.4 dB(A)in the day time monitoring period. The maximum concentration were reported at ANQ7

PARAMETERS	DESCRIPTION	
	Monitoring Period	December 2020 to February 2021
		(Sitarganj) 50.6 dB (A) in the night time monitoring period & minimum concentration were reported at ANQ8 (Kahra Pani Nursery) 35.9 dB(A) in the night time monitoring period. It is concluded that, the Sitarganj area is major road connectivity & there are found more traffic due to main highway SH9. In Kahra Pani nursery is a silence zone, so noise level is very low at location comparatively to other selected locations for noise monitoring
Water Sampling	Surface water sampling was carried out at 4 locations	As per analysis of surface water it was found that the surface water is indicating minor pollution in studies location area. The total coliform & faecal coliform count also indicated that the surface water is out of limit in two location SW1 &SW2 in the prescribed limit, so it cannot be used directly for any purposes. As per the analysis results found Faecal Coliform parameter results are falling under the Class C, BOD parameter results are falling under the Class Below E, pH parameter results are under the Class A, B, C, D & E, Dissolved oxygen parameter results are under the Class B &Electrical conductivity& Faecal Coliform results are falling under the Class Below E according to water quality criteria by CPCB.
	Ground Water sampling was done at 5 locations	According to baseline study within 10 km radius, It can be concluded from ground water analysis results that all parameters for all monitoring locations are within permissible limit as per IS: 10500-2012 "Specifications for Drinking Water". It is a fit for drinking purpose after RO filtration.
Soil Quality (4 locations)		It is observed that the soil quality- does not indicate any noticeable pollution and contamination. The soil qualities of villages are suitable for agriculture and can be improved by application of fertilizers in order to grow vegetation/plantation.

Source: - Environmental Monitoring via Noida Testing Laboratory

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION

Summary of anticipated adverse environmental impacts and mitigation measures are tabulated below

TABLE-1.4-ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION

Particular	Project Activities	Impacts	Mitigation Measures	Remark
Air Quality	Filling of low lying area to elevate the plinth level up to the road level	Increase in PM levels in ambient air due to dust generation and SOx concentration levels in ambient air due to vehicular emissions.	1. Exposed area will be limited to the minimum requirement. 2. Installation of spray systems (mist guns) for dust suppression at temporary dumping. 3. Minimization of drop distance for all materials-handling process through appropriate design of operations. 4. Covering of filling site through barricading of adequate height	All the filling will be done by the tenants under supervision of SIIDCUL. The filling material carriedout to the project site is proposed to be utilized on the same day. Storage of filling material the project site will not be allowed. Anti-smog guns will be installed at selected places if required. Regular Air monitoring will be carried out and CAAQMS will be installed if required.
	Transportation of Soil and stone aggregate to the project site	Increase in PM level due to dust generation and SOx concentration levels in ambient air due to vehicular emissions.	1. Regular watering of approach and access roads. 2. Approach roads will be clearly defined using marker posts so that vehicle traffic is controlled in the area. 3. 3. Approach Roads no longer required will be re-vegetated as soon as Possible. 4. Approach roads to be maintained by surface grading to minimize excessive road surface wearing. 5. Covered transport of Soil and stone aggregate will be carried out.	
	Unloading operation of filling material	Elevate PM concentrations in ambient air.	Speed limit of vehicles will be controlled and in no case it will be beyond 40 Km/hrs. Mechanical unloading reduces air borne dust hence it if	

Particular	Project Activities	Impacts	Mitigation Measures	Remark
			recommended for unloading the filling material.	Air pollution control devices i.e. ESP; bag filter; wetjet and fixed water sprinklers will be installed by tenants if the need arises. Only PUC verified vehicles will be allowed to enter in the proposed industrial area. Stacks will be as per the direction of SPCB/CPCB. Regular health checkup of workers will be carried out by tenant industries.
	Operation of industries	Excessive occupational Exposures to airborne particulate matter.	**1.** Occupational exposures to air pollutants will be assessed at regular intervals. **2.** Where exposures exceed the regulatory limits, appropriate engineered controls, management measures or, as a last resort, the provision of personal protective equipment will be implemented.	
Noise Levels Control	General activities including machine & transportation of soil and stone	Increase in noise Levels Occupational hazard due to noise exposures and	1. An analysis of measured noise levels, meteorological parameters, and industrial operations will be undertaken to determine	Six monthly/ Quarterly monitoring as per norms of SPCB and CPCB

Particular	Project Activities	Impacts	Mitigation Measures	Remark
	aggregate Transportation of industrial raw material and finished products Production process	Increase in ambient Noise	the risk of excessive noise impacts during industrial operations. **2.** Industrial operation and service vehicle movement will be limited to the daytime. **3.** Occupational noise exposures will be assessed. Where Leq (8 hour) noise exposures have the potential to exceed 85 dB(A), mitigation through engineered noise controls, management measures or, as a last resort, through the provision of personal protective equipment will be implemented.	
Water Resources and Quantity	Dewatering	Reduction in ground water availability for domestic or local business purposes Reduction in ground water availability for irrigation Purposes. Changes to hydraulic regime.	1. Rainwater collection and harvesting will be practiced in the upstream Bhabhar Area. 2. Rain water will be collected in the sump for future use. 3. Water conservation methods will be practiced.	Rain water harvesting will be practised in the upstream Bhabhar region in association with forest department.
Water Resources and Quality	Wastewater generated from domestic usage at proposed industrial estate.	Deterioration in ground water and soil quality when discharged untreated.	1. All the generated waste water will be treated in a CETP of 12MLD capacity, the treated water will be used to the maximum possible expert and the excess treated water will	

Particular	Project Activities	Impacts	Mitigation Measures	Remark
		Untreated waste water will be affected the aquatic flora & fauna downstream. The human health will also be adversely affected by the untreated sewerage/ waste water.	be discharged in the adjacent stream after prior permission from pollution control board, Uttarakhand. 2. Waste water or treated water will not be allowed to mix with rain water and will be flowing through the storm water drains. 3. The regular testing of CETP outlet will be carried out and in any case treated water not meeting discharge standards will not be allowed to enter any stream.	
Hydrogeology and Drainage pattern	Industrial activities	No in change regional hydrology and drainage	1. Prior to each phase of Industrial estate, update and implement the relevant EMP to include phase-specific control and mitigation measures. 2. Install diversion drains and sediment fences prior to starting earthworks.	
Landuse and Soil Characteristics	Commencement of Industrial Operations.	Existing land use of the core zone will remain same (industrial) however the land cover will be changed. Land degradation due to temporarily disposal of wastes.	1. All the tenant industries will be directed to include phase-specific control and mitigation measures. 2. Planned change will reduce the chances to soil contamination. 3. The vegetative measures to make the area aesthetically beautiful will be undertaken. 4. Any tree cutting will be compensated on a ratio of 1:10.	Project site is a plain land. SIIDCUL have secured the permission to clearfell 710 trees and have evacuated then in two phases of 330 trees and 380

Particular	Project Activities	Impacts	Mitigation Measures	Remark
		Exposure of topsoils to wind and water erosion.		trees. Any tree felling will be carriedout by the tenant after obtaining prior permission from the forest department.
Flora and Fauna	Industrial development and operations	No direct Habitat loss was observed however the potential for Adverse changes to species diversity and abundance cannot be ruled out.	1. The conservation plan will be implemented in coordination with forest department. 2. Locally native species will be used in landscaping works.	1. Project area is govt. Vacant fallow land. 2. No National parks within 10 Km radius Few Schedule -I fauna were reported in the core zone and conservation plan have been proposed for the same.
Occupational Health &Safety	Overall Industrial Operation.	Annoyance, sleep disturbance, and health impacts from noise emissions that exceed the	1. Implementation of noise and fugitive dust emission controls and management measures. Implementation of water quality management and control measures. 2. Development of an	Adoption of OSHAS and other guidelines for industrial health & safety of

Particular	Project Activities	Impacts	Mitigation Measures	Remark
		safe limits. Community annoyance from dust deposition. Potential for risk of harm to personnel and the local Community.	emergency response plan that includes installation of emergency response equipment to combat events such as spillage and fire. 3. On-site first aid facilities will be provided and employees will be extended to the local community in emergencies. 4. Non-active sides of the industrial area will be suitably fenced. 5. Industrial area will be suitably guarded and any approach to industry will be restricted and prohibited. 6. Protective safety boots, goggles, hand glove and helmets will be provided to the person working in the Industry. 7. Employee will be adequately trained and educated for involvement and commitment in to the implementation of health and safety guidelines. 8. Provision of all necessary resources for safety and health of employees and contractors engaged in industry. 9. Proper ear plugs and muffs will be provided to industrial workers in high noise area to protect them from noise hazards. 10. The industrial area will be	workers Constitution of Disaster management cell headed by local authority Dist. Collector.

Particular	Project Activities	Impacts	Mitigation Measures	Remark
			managed such that at all stages of the project, access to active industrial areas will be restricted to authorized personnel only.	

ENVIRONMENT MANAGEMENT PLAN

The cost of the complete project including land and development cost and other contingencies is Rs. 130.96crores. Below mentioned budget will be provided to the Environment Management Cell for implementation of EMP and monitoring of Environmental parameters.

S. No.	Particular	Cost in lacs
1.	EMP budget (Capital cost)	1062.7/-
2.	EMP budget (Recurring cost)	93.56/-
3.	Wildlife Conservation Plan	15.00/-
	Total	**1171.26/-/-**

Hence, a total of **Rs. 1171.26/-Lakhs** is allocated as Environmental Management and Monitoring Cost. The total capital cost is estimated to be **Rs. 1062.7 Lakhs** while the recurring cost to be **Rs. 93.56 Lakhs**. Almost 15 lakhs is allocated for the wild life conservation program from the project

CONCLUSION

There is no development without industrialization. But this should go hand in hand with environment protection. The proposed project of would take all precautionary measures to keep environment clean and green as it is or even take steps to improve it further.

****

कार्यकारी सारांश

1.0 परिचय

राज्य एकीकृत औद्योगिक विकास निगम सितारगंज में अपने मौजूदा औद्योगिक एस्टेट के पास एक औद्योगिक एस्टेट विकसित करने की योजना बना रहा है। वर्तमान पर्यावरण प्रभाव आकलन प्रतिवेदन सार्वजनिक सुनवाई के लिए तैयार की गई है और मुख्यध पर्यावरण प्रभाव आकलन प्रतिवेदन में जनता द्वारा उठाए गए मुद्दों को शामिल किया जायगा; प्रस्तावित औद्योगिक एस्टेट के लिए पर्यावरण मंजूरी हासिल करने के लिए बजट और समयरेखा के साथ उन्हें रोकने या कम करने के लिए प्रस्तावित कार्यवाही पर्यावरण प्रभाव आकलन प्रतिवेदन में प्रस्तुत की जाएगी। वर्तमान परियोजना गाँव में अपने मौजूदा औद्योगिक एस्टेट के पास एक औद्योगिक एस्टेट विकसित करना है

परियोजना प्रस्तावक विवरण:

परियोजना प्रस्तावक का नाम और पता:

नाम: श्री रोहित मीणा

पता: सिडकुल, 29, आईआईई सहस्त्रधारा रोड, (आईटी पार्क), देहरादून।

फोन नंबर: 0135- 2607292, 2708100

पिन कोड: 248001

<u>तालिका-1.1-परियोजना विवरण</u>

सूची	विवरण
परियोजना प्रस्तावक का नाम	स्टेट इंफ्रास्ट्रक्चर एंड इंडस्ट्रियल डेवलपमेंट कॉरपोरेशन ऑफ उत्तराखंड लिमिटेड (सिडकुल)
स्थान	खसरा नंबर: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28; 29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47;48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68; 69; 71;72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88;89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107;122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150;153; 154; 155; 156; 157; 158; 159; 161; 162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175;177; 178; 180; 182; 183; 184; 186; 165/189; 188/153 ग्राम - बारा; प्रह्लाद पलसिया; कल्याणपुर तहसील: - सितारगंज; जिला: - उधमसिंह नगर; राज्य :- उत्तराखंड; भारत
अक्षांश	29° 0'12.04"उत्तर
देशान्तर	79°41'0.67" पूर्व
परियोजना क्षेत्र	291.56 हेक्टेयर (720.47 एकड़)
भूमि उपयोग	औद्योगिक
हरित क्षेत्र	45.1 हेक्टेयर
सड़क और पार्किंग	44.61 हेक्टेयर
निकटतम आवास/नगर	नगर सितारगंज; 6.1 किमी; दक्षिण दिशा की ओर
निकटतम रेलवे स्टेशन	लालकुआ जंक्शन रेलवे स्टेशन (उत्तर पश्चिम दिशा की ओर 16.6 किमी)

निकटतम हवाई	अड्डा पंतनगर हवाई अड्डा फूलबाग में (18.8 किमी उत्तर पश्चिम दिशा की ओर)
निकटतम राजमार्ग	एनएच-125–7.2 किमी दक्षिण दिशा की ओर
शिक्षा सुविधा	प्राथमिक राजकीय विद्यालय; पश्चिम की ओर गवर्नमेंट गर्ल्स इंटर कॉलेज शक्तिफार्म1.8 किमी; पश्चिम की ओर
जल मांग और आपूर्ति स्रोत	संचालन चरण में कुल पानी (11 एमएलडी) की आवश्यकता लगभग होगी। ताजा पानी (7 एमएलडी) भूजल से प्राप्त किया जाएगा। बाकी सीईटीपी उपचारित अपशिष्ट जल (4 एमएलडी) के माध्यम से पूरा किया जाएगा। निर्माण चरण के दौरान 0.540 एमएलडी पानी की आवश्यकता होगी जो मौजूदा सीईटीपी के माध्यम से पूरी की जाएगी।
भूकंपीय क्षेत्र क्षेत्र	जोन-IV (बीएमटीपीसी के अनुसार)
प्रस्तावित उत्पादन प्रक्रिया	उद्योग जैसे शराब की भट्ठी, बॉटलिंग और खाद्य प्रसंस्करण इकाइयाँ; मिश्रित खाद्य उत्पाद; ऑटो उद्योग; ऑटो घटक; पैकेजिंग; लाइट इंजीनियरिंग आदि।
अनुमानित परियोजना लागत	रु. 130.96/- करोड़
भूजल स्तर	असंबद्ध जलभृत में, मानसून पूर्व और मानसून के बाद जल स्तर की गहराई क्रमशः 2.09 से 7.08 एमबीजीएल और 1.99 से 6.89 एमबीजीएल तक भिन्न होती है। मौसमी उतार-चढ़ाव 0.09 से 3.56 मीटर तक भिन्न होता है।
कार्य दिवस	340
मैन पावर	निर्माण चरण के दौरान 4000 व्यक्ति और संचालन चरण के दौरान 12658 व्यक्ति।
कुल बिजली की मांग और आपूर्ति स्रोत	संचालन चरण के दौरान यूपीसीएल (उत्तराखंड पावर कॉर्पोरेशन लिमिटेड) द्वारा 123 मेगावाट और निर्माण चरण के दौरान 60 किलोवाट बिजली अस्थायी कनेक्शन के माध्यम से आपूर्ति की जाएगी।
निर्मित होने वाली कुल वस्तुएँ	35107 टन / दिन
उत्पन्न होने वाला कुल ट्रैफ़िक (पीसीयू)	30932
कुल अपशिष्ट उत्पादन	22.5 टन/दिन औद्योगिक प्रक्रिया अपशिष्ट 2.75 टन/दिन नगरपालिका ठोस अपशिष्ट
वन्यजीव अभयारण्य	नन्दौर वन्यजीव अभयारण्य उत्तर पूर्व में 12.6 किलोमीटर है
पारिस्थितिक क्षेत्र	नंदौर वन्यजीव अभयारण्य का ईएसजेड उत्तर पूर्व में 6.6 किमी है
बेगुल नदी	50 मीटर (परियोजना स्थल के निकट)
सीईटीपी क्षमता	12 एमएलडी

स्रोतः विस्तृत परियोजना प्रतिवेदन, भारतीय सर्वेक्षण विभाग ओएसएम मानचित्र, विकिमेपिया, गूगल अर्थ, बीएमटीपीसी, आईएमडी

2.0 अध्ययन क्षेत्र एक नज़र में

अध्ययन क्षेत्र को परियोजना सीमा के चारों ओर 10 किलोमीटर के दायरे में विश्लेषण किया गया है। इस जोन में विभिन्न भौतिक पर्यावरणीय घटकों, सामाजिक आर्थिक, जैविक घटकों की निगरानी की गई। अपलिंका सॉल्यूशंस एंड टेक्नोलॉजीज प्रा। लिमिटेड दल के विशेषज्ञों और नोएडा परीक्षण प्रयोगशालाओं की प्रयोगशाला दल ने स्टेट इंफ्रास्ट्रक्चर एंड इंडस्ट्रियल डेवलपमेंट कॉरपोरेशन ऑफ उत्तराखंड लिमिटेड के अधिकारियों के साथ आधारभूत अध्ययन किया। तीन महीने दिसंबर 2020 से फरवरी 2021 (सर्दियों

के मौसम) की अवधि के लिए फील्ड अध्ययन आयोजित किए गए ताकि विभिन्न पर्यावरणीय विशेषताओं की मौजूदा स्थितियां निर्धारित किया जा सके। अध्ययन क्षेत्र की मुख्य विशेषताएं इस प्रकार हैं:-

तालिका-1.2-अध्ययन क्षेत्र की मुख्य विशेषताएं (10 किमी त्रिज्या)

क्रम सं	विवरण	
1.	10 किमी के दायरे में जनसांख्यिकी (2011 की जनगणना के आधार पर 2021 के लिए अनुमानित जनसंख्या)	
	कुल जनसंख्या	180626 व्यक्ति
	कुल पुरुष	93433 व्यक्ति
	कुल स्त्री	87194 व्यक्ति
	कुल कर्मी	69837 व्यक्ति
2.	जलवायु विज्ञान (दिसंबर 2020 से फरवरी 2021)	
	उच्चतम तापमान (oC)	31 oC
	न्यूनतम तापमान (oC)	4 oC
	उच्चतम सापेक्ष आर्द्रता (%)	100
	न्यूनतम सापेक्ष आर्द्रता (%)	25
3.	भूकंपीय क्षेत्र क्षेत्र	भूकंपीय क्षेत्र IV (स्रोत:- भवन निर्माण सामग्री प्रौद्योगिकी संवर्धन परिषद)
4.	वे क्षेत्र जो पारिस्थितिक कारणों से महत्वपूर्ण या संवेदनशील हैं - आर्द्रभूमि, जलमार्ग या अन्य जल निकाय, तटीय क्षेत्र, जीवमंडल, पहाड़, जंगल	पूर्व की ओर परियोजना स्थल से सटे गोरही नीलेला परियोजना स्थल से सटी सुखी नदी पश्चिम दक्षिण की ओर परियोजना स्थल से सटी बेगुल नदी ऊपरी बेगुल नहर 300 मीटर पूर्व की ओर कैलाश नदी 1.3 किमी पूर्व की ओर नंधौर नदी 2.4 किमी उत्तर पूर्व की ओर कटना नदी 5.6 किमी पश्चिम की ओर तेरहा नाला 6.0 किमी दक्षिण पश्चिम की ओर फावर नदी 6.9 किमी पूर्व की ओर धोरा नाला 7.0 किमी पश्चिम की ओर सीना नाला 7.1 किमी पूर्व की ओर देवहा नदी 8.0 किमी दक्षिण पूर्व की ओर खाकरा नाला 8.11 किमी दक्षिण पूर्व की ओर भैंसिया नाला 8.3 किमी उत्तर पूर्व की ओर शेर नाला 9.6 किमी उत्तर पश्चिम की ओर भूत नाला 9.8 किमी दक्षिण पश्चिम की ओर
5.	राष्ट्रीय उद्यान, वन्य जीवन अभयारण्य, जीवमंडल आरक्षित संरक्षित वन आदि। अध्ययन क्षेत्र के 10 किलोमीटर के दायरे में	परियोजना स्थल से 10 किमी के दायरे में डब्ल्यूएलएस पर्यावरण-संवेदनशील क्षेत्र और गंभीर रूप से प्रदूषित क्षेत्र ; कोई राष्ट्रीय उद्यान नहीं है । कैलाश आरएफ 1.0 किमी उत्तर पूर्व की ओर बरकोली आरएफ 2.0 किमी दक्षिण पश्चिम की ओर रायखाल आरएफ

क्रम सं	विवरण	
		3.1 किमी उत्तर की ओर रनसाली आरएफ 3.6 किमी पूर्व की ओर शिवालिक हाथी अभ्यारण्य 4.3 किमी उत्तर की ओर तुनिखाल आरएफ 4.5 किमी उत्तर पश्चिम की ओर सरौंजा आरएफ 5.3 किमी पूर्व की ओर कोटखरा आरएफ 5.9 किमी उत्तर पश्चिम की ओर कलागा आरएफ 7.0 किमी उत्तर पूर्व की ओर होरई आरएफ 7.9 किमी उत्तर पश्चिम की ओर मैलानी आरएफ 8.3 किमी उत्तर पश्चिम की ओर हंसपुर आरएफ 8.9 किमी उत्तर पूर्व की ओर नंधौर आरएफ 9.0 किमी उत्तर की ओर कलेगा आरएफ 9.1 किमी उत्तर पूर्व की ओर
6.	राज्य और अंतरराज्यीय सीमा	उत्तराखंड और उत्तर प्रदेश की अंतर्राज्यीय सीमा दक्षिण दिशा में 12.0 किलोमीटर पर है
8.	राष्ट्रीय राजमार्ग और पास की सड़क	एनएच-125-7.2 कि.मी दक्षिण दिशा की ओर
9.	निकटतम हवाई अड्डा	फूलबाग में पंतनगर हवाई अड्डा (उत्तर पश्चिम दिशा की ओर 18.8 किमी)
10.	निकटतम रेलवे लाइन	लालकुआ जंक्शन रे लवे स्टेशन (उत्तर पश्चिम दिशा की ओर 16.6 किमी)
11.	निकटतम, बस्ती/गांव कस्बा और शहर	सितारगंज; 6.1 किमी; दक्षिण
	स्कूल कॉलेज	राजकीय प्राथमिक विद्यालय , निर्मलनगर; पश्चिम दिशा में 0.38 किमी सरकारी उच्च विद्यालय ; राजनगर; दक्षिण पूर्व की ओर 1.06 कि.मी सरकारी डिग्री महाविद्यालय ; सिसोना; दक्षिण पूर्व की ओर 1.74 कि.मी गवर्नमेंट माध्यमिक महाविद्यालय ; शक्तिफार्म; दक्षिण की ओर 1.90 कि.मी सरकारी प्राथमिक विद्यालय ; उकरौली 2.34 km; उत्तर की ओर राजकीय माध्यमिक विद्यालय रुडपुर 2.74 कि.मी. उत्तर की ओर
	चिकित्सा सुविधाएं और अस्पताल	प्रयास अस्पताल और अनुसंधान केंद्र ; पूर्व की ओर 0.97 कि.मी स्वास्थ्य और कल्याण केंद्र ;नकुलिया; दक्षिण पूर्व की ओर 4.00 कि.मी सरकार। अस्पताल देवराकला ; सितारगंज; दक्षिण की ओर 7.18 कि.मी त्रिवेणी क्लिनिक; सितारगंज; दक्षिण की ओर 7.24 कि.मी

क्रम सं	विवरण	
		सत्य नेत्र अस्पताल, सितारगंज; दक्षिण की ओर 7.56 कि.मी डॉ. तुरना मैक्स सर्जिकल अस्पताल , सितारगंज; दक्षिण की ओर 7.84 कि.मी
	पुलिस स्टेशन	पुलिस फायर स्टेशन सिडकुल ; सितारगंज; उत्तर की ओर 1.64 कि.मी पुलिस स्टेशन; सितारगंज; दक्षिण की ओर 7.00 कि.मी
12.	परियोजना की लागत	रु. 130.96/- करोड़

स्रोतः परियोजना स्थल निरीक्षण और भारतीय सर्वेक्षण विभाग ओएसएम मानचित्र,

<u>तालिका-1.3-पर्यावरण निगरानी</u>

पैरामीटर	विवरण	
	निगरानी अवधि	दिसंबर 2020 से फरवरी 2021
परिवेशी वायु गुणवत्ता निगरानी (10 स्थान)		1. विश्लेषण के अनुसार एएक्यू 8 (करहापानी नर्सरी के पास) में PM_{10} की न्यूनतम सांद्रता 21.0 µg/m3 पाई गई और हाईवे रोड, घने बाजार, शहर में निर्माण गतिविधियों के कारण एएक्यू 7 (सितारगंज) में अधिकतम सांद्रता 89.5 µg/m3 पाई गई। हालाँकि अन्य स्थानों पर PM_{10} के निगरानी परिणाम क्रमशः सीपीसीबी के अनु सार निर्धारित सीमा 100 µg/m3 के भीतर हैं। 2. $PM_{2.5}$ के निगरानी परिणामों से पता चलता है कि एएक्यू 8 (करहापानी नर्सरी के पास) में 12.5µg/m3 की न्यूनतम सांद्रता पाई गई , जबकि एएक्यू7 (सितारगंज) में 51.0µg/m3 की अधिकतम सांद्रता पाई गई। हालाँकि अन्य स्थानों पर $PM_{2.5}$ के निगरानी परिणाम क्रमशः सीपीसीबी के अनुसार निर्धारित सीमा 60 µg/m3 के भीतर हैं। 3. सभी निगरानी स्टेशनों पर औद्योगिक, आवासीय और ग्रामीण क्षेत्रों के लिए गैसीय प्रदूषक SO2 और NO2 निर्धारित पीसीबी सीमा 80 µg/m3 के भीतर हैं। SO2 की न्यूनतम सांद्रता और अधिकतम सां द्रता एएक्यू8 (करहपानी नर्सरी के पास) में 3.5 µg/m3 और एएक्यू7 (सितारगंज) में क्रमशः 17.4 µg/m3 पाई गई। NO2 की न्यूनतम और अधिकतम सांद्रता एएक्यू8 (करहापानी नर्सरी के पास) में 5.1 µg/m3 और एएक्यू7 (सितारगंज) में क्रमशः 27.5 µg/m3 पाई गई। सीतागंज में भारी ट्रै फिक, कनेक्टिंग रोड, घनी आबादी और घने शहरी क्षेत्र के कारण गैसीय प्रदूषकों की सघनता में थोड़ी वृद्धि हुई है। 4. एएक्यू8 और एएक्यू7 पर CO सांद्रता क्रमशः 0.1 से 1.9 mg/m3 के बीच होती है। 5. अन्य प्रदूषक जैसे अमोनिया , ओजोन, भारी धातु (Pb, As & Ni), Benzo@pyrene सभी निगरानी स्थानों पर अनुपस्थित हैं।

पैरामीटर	विवरण	
	निगरानी अवधि	**दिसंबर 2020 से फरवरी 2021**
शोर स्तर की निगरानी (10 स्थान)		शोर के स्तर के लिए चयनित निगरानी स्टेशन के अनुसार , यह देखा गया है कि दिन के समय की निगरानी अवधि में एएनक्यू 7 (सितारगंज) 63.5 डीबी (ए) में अधिकतम एकाग्रता और एएनक्यू8 (कहरा पानी नर्सरी) 45.4 डीबी (ए) में न्यूनतम एकाग्रता की सूचना दी गई थी।) दिन के समय निगरानी अवधि में। रात के समय की निगरानी अवधि में अधिकतम एकाग्रता एएक्यू7 (सितारगंज) 50.6dB(A) पर रिपोर्ट की गई और न्यूनतम एकाग्रता एएनक्यू8 (कहरा पानी नर्सरी) 35.9 dB(A) में रात के समय की नि गरानी अवधि में रिपोर्ट की गई। यह निष्कर्ष निकाला गया है कि , सितारगंज क्षेत्र प्रमुख सड़क संपर्क है और मुख्य राजमार्ग SH9 के कारण अधिक यातायात पाया जाता है। कहारा पानी नर्सरी में साइलेंस जोन है, इसलिए शोर की निगरानी के लिए अन्य चयनित स्थानों की तुलना में शोर का स्तर उस स्थान पर बहुत कम है
पानी का नमूना	स्थानों पर सतही जल के नमूने लिए गए	सतही जल के विश्लेषण के अनुसार यह पाया गया कि सतही जल अध्ययन क्षेत्र में किसी जल प्रदूषण का संकेत नहीं दे रहा है। कुल कॉलीफॉर्म और फीकल कॉलीफॉर्म गणना ने यह भी संकेत दिया कि सतही जल प्रदूषण निर्धारित सीमा के भीतर है लेकिन इसे सीधे पीने और नहाने के उद्देश्य से इस्तेमाल नहीं किया जा सकता है। इसलिए यह पानी केवल सिंचाई के लिए ही अच्छा है। यह देखा गया है कि सभी पैरामीटर सीपीसीबी जल गुणवत्ता मानदंड के अंतर्गत आते हैं। विश्लेषण के परिणामों के अनुसार फेकल कोलीफॉर्म परिमाप परिणाम कक्षा सी के अंतर्गत आते हैं , बीओडी पैरामीटर परिणाम ई से नीचे की कक्षा के अंतर्गत आते हैं, पीएच पैरामीटर परिणाम कक्षा ए, बी, सी, डी और ई के अंतर्गत आते हैं, घुलित ऑक्सीजन पैरामीटर परिणाम हैं। कक्षा बी के तहत और विद्युत चालकता परिणाम सीपीसीबी द्वारा जल गुणवत्ता मानदंड के अनुसार कक्षा ई के अंतर्गत आते हैं।
	स्थानों पर ग्राउंड वाटर सैंपलिंग की गई	10 किमी के दायरे में आधारभूत अध्ययन के अनुसार, भूजल विश्लेषण परिणामों से यह निष्कर्ष निकाला जा सकता है कि सभी निगरानी स्थानों के लिए सभी परिमाप IS: 10500-2012 "पीने के पानी के लिए विनिर्देश " के अनुसार अनुमेय सीमा के भीतर हैं। यह सामान्य फिल्ट्रेशन के बाद पीने के उद्देश्य के लिए उपयुक्त है.
मिट्टी की गुणवत्ता (4 स्थान)		यह देखा गया है कि मिट्टी की गुणवत्ता - किसी भी ध्या न देने योग्य प्रदूषण और संदूषण का संकेत नहीं देती है। गाँवों की मिट्टी की गुणवत्ता कृषि के लिए उपयुक्त है और वनस्पति/पौधे उगाने के लिए उर्वरकों के प्रयोग से इसमें सुधार किया जा सकता है।

स्रोत:- नोएडा परीक्षण प्रयोगशाला के माध्यम से पर्यावरण निगरानी

3.0 प्रत्याशित पर्यावरणीय प्रभाव और न्यूनीकरण

प्रत्याशित प्रतिकूल पर्यावरणीय प्रभावों और शमन उपायों का सारांश नीचे सारणीबद्ध है

तालिका-1.4-प्रत्याशित पर्यावरणीय प्रभाव और न्यूनीकरण

विशिष्ट	परियोजना गतिविधियाँ	प्रभाव	शमन के उपाय	टिप्पणी
हवा की गुणवत्ता	निचले इलाके को भरना प्लिंथ स्तर को सड़क स्तर तक ऊपर उठाने के लिए	धूल के उत्पादन के कारण परिवेशी वायु में पीएम स्तर में वृद्धि और वाहनों के उत्सर्जन के कारण परिवेशी वायु में एसओएक्स सांद्रता के स्तर में वृद्धि।	**1.** अनावृत क्षेत्र न्यूनतम आवश्यकता तक सीमित होगा। 2. अस्थायी डंपिंग पर धूल दमन के लिए स्प्रे सिस्टम (धुंध बंदूकें) की स्थापना। 3. संचालन के उपयुक्त डिजाइन के माध्यम से सभी सामग्री -हैंडलिंग प्रक्रिया के लिए ड्रॉप दूरी को कम करना। 4. पर्याप्त ऊंचाई के बैरिकेडिंग के माध्यम से भराव स्थल को ढंकना	सभी भराई सिडकुल की देखरेख में किरायेदारों द्वारा की जाएगी। परियोजना स्थल पर ले जाने वाली भरण सामग्री को उसी दिन उपयोग करने का प्रस्ताव है। परियोजना स्थल पर भरने वाली सामग्री के भंडारण की अनुमति नहीं दी जाएगी। जरूरत पड़ने पर चुनिंदा जगहों पर एंटी स्मॉग गन लगाई जाएंगी। नियमित वायु निगरानी की जाएगी और यदि आवश्यक हो तो सीएएक्यूएमएस स्थापित किया जाएगा। वायु प्रदूषण नियंत्रण उपकरण यानी ईएसपी; बैग फिल्टर ; जरूरत पड़ने पर किरायेदारों द्वारा वेटजेट और फिक्स्ड वाटर स्प्रिंकलर लगाए जाएंगे। प्रस्तावित औद्योगिक
	परियोजना स्थल तक मिट्टी और पत्थर की ढुलाई	धूल के कारण पीएम लेवल में बढ़ोतरी हुई है परिवेश में पीढ़ी और एसओएक्स एकाग्रता का स्तर वाहनों के उत्सर्जन के कारण हवा।	1. संपर्क और पहुंच सड़क में नियमित रूप से पानी देना। 2. मार्कर पोस्ट का उपयोग करके पहुंच मार्ग को स्पष्ट रूप से परिभाषित किया जाएगा ताकि क्षेत्र में वाहन यातायात को नियंत्रित किया जा सके। 3. जिन पहुंच मार्गों की अब आवश्यकता नहीं है , उन्हें जल्द से जल्द फिर से हरा -भरा किया जाएगा। 4. सतही ग्रेडिंग द्वारा पहुंच सड़कों को बनाए रखा जाना चाहिए ताकि अत्यधिक सड़क सतह क्षरण को कम किया जा सके। 5. मिट्टी और पत्थर के पुर्जे का ढका हुआ परिवहन किया जाएगा।	
	सामग्री भरने का अनलोडिंग ऑपरेशन	परिवेशी वायु में PM सांद्रता बढ़ाएँ।	वाहनों की गति सीमा नियंत्रित रहेगी और किसी भी स्थिति में यह 40 किमी/घंटा से अधिक नहीं होगी।	

विशिष्ट	परियोजना गतिविधियाँ	प्रभाव	शमन के उपाय	टिप्पणी
			मैकेनिकल अनलोडिंग से वायु जनित धूल कम हो जाती है इसलिए यदि फिलिंग सामग्री को उतारने की सिफारिश की जाती है।	क्षेत्र में केवल पीयूसी वेरिफाइड वाहनों को ही प्रवेश की अनुमति होगी।
	उद्योगों का संचालन	अत्यधिक व्यावसायिक एयरबोर्न पार्टिकुलेट मैटर के संपर्क में आना।	**1.** वायु प्रदूषकों के व्यावसायिक जोखिम का नियमित अंतराल पर मूल्यांकन किया जाएगा। **2.** जहां एक्सपोजर विनियामक सीमाओं से अधिक है , उचित इंजीनियर नियंत्रण , प्रबंधन उपाय या, अंतिम उपाय के रूप में , व्यक्तिगत सुरक्षा उपकरण के प्रावधान को लागू किया जाएगा।	ढेर एसपीसीबी/सीपीसीबी के निर्देशानुसार होंगे। काश्तकार उद्योगों द्वारा श्रमिकों का नियमित स्वास्थ्य परीक्षण किया जायेगा।
शोर का स्तर नियंत्रण	सामान्य गतिविधियाँ मशीन सहित & यातायात मिट्टी और पत्थर के समुच्चय का औद्योगिक कच्चे माल और तैयार उत्पादों का परिवहन उत्पादन प्रक्रिया	शोर में वृद्धि स्तरों व्यावसायिक के कारण खतरा शोर जोखिम और परिवेशी शोर में वृद्धि	**1.** औद्योगिक संचालन के दौरान अत्यधिक शोर के प्रभावों के जोखिम को निर्धारित करने के लिए मापे गए शोर के स्तर, मौसम संबंधी मापदंडों और औद्योगिक संचालन का विश्लेषण किया जाएगा। **2.** औद्योगिक संचालन और सर्विस व्हीकल की आवाजाही दिन के समय तक सीमित रहेगी। **3.** व्यावसायिक शोर जोखिम का आकलन किया जाएगा। जहां Leq (8 घंटे) शोर के जोखिम में 85 dB(A) से अधिक होने की क्षमता है, वहां इंजीनियरी शोर नियंत्रण , प्रबंधन उपायों के माध्यम से शमन या, अंतिम उपा य के रूप में , व्यक्तिगत सुरक्षा उपकरण के प्रावधान के माध्यम से लागू किया जाएगा।	एसपीसीबी और सीपीसीबी के मानदंडों के अनुसार छह मासिक/त्रैमासिक निगरानी
जल संसाधन और गुणवत्ता	निर्जलीकरण	भूजल में कमी घरेलू या स्थानीय व्यावसायिक उद्देश्यों के लिए उपलब्धता	**1.** भावर क्षेत्र में संचयन और संचयन का अभ्यास किया जाएगा। **2.** वर्षा जल भविष्य में उपयोग के लिए संप में एकत्र किया जाएगा।	

विशिष्ट	परियोजना गतिविधियाँ	प्रभाव	शमन के उपाय	टिप्पणी
		सिंचाई के लिए भूजल उपलब्धता में कमी उद्देश्य। हाइड्रोलिक शासन में परिवर्तन। प्राप्त निकाय की सतह/भूजल गुणवत्ता में गिरावट	**3.** जल संरक्षण के त रीके अपनाए जाएंगे।	
जल संसाधन और गुणवत्ता	औद्योगिक एस्टेट उपयोग से उत्पन्न अपशिष्ट जल।	अनुपचारित छोड़े जाने पर भूजल और मिट्टी की गुणवत्ता में गिरावट। अनुपचारित अपशिष्ट जल नीचे की ओर जलीय वनस्पतियों और जीवों को प्रभावित करेगा। अनुपचारित सीवरेज/अपशिष्ट जल से मानव स्वास्थ्य पर भी प्रतिकूल प्रभाव पड़ेगा।	सभी उत्पन्न अपशिष्ट जल को 12MLD क्षमता के CETP में उपचारित किया जाएगा , उपचारित पानी का अधिकतम संभव विशेषज्ञ द्वारा उपयोग किया जाएगा और अतिरिक्त उपचारित पानी को प्रदूषण नियंत्रण बोर्ड , उत्तराखंड से पूर्व अनुमति के बाद बगल की धारा में बहा दिया जाएगा। उपचारित जल को वर्षा के जल में नहीं मिलने दिया जाएगा और वर्षा जल नालियों के माध्यम से प्रवाहित किया जाएगा। सीईटीपी आउटलेट का नियमित परीक्षण किया जाएगा और किसी भी मामले में उपचारित पानी के निर्वहन मानकों को पूरा नहीं करने पर किसी भी धारा में प्रवेश करने की अनुमति नहीं दी जाएगी।	
हाइड्रोज्योलोजी और जल निकासी नमूना	औद्योगिक एस्टेट गतिविधियाँ	क्षेत्रीय जल विज्ञान और जल निकासी में परिवर्तन नहीं	**1.**औद्योगिक एस्टेट विकास के प्रत्येक चरण से पहले, चरण-विशिष्ट नियंत्रण और शमन उपायों को शामिल करने के लिए प्रासंगिक ईएमपी को अद्यतन और कार्यान्वित करें। **2.** मिट्टी का काम शुरू करने से पहले डायवर्जन नालियों और	औद्योगिक क्षेत्र में कोई धारा न तो प्रवेश कर रही है और न ही छोड़ रही है। इसलिए किसी भी स्ट्रीम के लिए डायवर्जन प्रोग्राम की जरूरत नहीं है।

विशिष्ट	परियोजना गतिविधियाँ	प्रभाव	शमन के उपाय	टिप्पणी
			तलछट बाड़ों को स्थापित करें।	
भूमि उपयोग और मिट्टी की विशेषताएं	औद्योगिक की शुरुआत संचालन।	कोर जोन का मौजूदा भूमि उपयोग वही (औद्योगिक) रहेगा हालांकि भूमि कवर बदल दिया जाएगा। अस्थायी रूप से कचरे के निपटान के कारण भूमि का क्षरण। हवा और पानी के कटाव के लिए ऊपरी मिट्टी का एक्सपोजर।	**1.** सभी किरायेदार उद्योगों को चरण-विशिष्ट नियंत्रण और शमन उपायों को शामिल करने के लिए निर्देशित किया जाएगा। **2.** नियोजित परिवर्तन से मिट्टी के दूषित होने की संभावना कम हो जाएगी। **3.** क्षेत्र को सौंदर्य की दृष्टि से सुंदर बनाने के लिए वानस्पतिक उपाय किए जाएंगे। **4.** किसी भी पेड़ को काटने पर 1:10 के अनुपात में मुआवजा दिया जाएगा।	प्रोजेक्ट फ्लैट एवं खाली भूमि है। वन विभाग से पूर्व अनुमति प्राप्त करने के बाद किरायेदार द्वारा किसी भी पेड़ की कटाई की जाएगी।
वनस्पति और जीव	औद्योगिक विकास और संचालन	कोई प्रत्यक्ष पर्यावास हानि नहीं देखी गई , हालांकि इसकी संभावना थी प्रजातियों की विविधता और प्रचुरता में प्रतिकूल परिवर्तन से इंकार नहीं किया जा सकता है।	**1.** वन्य जीव संरक्षण योजना को वन विभाग के समन्वय से लागू किया जाएगा। **2.** भूनिर्माण कार्यों में स्थानीय देशी प्रजातियों का उपयोग किया जाएगा।	**1.** परियोजना क्षेत्र सरकारी है। खाली बंजर भूमि। **2.** 10 किलोमीटर के दायरे में कोई राष्ट्रीय उद्यान नहीं कोर जोन में अनुसूची-I के कुछ जीवों की सूचना मिली थी और इसके लिए वन्य जीव संरक्षण योजना प्रस्तावित की गई है.
व्यावसायिक स्वास्थ्य एवं सुरक्षा	कुल औद्योगिक कार्यवाही।	सुरक्षित सीमा से अधिक शोर उत्सर्जन से झुंझलाहट, नींद की गड़बड़ी और स्वास्थ्य पर प्रभाव। धूल जमाव से सामुदायिक क्षोभ। कर्मियों और स्थानीय	**1.** शोर और क्ष णिक धूल उत्सर्जन नियंत्रण और प्रबंधन उपायों का कार्यान्वयन। जल गुणवत्ता प्रबंधन और नियंत्रण उपायों का कार्यान्वयन। **2.** एक आपातकालीन प्रतिक्रिया योजना का विकास जिसमें रिसाव और आग जैसी घटनाओं से निपटने के लिए आपातकालीन प्रतिक्रिया	श्रमिकों के औद्योगिक स्वास्थ्य और सुरक्षा के लिए OSHAS और अन्य दिशानिर्देशों को अपनाना स्थानीय प्राधिकरण जिला की अध्यक्षता में आपदा प्रबंधन प्रकोष्ठ का गठन। एकत्र

विशिष्ट	परियोजना गतिविधियाँ	प्रभाव	शमन के उपाय	टिप्पणी
		समुदाय को नुकसान के जोखिम के लिए संभावित।	उपकरण की स्थापना शामिल है। **3.** ऑन-साइट प्राथमिक चिकित्सा सुविधाएं प्रदान की जाएंगी और आपात स्थिति में कर्मचारियों को स्थानीय समुदाय तक बढ़ाया जाएगा। **4.** औद्योगिक क्षेत्र के असक्रिय क्षेत्रों की उपयुक्त रूप से घेराबंदी की जाएगी। **5.** औद्योगिक क्षेत्र को उपयुक्त रूप से संरक्षित किया जाएगा और उद्योग के लिए किसी भी दृष्टिकोण को प्रतिबंधित और प्रतिबंधित किया जाएगा। **6.** उद्योग में काम करने वाले व्यक्ति को सुरक्षात्मक सुरक्षा जूते , चश्मा, हाथ के दस्ताने और हेलमेट प्रदान किया जाएगा। **7.** कर्मचारी को स्वास्थ्य और सुरक्षा दिशानिर्देशों के कार्यान्वयन में शामिल होने और प्रतिबद्धता के लिए पर्याप्त रूप से प्रशिक्षित और शिक्षित किया जाएगा। **8.** उद्योग में लगे कर्मचारियों और ठेकेदारों की सुरक्षा और स्वास्थ्य के लिए सभी आवश्यक संसाधनों का प्रावधान। **9.** उच्च ध्वनि क्षेत्र में औद्योगिक श्रमिकों को शोर के खतरों से बचाने के लिए उचित ईयर प्लग और मफ प्रदान किया जाएगा। **10.** औद्योगिक क्षेत्र का प्रबंधन इस प्रकार किया जाएगा कि परियोजना के सभी चरणों में सक्रिय औद्योगिक क्षेत्रों तक पहुंच केवल अधिकृत कर्मियों तक ही सीमित रहेगी।	करनेवाला।

4.0 पर्यावरण प्रबंधन योजना

5.0 भूमि और विकास लागत और अन्य आकस्मिकताओं सहित पूरी परियोजना की लागत रुपये है। 130.96 करोड़। ईएमपी के कार्यान्वयन और पर्यावरण मानकों की निगरानी के लिए पर्यावरण प्रबंधन सेल को नीचे उल्लिखित बजट प्रदान किया जाएगा।

क्रम संख्या	विवरण	**कीमत लाख में**
1	ईएमपी बजट (पूंजी लागत)	1062.7**/-**
2	ईएमपी बजट (आवर्ती लागत)	93.56**/-**
3	वन्यजीव संरक्षण योजना	15.00**/-**
	कुल	**1171.26/-**

अत: कुल रू. 1171.26/- लाख पर्यावरण प्रबंधन और निगरानी लागत के रूप में आवंटित किया गया है। कुल पूंजी लागत रुपये होने का अनुमान है। 1062.7 लाख जबकि आवर्ती लागत रु। 93.56 लाख। परियोजना से वन्य जीवन संरक्षण कार्यक्रम के लिए लगभग 30 लाख रुपये आवंटित किए गए हैं

6.0 निष्कर्ष

औद्योगीकरण के बिना कोई विकास नहीं है। लेकिन यह पर्यावरण संरक्षण के साथ-साथ चलना चाहिए। की प्रस्तावित परियोजना पर्यावरण को स्वच्छ और हरा-भरा रखने के लिए सभी एहतियाती कदम उठाएगी या इसे और बेहतर बनाने के लिए कदम उठाएगी।

****

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXURE

LIST OF ABBREVIATIONS

AAQ	:	AMBIENT AIR QUALITY
AAQM	:	AMBIENT AIR QUALITY MONITORING STATION
AAS	:	ATOMIC ABSORPTION SPECTROPHOTOMETER
AC	:	AIR CONDITIONER
ADM	:	ADDITIONAL DISTRICT MAGISTRATE
AM	:	ANTE MERIDIEM
ANVT	:	ANAND VIHAR TERMINAL
AOI	:	AREA OF INTEREST
AP	:	AIR POLLUTION
APHA	:	AMERICAN PUBLIC HEALTH ASSOCIATION
APPROX	:	APPROXIMATELY
AQ	:	AIR QUALITY
AQ	:	AIR QUALITY
AQI	:	AIR QUALITY INDEX
AR	:	ANALYTICAL REAGENT

ARMET	:	A METEOROLOGICAL DATA PREPROCESSOR
ASASSSA	:	AMERICAN SOCIETY FOR AGRONOMY AND SOIL SCIENCE SOCIETY AMERICA
ASR	:	AMRITSAR JUNCTION RAILWAY STATION
ASTPL	:	APLINKA SOLUTIONS & TECHNOLOGIES PRIVATE LIMITED
AWS	:	AUTOMATIC WEATHER STATION
BDTS	:	BANDRA TERMINUS RAILWAY STATION
BGL	:	BELOW GROUND LEVEL
BIA	:	BIOLOGICAL IMPACT ASSESSMENT
BIS	:	BUREAU OF INDIAN STANDARDS
BIS	:	BUREAU OF INDIAN STANDARDS
BMTPC	:	BUILDING MATERIAL TECHNOLOGY PROMOTION COUNCIL
BOD	:	BIOLOGICAL OXYGEN DEMAND
BSF	:	BORDER SECURITY FORCE
C & D WASTE	:	CONSTRUCTION & DEMOLITION WASTE
CAAQMS	:	CONTINUOUS AMBIENT AIR MONITORING SYSTEM
CAPA	:	CORRECTION ACTION AND PREVENTIVE ACTION PLAN
CBA	:	COST BENEFIT ANALYSIS
CBH	:	CIRCUMFERENCE AT BREAST HEIGHT
CEAR	:	CENTRAL ELECTRICITY AUTHORITY
CEC	:	CATION-EXCHANGE CAPACITY
CER	:	CORPORATE ENVIRONMENTAL RESPONSIBILITY
CETP	:	COMBINED EFFLUENT TREATMENT PLANT
CFL	:	COMPACT FLUORESCENT LIGHT/
CHWMF	:	COMMON HAZARDOUS WASTE MANAGEMENT FACILITY
CI	:	CAST IRON
CIA	:	CENTRAL INTELLIGENCE AGENCY
CNB	:	KANPUR CENTRAL RAILWAY STATION
CO	:	OXIDES OF CARBON
COD	:	CHEMICAL OXYGEN DEMAND
COVID	:	CORONA VIRUS DISEASE
CPCB	:	CENTRAL POLLUTION CONTROL BOARD
CPHEEO	:	CENTRAL PUBLIC HEALTH AND ENVIRONMENTAL ENGINEERING ORGANIZATION
CR	:	CRITICALLY ENDANGERED
CRZ	:	COASTAL REGULATION ZONE
CUMSEC	:	CUBIC METER PER SECOND
D/S	:	DOWN STREAM
DB	:	DECIBEL
DBH	:	DIAMETER AT BREAST HEIGHT
DC	:	DIVISIONAL COMMISSIONER
DD	:	DATA DEFICIENT
DDN	:	DEHRADUN RAILWAY STATION
DFO	:	DIVISIONAL FOREST OFFICER

DG SETS	:	DIESEL GENERATOR SET
DI	:	DUCTILE IRON
DIST	:	DISTANCE
DM	:	DISTRICT MAGISTRATE
DMP	:	DISASTER MANAGEMENT PLAN
DO	:	DISSOLVED OXYGEN
DPR	:	DETAILED PROJECT REPORT
DTM	:	DIGITAL TERRAIN MODEL
EAC	:	EXPERT APPRAISAL COMMITTEE
EBM	:	ENVIRONMENTAL BASELINE MONITORING
EC	:	ENVIRONMENTAL CLEARANCE
ECS	:	EQUIVALENT CAR SPACE
EHS	:	ENVIRONMENT HEALTH & SAFETY
EIA	:	ENVIRONMENT IMPACT ASSESSMENT
ELSR	:	ELEVATED RESERVOIR
EMC	:	ENVIRONMENT MANAGEMENT CELL
EMP	:	ENVIRONMENT MANAGEMENT PLAN
EMS	:	ENVIRONMENT MANAGEMENT SYSTEM
EN	:	ENDANGERED
EP ACT	:	ENVIRONMENT PROTECTION ACT
EPANET	:	THE ENVIRONMENTAL PROTECTION AGENCY NETWORK
EPZS	:	EXPORT PROCESSING ZONES
ESZ	:	ECO SENSITIVE ZONE
ETP	:	EFFLUENT TREATMENT PLANT
EW	:	EXTINCT IN WILD
EX	:	EXTINCT
FAA	:	FUNCTIONAL AREA ASSOCIATE
FAE	:	FUNCTIONAL AREA EXPERT
FCC	:	FALSE COLOR COMPOSITE
FETI	:	FIRE EXPLOSION AND TOXICITY INDEX
FPM	:	FLUORO-ELASTOMER MATERIALS
FPS	:	FINE PARTICULATE SAMPLER
GCP	:	GROUND CONTROL POINTS
GDP	:	GROSS DOMESTIC PRODUCT
GDP	:	GROSS DOMESTIC PRODUCT
GEO	:	GEOLOGY
GHF	:	GENERAL HAZARD FACTOR
GHG	:	GREEN HOUSE GASES
GHZ	:	GIGA HERTZ
GI	:	GALVANIZED IRON
GIS	:	GEOGRAPHICAL INFORMATION SYSTEM
GIZ	:	DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT (GIZ) GMBH
GKP	:	GORAKHPUR

GLC	:	GROUND LEVEL CONCENTRATION
GLS	:	GENERAL LIGHTING SERVICE
GLSR	:	GROUND LEVEL RESERVOIR
GOI	:	GOVERNMENT OF INDIA
GSR	:	GENERAL STATUTORY RULES
GST	:	GOODS AND SERVICES TAX
GW	:	GROUND WATER
GW	:	GROUND WATER
HA	:	HECTARE
HAZMAT	:	HAZARDOUS MATERIALS
HDPE	:	HIGH-DENSITY POLYETHYLENE
HG	:	HYDROLOGY, GROUND WATER & WATER CONSERVATION
HP	:	HORSE POWER
HPLC	:	HIGH PERFORMANCE (OR HIGH PRESSURE) LIQUID CHROMATOGRAPHY
HR	:	HOUR
HRQOL	:	HEALTH-RELATED QUALITY OF LIFE
HSD	:	HIGH SPEED DIESEL
HWH	:	HOWRAH JN RAILWAY STATION
IAP	:	INCIDENT ACTION PLAN
IC	:	INCIDENT COMMANDER
ICAR	:	INDIAN COUNCIL OF AGRICULTURAL RESEARCH
ICP	:	INDUCTIVELY COUPLED PLASMA
IE	:	INDUSTRIAL ESTATE
IFC	:	INTERNATIONAL FINANCE CORPORATION
IIE	:	INTEGRATED INDUSTRIAL ESTATE
IMD	:	INDIAN METEOROLOGICAL DEPARTMENT
IMO	:	INCIDENT MEDIA OFFICER
IRC	:	INDIAN ROAD CONGRESS
IRCTC	:	INDIAN RAILWAY CATERING AND TOURISM CORPORATION
IRS	:	INDIAN REMOTE SENSING SATELLITE
IRS	:	INCIDENT RESPONSE SYSTEM
IS	:	INDIAN STANDARDS
IT	:	INFORMATION & TECHNOLOGY
ITR	:	INCIDENT RESPONSE TEAM
IUCN	:	INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES
IVI	:	IMPORTANT VALUE INDEX
KG	:	KILOGRAM
KGM	:	KATHGODAM RAILWAY STATION
KL	:	KILO LITER
KLD	:	KILO LITER PER DAY
KM	:	KILOMETER
KW	:	KILO WATT
LC	:	LEAST CONCERN

LCV	:	LIGHT COMMERCIAL VEHICLE
LDO	:	LIGHT DIESEL OIL
LED	:	LIGHT EMITTING DIODE
LEQ	:	EQUIVALENT LEVEL
LIG	:	LOWER INCOME GROUP
LISS	:	LINEAR IMAGING SELF-SCANNING CENSORS
LJN	:	LUCKNOW JUNCTION RAILWAY STATION
LKU	:	LALKUAN JN
LO	:	LIAISON OFFICER
LOS	:	LEVEL OF SERVICE
LPCD	:	LITER PER CAPITA PER DAY
LPG	:	LIQUEFIED PETROLEUM GAS
LPM	:	LITER PER MINUTE
LPS	:	LITER PER SECOND
LS	:	LOGISTICS SECTION
LULC	:	LANDUSE & LANDCOVER
M/S	:	METER PER SECOND
M/S	:	METER PER SECOND
MBAS	:	METHYLENE BLUE ACTIVE SUBSTANCES ASSAY
MBGL	:	METERS BELOW GROUND LEVEL
MDR	:	MAIN DISTRICT ROAD
MF	:	MATERIAL FACTOR
MG	:	MILLIGRAM
MG/L	:	MILLIGRAM PER LITER
MLD	:	MILLION LITER PER DAY
MM	:	MILLIMETER
MM/HR	:	MILLIMETER PER HOUR
MOEF&CC	:	MINISTRY OF ENVIRONMENT , FOREST AND CLIMATE CHANGE
MOM	:	MEETING OF MINUTES
MORTH	:	MINISTRY OF ROAD TRANSPORT & HIGHWAYS
MOU	:	MEMORANDUM OF UNDERSTANDING
MPN	:	MOST PROBABLE NUMBER
MPS	:	METER PER SECOND
MSW	:	MUNICIPAL SOLID WASTE
MT	:	MILLION TON
NA	:	NOT AVAILABLE
NAAQ	:	NATIONAL AMBIENT AIR QUALITY
NAAQMS	:	NATIONAL AMBIENT AIR QUALITY MONITORING.
NABET	:	NATIONAL ACCREDITATION BOARD FOR EDUCATION & TRAINING
NBC	:	NATIONAL BUILDING CODE
NDIR	:	NON-DISPERSIVE INFRA-RED SPECTROSCOPY
NDLS	:	NEW DELHI RAILWAY STATION
NE	:	NORTH-EAST

NH	:	NATIONAL HIGHWAY
NIHL	:	NOISE INDUCED HEARING LOSS
NO	:	NODAL OFFICER
NO	:	OXIDES OF NITROGEN
NOS	:	NUMBERS
NP	:	NAGAR PALIKA
NPP	:	NAGAR PALIKA PARISHAD
NRDWP	:	NATIONAL RURAL DRINKING WATER PROGRAMME
NRSC	:	NATIONAL REMOTE SENSING CENTRE
NT	:	NEAR THREATENED
NV	:	NOISE & VIBRATION
NW	:	NORTH-WEST
O & M	:	OPERATION AND MAINTENANCE
O&M	:	OPERATION AND MAINTENANCE
O/L	:	ODORLESS
OBC	:	OTHER BACKWARD CAST
OES	:	OPTICAL EMISSION SPECTROMETRY
OHR	:	OVER HEAD RESERVOIR
OS	:	OPERATION SECTION
OSHA	:	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PAH	:	POLYCYCLIC AROMATIC HYDROCARBONS
PC	:	PERSONAL COMPUTER
PCU	:	PASSENGER CAR UNIT
PFR	:	PREFEASIBILITY REPORT
PH	:	POTENTIAL OF HYDROGEN
PHC	:	PRIMARY HEALTH CENTER
PHD	:	DOCTORATE OF PHILOSOPHY
PHED	:	PUBLIC HEALTH ENGINEERING DEPT.
PIA	:	PROJECT INFLUENCE AREA
PM	:	PARTICULATE MATTER
PM	:	POST MERIDIEM
PMC	:	PROJECT MANAGEMENT CELL
PP	:	PROJECT PROPONENT
PPE	:	PERSONAL PROTECTIVE EQUIPMENTS
PPMP	:	POST-PROJECT MONITORING PLAN
PROBES	:	PROGRAMME OBJECTIVES SERIES
PS	:	PLANNING SECTION
PSC	:	PRE-STRESSED CONCRETE
PUC	:	POLLUTION UNDER CONTROL
PVC	:	POLY VINYL CHLORIDE
PVI	:	PAVEMENT VEHICLE INTERACTION
PWD	:	PUBLIC WORKS DEPARTMENT
QCI	:	QUALITY COUNCIL OF INDIA

R & R	:	RESETTLEMENT & REHABILITATION
R&R	:	REHABILITATION & RESETTLEMENT
RA	:	RISK ASSESSMENT
RCC	:	REINFORCED CONCRETE
RDS	:	RESPIRABLE DUST SAMPLER
RDS	:	RESPIRABLE DUST SAMPLER
RF	:	RESERVE FORESTS
RF	:	REPRENSATIVE FRACTION
RFP	:	REQUEST FOR PROPOSAL
RH	:	RISK AND HAZARD
RMR	:	RAMNAGAR RAILWAY STATION
RMS	:	ROOT MEAN SQUARE
RO	:	REVERSE OSMOSIS
ROW	:	RIGHT OF WAY
RSPM	:	RESPIRABLE SUSPENDED PARTICULATE MATTER
RWH	:	RAIN WATER HARVESTING
S/N	:	SERIAL NUMBER
SAR	:	SODIUM ADSORPTION RATIO
SE	:	SOUTH EAST
SEAC	:	STATE LEVEL EXPERT APPRAISAL COMMITTEE
SEIAA	:	STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY
SEL	:	SOUND EQUIVALENT LEVEL
SEZS	:	SPECIAL ECONOMIC ZONES
SGDP	:	STATE GROSS DOMESTIC PRODUCT
SH	:	STATE HIGHWAY
SHW	:	SOLID AND HAZARDOUS WASTE
SIA	:	SOCIAL IMPACT ASSESSMENT
SIDA	:	STATE INDUSTRIAL DEVELOPMENT AUTHORITY
SIIDCUL	:	STATE INFRASTRUCTURE AND INDUSTRIAL DEVELOPMENT CORPORATION
SLM	:	SOUND LEVEL METER
SMES	:	SMALL & MEDIUM ENTERPRISES
SO	:	OXIDES OF SULPHOR
SO	:	STATUTORY ORDERS
SO	:	SAFETY OFFICER
SOI	:	SURVEY OF INDIA
SOP	:	STANDARD OPERATING PROCEDURE
SPCB	:	STATE POLLUTION CONTROL BOARD
SPH	:	SPECIAL PROCESS HAZARD FACTOR
SPL	:	SOUND PRESSURE LEVEL
SPM	:	SUSPENDED PARTICULATE MATTER
SQ	:	SOIL QUALITY
SQM	:	SQUARE METER
SRO	:	STATUTORY RULES AND ORDERS

SSB	:	SEEMA SURAKSHYA BAL
SSW	:	SOUTH SOUTH WEST
STP	:	STANDARD TESTING PROCEDURE
SW	:	SURFACE WATER
SW	:	SOUTH WEST
SW	:	SURFACE WATER
SWIR	:	SHORT WAVE INFRARED
TAL	:	TARAI ARC LANDSCAPE
TDS	:	TOTAL DISSOLVED SOLID
THC	:	TETRA HYDRO CANNABINOL
TLV	:	THRESHOLD LIMIT VALUE
TOR	:	TERMS OF REFERENCE
TPA	:	TON PER ANNUM
U/S	:	UP STREAM
UEPCB	:	UTTARAKHAND ENVIRONMENT PROTECTION AND POLLUTION CONTROL BOARD
UGR	:	UNDERGROUND RESERVOIR
UGT	:	UNDERGROUND TANK
UKFD	:	UTTARAKHAND FOREST DEVELOPMENT CORPORATION
UNDP	:	UNITED NATION DEVELOPMENT PROGRAMME
UP	:	UTTAR PRADESH
UPCL	:	UTTARAKHAND POWER CORPORATION LIMITED
USEPA	:	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
USP	:	UNIQUE SELLING POINT
UT	:	UTILITARIAN AREA
VU	:	VULNERABLE
WEF	:	WITH EFFECT FROM
WHO	:	WORLD HEALTH ORGANIZATION
WII	:	WILDLIFE INSTITUTE OF INDIA
WLA	:	WILDLIFE PROTECTION ACT
WLS	:	WILDLIFE SANCTUARY
WP	:	WATER POLLUTION
ZSL	:	ZOOLOGICAL SOCIETY OF LONDON

CHAPTER- I
INTRODUCTION

1.0 Introduction:

Manufacturing is one of the most important sectors and accounts for 78 percent of total production. The biggest segments within Manufacturing are: basic metals (13 percent of total production); coke and refined petroleum products (12 percent); chemicals and chemical products (8 percent); food products (5 percent); pharmaceuticals, medicinal chemical and botanical products (5 percent); motor vehicles, trailers and semi-trailers (5 percent); machinery and equipment n.e.c. (5 percent); other non-metallic mineral products (4 percent); and textiles, electrical equipment and fabricated metal products (3 percent each). Mining accounts for 14 percent of total output; and electricity accounts for 8 percent. Industrial production in India rose 13.6 percent year-on-year in June of 2021, slightly above market expectations of 13.5 percent. Manufacturing production advanced 13 percent, led by basic metals (24 percent), coke and refined petroleum products (5.4 percent) and motor vehicles, trailers and semi-trailers (61.5 percent). Also, output rose for mining (23.1 percent) and electricity (8.3 percent). Source: *Ministry of Statistics and Programme Implementation (MOSPI).*

SIIDCUL, which is a Government of Uttarakhand Enterprise, was incorporated as a Limited Company in the year 2002 with an authorized share capital of Rs. 50 Crores by Government of Uttarakhand. It was established primarily with an objective of providing overall industrial development of the state by developing necessary infrastructure and industrial in the state of Uttarakhand directly or through special purpose vehicles, investments assisted companies etc.

SIIDCUL is committed towards 'Ease of Doing Business' by providing an investor-friendly & transparent mechanism which completely eliminates any physical touch point. A fully automated land allotment process through single window clearance system and the*eservicessiidcul.com* application has been to bring in speed and accountability to the land allotment process and other processes of SIIDCUL. GIS has also been incorporated within the *eservicessiidcul.com* application providing plot status and availability as well as the provisions of infrastructure like road connectivity, water connection, electricity infrastructure and sewerage connection etc of all the industrial estates in an interactive representation equipping investors with reliable information to take informed decisions.

1.1 Purpose of the report: The present draft EIA Report is being prepared for public hearing and the final EIA incorporating the issues raised by the public; action proposed to close or minimize them along with budget and timeline will be submitted to SEIAA for securing the environmental clearance for proposed industrial estate. The present project is to develop an industrial estate near its existing industrial estate at Khsara No: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28; 29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47; 48; 49; 50; 51; 52; 55; 56; 57;

58; 59; 60; 66; 67; 68; 69; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88; 89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107; 122; 122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156; 157; 158; 159; 161; 162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153 at Village – Bara, Prahlad Palsia, Kalyanpur; Tehsil: - Sitarganj; District:- Udhamsingh Nagar; State :- Uttarakhand; India. (*Refer Figure 1.1 Location Map on a Regional level*) EIA is one of the main legislative tools recognized to reduce an anthropogenic impact on the environment. EIA can be defined as "a process by which information about the environmental effects of a proposed project is collected, both by the developer and from other sources, and taken into account by the relevant decision-making body before a decision is given on whether the development should go ahead or the project should be scrapped off." The purpose of EIA is to ensure that the environmental effects of a proposed development are fully considered, together with its economic or social benefits. This should be considered before the planning application would be determined. EIA is thus an anticipatory, participatory environmental management tool. (*Source: D. Komínková, "Environmental impact assessment and application—part 1," in Encyclopedia of Ecology, J. S. Erik and F. Brian, Eds., Academic Press, Oxford, UK, 2008*) The extensive understanding of EIA as an anticipatory environmental management tool has made a significant consideration over the extent to which it is achieving its purposes. This has been measured in terms of EIA "effectiveness," especially as discussion has moved away from issues of procedural operation to the more practical goals of EIA and its place in more comprehensive decision-making situations. (*Source: S. Jay, C. Jones, P. Slinn, and C. Wood, "Environmental impact assessment: retrospect and prospect," Environmental Impact Assessment Review, vol. 27, no. 4, pp. 287–300, 2007*)

1.2 Identification of project & project proponent: SIDCUL has equity participation from UBI, OBC and SIDBI besides the State Government . Other banks are also in the process of participating in its equity. This has led to a high degree of professionalism and autonomy in the functioning of the Corporation. The spate of concessions available for Industrial ventures in Uttarakhand along with the proactive govt. and facilitative environment has lead to more than a thousand EOI‟s with SIDCUL, which entail an investment of around Rs. 20,000 Crore. Major Industrial Infrastructure being developed by SIDCUL includes-

a) Integrated Industrial Estate at BHEL, Haridwar
b) Integrated Industrial Estate at Pantnagar
c) IT Park, Dehradun
d) Pharma City - Selaqui, Dehradun
e) Growth Centre at Pauri
f) Integrated Industrial Estate at Sitarganj

The facilities in Integrated Industrial Estates include dedicated 220 KV Substation with a string of feeder substations, Common Effluent Treatment Plants, 60 meter roads, All modes of connectivity, logistic centers, zonal distribution of Industries, residential and commercial areas. The maintenance of these Estates would be looked after by reputed O & M

Contractors. Specialized Theme Parks are also contemplated within these Estates so as to garner all benefits of a cluster based development.

Project Details:

Name of the Project : IIE Sitarganj Part II (B)

Location : Khsara No: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28;29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47; 48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68; 69; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88; 89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107; 122; 122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156; 157; 158; 159; 161; 162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153
At Village – Bara, Prahlad Palsia, Kalyanpur.

Tehsil : Sitarganj

District : Udhamsingh Nagar, Uttarakhand; India

Land Area : 29, 15,600 sq. m (291.56 hectares)

Project Proponent Details:

Name and Address of the Project Proponent:

Name : Mr. Rohit Meena

Address : SIIDCUL, 29, IIE Sahastradhara Road, (IT Park), Dehradun.

Phone No. : 0135- 2607292, 2708100,

Pin code : 248001

1.3 Salient features of the project: The salient features of the proposed industrial estate can be summarized in the following table 1.1 – Salient features.

Table 1.1 – Salient features

Items	Details
Proponent Name	State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. (SIIDCUL)
Location	Khsara No: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28; 29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47;48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68; 69; 71;72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88;89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107; 122; 122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156; 157; 158; 159; 161;162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153 at Village – Bara, Prahlad Palsia, Kalyanpur. Tehsil :- Sitarganj; District:- Udhamsingh Nagar; State :- Uttarakhand; India
Latitude	29° 0'12.04“ North
Longitude	79°41'0.67"East
Project area	291.56 ha (720.47 acre)
Land use	Industrial
Green Area	44.49Ha (15.26%)
Road & parking	44.61 Ha (15.30%)
Nearest Habitat/Town	Sitarganj; 6.1km; S
Nearest Railways Station	Lalkua Junction Railway Station (16.6 km towards NW direction)
Nearest Airport	Pantnagar Airport at Phoolbagh (18.8 km towards NW direction)
Nearest Highway	NH-125–7.2Km towards S Direction
Education Facility	Primary Govt. School 370m; W, Govt. Girls Inter college Shaktifarm1.8km; W
Water Demand and Supply source	During construction phase 0.540 MLD water will be required the same will be met through existing CETP. The total water requirement in operation phase will be approx. 11 MLD. Fresh water (7 MLD) will be obtained from ground water. Rest will be met via CETP treated wastewater (4 MLD).
Seismic Zone	Zone –IV (As per BMTPC)

Proposed Production process	Industries such as Brewery, Bottling and food processing units; Mixed Food products; Auto Industries; Auto components; packaging; Light engineering etc.
Estimated Project Cost	Rs. 130.96/- Crore
Ground water level	In the unconfined aquifer, the depth to water level in pre monsoon and post monsoon varies from 2.09 to 7.08 m bgl and from 1.99 to 6.89 m bgl, respectively. The seasonal fluctuation varies from 0.09 to 3.56 m *(Source: CGWA district brochure- Udhamsingh Nagar)*
Working Days	340
Man Power	4000 individuals during construction phase and 15822 individuals during operation phase.
Total Power demand and supply source	60 KW during construction phase through temp connection and 123MW electricity will be supplied by UPCL (Uttarakhand Power Corporation Limited) during operation phase.
Total Goods to be manufactured	35107 tons/day
Total Traffic to be generated (PCU)	30932
Total Waste Generation	22.5 MT/day Industrial process waste 2.75 MT/day Municipal Solid waste
Wildlife Sanctuary	None Nearest sanctuary is Nandhour Wildlife Sanctuary, 12.6 Km in NE
Eco-sensitive Zone	ESZ of Nandhour Wildlife Sanctuary is 6.6 Km in NE
Begul River	50 meter (adjacent to Project site)
CETP Capacity	12 MLD

(Source: Detailed Project Report)

1.4Brief description of nature, size, location of the project and its importance to the country, region:

SIIDCUL aims to bring Uttarakhand to the forefront of industrial progress and push the state to be the most industrially developed state in the country and contribute towards holistic development of India as a whole. Apart from this, the project will generate direct and indirect employment opportunities in the nearby villages. Increased employment generation will improve the socio-economic status of society. Also, the management will conduct medical camps at regular intervals in the nearby villages and will help the nearby villages in providing infrastructure like school furniture, water tankers, etc.

1.4.1 Nature:

The project will comprise development of industrial estate in an area of 291.56 ha (720.47 acre). It will involve development of industrial plots along with primary infrastructure for water, transportation and electricity. The facilities in Integrated Industrial Estates include dedicated Substation with a string of feeder substations, Common Effluent Treatment Plants, connectivity, logistic centers, zone wise distribution of Industries, residential and commercial areas. The maintenance of these estates would be looked after by reputed O & M Contractors. The industrial units may include B category industries as per the EIA Notification, 2006 as amended thereof.

Applicability of Environmental clearance

The area of the proposed integrated industrial estate (Phase-II) at Sitarganj is 291.56 hectares (720.47acre). The project is less than 500 hectares but will comprise CETP. Also, B category heterogeneous industries are expected to be housed in the IE. Thus, as per schedule of EIA notification, 2006 as amended thereof the project falls in Category "B", under schedule 7 (c). Separate Environment Clearance will be obtained by each industrial units to be established in the proposed IIE, if applicable as per EIA notification 2006, and amendments thereof. Site has been allotted to SIIDCUL for development of Integrated Industrial Estate and marked for industrial development by Chief Secretary, Government of Uttarakhand vide letter no. 2069/XX (4)-231/Kara-03/2006 dated 03.06.2006.

Type of Industries: - The project is in the planning stage now. It is anticipated that only B category Industries (Brewery Bottling and food processing, Auto Industry and Light engineering works)as per the EIA Notification, dated 14th September, 2006 will be developed here.

1.4.2 Size & Location of the project: The proposed industrial estate project site is situated at Khsara No: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28; 29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47; 48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68; 69; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88; 89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107; 122; 122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156; 157; 158; 159; 161; 162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153 at Village – Bara, Prahlad Palsia, Kalyanpur; Tehsil :- Sitarganj; District:- Udhamsingh Nagar; State :- Uttarakhand; India. The project site is connected to Sitarganj town by a state road, which is 2 lane wide.

Site coordinates: 29° 0'12.04"North, 79°41'0.67"East

Other coordinates:
South- 28°59'26.55"N 79°41'11.82"E
North- 29° 0'38.56"N 79°40'52.42"E

East- 29° 0'22.49"N 79°41'31.67"E
West- 29° 0'7.65"N 79°40'18.62"E

1.4.3 Importance to the country

The proposed industrial estate project will be offering many benefits to the country. Some of them are as follows**:**

1. Promote decentralization by preventing or checking excessive concentration in urban areas.
2. Increase the economic productive and employment base of rural as well as urban communities.
3. Regulate the inflow of industry and to guide its orderly location on the most suitable land
4. Strengthen the economic base of small and medium-sized towns
5. Provide a healthier and more attractive urban environment by separating non-industrial and industrial areas
6. Minimize distance to work and to reduce load on the transport system
7. Maximize efficient land usage and reduce the cost of land and land development
10. Achieve economies in the provision of urban services and utilities
11. Accelerate industrialization of the region & country
12. To increase national and local employment
13. To achieve a more balanced regional distribution of employment, production and consequent balanced regional growth
14. To attract private investment
15. To promote the development of small domestic-owned industries
16. To bring industries and industrial employment to rural areas
17. To induce structural changes in production and employment; especially diversification
19. To improve product quality and increase productivity
20. To train labour and increase its productivity
21. To achieve economies in investment in public infrastructure
22. To reduce the cost of capital investment to the industrialist
23. To eliminate delays for the industrialist in obtaining a suitable site utilities and buildings

1.5 Scope of the study – details of regulatory scoping carried out (As per Terms of Reference)

Scoping is an important step of environmental clearance process. Scoping refers to the process of determining detailed and comprehensive Terms of Reference (TOR)addressing all relevant environmental concerns for the preparation of an Environment Impact Assessment (EIA) Report in respect of the project or activity for which prior environmental clearance is sought. Standard TOR for IE has been developed by the MoEF & CC in consultation with the sector specific Expert Appraisal Committees.

1.5.1 Details of regulatory scoping

The proposal (Form-1; PFR along with proposed TOR) for obtaining environmental clearance for proposed industrial estate at Khsara No: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28; 29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47; 48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68; 69; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88; 89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107; 122; 122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156; 157; 158; 159; 161; 162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153 at Village – Bara, Prahlad Palsia, Kalyanpur; Tehsil: - Sitarganj; District: - Udhamsingh Nagar; State: - Uttarakhand; India was submitted online on 20th March 2021. The proposal was considered in agenda of 17th meeting of SEAC, Uttarakhand on 2nd June 2021. The above meeting was through video/telephonic conferencing, without inviting the respective P.P./Consultant physically due to COVID-19. The TOR proposal was appraised by SEAC and recommended for grant of standard TOR along with additional TOR vide SEAC MOM letter no 220/SEAC dated 14th June 2021. The State Environment Impact Assessment Authority Uttarakhand issued the TOR on the recommendation of SEAC-Uttarakhand vide letter No 221/SEAC dated 15th June 2021 for preparation of Environmental Impact Assessment Report. **(Annexure-I)**

1.5.2 Applicable Rules and regulations:

There are a number of Rules and regulations that need to be followed by a developer of any industrial estate. Some of them are as follows:

1. **EIA Notification 2006 as amended thereof:** Environmental Impact Assessment Notification, 2006 is an importantdecision-making tool for minimizing the adverse impact of developmental projects and for reversing the trends which may lead to climate change in the long run. EIA. Notification, 2006 was issued on 14th September 2006, in supersession of EIANotification, 1994.

2. **Forest (Conservation) Act, 1980:** The Forest (Conservation) Act, 1980, provides for the conservation of forests and matters connected therewith. It was further amended in 1988. This law extends to the whole of India. It was enacted by Parliament of India to control further deforestation of Forest Areas in India. The Act came into force on 25 October, 1980.

3. **Wildlife Protection Act 1972:** The Wild Life (Protection) Act, 1972 is an Act passed by the Parliament of India on August 21, 1972. This Act was enacted for the protection of plants, birds and animal species. The Act includes provisions for protection of plants and animals, hunting, and various other ancillary matters connected thereto. It has six schedules offering varying degrees of protection to wild animals.

4. **Biodiversity Act 2002:** Before the Biological diversity Act, 2000, India had several environmental legislations put to work but certainly a void existed which required the enactment of this Act in 2002. India had signed the Convention on Biological Diversity at Rio de Janeiro providing a framework and foundation for sustainable development and preservation of its biodiversity with a lot of focus on natural resources.

5. **Environment (Protection) Act, 1986:** Environment Protection Act, 1986 Act of the Parliament of India. In the wake of the Bhopal gas Tragedy or Bhopal Disaster, the [Government of India] enacted the Environment Protection Act of 1986 under Article 253 of the Constitution. Passed in May 1986, it came into force on 19 November 1986. It has 26 sections and 4 chapters. The purpose of the Act is to implement the decisions of the United Nations Conference on the Human Environment. They relate to the protection and improvement of the human environment and the prevention of hazards to human beings, other living creatures, plants and property. The Act is an "umbrella" legislation designed to provide a framework for central government coordination of the activities of various central and state authorities established under previous laws, such as the Water Act and the Air Act.

6. **The Environment (Protection) Rules, 1986:** The environment protection rules were issued on in exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1906 (29 of 1986). It describes the mechanism for implementation of the rules of the Act by providing information on the:
   - Standards for emissions or discharge of environmental pollutants
   - The mode in which directions can be issued
   - Prohibitions and restrictions on the location of industries and the carrying on processes and operations in different areas
   - Procedure for taking samples for testing
   - Service of notice to the occupier or his/her agent
   - Procedure for submission of samples for analysis, and the form of laboratory report
   - Functions of environmental laboratories
   - Qualification of the government analyst
   - Manner of giving notice
   - Furnishing of information to authorities and agencies in certain cases
   - Prohibition and restriction on the handling of hazardous substances in different areas
   - Submission of environmental statement

7. **Water (Prevention and Control of Pollution) Act, 1974, and as amended:** The Water (Prevention and Control of Pollution) Act was enacted in 1974 to provide for the prevention and control of water pollution, and for the maintaining or restoring of

wholesomeness of water in the country. The Act was amended in 1988. The Act was last amended in 2003.

8. **The Water (Prevention and Control of Pollution) Rules, 1975:** These rules may be called the Water (Prevention and Control of Pollution) Rules, 1975. It describes the mechanism for implementation of the rules of the Water (Prevention and Control of Pollution) Act.

9. **Air (Prevention and Control of Pollution) Act, 1981:** An Act to provide for the prevention, control and abatement of air pollution, for the establishment, with a view to carrying out the aforesaid purposes, of Boards, for conferring on and assigning to such Boards powers and functions relating thereto and for matters connected therewith.

10. **The Air (Prevention and Control of Pollution) Rules, 1982:** The present Rules provide for the Central Board activities, legal and administrative procedures, for annual reporting, fees to be paid to members, transaction of business and other related issues. Included in the Rules are forms for the Board Budget estimation, single item budgeting, personnel wages, annual financial report and annual expenditure.

11. **Noise Pollution (Regulation and Control) Rules, 2000:** In order to avoid noise pollution all territory shall be classified in industrial, commercial, residential or silence areas/zones the noise levels in any area/zone shall not exceed noise standards in terms of air quality; the use of amplifiers and loudspeakers is restricted to certain facilities. Annexed Schedules details air quality standards for noise emission in the various areas.

12. **The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996:** An Act to regulate the employment and conditions of service of building and other construction workers and to provide for their safety, health and welfare measures and for other matters connected therewith or incidental thereto.

13. **Construction and Demolition Waste Management Rules, 2016:** The construction and demolition waste generated is about 530 million tons annually. The Ministry of Environment, Forest and Climate Change notified the Construction & Demolition Waste Management Rules, 2016 on 29 March 2016. The rules are an initiative to effectively tackle the issues of pollution and waste management.

14. **Hazardous and Other Wastes (Management and Handling) Rules, 2016:** Hazardous waste means any waste, which by reason of characteristics, such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger to health, or environment. It comprises the waste generated during the manufacturing processes of the commercial products such as industries involved in petroleum refining, production of pharmaceuticals, petroleum, paint, aluminum, electronic products etc. As per the information furnished by Central Pollution Control Board (CPCB) in the year 2015, the

total hazardous waste generation in the country is 7.46 million metric tons per annum from about 44,000 industries. For the first time, Rules have been made to distinguish between Hazardous Waste and other wastes. Other wastes include: Waste type, paper waste, metal scrap, used electronic items, etc. and are recognized as a resource for recycling and reuse. These resources supplement the industrial processes and reduce the load on the virgin resource of the country.

15. **Wetland (Conservation and Management) Rules 2017:** The new rules, notified by the environment ministry, decentralize wetlands management by giving states powers to not only identify and notify wetlands within their jurisdictions but also keep a watch on prohibited activities.

16. **Public Liability Insurance Act, 1991, as amended:** An Act to provide for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto.

17. **Notification for use of Fly Ash - 2009:** Fly Ash Notification 2009 was issued to get rid of problem of fly ash disposal. It has been made mandatory to use certain percentages of fly ash in constructions activities.

18. **Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996:** The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996. (1) These rules may be called the Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996. (2) They shall come into force on the date of their publication in the Official Gazette.

19. **Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 2000:**The regulation was firstly enacted in 1989 by the Ministry of Environment & Forests (MoEF) and later amended in 1994 and 2000. It regulates the manufacture, storage and import of hazardous chemicals in India. The transport of hazardous chemicals must meet the provisions of the Motor Vehicles Act, 1988.

20. **Solid Waste Management Rules, 2016:** With the ever increasing population and urbanization, waste management has emerged as a huge challenge in the country. Not only has the waste increased in quantity, but the characteristics of waste have also changed tremendously over a period, with the introduction of so many new gadgets and equipment. It is estimated that about 62 million tons of waste is generated annually in the country, out of which 5.6 million is plastic waste, 0.17 million is biomedical waste. In addition, hazardous waste generation is 7.90 million TPA and 15 lakh tones is e-waste. The per capita waste generation in Indian cities range from 200 grams to 600 grams per

day (2011). 43 million TPA is collected, 11.9 million is treated and 31 million is dumped in landfill sites.

The salient features of the Solid Waste Management Rules, 2016 are

- The Rules are now applicable beyond Municipal areas and extend to urban agglomerations, census towns, notified industrial townships, areas under the control of Indian Railways, airports, airbase, Port and harbor, defense establishments, special economic zones, State and Central government organizations, places of pilgrims, religious & historical importance.
- The source segregation of waste has been mandated to channelize the waste to wealth by recovery, reuse and recycle.
- Responsibilities of Generators have been introduced to segregate waste in to three streams, Wet (Biodegradable), Dry (Plastic, Paper, metal, wood, etc.) and domestic hazardous wastes (diapers, napkins, empty containers of cleaning agents, mosquito repellents, etc.) and handover segregated wastes to authorized rag-pickers or waste collectors or local bodies.
- Integration of waste pickers/ rag pickers and waste dealers/ Kabadiwalas in the formal system should be done by State Governments, and Self Help Group, or any other group to be formed.
- All Resident Welfare and market Associations, Gated communities and institution with an area >5,000 sq. m should segregate waste at source- in to valuable dry waste like plastic, tin, glass, paper, etc. and handover recyclable material to either the authorized waste pickers or the authorized recyclers, or to the urban local body.
- The bio-degradable waste should be processed, treated and disposed of through composting or bio-methanation within the premises as far as possible. The residual waste shall be given to the waste collectors or agency as directed by the local authority.
- The bio-degradable waste should be processed, treated and disposed of through composting or bio-methanation within the premises as far as possible. The residual waste shall be given to the waste collectors or agency as directed by the local authority.
- New townships and Group Housing Societies have been made responsible to develop in-house waste handling, and processing arrangements for bio-degradable waste.
- Every street vendor should keep suitable containers for storage of waste generated during the course of his activity such as food waste, disposable plates, cups, cans, wrappers, coconut shells, leftover food, vegetables, fruits etc. and deposit such waste at waste storage depot or container or vehicle as notified by the local authority.
- The developers of Special Economic Zone, industrial estate, industrial park to earmark at least 5% of the total area of the plot or minimum 5 plots/ sheds for recovery and recycling facility.

21. **Petroleum Rules, 2002:** This Rule provides the guidelines, methods and procedures for handling petroleum rules 2002.
22. **Workmen's Compensation Act 1923:** The workmen's compensation act, 1923, is a type of social security legislation. The compensation is paid in event of an accident or injury (including some occupational disease) that arises out of or during the employment and that results in total or partial disablement or demise of the worker.
23. **Contract Labour (Regulation and Abolition) Act, 1970:** An Act to regulate the employment of contract labour in certain establishments and to provide for its abolition in certain circumstances and for matters connected therewith.
24. **Minimum Wages Act, 1948:** To ensure a secure and adequate living wage for all laborers in the interest of the public. To ensure that the employee has enough to provide for his family. Ensuring a decent life standard that pertains to the social comfort of the employee.
25. **Payment of Wages Act, 1936:** The main objective of the act is to ensure regular and prompt payment of wages and to prevent unauthorized deductions and arbitrary fines from the wages. It also regulates the rate of payment for overtime work.
26. **Equal Remuneration Act, 1979:** An Act to provide for the payment of equal remuneration to men and women workers and for the prevention of discrimination, on the ground of sex, against women in the matter of employment and for matters connected therewith or incidental thereto.
27. **Child Labour (Prohibition and Regulation) Act, 1986:** An Act to prohibit the engagement of children in certain employments and to regulate the conditions of work of children in certain other employments. This Act may be called the Child Labour (Prohibition and Regulation) Act, 1986. It extends to the whole of India.
28. **Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979:** An Act to regulate the employment of inter-State migrant workmen and to provide for their conditions of service and for matters connected therewith. This Act may be called the Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979. It extends to the whole of India.

1.5.3 Structure of Report

The structure of the EIA is as per the generic structure given in the Appendix – III of EIA Notification, 2006 as amended thereof and Technical Guidance Manual for Industrial Estate by IL&FS Ecosmart Ltd. The contents of the chapters are as follows.

1. **Chapter-I 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 and region; Scope of the study, details of regulatory scoping carried out (As per Terms of Reference), applicable Acts and Rules.

2. **Chapter-II Project Description:** Condensed description of aspects of the project (based on project feasibility study) likely to cause environmental impacts such as:

a. Type of project.

b. Need for the project

c. Location (maps showing general location, specific location, project boundary & project site layout)

d. Size or magnitude of operation including associated activities required by or for the project

e. Proposed schedule for approval and implementation

f. Technology and process description

g. Project description. Including drawings showing project layout, components of project etc. Schematic representations of the feasibility drawings which give information important for EIA purpose.

h. Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions or other EIA requirements (as required in the scope)

i. Assessment of New & untested technology for the risk of technological failure

3. **Chapter-III Description of the Environment:** Study area, period, components & methodology; Establishment of baseline for valued environmental components, as identified in the scope and Base maps of all environmental components.
4. **Chapter-IV Anticipated Environmental Impacts & Mitigation Measures:** Details of investigated Environmental impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project; Measures for minimizing and/ or offsetting adverse impacts identified; Irreversible and Irretrievable commitments of environmental components and assessment of significance of impacts (Criteria for determining significance, Assigning significance).
5. **Chapter-V Analysis of Alternatives (Technology & Site):** In case, the scoping exercise results in need for alternatives - Description of each alternative; Summary of adverse impacts of each alternative; Mitigation measures proposed for each alternative and selection of alternative.
6. **Chapter-VI Environmental Monitoring Program:** Technical aspects of monitoring the effectiveness of mitigation measures including methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules).
7. **Chapter-VII Additional Studies:** Public Consultation; Risk assessment and Social Impact Assessment. R&R Action Plans.
8. **Chapter-VIII Project Benefits:** Improvements in the physical infrastructure; Improvements in the social infrastructure; Employment potential –skilled; semi-skilled and unskilled and other tangible benefits.

9. **Chapter-IX Environmental Cost Benefit Analysis:** Only if recommended at the Scoping stage.
10. **Chapter-X EMP: Plan for implementation of mitigation measures based on impact assessment carried out.** Organizational structure and resulting cost is also included.
11. **Chapter-XI Summary & Conclusion:** Overall justification for implementation of the project; Summary of adverse effects of the project and project benefits.
12. **Chapter-XII Disclosure of Consultants engaged:** The names of the Consultants engaged with their brief resume and nature of Consultancy rendered.

Considering the above points, an EIA report has been prepared along with the Environment Management Plan (EMP) for various environmental components, which may affect due to the proposed mine. The risk assessment and disaster management plan have also been prepared to meet the eventualities during the operation phase.

An Environment Consultant, "Aplinka Solutions & Technologies Pvt. Ltd (ASTPL)" is appointed by project proponent for assessment of probable Environment Impacts, preparation of EIA Report and presentation of project in the concerned Committee & Authority. ASTPL is accredited Environment Consultant from NATIONAL ACCREDITATION BOARD FOR EDUCATION &TRAINING-Quality Council of India (QCI) and is eligible for preparation & presentation of projects in the Committee/Authority. **(Refer Annexure-II)** Lab monitoring & analysis of physical environment components has been done by NABL and MoEF& CC accredited "NOIDA TESTING LABORATORY". Baseline study was conducted during December, 2020 to February, 2021.

1.6 Compliance to TOR Conditions: The compliance to the TOR conditions approved by the SEIAA Uttarakhand vide letter No 221/SEAC dated 15th June 2021 for preparation of Environmental Impact Assessment Report is as follows.

S. No	TOR points as per letter No 221/SEAC dated 15th June 2021	Reply	References
1	Reasons for selecting the site with details of alternate sites examined/rejected/selected on merit with comparative statement and reason/basis for selection. The examination should justify site suitability in terms of environmental damage, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site,	The project site has been allocated to SIIDCUL by the Govt of Uttarakhand for the development of industrial estate. and one existing industrial estate is already functional adjacent to proposed industrial estate, The site suitability has been analyzed with reference to weightage criteria and detailed out in **chapter - IV**	Section - 4.5.8; Chapter-IV
2	Submit the details of the land use break-up for the proposed project. Details of land use around 10 km radius of the project site. Analysis should be made based on the latest satellite imagery for land use with raw images. Check on the flood plain of any river.	The details of the land use break-up for the proposed industrial estate project and analysis of landuse based on latest satellite imageries for 10 Km radius is described in chapter -III. The contour and drainage details involving the check on the floodplain of the river is given in chapter -III.	Section-3.5; Chapter-III Section-3.4; Chapter-III

3	Submit details of environmentally sensitive places, land acquisition status. Rehabilitation of communities/villages and present status of such activities	The details of environmentally sensitive places have been given in chapter-III. The land acquisition status; Rehabilitation of communities/villages have been detailed out in chapter-II.	Table 3.2; Chapter-III Section-7.10 Chapter-VII Section-2.1.4 Chapter-II
4	Examine the impact of proposed project on the nearest settlements	The impact of proposed project on the nearest settlements is detailed out in chapter- IV	Section-4.4.8 Chapter-IV
5	Examine baseline environmental quality along with projected incremental load due to the project taking into account the existing developments nearby.	The baseline environmental quality has been described in chapter-III and the projected incremental load due the proposed industrial estate project and the existing nearby development is given in chapter-IV.	Section-3.1 to Section 3.9 Chapter-III Section-4.2 to section 4.5 Chapter-IV
6	Environmental data to be considered in relation to the project development would be	The environmental data considered for the proposed industrial estate development includes the following and described in chapter-III	Chapter-III
a	land,	Land Environment has been described in chapter-III & chapter-II	Section-3.5; Chapter-III
b	groundwater	Ground water Environment has been described in chapter-III	Section-3.4; Chapter-III
c	surface water	Surface Environment has been described in chapter-III	Section-3.4; Chapter-III
d	air	Air Environment has been described in chapter-III & chapter-IV	Section-3.2; Chapter-III
e	biodiversity	Biological Environment has been described in chapter-III & chapter-IV	Section-3.8; Chapter-III

f	noise and vibrations	Noise and Vibration Environment has been described in chapter-III & chapter-II	Section-3.3; Chapter-III
g	socio economic and health	Socio-economic Environment including health has been described in chapter-III & chapter-IV	Section-3.7; Chapter-III
7	Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area, and any obstruction of the same by the project.	The copy of the contour plan with slopes, drainage pattern of the site and surrounding area, and any obstruction of the same by the project has been detailed out in chapter-II	Section-2.2; Chapter-II
8	Details regarding project boundary passing through any eco- sensitive area and within 10 km from eco-sensitive area.	The eco- sensitive area and within 10 km radius is detailed out in chapter-III.	Table 3.2; Chapter-III
9	Green buffer in the form of green belt to a width of 15 meters should be provided all along the periphery of the industrial area. The individual units should keep 33% of the allotted area as a green area.	Green buffers having a width of 15 meters have been provided all along the periphery of the industrial area and the details of the same is given in chapter - II along commitment to put a condition for individual units to keep 33% of the allotted area as a green area	Section - 2.2.11; Chapter-II
10	Submit the details of the trees to be felled for the project,	Details of the trees to be felled for the proposed industrial estate project is given in chapter- II	Section - 2.2.11; Chapter-II
11	Submit the details of the Infrastructure to be developed.	The details of the industrial Infrastructure like (road; drainage; sever fresh and treated water supply) have been given in chapter II.	Section - 2.2.11; Chapter-II
12	Submit the present land use and permission required for any conversion such as forest. Agriculture etc.	The details of present landuse of proposed industrial estate is given in chapter-II and govt order regarding the same is attached as **Annexure-III**	Section - 2.1.4; Chapter-II

13	Submit details regarding R&R involved in the project	No person is residing in the area identified for proposed industrial estate development, all the land are in possession of SIIDCUL; hence R & R is not required.	Section 7.10 Chapter-VII
14	Zoning of the area in terms of 'type of industries' coming-up in the industrial area based on the resource requirement along with likely pollutants with quantity from the various industries	Zoning of the proposed industrial area in terms of 'type of industries' based on the resource requirement (like Road; Water; Manpower; Electricity etc) have been detailed out in chapter-II. The expected pollutants and their quantities are detailed out in chapter IV.	Section 2.2 Chapter-II Table 4.6, Chapter-IV
15	The project boundary area and study area for which the baseline data is generated should be indicated through a suitable map. Justification of the parameters, frequency and locations shall be discussed in the EIA.	Various thematic maps based on SOI open series maps for generation of baseline data have been prepared using Arc GIS and the same has been used to justify the locations; parameters and frequency in chapter III.	Section-3.2; 3.3 & 3.4 Chapter-III
16	Submit Legal framework for the implementation of Environmental Clearance conditions - to be clearly spelt out in the EIA report.	The legal framework for the implementation of conditions of environmental clearance is detailed out in chapter X.	Section-10.4.3 Chapter-X
17	Submit Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of EP Act.	Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of EP Act has been detailed out in chapter X.	Section-10.4.1 Chapter-X
18	Site justification of the identified industry sectors from environmental angle and the details of the studies conducted if any.	Site justification of the identified industry sectors from environmental angle is given in chapter II along with the references of studies conducted on the same.	Table 4.10 Chapter-IV

19	Ground water classification as per the Central Ground Water Authority,	Ground water classification as per the Central Ground Water Authority is given in chapter III.	Section-3.4 Chapter-III
20	Submit the source of water, requirement vis-a-vis waste water to be generated along with treatment facilities, use of treated waste water along with water balance chart taking into account all forms of water use and management.	Source of fresh water requirement will be ground water; the same will be withdrawn by tubewell by SIIDCUL and will be supplied to the various industries as per their requirement. A CETP of 12 MLD capacity will be installed in the proposed industrial estate and the treated water will be supplied to the industries as per their demand. The details of the water supply scheme and CETP have been given in chapter-II.	Section-2.3 Chapter-II
21	Rain water harvesting proposals should be made with due safeguards for ground water quality. Maximize recycling of water and utilization of rainwater. Examine details	The rainwater harvesting proposal has been detailed out in chapter-II. The water level in the project site is higher than 5 Meter MBGL; hence the recharge is not possible; however the rain water will be stored in UGTs during rainy season and will be used during non rainy season.	Section-2.3.6 Chapter-II
22	Examine soil characteristics and depth of ground water table for rainwater harvesting.	The soil is sandy loam at the project site and as per geotechnical report the ground water table is 1.5 meter MBGL, hence groundwater recharge is not proposed.	Section-2.3.6 Chapter-II
23	Examine details of solid waste generation treatment and its disposal.	The expected solid waste generation details are given in chapter-II and the treatment and disposal of the same is given in chapter 10.	Section 2.2.10 Chapter - II Section 10.6.4.1 Chapter - X

24	Examine and submit details of use of solar energy and alternative sources of energy to reduce fossil energy consumption.	Details of use of solar energy and alternative sources of energy to reduce fossil energy consumption are given in chapter II.	Table 10.7 Chapter - X
25	In case DG sets are likely to be used during construction and operational phase of the project, emissions from DG sets must be taken into consideration while estimating the impacts on air environment. Examine and submit details.	The DG set are not proposed as power supply is good in Uttarakhand, however pollution from vehicle and incremental GLC have been considered for estimating the impacts on air environment. The same has been described in chapter-IV	Section – 4.2 Chapter - IV
26	Examine road rail connectivity to the project site and impact on the traffic due to the proposed project. Present and future traffic and transport facilities for the region should be analyzed with measures for preventing traffic congestion and providing a faster trouble free system to reach different destinations in the city.	The detailed traffic study involving the examination of rail; road and air connectivity, anticipated traffic due to proposed industrial estate; the present and future traffic and transport scenarios have been described in chapter-III. Measures for preventing traffic congestion and providing a faster trouble free system to reach different destinations have also been detailed out in Chapter III.	Section – 3.9 Chapter - III
27	A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.	The detailed traffic study involving existing and projected passenger and cargo traffic is detailed out in chapter-III.	Section – 3.9 Chapter - III
28	Examine the details of transport of materials for construction which should include source and availability.	The details of transport of materials for construction including source and availability are given in chapter II.	Section – 2.3.14 Chapter - II

29	Examine the details of National Highways/State Highways expressways falling along the corridor and the impact of the development on them,	The details of National Highways/State Highways expressways falling within the study area (10Km) and the impact of the development on them have been analyzed and given in chapter-III.	Section – 3.9 Chapter - III
30	Examine noise levels - present and future with noise abatement measures.	The noise levels - present and future with noise abatement measures have been described within chapter-III.	Section – 3.3.5 Chapter - III
31	Identify, predict and assess the environmental and sociological impacts on account of the project. A detailed description with cost estimates of CSR should be incorporated in the EIA EMP report.	Identification, prediction and impact assessment on environmental and social components of existing scenarios on account of proposed industrial estate is detailed out in chapter-IV. The Corporate Environmental Responsibility will be designed as per the issue raised by the public during public hearing and will be the part of Final EIA.	Section – 7.2 Chapter - VII
32	Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.	The Environmental Management Plan and Environmental Monitoring Plan with cost and parameters separately for construction and operation phases of proposed industrial estate is given in Chapter - X and Chapter VI.	Table – 10.6; 10.7 & 10.8 Chapter - X
33	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disasters.	The comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disasters has been detailed in chapter VII.	Section – 7.4 Chapter - VII

34	The Public hearing should be conducted for the project in accordance with provisions of Environmental impact Assessment Notification,, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the TOR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.	The issues raised by the public and its addressal in the Environmental Management Plan involving Corporate Environmental Responsibilities with well defined activities, timeline and budget will be part of the final Environmental Impact assessment Report. The same will be incorporated in chapter- VII.	Section – 7.2 Chapter - VII
35	A detailed draft EIA. /EMP report should be prepared in accordance with the above additional TOR and should be submitted to the Ministry in accordance with the Notification.	The detailed draft EIA. /EMP report is prepared in accordance with the standard TOR issued by the ministry and additional TOR issued by the SEIAA Uttarakhand.	Annexure-I
36	Details of litigation pending against the project. if any, with direction /order passed by any Court of Law against the Project should be given.	Litigation is pending against the proposed industrial estate project is attached as Annexure-IV.	Annexure-IV
37	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP is clearly described in Chapter - II and Chapter- X respectively.	Table – 10.6; 10.7 & 10.8 Chapter - X

38	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigation measure, project proponent can refer to the model ToR available on Ministry website "http//moef.nic.in/Manual/Industrial Estates"	The model ToR available on Ministry website “http//moef.nic.in/Manual/Industrial Estates" is also being followed while preparing this Draft EIA.	-

****

CHAPTER – II

PROJECT DESCRIPTION

2.0 Aspects of the project likely to cause environmental effects:

The proposed Industrial Area development will cause resource depletion, air emissions, wastewater generation, waste generation and landuse change. To fully understand these impacts, it is necessary to understand project features that will interact and impact the environment.

2.1 Project details: The proposed project will comprise Integrated Industrial Estate development in an area of 291.56 Ha (720.47 acre) at Sitarganj. It will involve development of industrial plots along with primary infrastructure for water, transportation and electricity. The facilities in Integrated Industrial Estates include dedicated Substation with a string of feeder substations, Common Effluent Treatment Plants, connectivity, logistic centers, zone wise distribution of Industries, residential and commercial areas.

The maintenance of these estates would be by reputed O & M Contractors. The industrial units may include B category industries as per the EIA Notification, 2006 as amended thereof. Site has been allotted to SIIDCUL for development of Integrated Industrial Estate and marked for industrial development by Chief Secretary, Government of Uttarakhand vide letter no. 2069/XX (4)-231/Kara-03/2006 dated 03.06.2006.

2.1.1 Type of Project: It is a Greenfield project and will involve the development of industrial infrastructure to cater to industrial needs.

2.1.2 Need for the Project: SIIDCUL aims to bring Uttarakhand to the forefront of industrial progress and push the state to be the most industrially developed state in the country and contribute towards holistic development of India as a whole. The project will generate direct and indirect employment opportunities in the nearby villages. Increased employment generation will improve the socio-economic status of society. Medical camps will be held at regular intervals in the nearby villages and SIIDCUL will help the nearby villages in providing infrastructure like school furniture, water tankers, etc.

2.1.3 Location of Project:

Name of the Project	:	IIE Sitarganj Part II (B)
Location	:	Khsara No: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28; 29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47; 48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68; 69; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88; 89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107; 122; 122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156; 157; 158; 159; 161; 162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153at Village – Bara, Prahlad Palsia, Kalyanpur.
Tehsil	:	Sitarganj

District : Udhamsingh Nagar, Uttarakhand; India
Land Area : 29, 15,600 sq. m (291.56 hectares)
Site Surrounding : The project site is well connected with road, rail and air service.

Sitarganj-Kathgodam Road via Chorgalia- 225m
National Highway-125 at 7.2km
National Highway-74 at 8.3km
Lalkua Junction RailwayStation–16.6km
Pantnagar Airport at Phoolbagh –18.8km

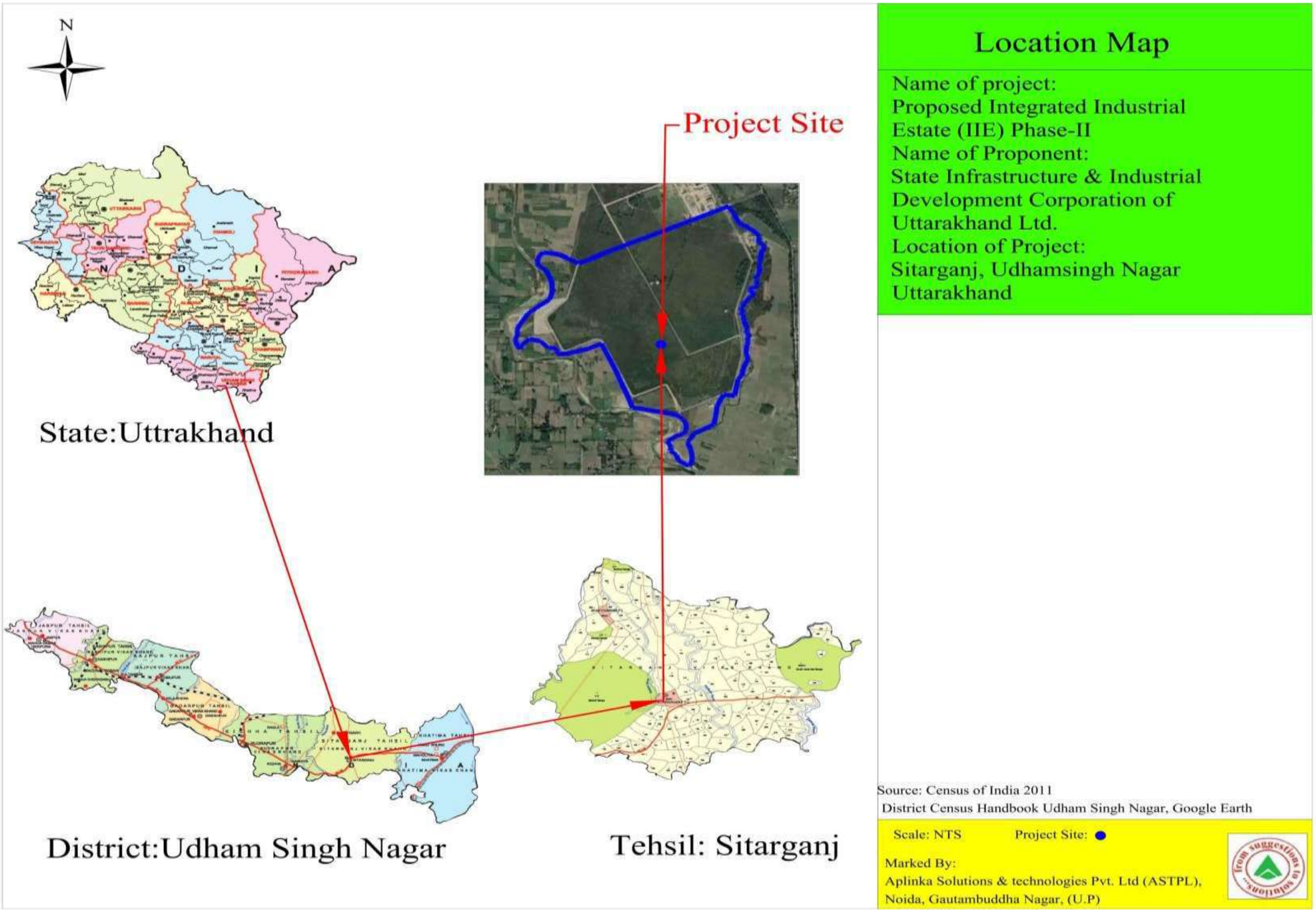


Figure 2.1: Map showing Geographical location

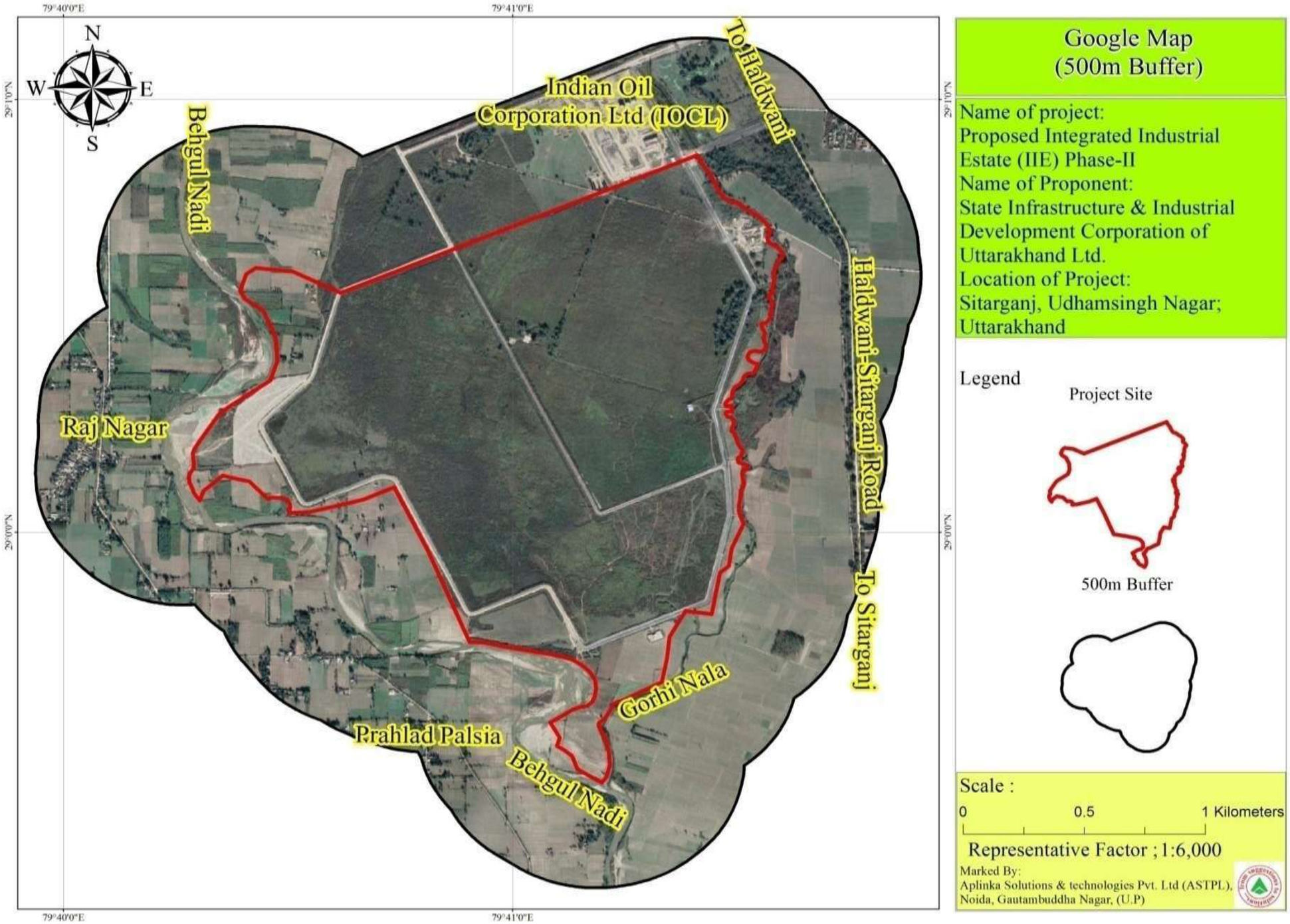


Figure 2.2 : Map showing 500 meter buffer

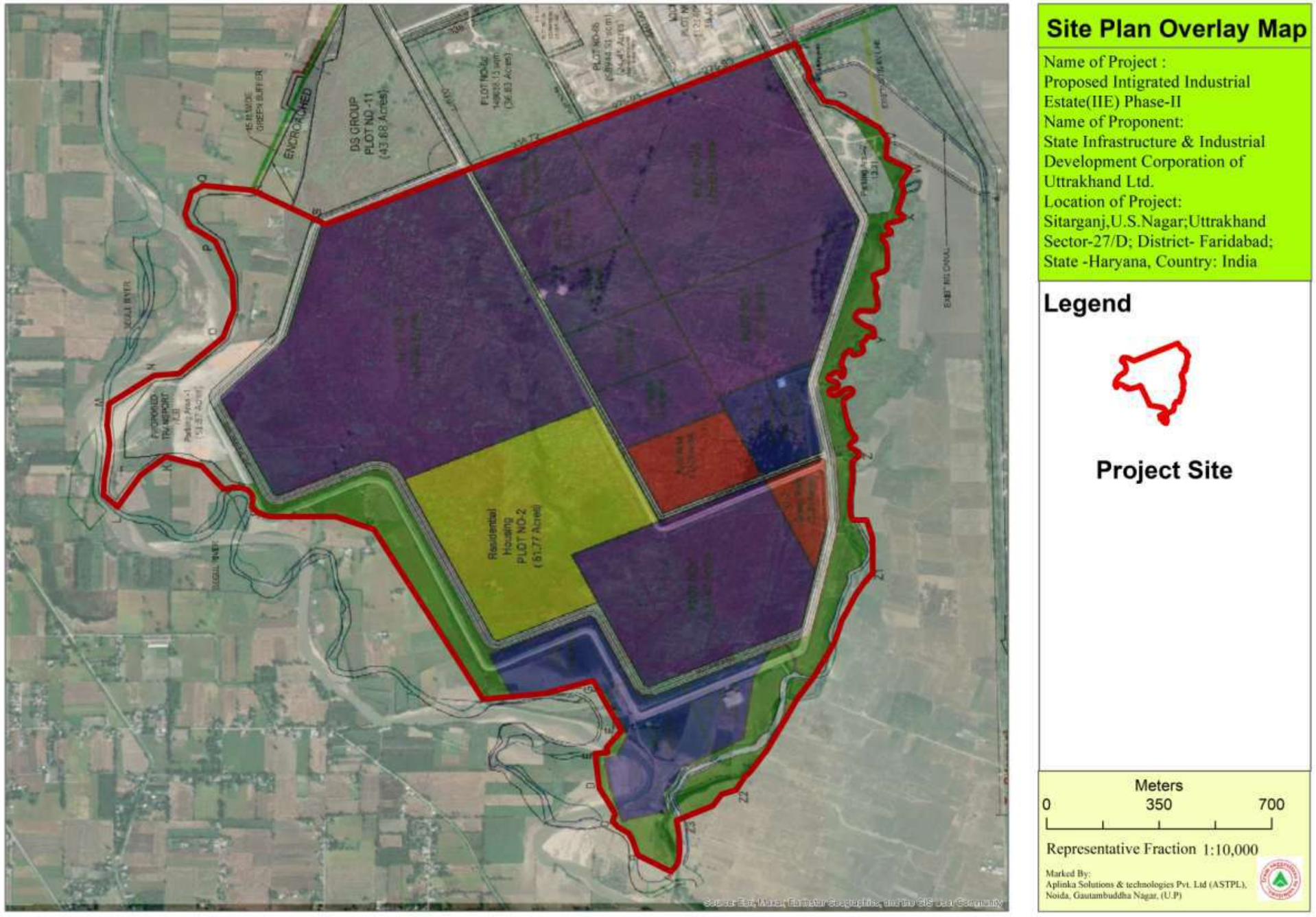


Figure 2.3 : Map showing project layout overlay on Google earth

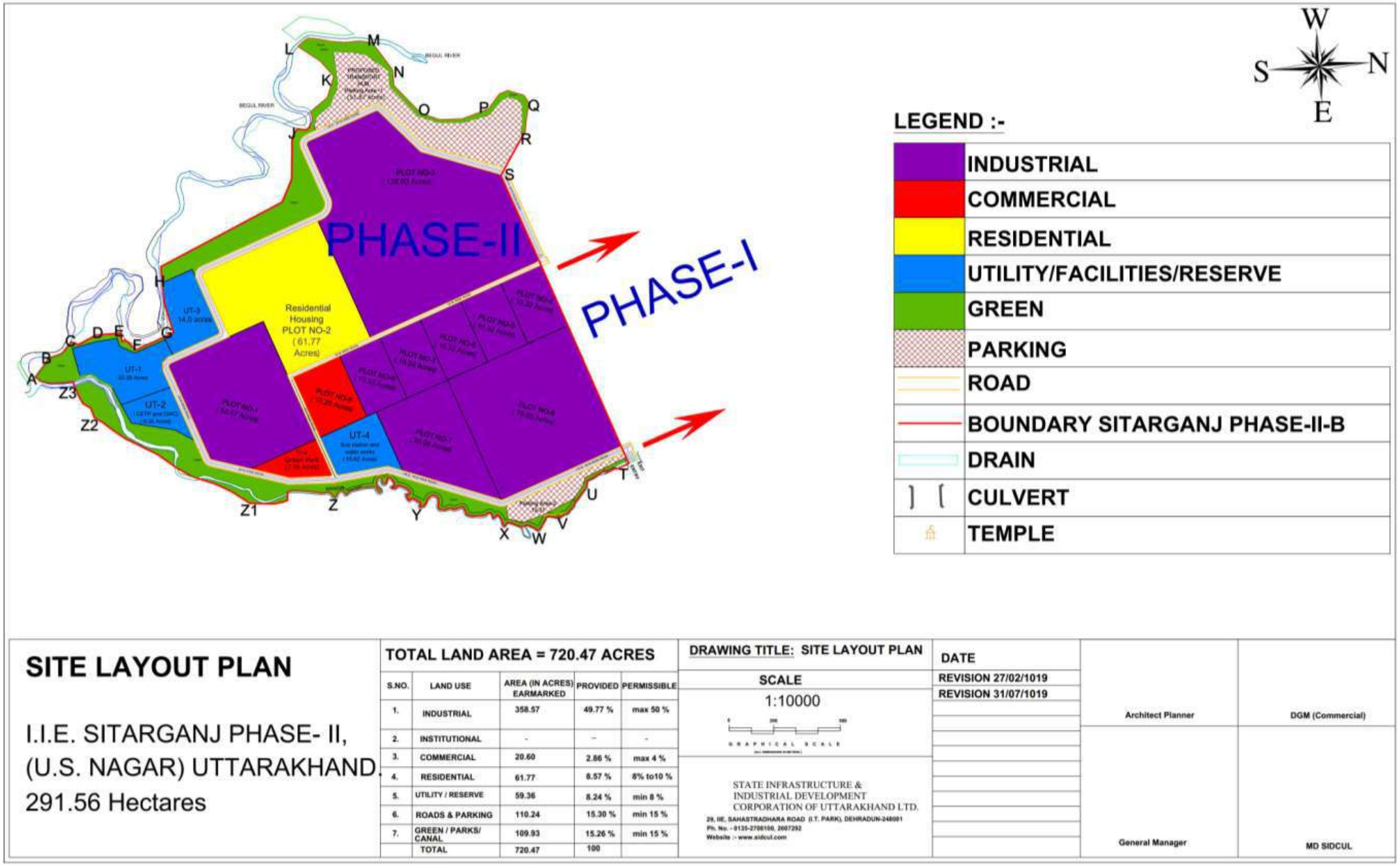


Figure 2.4 Map showing project site layout

2.1.4 Land Acquisition for Proposed Project: The land has been allocated to SIIDCUL by Chief Secretary, Government of Uttarakhand vide letter no. 2069/XX(4)-231/Kara-03/2006 dated 03.06.2006, for development of industrial estate and land has already been acquired. The land was earlier a part of Sampurnanand Jail. The concept of open prison in the form of Sampurnanand camp, Sitarganj was developed from the time of undivided UP, which was established on February 16, 1960. The Jail Campus was located in an area of 5965 acres; later on the Govt. of UP distributed some land through lease. After the formation of Uttarakhand, the jail land was allotted to SIIDCUL, BSF, SSB, Central Jail, and Power House. After the establishment of SIIDCUL, 2900 acres of land was transferred to SIIDCUL in two phases.

2.1.5 Landuse of Proposed Project Site: The land use of the project site was changed to Industrial landuse (refer to **Annexure-III**) by the government at the time of allocating the land to SIIDCUL. The proposed internal land use of the area is industrial, commercial, residential, roads, greenbelts etc

2.1.6 Site selection criteria for Proposed Project Site: The Important Site selection criteria for the proposed industrial estate are as follows.

2.1.6.1 Existing Industrial Estate: There is an existing industrial estate owned by SIIDCUL adjacent to the proposed industrial estate. The proposed industrial estate will have logistic advantage by way of sharing the existing admin building. The treated wastewater from the existing ETP will be used for construction purpose of the project thereby reducing the freshwater demand. Efforts will be made to eliminate the problems faced in the existing estate at the project development stage itself.

2.1.6.2 Rail/ Road and Air Connectivity: The site is well connected through rail road and air transportation modes. The nearest Railway station is Lalkuan Junction about 16.6km in west direction; The nearest Airport is Pantnagar Airport at Phoolbagh about 18.8km in west direction; the main District Road from Kathgodam to Sitarganj is passing adjacent to the project site.

2.1.6.3 Recourse Availability: The proposed site has the availability of basic resources like water, electricity, raw material availability and access and human resources. The project area has suitable terrain for a largely hilly state. The area is also well connected to regional, national and global markets because of excellent air; road and rail connectivity.

2.1.7 Planning for Proposed Industrial Estate: The overall objective of IE planning is to identify sites for proposed Industrial Estate and plan industrial development in compatibility with the surrounding land uses in a sustainable manner. The various steps involved in the identification of a suitable site for proposed Industrial Estate include:

- Identification of an area suitable for developing proposed Industrial Estate for industries.
- Avoiding sensitive areas in terms of protected areas, critically environmental polluted areas, hazard prone areas etc.
- Identification of types of industries that can be allowed in the proposed Industrial Estate after assessing the pollution risks from those industries and the environmental impact risks by predicting the amount and spatial extent of adverse impacts

- Recommending necessary effluent treatment, waste disposal facilities and other commonly needed abatement infrastructure used by all industries of the proposed Industrial Estate.
- Providing appropriate buffer zones around the proposed Industrial Estate
- Recommending land use controls around the proposed Industrial Estate for controlling and minimising adverse environmental impacts; and
- Identifying the social impacts of developing the proposed Industrial Estate at an identified site and recommend methods of mitigation or compensation, if needed

2.1.8 Conformity to the Regional Master Plan: SIIDCUL is the major regional planning authority and the proposal is in conformity to the regional master plan.

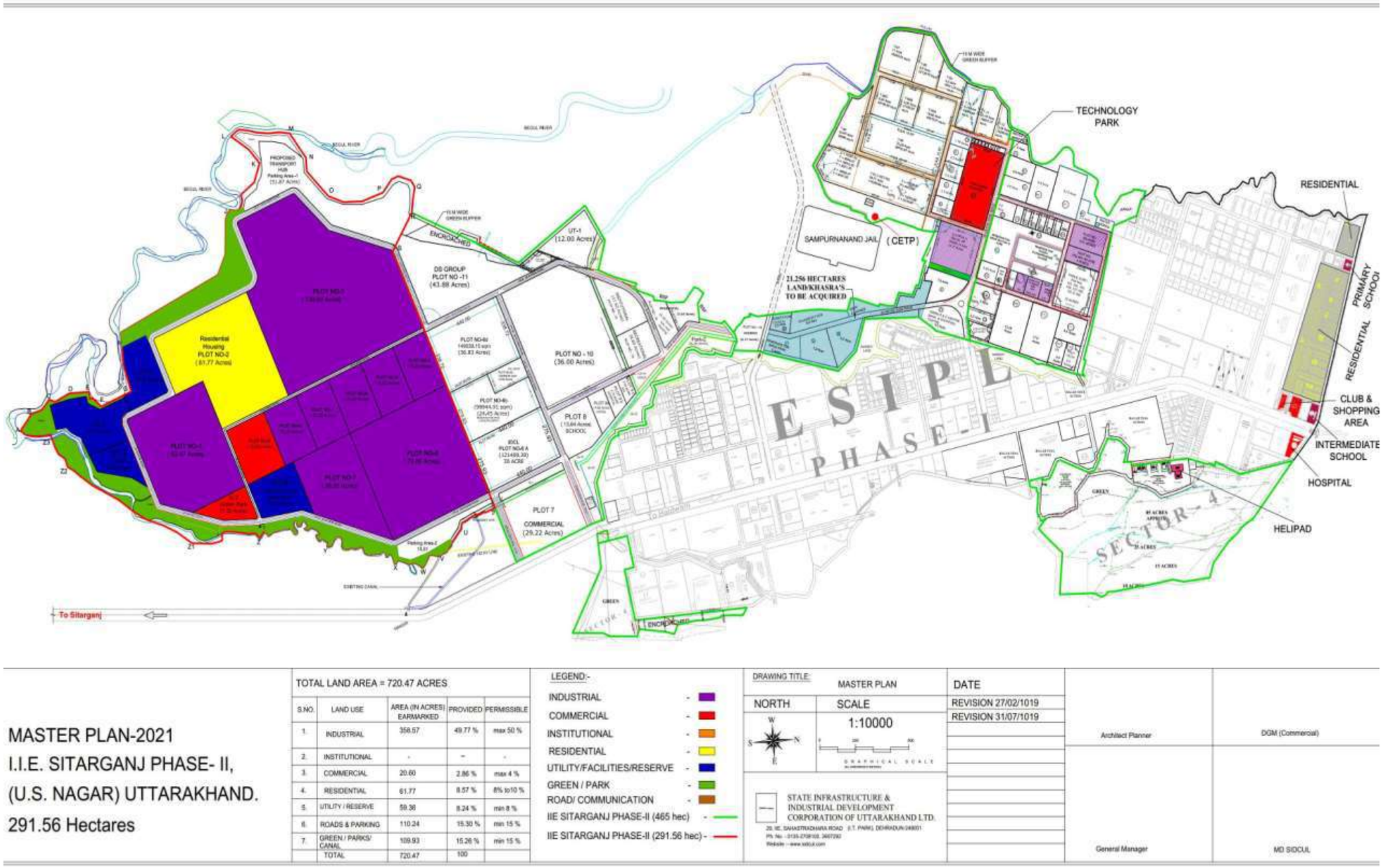


Figure 2.5 Proposed Master Plan 2021 IIE Sitarganj

2.1.9 Site analysis of proposed Project site: Sitarganj is situated on the Tarai plains, which are quite fertile. The ground slopes from North to South. Soils in the study area are loamy silt. Climatic characteristics of the area are divided into three distinct seasons' pre-monsoon (March- June), monsoon (July-September) and post monsoon (October-February). The sediments mainly consist of loam and silt. The soil texture varies from loamy to silty having a heterogeneous composition.

In view of the state's New Industrial Policy, new industrial areas need to be developed to cater to the escalating demand. In addition, following are the driving factors for the development of the proposed Industrial Estate Sitarganj.

- Good rail; road and air connectivity
- Availability of trained Manpower.
- Strategic location as gateway of Kumaon region.
- Focus on attracting investment in the state.
- Responsive administration
- Good law and order situation
- State focus on industrialization

However, following areas needs attention to make it a state-of-art industrial estate:

- Convenient & flexible regulatory framework
- Ensure administrative autonomy
- State-of-the-art infrastructure with power back-up, IT connectivity, etc. In short, a self-contained industrial township, this can help in attracting and retaining the best industries.
- Simplified procedures at various stages.
- Fiscal and other incentives to institutions.
- Improve existing connectivity through road widening (four lanes) etc.
- Create specialized infrastructure to meet specific requirements of developers/investors/institutions.
- Create a flexible environment to establish comfort among prospective stakeholders.

2.1.10 Salient features: The project for the development of the proposed Industrial Estate at Sitarganj is conceived specifically to provide a platform of services and facilities that would be beneficial for the creation of better infrastructure as well as to create more employment opportunities for the local population. The project would have the back-up support of infrastructure in terms of

- Water Supply
- Sewerage and storm water drainage
- CETP
- Horticulture & Green Belt
- Industrial sheds, industrial plots, built to suit facilities
- Residential facilities for industrial workers
- Commercial facilities
- Education and training facilities
- Trunk and internal roads
- Waste Water treatment & distribution facilities

- Drainage and sewerage facilities
- Power substation and distribution
- Data and telecom facilities

2.1.11 Type of Industries:

(A) Brewery Bottling and food processing: India is a fast-growing and large emerging market. Although consumption patterns are changing, food and beverages still account for a substantial part of Indian consumption (over 30%) compared to other emerging markets (Brazil at 17% and China at 25%). Within the food and beverage category, in recent years, there has been a shift towards packaged food and beverages and branded products. India is also a large producer of fruits, vegetables and milk. The government is trying to develop the country as a food processing hub, which is likely to boost the Indian food processing sector in particular and the manufacturing sector in general. *(Food Processing Industry in India Unleashing the Potential of the Non-alcoholic Beverage Sector; Arpita Mukherjee • Debolina Mukherjee Deboshree Ghosh • Divya Satija)*

(B) Auto Industry: In 2020, India was the fifth-largest auto market, with ~3.49 million units combined sold in the passenger and commercial vehicles categories. It was the seventh largest manufacturer of commercial vehicles in 2019. The two wheelers segment dominates the market in terms of volume owing to a growing middle class and a young population. Moreover, the growing interest of the companies in exploring the rural markets further aided the growth of the sector. India is also a prominent auto exporter and has strong export growth expectations for the near future. In addition, several initiatives by the Government of India and major automobile players in the Indian market are expected to make India a leader in the two-wheeler and four-wheeler market in the world by 2020. *(INDIAN AUTOMOBILE INDUSTRY REPORT JULY, 2021)*

(C) Light engineering works:Manufacture of barrels, drums, containers, switch gears, electric motors, exhausters, air-brakes, LPG cylinders, components and instruments, cables machine tools, watches, tractors, lamps, telephones, teleprinters etc.

2.1.12 Connectivity:

2.1.12.1 Air Connectivity: The proposed integrated industrial estate project site is well connected with the rest of the country through Air; Rail and Road. The nearest airport is Pantnagar Domestic Airport at an aerial distance of 18.7 Km in the west direction. On 31 July 2020, the Pantnagar Airport was announced to be developed as the first international airport in Uttarakhand by the Chief Minister of Uttarakhand Trivendra Singh Rawat. The Pantnagar Airport has regular flights to Delhi; Dehradun and Pithoragarh.

2.1.12.2 Rail Connectivity: The nearest Railway station is Lalkuan Railway Junction; which is about 16.6 Km in North-west Direction from project site. Lalkuan Junction is well connected with Kathgodam; Tanakpur (Via Baheri; Bhojipura; Pilibhit; Khatima and Banbasa); Ramnagar (Via Gularbhoj; Bajpur; Kashipur and Pirumadara) Delhi (Via Rudrapur; Moradabad; Hapur and Ghaziabad); Chandigarh (Via Moradabad; Dhampur; Nazibabad; Roorkee; Saharanpur; Yamuna nagar; Ambala and Derabassi).

2.1.12.3 Road Connectivity: The proposed integrated industrial estate project site is en route between Sitarganj to Kathgodam via Chorgalia. It is about 9.39 Km (road distance) from Sitarganj and besides 3 to 4 busses of Uttarakhand Roadways about 43 plus private bus service that operate between Sitarganj and Kathgodam via chorgalia. Sitarganj falls on the NH-9 (Old NH-74 Rudrapur-Sitarganj-Khatima section) which starts at Malout in Punjab and ends at Pithoragarh in Pithoragarh district in Uttarakhand. Sitarganj is well connected with all the major cities and urban centers all over India & Nepal.

2.1.13 Service availability: The available services at the project site are road connectivity through all the modes of bus; car; jeep; tractor; motorcycle; cycle etc. The water will be supplied by SIIDCUL. Electricity will be supplied by UPCL (Uttarakhand Power Corporation Limited). Air connectivity is available at a distance of 18.5 Km in the west direction from Pantnagar Airport. The Rail connectivity is available at a distance of 16.6 Km in North-west direction at Lalkuan Junction. About 36 trains pass from the Lalkuan Junction connecting it to the rest of the country.

2.2 Infrastructure Development Proposal of Proposed Project: The important infrastructures proposed are as follows.

S/n	landuse	Area (in ha)	Area (in acres)	Permissible (%)	Provided (%)
1	Industrial	145.11	358.57	Maximum 50	49.77
2	Institutional	0.00	0		0.00
3	Commercial	8.34	20.6	Maximum 4	2.86
4	Residential	25.00	61.77	Between 8 to 10	8.57
5	Utility/ Reserve	24.02	59.36	Minimum 8	8.24
6	Road & Parking	44.61	110.24	Minimum 15	15.30
7	Green/parks/ canal	44.49	109.93	Minimum 15	15.26
8	Total	291.56	720.47		100

Source: Master plan of IIE Sitarganj 2021 (SIIDCUL)

(i) Industrial Area (Processing area): The total plot area is 291.56 hectares; out of which, 145.11hectares (358.57 acres) will be the area for industrial plots. The industrial area will have manned entry and exit. The details of further breakup of Industrial plots are given below:

S/n	Plot No	Area (in acres)	Area (in ha)
1	1	52.47	21.23
2	3	138.6	56.09

S/n	Plot No	Area (in acres)	Area (in ha)
3	4	10.32	4.18
4	5	10.32	4.18
5	6	10.32	4.18
6	7	10.32	4.18
7	8	10.32	4.18
8	Pl-7	36.05	14.59
9	Pl-8	79.85	32.31
	Total	**358.57**	**145.11**

(ii) Residential area (Housing area): Residential facility is proposed for the operational staff in the proposed industrial estate project; residential area covers about 61.77 acres or 25 ha. The residential area will be suitably separated from the processing zone by a wall or barbed wire. There will be vegetation barriers also around the residential zone.

(iii) Green/ canal area: It is proposed to develop a 1.5m wide green belt along the southern periphery of the project site. About 44.49 ha (109.93 acres)of land area will be maintained as green/park/canal with selected species to attenuate air and noise pollution from the project site. Species such as *Mangifera indica* (mango), *Azadiracta indica* (neem), *Dalbergia sissoo*(shisham), *Cassia fistula*(amaltas), *Aegle marmelos*(bel), *Polyalthia longifolia* (ashoka), *Tamarindus indicus* (imli), *Bombax ceiba* (silk cotton tree), *Delonix regia* (gulmohar) etc will be planted. This will also improve site aesthetics and help restore the ecological balance of the area.

(iv) Commercial area: The commercial activities are proposed in plot no -6 (13.25 acres) & G-2 (7.35 acres); the total area allotted for commercial activities are 20.6 acres or 8.34 ha.

(v) Utility/ Reserve: Utility/ reserve area allotted in the proposed industrial area is 59.36 acres (24.02 ha). The details of utility/ reserve area are as follows:

S/no	Plot No	Area (in acres)	Area (in ha)
1	UT-1	20.39	8.25
2	UT-2 (CETP)	9.35	3.78
3	UT-3	14	5.67
4	UT-4 (Substation & Water Works)	15.62	6.32
	Total	**59.36**	**24.02**

(vi) Road & Parking: An area of 44.61 ha (110.24 acres) has been allocated for road and parking services. . About 65.18 acres (Parking area-I:- 51.87 acres & Parking area-II:- 13.31 acres) of land area is devoted for parking and about 45.06 acres is for road development.

(vii) Social infrastructure: Existing roads will be maintained regularly: Roads will be developed over an area of 16.21 ha (40.06 acres or 162117.07 Sqm). The internal as well external roads will be maintained regularly by SIIDCUL.

Employment opportunity: The project will provide employment to nearly 12,658 persons. Similarly about double of this will be involved in indirect jobs i.e. transport; supply chain etc.

CSR / CER programmes: Medical camps; Social awareness camps, Donations to schools and the other activities will be carried out to address the issues raised during public hearing or identified during public interactions, through CSR/ CER of the companies.

2.3 UTILITIES

2.3.1 Water supply scheme: The total water demand for the proposed industrial estate will be 10.14 MLD (Fresh Water: 6.56 MLD and Treated Water is 3.58MLD). The treated waste water used in Landscape development; Greenbelt development and Road washing will be 2.7MLD; 0.35MLD and 0.19 MLD respectively. The waste water generation from the proposed industrial estate will be 4.60 MLD and 5.02MLD wastewater will be available from existing industrial estate. A combined effluent treatment plant (CETP) of 12 MLD capacity will be installed for the treatment of 9.62 MLD wastewater generated from the proposed project. About 4.12 MLD treated waste water will be discharged to Begul River after 50% dilution, as per the local bye laws. *(Refer Table 2.2 Water Demand for proposed Industrial Estate)*

Table 2.1 Water Demand for proposed Industrial Estate

S. No.	Particular	Occupancy	Area in Sqm	Water Demand per capita (LPCD)	Fresh Water (MLD)	Treated Water (MLD)	Total Water Demand (MLD)	Waste water generation (MLD)
1	Domestic water demand for Industrial staff	12658	249974	135	1.37	0.34	1.71	1.44
2	Domestic Water Demand for Visitors	3164		45	0.11	0.03	0.14	0.12
3	Industrial water demand		1451607	3.5ltr/sqm/day	5.10		5.10	3.05
4	Landscape Area/		444871	6ltr/sqm/day		2.7	2.7	
5	Greenbelt	36445 trees		9.5 liter per sapling		0.35	0.35	
6	Road Washing		162117	1.2 lit/ m^2/day		0.19	0.19	

7	Total				6.56	3.58	10.14	4.60
8	Waste water from existing phase 1							5.02
9	Total waste water available for treatment							9.62
10	Capacity of CETP (25 % higher Capacity)							12.00
11	Treated waste water available from CETP							7.70
12	Total treated Discharge from CETP							4.12

Source: DPR of Proposed Industrial estate

Water Balance Diagram is given below.

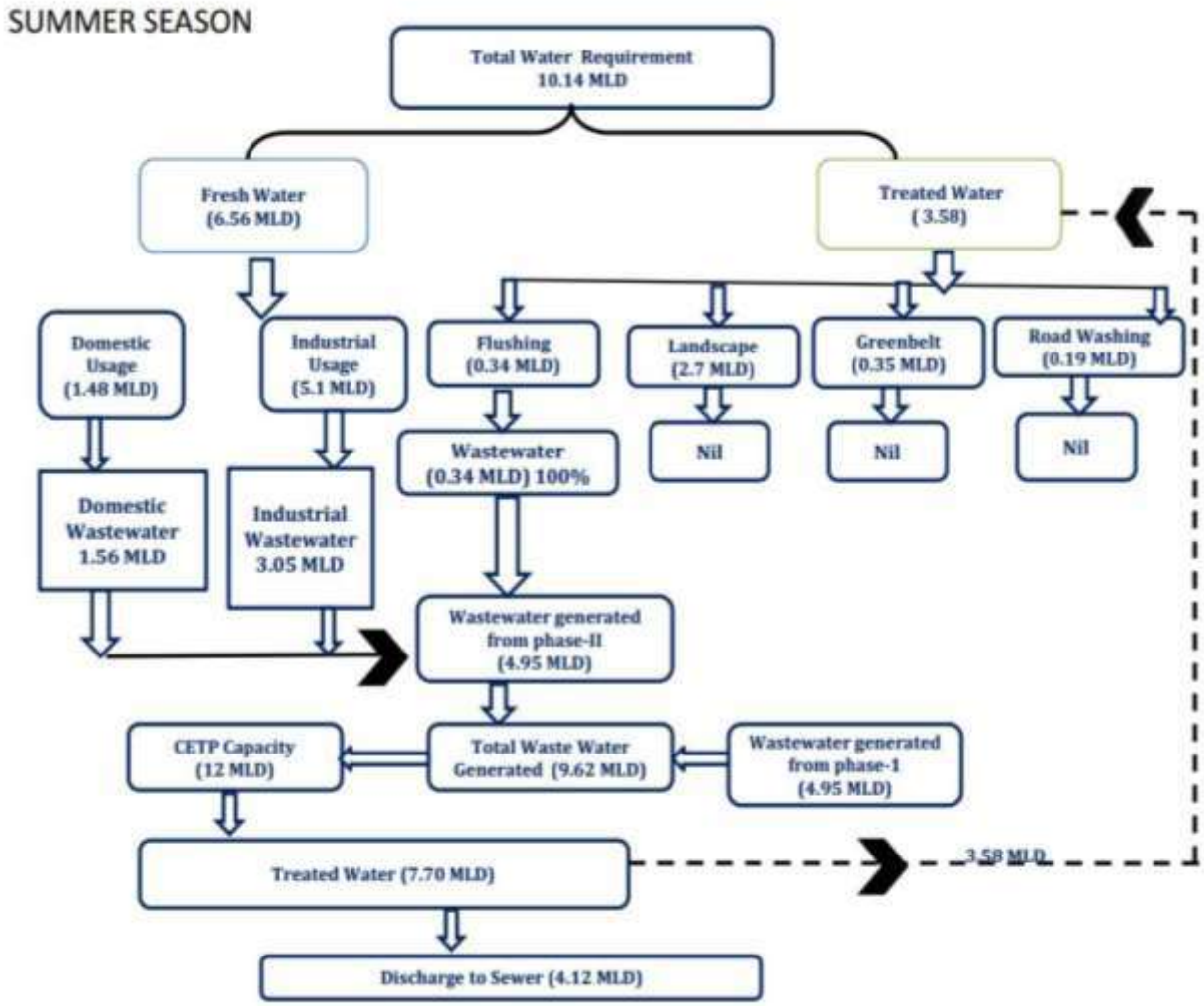


Figure- 2.6 Water Balance Diagram

Fresh water; Sewerage and recycled water layout is given below.

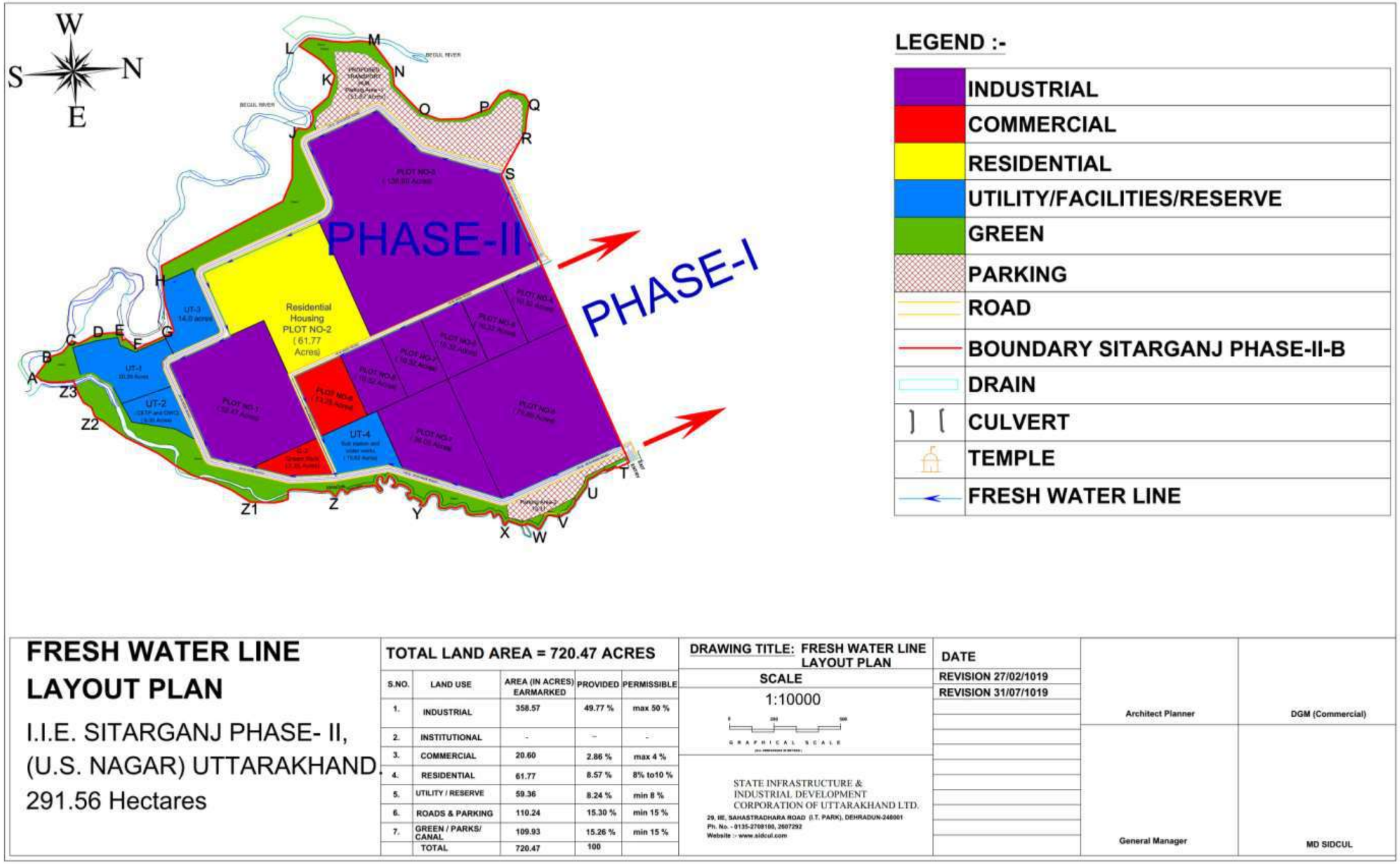


Figure- 2.7Fresh Water Supply Layout

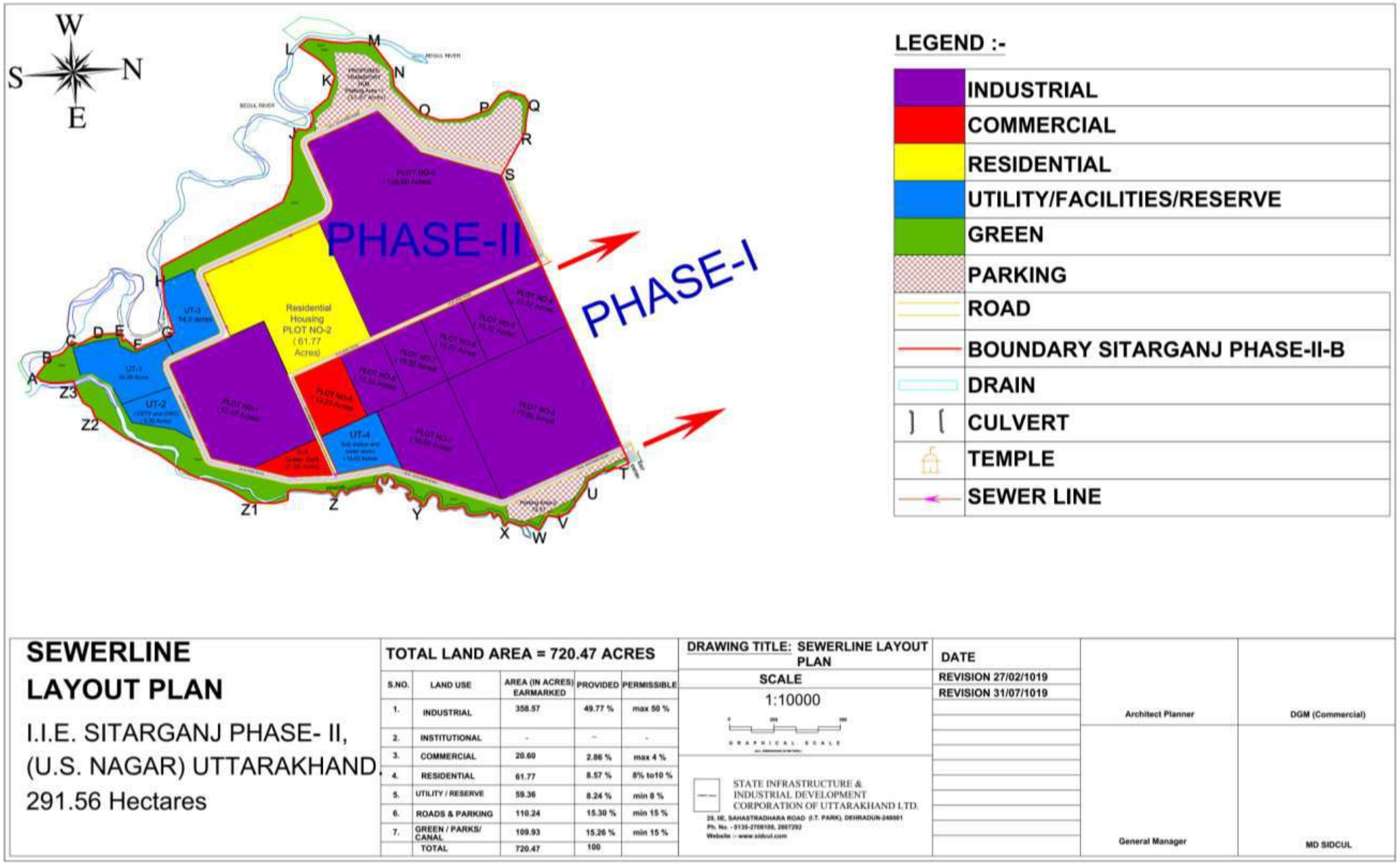


Figure- 2.8Sewer Line Layout

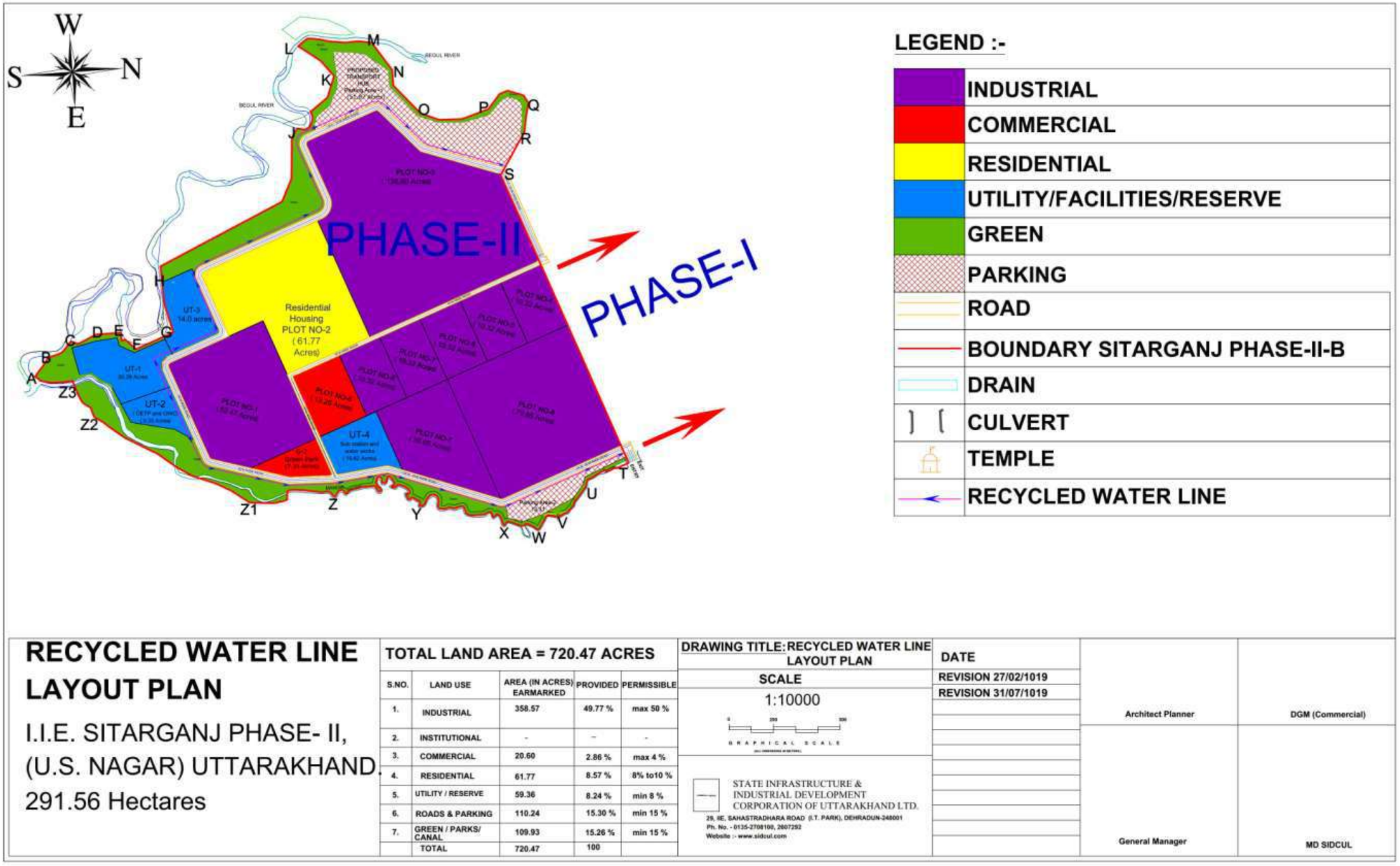


Figure- 2.9Recycled Water Supply Layout

2.3.2 Sewerage Scheme: Proposed water supply system is designed to supply adequate quantity and quality of water at desired locations, in an economical and sustainable manner. The waste water generated from the development of proposed industrial estate will be treated and supplied for non potable purposes through a separate distribution system (Dual Plumbing system). Part of the non potable water demand of the site area shall be met by the recycled water generated by the proposed CETP and rest of the water demand shall be met by raw water through a reservoir at water works locations. Recycling of waste water will reduce the fresh water demand considerably.

2.3.2.1 Scope for providing sewerage system: The water supply system has been planned to minimize the water intake from external sources. The wastewater generated shall be treated to the design standard and recycled for non potable requirements. The water supply distribution system has been designed on the guidelines stipulated in the manual of the central public health and environmental engineering organization (CPHEEO).

2.3.2.2 Technical & Design Specifications: Water supply distribution system is designed to provide a minimum residual pressure of 12m, with an exception in some locations where elevations are high. There are seven nodes in the system with pressure less than 12m. However, a minimum residual pressure of 7m is achieved at these locations. The following minimum residual pressures were recommended in the CPHEEO manual.

- For single story building: 7m
- For double storey building: 12m
- For three storey building: 17m

2.3.2.2.1 <u>Network design methodology:</u> The water supply distribution system has been designed using the software package Water Gems V8i/ EPANET-2.0. These software packages have capabilities to design, analyse and simulate real time situations. The input data required for the hydraulic model are, ground levels or elevation, water demand at each node, pipe material and roughness coefficients. The length of each pipe in the network will be automatically taken by the software from the network mapping. Hazen-William formula has been used for design, but other formulae can be used depending upon the requirements.

2.3.2.2.2 Pipe Material: Various pipe materials are available for conveying water & waste water through transmission or distribution systems. The pipe material available are Cast Iron (C.I) as per IS:1537 (vertically cast); IS:1536 (centrifugally cast), Ductile Iron (D.I) pipes as per IS:8329; PVC pipes as per IS:4958; Concrete Pipes as per IS:458; PSC pipes as per IS:784 and HDPE pipes as per IS:4984. The DI pipes have been recommended for both transmission and distribution systems.

2.3.2.2.3 Pipe Appurtenances: In order to run the systems efficiently, to inspect and test the system, to control or stop the flow, to clean and repair the system; a number of appurtenances or auxiliaries such as valves, gates, manholes, insulation joints, expansion joints, anchorages etc are proposed at suitable locations along the transmission and distribution pipe network.

2.3.2.2.3.1 Line valves: Main line valves are provided to stop and regulate the flow of water in the course of ordinary operation and in emergency. In larger lines isolating valves are frequently installed at intervals of 1 to 5 Km. These valves are placed at major summits of pressure conduits.

2.3.2.2.3.2 Sluice valves: Sluice valves or gate valves are the normal type of valves used for isolating or scouring. Sluice valves are not intended to be used for continuous throttling as erosion of the seats and body cavitation may occur. If small flows are required, the bypass valve is more suitable for this duty. The Indian Standard relating to sluice valves are IS:780 for valves up to 300mm diameter and IS:2906 for valves from 350mm diameter to 1200mm diameter. Sluice valves of 100 to 350 mm diameter are proposed to be used for this development.

2.3.2.2.3.3 Scour Valves: In pressure conduits, small gate-off take known as blow-off or scour valves are provided at low points above the line valves situated in the line situated on a slope such that each section of the line between valves can be emptied and drained completely. These valves are located at the lowest point in the section in such a way that a dewatered quantity of water is properly disposed of into natural watercourse.

2.3.2.2.3.4 Air Valves: The presence of air in the water mains in service or charging could be the cause of serious troubles such as delay in filling the main, reduction in discharging capacity, risk of water hammer. Kinetic air valves are most commonly used as air valves on pipelines. Suitable venting points are required to be established on the pipeline and air valves are provided for the purpose of evacuation of air as well as admission of air. As a first priority peak, points of the alignment are points requiring the provision of air valves. The present project will use 40mm to 100mm diameter air valves as per design.

2.3.2.2.3.4 Non-Return or Reflux Valves: Non-return valves have comparatively limiting application in water supply installations. They are used as a controlling device to ensure unidirectional flow in the pipeline. These find their application in pumping installations to avoid water hammer effect on pipelines.

2.3.2.2.3.5 Anchorage: Anchorages are required for one or more of the following reasons.
To resist the tendency of pipes to pull apart at bends and other points when unbalanced pressure occurs this exceeds the resistance of their joints to their longitudinal stresses.
When the resistance of the joints to longitudinal stresses are inadequate and the pipes have the tendency to pull apart when pipe is laid on steep ground. These are provided at bends, tees and crosses to protect the pipe from unbalanced forces.

2.3.3 Proposed fresh water supply system: The source of fresh water supply for the proposed industrial estate is from the tube wells dug within the site. Raw water from the source shall be conveyed to the water works plot located in UT-4. The water works shall house the ground level reservoir (GLSR) and Elevated Reservoir (ELSR) and be proposed in utility plot (UT-1). About 6.56 MLD water balance table shown above shall be obtained from tube wells and the remaining demand shall be met by recycled water from the CETP.

The water from the tube well shall be collected in a clear water reservoir located within the water works premises.

2.3.3.1 Bore well: Water works shall have three bore wells where two will be operating and one will be on standby. The details of the bore wells are given below:

S/n	Details	Quantity	Unit	Remarks
1	Number of Operating Bore wells	2	Nos	
2	Stand by each location	1	Nos	
3	Capacity individual Bore	80	Cumecs	16 Hr Pumping

Note: Water works for the fresh water supply system.

2.3.3.2 Storage Reservoirs: Storage reservoir will be part of water works in the utility plot. The capacity of the reservoirs has been shown in the table below:

S/n	Water Infrastructure	Parameter	Quantity
1	Underground Water Tank	Capacity	2.91- 0.75 = 2.16 ML Say 2200m^3
		Area of the Reservoir	30m
		The width of the reservoir	733/30 = 24.42m say 25m
		Capacity of the size of UGR (assuming a freeboard of 500mm)	(30x25x3.5) M
2	OHT (Considering it to be of intz type)	Diameter of the tank	12.5m
		Ht of Water Level from Bottom ring bean	5.5m
		Ht of Water Level from Heel Beam to Bottom Ring beam	1.5m
		Staging Ht of OHT	20m
3	Pump Capacity	Capacity of Submersible Pumps assuming Head of Pump= 30m Efficiency =65%	25 H.P

		Two No of Wells Required	2 submersible pumps of 25 H.P capacities each and provision of 1 Bore well carrying the same capacity pump as standby would be required.
		HP of centrifugal pump required 10 H.P	Provide 3 Pump in the Pump House adjoining to the UGR of 10 H.P capacity each, with one of them as standby would be required.
		Dimension of the Pump House	150 Sqm

(Quantity of Sewage; Pipes; Size of sewer; Peak Factors; Velocity & gradients; Capacity; Cover; Design of the Sewer lines; Manholes Sizes; Spacing of manholes; Manholes Covers etc)

2.3.4 Salient Features of Sewerage Scheme

2.3.4.1 Industrial Waste Water: Wastewater network is designed to minimize the number of pumping/lift stations and at the same time to avoid deep sewers. The total length of wastewater network for the proposed industrial estate is about 7.20 km. The maximum depth of excavation is limited to 2.5m for most of the network.

2.3.4.2 Waste Water Generation: The quantity of wastewater generated from the proposed industrial estate is calculated based on the fresh water demand and has been estimated to be about 4.60 MLD. The sewage generation is taken as 80% of domestic demand and 60% from the industrial processing demand. About 5.02 MLD waste water will be received from Phase-I of the IIE- Sitarganj for treatment in the proposed CETP. Total 9.62 MLD of waste water will be treated in CETP of 12 MLD Capacity.

2.3.4.3 Design Criteria

2.3.4.3.1 Peak Factor: The proposed sewerage system for the industrial estate is designed for the peak flows calculated at each node using a peak factor, which is the ratio of maximum to average flow. In developments like this industrial estate with mixed land uses, the peak flows will remain low because the water usage will spread over the day depending upon the type of land use industrial, institutional, commercial and residential etc. and the habits of the water users.

2.3.4.3.2 Hydraulic Design of Sewers: The hydraulic analysis and design of the sewerage network is carried out for the peak flows as stated above. The sewerage network is simplified by assuming steady flow conditions at the peak flows. A well designed sewer network should be able to carry the peak flow for which it is designed and should transport suspended solids in such a manner that deposits in a sewer are kept to minimum. The proposed sewerage network is designed to achieve a self-cleansing velocity of 0.8 m/s for the ultimate peak flows to avoid silt deposition in the sewers. Generally, if there is an existing development a self-cleaning velocity of 0.6 m/s will be considered for the present peak

flows. The proposed sewerage network is designed to limit the maximum allowable velocity to 3.0 m/s to avoid Scouring and erosion in the sewers.

2.3.4.3.3 Design Formula: The Manning's formula is used for the design of sewerage system as recommended in the Central Public Health and Environmental Engineering Organisation (CPHEEO) manual.

$V = 1/n * R^{2/3} * S^{1/2}$

$Q = AxV$

Where,

Q =Discharge in (m3/sec)
A =Cross-sectional area in (m2)
S =Slope of hydraulic gradient
D =Internal diameter of pipeline in (m)
V =Velocity in (mps)
R =Hydraulic radius in (m
N =Manning's coefficient of roughness

2.3.4.3.4 Manning's Coefficient of Roughness: The Manning's roughness coefficient (n) varies with the type of pipe material used in sewer Construction. HDPE pipes are proposed for the sewerage system of the Proposed Industrial Estate.

2.3.4.3.5 Minimum Size of Sewer: A Minimum size of 200 mm diameter is considered in the design of sewerage system as recommended in the CPHEEO manual.

2.3.4.3.6 Minimum Depth of Cover: A minimum depth of cover of 1m is maintained to protect sewers from the external loads and tensure connectivity of flows from the properties into the laterals and branch sewers. However, in some locations for the laterals and branch sewers, the minimum depth of cover is restricted to 0.8 m to avoid deep excavations further downstream in the system.

2.3.4.3.7 Maximum Allowable Depth of Sewer: Maximum depth of sewers is restricted to 3.0 from original ground level in this development because of the ground conditions and the topography of the area. The maximum depth of sewers is minimized for the health and safety during construction, operation and maintenance

2.3.4.3.8 Maximum Allowable Depth of Flow: Sewers have been designed for the partial flow condition i.e. 80% depth to carry estimated peak flows. This is to ensure proper ventilation and prevent septicity.

2.3.4.3.9 Sizing of Sewers: Size of the sewers should be adequate to take the peak flows to be generated. Sewer networks should be designed to achieve higher velocities within the permissible limit, wherever possible. Silting may take place during minimum flows which will be flushed out during peak flows. However, Silting could be a problem during early years particularly for smaller sewers, where depth of flow during early years is only a small fraction of the full depth. Similarly,

initial stretches of the laterals may pose a problem as they flow partly full even at the Ultimate design flow irrespective flow rates, a minimum diameter of 200mm has to be adopted as per the CPHEEO manual. In such situations regular flushing may be required during initial years.

2.3.4.3.9.1 Pipe Materials: Following factors are considered in the selection of pipe material for the wastewater network of the proposed development.

- Hydraulic performance
- Durability and design life of the pipe
- Capital cost
- Operation and Maintenance (0&M) costs

After careful consideration RCC pipes are proposed for the wastewater collection system.

2.3.4.3.9.2 Manholes: In sewerage system manholes will provide access to the sewers for inspection and cleaning Manholes are provided in the system at the head of all sewers, at every junction of two or more sewers and where there is a change in the alignment or gradient or diameter. Spacing of the manholes will depend on the size, type of the sewer and cleaning equipment used. Generally the Spacing of manholes is not more than 30m but spacing can be increased with the size of the sewer.

2.3.4.3.9.3 Size and Shape of Manholes: Circular manholes are preferred for all depth. Since the manholes are proposed within the utility Corridor, they are not expected to take any heavy superimposed loads.

- For depths above 0.90 m and up to 1.65 m, 910 mm diameter
- For depths above 1.65 m and up to 2.50 m, 1220 mm diameter
- For depths above 2.50 m, 1520 mm diameter

2.3.4.3.9.4 Self-Cleansing Velocity: Sewers have been designed to maintain flow velocities to avoid silt deposition and ensure self cleansing velocity in sewers. The flow in sewers varies widely from hour to hour and also seasonally, but for the purpose of hydraulic design, it is estimated peak flow that is adopted. However, it is to be ensured that a minimum velocity is maintained in the sewers even during minimum flow conditions. A minimum velocity of 0.2m/s is ensured in starting laterals. Sewers are designed to limit maximum velocities to 3.0 m/s to avoid or minimize the erosion caused by sand and grit present in the wastewater

2.3.4.3.9.5 Wastewater Collection System: The sewer lines are generally provided on either side of the road to collect flows from individual plots on both sides of the road, along the alignment. A dedicated space is provided within the utility Corridor for the wastewater network. The total length of proposed wastewater network and detailed break up of different diameters of sewers is given below. Refer annexure of waste water drawing: for further details of the proposed network. The wastewater generation from individual plots is calculated based on the land use and population density. The wastewater network is designed for the cumulative peak flows at respective nodes in the entire area of Package II. The design of the wastewater network is carried out in Sewer CAD software version V8.

2.3.5 Proportion of Industrial and Domestic Waste

2.3.5.1 Wastewater characteristics and degree of treatment required

2.3.5.2 CETP: Effluent Treatment of wastewater involves breakdown of complex organic compounds into simpler Compounds that are stable and nuisance-free. The treatment process may involve a combination of physical, chemical and biological treatment (treatment using microorganisms processes. The following are some of the impacts of discharging untreated wastewater into the environment.

- The decomposition of the organic materials contained in wastewater can lead to the production of large quantities of malodorous and noxious gases.
- Untreated wastewater (sewage) containing large amount of organic matter, discharged into a river/ stream will consume Dissolved Oxygen (DO) for satisfying the Biochemical Oxygen Demand (BOD) of wastewater Depletion of the Dissolved Oxygen (DO) in the water bodies causes harm to the fish and other organism.
- Wastewater may also contain nutrients which can stimulate the growth of aquatic plants and algal blooms, thus leading to eutrophication of the lakes and streams.
- Untreated wastewater usually contains numerous pathogenic or disease causing microorganisms and toxic compounds that dwell in the human intestinal tract. These may contaminate the land or the water body where such sewage is disposed.
- Because of the above reasons wastewater treatment using appropriate technology and suitable disposal arrangements are essential.
- All land uses, either residential or industrial estates, need an efficient wastewater treatment facility Along with a good wastewater collection system. Treated waste water should meet the statutory Requirements to dispose or recycle treated effluents for various purposes like horticulture, watering of lawns etc., and for other purposes like make up water demand in cooling towers, flushing of toilets, Vehicle washing and construction activity etc.
- The exact type of industries going to come up in the development and the characteristics of the effluent to be treated is not known. Therefore, it is advisable to have pre-treatment facilities where it is required that the industries meet the set criteria for discharging their effluents into common wastewater network for treatment at CETP

2.3.5.2.1 Tolerance limits for discharge of wastewater: The effluents from the Common Effluent Treatment plant (CETP) may be discharged into receiving waters, rivers, and streams or on land. The nature and degree of treatment to the sewage depends upon the requirement of ultimate disposal. The water content of the sewage effluent along with the fertility value of the nutrients makes it useful for irrigation and horticulture. The effluent can also be used for low grade industrial use. The effluent standards listed should be satisfied while disposing the effluent into the environment.

The following inlet effluent standards should be satisfied while discharging wastewater from the industries into CETP or the associated wastewater network.

Table: 2.2 Inlet effluent standards

S/n	Parameter	Concentration (Maximum)
1	pH	5.5-9.0
2	BOD	550 mg/L
3	COD	1100 mg/L
4	Total Dissolved Solids (TDS)	2100 mg/L
5	Total Suspended Solids (TSS)	1500 mg/L
6	Oil & Grease	20.0 mg/L
7	Phenolic Compounds (as C_6H_5OH)	5.0 mg/L

S/n	Parameter	Concentration (Maximum)
8	Ammonical Nitrogen (as N)	50.0 mg/L
9	Cynide (as CN)	2.0 mg/L
10	Hexavalent Chromium (as Cr^{+6})	2.0 mg/L
11	Total Chromium (as Cr)	2.0 mg/L
12	Copper (as Cu)	3.0 mg/L
13	Lead (as Pb)	1.0 mg/L
14	Nickel (as Ni)	3.0 mg/L
15	Zinc (as Zn)	15.0 mg/L
16	Arsenic (as As)	0.2 mg/L
17	Mercury As (Hg)	0.01 mg/L
18	Cadmium (as Cd)	1.0 mg/L
19	Selenium (as Se)	0.05 mg/L
20	Fluoride (as F)	15.0 mg/L
21	Boron (as B)	2.0 mg/L
Radio Active Material		
22	Alpha Emitters, micro curie/mL	10^{-7}
23	Beta Emitters, micro curie/mL	10^{-8}

Source: UEPPCB Office Order UEPPCB/HO/GEN-392/2018/457 DATED 14TH June 2018

2.3.5.2.2 Wastewater Characteristics for CETP: The salient characteristics of treated Wastewater after the treatment shall be as follow:

Each industry will be charged on the quantity of effluent discharged. Each industry will have to carry out wastewater treatment to meet the inlet norms of proposed CETP including primary/secondary treatment units.

2.3.5.2.3 Limiting Characteristics for discharge from industries: Limiting wastewater discharge parameters for individual unit shall be as follows:

S/n	Parameter	Inland surface water	Public sewers	Land for irrigation
1	Color and Odour	All efforts should be made to remove colour and unpleasant odour as far as practicable		All efforts should be made to remove colour and unpleasant odour as far as Practicable
2	Suspended solids	100	600	200
3	Particle size suspended solids	Shall pass 850 micron Sieve	-	-
4	pH value	5.5-9.0	5.5-9.0	5.5-9.0
5	Temperature	Shall not exceed above the receiving water temperature	-	-
6	Oil & Grease mg/L, Max	10	20	10
7	Total residual chlorine mg/L, Max	1.0	-	-
8	Ammonical Nitrogen	50	50	-

S/n	Parameter	Inland surface water	Public sewers	Land for irrigation
	(as N); mg/L, Max			
9	Total Kjeldhal Nitrogen (as N); mg/L, Max	100	-	-
10	Free ammonia (as NH_3); mg/L, Max	5	-	-
11	Biochemical Oxygen Demand (3 days at 27°C)); mg/L, Max	30	350	100
12	Chemical Oxygen Demand (as COD); mg/L, Max	250	-	-
13	Arsenic (as As); mg/L, Max	0.2	0.2	0.2
14	Mercury (as Hg); mg/L, Max	0.01	0.01	-
15	Lead (as Pb); mg/L, Max	0.1	1.0	-
16	Cadmium (as Cd); mg/L, Max	2.0	1.0	-
17	Hexavalent Chromium (as Cr^{+6}); mg/L, Max	0.1	2.0	-
18	Total Chromium (as Cr); mg/L, Max	2.0	2.0	-
19	Copper (as Cu); mg/L, Max	3.0	3.0	-
20	Zinc (as Zn); mg/L, Max	5.0	15	-
21	Selenium (as Se); mg/L, Max	0.05	0.05	-
22	Nickel (as Ni); mg/L, Max	3.0	3.0	-
23	Cynaide (as Cn); mg/L, Max	0.2	2.0	0.2
24	Fluoride (as F) mg/L max	2.0	15	-
25	Dissolved Phosphate (as P) mg/L max	5.0	-	-
26	Sulphide (as S) mg/L max	2.0	-	-
27	Phenolic Compounds (as C_6H_5OH) mg/L max	1.0	5.0	-

S/n	Parameter	Inland surface water	Public sewers	Land for irrigation
28	Radioactive materials: (a) Alpha emitters micro curie mg/L, max (b) Beta emitters micro curie mg/L, max	10^{-7} 10^{-6}	10^{-7} 10^{-6}	10^{-8} 10^{-7}
29	Bio-assay test	90 % survival of fish after 96 hours in 100 % effluent	90 % survival of fish after 96 hours in 100 % effluent	90 % survival of fi after 96 hours in 100 effluent
30	Manganese	2 mg/L	2 mg/L	
31	Iron (as Fe)	3 mg/L	3 mg/L	
32	Vanadium (as V)	0.2 mg/L	0.2 mg/L	-
33	Nitrate Nitrogen	10 mg/L	-	-

Source: CPCB

2.3.5.2.4 Recycling & Reuse of Waste water: The Option of recycling of wastewater and reusing it for non-domestic purposes is becoming a very popular option with the depleting water resources in various regions. Many countries have developed their water quality standards. Table below presents some guidelines (as per USEPA Standards) for the utilization of treated wastewater, indicating the type of treatment required and resultant water quality specifications. One of the most critical steps in any reuse program is to protect the public health, especially that of workers and consumers. To this end, it is most important to neutralize or eliminate any infectious agents or pathogenic organisms that may be present in the wastewater. For some reuse applications, such as irrigation of non-food crop plants, secondary treatment may be acceptable. For other applications, further disinfection, by such methods as chlorination or ozonation, may be necessary.

2.3.5.2.5 Guidelines for Occupier Industries: With an increased concern for the environment in the corporate and industrial management sector, more and more companies and industries are adopting cleaner and eco-friendly technologies to minimize energy consumption and to reduce waste generation at all stages. Following common guidelines/ practices shall be made mandatory for every occupier in the proposed industrial estate.

- Adopt cleaner technologies
- Use alternatives like, less polluting chemicals in the process
- Use less polluting alternate manufacturing processes
- Reduce, reuse and recycle wastewater, wherever possible
- Develop green belt, lawns, and plant fruit/ornamental trees
- Adopt rain water harvesting.
- Adopt best practices to control solid waste generation, storage., handling. and disposal
- Bring effluent characteristic to the prescribed limits
- Stages of Treatment: There are various stages in wastewater treatment. The common stages in wastewater collection and treatment are as follows.

- Wastewater collection system comprising gravity pipelines, manholes. Pumping stations/lit stations and rising mains to convey wastewater to a Common Effluent Treatment Plant (CETP).
- Physical Treatment. - Screenings, Grit removal, Oil & Grease and Scum Removal.
- Chemical Treatment. Neutralization, Flocculation, Reaction-Oxidation/Reduction.
- Biological Treatment, by Aerobic or Anaerobic Process.
- Tertiary Treatment by Filtration from Pressure Sand and Carbon Filter, or by Softening, or
- De-mineralization, or Reverse Osmosis (RO)
- Storage and Recycling.

2.3.5.2.6 Receiving of Raw Effluent: Deep gravity outfall raw effluent shall discharge the raw effluent into a receiving chamber from where it shall be taken into downstream course screen.

2.3.5.2.6.1 Screens: Adequate no. of mechanical working along with manual standby course screens shall be provided upstream of the wet well for removal of floating and oversize material coming with the effluent. The course screen shall screen out most of the medium and large floating material such as plastic bags, debris, weeds, paper, cloth, rags etc. etc. which could clog the waste water pump impellers. The coarse screen shall be inclined bar screen of stainless steel flats and shall be of sturdy design, to take care of all sorts of material coming in the gravity sewer. The structure is to be constructed in RCC grade M-35.

2.3.5.2.6.2 Raw effluent Sump & Pump Station: Screened effluent after coarse screening shall enter into the wet well of the pumping station the capacity of the wet well is such that adequate retention time is available during average & peak flow Conditions. Additional depression shall be provided to ensure adequate submersion of pumps. Pumping station shall have a room adequate for installing electric panels. Suitable arrangements should be provided for lifting of pumps. Suitable combinations of submersible pumps shall be provided to cater the pumping requirements at average 8& peak flow conditions. Based on incoming flow conditions adequate no of pumps shall start/stop automatically to cater the pumping requirements. The pumped flow from the pumping station shall be taken from the grit removal chamber.

2.3.5.2.6.3 Grit Separators: The pumped raw effluent will enter into the grid separator tank for removal of grit and small organic particulate matter of specific gravity about 2.65 and particle size of about 150 microns. The grit separator tanks shall be of RCC grade M35 construction complete with mechanical internals and square in size with scraper system. The grit separated shall be properly collected and transported for disposal. The de-gritted effluent shall flow thru open channels to pre settling clarifier tanks Pre-settling clarifier Tank There is a large amount of sludge in the effluent which gets deposited in the tank which reduces the capacity of the tank.

2.3.6 Storm water drainage scheme: The site has been analyzed in the context of pre and post development of land with respect to hydrological characteristics to achieve effective storm water management and harvesting of maximum quantity of rain water utilization for non-potable usage.
Design Basis: The drainage catchment of the site area has been studied in details with respect to pre and post development as per the topography of the land layout and final master Plan). The present

drainage proposal is based on the finalized grading plan. Zoning of land has been done by taking into consideration the storm water flow direction based on the grading plan, contours and existing water bodies. Each zone has one disposal point (as existing water body within catchment) with one or multiple outfalls. Outfalls are given at suitable locations. The drainage design has taken into consideration the following factors:

- Storm water drains are aligned to the carriageways following the proposed road gradients, draining into the water bodies.
- Proposed plot grading and direction of plot outfall has been considered in estimating the runoff generation in a particular road stretch.

The main criteria followed in the design of drainage system are:

- Safe disposal of storm water that is collected from the roads, pavements, medians, plots and other open/green areas.
- Maintaining self-cleansing velocity within the drains so that there is no stagnant water or silting.
- Maximum flow of water with minimum cross sections.

The figure below gives a schematic diagram of the process of Storm Water Network design followed.

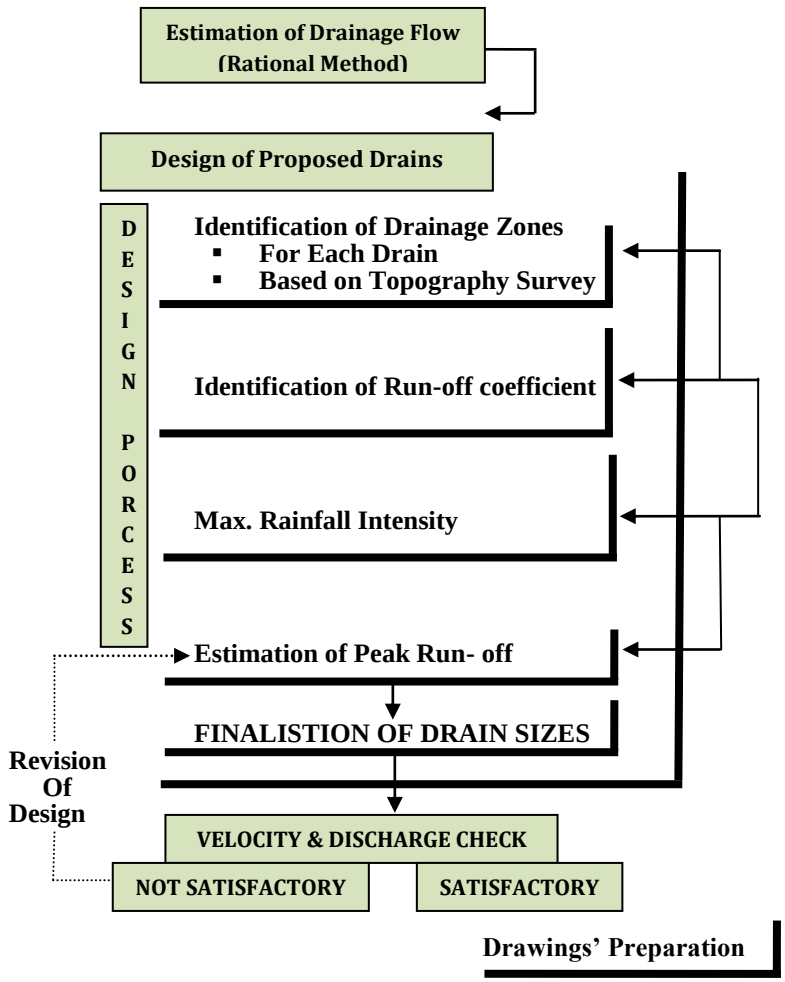


Figure- 2.10 Schematic diagram showing process of storm water network design

2.3.6.1 Design Criteria

2.3.6.1.1 Rainfall and runoff: The average rainfall is 1.296 m. The intensity of rainfall for the design of the storm water drainage network has been determined considering the historical meteorological conditions. The design has been based on analysis of the rainfall pattern and its distribution with respect to time and intensity. The critical parameters that have been considered with respect to rainfall include frequency distribution, depth and duration. The standard and norms of the central soil and water conservation research and training institute are analyzed as per requirement.

2.3.6.1.2 Coefficient of Runoff: The Coefficient of runoff is the factor of different types of landuse. Based on the permeability of the type of landuse the value of C can be decided. So, higher the permeability of the land, lower the C value and vice versa. Though the wetted C value for multiple land use is 0.6, keeping in view the gradient of the land, the C value of 0.7 is recommended uniformly for all zones.

2.3.6.1.3 Storm Water Discharge (Q): The storm water flow discharge has been determined by using the rational method.

$$Q = 10CIA$$

Where
Q = storm runoff in m^3/hr
C = runoff coefficient
I = intensity of rainfall in mm/hr
A = area of the drainage district in hectares

Manning's formula is adopted for the design of storm water drainage systems.

$$V=1/nR^{2/3}S^{1/2}$$

$$Q = A \times V$$

Where
V = Velocity in m/sec at partial flow condition
n = Manning's Roughness coefficient
R = Hydraulic Radius (m)
S = Slope of Hydraulic Gradient
Q = Flow rate in cumsec
A = Cross sectional area of pipe in sq. m

2.3.6.1.4 Free Board: The free board would vary from 0.1 to 0.9 m depending on the size and type of drain.

2.3.6.1.5 Longitudinal Bed Slope: Longitudinal bed slopes of drains would be fixed considering the natural slopes of the area and nominal drops are provided to meet the permissible velocity criteria in case of steep slopes. The design would be based on Manning's formula.

2.3.6.1.6 Design of Drain Section: unlike the usage of conventional rectangular section, it is recommended to provide kerb channels within the carriageway for carrying the storm runoff due to the following reasons.

- The length of the independent network is small resulting in lesser discharge
- Rainfall pattern of the area is low to moderate
- Optimization of the area within utility corridor

In the entire network, the sections have been used to the extent of contributing catchment area. In order to design and determine the section type, each zone has been divided into a number of catchment areas based on the respective outfalls. Considering the topography and discharge, such surface drains are feasible from the point of economy, construction, wear and tear and efficient maintenance and management. Inspection chambers are provided at 15 m intervals all along the network for effective maintenance of the storm water network.

2.3.7 Constructions of Roads: The road network is the most important infrastructure development in any industrial area, as movement of all raw material to and finished goods from plots is dependent on the road network. The alignment and design development of an industrial road network is a measure of and catalyst to an efficient construction and operation of an industrial area. Appropriate combination of various links both technically and economically generate industrial traffic infrastructure, and promote the objectives of accessibility and connectivity. Road network planning includes the fixing of right or way, geometric design of roads, design of typical cross-sections to ensure adequacy carriageway width and utility corridor, selection and design of pavement type, design of intersection, interchanges, locations &provision of appropriate facilities. Design of road sections has been done according to design standards stipulated in IRC codes and improvements identified at the various stages of the project. A total length of 7.4 Km is proposed.
The design of the longitudinal section of the road can be described as follows:

Right of Way (ROW): It is important to allocate the land for the utility corridor, which runs parallel to the carriageway by theory and practice. The utility corridor demands a width varying to accommodate all services in stages of hierarchy including greenbelt, networks for water supply, effluent conveyance, power supply, storm water drains, telecom, gas and any other industry specific service. The ROW of the proposed industrial estate has been planned considering all these aspects. There will be two categories of roads viz:

- Major/arterial road: width 30m
- Primary/sub-arterial road: width 18m

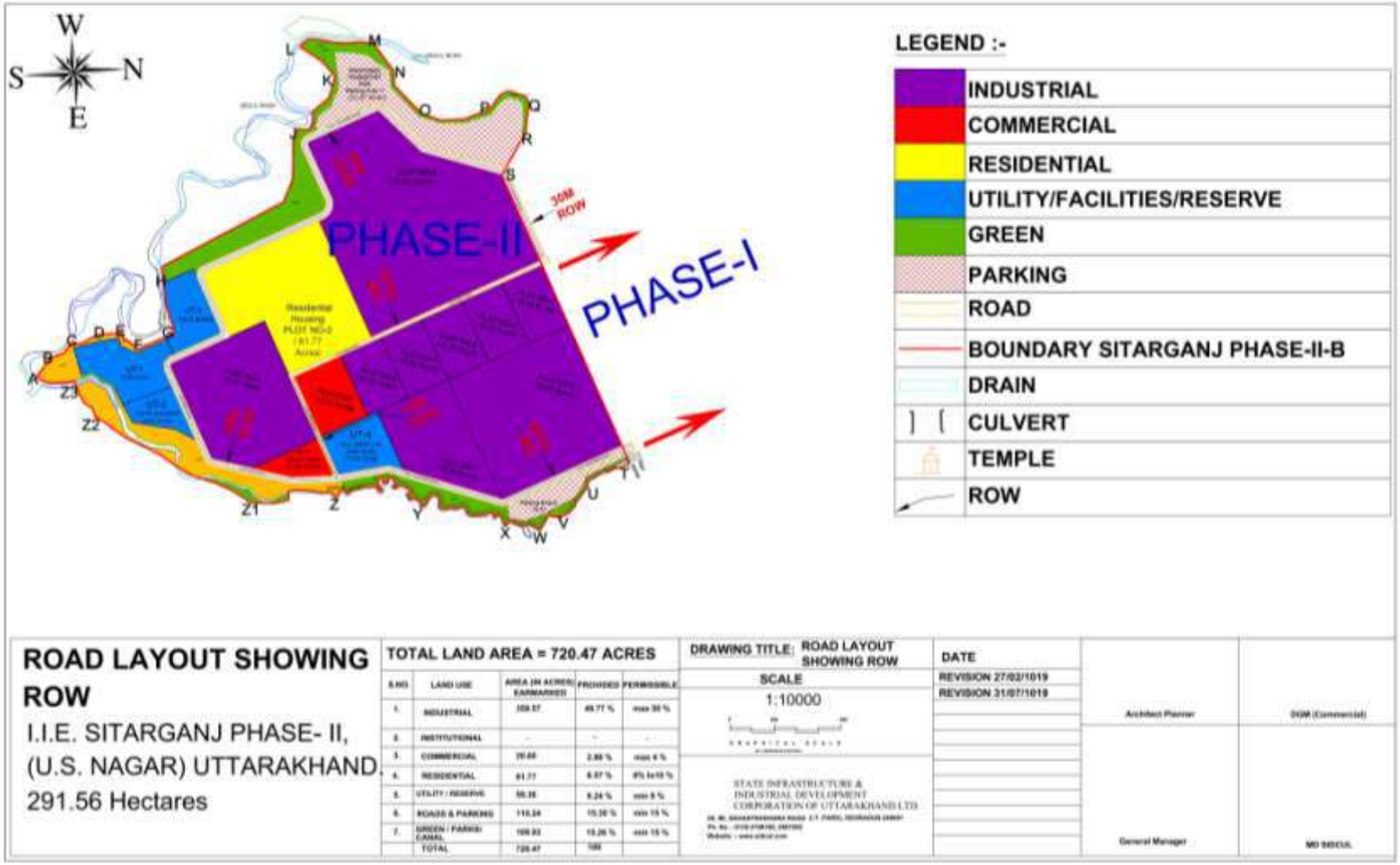


Figure- 2.11Internal Roads showing proposed ROW

Cross Sectional Element: Cross sectional elements were developed on the basis of design standards and specifications set for the different project links. The chamber is provided to drain off the surface water and road is proposed to be 2.5%. The classification of links-cross section is given in Table 2.6

Table 2.3: Classification of links-cross section

Total ROW (m)	Utility corridor (m)	Service lane (m)	Edge strip (m)	Carriage way (M)	Median (m)	Carriage way (m)	Edge strip (m)	Service Lane (m)	Utility Corridor (m)
30	7.25	0	0	7.2	1.1	7.2	0	0	7.25
18	5.5	0	0	3.5	0	3.5	0	0	5.5

Assuming the proposed industrial estate may require RoW of different width in the later stage, subdivision of plots may happen depending upon the market demand.

Internal traffic circulation is shown below:

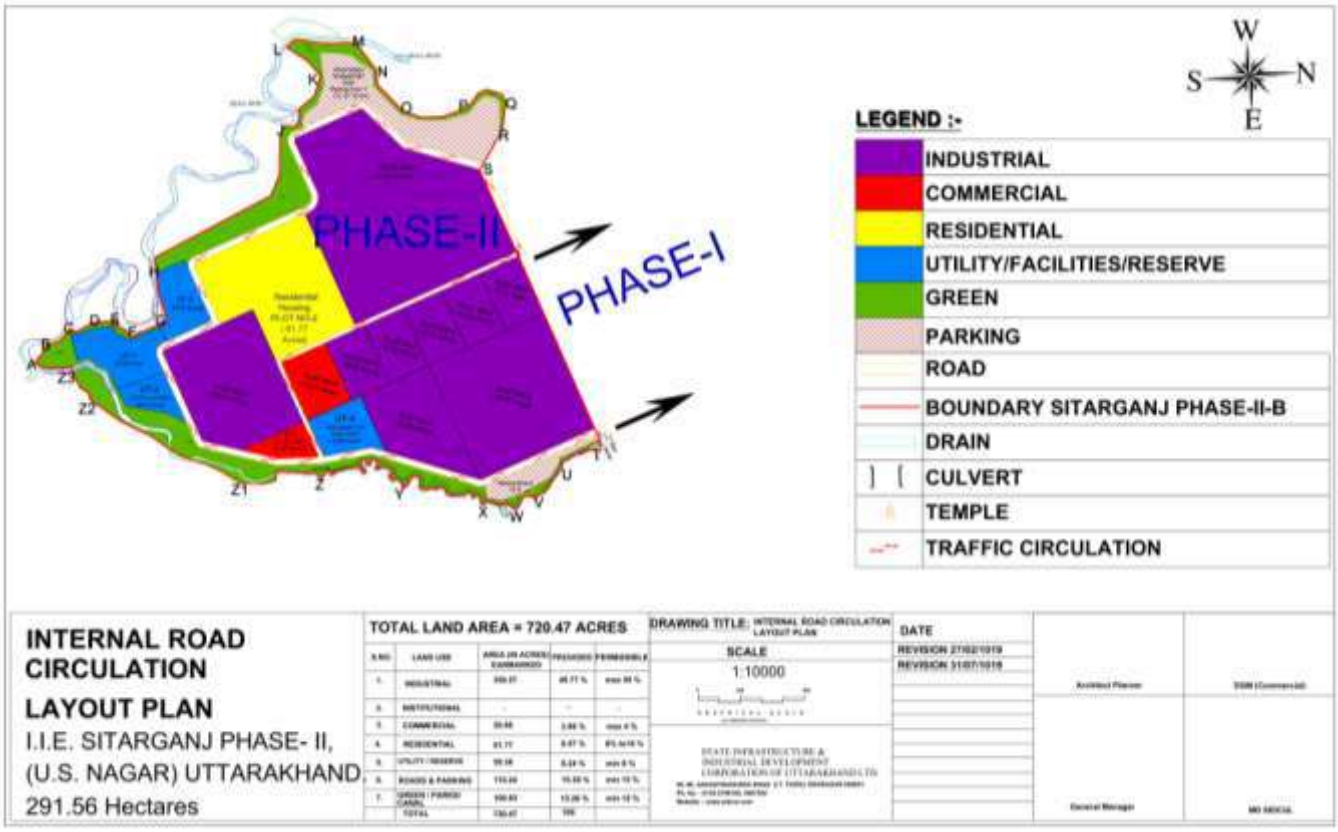


Figure- 2.12 Internal Traffic Circulation

Vertical Profile

The profile of the Project corridor has been designed preliminarily on the basis of DTM Data collected during the topographic survey. In addition to the standards and guidelines, a number of other considerations have been made to design the vertical profile, which is presented below.

- Minimum distance between the two PVI is kept as 50m except 26m at one road only.
- Minimum length of vertical curve as 60m
- Maximum gradient of 2.5% is adopted at one place only where it was unavoidable due to the terrain condition; otherwise a gradient of 1.0% is adopted.

Efforts have been made to keep the grade line smooth that matches with the character of the terrain.

Intersections: Since, anticipated traffic volume is high in the proposed industrial estate development project the smooth traffic movement prevails over high speed, all the intersections are kept at grade only. Thus the basic requirement for the design of intersections in the proposed industrial estate is to cater to safe movements for the traffic and to provide them full traffic information by way of traffic signs, pavement markings and traffic signals. Further simplicity and uniformity has been considered as the guiding principles for intersection design and to ensure the safe passage of movements.

Though IRC-SP:41-1994 gives the monogram for warrants for the different types of at-grade or grade separated intersections, these warrants are based upon the traffic volumes on each of the two intersecting roads. The type of intersection to be provided shall be based on these IRC guidelines. Similarly, warrants given in the "Type Designs for intersections on National Highway" published by MORT & H have also been taken into consideration for the design of intersections. However looking at the very high level of traffic the at grade intersections have been categorized in two types:

- Intersections within sub links
- Intersection of sub links with the main link.

Road Junctions

Types of Junctions: The following types of junctions have been identified.

- Tee Junctions
- 4 Arm Junctions

Features of Junctions: The following features have been included in the Junctions of proposed industrial estate.

- Initially all junctions shall be of Non signalized type, Later they can be converted to signalized junctions in due course as traffic volume grow without any major changes in the layout of the curves and islands.
- Pedestrian crossing (Zebra Crossings) will be marked.
- Turning arrows will be marked
- Centre lines and lane lines will be demarcated
- Traffic safety aids such as studs (cluster of red reflectors) shall be provided at the nose of islands and rotary islands.
- Traffic signs shall be installed.
- For all junctions the turning radius shall be kept as 13m.

Sight Distance: Sight distance is required for safe movement of traffic on road and at intersections. The driver's ability to judge the hazard of entering an intersection is very much enhanced as the visibility

is increased by removal of obstructions falling in the line of sight. Improvements to sight distance have been impacted by making the corners of the prosperity lines circular parallel to the radius of the outer line of the carriageway or by giving greenstrip between carriageway and plot lines.
Drainage: Drainage is an essential component of road and intersections and therefore, the design should facilitate the removal of storm water from the junction expeditiously. Accordingly suitable gradients and cross-slopes have been provided to ensure proper drainage of junctions.

2.3.8 Constructions of Boundary Walls: The boundary wall is proposed to be constructed for the security of industrial estate.

2.3.9 Electrification Requirement of Industrial Estate: Total electrical load will be about 123 MW and it will be supplied by UPCL (Uttarakhand Power Corporation Limited). Industries will have a power load of 72 MW while residential; commercial and utilities will have a power load of 51 MW Construction work will be carried out through the electrical connection (60KW) at site. Thus, storage of fuel is not proposed. About 10% of the total electrical load (12 MW) will be met via solar power that will connect to the common areas.
Transportation will be done through dumpers or trucks operating on diesel.

2.3.10 Solid Waste: There will be various kinds of wastes generated from the proposed IE. Uncontrolled waste dumping causes soil pollution and subsequently groundwater pollution. Hence, to handle the wastes and their management, an area will be demarcated. Municipal solid waste (2.75 tons/day) 90 % biodegradable will be treated in an Organic Waste converter. Other wastes like the recyclable waste will be handed over to an authorized recycler. Industrial process waste (approx. 22.5 Tons/day) will be generated as per type of industries coming up in the project premises and individual unit will be responsible for management of its industrial waste. Hazardous wastes will be handed over to authorized agency.

2.3.11 Details of Tree felling: There were 710 tree in the phase-II, and permission to clear fell the same was granted by DFO- Tarai East (Haldwani) vide letter no 9/23-3 dated 04/07/2017 and all of them have been felled. The Permission from DFO and list of felled trees are attached as **Annexure- V**

2.3.12 Details of Green Belt & liabilities of individual Industries towards Green Belt: It is proposed to develop a 1.5m green belt along the periphery of the project site. About 44.49 ha of land area will be maintained green/park/canal with selected species to attenuate air and noise pollution from the project site. Species such as *Mangifera indica*(mango), *Azadiracta indica*(neem), *Dalbergia sissoo*(shisham), *Cassia fistula*(amaltas), *Aegle marmelos*(bel), *Polyalthia longifolia*(ashoka), *Tamarindus indicus* (imli), *Bombax ceiba*(silk cotton tree), *Delonix regia*(gulmohar) etc will be planted. This will also improve site aesthetics and help restore the ecological balance of the area.

2.3.13 Filling of land: The project boundary of the site is adjacent Begul River. The river is prone to flooding during monsoons. There is a small bund between the site and the river and it is in need of repair. Permission for the same will be sought from authorities. The project site has difference in elevation and will require cut and fill. The utilization of terrain depends upon the existing terrain and

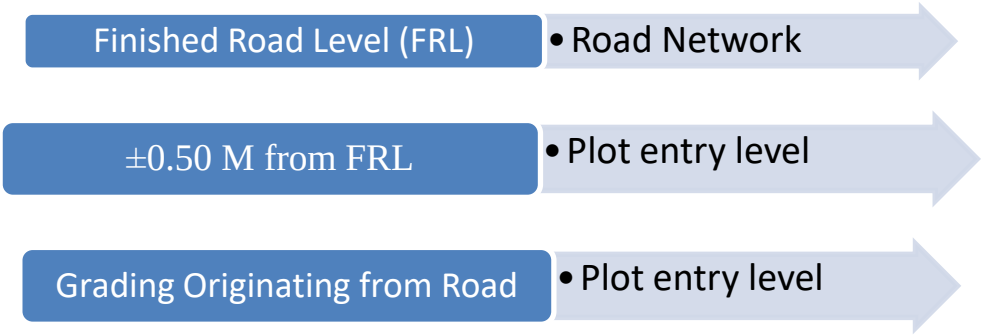
the road network design. The following factors necessitate the grading/ leveling of project site as follows.

1. Creating usable land parcels

2. Providing access to each plot/land parcel from designed finished road levels.

3. Reducing the need for each retaining structure such as retaining walls, embankments, bunds, pitched slopes etc, to stabilize areas closer to water channels.

The following grading strategy need to be followed.



Therefore to enhance the usability of land, the site needs to be graded to appropriate slopes and levels. About 14,538tons of soil& sand and gravel will be required for raising the land up to road level. The filling material will be sources at local level from Nandhour River mining area.

2.3.14 Abstract of the Project Cost: The total estimated project cost is Rs. 130.96/- Crore. The details are given below

S/n	Description of Service	Cost in lac
1	Water Supply System	1234.01
2	Sewerage System	775.36
3	Storm Water Disposal Services	5439.92
4	Recycling of Treated Effluent	779.46
5	Road Network	4867.25
	Total estimated project cost	13096.00

Include the cost of other details as per project components i.e. horticulture & road side plantation, solid waste management, storm water.

****

CHAPTER – III

DESCRIPTION OF THE ENVIRONMENT

3.0 Development of Environment Baseline:

3.1 The Objective: The Description of Existing Environment for the proposed industrial estate project has been made in this chapter to describe the existing environmental conditions in and around the project site (baseline environmental status). It identifies the environmental parameters that are consequent to the proposed industrial estate; type of industries coming up there and the impact of industries on environmentalparameters. Environment Management Plan (EMP), thus, prepared includes the general background of the project like process details, facilities description, details of major utility systems and special care, which needs to be taken during design/ construction/ operation stage for mitigating environmental impacts. The environmental parameters that have been include ambient air quality, water quality, aquatic ecology, micrometeorology, noise levels, flora and fauna etc. in accordance with the guidelines of the Ministry of Environment and Forests, Government of India.

Based on the project inputs, impact on the environmental parameters has been assessed using the standard methods. The existing environmental quality in the project area has been assessed based on current available data. Wherever data was not available, in order to make fair assessment ,actual monitoring in the field has been carried out. The potential sources of pollution owing to the project facilities have been identified.A study on wildlife and flora-fauna has been taken up in and around the project site.

3.1.1 Study Area: The Study area has been covered10 Kilometerradius around project boundary. Various Physical environmental components, Socioeconomic, Biological components were monitored / studied in this zone.The project area is identified as core area of the study.

3.1.2 Methodology: Team of experts from ASTPL and laboratory team from Noida testing laboratories conducted the baseline study along with officials ofState Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. The sampling points for the survey were selected on the basis of following points:

- Predominant wind direction in the study area as recorded by India Meteorological Department (IMD);
- Existing topography;
- Location of surface water bodies;
- Location of various receptors
- Location of village/towns;
- Power accessibility and security of monitoring equipment;

Methodology used for preparation of report is as per the Standard operating procedure submitted to QCI NABET. Field studies were conducted for a period of three months December 2020 to February 2021 (winter season) to determine the existing conditions of various environmental attributes. The environmental attribute along with monitoring frequency is given in table 3.1 below:-

TABLE-3.1-ENVIRONMENTAL ATTRIBUTES AND FREQUENCY OF MONITORING

S. No	Particulars	Sampling Locations	Sampling Parameters	Sampling Period/Sampling Type	Sampling Frequency
1.0	Meteorology	One central location of Project Site	Temperature, Wind speed, Wind Direction, relative humidity, rainfall	Dec 2020 to Feb 2021	Continuous hourly recording for three month only
2.0	Ambient air quality	10 locations of Core & Buffer Zone	PM_{10}, $PM_{2.5}$, SO_2, NOx, CO, NH3, O3, Pb. Ni. As & Benzo@pyrene as per NAAQMS-2009	Two consecutive days per week for 3 months	Once during study period
3.0	Water Quality	5Ground water and 4Surface water locations	As per IS 10500, parameters analysed using methods IS 3025/APHA & comparison with Indianstandards: IS: 10500: 2012.	Dec 2020 to Feb 2021&Grab Sampling	Once during study period
4.0	Noise	10Locations	Sound pressure level (Day & Night) as per CPCB	Continuously for 24 hrs.	Once during study period
5.0	Soil	4 Locations	Physical &Chemical constituents	Composite sample	Once during study period
6.0	Ecology	Study area	Flora and Fauna	Filed observations and secondary sources	Once in study period
7.0	Demography and Socio economic aspects	Study area	Demographic structure and social setup in the study area	Based on Primary Census Abstract, District census handbook (2011), Department of Industries, Planning Commission and primary data collection.	
8.0	Land use	Total study area	Trend of land use change for different categories	Based on analysis of NRSC data of LISS-III, ResourceSet-II 2017 data; SOI and primary data collection.	
9.0	Geology		Geological History	Data collected from secondary sources and extracted from geo-technical investigations within project site.	
10.0	Hydrogeology		Drainage area and pattern, nature of streams, aquifer characteristic, recharge and discharge rated	Data collected from secondary sources as well as hydrology, hydro-geology study report prepared separately.	

Source- EIA Guidance Manual forIndustrial Estate by IL&FS Ecosmart Limited

Monitoring period has been used for interpretation of the baseline scenario as well as for interpretation of impacts.

3.1.3 Climatology and Meteorology

A) IMD Meteorological Data

Historical data on climatological parameters recorded at Meteorological Center, Pantnagar located at about 19 km (aerial distance) in west direction of the project have been used to establish general meteorological regime of the study area while meteorological data recorded at site during the input to prediction model for area quality.

b)Temperature

As per the geography of the region it has been observed that from December, the ambient temperature gradually rise till June, which is the hottest month of the year with a maximum and minimum of 40 ^{0}C and 4 ^{0}C, respectively.

c) Rain Fall

The annual normal rainfall of the district comes to be approx. 1106 mm. The maximum rainfall occurs during the monsoon period i.e., June to September having the normal value of 1137 mm which is about 102.8% of annual rainfall.

d) Wind Direction

Metrological data is taken for the period of December 2020 to February 2021 procured from the windrose for an average of 30 years as per Climatological Normals (1985-2000). Extrapolation of wind data has been done as per "Assessment of Impact to Air Environment: Guidelines for conducting Air Quality Modeling" published by CPCB, Delhi in 1998 (Ref: PROBES/70/1997-98). The windrose was plotted which is shown below in Figure 3.1, showing historical direction of the wind from December to Febuary.

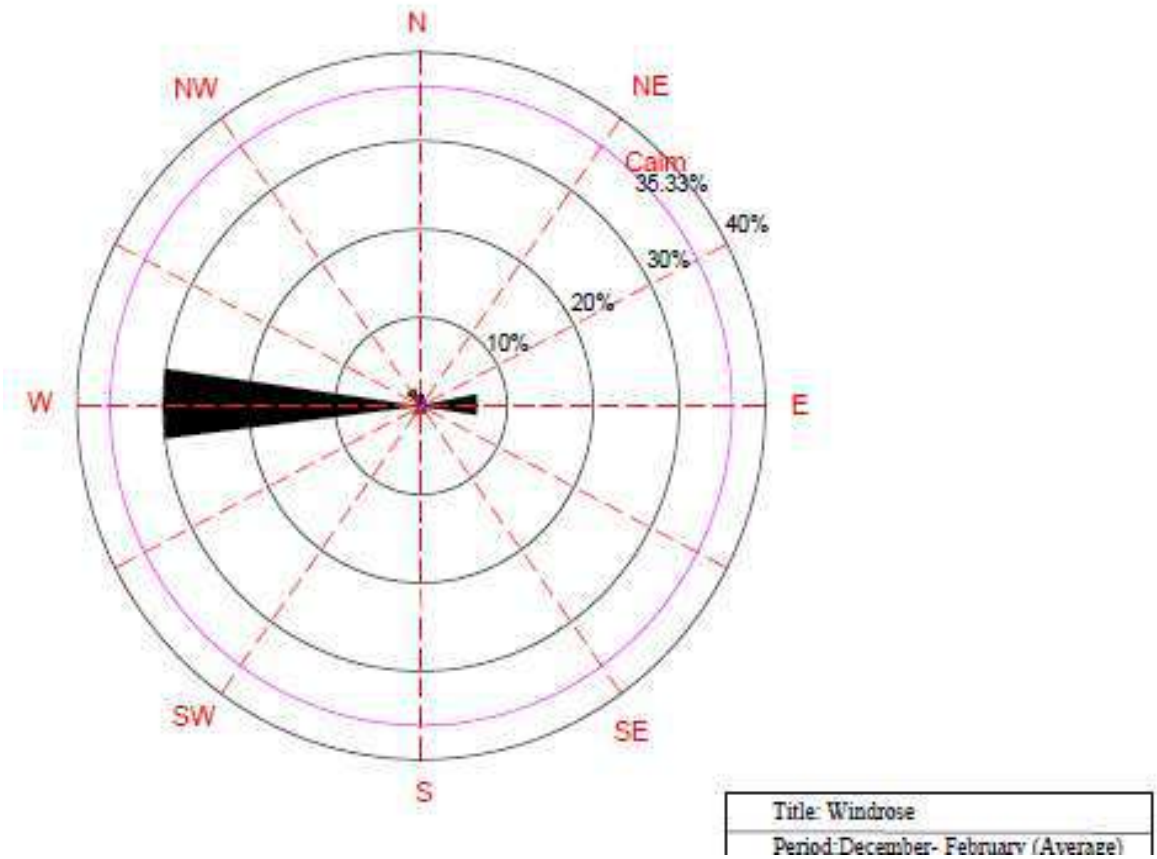


Figure 3.1: Windrose based on IMD data (Historical Average for December to Febuary)

Inference: Historically, the direction of the wind is from West to East followed by NE to SE, as observed from the average of 30 years. Hence, the monitoring locations for upwind directions have been taken in West direction, while that in east as Downwind direction, North, NE& SW directions can be considered as Crosswind direction as per the historical wind pattern of the region.

e) Wind rose:

This section makes a comparative analysis of the meteorological data of the study area collected by the project team in December 2020 to February 2021. An automatic weather monitoring station (AWS) was installed during the study period to record various meteorological parameters on hourly basis to understand the wind speed & direction, temperature variation, cloud cover, rainfall and relative humidity at 1-hour interval during December 2020 to February 2021The windrose was plotted with the aid of software WR PLOT which is shown in Fig 3.12 and following results have been obtained.

The monthly mean meteorological data recorded are given as follows:-

TABLE-3.2-MICRO-METEOROLOGY AT SITE

Months-	Avg. Wind Speed (m/s)	Temperature °C)		Relative Humidity (%)		Avg. Rainfall (mm)
		Highest	Lowest	Highest	Lowest	
December	2.71	24	4	100	38	0.39
January	2.48	25	5	100	55	0
Febuary	2.64	31	9	100	25	0

The recorded wind pattern data during the study period have been used to plot wind roses. Windrose have been plotted with the aid of software AERMET and WR PLOT and following results have been obtained.

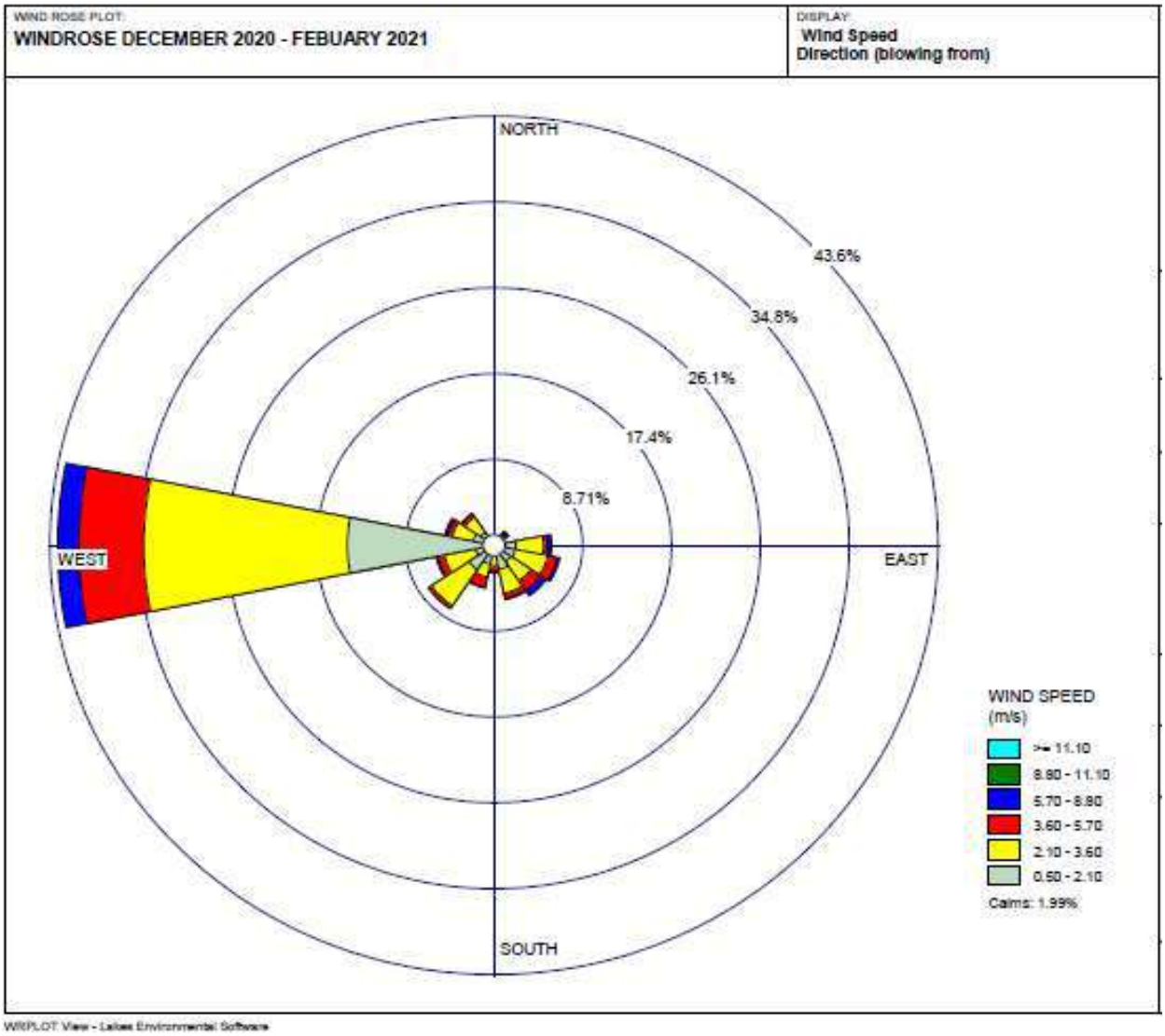


Figure 3.2 Windrose diagram at the Site (December 2020 to February 2021)

Interpretation of Wind rose:

- Predominant wind directionisfromWest
- Second &third predominant wind directionarefromNW and SW respectively.
- Calm conditionswere recorded as1.99 %.
- Average wind speedwasfound to be2.60m/s.

3.2 AIR ENVIRONMENT: Air quality is influenced by a number of factors, which includes natural (e.g. winds, thermal profile, humidity etc.) and anthropogenic or manmade (e.g. road dust, emissions from vehicles, domestic fuel burning, construction activities, industrial emissions etc.) factors. An assessment of the existing air quality status was carried out in 10 Km (from project boundary) radius at ten different locations. (For pics refer Annexure-VIII) It would provide the ground level concentration of air quality indicators. The impact of the project on local Ambient Air Quality can be compared with the baseline AAQ scenario.

The baseline status is assessed though a scientifically designed ambient air quality monitoring network based on the following considerations:-

- Meteorological conditions including wind direction;
- Topography of the study area;
- Existing Ambient Air Quality for obtaining baseline;

3.2.1 Frequency and Parameters of Monitoring:

AMBIENTairqualitymonitoringhasbeencarriedoutwithafrequencyoftwice in a week at ten monitoring locations (10)for the period December 2020 toFebruary 2021. The monitoring ofambient air hasbeen carried out for the following parameters as mentioned below:

- Particulate Matter$_{10}$ (PM_{10})
- Particulate Matter$_{2.5}$ ($PM_{2.5}$)
- Sulphur dioxide (SO_2)
- Nitrogen Oxide(NO_2)
- Carbon monoxide (CO)
- Ammonia
- Ozone
- Lead
- Nickel
- Arsenic
- Benzo pyrene

3.2.2 INSTRUMENTS USED FOR SAMPLING

In order to assess the Ambient Air Quality (AAQ), samples of ambient air were collected by installation of Respirable Dust Sampler and Fine Particulate Sampler at different locations within the study area and analyzed to find out the existing status of ambient air quality.

3.2.3 SAMPLING AND ANALYTICAL TECHNIQUE

With a view to collecting the samples, Envirotech made Fine Particulate Sampler and Respirable Dust Samplers along with Gaseous attachment have been used. Filter papers were used for the collection of PM_{10} & $PM_{2.5}$. The gaseous components were collected by drawing air at a flow-rate of 0.5 liters per minute (lpm) through an absorbing solution. Carbon monoxide was collected 8 hourly and analyzed by Non-Dispersive Infra-Red Spectroscopy (NDIR).

3.2.4 SELECTION OF SAMPLING LOCATIONS:

Ambient air quality monitoring (AAQM) stations (10 in nos.) were selected on the basis of topography and meteorology of the area which are as follows:-

- One location marked at project site
- One (1 no.) AAQM location in the upwind direction of wind within 1 km as supported by wind-rose of the season.
- Two AAQM locations on the downwind directions (within 2 km).
- One AAQM location represents the silent areas within the vicinity.
- One AAQM location represents the Commercial area and transportation route

- Two AAQM locations represent the Cross wind direction nearest to commercial area and road connecting the proposed project area where potential supply of materials will occur.
- Two AAQM locations represent commercial area and other area in SSW direction.

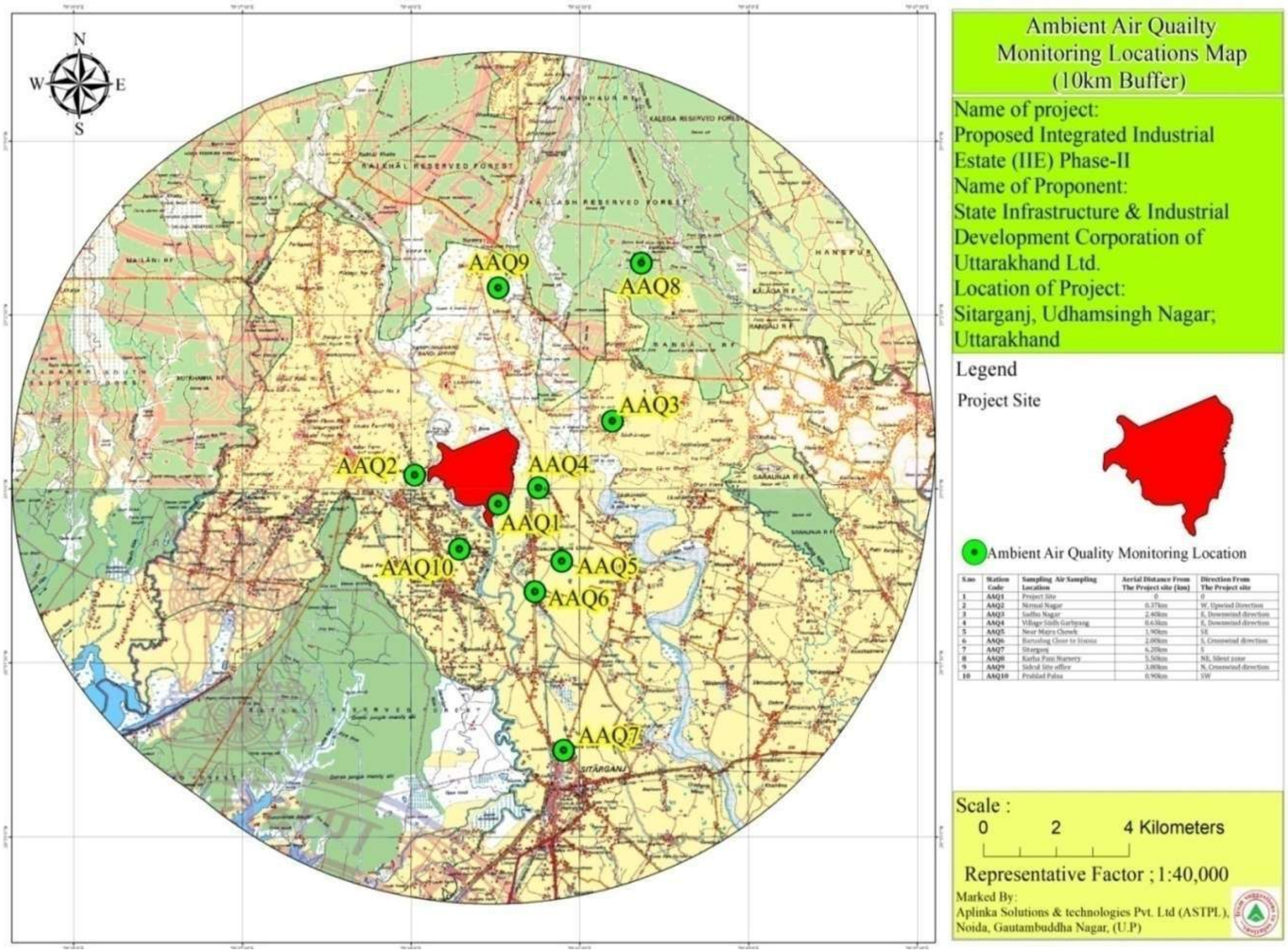
The monitoring stations have been set up in order to locate the locations as close as feasible to the anticipated maximum pollutant concentration areas Logistic considerations such asaccessibility, security, and availability of reliable power supply etc, were also examined while finalizing the stations. The monitoring locations are given in Table 3.3.

Table3.3: Ambient Air Quality Monitoring Locations

S. No.	Code	Location	Dist. from the project site (km)	Direction	Selection criteria
1	AAQ1	Project Site	--	--	--
2	AAQ2	Nirmal Nagar	Approx. 0.37	W	Upwind Direction in West
3	AAQ3	Sadhu Nagar	Approx. 2.40	E	Downwind direction in East)
4	AAQ4	SiidhGarbyang	Approx. 0.63	E	Downwind direction in NE)
5	AAQ5	Near MajraChowk	Approx. 1.90	SE	on transportation route in SE direction
6	AAQ6	Baruabag closed to Sisona	Approx. 2.00	SE	Crosswind direction and on transport route in SE Direction
7	AAQ7	Sitarganj	Approx. 6.20	S	Town -Commercial area in South direction
8	AAQ8	KarhaPani Nursery	Approx. 5.50	SE	Silent zone
9	AAQ9	SIIDCUL Office	Approx. 3.80	N	Crosswind direction near commercial area in NW direction
10	AAQ10	PrahladPalsa	Approx. 0.90	SSW	in SSW Direction

Source: Onsite monitoring

The monitoring map as shown in the toposheet is shown in Figure 3.3.



S.no	Station Code	Sampling Air Sampling Location	Aerial Distance From The Project site (km)	Direction From The Project site
1	AAQ1	Project Site	0	0
2	AAQ2	Nirmal Nagar	0.37km	W, Upwind Direction
3	AAQ3	Sadhu Nagar	2.40km	E, Downwind direction
4	AAQ4	Village Sindh Garhpang	0.63km	E, Downwind direction
5	AAQ5	Near Magra Chowk	1.90km	SE
6	AAQ6	Barsalag Close to Station	2.00km	S, Crosswind direction
7	AAQ7	Sitarganj	6.20km	S
8	AAQ8	Karha Pani Nursery	5.50km	NE, Silent zone
9	AAQ9	Sidcul Site office	3.00km	N, Crosswind direction
10	AAQ10	Prahlad Palsia	0.90km	SW

Figure 3.3: Ambient Air Quality Monitoring Locations marked on SOI Toposheet

Table3.4: Ambient Air Quality Monitoring Location – AAQ-1(Project Site)

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
01.12.20	52.63	28.47	8.62	12.96	0.86	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
04.12. 20	56.26	28.63	11.78	11.06	0.89	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
08.12.20	52.14	35.72	10.96	15.28	0.92	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
11.12.20	59.80	37.42	8.45	10.86	0.95	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
16.12.20	57.48	24.53	10.86	13.85	0.836	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
19.12.20	54.85	28.63	10.33	11.32	0.75	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
23.12.20	44.25	24.75	8.52	14.63	0.92	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
27.12.20	53.85	26.58	8.18	15.29	0.93	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
02.01.21	56.32	26.51	10.47	12.45	0.91	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
06.01.21	57.48	27.35	8.63	10.57	1.38	<20.0	14.0	<0.1	<1.0	<1.0	<0.01
08.01.21	59.38	27.46	10.23	11.24	0.52	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
12.01.21	58.53	28.42	8.23	11.52	0.35	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
16.01.21	59.68	28.42	8.48	14.63	0.59	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
20.01.21	58.47	28.62	10.85	15.42	1.56	<20.0	14.0	<0.1	<1.0	<1.0	<0.01
24.01.21	58.69	27.42	8.18	10.66	1.4	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
27.01.21	55.63	26.35	8.65	14.57	0.63	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
02.02.21	58.63	25.47	10.42	11.47	0.53	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
06.02.21	59.45	28.42	8.17	13.45	0.32	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
10.02.21	55.21	25.96	8.75	12.53	1.47	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
14.02.21	57.42	25.47	8.19	10.74	0.65	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
17.02.21	53.63	25.63	11.97	14.25	0.89	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
20.02.21	55.50	28.42	10.42	13.52	0.48	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
25.02.21	58.42	26.45	10.53	13.65	1.56	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
29.02.21	59.63	25.63	8.16	15.47	0.66	<20.0	13.0	<0.1	<1.0	<1.0	<0.01

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
min	**44.25**	**24.53**	**8.16**	**10.57**	**0.32**	**<20.0**	**13.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
max	**59.80**	**37.42**	**11.97**	**15.47**	**1.56**	**<20.0**	**21.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
stdev	**3.47**	**3.03**	**1.29**	**1.73**	**0.37**	**<20.0**	**2.32**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 98	**59.74**	**36.64**	**11.88**	**15.45**	**1.56**	**<20.0**	**21.00**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
Mean	**56.39**	**27.78**	**9.50**	**12.97**	**0.87**	**<20.0**	**16.83**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 95	**59.67**	**34.66**	**11.66**	**15.40**	**1.55**	**<20.0**	**20.85**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Source: Baseline Lab Monitoring by Noida testing laboratory

Table3.5: Ambient Air Quality Monitoring Location – AAQ -2 (Nirmal Nagar)

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
01.12.20	62.99	28.35	9.65	12.96	1.22	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
04.12. 20	60.58	27.26	11.24	11.06	1.28	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
08.12.20	53.62	26.35	13.25	15.28	1.47	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
11.12.20	61.31	31.52	9.88	11.10	1.65	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
16.12.20	61.01	31.63	9.85	13.85	1.55	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
19.12.20	59.86	28.45	10.96	11.32	1.24	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
23.12.20	50.24	28.69	9.49	14.63	0.35	<20.0	14.0	<0.1	<1.0	<1.0	<0.01
27.12.20	61.06	29.35	9.57	15.29	1.24	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
02.01.21	56.32	29.85	9.63	12.45	1.18	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
06.01.21	60.98	27.44	9.75	11.63	1.38	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
08.01.21	61.35	31.42	10.42	11.24	0.52	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
12.01.21	59.88	31.69	9.48	11.52	0.43	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
16.01.21	68.45	29.63	9.47	14.63	0.59	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
20.01.21	63.48	28.57	11.42	15.42	1.56	<20.0	18.0	<0.1	<1.0	<1.0	<0.01

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
24.01.21	66.48	29.92	9.74	11.85	1.4	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
27.01.21	54.74	32.56	9.52	14.57	0.63	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
02.02.21	63.59	38.63	12.35	11.47	0.53	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
06.02.21	62.85	40.10	9.68	13.45	0.57	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
10.02.21	58.28	29.85	9.75	12.53	1.47	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
14.02.21	60.75	29.45	9.42	12.36	0.65	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
17.02.21	61.31	29.74	12.35	14.25	1.6	<20.0	22.0	<0.1	<1.0	<1.0	<0.01
20.02.21	56.39	29.56	10.42	13.52	0.48	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
25.02.21	61.10	27.50	9.63	13.65	1.5	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
29.02.21	60.53	28.65	9.45	15.47	0.66	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
min	**50.24**	**26.35**	**9.42**	**11.06**	**0.35**	**<20.0**	**14.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
max	**68.45**	**40.10**	**13.25**	**15.47**	**1.65**	**<20.0**	**23.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
stdev	**3.94**	**3.21**	**1.09**	**1.54**	**0.46**	**<20.0**	**2.04**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 98	**67.54**	**39.42**	**12.84**	**15.45**	**1.63**	**<20.0**	**22.54**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
Mean	**60.30**	**30.26**	**10.27**	**13.15**	**1.05**	**<20.0**	**18.46**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 95	**66.05**	**37.72**	**12.35**	**15.40**	**1.59**	**<20.0**	**21.85**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Source: Baseline Lab Monitoring by Noida testing laboratory

Table3.6: Ambient Air Quality Monitoring Location – AAQ -3 (Sadhu Nagar)

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
01.12.20	48.69	27.42	9.542	12.65	1.11	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
04.12. 20	49.52	29.56	10.78	10.52	0.78	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
08.12.20	52.66	27.42	7.69	10.36	0.92	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
11.12.20	55.62	28.42	8.53	11.58	0.83	<20.0	18.0	<0.1	<1.0	<1.0	<0.01

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
16.12.20	58.45	36.2	8.42	10.58	1.11	<20.0	22.0	<0.1	<1.0	<1.0	<0.01
19.12.20	47.42	31.42	9.63	10.45	0.82	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
23.12.20	49.63	35.42	9.52	12.48	0.94	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
27.12.20	58.45	27.59	9.48	13.85	1.01	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
02.01.21	56.32	27.45	9.78	13.48	0.81	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
06.01.21	54.12	29.58	9.42	12.46	0.42	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
08.01.21	54.85	29.6	12.69	13.63	0.86	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
12.01.21	54.69	27.42	9.86	14.21	1.05	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
16.01.21	52.63	28.45	9.75	13.68	0.814	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
20.01.21	52.96	29.63	9.42	12.47	0.98	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
24.01.21	57.34	32.45	9.63	14.55	0.82	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
27.01.21	52.69	35.66	10.58	12.65	1.03	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
02.02.21	59.60	36.85	9.74	12.58	0.84	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
06.02.21	61.52	27.42	9.45	13.63	0.95	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
10.02.21	58.54	29.8	9.55	12.45	1.35	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
14.02.21	58.63	28.63	9.55	12.47	0.86	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
17.02.21	62.42	38.89	10.63	12.65	1.01	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
20.02.21	64.14	27.45	9.75	12.45	0.84	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
25.02.21	58.42	28.65	9.68	12.63	0.98	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
29.02.21	49.745	27.06	9.74	12.54	0.66	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
min	**47.42**	**27.06**	**7.69**	**10.36**	**0.42**	**<20.0**	**16.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
max	**64.14**	**38.89**	**12.69**	**14.55**	**1.35**	**<20.0**	**22.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
stdev	**4.53**	**3.58**	**0.91**	**1.16**	**0.18**	**<20.0**	**1.74**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 98	**63.35**	**37.95**	**11.81**	**14.40**	**1.24**	**<20.0**	**21.54**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
Mean	**55.38**	**30.35**	**9.70**	**12.54**	**0.91**	**<20.0**	**18.63**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
P 95	**62.29**	**36.75**	**10.76**	**14.16**	**1.11**	**<20.0**	**21.00**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Source: Baseline Lab Monitoring by Noida testing laboratory

Table3.7: Ambient Air Quality MonitoringLocation – AAQ -4 (Siddhgarbyang)

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
05.12.20	71.53	28.63	8.36	10.58	0.53	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
06.12.20	52.49	36.48	9.24	12.56	1.24	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
09.12.20	60.38	27.48	10.26	10.54	1.60	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
13.12.20	70.14	37.70	9.23	10.57	1.38	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
15.12.20	59.42	30.48	10.11	10.39	0.52	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
22.12.20	60.11	25.63	8.20	11.40	0.56	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
27.12.20	63.54	28.96	10.41	12.57	0.59	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
29.12.20	70.85	39.42	8.37	10.43	1.36	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
02.01.21	60.29	30.52	12.11	15.95	1.40	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
05.01.21	61.38	28.45	10.25	10.48	1.65	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
08.01.21	60.37	24.96	10.36	10.52	1.05	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
10.01.21	70.45	36.74	10.11	10.34	1.25	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
14.01.21	52.59	26.85	9.76	11.35	1.45	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
18.01.21	54.31	39.14	10.40	11.37	1.36	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
21.01.21	71.24	29.85	10.31	10.42	1.57	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
27.01.21	70.50	26.39	9.81	11.34	1.11	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
03.02.21	52.45	24.56	12.21	15.42	1.52	<20.0	24.0	<0.1	<1.0	<1.0	<0.01
06.02.21	58.87	38.52	9.55	10.51	0.89	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
09.02.21	70.09	26.45	8.89	10.52	0.78	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
12.02.21	70.15	28.42	9.21	10.58	1.52	<20.0	18.0	<0.1	<1.0	<1.0	<0.01

Monitoring Date	PM 10	PM 2.5	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
14.02.21	52.79	29.15	8.33	10.56	0.56	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
16.02.21	70.24	33.15	12.09	15.34	1.63	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
21.02.21	53.31	26.46	10.21	10.57	0.68	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
23.02.21	70.39	34.85	10.34	10.38	0.99	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
min	**52.45**	**24.56**	**8.20**	**10.34**	**0.52**	**<20.0**	**15.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
max	**71.53**	**39.42**	**12.21**	**15.95**	**1.65**	**<20.0**	**24.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
stdev	**7.34**	**4.88**	**1.13**	**1.71**	**0.40**	**<20.0**	**2.39**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 98	**71.40**	**39.29**	**12.16**	**15.71**	**1.64**	**<20.0**	**23.54**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
Mean	**62.83**	**30.80**	**9.92**	**11.45**	**1.13**	**<20.0**	**18.96**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 95	**71.18**	**39.05**	**12.11**	**15.41**	**1.63**	**<20.0**	**23.00**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Source: Baseline Lab Monitoring by Noida testing laboratory

Table3.8: Ambient Air Quality MonitoringLocation – AAQ -5 (Near Majra Chowk)

Monitoring Date	PM 10	PM 2.5	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
05.12.20	82.42	43.55	16.47	13.54	0.65	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
06.12.20	62.42	30.55	10.35	22.63	1.36	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
09.12.20	69.48	42.53	16.42	10.42	0.96	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
13.12.20	75.63	32.69	12.48	24.21	0.75	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
15.12.20	82.63	35.42	10.65	12.79	0.95	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
22.12.20	66.49	41.25	16.35	15.56	1.47	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
27.12.20	67.43	34.25	12.85	15.42	0.89	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
29.12.20	82.45	31.96	11.21	12.50	0.69	<20.0	25.0	<0.1	<1.0	<1.0	<0.01
02.01.21	74.52	30.86	10.56	10.68	1.10	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
05.01.21	85.96	45.32	10.69	15.63	1.66	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
08.01.21	70.61	30.86	16.53	20.46	0.65	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
10.01.21	81.36	48.62	12.69	15.53	1.66	<20.0	18.0	<0.1	<1.0	<1.0	<0.01

Monitoring Date	PM $_{10}$	PM $_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
14.01.21	85.42	34.85	14.85	10.74	1.85	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
18.01.21	73.56	40.15	10.68	12.68	0.66	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
21.01.21	60.30	30.85	13.42	15.72	0.58	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
27.01.21	81.63	34.15	12.54	14.66	0.69	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
03.02.21	85.63	30.48	15.42	25.32	0.87	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
06.02.21	59.73	31.45	13.56	10.55	1.47	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
09.02.21	78.42	42.15	12.63	12.45	1.69	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
12.02.21	81.24	35.48	10.67	22.45	0.96	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
14.02.21	66.49	30.68	10.62	14.72	0.87	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
16.02.21	67.43	30.42	11.24	23.46	1.63	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
21.02.21	71.45	31.85	10.63	13.51	1.11	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
23.02.21	59.99	28.63	11.52	12.73	0.89	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
min	**59.73**	**28.63**	**10.35**	**10.42**	**0.58**	**<20.0**	**15.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
max	**85.96**	**48.62**	**16.53**	**25.32**	**1.85**	**<20.0**	**25.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
stdev	**8.78**	**5.69**	**2.19**	**4.68**	**0.40**	**<20.0**	**2.30**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 98	**85.81**	**47.10**	**16.50**	**24.81**	**1.78**	**<20.0**	**24.08**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
Mean	**73.86**	**35.38**	**12.71**	**15.77**	**1.09**	**<20.0**	**18.79**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
95%	**85.60**	**45.05**	**16.46**	**24.10**	**1.69**	**<20.0**	**22.70**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Source: Baseline Lab Monitoring by Noida testing laboratory

Table3.9: Ambient Air Quality MonitoringLocation – AAQ -6 (Baruabag closed to Sisona)

Monitoring Date	PM $_{10}$	PM $_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
02.12.20	71.56	30.62	10.56	10.98	1.24	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
05.12.20	80.64	42.85	9.75	10.98	0.86	<20.0	14.0	<0.1	<1.0	<1.0	<0.01
08.12.20	58.47	29.56	12.86	12.02	1.57	<20.0	23.0	<0.1	<1.0	<1.0	<0.01

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
10.12.20	80.65	43.65	10.36	11.12	1.48	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
14.12.20	60.42	27.45	10.11	13.97	0.96	<20.0	24.0	<0.1	<1.0	<1.0	<0.01
17.12.20	59.63	27.05	13.14	10.99	1.72	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
21.12.20	81.75	37.85	10.49	11.00	0.75	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
24.12.20	74.58	44.58	10.31	11.14	1.38	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
03.01.21	59.75	28.79	9.81	12.16	1.19	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
07.01.21	82.59	31.78	10.21	14.03	0.96	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
10.01.21	76.66	34.74	12.47	11.07	0.44	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
14.01.21	65.85	44.63	10.65	15.4	0.86	<20.0	25.0	<0.1	<1.0	<1.0	<0.01
19.01.21	59.37	30.62	9.87	11.11	0.47	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
22.01.21	84.56	34.52	10.24	13.08	0.58	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
26.01.21	76.42	44.15	12.85	12.07	1.52	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
30.02.21	65.35	34.21	13.05	11.10	1.48	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
01.02.21	79.42	33.58	10.33	14.12	0.86	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
04.02.21	82.42	38.42	10.59	11.01	1.36	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
08.02.21	62.63	32.58	12.45	10.98	1.19	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
13.02.21	58.40	40.25	9.93	10.97	0.86	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
16.02.21	78.15	33.57	10.11	11.16	1.06	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
24.02.21	81.63	35.96	9.83	11.14	1.08	<20.0	14.0	<0.1	<1.0	<1.0	<0.01
26.02.21	59.63	27.12	12.63	11.12	1.53	<20.0	12.0	<0.1	<1.0	<1.0	<0.01
28.02.21	59.45	27.04	9.74	10.96	0.56	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
min	**58.40**	**27.04**	**9.74**	**10.96**	**0.44**	**<20.0**	**12.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
max	**84.56**	**44.63**	**13.14**	**15.40**	**1.72**	**<20.0**	**25.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
stdev	**9.93**	**5.99**	**1.25**	**1.30**	**0.37**	**<20.0**	**3.27**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 98	**83.65**	**44.61**	**13.10**	**14.81**	**1.65**	**<20.0**	**24.54**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
Mean	**70.83**	**34.82**	**10.93**	**11.82**	**1.08**	**<20.0**	**18.25**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
95%	**82.56**	**44.52**	**13.02**	**14.11**	**1.56**	**<20.0**	**23.85**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Source: Baseline Lab Monitoring by Noida testing laboratory

Table3.10: Ambient Air Quality MonitoringLocation – AAQ -7 (Sitarganj)

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
02.12.20	61.52	32.88	12.69	15.63	0.86	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
05.12.20	77.05	43.92	10.85	22.14	1.11	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
08.12.20	62.35	33.83	14.25	19.51	0.75	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
10.12.20	71.52	40.77	11.42	14.12	0.83	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
14.12.20	75.96	43.30	10.58	16.42	1.24	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
17.12.20	62.56	35.66	12.48	21.45	0.95	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
21.12.20	81.42	46.41	11.58	20.63	0.92	<20.0	14.0	<0.1	<1.0	<1.0	<0.01
24.12.20	62.30	35.51	10.36	18.25	1.63	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
03.01.21	65.86	37.54	13.48	26.53	0.75	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
07.01.21	75.42	42.99	10.85	24.15	0.76	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
10.01.21	76.20	43.43	11.65	20.58	0.92	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
14.01.21	79.45	45.29	10.47	17.42	1.54	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
19.01.21	89.45	50.99	10.63	24.10	1.74	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
22.01.21	85.42	48.69	10.53	27.45	0.98	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
26.01.21	84.66	48.25	12.42	16.53	0.97	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
30.02.21	80.45	45.86	17.42	22.47	1.78	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
01.02.21	74.15	42.27	10.75	25.48	1.17	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
04.02.21	71.53	40.77	10.45	19.68	0.84	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
08.02.21	67.45	38.45	17.42	15.42	0.87	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
13.02.21	69.69	39.72	10.26	21.11	1.89	<20.0	19.0	<0.1	<1.0	<1.0	<0.01

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
16.02.21	68.45	39.02	13.65	18.45	1.45	<20.0	22.0	<0.1	<1.0	<1.0	<0.01
24.02.21	74.52	42.48	14.52	14.53	0.98	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
26.02.21	60.69	33.61	10.36	23.45	0.96	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
28.02.21	62.35	33.43	15.32	22.36	1.55	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
min	**60.69**	**32.88**	**10.26**	**14.12**	**0.75**	**<20.0**	**14.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
max	**89.45**	**50.99**	**17.42**	**27.45**	**1.89**	**<20.0**	**23.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
stdev	**8.39**	**5.20**	**2.18**	**3.81**	**0.36**	**<20.0**	**2.19**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 98	**87.60**	**49.93**	**17.42**	**27.03**	**1.84**	**<20.0**	**23.00**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
Mean	**72.52**	**41.04**	**12.27**	**20.33**	**1.14**	**<20.0**	**19.13**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
95%	**85.31**	**48.62**	**17.11**	**26.37**	**1.77**	**<20.0**	**22.85**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Source: Baseline Lab Monitoring by Noida testing laboratory

Table3.11: Ambient Air Quality MonitoringLocation – AAQ -8 (Karha Pani Nursery)

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
03.12.20	32.52	17.24	3.56	6.85	0.32	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
07.12.20	29.56	14.65	5.42	5.96	0.25	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
12.12.20	31.52	17.52	3.85	5.11	0.39	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
15.12.20	28.45	17.45	3.45	6.57	0.42	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
18.12.20	21.02	13.25	4.15	5.45	0.25	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
22.12.20	23.63	14.53	5.21	7.45	0.15	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
26.12.20	26.53	15.66	3.58	6.96	0.35	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
29.12.20	25.42	14.24	5.63	5.55	0.26	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
01.01.21	28.63	16.52	4.21	6.53	0.35	<20.0	24.0	<0.1	<1.0	<1.0	<0.01
05.01.21	23.63	15.58	3.56	7.42	0.28	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
09.01.21	25.42	16.85	3.85	6.85	0.44	<20.0	16.0	<0.1	<1.0	<1.0	<0.01

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
13.01.21	24.15	16.42	4.56	5.96	0.14	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
17.01.21	25.63	15.24	4.52	5.85	0.35	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
21.01.21	26.35	14.58	4.14	6.24	0.29	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
25.01.21	24.15	13.77	5.63	7.46	0.38	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
29.01.21	23.53	13.69	5.21	6.48	0.27	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
03.02.21	22.58	12.54	3.58	6.58	0.42	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
07.02.21	28.45	16.88	3.58	7.45	0.39	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
11.02.21	26.35	16.87	5.26	6.24	0.35	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
15.02.21	24.58	14.99	4.25	7.45	0.36	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
18.02.21	28.53	16.84	3.69	6.58	0.42	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
21.02.21	26.35	15.47	3.48	6.53	0.18	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
24.02.21	22.85	13.45	3.47	7.35	0.25	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
27.02.21	28.42	14.25	3.99	7.42	0.45	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
min	**21.02**	**12.54**	**3.45**	**5.11**	**0.14**	**<20.0**	**15.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
max	**32.52**	**17.52**	**5.63**	**7.46**	**0.45**	**<20.0**	**24.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
stdev	**2.88**	**1.47**	**0.75**	**0.70**	**0.09**	**<20.0**	**2.42**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 98	**32.06**	**17.49**	**5.63**	**7.45**	**0.45**	**<20.0**	**23.54**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
Mean	**26.18**	**15.35**	**4.24**	**6.60**	**0.32**	**<20.0**	**18.71**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 95	**31.23**	**17.42**	**5.60**	**7.45**	**0.44**	**<20.0**	**23.00**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Source: Baseline Lab Monitoring by Noida testing laboratory

Table3.12: Ambient Air Quality MonitoringLocation – AAQ -9 (SIIDCUL Office)

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
03.12.20	59.36	29.80	8.63	10.52	1.06	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
07.12.20	71.45	29.77	12.69	16.36	1.05	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
12.12.20	59.30	29.78	11.70	16.78	1.25	<20.0	17.0	<0.1	<1.0	<1.0	<0.01

Monitoring Date	PM_{10}	$PM_{2.5}$	SO_2	NOx	CO	NH_3	Ozone	Lead	Nickel	Arsenic	Benzo @ Pyrene
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
15.12.20	78.45	38.14	8.45	10.63	1.45	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
18.12.20	75.36	30.25	10.47	11.47	1.36	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
22.12.20	78.42	29.86	11.72	16.72	1.78	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
26.12.20	59.38	39.75	8.96	10.48	1.68	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
29.12.20	71.00	29.53	11.73	16.72	1.52	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
01.01.21	57.30	35.91	10.73	11.69	0.89	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
05.01.21	72.15	32.02	8.59	11.47	0.78	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
09.01.21	59.45	29.76	10.59	11.42	0.96	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
13.01.21	73.69	39.64	11.70	16.76	0.56	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
17.01.21	74.52	33.78	8.57	15.94	1.63	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
21.01.21	71.56	30.22	9.86	16.37	1.48	<20.0	24.0	<0.1	<1.0	<1.0	<0.01
25.01.21	77.85	35.81	9.68	16.58	0.68	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
29.01.21	79.62	39.85	8.25	15.91	1.75	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
03.02.21	74.15	35.85	10.53	15.69	0.96	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
07.02.21	79.95	26.47	9.47	16.74	1.47	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
11.02.21	59.30	30.30	8.63	11.85	0.53	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
15.02.21	76.98	39.58	10.42	15.83	1.47	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
18.02.21	72.14	29.87	11.84	11.35	1.44	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
21.02.21	60.23	29.94	12.77	15.91	0.89	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
24.02.21	76.25	29.86	11.76	15.77	0.47	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
27.02.21	71.41	29.73	11.55	15.67	1.67	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
min	**57.30**	**26.47**	**8.25**	**10.48**	**0.47**	**<20.0**	**15.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
max	**79.95**	**39.85**	**12.77**	**16.78**	**1.78**	**<20.0**	**24.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
stdev	**7.80**	**4.16**	**1.45**	**2.54**	**0.41**	**<20.0**	**2.25**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 98	**79.80**	**39.80**	**12.73**	**16.77**	**1.77**	**<20.0**	**23.54**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
Mean	**70.39**	**32.73**	**10.39**	**14.36**	**1.20**	**<20.0**	**18.54**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
95%	**79.44**	**39.73**	**12.56**	**16.76**	**1.74**	**<20.0**	**22.70**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Source: Baseline Lab Monitoring by Noida testing laboratory

Table3.13: Ambient Air Quality MonitoringLocation – AAQ -10 (Prahlad Palsa)

Monitoring Date	**PM $_{10}$**	**PM $_{2.5}$**	**SO_2**	**NOx**	**CO**	**NH_3**	**Ozone**	**Lead**	**Nickel**	**Arsenic**	**Benzo @ Pyrene**
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
05.12.20	62.78	30.54	12.47	11.73	0.55	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
06.12.20	58.27	40.22	9.78	11.66	1.63	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
09.12.20	59.30	30.61	12.18	11.99	1.47	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
13.12.20	60.61	29.49	11.72	12.36	0.84	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
15.12.20	65.43	30.50	9.49	11.78	1.47	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
22.12.20	54.27	32.63	11.73	12.16	1.58	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
27.12.20	74.69	40.19	12.94	14.03	0.96	<20.0	15.0	<0.1	<1.0	<1.0	<0.01
29.12.20	58.56	30.67	9.67	10.42	1.24	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
02.01.21	60.72	32.53	12.69	13.98	1.66	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
05.01.21	74.65	29.46	11.70	11.89	0.87	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
08.01.21	74.39	28.53	9.58	13.08	1.32	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
10.01.21	61.62	30.49	12.96	10.35	1.44	<20.0	24.0	<0.1	<1.0	<1.0	<0.01
14.01.21	75.21	40.58	12.47	16.46	0.86	<20.0	16.0	<0.1	<1.0	<1.0	<0.01
18.01.21	76.89	31.73	9.63	15.88	1.75	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
21.01.21	69.37	33.76	12.94	11..65	1.48	<20.0	23.0	<0.1	<1.0	<1.0	<0.01
27.01.21	66.39	29.64	12.29	16.23	0.33	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
03.02.21	74.53	40.35	9.75	11.74	1.47	<20.0	20.0	<0.1	<1.0	<1.0	<0.01
06.02.21	67.43	30.52	11.32	14.67	1.75	<20.0	25.0	<0.1	<1.0	<1.0	<0.01
09.02.21	60.42	29.67	10.33	15.81	1.38	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
12.02.21	78.42	28.66	9.85	13.78	1.69	<20.0	18.0	<0.1	<1.0	<1.0	<0.01
14.02.21	74.29	40.12	11.73	10.24	1.58	<20.0	19.0	<0.1	<1.0	<1.0	<0.01
16.02.21	63.33	30.31	12.63	14.32	0.98	<20.0	21.0	<0.1	<1.0	<1.0	<0.01
21.02.21	78.63	28.43	10.12	11.63	1.18	<20.0	17.0	<0.1	<1.0	<1.0	<0.01
23.02.21	60.53	31.84	9.63	13.98	0.96	<20.0	18.0	<0.1	<1.0	<1.0	<0.01

Monitoring Date	**PM $_{10}$**	**PM $_{2.5}$**	**SO_2**	**NOx**	**CO**	**NH_3**	**Ozone**	**Lead**	**Nickel**	**Arsenic**	**Benzo @ Pyrene**
Standards	**100 µg/m³**	**60 µg/m³**	**80 µg/m³**	**80 µg/m³**	**2 mg/m³**	**400 µg/m³**	**100 µg/m³**	**1 µg/m³**	**20 ng/m³**	**6 ng/m³**	**1 ng/m³**
min	**54.27**	**28.43**	**9.49**	**10.24**	**0.33**	**<20.0**	**15.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
max	**78.63**	**40.58**	**12.96**	**16.46**	**1.75**	**<20.0**	**25.0**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
stdev	**7.56**	**4.25**	**1.33**	**1.90**	**0.39**	**<20.0**	**2.78**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 98	**78.53**	**40.47**	**12.95**	**16.36**	**1.75**	**<20.0**	**24.54**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
Mean	**67.11**	**32.56**	**11.23**	**13.05**	**1.27**	**<20.0**	**18.92**	**<0.1**	**<1.0**	**<1.0**	**<0.01**
P 95	**78.19**	**40.33**	**12.94**	**16.20**	**1.74**	**<20.0**	**23.85**	**<0.1**	**<1.0**	**<1.0**	**<0.01**

Source: Baseline Lab Monitoring by Noida testing laboratory

Note-(i) No B-29016/20/90/PCI-I, National Ambient Air Quality Standards National Ambient Air Quality Standards Notification, Central Pollution Control Board, Delhi, 18th November, 2009.

*(ii) *SO. 384(E), National Ambient Air Quality Standards Notification, Central Pollution Control Board, Delhi, 11th April, 1994*

*(iii) **24 hourly or 08 hourly or 01 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*

*(iv) ***Industrial, Residential, Rural and Other Areas Standards (CPCB).*

Table 3.14: Air Quality Index & Sub Index Results

Parameters	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO(mg/m3)
NAAQS, For 24 hourly monitoring (except for CO i.e. 8 hours)	100(µg/m³)	60(µg/m³)	80(µg/m³)	80(µg/m³)	2.0(mg/m³)
PROJECTSITE(AAQ-1)					
Sub Index	56	46.0	12.0	16.0	45.0
AQI	56				
Prominent Pollutant	PM_{10}				
Nirmal Nagar(AAQ-2)					
Sub Index	60	51.0	13.0	16.0	50.0
AQI	60				
Prominent Pollutant	PM_{10}				
Sadhu nagar (AAQ-3)					
Sub Index	55	51.0	12.0	16.0	55.0
AQI	55				

Parameters	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO(mg/m3)
NAAQS, For 24 hourly monitoring (except for CO i.e. 8 hours)	100(µg/m³)	60(µg/m³)	80(µg/m³)	80(µg/m³)	2.0(mg/m³)
Prominent Pollutant	PM_{10}				
Siidh Garbyang Village (AAQ-4)					
Sub Index	62	51.0	12.0	14.0	55.0
AQI	62				
Prominent Pollutant	PM_{10}				
MajraChowk (AAQ-5)					
Sub Index	74	59.0	16.0	20.0	55.0
AQI	74				
Prominent Pollutant	PM_{10}				
Baruabag Closed to Sisona Road (AAQ-6)					
Sub Index	71	58.0	14.0	15.0	55.0
AQI	71				
Prominent Pollutant	PM_{10}				
Sitarganj (AAQ-7)					
Sub Index	73	68.0	15.0	25.0	55.0
AQI	73				
Prominent Pollutant	PM_{10}				
Near KarhaPani Nursery (AAQ-8)					
Sub Index	26	26.0	5.0	8.0	15.0
AQI	26				
Prominent Pollutant	PM_{10}				
SIIDCUL Office (AAQ-9)					
Sub Index	71	55.0	13.0	18.0	60.0
AQI	71				
Prominent Pollutant	PM_{10}				
PrahladPalsa (AAQ-10)					

Parameters	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO(mg/m3)
NAAQS, For 24 hourly monitoring (except for CO i.e. 8 hours)	100(µg/m³)	60(µg/m³)	80(µg/m³)	80(µg/m³)	2.0(mg/m³)
Sub Index	67	54.0	14.0	16.0	65.0
AQI	67				
Prominent Pollutant	PM_{10}				

3.2.5 RESULT INRERPRETATION-

As per National Ambient Air Quality Standards (revised on 16th November 2009) the quality of air is found to be within the prescribed standard at all monitoring location. The Ambient air quality is complied with CPCB standard for all the parameters.

As per the analysis the minimum concentration of PM_{10} was found to be 21.0 µg/m^{3}at AAQ8 (Near Karhapani Nursery) and maximum concentration at 89.5 µg/m^3 was found at AAQ7 (Sitarganj)owing to the existing highway, dense market, and construction activities in town. However the monitoring results of PM_{10} are within theprescribed limit of 100 µg/m^3 as per CPCB respectively.

The monitoring results of $PM_{2.5}$ reveals that minimum concentration of 12.5µg/m^3 is observed at AAQ8 (Near Karhapani Nursery) whilemaximum concentration of 51.0µg/m^3 is at AAQ7 (Sitarganj). However the monitoring results of $PM_{2.5}$are within the prescribed limit 60 µg/m^3 at all locations.

The gaseous pollutants SO_2 and NO_2 are within the prescribed CPCB limit of 80 µg/m^{3}for Industrial residential and rural areas for all monitoring stations. The minimum concentration& maximum concentrations of SO_2 were found to be 3.5 µg/m^3 at AAQ8 (Near Karhapani Nursery)&17.4µg/m^3 at AAQ7 (Sitarganj) respectively. The minimum & maximum concentrations of NO_2 were found to be 5.1 µg/m^{3}at AAQ8 (Near Karhapani Nursery) &27.5µg/m^3 at AAQ7 (Sitarganj)respectively.In Sitanganj gaseous pollutants concentration is higher owing to heavy traffic, connecting road, dense population & dense urban area.

CO concentration ranges between 0.1 to 1.9 mg/m^3 at AAQ8 (Near Karhapani Nursery) and AAQ7 (Sitarganj) respectively.

Ozone concentration ranges between 13.0 µg/m^3 at to 25.0 µg/m^3 respectively.

Other pollutants like Ammonia, Heavy metal (Pb, As & Ni), Benzo pyrene were not detected at any of the monitoring locations.

3.2.6 Air Quality Index

The emission of the gaseous pollutant from the stationary/mobile sources has an adverse effect on the air quality of the atmosphere. The measure of how much the air has become polluted is measured by Air Quality Index (AQI). It serves as calculator ranging from 0 to 500 against the rising level of air pollution which is usually expressed in the concentration (microgram/cubic meter).

Table 3.15 Significance of Air Quality Index

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
0-50	Good	Green
51-100	Satisfactory	Light Green
101-200	Moderate	Yellow
201-300	Poor	Orange
301-400	Very Poor	Red
>401	Severe	Maroon

Impact & Level of Health Concern against AQI

Good (0–50)	Minimal Impact	Poor (201–300)	Breathing discomfort to people on prolonged exposure

Satisfactory (51–100)	Minor breathing discomfort to sensitive people	Very Poor (301–400)	Respiratory illness to the people on prolonged exposure
Moderate (101–200)	Breathing discomfort to the people with lung,	Severe (>401)	Respiratory effects even on healthy people

Source – CPCB Guideline

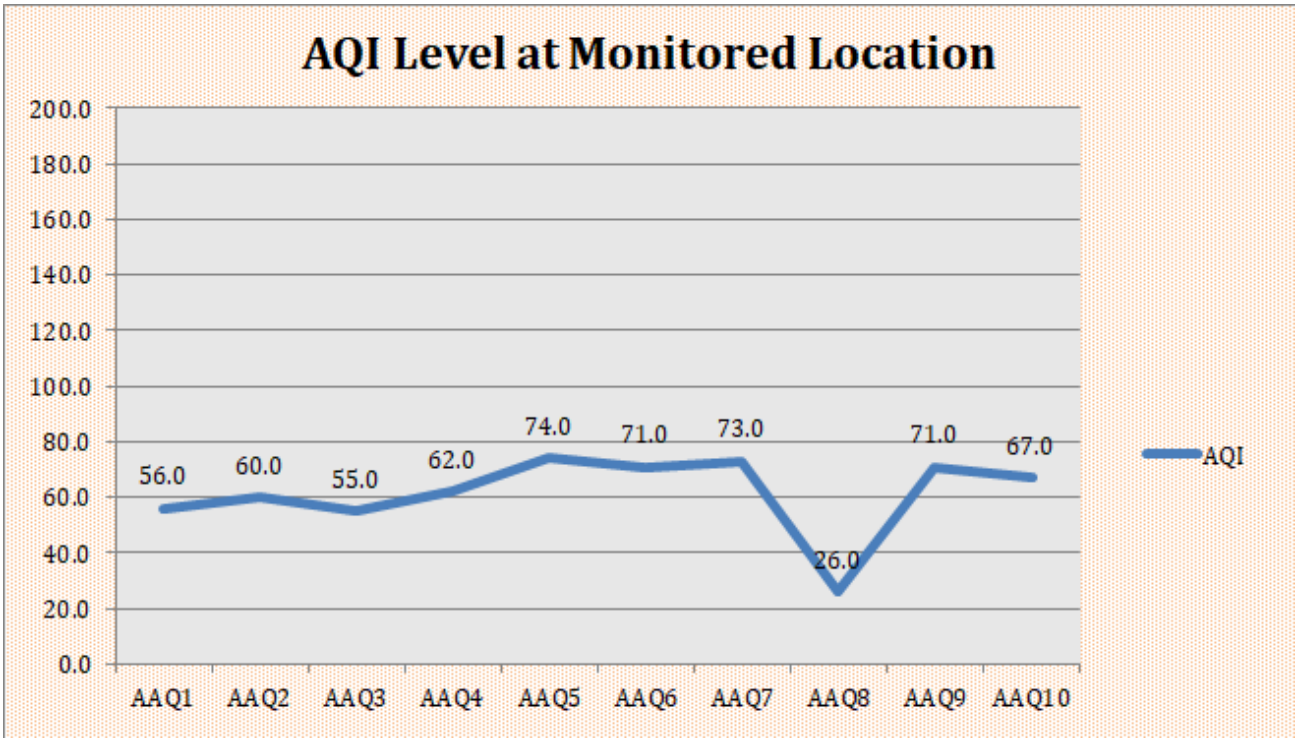


Figure.3.4: AQI level atdifferent monitoring locations

AQI level Observation- It is clearly seen in graphical presentation above (Figure 3.4) that AQI level found at 10 monitoring locations are within the range of 26 to 74 counts recorded. No monitored parameter was found to exceed the value of Air quality standard. The minimum AQI level is observed at AAQ8 (Karha Pani Nursery) i.e. 26.0 & the maximum AQI level of 74.0 was found at AAQ5 (Majra Chowk). As per analysis, it is clear the PM_{10} is the prominent pollutant andcontribute majorly to the value of air Quality index. The quality of air during the baseling period was found in 'satisfactory' category.

3.2.7 AMBIENT AIR QUALITY IN THE STUDY AREA

(a) Respirable Suspended particulate Matter (PM_{10}) The Ambient Air Quality Monitoring reveals that out of 10 monitoring stations the minimum concentration of 98thpercentile was reported to be 32.1µg/m^3 at AAQ8 (KahraPani Nursery) and maximum 85.8µg/m^{3}concentration found at AAQ5 (Near Majra Chowk)respectively.Station wise variation of 98 percentile for PM_{10} is graphically shown in Figure 3.5.

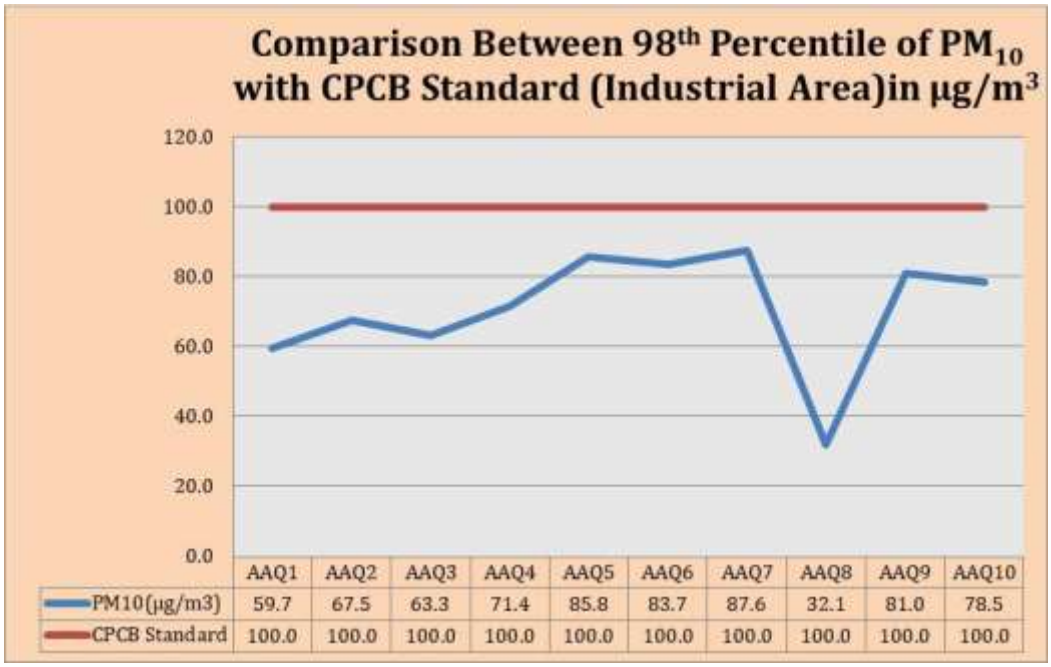


Figure.3.5: Graphical representation of 98th percentile of PM_{10} at all monitoring locations

b)Fine particulate Matter ($PM_{2.5}$) -The minimum concentration of 98thpercentile was foundto be 17.5µg/m3 at AAQ8 (Kahra Pani Nursery) while the maximum concentrationof 49.9µg/m³ was observed at AAQ7 (Sitarganj). Concentrations are within the prescribed CPCB limit of 60 µg/m³respectively for Industrial, Residential, Rural and Other Areas". Station wise variation of 98 percentile is graphically shown in Figure 3.6.

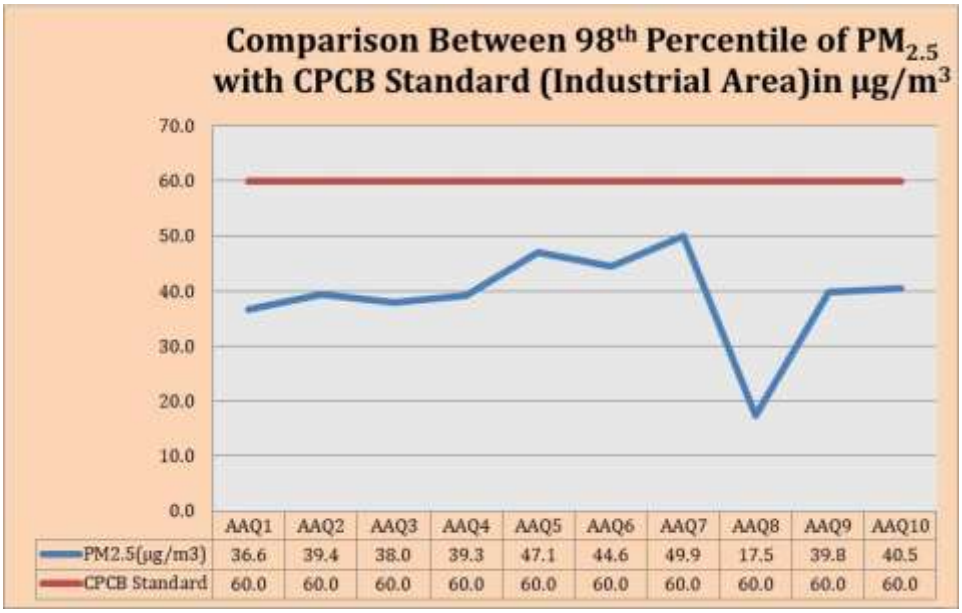


Figure 3.6: Graphical Representation of 98th percentile of $PM_{2.5}$ at monitoring locations

c)Sulphur Dioxide (SO_2) The minimum and maximum concentrations of SO_2 were found to be 5.6µg/m³ at AAQ8 (Kahra Pani Nursery) &17.4µg/m³ at AAQ7 (Sitarganj) respectively. These values

for SO_2 are within prescribed CPCB limit of 80 µg/m³ respectively for Industrial, Residential, Rural and Other Areas". Station wise variationof 98 percentile is pictorially shown in Figure 3.7.

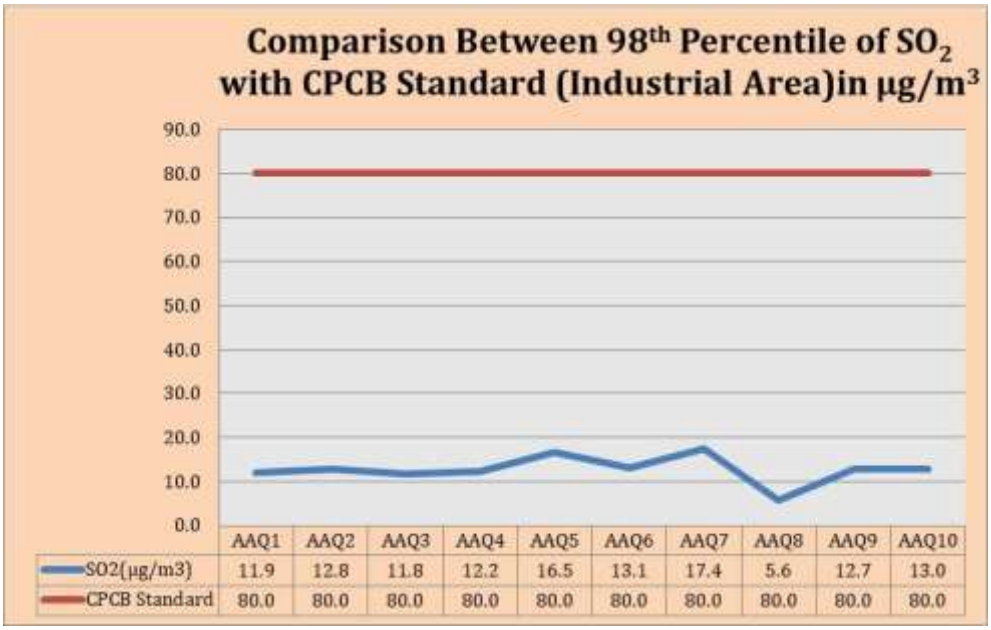


Figure.3.7: Graphical Representation of 98th percentile of SO2at different monitoring locations

d)Nitrogen Dioxide (NO_2): The minimum and maximum concentrations of NO_2 were found to be 7.5µg/m³ at AAQ8(Kahra Pani Nursery)&27.0µg/m³ at AAQ7 (Sitarganj) respectively. These values for NO_2 are within prescribed CPCB limit of 80 µg/m³ respectively for Industrial, Residential, Rural and Other Areas". Station wise variation of 98 percentile is pictorially shown in Figure 3.8.

Figure 3.8: Graphical Representation of 98th percentile of NO²at different monitoring locations

e)Carbon Monoxide (CO): The minimum and maximum concentrations of CO were found to be 0.4µg/m³ at AAQ8&1.8µg/m³ at AAQ5, AAQ7 & AAQ9 respectively. These values for COare within

prescribed CPCB limit of 2.0mg/m^3 respectively for Industrial, Residential, Rural and Other Areas". Station wise variation of 98 percentile is pictorially shown in Figure 3.9.

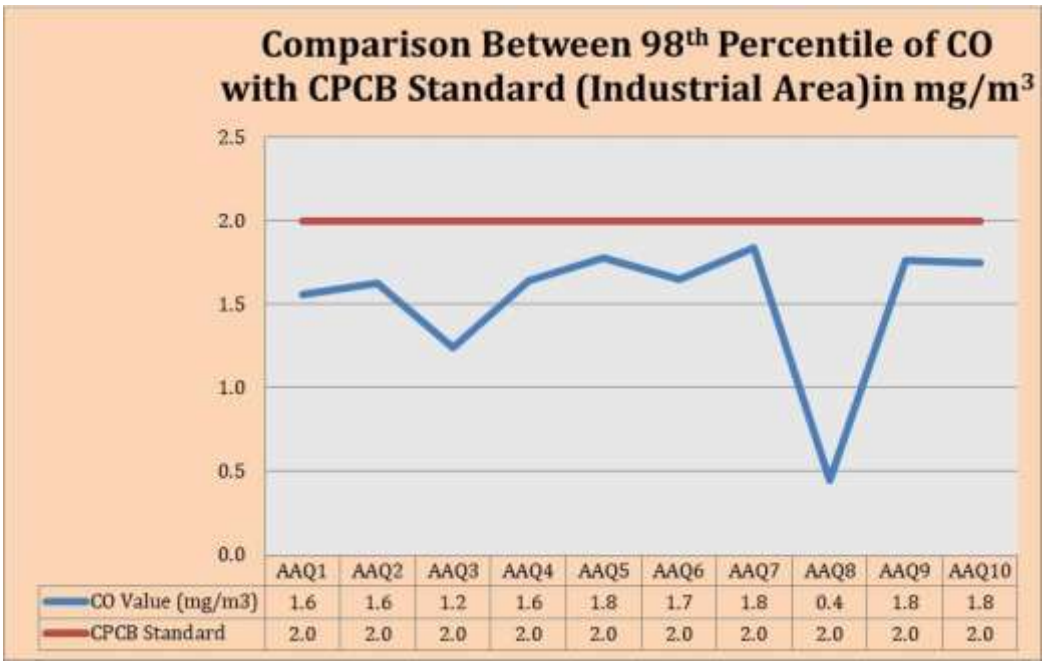


Figure 3.9: Graphical Representation of CO at different monitoring locations

3.3 NOISE ENVIRONMENT:

A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in and around the mine lease area. There are several sources in the 10 km radius of study area, which contributes to the local ambient noise level of the area. An ambient noise source in the vicinity of the project includes noise from traffic on road, human activities in villages and agricultural fields.

3.3.1 Short Methodology for Noise environment: The main objective of noise monitoring in the study area isto establish the baseline noise levels, and assess the impact of the total noise expected to be generated by construction activity. The environmental impact of noise can have several effects varying from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of noise. The environmental impact assessment of noise from the construction operations and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

3.3.2 Frequency and Parameters of Sampling:

Noise levels were recorded at an interval of 60 minutes during the day and night times to compute the day equivalent, night equivalent and day-night equivalent level. The noise level was monitored once during the study period at each monitoring location. The noise level is recorded in dB (A).

3.3.3 Instrument used for Sampling

Automatic sound level meter (SLM 100) has been used for noise monitoring at all selectedlocations. The spacial feature of the used noise meter SLM 100 has been designed for ease infield operation. The SLM 100 has built in Data Logger designed to record all the importantSound Level parameters.In

Operation Modes: Continuous and Recording. In Continuous Mode the SLM100 displays the current SPL level and LEQ, SEL etc. for the duration

3.3.4 Sampling and Analytical Techniques: Ambient Noise level monitoring was carried out continuously for 24 hours with one hour interval. (For pics refer Annexure-VIII) During each hour, Leq were directly computed by the instrument based on the sound pressure levels. The Leq is the equivalent continuous sound level, which is equivalent to the same sound energy as the actual fluctuating sound measured in the same period. This is necessary because sound from noise source often fluctuates widely during a given period of time. This is calculated from the following equation:

Leq (hrly) = L_{50}+ $((L_{10}-L_{90})^2 / 60)$

Leq DAY: is defined as the equivalent noise level measured over a period of time during day (6amto 10pm)

Leq NIGHT: is defined as the equivalent noise level measured over a period of time during night (10pm to 6am)

The noise levels were monitored during December 2020 to February 2021 (winter season) at ten monitoring locations using the Sound Level Meter (SLM 100) as per the Noise Pollution (Regulation and Control) Rules, 2000 and amendment till date.

3.3.5 Ambient Noise:

Table 3.16: Noise Levels Standards for Residential, Commercial, Industrial & Silence Zones:

Ambient Noise Standard in dB(A) Leq	A. Industrial Area	B. Commercial Area	C. Residential Area	D. Silence Area
Day time (6 AM to 10 PM)	75	65	55	50
Night time (10 PM to 6 AM)	70	55	45	40

Source: CPCB

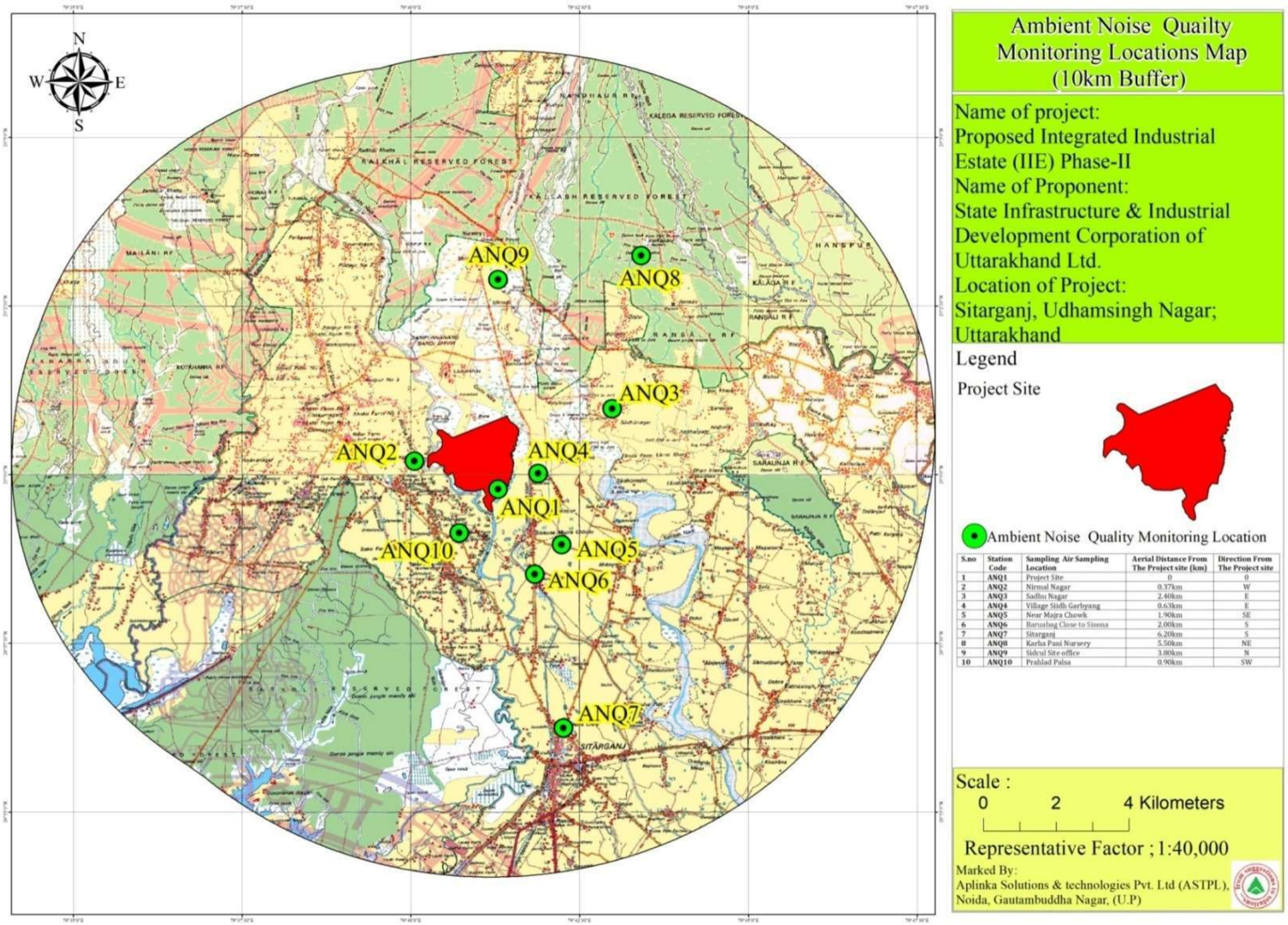
3.3.6 Sampling locations & Duration: Noise monitoring has been conducted to determine noise levels at each monitoring location which were recorded for 24 hours. The details of monitoing locationsare tabulated below in Table 3.17. The monitoring results are given in Table 3.18.

TABLE-3.17-AMBIENT NOISE MONITORING STATIONS

S. No.	Code	Location	Dist. from the project site (km)	Direction
1	ANQ1	Project Site	--	--
2	ANQ2	Nirmal Nagar	Approx. 0.37	W
3	ANQ3	Sadhu Nagar	Approx. 2.40	E
4	ANQ4	SiidhGarbyang	Approx. 0.63	E
5	ANQ5	Near MajraChowk	Approx. 1.90	SE
6	ANQ6	Baruabag closed to Sisona	Approx. 2.00	SE
7	ANQ7	Sitarganj	Approx. 6.20	S
8	ANQ8	KarhaPani Nursery	Approx. 5.50	SE

S. No.	Code	Location	Dist. from the project site (km)	Direction
9	ANQ9	SIIDCUL Office	Approx. 3.80	N
10	ANQ10	PrahladPalsa	Approx. 0.90	SSW

Source: Survey of India (SOI) Toposheet and Field Visit



S.no	Station Code	Sampling Air Sampling Location	Aerial Distance From The Project site (km)	Direction From The Project site
1	ANQ1	Project Site	0	0
2	ANQ2	Nirmal Nagar	0.37km	W
3	ANQ3	Sadhu Nagar	2.40km	E
4	ANQ4	Village Sidh Garbyang	0.63km	E
5	ANQ5	Near Majra Chowk	1.90km	SE
6	ANQ6	Baruabag Close to Sisona	2.00km	S
7	ANQ7	Sitarganj	6.20km	S
8	ANQ8	Karha Pani Nursery	5.50km	NE
9	ANQ9	Sidcul Site office	3.80km	N
10	ANQ10	Prahlad Palsa	0.90km	SW

Figure: 3.10 Ambient Noise Qualities Monitoring At Different Locations

TABLE 3.18: AMBIENT NOISE QUALITY RESULTS

Location	Zone	Day Time	Standard	Night Time	Standard
		6 AM to 10 PM	Day time	10 AM to 6AM	Night time
Project Site	Industrial	52.9	75	39.5	70
Nirmal Nagar	Residential	57.4	55	45.2	45
Sadhu Nagar	Residential	56.8	55	44.2	45
SiidhGarbyang	Residential	59.4	55	48.9	45
Near MajraChowk	Residential	57.5	55	47.6	45
Baruabag closed to Sisona	Residential	58.1	55	48.6	45
Sitarganj	Residential	63.5	55	50.6	45
KarhaPani Nursery	Silence	45.4	50	35.9	40
SIIDCUL Office	Industrial	54.4	75	41.2	70
PrahladPalsa	Residential	55.2	55	43.8	45

Source: Baseline Lab Monitoring by Noida testing laboratory

Observation &Interpretation:

As per selected monitoring station for noise level, it is observed that during daytime, the maximum concentration was reported at AAQ7 (Sitarganj) i.e. 63.5 dB (A) and minimum concentration wasreported at AAQ8 (KahraPani Nursery) i.e. 45.4 dB (A) .At night time, the maximum concentration wereobservedat AAQ7 (Sitarganj) i.e. 50.6 dB (A) & minimum concentration was reported at AAQ8 (KahraPani Nursery) i.e. 35.9 dB (A). It is concluded that, the Sitarganj area has major road connectivity & there are found more trafiic due to main highway SH9. In kahraPani nursery is a silence zone, so noise level is very low at location comparatively to other selected locations for noise monitoring.

3.3.7 Comparatively Graph between Day & Night Time Noise Exposure with CPCB Standard(Industrial Area): -

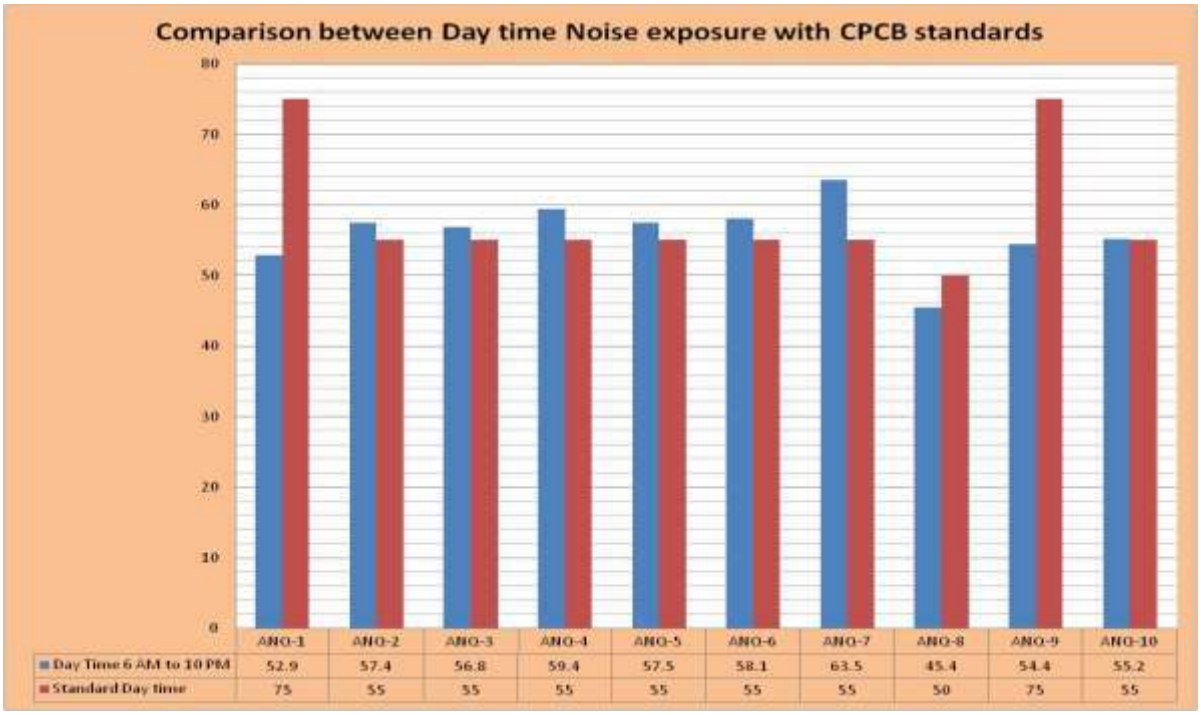


Figure: 3.11 Ambient Noise Exposure (Day Time) Monitoring At Different Locations

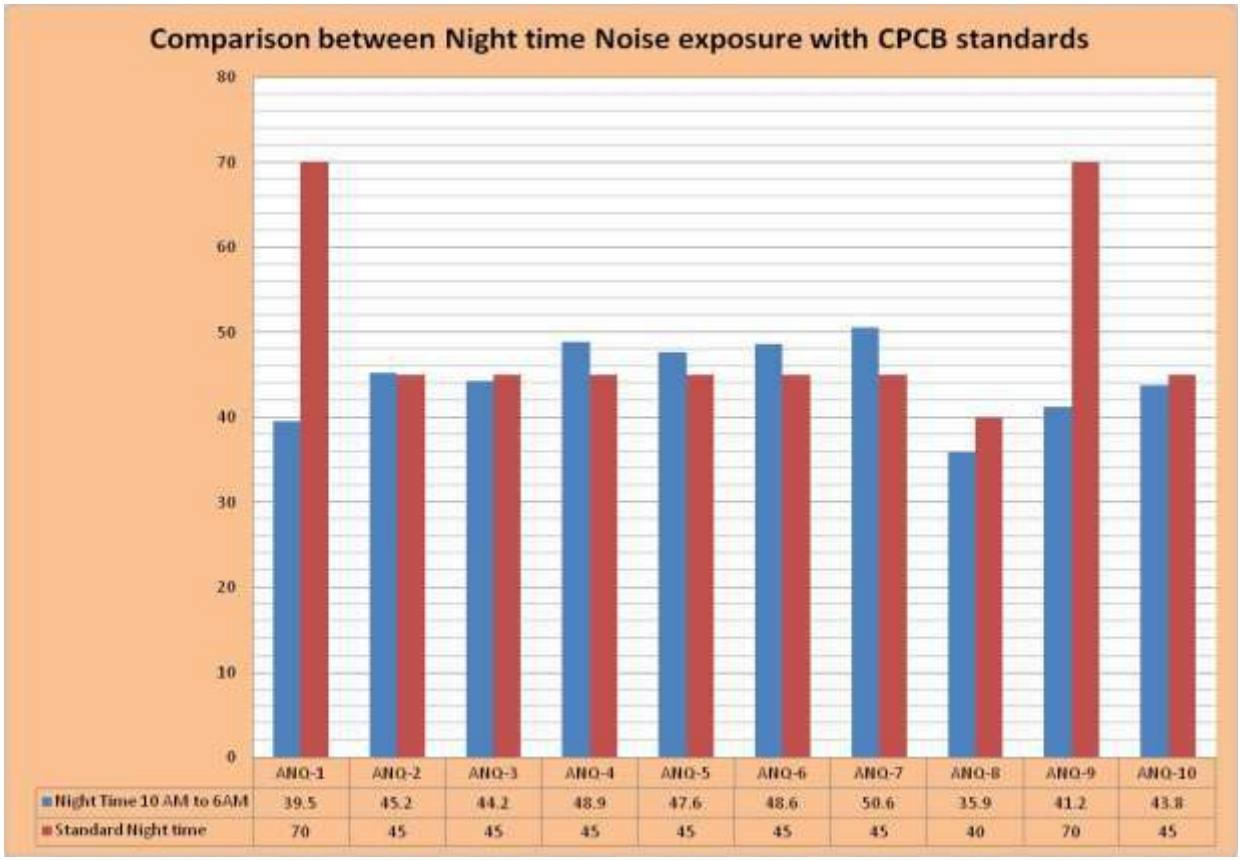


Figure: 3.12 Ambient Noise Exposure (Night Time) Monitoring At Different Locations

3.4 Water Quality Assessment

Selected water quality parameters of surface and ground water resources in the study area have been studied for assessing the water environment and evaluate anticipated impact of the construction project. Understanding the water quality is essential in preparation of Environmental Impact Assessment and to identify critical issues with a view to suggest appropriate mitigation measures for implementation. The purpose of this study is to:

- To identify water quality characteristics for critical parameters,
- To evaluate the impacts on different usage of water i.e. agriculture, drinking, industry and aesthetics in the vicinity; and
- To prediction of impact on water quality by the proposed project

Water samples were collectedand analyzed for following Physico-chemical andbiological parameters.

3.4.1 Ground water Parameters –

(A)Physical Parameters-Color, Odour, Taste, Turbidity, pH, TDS,

(B) Physico-chemical & Toxic parameters - Aluminum, Total Ammonia, Anionic Detergents(as MBAS), Barium (as Ba), Boron(as B), Calcium(as CA), Chloramines(as Cl2), Chloride(as Cl), Copper (as Cu), Fluoride (as F), Free Residual Chlorine, Iron(as Fe), Magnesium(Mg), Manganese(Mn), Mineral Oil, Nitrate(as NO3), Selenium (as Se), Silver(as Ag), Sulphate(as So4),Sulphide(as H2S), Alkalinity(as CaCO3), Total Hardness(as CacO3), Zinc(as Zn), Phenolic Compound as (C6H5OH), Cadmium(as Cd),

Cyanide(as CN), Lead (as Pb), mercury (as Hg), Molybdenum(Mo), Nickel(as Ni), Total Arsenic(as As), Total Chromium(as Cr),
(C)Microbial Parameters -E.Coli& Total Coliform

3.4.2 Surface water Parameters -

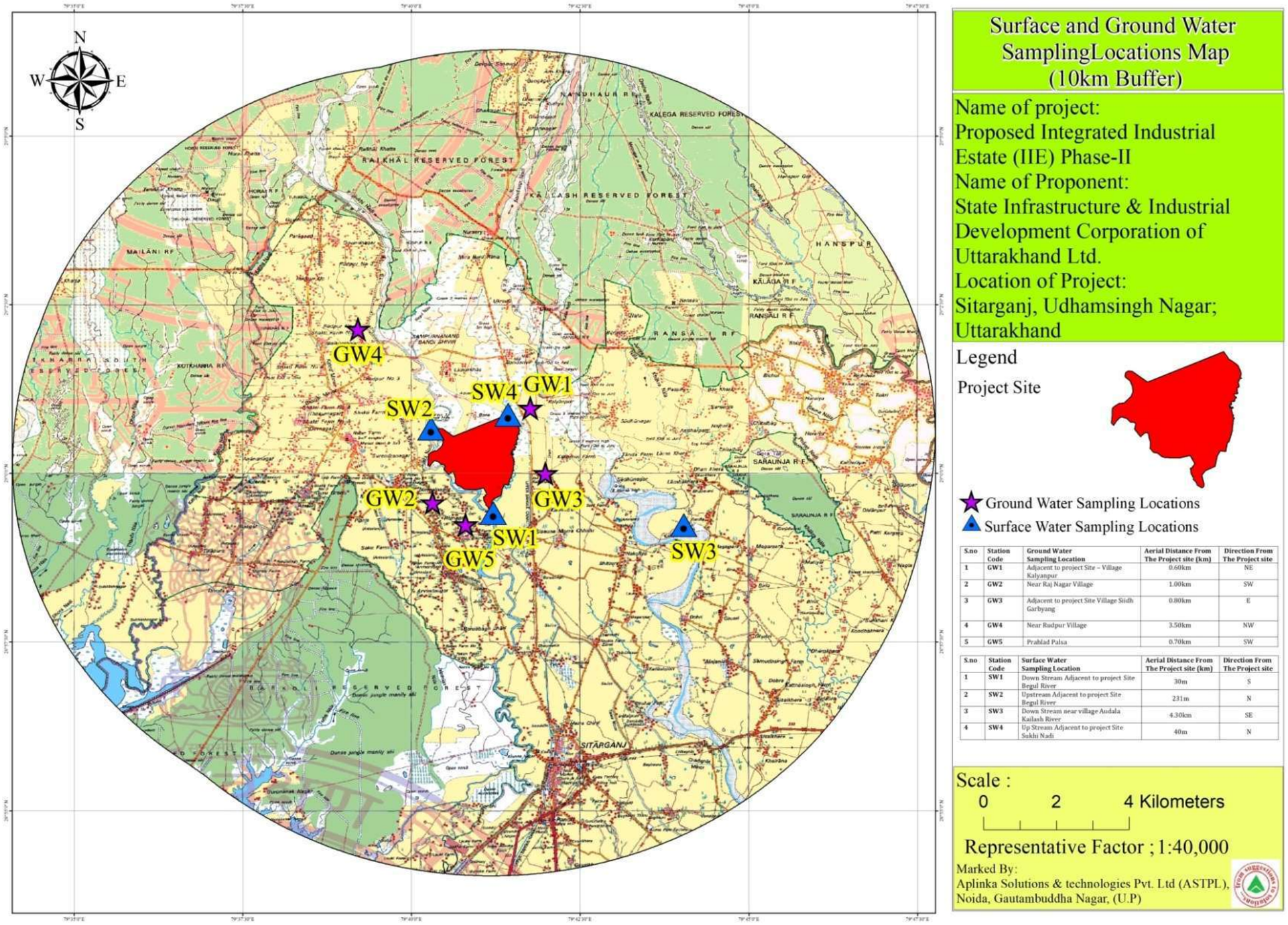
- Physical Parameters- pH, temperature, and conductivity and dissolved oxygen Total dissolved solids
- Chemical parameters-, Alkalinity, hardness, NO_3, Cl, SO_4, Na, K, Ca, Mg, Phenolic compounds, BOD and COD&Cyanide.
- Heavy metals-, Aluminum, Arsenic, Cadmium, Chromium, Iron, Copper, Lead, Manganese, Zinc and Mercury.
- Biological parameters – Total coliform, faecalColiform

3.4.3 Water sampling Locations

Water quality was assessed by collecting and analysis of samples from selected monitoring locations in core and buffer zone. Foursurface water and fiveground water sampling locations have been selected to assess the water quality during baseline period (December 2020 to Febuary 2021). The details of water quality sampling locations are given in Table 3.19.

Table3.19: Water Monitoring Locations

Station Code	Location	Direction from Site	Aerial Distance from Project Site (Km.)
Surface Water			
SW1	Down Stream Adjacent to project Site Begul River	S	0.03
SW2	UpStreamAdjacent to project Site Begul River	N	0.23
SW3	Down Stream near Village AudalaKailash River	SE	4.3
SW4	UpStreamAdjacent to project Site SukhiNadi	N	0.04
Ground Water			
GW1	Adjacent to project Site VillageKalyanpur	NE	0.60
GW2	Near Rajnagar Village	SW	1.0
GW3	Adjacent to project Site Village SiidhGarbyang	E	0.80
GW4	Near Rudpur Village	NW	3.50
GW5	PrahaldPalsa	SW	0.70



S.no	Station Code	Ground Water Sampling Location	Aerial Distance From The Project site (km)	Direction From The Project site
1	GW1	Adjacent to project Site – Village Kalyanpur	0.60km	NE
2	GW2	Near Raj Nagar Village	1.00km	SW
3	GW3	Adjacent to project Site Village Siidh Garbyang	0.80km	E
4	GW4	Near Rudpur Village	3.50km	NW
5	GW5	Prahlad Palsa	0.70km	SW

S.no	Station Code	Surface Water Sampling Location	Aerial Distance From The Project site (km)	Direction From The Project site
1	SW1	Down Stream Adjacent to project Site Begul River	30m	S
2	SW2	Upstream Adjacent to project Site Begul River	231m	N
3	SW3	Down Stream near village Audala Kailash River	4.30km	SE
4	SW4	Up Stream Adjacent to project Site Sukhi Nadi	40m	N

Figure 3.13: Ground Water& Surface Water Quality Monitoring Location Map

3.4.4 Methodology for Sampling & Analysis

a)Water Sampling – Water Sampling have done as per the method IS 3025 Part -1.

b)Sample Collection Technique

The samples were collected as per IS procedures. The parameters such as pH, temperature and DO were analyzed at the site itself at the time of collection of sample while for other parameters; samples were preserved and analyzed in laboratory. Samples were collected, preserved and analyzed as per methods given in Standard Methods for the Examination of Water (APHA).

c)Water Analysis protocols – Water Analysis protocol used as per mentioned in IS 10500 : 2012.

3.4.5 Water Quality Criteria

Table3.20: Water Quality Criteria as per CPCB

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	Total Coliforms Organism MPN/100ml shall be 500 or less; pH between 6.5 and 8.5; Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliform Organism MPN/100ml shall be 5000 or less; pH between 6 to 9; Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25°C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

Source: Central Pollution Control Board, Government of India, New Delhi

3.4.6 Surface Water Results: -

Table3.21: Surface Water Quality results

S. No.	Parameter	Surface Water Analysis Results				Unit
		Downstream Adjacent to project Site Begul River (SW-1)	Upstream Adjacent to project Site Begul River (SW-2)	Down Stream near village Audala Kailash River (SW-3)	Up Stream Adjacent to project Site SukhiNadi (SW-4)	
1.	pH	7.71	7.75	7.80	7.64	-
2.	Temperature	17.5	18.2	17.7	17.1	^{0}C
3.	Turbidity	36.5	32.6	34.7	25.4	NTU

S. No.	Parameter	Surface Water Analysis Results				Unit
		Downstream Adjacent to project Site Begul River (SW-1)	Upstream Adjacent to project Site Begul River (SW-2)	Down Stream near village Audala Kailash River (SW-3)	Up Stream Adjacent to project Site SukhiNadi (SW-4)	
4.	Electric Conductivity @25^{0}C	410	380	440	366	µS/cm
5.	Sulphate (SO_4)	12.6	10.07	16.8	7.55	mg/l
6.	Nitrate (NO_3)	5.43	4.88	6.98	7.88	mg/l
7.	Total Hardness (as $CaCO_3$)	85	92	108.6	74	mg/l
8.	Chloride (as Cl)	25.7	17.0	32.4	24.8	mg/l
9.	Fluoride (as F)	0.15	0.13	0.17	0.24	mg/l
10.	COD (as O_2)	35.0	30.0	22.0	18.0	mg/l
11.	Iron (as Fe)	0.08	0.03	0.46	0.13	mg/l
12.	Dissolve Oxygen	5.2	5.5	7.2	7.8	mg/l
13.	Total Dissolved Solid	246	222	264	202	mg/l
14.	Total Suspended Solid	27.0	24.0	32.0	20.0	mg/l
15.	BOD (3 days at 27^{0}C)	15.0	12.0	8.0	5.0	mg/l
16.	Calcium (as Ca)	38	35	54.5	32	mg/l
17.	Magnesium (as Mg)	16	15	24.3	12	mg/l
18.	Arsenic (as As)	<0.01	<0.01	<0.01	<0.01	mg/l
19.	Lead (as Pb)	<0.01	<0.01	<0.01	<0.01	mg/l
20.	Copper (as Cu)	<0.01	<0.01	<0.01	<0.01	mg/l
21.	Zinc (as Zn)	<0.1	<0.1	<0.1	<0.1	mg/l
22.	Manganese (as Mn)	0.11	0.10	0.14	0.12	mg/l
23.	Total Chromium (as Cr)	<0.01	<0.01	<0.01	<0.01	mg/l
24	Sodium (as Na)	6.0	5.0	6.2	5.3	mg/l
25	Potassium (as K)	1.0	1.5	2.77	1.1	mg/l
26	Total Alkalinity (as $CaCO_3$)	76.8	72.5	93.9	68.6	mg/l
27	Phosphate (as P)	0.43	0.40	0.84	0.68	mg/l
28	Nitrite (as NO_2)	<0.05	<0.05	<0.05	<0.05	mg/l
29	Total Coliform	$8.7*10^3$	$7.9*10^3$	$2.2*10^3$	$2.0*10^3$	MPN/100 ml
30.	Faecal Coliform	$5.2*10^3$	$4.6*10^3$	$8.6*10^2$	$8.4*10^2$	MPN/100 ml

Source: Baseline Lab Monitoring by Noida testing laboratory

Observation

- The analysis results indicate that the pH value is 7.64 to 7.80 which is well within the specified standard of 6.5 to 8.5;
- The TDS was observed as 202 to 264 mg/l. The maximum TDS was observed at SW3 and the minimum TDS was observed at SW4.
- The COD value wasfound as 18.0 to 35.0mg/l. The maximum COD was observed at SW1 & minimum at SW4.
- The BOD values were found as 5.0 to 15.0mg/l. The maximum BOD was observed at SW1& minimum observed at SW4. BOD values at all locations are higher side from water quality criteria limit as per CPCB.
- The DO value was found range between 5.2 mg/l to 7.8 mg/l. The maximum DO was observed at SW4 and the minimum DO was observed at SW1
- The chlorides were found as 17.0 to 32.4 mg/l.
- The sulphates were found as 7.55 to 16.8 mg/l.
- Total hardness ranges between 74 to 108.6 mg/l.
- Electrical conductivity is found in the range of 366(min at SW4)-440(max at SW3) us/cm .EC value at all locations isunder the limit prescribed value as per Class-E.
- Total Coliform value is minimum at sites SW-4and maximum at SW-1& Faecal coliform value minimum at site SW4 & maximum at site SW1. As per the value of these two parameters crossing the limits of class B & C but under limit from class D as per prescribed by CPCB.

Interpretation of results

As per analysis of surface water it was found that the surface water is indicating minor pollution in studies location area. The total coliform & faecal coliform count also indicated that the surface water is out of limit in two location SW1 &SW2 in the prescribed limit.so it cannot be used directly for any purposes. As per the analysis results found Faecal Coliform count are falling under the Class C, BOD parameter results are falling under the Class Below E, pH parameter results are under the Class A, B, C, D & E, Dissoloved oxygen parameter results are under Class B &Electrical conductivity& Faecal Coliformcount is falling under Class Below E according to water quality criteria by CPCB.

3.4.7 Ground water Quality: The ground water quality analysis parameters have been done as per IS 10500: 2012. The analysis results are tabulated below.

Table 3.22Ground Water Analysis Result: -

S. No.	Parameter	Test method	Ground Water Analysis					Unit	Limit as per IS:10500-2012	
									Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source
			GW-1	GW-2	GW-3	GW-4	GW-5			
Organoleptic & Physical parameters										
1.	Colour	IS-3025(P-04)	<1.00	<1.00	<1.00	<1.00	<1.00	Hazen Unit	5	15
2.	Odour	IS-3025(P-05)	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	-	Agreeable	Agreeable
3.	Taste	IS-3025(P-07 & 08)	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	-	Agreeable	-
4.	Turbidity	IS-3025(P-10)	<1.0	<1.0	<1.0	<1.0	<1.0	NTU	1	5
5.	pH value	IS-3025(P-04)	7.52	7.63	7.48	7.29	7.57	-	6.5-8.5	-
6.	Total Dissolved Solid (TDS)	IS-3025(P-16)	266	252	170	210	248	mg/l	500	2000
General Properties -										
7.	Aluminum (as Al)	IS: 3025 (P- 55)	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.03	0.2
8.	Total Ammonia	IS: 3025 (P- 34)	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	0.5	No Relaxation
9.	Anionic surface Detergents (as MBAS)	Annex K of IS-13428	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	0.2	1.0
10.	Barium (as Ba)	IS: 15302	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	0.7	No Relaxation
11.	Boron (as B)	IS: 3025 (P- 57)	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	0.5	1.0
12.	Calcium (as Ca)	IS: 3025 (P- 40)	35	27.6	16.4	32.8	21.6	mg/l	75	200
13.	Chloramines	IS: 3025 (P- 26)	<1.00	<1.00	<1.00	<1.00	<1.00	mg/l	4.0	No Relaxation

S. No.	Parameter	Test method	Ground Water Analysis					Unit	Limit as per IS:10500-2012	
			GW-1	GW-2	GW-3	GW-4	GW-5		Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source
	(as Cl_2)									
14.	Chloride (as Cl)	IS: 3025 (P- 32)	29.6	25.4	19.4	24.6	28.9	mg/l	250	1000
15.	Copper (as Cu)	IS: 3025 (P-42)	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.05	1.5
16.	Fluoride (as F)	IS: 3025 (P-60)	0.42	0.38	0.46	0.62	0.32	mg/l	1.0	1.5
17.	Free Residual Chlorine	IS: 3025 (P-26)	<0.1	<0.1	<0.1	<0.1	<0.1	mg/l	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l	
18.	Iron (as Fe)	IS: 3025(P-52)	0.035	0.025	0.034	0.042	0.031	mg/l	1.0	No Relaxation
19	Magnesium (as Mg)	IS: 3025 (P-46)	16.0	13.1	10.1	12.1	14.6	mg/l	30	100
20.	Manganese (as Mn)	Clause 35 of IS 3025	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	0.1	0.3
21.	Mineral Oil	Clause 6 of IS: 3025	<0.50	<0.50	<0.50	<0.50	<0.50	mg/l	0.5	No Relaxation
22.	Nitrate (as NO_3)	IS: 3025 (P- 34)	1.52	1.33	2.65	5.14	1.11	mg/l	45	No Relaxation
23.	Selenium (as Se)	IS: 3025 (P- 56)	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
24.	Silver (as Ag)	Annex J IS: 13428	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.1	No Relaxation
25.	Sulphate (as SO_4)	IS: 3025 (P- 24)	6.6	4.9	7.2	10.6	5.2	mg/l	200	400

S. No.	Parameter	Test method	Ground Water Analysis					Unit	Limit as per IS:10500-2012	
			GW-1	GW-2	GW-3	GW-4	GW-5		Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source
26.	Sulphide (as H_2S)	IS-3025 (P-29)	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.05	No Relaxation
27.	Alkalinity (as Ca CO_3)	IS: 3025 (P- 23)	175	182	146	176	172	mg/l	200	600
28.	Total Hardness (as $CaCO_3$)	IS: 3025 (P- 23)	156	148	136	144	150	mg/l	200	600
29.	Zinc (as Zn)	IS: 3025 (P- 49)	<0.1	<0.1	<0.1	<0.1	<0.1	mg/l	5.0	15
Toxic Properties										
30	Cadmium (as Cd)	IS-3025(P-41)	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	0.003	No Relaxation
31.	Cyanide (as CN)	IS-3025(P-27)	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.05	No Relaxation
32.	Lead (as Pb)	IS-3025(P-47)	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
33.	Mercury (as Hg)	IS-3025(P-48)	<0.001	<0.001	<0.001	<0.001	<0.001	mg/l	0.001	No Relaxation
34.	Molybdenum (Mo)	IS-3025(P-2)	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.07	No Relaxation
35.	Nickel (as Ni)	Annex L of IS-13428	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.02	No Relaxation
36.	Arsenic (as As)	IS-3025(P-37)	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
37.	Total Chromium (as Cr)	Annex J of IS-13428	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	0.05	No Relaxation
38	*Escherichia coli*	IS-1622	Absent	Absent	Absent	Absent	Absent	mg/l	Absent/100ml	

S. No.	Parameter	Test method	Ground Water Analysis					Unit	Limit as per IS:10500-2012	
									Requirement (Acceptable Limit)	Permissible Limit in absence of alternate source
			GW-1	GW-2	GW-3	GW-4	GW-5			
39	*Coliform Bacteria*	IS-1622	Absent	Absent	Absent	Absent	Absent	mg/l	Absent/100ml	

Source: Baseline Lab Monitoring by Noida testing laboratory

3.4.8 Observations

- The analysis results indicate that the pH ranges between 7.29 to 7.63. Results shows ground water is slightly alkaline in nature.
- Total hardness was observed to be ranging from 136 – 156 mg/l. The maximum hardness was recorded at GW1 (Kalyanpur) and the minimum was recorded at GW3 (Siddhgarbyang).
- Chlorides were found to be in the range of 19.4 – 29.6 mg/l. The maximum concentration was observed at GW1 (Kalyanpur), and where as the minimum value was observed at GW3 (Siddhgarbyang).
- Fluorides were found to be in the range of 0.32-0.62 mg/l. The maximum value observed at GW4 (Rudpur), whereas the minimum value observed at GW5 (Prahlad Palsa).
- Sulphates were found to be in the range of 4.9.0– 10.6 mg/l. The maximum value observed at GW 4(Rudpur), whereas the minimum value observed at GW2 (Rajnagar),
- The Total Dissolved Solids (TDS) concentrations were found to be ranging in between 170.0 – 266.0 mg/l, the maximum TDS observed at GW1 (Kalyanpur), and minimum concentration of TDS observed at GW3 (Siddhgarbyang); and it is well within the acceptable limit.
- Calciumwere found to be in the range of 16.4– 35.0 mg/l. The maximum value observed at GW1 (Kalyanpur), was as the minimum value observed at GW3 (Siddhgarbyang).
- Magnesiumwas found to be in the range of 10.1– 16.0 mg/l. The maximum value observed at GW1 (Kalyanpur), whereas the minimum value observed at GW3 (Siddhgarbyang).
- Iron was found to be in the range of 0.025– 0.042 mg/l. The maximum value observed at GW4 (Near Rudpur Village), whereas the minimum value observed at GW2 (Near Rajnagar Village).

Interpretationof results

According to baseline study within 10 km radius, it can be concluded from ground water analysis results that all parameters for all monitoring locations are within permissible limit as per IS: 10500-2012 “Specifications for Drinking Water”. It is fit for drinking purpose after RO filtration.

3.5 Land environment

3.5.1 Objectives: Current study is a part of Rapid EIA with the following main objectives.

- To prepare the landuse-landcover map of study area based on recent satellite imageries.
- To assess the impact of proposed project on existing landuse and landcover
- To suggest mitigations measures

3.5.2 Geographical location of the study area: The project is for environmental clearance of proposed Integrated Industrial Estate (IIE) Phase-II, State Infrastructure & Industrial Development Corporation of Uttarakhand Ltd., located at Sitarganj, Udham Singh Nagar; Uttarakhand. The study area comprises parts of tehsil- Kiccha and Haldwani of Distt -Udham Singh and Nanital respectively. The total geographical area of study area is 39, 52, 67,377 sqm. The study area is a part of Valley temperate subzone of Western Himalayan Region agro-climatic zone of India. It receives an annual average rainfall of about 400 mm and climate is sub humid. Valley temperate subzone extends to Chamoli, Rudraprayag, Pauri Garhwal, Dehradun, Pithoragarh, Champawat, Tehri Garhwal, Almora, Nainital, Uttarkashi and Udham Singh Nagar and has Sub Mountain, Mountain, Meaduw, Skeletal soil.

3.5.3 Materials: The equipment used during the present investigation includes ground truth hand held GARMIN 12 GPS receiver for ground truth collection, besides the visual observation and analysis.

3.5.3.1 Satellite data: The Indian Remote Sensing satelliteIRS-Resourceset-2 LISS III was used for present analysis. Four scenes of IRS Resourceset-2 LISS III covered the entire study area. The row and path of satellite data used were as follows.
Path – 098
Row – 051
Date of Pass: 24th February, 2017

3.5.3.2 Topographical maps of the study area: The Survey of India toposheets 53O12, 53O16, 53P9 & 53P13 on 1:50,000 scales covering of tehsil- Kiccha and Haldwani of Distt.-Udham Singh and Nanital respectively, was used as reference map for geo-referencing of the remote sensing data. These maps helped to select the ground truth collection sites.

3.5.3.3 Ancillary data: Information derived from the remotely sensed data can only be verified using field data. Field data is used to improve the information extraction, to calibrate either data or the information and to assess the accuracy of the derived information. Field data used in the study was of different types such as maps of Survey of India, data collected in the field sampling, and information derived from statistical data from revenue department.

3.5.3.4 Computer hardware and software: LG Computer with Pentium 3.1 Ghz processor with ERDAS IMAGINE 8.5 image analysis software was used for processing and analysis of the remote sensing data. Arc view version 3.2 was used for making landuse maps.

3.5.4 Spatial observations: Spatial measurements were made with the help of hand held GPS to get the spatial coordinated along with type of landuse.
The raw LISS III spectral information's was collected in the four bands as detailed below:
Band 2: Green region, 0.52 – 0.59 μ
Band 3: Red region, 0.62 – 0.68μ
Band 4: Near infrared region, 0.77 – 0.86μ
Band 5: Short Wave Infrared (SWIR), 1.55 – 1.70μ

3.5.5 Data & Methodology: For the present landuse study LISS III sensor data of IRS-Resourceset-2satellite has been used which has a spatial resolution of 23.5m, which is good enough for Level-I classification. National Remote Sensing Centre (NRSC), Hyderabad classification scheme has been followed for present landuse study. First of all the .tiff file is imported to .img format, geometric corrections were performed and data prepared for further process was done. Unsupervised classification method has been adopted followed by visual interpretation technique for 10 km radius and a total of 8 classes have been obtained.

3.5.6 Digital image analysis: The various steps involved in the digital image analysis of remote sensing data are as follows.For digital image processing and analysis, preliminary work like collection

of maps, reports, remote sensing images, collection and study of collateral and ground truth data were done first. Among all, ground truth data collection is very important for subsequent digital analysis. The HP P-4 dual core PC with ERDAS IMAGINE 8.5 software was used for processing and analysis of remote sensing data. The toposheets of the study area on1:50,000 scales were scanned and were geometrically corrected in the DATA PREPARATION panel of ERDAS IMAGINE. The IRS Resourceset-2 LISS III Image of the study area was loaded into the ERDAS IMAGINE using the IMPORT option. Later, geometric correction of the image was done with the help of the geometrically corrected SOI Toposheets and Ground Control Points (GCPs) collected with the GPS receiver. The raw image data when viewed on the display showed the difficulty indistinguishing all features. Preliminary interpretation of the satellite data was conducted and GCPs, which were distributed randomly throughout the image with minimum root mean square (rms) error of less than 0.5 were selected. Polynomial transformation of 1storder was used because the correction program runs faster with it and it also avoids geometric distortion in areas of very few GCPs. After completing geometric correction of the image, study area boundary overlay wa sdone. The study area boundary comprising of Kicha tehsil was digitized from SOI toposheets using AOI tools polygon and vector options, saved as AOI layers. This AOI layer was used as administrative boundary mask and the subsets of the respective blocks was prepared using subset image option of data preparation panel. The unsupervised classification was used to prepare the LULC map of the study area. Detailed LULC methosology is attached as **Annexure-VI.** The LULC map around the 10 Km radius study area is depicted below.

Table 3.23 Breakup of Landuse of 10 Km study area

S. No.	Categories	Area in Ha	Percentage
1	Rivers & Water Bodies	1717.0	4.3
2	Tree Cover	13599.3	34.4
3	Scrub Land	6549.2	16.6
4	Built Up Land	2257.0	5.7
5	Crop Land	11395.5	28.8
6	Fallow Land	2281.1	5.8
7	Marshy Land	1369.2	3.5
8	Existing Industrial Estate	394.2	1.0
	Total	39562.5	100

3.5.7 Description of Land use in study area: The Tree Cover is the largest category forming 19, 65, 13599.3 ha (34.4%) of the study area. Crop land area stands as the next largest category with 11395.5 ha (28.8%), primarily used for farming and for production of food, fiber and other commercial and horticultural crops. Scrub Land is the next landuse category having an area of 6549.2 ha (16.6 %) primarily due to harsh edaphic factors. The Builtup area or the land partly or completely modified by the anthropogenic action is the next landuse category at about 2257.0 ha (5.7 %) of the study area. Fallow land is the land, which is taken up for cultivation but is temporarily allowed to rest, un-cropped for one or more season, but not less than one year is the next landuse category having an area of 2281.1 ha (5.8 %). Water body forms 1717.0 ha (4.3%) of the total area and Marshy Land formed due to presence of artesian in the area form about 1369.2 ha (3.5 %). There is an existing industrial estate forming about 394.2 ha (1 %) of the study area. {Refer chart 1.1&Refer table 3.23}.

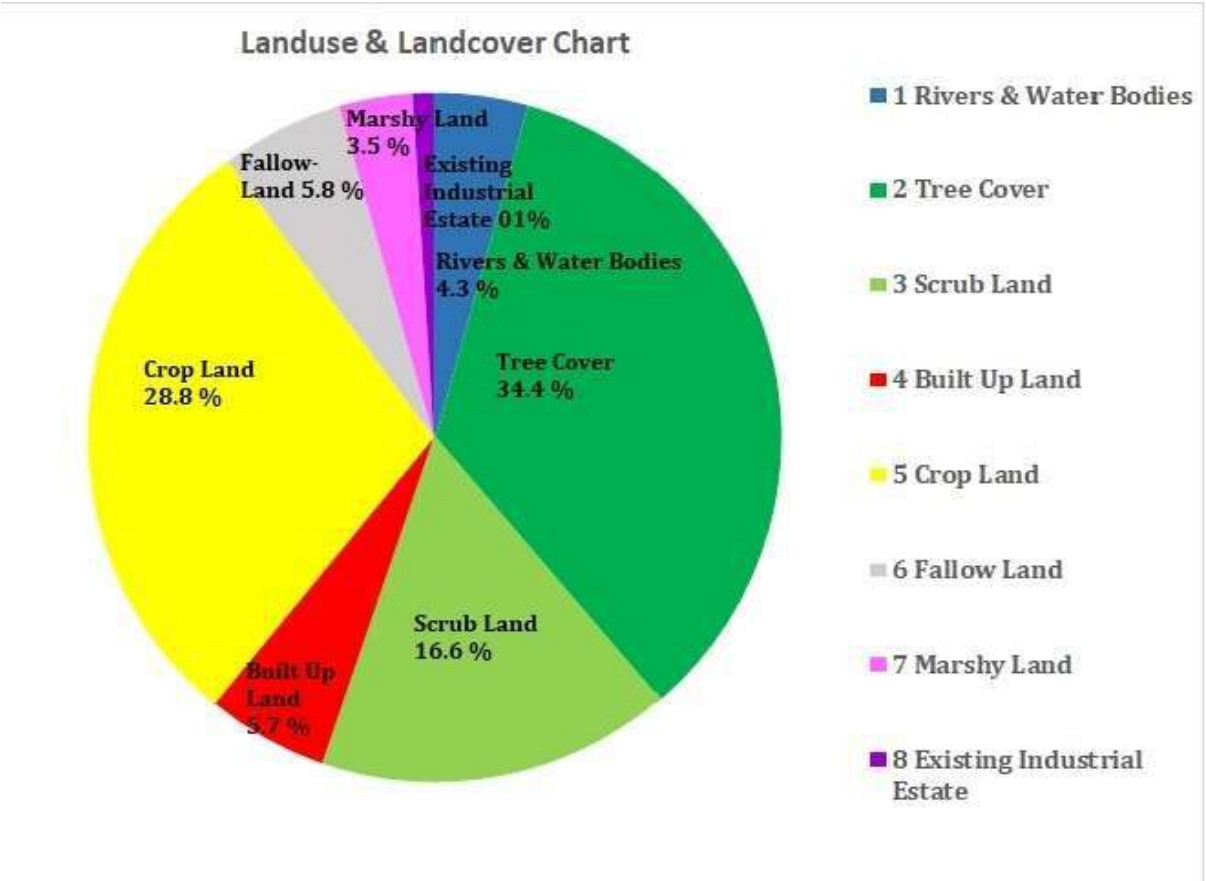


Figure: 3.14 Breakup of Landuse of 10 Km study area

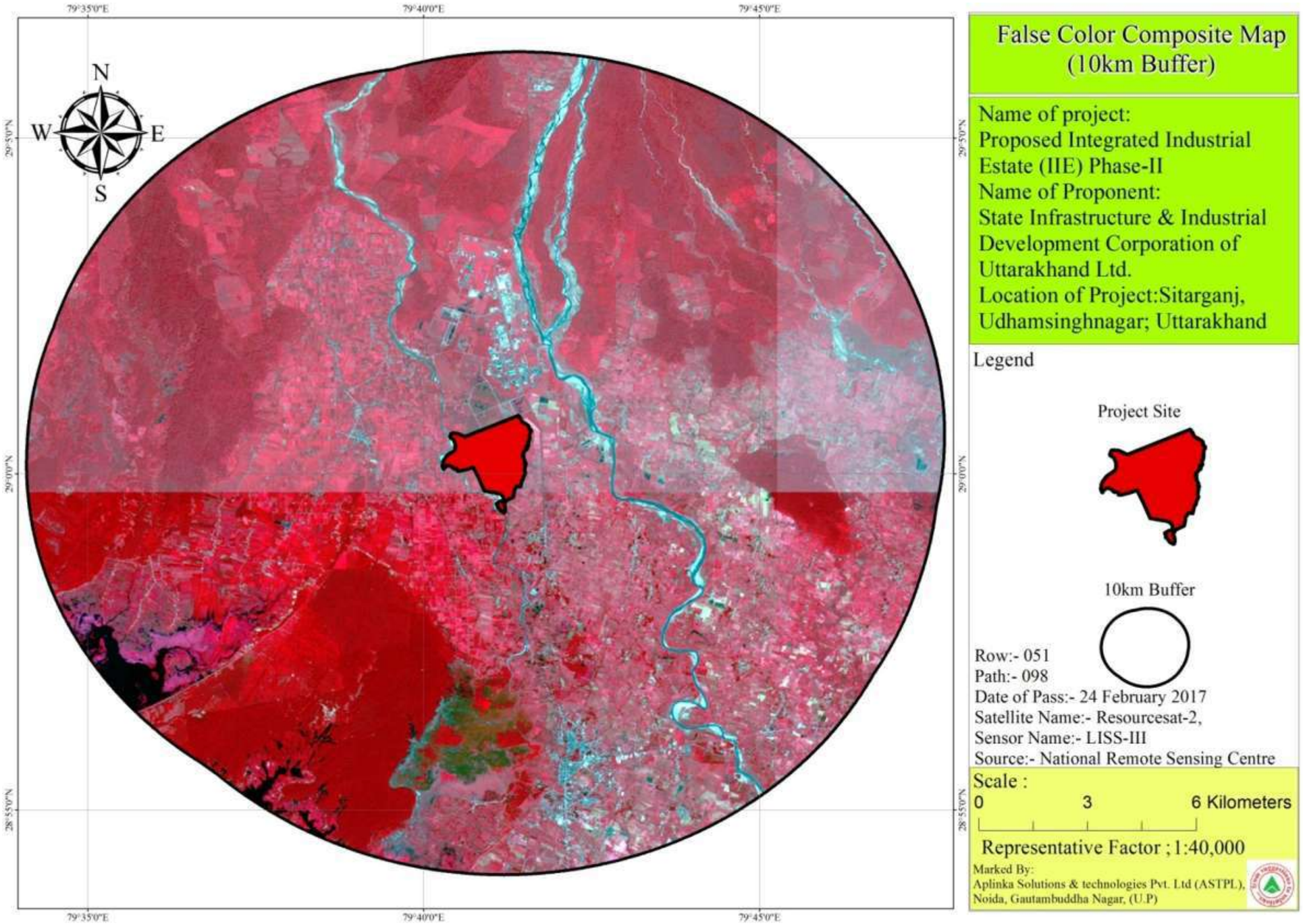
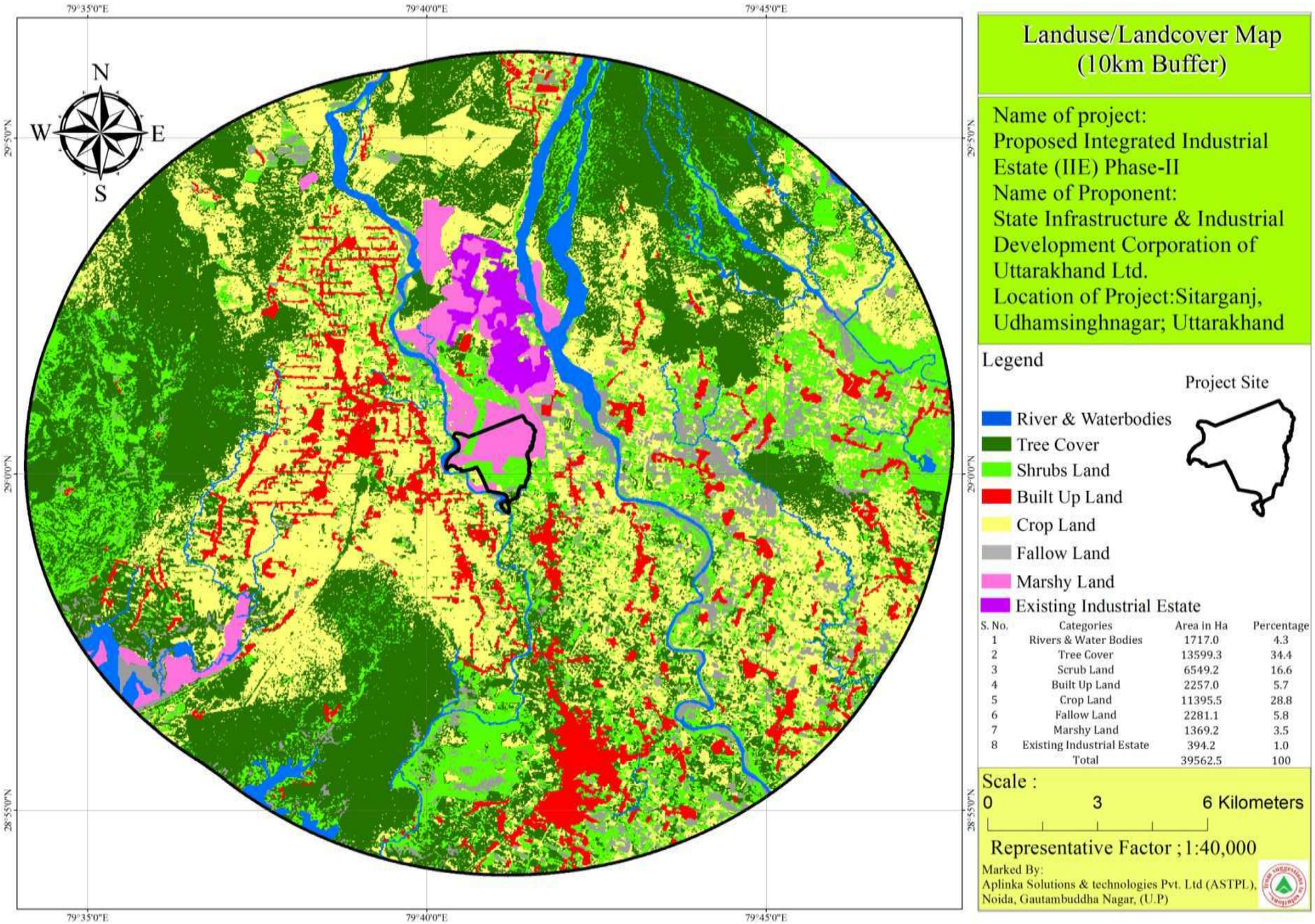


Figure: - 3.15 False Color Composite Map of Study area



S. No.	Categories	Area in Ha	Percentage
1	Rivers & Water Bodies	1717.0	4.3
2	Tree Cover	13599.3	34.4
3	Scrub Land	6549.2	16.6
4	Built Up Land	2257.0	5.7
5	Crop Land	11395.5	28.8
6	Fallow Land	2281.1	5.8
7	Marshy Land	1369.2	3.5
8	Existing Industrial Estate	394.2	1.0
	Total	39562.5	100

Figure 3.16: Landuse/ Landcover Map of Study area

3.5.8 Landuse/ landcover of project site: The landuse of the project site is industrial and main landcover is marshy land. The development of the industrial estate needs to be planned in such a way so as to ensure the stability of land from degradation and agradational forces of nature. The project site expands in an area of 291.56 ha which will result in 0.74 % loss of marshy land and destruction of aquatic ecosystem.

3.6 Soil Environment: Soil is the media for supplying nutrients for plant growth.Study of soil indicated the suitability of soil for growth of crops and other plants and also possible contamination in it. In order to establish the baseline status of soil characteristics, soil samples were collected at project site.

3.6.1 Soil Quality of the Project Area & Vicinity: As per Krishi Vigyan Kendra Udhamsingh Nagar the soil of the study area is loam and sandy loam.At places it is in water logged condition, prone to flood, soil fertility is medium where irrigation facility is available. Paddy-Wheat and Paddy-Sugarcane crops are major crop combination grown in the study area.

3.6.2 Investigation of Soil Quality in Study Area: The samples were collected by ramming a core cutter into the soil up to a depth of 90 cm to study the soil profile of the region. Sampling locations were selected to assess the existing soil conditions in and around the mine lease area. The physical, chemical and heavy metal concentrations were determined. Sampling location shall fulfil following objectives

- To determine the baseline soil characteristics of the study area;
- To represent various land use available in the study area
- To determine the impact of construction on soil characteristics; and
- To determine the impact on soils more importantly from agricultural productivity point of view.

3.6.3.1 Soil Sampling: The sampling locations with their distance & direction from project site are shown in Table 3.24& their locations marked on toposheet are shown as below in Figure

Representative soil samples were collected from five different predetermined locations within the study area. The prominent landuse was the major criteria for selection of soil sampling locations. At each location, soil samples were collected from three different depths viz. 30 cm, 60 cm and 90 cm below the surface and are homogenized.

3.6.3.2 Soil Methodology: -

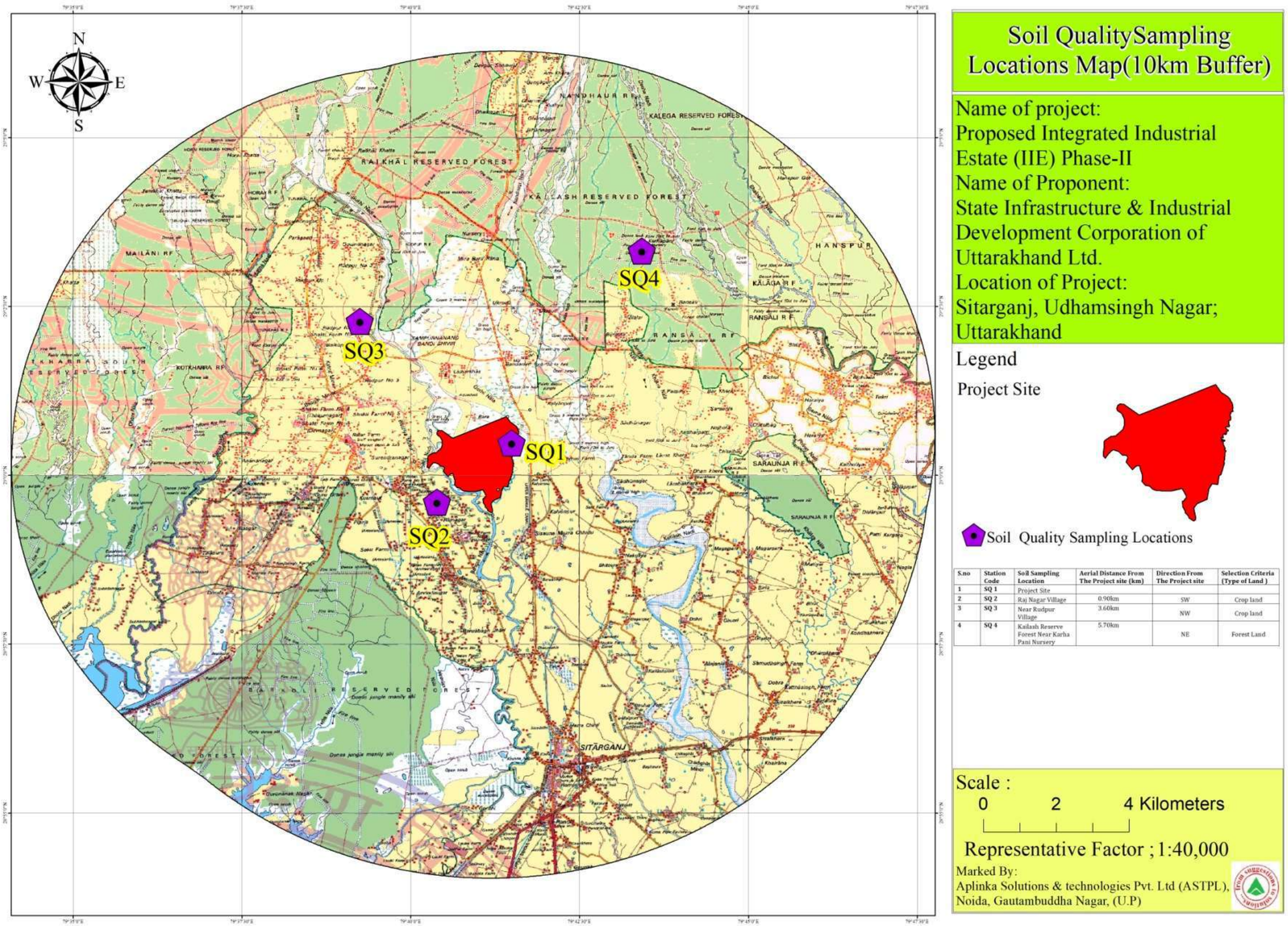
Standard procedures were followed for the sampling and analysis of physico–chemical parameters. This is in line with IS: 2720 and Methods of Soil Analysis, Part-1, 2nd edition, 1986 of (American Society for Agronomy and Soil Science Society America). The heavy metals have been analyzed by using Atomic Absorption Spectrophotometer & ICP OES/MS.

Table 3.24: SamplingLocations for Soil Quality

S. No.	Code	Location	Dist. from the project site (km)	Direction
1	SQ1	Project site	Approx. 0	...
2	SQ2	Raj Nagar Village	Approx. 0.9 km	SW
3	SQ3	Near Rudpur Village	Approx. 3.6 km	NW

S. No.	Code	Location	Dist. from the project site (km)	Direction
4	SQ4	Kailash reserve forest Near KarhaPani Nursery	Approx. 5.7 km	EW

Source: Onsite monitoring



S.no	Station Code	Soil Sampling Location	Aerial Distance From The Project site (km)	Direction From The Project site	Selection Criteria (Type of Land)
1	SQ 1	Project Site			
2	SQ 2	Raj Nagar Village	0.90km	SW	Crop land
3	SQ 3	Near Rudpur Village	3.60km	NW	Crop land
4	SQ 4	Kailash Reserve Forest Near Karha Pani Nursery	5.70km	NE	Forest Land

Figure 3.17: Soil Sample Collections at Different Locations

3.6.3.3 Analysis& Results: Analysis of collected soil samples was carried out using the methodologies given in various standard protocols as per the relevant BIS/SOPs specifications.Mechanical, physical and titrimetric, gravimetric and instrumental methods were used for analysis.HPLC grade water was used for reagent preparation & blank correction.Analytical Reagent (AR) grades or pure quality chemicals were used in analysis.

The soil quality as analyzed from the collected samples of the study area is given in Table 3.25.

Table 3.25: Soil Quality analysis results

S. No.	Parameters		Results				Test Method
			SQ1	SQ2	SQ3	SQ4	
1.	pH		7.56	7.52	6.96	6.99	IS:2720(Part-26)
2.	Conductivity (µmhos/cm)		254	265	345	820	IS:2720(Part-21)
3.	Sodium (as Na) (mg/kg)		156.3	148.7	169.1	189.5	STP/SOIL
4.	Water holding capacity (%)		22.3	28.1	28.4	30.53	STP/SOIL
5.	Potassium (as K) (mg/kg)		89.6	242.7	308.2	356.3	STP/SOIL
6.	Texture	Sand (% by mass)	49.44	50.90	56.63	36.86	STP/SOIL
		Clay (% by mass)	24.50	26.35	27.23	36.53	STP/SOIL
		Silt (% by mass)	26.06	22.75	16.14	26.61	STP/SOIL
7.	Soil Texture		Silty Loam	Silty Loam	Silty Loam	Silty Clay	STP/SOIL
8.	Calcium (as Ca)(mg/kg)		656.5	596.6	452.4	741.5	STP/SOIL
9.	Magnesium (as Mg) (mg/kg)		142.6	278.6	155.6	245.3	STP/SOIL
10.	SAR		1.44	1.26	1.75	1.54	STP/SOIL
11.	CEC(meq/100gm)		2.85	3.24	2.96	2.64	STP/SOIL
12.	Available Phosphorus (as P),(mg/kg)		78.2	86.3	87.7	108.6	STP/SOIL
13.	Organic carbon (%)		0.84	0.53	0.77	1.95	STP/SOIL
14.	Porosity(% by mass)		27.21	25.6	28.7	25.5	STP/SOIL
15.	Permeability (cm/hr)		1.55	2.88	1.3	1.05	STP/SOIL
16.	Bulk Density(kg/cm^3)		1.28	1.27	1.28	1.30	STP/SOIL
17.	Nitrogen (Kg/ha)		88.4	77.6	97.2	124.1	STP/SOIL

Source: Baseline Lab Monitoring by Noida testing laboratory

3.6.4 Discussion on Results:

A)Physical&chemical Properties: From the tabulated values, the following conclusions can be made about physical and chemical characteristics of the samples.

- It has been observed that the pH of the soil in the study area ranged from 6.96 to 7.56. The pH of the soil is slightly alkaline.
- The electrical conductivity was observed to be in the range of 254 to 820 (µmho/cm).
- The Nitrogen values range between 77.6 to 124.1 Kg/ha. Nitrogen is found in sufficient quantity in soil as per standard soil classification of ICAR(Indian Council of Agricultural Research), New Delhi
- The available phosphorus values range between 78.2 to 108.6 Kg/ha, indicating that the phosphorus content in the study area falls in on an average sufficient category.
- The potassium values range between 89.6 to 356.3 Kg/ha. It was found more than sufficient quantity as per ICAR soil classification.

It is observed that the soil quality- does not indicate any noticeable pollution and contamination. The soil qualities of villages are suitable for agriculture and can be improved by application of fertilizers in order to grow vegetation/plantation.

3.7 Socio-economic Environment: This section of the EIA report deals with Socio-Economic Impact assessment of the Proposed Integrated Industrial Estate (IIE) Phase –II(Total Plot Area-29,15,600 Sqm or 291.56 ha),located at village: Bara, Prahlad Palsia, Kalyanpur; Sitarganj, Tehsil: Kiccha, District: Udhamsingh Nagar; State: Uttarakhand to be developed by State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. The project falls under Category B1 of item no 7(c) of the schedule of EIA notification 2006 as amended thereof and therefore requires preparation of an Environmental Impact Assessment report and public hearing.

Social economics study is mainly concerned with the interplay between social processes and economic activity within a society. Social economic indicators explain how a particular social group or socio-economic class behaves within a society; including their actions as consumers or final recipient.

Different socioeconomic classes may have different priorities regarding how they live and what they want. The social economic study deals with different characteristics and features of the society that can include social and economic standards of living, level of education, current profession, and ethnic background or heritage. Hence determination the social condition of the study area plays a very important role in EIA report.

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

- To study the socio-economic status of the people living in the study area of Proposed Integrated Industrial Estate (IIE) Phase –II
- To assess the impact of the Proposed Integrated Industrial Estate (IIE) Phase –II on State Gross Domestic Product (SGDP)
- To suggest Community Development measures needs to be taken for the study area.
- To identify the impact of the project on the life of the people and their economic growth.
- To identify the benefits of this project on the occupational growth, economic growth as well as on their socio-economic growth.

3.7.1 Methodology: The methodology adopted for impact assessment is as follows:

The details of the society and population structure have been obtained from projection of Census 2011 and analyzed.

Primary data was collected by a door-to-door survey in study area and household's living therein. The data collected during the above survey was analyzed to evaluate the prevailingsocio-economic profile of the area.

Based on the above data, impacts due to mining operations on the community have been assessed and recommendations for further improvement have been made.

For detail methodology please refer **Annexure –VI**

3.7.2 Findings of the study:

3.7.2.1 Description of the Study Area: The study area of the Proposed Integrated Industrial Estate (IIE) Phase –II , located at village-Bara, Prahlad Palsia, Kalyanpur; Sitarganj, Tehsil-Kiccha, District-Udham Singh; State-Uttarakhand to be developed by State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd is 10 Km from the boundary of proposed project site. The study area comprises parts of Tehsil- Kiccha and Haldwani of Distt.-Udhamsingh Nagar and Nanital respectively.

Fig no.3.1 represents the administrative boundaries of the villages in the study area. The green colour shows the forest, while the blue color shows the rivers. The major river includes Kailash River, Daoha River, Katna River, Bagul River which contribute water facility for agriculture in the study area. The Nagarpalikas in the study area are shown in red which are major urban areas i.e. Sitarganj and Shaktigarh. This map clearly describes the boundaries of rural areas also. Important roads have also been demarked in the map by black color.

The study area involves two urban settlements {Shaktigarh (NP), Sitarganj (NPP)} and 78 rural villages. The total no of settlements in the study area are 80. About 33292 Nos of Household with the total population of 1, 80,626 individuals reside in the study area.

The important forest ranges such as Nandhaura Range, Dauli Range, Barkoli Range, Raikhal Range are also a part of the study area. Please refer Figure-3.18.

Table 3.26 Demographic Profile of the Villages in the study area

S/No	Demographic Feature	Buffer Zone				
		0-2 Km	2-5 Km	5-7 Km	7-10 Km	Total (10 Km)
1	No. of Settlements/ Villages	12	22	17	29	80
2	Household	4908(14.74)	12170(36.56)	3929(11.80)	12285(36.90)	33292
3	Total Population	27207(15.06)	65598(36.32)	21270(11.78)	66551(36.84)	180626
4	Male	14117(15.11)	33988(36.38)	11006(11.78)	34322(36.73)	93433
5	Female	13090(15.01)	31610(36.25)	10264(11.77)	32230(36.96)	87194
6	Children	3455(14.59)	8446(35.67)	2689(11.36)	9091(38.39)	23681
7	Schedule caste	3252(19.64)	6594(39.83)	2115(12.78)	4594(27.75)	16555
8	Schedule Tribe	3781(14.02)	7097(26.31)	5795(21.48)	10301(38.19)	26974
9	General & OBC caste	20173(14.71)	51907(37.86)	13360(9.74)	51656(37.68)	137096

S/No	Demographic Feature	Buffer Zone				
		0-2 Km	2-5 Km	5-7 Km	7-10 Km	Total (10 Km)
10	Literate	17294(15.20)	41067(36.10)	13152(11.56)	42253(37.14)	113766
11	Illiterate	9913(14.83	24531(36.69)	8118(12.14)	24298(36.34)	66860
12	Total Worker	10274(14.71)	27291(39.08)	8665(12.41)	23607(33.80)	69837
13	Non Worker	16933(15.28)	38307(34.58)	12605(11.38)	42945(38.76)	110790
14	Main Worker	8429(15.42)	20528(37.54)	7038(12.87)	18684(34.17)	54679
15	Cultivator	3208(18.26)	6575(37.43)	3140(17.88)	4643(26.43)	17566
16	Ag Labour	2831(17.75)	7600(47.65)	2868(17.98)	2652(16.63)	15951
17	Household Worker	323(15.14)	1002(46.95)	111(5.20)	698(32.71)	2134
18	Other Worker	2068(10.87)	5350(28.12)	918(4.82)	10692(56.19)	19028

**Source: Census of India 2011, figures in parenthesis represents percent value.*

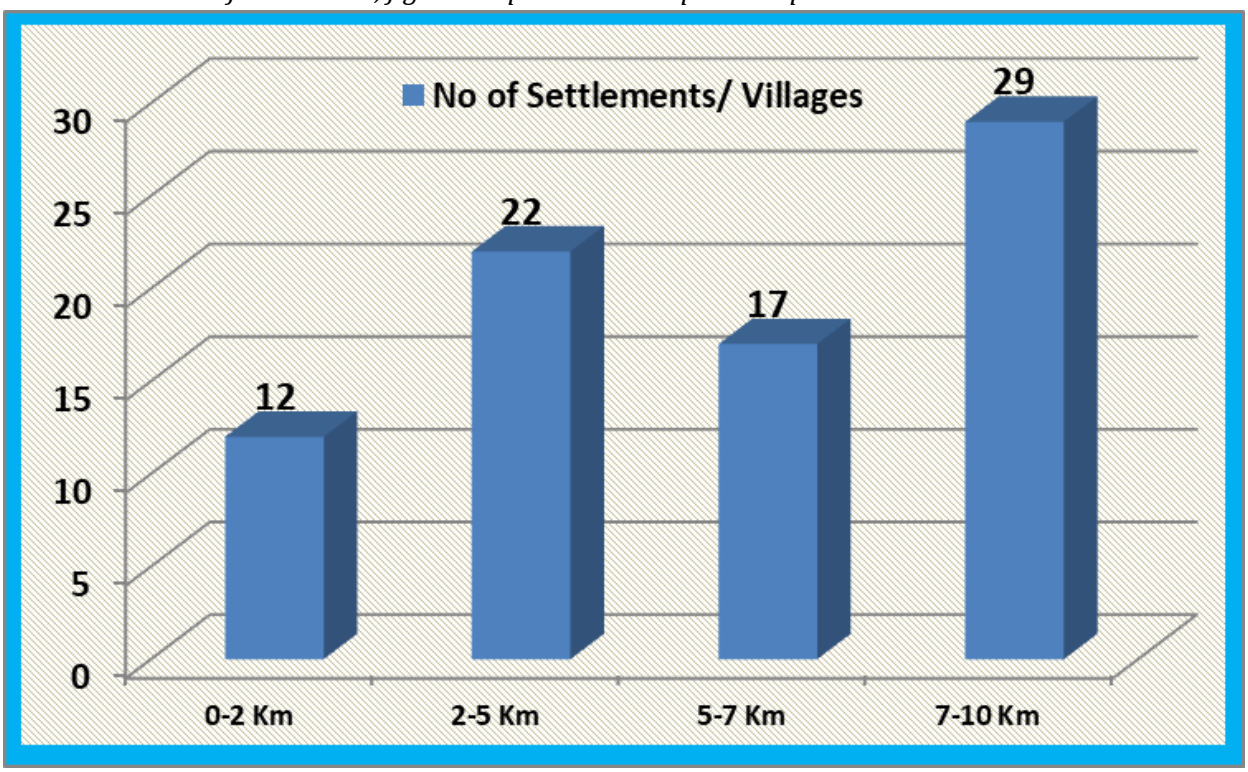


Figure –3.18 Distributions of settlements/villages in study area

3.7.2.2 Demographic composition: According to Census 2011,Uttarakhand has a total population of 1,00,86,292 individuals out of which males are 51,37,773 individuals and females are 49,48,519 individuals. As per census 2011 Udhamsingh Nagar had population of 1,648,902 individuals of which male are 858,783 individuals and female are 790, 119 individuals. The Bara village falls inside the project site which does not have any settlement and population. The table-3.27 given below shows the

total population of study area, district Udhamsingh Nagar, state Uttarakhand and India. About 1% of the total population of Udhamsingh Nagar falls within the study area.

Table 3.27 Demography of Study Area, District Udhamsingh Nagar, Uttarakhand, India

S/n	Item	Number of Individuals	%	Number of Individuals		Number of Individuals	%	Number of Individuals	%
		Study area		District - Udhamsingh Nagar		State- Uttarakhand		India	
2	Total Population	133563		16,48,902		1,00,86,292		1,21,08,54,977	
3	Total Male Population	69088	51.7	8,58,783	50.52	51,37,773	50.94	62,37,24,248	52
4	Total Female Population	64475	48.3	7,90,119	46.71	49,48,519	49.06	58,64,69,174	48

Source: Census of India 2011

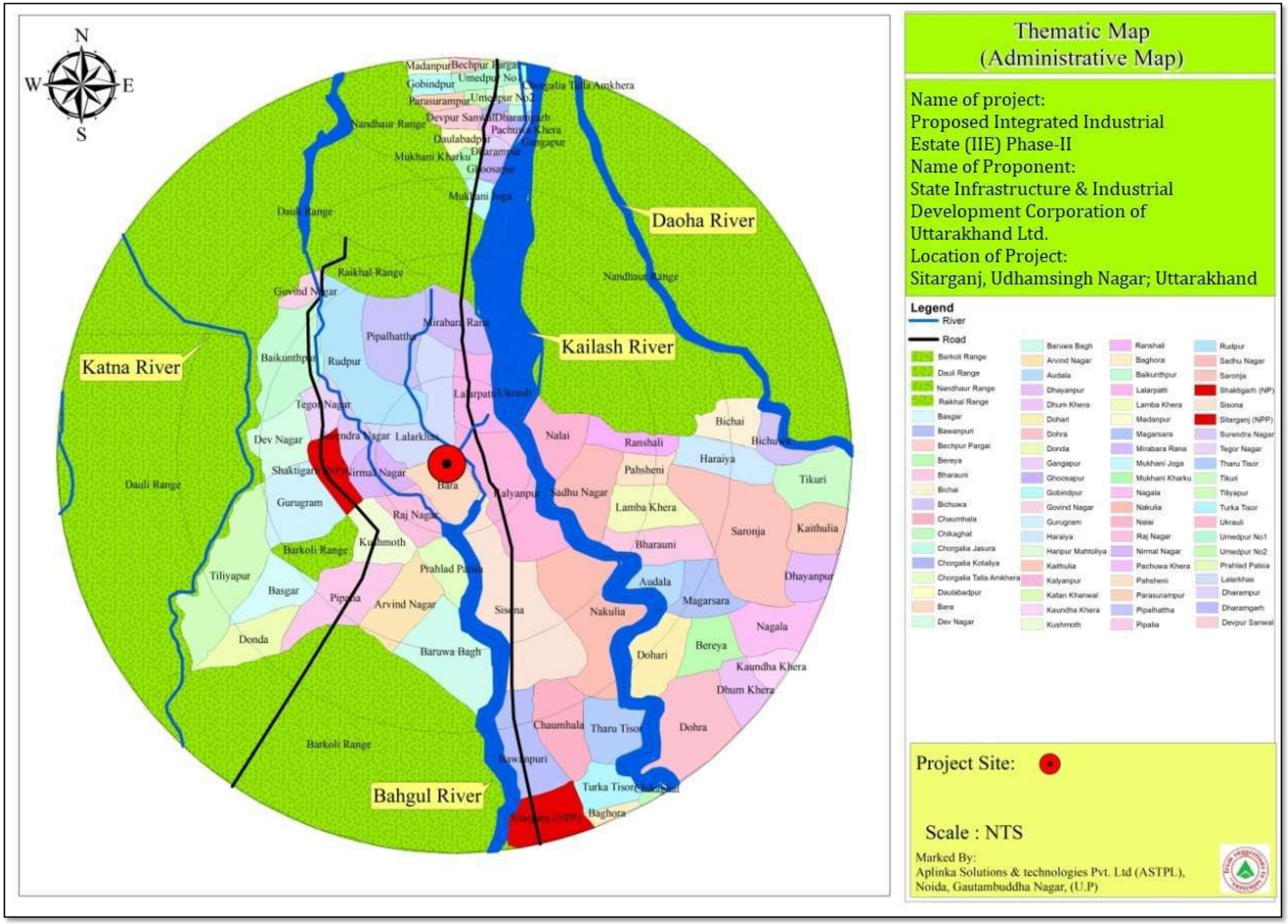


Figure-3.19 Administrative Map of Study area

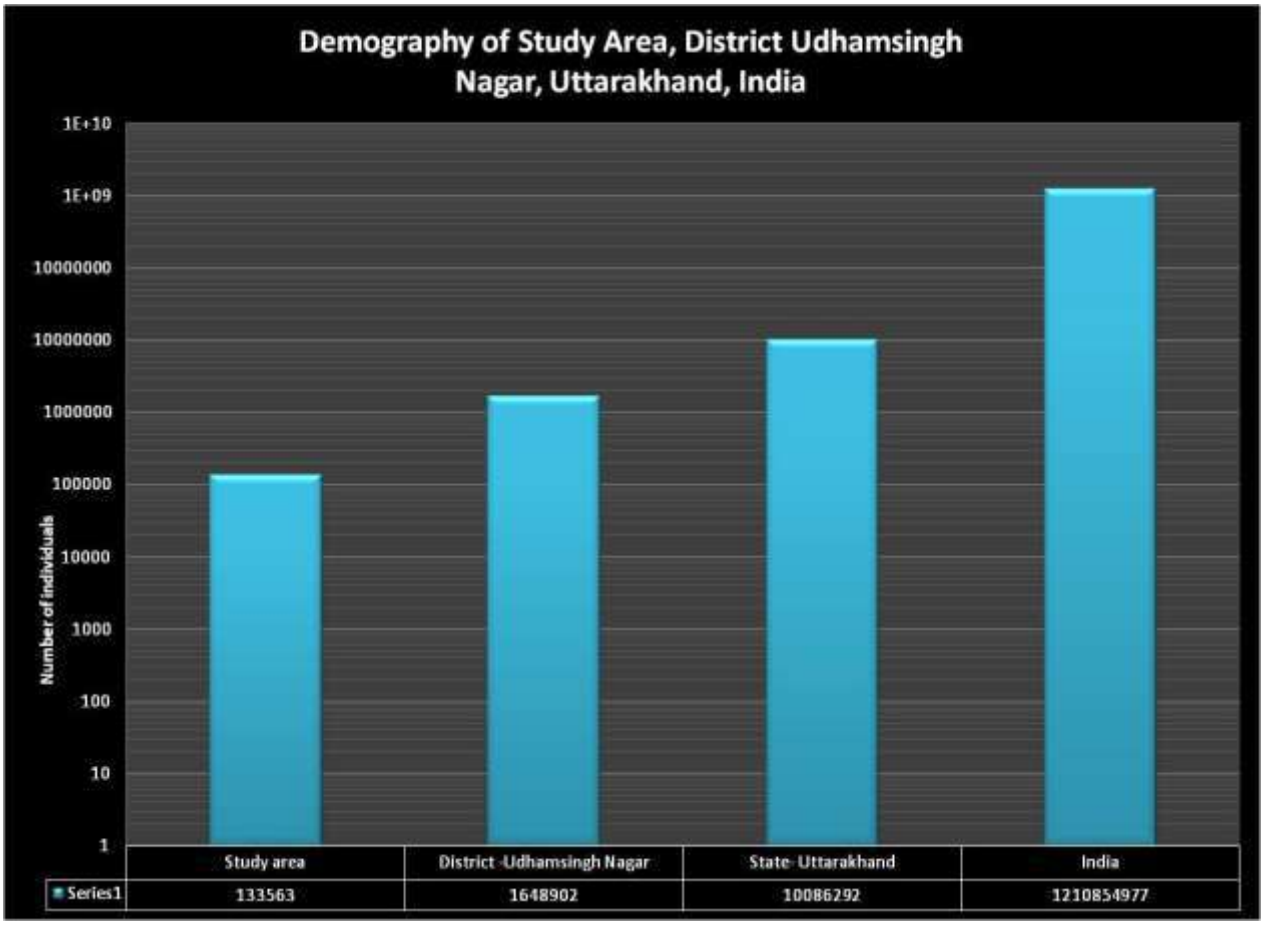


Figure 3.20 Comparative demography of Study Area, District-Udhamsingh Nagar, State –Uttarakhand

3.7.2.3 Comparison: The pie chart of total population clears depict that study area has total population of 133563 ie.1% of the total population of the Uttarakhand while district Udhamsingh Nagar has population of 1648902 ie.20% of the total population of the Uttarakhand

3.7.2.4 Population density: Fig3.4 shows the distribution of the total population across the study area. The population density at various regions in the study area is represented by red dots which depicts approx. 200 individuals per red dot, as per which it can be observed and concluded that the population density is relatively high in the regions of Sitarganj and Shaktigarh as compared to other regions in the study area. It was observed that the population density in the 2-5 km and 7-10 km is higher than 0-2km and 5-7km subzones. Udhamsingh Nagar has population density of 648 inhabitants per Sq Km (1680 sq mi). Its population growth rate is 33.4% from 2001 to 2011. The study area i.e. 10km has further been divided in to 4 subzones.

- 0-2km subzone is having 12 villages, 3629 household and 20118 populations
- 2-5km subzone is having 12 villages, 8999 household and 48506 populations
- 5-7km subzone is having 17 settlements, 2905household and 15728 populations
- 7-10km subzone is having 29 settlements, 9084house hold and 49211 populations

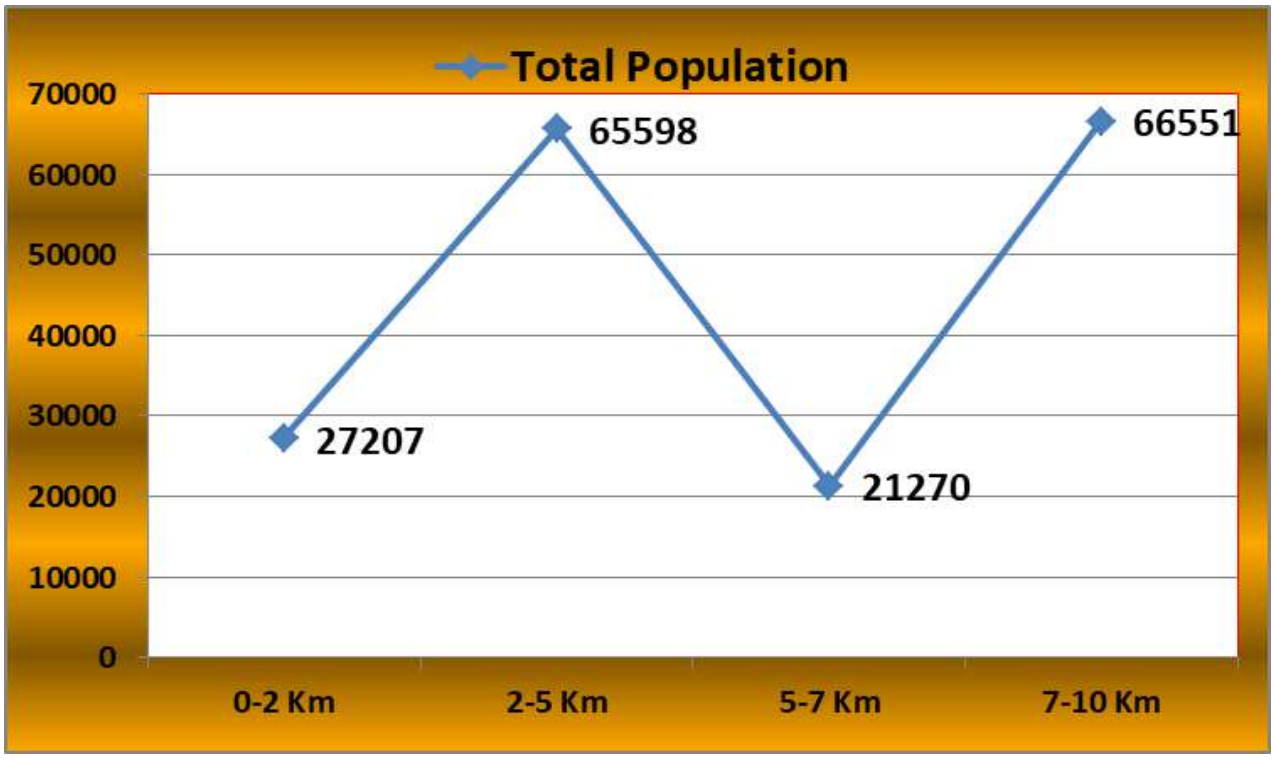


Fig-3.21 Population in the study area

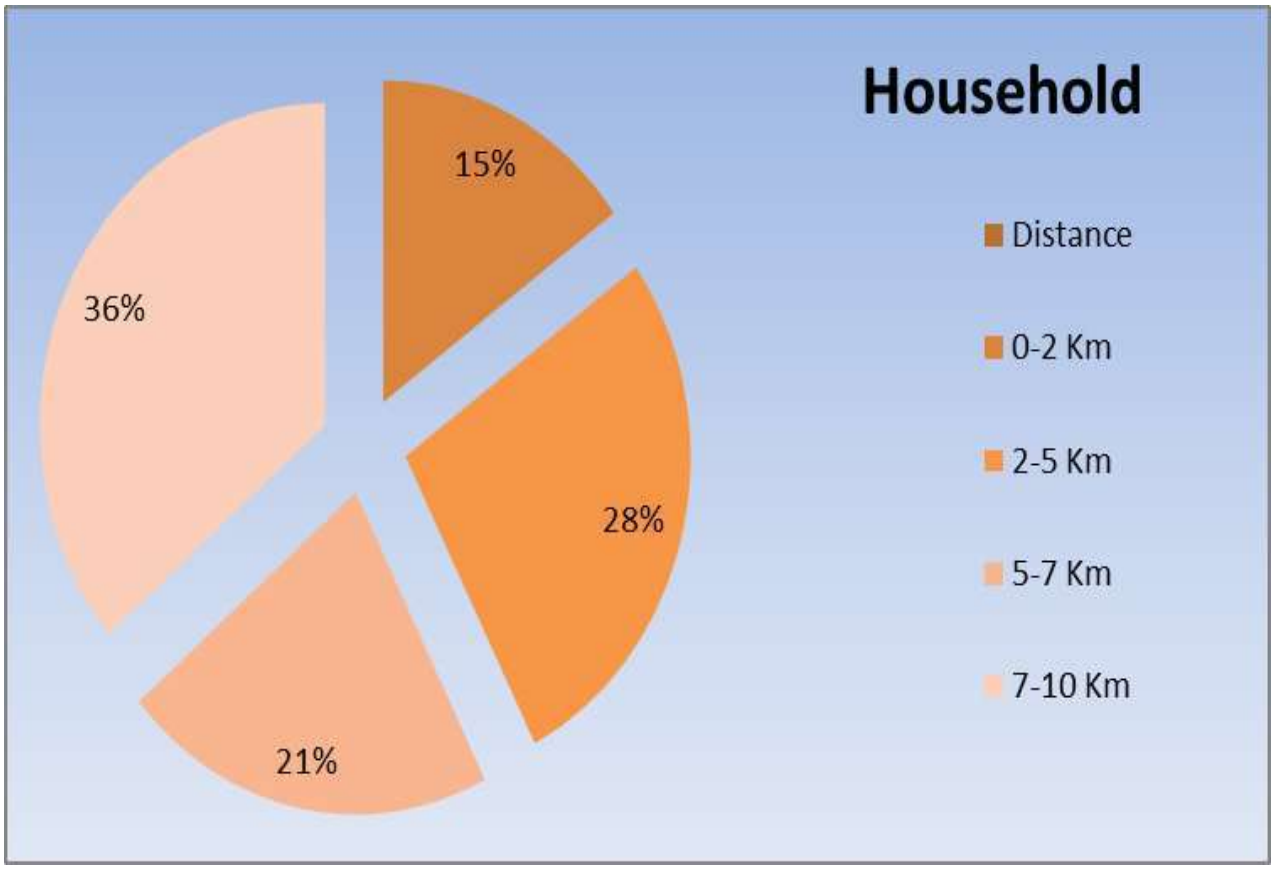


Fig-3.22 Householdin the study area

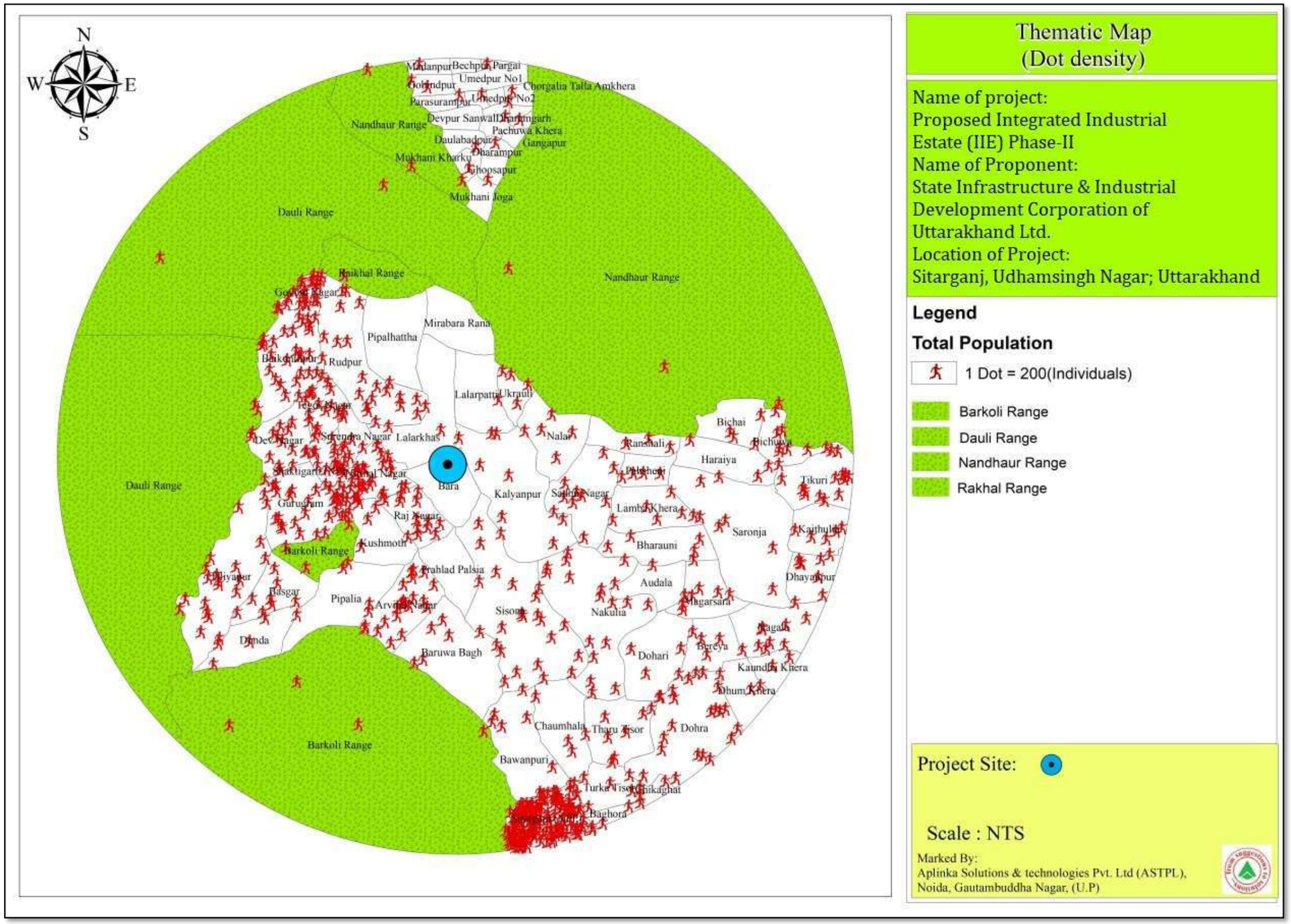


Figure-3.23 Dot Map depicting distribution of total population in study area

3.7.2.5 Occupation Details: As per survey it was observed that most of the people in the study area are cultivators and mainly depend on the agricultural practices. It was observed that as distance from the project site increase people are more involved in other works than the crop cultivation. The graph below show the distribution of main occupation of the region i.e. Cultivators, agricultural labors, household workers, and other works at different categories i.e. 0-2km, 2-5km, 5-7km, 7-10km.

Fig no-3.6 shows the occupational structure of the study area. The dark green colour clearly shows that most of the people in the study area are involved in cultivation. Hence most of the people are farmers and agricultural labours while very less fraction of people are involved in house hold activities.

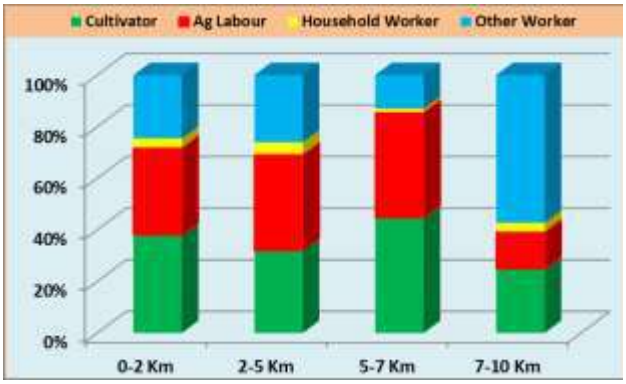


Figure-3.24 Stacked Bar Diagram of Occupational structure in the study area

Figure-3.25 Graph showing the relationship between workers in the study area

3.7.2.6 Worker & Non Worker & Occupational structure: This graph show that most of the people are in the category of non-workers while 78.29% are main workers, 21.71% are marginal workers out of total workers .Marginal workers are those workers who had not worked for the major part of the reference period i.e. less than 6 months while main workers are those who had worked for the major part of the reference period i.e. 6 months or more. So it can be concluded that due to this project the employment rate will be increase due to development of the industries.Dependency of non-workers (children's, housewife's, aged fellows, persons with disability etc) on workers is an important criterion for assessment of social setup. In analysis of data it was revealed that the urban areas having good road connectivity have more workers while remote area have more non workers.

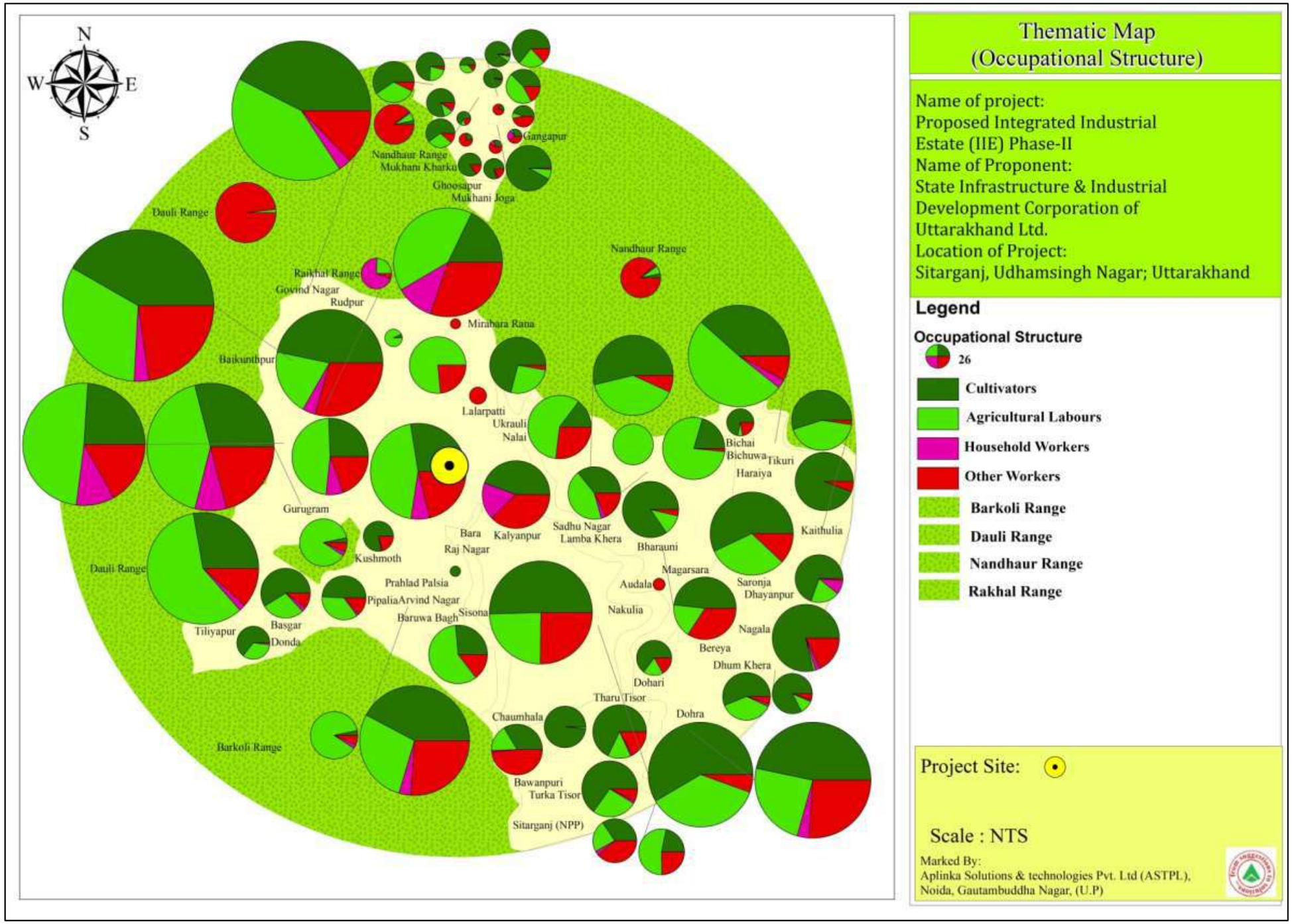


Figure-3.26 Thematic Map (Pie diagram) depicting distribution of occupation in study area

3.7.2.7 Sex-ratio: Sex ratio is an important indicator of social scenarios in study area, sex ratio is represented by number of female per thousand male.It is a very important demographic parameters and provide an indication of both the relative survival of females and males and the future breeding potential of a population. A good sex ratio is observed is observed in 3 villages i.e. Pipalia, Umedpur No1 and Chorgalia Kotaliya. It is also observed that males are more than females in the study area. Udhamsingh Nagar has sex ratio of 919 females per thousand males.

- Sex ratio of > 1001 females per thousand male was observed in 3 villages
- The sex ratio between 900 to 700 was observed in 42 villages
- The sex ratio between 700 to 500 was observed in 28 villages
- The sex ratio less than 500 was observed in 2 villages

Fig -3.9 show the differences in sex ratio in the study area. Using a spatial statistical approach, it has been possible to identify homogeneous groups of villages in the study that shows the same sex ratio. This map depicts that most of the villages has sex ratio between 700 – 900 only few villages has sex ratio less then 500.The dark color villages show that no of females are greater than males. The white color area shows that no person is living in that region

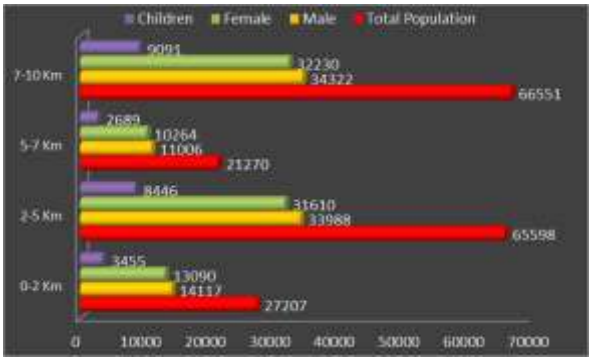


Figure – 3.27 Relationship of Male, Female and child Division with total population

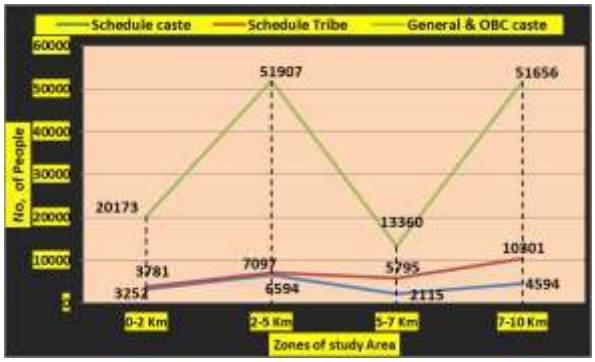


Figure –3.28 Social Structure in the study area

3.7.2.8 Social Structure & Male Female division: The society is dominated by OBC and general caste and schedule tribe comes after that in terms of numerical strength in the study area. The buffer zone of 2 – 5Km is having highest number of household's ie.8999; total population and other demographic factors. According to WII-ZSL-UKFD Report of Supporting Transboundary Tiger Recovery in India and Nepal- 2019; the scheduled tribe of Tharu is the largest tribal group of the State constituting 33% of the total tribal population in the state. They live close to the Nepal border in Khatima and Sitarganj Tehsils of district Udham Singh Nagar. The origin of the Tharus is contested but it is believed that they are predominantly mongoloid people and have successfully assimilated non-mongoloid features as well (Pant & Pal, 2017). In addition to the vulnerable social condition their own unfortunate habit of consuming alcohol further enhanced their plight and often rendered them landless. There seems to have developed a lot of awareness among the Tharus and are seen to take active interest in the constitutional and political posts reserved for tribal communities. The Rai Sikhs living in low lying river banks of Terai are primarily farmers and traders. Their ancestry can be traced to belong to the Mahtam clan who were low caste Hindus living in the Montogomery district of Punjab during colonial times who were followers of Hinduism, Islam and Sikhism. The Rai Sikhs continue to live

with the label of a criminal tribe. Though the Rai Sikhs of Punjab have been conferred the status of a scheduled caste, they have been granted Other Backward Classes status elsewhere (Major 1999;Gandee 2018). They are an economically well off and politically influential community.

3.7.2.9 Literate& Illiterate: The society is dominated by Literate in compare to illiterates refer the trend line given in Figure 3.27. The literacy rate of Udhamsingh Nagar is 74.44%. The high illiterate in the society indicate that the area currently reeling under extreme poverty and is prone to be developed. The job availability is the only pre-requisite for the development of the area.

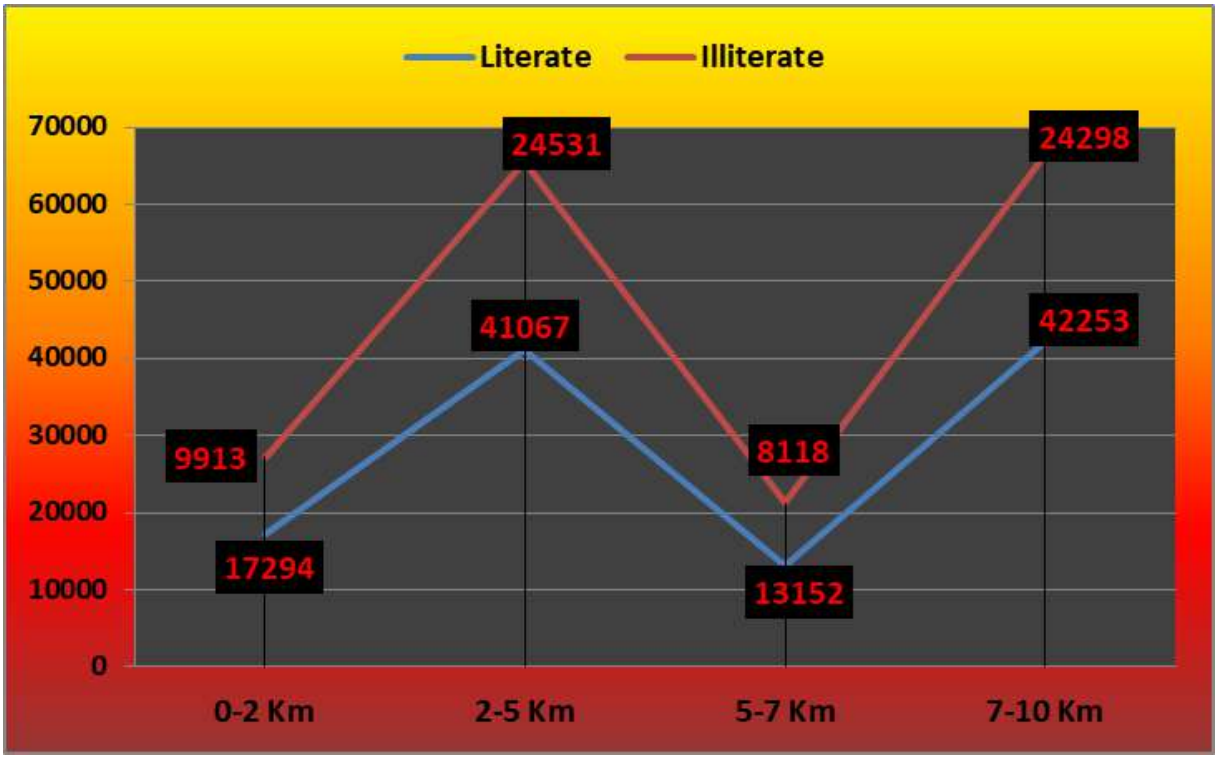


Figure – 3.29 Literates & Illiterates in the study area

3.7.3 Social Infrastructure Available: The study area of the Proposed Integrated Industrial Estate (IIE) Phase –II, located at village Sitarganj, Tehsil: Kiccha, District: Udham Singh; State: Uttarakhand to be developed by State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd harbors following social amenities.

Table 3.28: Social Amenities available in the study area

S. No.	Amenities	Distance
SCHOOL/ COLLEGE		
	Govt High school; Rajnagar	1.06km; SE
	Govt Degree collage; Sisona	1.74km; SE
	Govt Primary school; Sisona	5.92km; NE
	Govt Inter college;Audli	4.90km; SE
	Govt Primary school;Nirmalnagar	0.38km; W
	Govt Primary school; Nirmalnagar	0.77km; W
	Govt Senior Secondary school; Sitarganj	7.59km; S

S. No.	Amenities	Distance
	Govt Inter collage; Sitarganj	6.51km; S
	Govt Inter collage;Rudpur	2.74km; N
	Govt Inter collage; Shaktifarm	1.90km; S
	Govt Inter collage; Gurugram	3.11km; SW
	Govt Primary school; Subhashnagar	6.78km; NW
	Govt Upper Primary school; Dhauradaam	8.14km; SW
	Govt P.G collage; Sitarganj	8.28km; S
	Govt Primary school; Ukrauli	2.34km; N
	Govt Primary school; Nalai	3.86km; NE
	Primary School; Lambakhera	4.09km; E
TEMPLE		
	Kali Sheetla Mandir ;Arvindnagar	1.78km; SW
	Lalarkhas Temple;Lalarkhas	1.68km; N
	Sanatan Dharm Mandir;	2.18km; W
	Durga Mandir; Kushmoth	1.03km; W
	Krishna Mandir ;Tegor Nagar	2.40km; NW
	Shiv Mandir;Sisona	2.13km; SE
	Shri Krishna Mandir ;PrahladPalsia	0.88km; SW
	Hanuman Mandir; Bamabpuri	4.01km; S
	Shiv Mandir; Bamabpuri	4.05km; S
	SantShri Guru Ravidas Temple; TharuTisor	5.70km; SE
	Shiv Mandir; Chikaghat	7.80km; S
	Shiv Mandir; Baghora	8.60km; S
	Manshadevi Temple; Baruwabagh	1.69km;SW
	Sri Sanidev Mandir;Surendranagar	1.92km;NW
	Shiv Mandir; Baghora;Magarsara	6.13km;SE
HOSPITAL		
	Govt. Hospital Deorakala; Sitarganj	7.18km; S
	Triveni clinic ; Sitarganj	7.24km; S
	Satya Eye hospital ; Sitarganj	7.56km;S
	Dr.Turna Max Surgical hospital ; Sitarganj	7.84km;S
	Prayas hospital and research center	0.97km;E
	Health and wellness center ;Nakulia	4.00km;SE
POLICE STATION		
	Police fire Station SIDCUL; Sitarganj	1.64km; N
	Police Station; Sitarganj	7.00km; S
POST OFFICE		
	Post Office ;Shaktifarm	1.96km; W
	Post Office ;Sisouna	1.41km; SE
	Post Office; Baruabad	4.00km; S
	Post Office; Pandari	8.55km; S

3.7.4 Social Interaction observations & Analysis: A team of experts lead by socio-economic expert had visited the study area and carried social baseline primary data collection through the group discussions.

- The socio-economic survey revealed that most of neighboring villagers are migrants from various parts of India during different period of history such as Hilly regions of Kumoun; Bengalis of East Pakistan (Bangladesh) and Sikhs of West Pakistan (Pakistan) and Tharu and Bhuksha (Schedule tribes) are the original inhabitants of the region.
- The soil of this region is highly fertile and is resulting one the highest crop productivity in India in this region. Almost all crop are being produced in the region, however the important crops are Wheat; Rice; Maize; Sugercane; Sugerbeat; Soyabean; Fruits and Vegetables.
- Flood irrigation is followed due to availability of plenty of water and artisans. Agro-based industries are having good support in the area i.e. Sugar; Jaggery; Fish farming etc.
- The Sikhs are economically dominant community. Man animal conflict is also common in the study area and it often results in human casualties.
- The tiger was also reported to come near forest chauki of KahraPani Gate and drink the water from Nandhaur.
- The infrastructure facilities like school, PHC, Panchayat, Drinking water facilities, electricity, and road connectivity are available in the study area.

Fig-3.30 Social Interaction with the native people

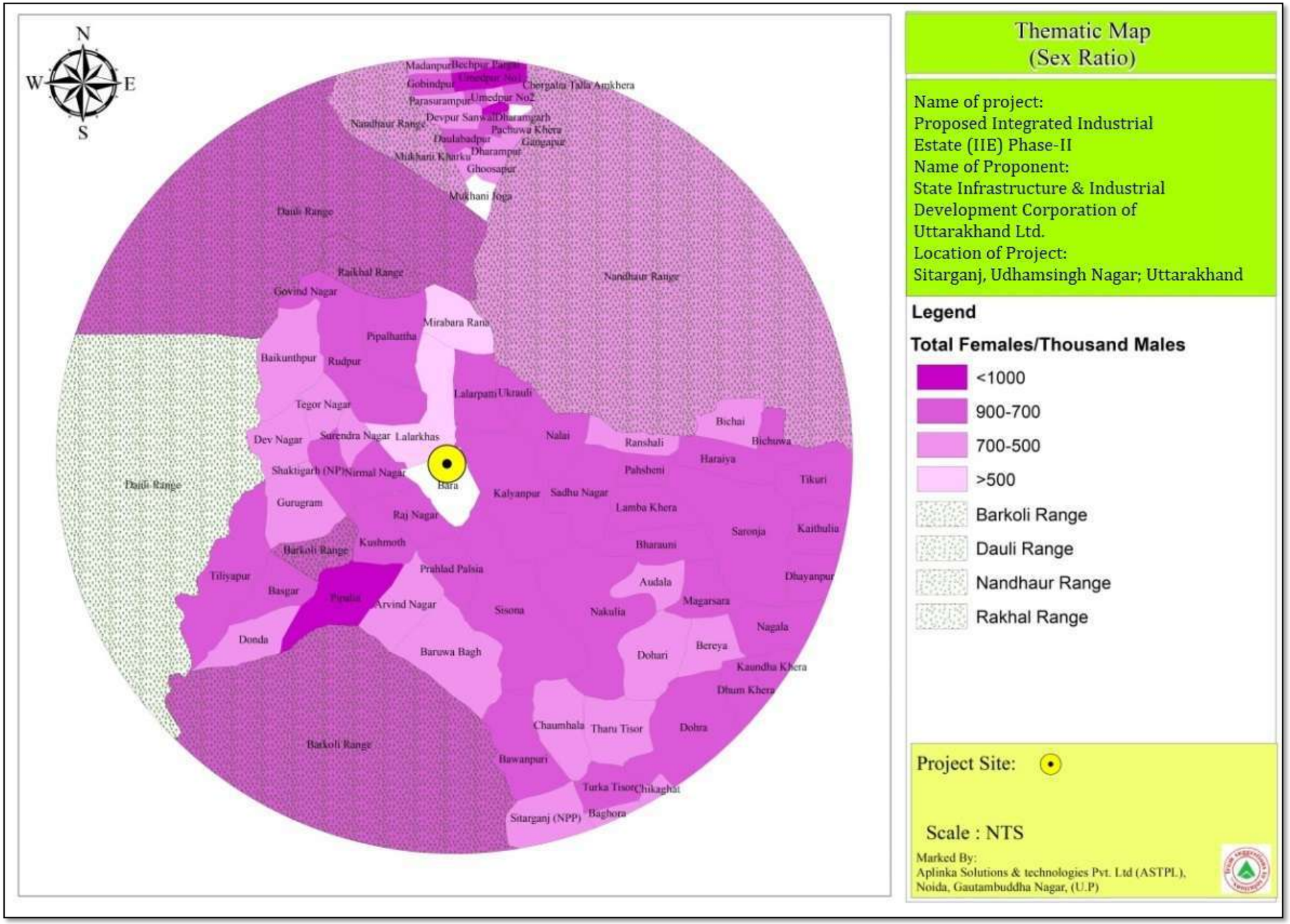


Figure-3.31 Choro-chromatic Map depicting distribution of sex-ratio in study area

3.7.5 Drinking Water Facilities in Study area: The study area has abundance of water sources however about 54.2 % households are dependent on handpump and only 32.2 % household have tapwater facilities. About 57.2 % household have the drinking water sources within their premises while 13.2 % households have to travel about 2 Km to fetch the drinking water. **(Refer Annexure-VII)**

3.8 Biological environment: This section explains the biological aspects of the project area and study area. It summarizes the biological resources and important habitat either of terrestrial or aquatic ecosystem that are present within the study area (10km radius of the project site). A natural ecosystem is a structural and functional unit of nature. It has different components, which are interrelated to each other and survive by interdependence. An ecosystem has self sustaining ability and controls the number of organisms at each level. The anthropogenic actions modify the natural ecosystem and make it converted ecosystem. The converted ecosystems are highly dependent on condensed sources of energy and are dependent on market to a greater extent. The objectives of biological assessment are to,

- Identify the important ecological habitats.
- Understand the functioning of converted ecosystems.
- Assess the existing flora and fauna species.
- Assess the protection status of fauna as per Wildlife protection act 1972 and IUCN Red List.
- Identify the threats associated with the project to biological environment.
- Suggest the mitigation measures for the threats and improving the biological diversity

3.8.1 General setting: The area has a number of protected or reserved forest.However, there is only one wildlife sanctuary namely "Nandhour Wildlife Sanctuary" within the study area. The Shivalik elephant reserve which provides a safe passage to the tuskers of Raja Ji National Park to Nepal through Tarai Arc Landscape (TAL) is also very close to the proposed industrial estate. The study area is very rich in biodiversity. The study area represents the ecotone where two or more ecosystems meet with each other i.e. The Tarai; Bhabhar and Shivalik. The study area harbors varied ecosystem i.e. three tired Sal Forests ecosystem; riparian ecosystem; agro-ecosystem and marshy ecosystem etc.
The Siwalik Hills are known to be the youngest sub-mountainous range of the outer Himalaya and has a distinct ecosystem in itself. They are formed almost parallel to the south of the lesser Himalayan range and is composed of the Siwalik Hills and its piedmont plains. Below the foothills, towards the South of the Siwalik Hills is the Bhabar Region. It is composed of coarse sand, shingle and boulders deposited by the rivers that flow from the higher Himalaya through the Siwaliks. The Terai lies to the south of Bhabar and is characterized by high water retention capacity, moist loamy soil, deep, marshy, gravel and boulder free and extremely. The underground streams of Bhabar reappear in the Terai.
In terms of vegetation, it mainly comprises Sal (*Shorea robusta* Roth) forest interspersed with wet tall grasslands, and shallow seasonal swamps[1]. Sal forest occurs gregariously on the southern slopes of the Himalayas and is distributed on the plains and lower foothills of the Himalayas including the valley[2]. The project

[1] Gautam, K.H. 2001 Lopping Regimes in Community Managed Sal (Shorea robusta) Forests of Nepal: Prospects for Multiple-Product Silviculture for Community Forestry. School of Forestry, University of Canterbury, Christchurch, 267 pp.

[2] Gautam, K.H. 2001 Lopping Regimes in Community Managed Sal (Shorea robusta)
Forests of Nepal: Prospects for Multiple-Product Silviculture for Community Forestry. School of Forestry, University of Canterbury, Christchurch, 267 pp.

area also comprises riparian ecosystem as well as marshy vegetation as the project area lies near the interface between land and a river (River Beghul).

The dominant top-most stratum species of the area includes (Sal) *Shorea robusta* Roth along with (Chitvan) *Alstonia scholaris* (L.) R. Br.*;* (Semal) *Bombax ceiba* L.*;* (Bel) *Aegle marmelos* (L.) Corr.*;* (Maharookh) *Ailanthus excelsa* Roxb*;* (Salai) *Boswellia serrata Roxb* ex Colebr.*;* (Neem) *Azadirachta indica* A. Juss.*;* (Sisham) *Dalbergia latifolia* Roxb.*;* (Sisu) *Dalbergia sissoo* Dc.*;* (Safeed Siris) *Albiziaodoratissima* (L.F.) Benth*;* (Black Siris) *Albizia procera* (Roxb.) Benth*;*(Subabool) *Leucaena leucocephala* (Lamk) DeWit; (Dhaura) *Anogeissus latifolia* (Roxb Ex Dc.); (Arjun) *Terminalia arjuna (*Roxb Ex Dc) W. & A., Prodr; (Baheda) *Terminallia bellirica (*Gaertn) Roxb*; Callistemon lanceolatus* (Sm) Sweet;(Majnu) *Lagerstroemia indica* L.;(Silver Oak) *Grevillea robusta A*Cunn ;(Chilbil) *Holoptelea integrifolia Planch;* (Babool) *Acacia nilotica* (L.) Delile; (Jarul) *Lagerstromia parviflora* Roxb etc. Apart from trees, some bamboo species were present such as *Bambusa bambos* syn. *Bambus arundinaceae*.

Similarly, some of the dominant shrubs of the area include (Bhankatiya) *Solanum torvum* Sw.,(Hastidanti) *Baliospermum montanum,* (Kukur jihwa) *Leea indica* (Burm.f.) Merr.,(Ban chola) *Flemingia macrophylla (Willd.) Merr.,*(Arandi) *Ricinus communis,* (Bashram bar) *Ipomoea carnea* Jacq. , (Raimuniya) *Lantana camara L.,* (Titabhant) *Clerodendrum infortunatum* L *and* (Ban nimb) *Glycosmis pentaphylla* (Retz) DC.These species form the second stratum in the area.

The ground vegetation mainly includes (Kandai) *Cirsium arvense (L.) Scop* (Piparisari) *Pouzolzia pentandra* (Roxb.)Benn, (Bachita) *Urena lobata* L.,(Kankawa) *Commelina benghalensis* L., (Jangli pudina) *Ageratum conyzoides* L, (Kana) *Cyanotis cristata* (L.) D.Don, (Suvattru mullangi) *Blumea mollis* (D.Don) Merr.,(Apamarga/Chirchita) *Achyranthes aspera* L, (Arabi) *Colocasia esculenta* (L.) Schott, (Gajar Ghas) *Parthenium hysterophorus* L, *(Bhrangraj) Eclipta alba*(L.) Hassk, (Dabra/ Chitraparni) *Uraria lagopodioides* (L.)DC, (Bhatkatiya) *Solanum xanthocarpum* Schrad & Wendl,(Janglimedhi) *Sida rhombifolia subsp. retusa* (L.)Borssum, (Daabha, Siru, Ulu) *Imperata cylindrica* (L.) P.Beauv, (Munja) *Saccharum bengalense*Retz., (Narkat) *Phragmites karka* (Retz.) Trin.ex Steud. and (Khus grass) *Chrysopogon zizanioides* (L.) Roberty., (Arusa) *Hemigraphis latebrosa* (Roth) Nees, (Rasbhari) *Physalis minima* L, (Jangali Palak) *Persicaria barbata var. gracilis* (Danser) H. Haraand(Chakunda) *Senna tora* (L.) Roxb..Apart from the herbs, some grasses of the area include (Tachula) *Apluda mutica* L, (Sava ka Chawal) *Echinochloa colona* (L) Link.

In order to know the vegetation cover as well as the wildlife of the project area, the following methodology has been followed:

3.8.2 Methodology: Biodiversity study of the proposed project area was carried out to understand the status of predominant floral and faunal groups i.e. trees, shrubs, herbs, grasses, fishes, herpeto fauna, avifauna and mammals. To collect data and information on specific components of the ecological system and pertinent issues, widely used standard scientific methods were adopted. Firstly the secondary data was reviewed to know the important habitat of the study area. Then field surveys were undertaken to document the flora and fauna present within the project area and study area. (Please refer **Annexure- VI** for detailed methodology followed) During the survey, the area is divided into two zones, viz. core and buffer zone.

3.8.2.1 Core zone: The field survey was conducted within the project area to document the vegetation cover as well as fauna species. Regarding the vegetation cover, the project area comprises of trees and herbs primarily.

3.8.2.2 Buffer Zone: The flora and fauna of the buffer zone was enlisted based on visual observation or ocular assessment as well as survey using utilitarian biodiversity with the local resident of study area. The phyto-social studies are quite frequently used and tested tool for getting baseline status of flora in study area. The buffer zone consists of some Reserved and Protected Forests. The method that was used for the assessment is briefly given in Table 3.31.

Table 3.29: Sampling Methods to Study Biological Environment

S. No	Description	Sampling Methods
FLORA		
	Herbs, shrubs, and trees	Quadrant Method and discussion with local people.
FAUNA		
	Fishes	Discussion with local people and fishermen group
	Amphibians	Visual encounter survey
	Reptiles	Visual encounter survey
	Birds	Opportunistic observation
	Mammals	Tracks and signs, and visual encounter survey

All the information obtained from the primary survey were cross verified with the available literatures and are presented in the following sections. The eco-sensitive areas as well as flora and fauna observed in study area are given below:-

3.8.2.3 Protected Area: There are no environmentally sensitive placeswithin the project site. The Nandhour Wildlife Sanctuary & its Eco-sensitive Zone (ESZ) is present almost at 12.6 km and 6.6 km respectively from the project site (Figure 3.29). Also, a Shiwalik Elephant Reserve under Tarai East Forest division is at about 4.3 km from the project site (Figure 3.30). The distances of the ecologically sensitive areas falling within 10 Km from the project boundary are given below in Table 3.32:

Table 3.30: Ecological Sensitivity within 10 Km radius of project site

S. No.	Description	Name	Approx. Distance and Direction
	Reserve Forests	Kailash RF Barkoli RF Raikhal RF Ransali RF Tunikhal RF Saraunja RF Kotkharra RF Kalaga RF Horai RF Mailani RF Hanspur RF Nandhaur RF Kalega RF	1.0 Km in NE 2.0 km; SW 3 3.1 Km: N 3.6 km; E 4.5 km; NW 5.3 km; E 5.9 km; NW 7.0 km; NE 7.9 km; NW 8.3 km; NW 8.9 km; NE 9.0 km; N 9.1 km; NE
	Elephant Reserve	Shivalik Elephant Reserve	4.3 Km; N
	Water bodies	Gorhi Neleala Sukhi Nadi	Adjacent in E Adjacent in W

S. No.	Description	Name	Approx. Distance and Direction
		BeghulNadi Upper Beghul Canal Kailash Nadi Nandhaur Nadi Katna Nadi Terha Nala Phawr Nadi Dhora Nala Seena Nala Deoha Nadi Khakra Nala Bhainsiya Nala Sher Nala Bhuta Nala	Adjacent in S 300 m; E 1.3 km; E 2.4 m; NE 5.6 km; W 6.0 km; SW 6.9 km; E 7.0 km; W 7.1 km; E 8.0 km; SE 8.11 km; SE 8.3 km; NE 9.6 km; NW 9.8 km; SW

3.8.2.4 Wetlands: Almost, at the boundary of 10 km from the study area, two wetlands namely Dhora Dam, and Beghul dam are present (Figure 3.3). The Nanak Sagar is present beyond 10 km of the project site at almost 13km from the project site. Dhora Dam undergoes appreciable seasonal fluctuations and it provides a good habitat for waterfowl during winter when water level is low. Similarly, Beghul dam provides a good habitat for water birds during winter.

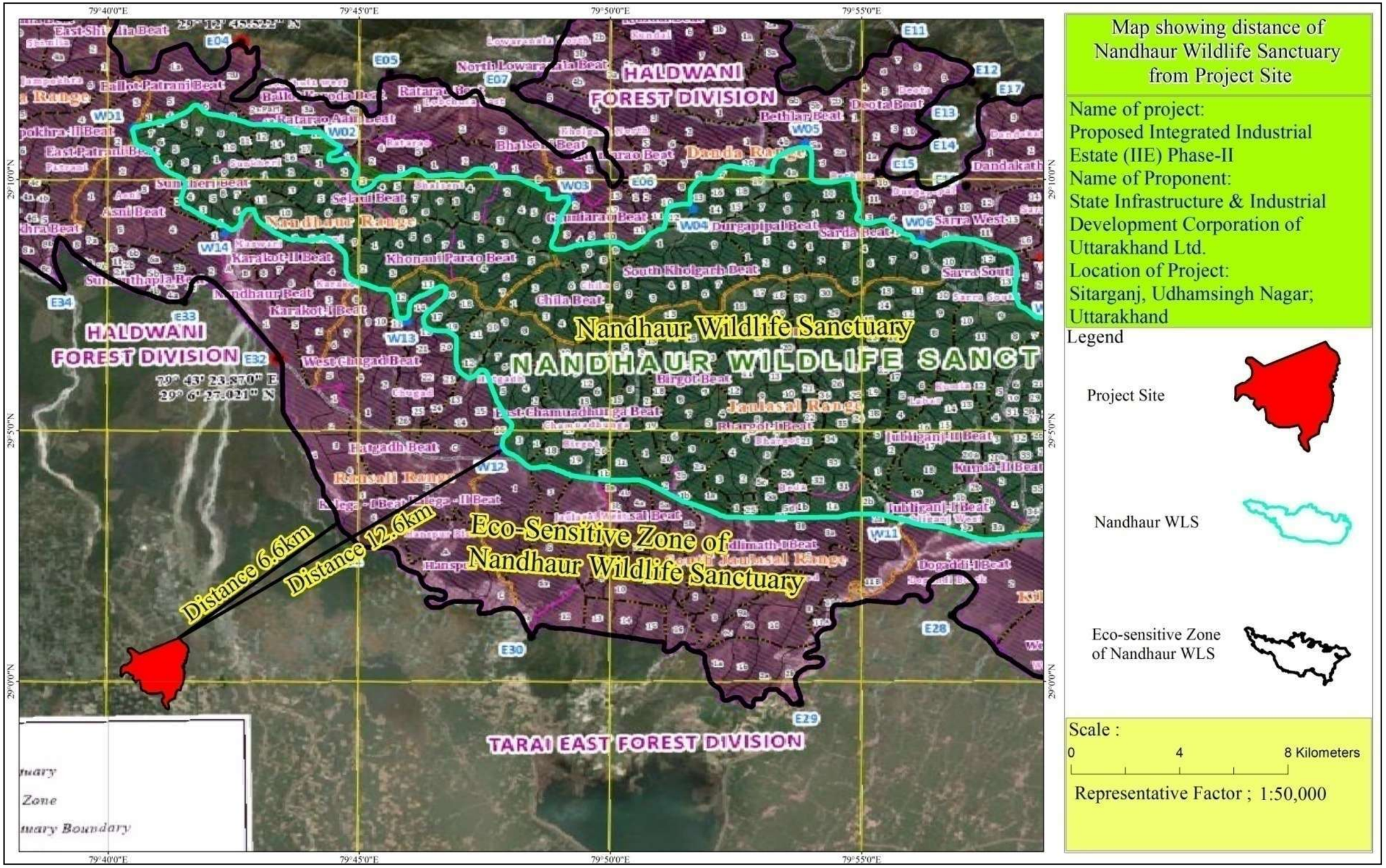


Figure 3.32: Distances of ESZ and Nandhaur WLS from Project Boundary

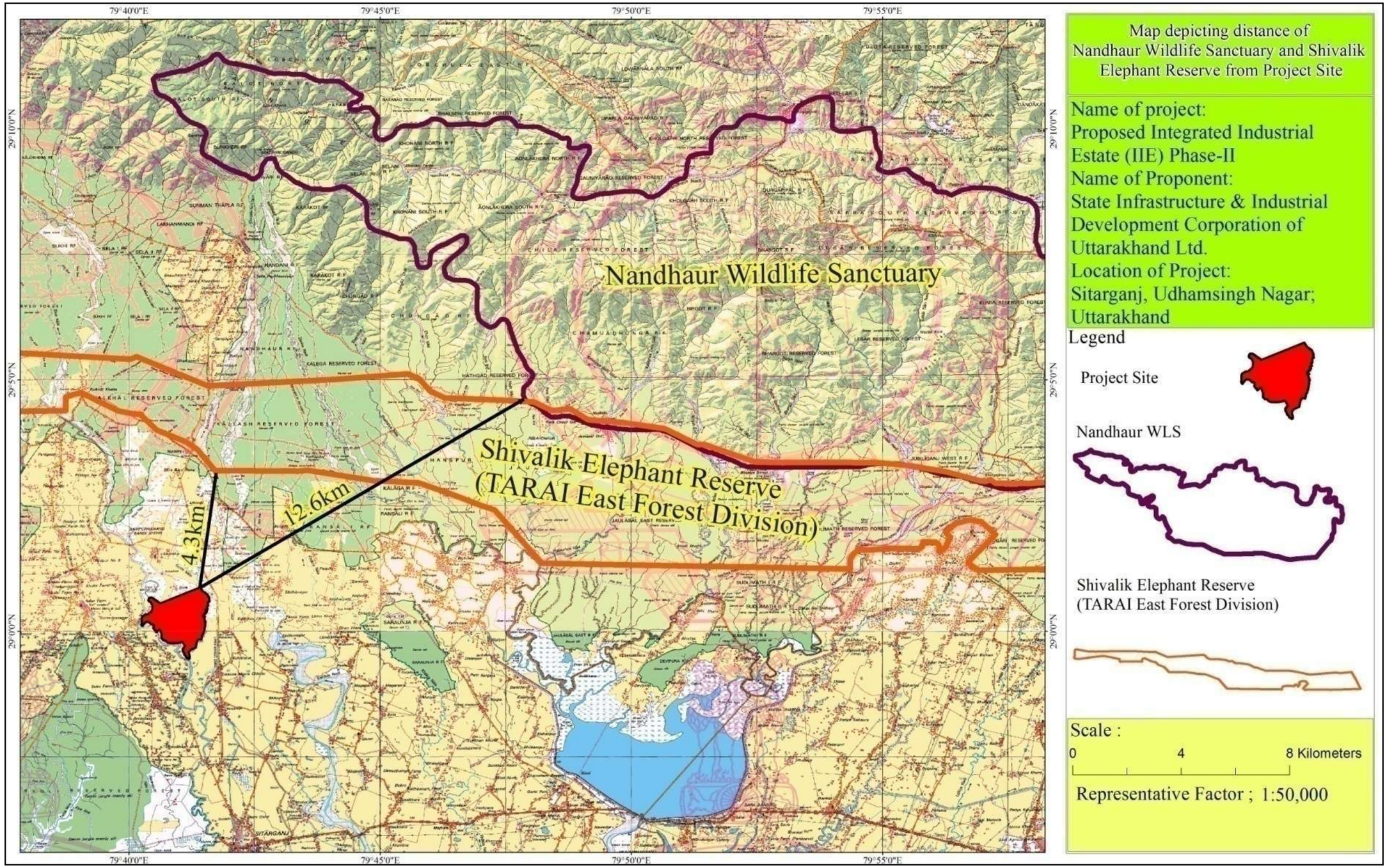
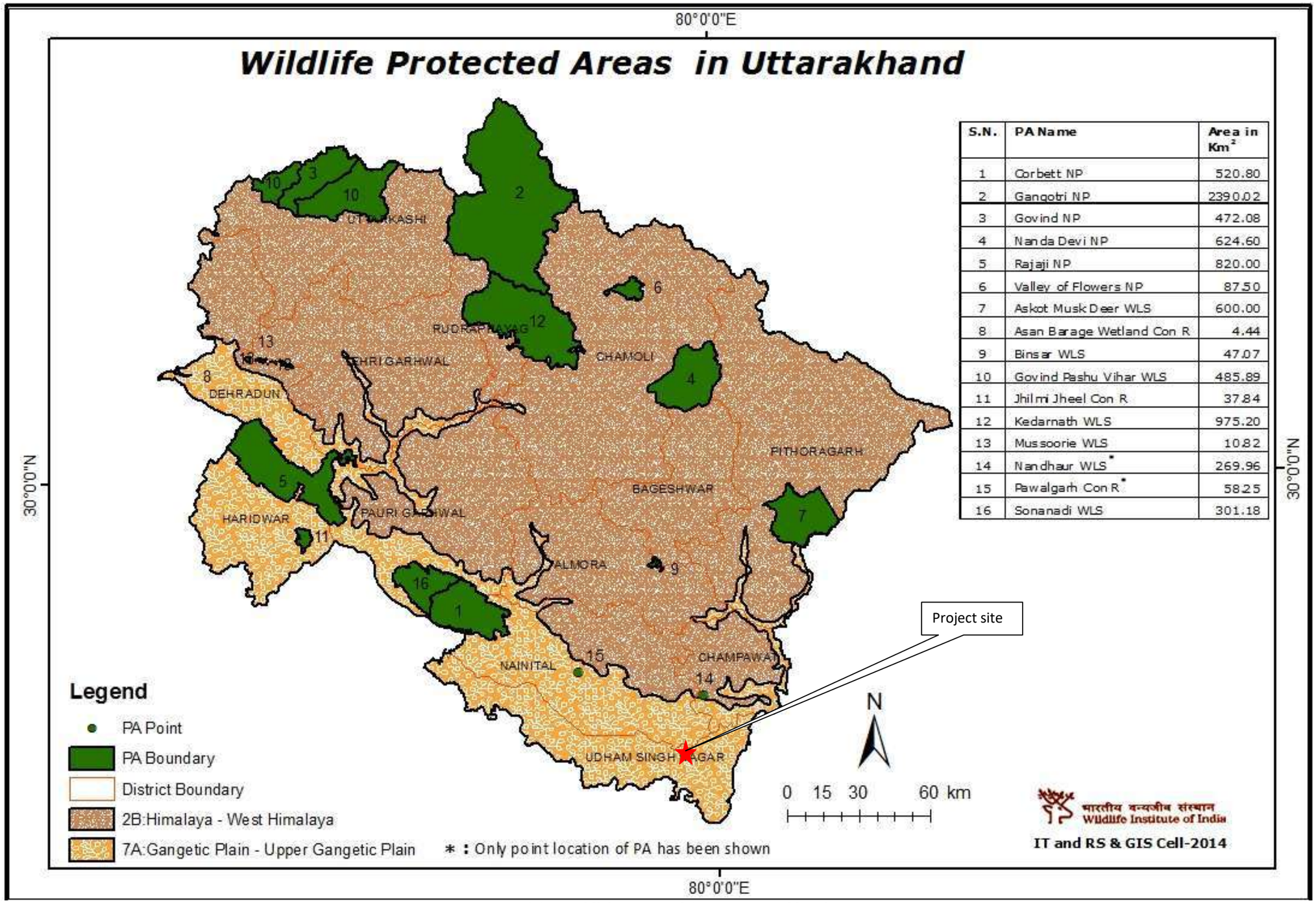


Figure 3.33: Distances of Shivalik Elephant Reserve from Project Boundary



S.N.	PA Name	Area in Km^2
1	Corbett NP	520.80
2	Gangotri NP	2390.02
3	Govind NP	472.08
4	Nanda Devi NP	624.60
5	Rajaji NP	820.00
6	Valley of Flowers NP	87.50
7	Askot Musk Deer WLS	600.00
8	Asan Barage Wetland Con R	4.44
9	Binsar WLS	47.07
10	Govind Pashu Vihar WLS	485.89
11	Jhilmi Jheel Con R	37.84
12	Kedarnath WLS	975.20
13	Mussoorie WLS	10.82
14	Nandhaur WLS*	269.96
15	Pawalgarh Con R*	58.25
16	Sonanadi WLS	301.18

Figure 3.34 : Wildlife Protected Areas in Uttarakhand

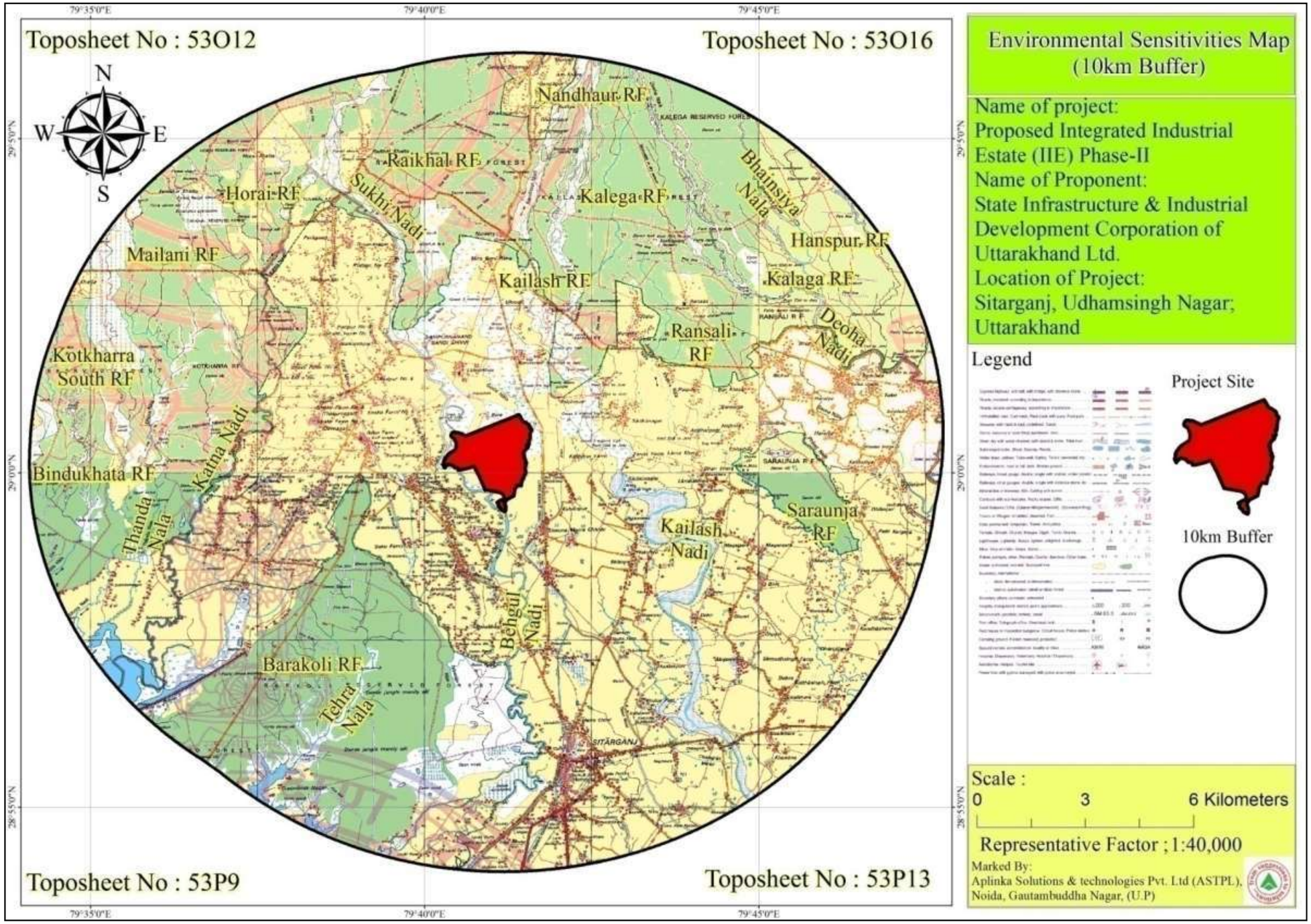


Figure 3.35: Eco-sensitivities within 10 km boundary.

The flora and fauna species present in both the core and buffer zones are given in the following section.

3.8.3 Core Zone

Floral Diversity

The project site was a part of Sampoornanand Open Jail. It is allocated to SIDCUL by Government of Uttarakhand for the development of Industrial Estate. The area is a marshy land and comprises of marshy vegetation. The flora of the project area is as follows:

Table 3.31: Trees Observed in the Project Site

S. No	Local Name	Scientific Name	IUCN Conservation Status
1.	Sisham	*Dalbergia sissoo* Roxb.	LC
2.	Chitvan	*Alstonia scholaris* (L.) R.Br.	LC
3.	Khajur	*Phoenix dactylifera* L.	LC
4.	Palash	*Butea monosperma* (Lam.) Taub.	LC
5.	Neem	*Azadirachta indica* A.Juss	LC
6.	Popular	*Populus tremula* L.	LC
7.	Semal	*Bombax ceiba* L.	LC
8.	Kachnar	*Bauhinia variegata* (L.) Benth.	LC
9.	Majnu	*Salix babylonica* L.	NA
10.	Maharukh	*Ailanthus excelsa* Roxb.	NA
11.	Pilkhan	*Ficus virens* Aiton	LC
12.	Gular	*Ficus racemosa* L.	LC
13.	Kikar	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb	LC
14.	Akashmoni	*Acacia auriculiformis* A.Cunn. ex Benth.	LC
15.	Jamun	*Syzygium cumini (L.) Skeels.*	NA
16.	Baheda	*Terminalia bellirica* (Gaertn.) Roxb.	NA
17.	Palash	*Butea monosperma* (Lam.) Taub.	LC
18.	Bakain	*Melia azaderach* L	LC
19.	Kasod	*Senna siamea* (Lam.) Irwin et Barneby	LC
20.	Sahjan	*Moringa oleifera* Lam.	LC

Source: Site visit by ASTPL team

Table 3.32: Herbs Observed in the Project Site

S.No	Local Name	Scientific Name	IUCN Conservation Status
1.	Munj	*Saccharum munja* Roxb.	NA
2.	Gajar Ghass	*Parthenium hysterophorus L*	NA
3.	Madar	*Calotropis gigantea (L.) Dryand.*	NA
4.	Elephant grass	*Cenchrus purpureum* (Schumach.) Morrone	NA
5.	Congress grass	*Parthenium hysterophorus* L	NA
6.	Dhatura	*Datura metel* L.	NA
7.	Gamal	*Ageratum houstonianum* Mill.	NA
8.	Peeli Kantili	*Argemone mexicana* L.	NA
9.	Gokhuru	*Tribulus terrestris* L	NA
10	Bhat katiya	*Solanum virginianum* L.	NA

Source: Site visit by ASTPL team

3.8.3.1 Floral Diversity

Apart from above mentioned plants, the parasitic plants Amarbel/Dodders (*Cuscuta sps)* are also observed in the site.

Fauna Diversity

The core zone harbors following faunal species i.e. Amphibians (Toad, Frog); Reptiles (Indian garden lizards, Dhaman, Crocodiles); Mammals (Indian palm squirrel, Mongoose); Aves (Crow; Sparrow; Baya; Parrot; Pigeon; Cattle Egret; Bulbul; Myna; Koel, Spotted dove and Peacock.

Figure 3.36 : Glimpses of Field Study in Core Zone

Table 3.33: Fauna at Project Site

S.No.	Local Names	Zoological Names	IWLPA 1972 Schedule Amended in 2021	IUCN conservation status
AMPHIBIANS				
1	Toad	*Duttaphrynus melanostictus* Schneider	NA	Least Concern
2	Frog	*Hoplobatrachus tigerinus* Daudin	Schedule-II	Least Concern
REPTILES				
1	Indian garden lizards	*Calotes versicolor* Daudin	NA	Least Concern
2	Dhaman	*Ptyas mucosa* Linnaeus	Schedule-II	Least Concern
3	Crocodiles	*Crocodylus palustris* Lesson	Schedule-I	Vulnerable
MAMMALS				
1	Indian palm squirrel	*Funambulus pennantii* Wroughton	Schedule-II	Least Concern
2	Blue bull	*Boselaphus tragocamelus* Pallas,	Schedule-II	Least Concern
3	Indian Fox	*Vulpes bengalensis* Shaw,	Schedule-II	Least Concern
4	Mongoose	*Herpestes edwardsi* É. Geoffroy Saint-Hilaire	Schedule-II	Least Concern
5	Kharha	*Lepus nigricollis* F. Cuvier	Schedule-II	Least Concern
AVES				
1	Crow	*Corvus splendens* Vieillot	NA	Least Concern
2	Sparrow	*Passer domesticus* Linnaeus	Schedule-II	Least Concern
3	Baya	*Ploceus philippinus* Linnaeus	Schedule-II	Least Concern
4	Parrot	*Psittacula krameri* Scopoli	Schedule-II	Least Concern
5	Pigeon	*Columba livia* Gmelin	Schedule-II	Least Concern
6	Cattle Egret	*Bubulcus ibis* Linnaeus	Schedule-II	Least Concern
7	Bulbul	*Pycnonotus jocosus* Linnaeus	Schedule-II	Least Concern
8	Myna	*Acridotheresg inginianus* Latham	Schedule-II	Least Concern
9	Koel	*Eudynamys scolopaceus* Linnaeus	Schedule-II	Least Concern
10	Spotted dove	*Streptopelia chinensis* Scopoli	Schedule-II	Least Concern
11	Peacock	*Pavo cristatus* Linnaeus,	Schedule- I	Least concern

Two species of ambphibians, three species of reptiles; five species of mammals are reported from the project site. The crocodiles are reported along the project site close to the Beghul River. Both peacock and crocodiles come under the Schedule I as per Wildlife Protection Act 1972, while as per IUCN conservation status crocodile comes under vulnerable and peacocks comes under least concern status. The conservation plan of schedule one fauna is is given in chapter X (Environmental Management Plan).

3.8.4 Buffer Zone

3.8.4.1 Floral Diversity

3.8.4.2 Phyto-social studies: - Phytosociology, also known as phytocoenology or simply plant sociology, is the study of groups of species of plant that are usually found together. Phytosociology aims to empirically describe the vegetative environment of study area. A specific community of plants is considered a social unit, the product of definite conditions, present and past, and can exist only when such conditions are met. In phytosociology such an unit is known as a phytocoenosis (or phytocoenose). A phytocoenosis is more commonly known as a plant community, and consists of the sum of all plants in a given area. It is a subset of a biocoenosis, which consists of all organisms in a given area. More strictly speaking, a phytocoenosis is a set of plants in area that are interacting with each other through competition or other ecological processes. Coenoses are not equivalent to ecosystems, which consist of organisms and the physical environment that they interact with. A phytocoensis has a distribution which can be mapped. Phytosociology has a system for describing and classifying these phytocoenoses in a hierarchy, known as syntaxonomy, and this system has a nomenclature. The primary data is collected in the form of quadrat (10x10 meter for trees; 5x4 meter for shrubs and 1x1 meter for herbs) and measuring the CBH by measuring the inch-tape and the geographical coordinate as well as elevation is also gathered using the global positioning system. The collected primary data is tabulated and any redundancies are removed before analyzing and various phyto-social parameters are calculated using the well defined formulas.

3.8.4.3 Inferences: The density is observed highest for the species *Shorea robusta* Roth., *Tectona grandis* L.f. , *and Mallotus philippinensis* Muell,with density of about 0.02 per m^2 i.e. 200 species in 1 ha of area. The lowest density was observed for the species *Schleichera oleosa* (Lour.) Oken, *Terminalia arjuna*(Roxb.) Wight & Arn *and Fraxinus micrantha* Lingelsh *i.e.* 0.003 per m^2 i.e. 30 species in 1 ha of area.

In terms of frequency, the highest frequency is obtained for the species *Mallotus philippinensis Muell* while lowest for the species *Terminalia arjuna*(Roxb.) Wight &Arn, *and Fraxinus micrantha* Lingelsh. Similarly, the dominance index shows that the species *Tectona grandis* L.f.has the highest dominance value followed by *Adina cordifolia and Shorea robusta.* In terms of abundance, the most abundant species *is Shorea robusta* Rothand *Tectona grandis* L.f.and *Fraxinus micrantha* Lingelsh

Based on the density, frequency and dominance, the important value indexes (IVI) of the species were calculated. IVI value was observed to be the highest for the species *Tectona grandis* L.f.followed by *Shorea robusta* Roth. *IVI i*s a measure of how dominant a species is in a given area.IVI showed that the less dominant species is *Terminalia arjuna*(Roxb.) Wight & Arn. Likewise the species diversity index was found out based on Shannon diversity index. The observed value was 2.14, which shows a normal species diversity in the area.

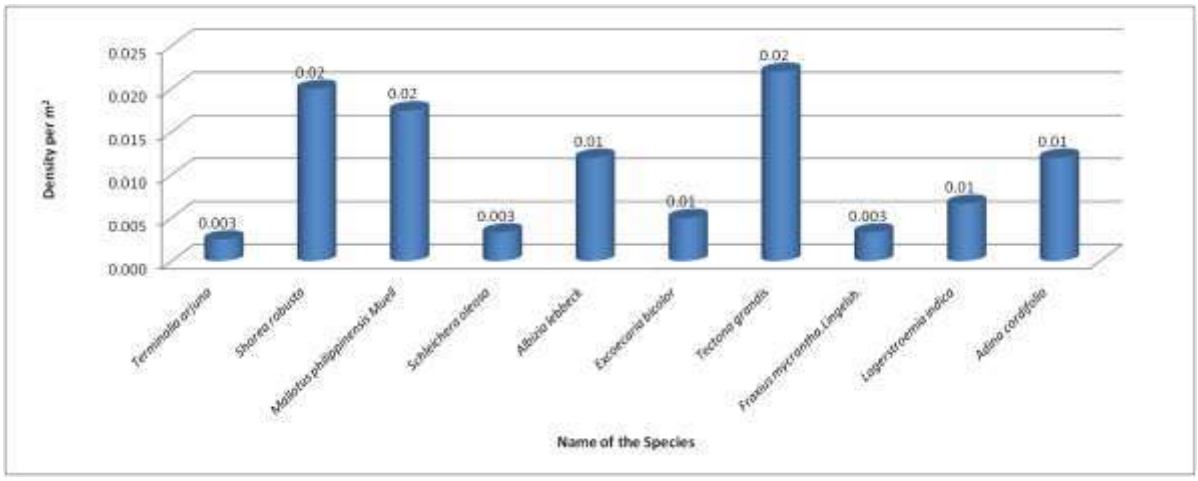


Figure- 3.37 : Bargraph depicting the distribution of density among tree species

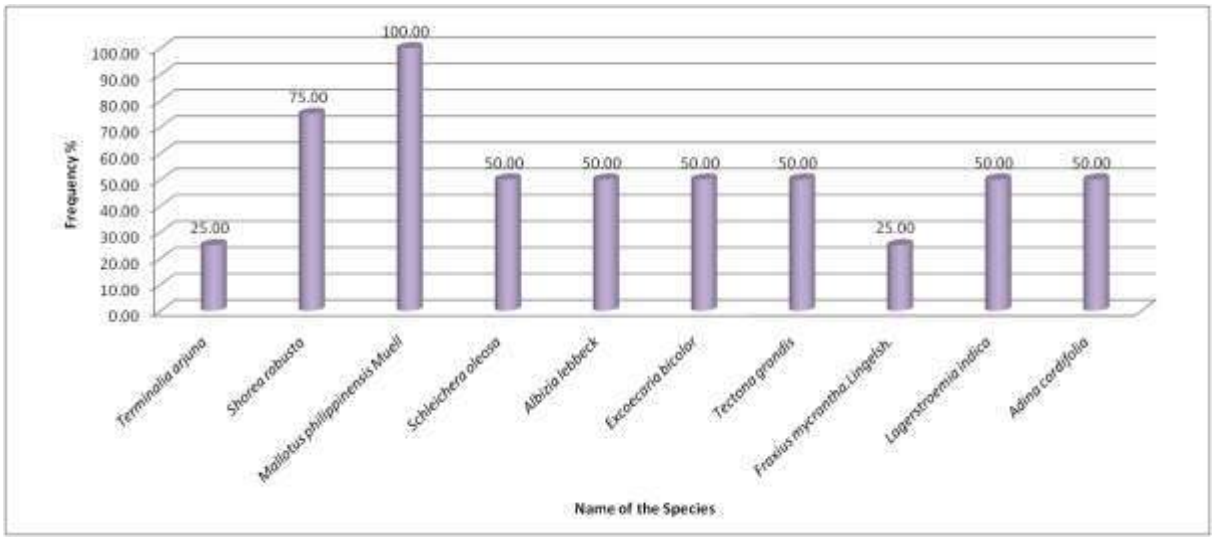


Figure- 3.38: Bargraph depicting the distribution of frequency among tree species

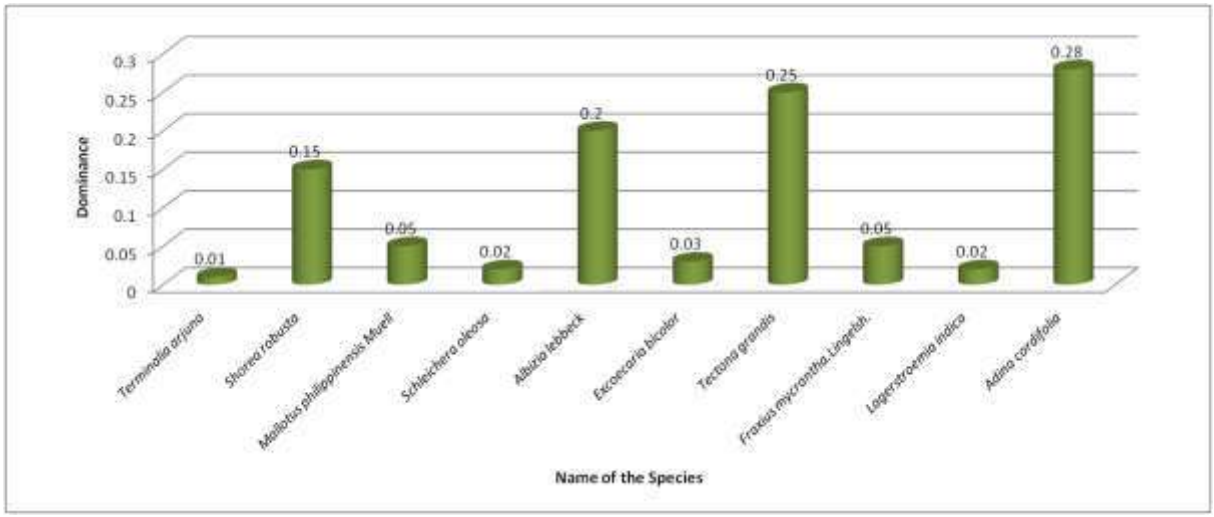


Figure- 3.39: Bargraph depicting the distribution of dominance among tree species

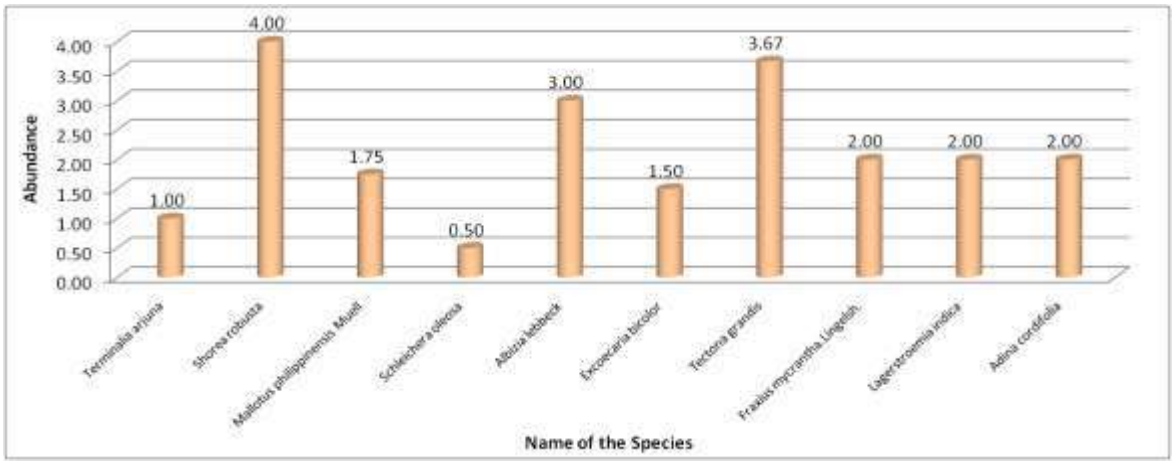


Figure- 3.40: Bargraph depicting the distribution of Abundance among tree species

Table 3.34: Quadrant study of Trees

S/n	Local Name	Scientific Name	Average (DBH in m)	Total	Density	Frequency	Abundance	Dominance	Average Density	Average Frequency	Average Dominance	IVI	pi	lnpi	-pi*lnpi
1	Arjun	*Terminalia arjuna*(Roxb.) Wight & Arn.		1	0.003	25.00	1.00		2.40	4.76	0.91	8.06	0.03	-3.62	0.10
	DBH		0.111					0.01							
2	Sal	*Shorea robusta*Roth		8	0.02	75.00	4.00		19.17	14.29	14.32	47.78	0.16	-1.84	0.29
	DBH		0.443					0.15							
3	Kamla	*Mallotus philippinensis* Muell		7	0.02	100.00	1.75		16.77	19.05	4.88	40.70	0.14	-2.00	0.27
	DBH		0.259					0.05							
4	Kusum	*Schleichera oleosa*(Lour.) Oken		2	0.003	50.00	0.50		3.19	9.52	1.85	14.57	0.05	-3.03	0.15
	DBH		0.159					0.02							
5	Siris	*Albizia lebbeck* (L.) Benth.		6	0.01	50.00	3.00		11.50	9.52	18.65	39.67	0.13	-2.02	0.27
	DBH		0.506					0.20							
6	Majnu	*Salix babylonica* L.		3	0.01	50.00	1.50		4.79	9.52	2.73	17.04	0.06	-2.87	0.16

S/n	Local Name	Scientific Name	Average (DBH in m)	Total	Density	Frequency	Abundance	Dominance	Average Density	Average Frequency	Average Dominance	IVI	pi	lnpi	-pi*lnpi
	DBH		0.193					0.03							
7	Sagon	*Tectona grandis* L.f.		11	0.02	50.00	3.67		21.09	9.52	23.45	54.06	0.18	-1.71	0.31
	DBH		0.567					0.25							
8	Angu	*Fraxinus micrantha* Lingelsh		2	0.003	25.00	2.00		3.19	4.76	5.03	12.99	0.04	-3.14	0.14
	DBH		0.263					0.05							
9	Lagerstromia	*Lagerstroemia speciosa*(L.) Pers.		4	0.01	50.00	2.00		6.39	9.52	2.04	17.95	0.06	-2.82	0.17
	DBH		0.167					0.02							
10	Haldu	*Haldina cordifolia*(Roxb.) Ridsdale		6	0.01	50.00	2.00		11.50	9.52	26.16	47.18	0.16	-1.85	0.29
	DBH		0.599					0.28							

(Source: Primary data collected in Study area)

Figure 3.41.: Glimpses of Field Study in Buffer Zone

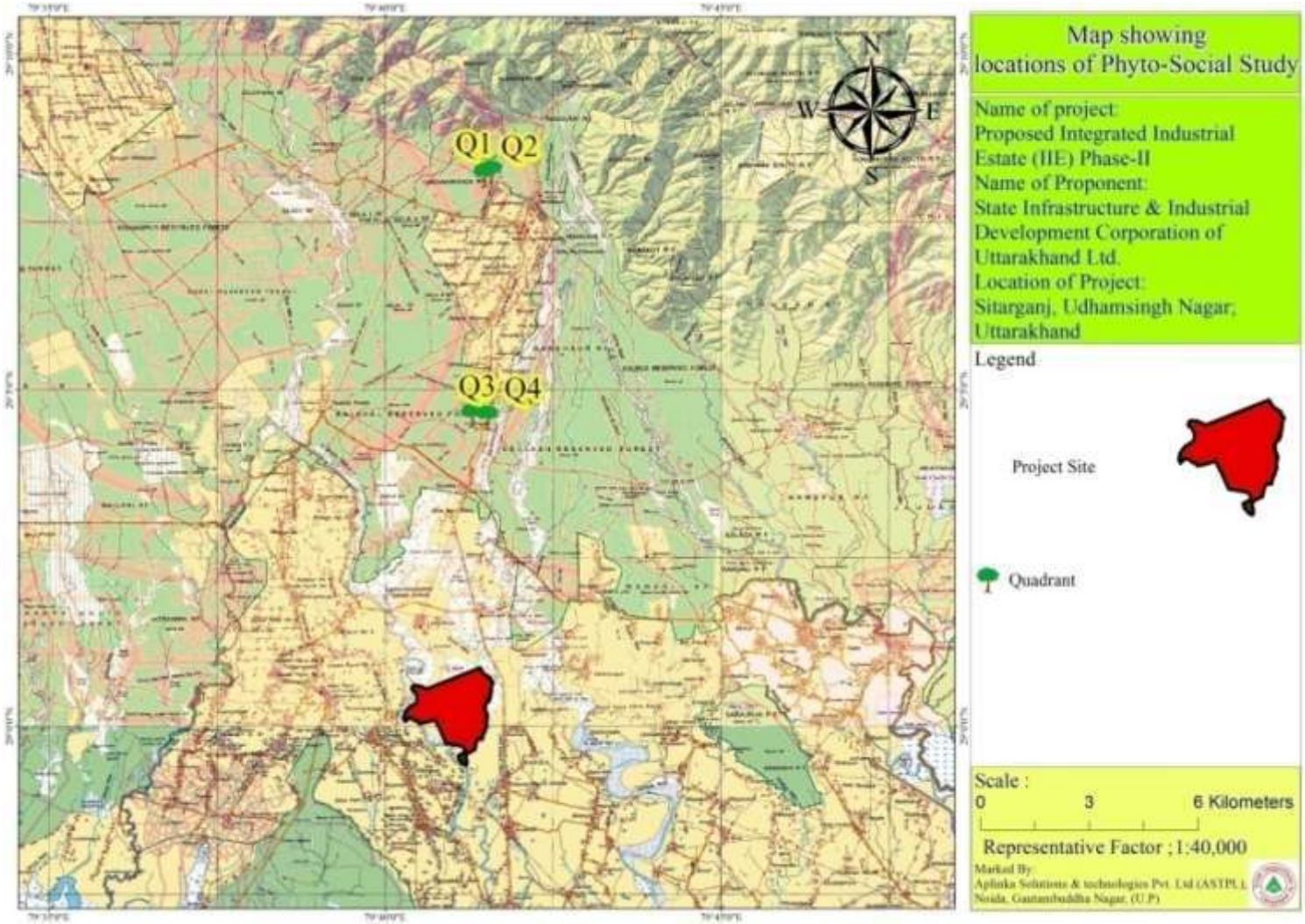


Figure 3.42 : Quadrat Sampling Locations

Apart from quadrat analysis the team has interacted with the local people to list out the species present in the area. The detailed inventories were also prepared on the basis of public interaction as well as field observation. The species listed out during the study includes the species of trees, shrubs and herbs/grasses are as follows:

Table 3.35: Trees of Buffer Area

S.No	Local Name	Scientific Name	IUCN Conservation Status
1.	Kala siris	*Albizia odoratissima* (L.f.) Benth.	NA
2.	Safeed siris	*Albizia lebbeck* (L.) Benth.	LC
3.	Kikar	*Vachellia farnesiana (L.) Wight & Arn.*	LC
4.	Khair	*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.	NA
5.	Chitwan	*Alstonia scholaris* (L.) R.Br.	LC
6.	Neem	*Azadirachta indica* A.Juss.,	LC
7.	Babool	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb.	LC
8.	Bakli	*Anogeissus pendula* Edgew.	NA
9.	Bel	*Aegle marmelos* (L.) Corrêa	NT
10.	Ari	*Acacia gageana* Craib	NA
11.	Kathbilva	*Buchanania latifolia* Roxb.	NA
12.	Kachnar	*Bauhinia variegate*(L.) Benth.	LC
13.	Khatava	*Bauhinia malabarica* Roxb.	LC
14.	Khaja	*Bridelia retusa* (L.) A.Juss.	LC
15.	Khaiwal	*Bauhinia purpurea* L	LC
16.	Gaithi	*Boehmeria rugulosa* Wedd	NA
17.	Dhak	*Butea monosperma* (Lam.) Taub.	NA
18.	Paper mulberry	*Broussonetia papyrifera* (L.) Vent.	LC
19.	Panisimul	*Bischofia javanica* Blume	NA
20.	Red Silk Cotton	*Bombax ceiba* L.	LC
21.	Maljhan	*Phanera vahlii* Wight & Arn	NA
22.	Amaltas	*Cassia fistula* L.	LC
23.	Kumbhi	*Careya arborea* Roxb.	NA
24.	Dalcini	*Cinnamomum tamala* (Buch.-Ham.) T.Nees & C.H.Eberm.	LC
25.	Kharik	*Celtis tetrandra* Roxb.	LC
26.	Tilphora	*Cocculus laurifolius* DC.	NA
27.	Chilla	*Casearia elliptica* Willd.	NA
28.	Barna	*Crateva religiosa* G.Forst.	NA
29.	Lasora	*Cordia dichotoma* G.Forst.	LC
30.	Lalchila	*Casearia graveolens* Dalzell	NA
31.	Aakash Bel	*Cuscuta reflexa* Roxb.	NA
32.	Bent	*Calamus tenuis* Roxb.	LC
33.	Kala Tendu	*Diospyros tomentosa* Roxb.	NA
34.	Shisam	*Dalbergia sissoo* Roxb.	LC
35.	Amla	*Phyllanthus emblica* L	LC
36.	Chamror	*Ehretia laevis* Roxb.	NA
37.	Dhaula Dhak	*Erythrina suberosa* Roxb.	NA

S.No	Local Name	Scientific Name	IUCN Conservation Status
38.	Safeda	*Eucalyptus hybrid*	NA
39.	Katai	*Flacourtia indica* (Burm.f.) Merr.	LC
40.	Kumia	*Ficus semicordata* Buch.-Ham. ex Sm.	NA
41.	Khabar	*Ficus virens* Aiton	NA
42.	Timla	*Ficus roxburghii* Wall	NA
43.	Peepal	*Ficus religiosa* L.	NA
44.	Kath bel	*Limonia acidissima* L.	NA
45.	Banratha	*Ficus benghalensis* L.	NA
46.	Betuli	*Ficus pumila* L.	NA
47.	Gular	*Ficus racemosa* L.	NA
48.	Kamhar	*Gmelina arborea* Roxb.	LC
49.	Titmira	*Garuga pinnata* Roxb.	NA
50.	Thanela	*Ceriscoides turgida* (Roxb.) Tirveng.	NA
51.	Thaman	*Grewia elastica* Royle	NA
52.	Farasen	*Grewia asiatica* L.	NA
53.	Bhimal	*Grewia oppositifolia Roxb. ex DC.*	NA
54.	Marorphali	*Haplophragma adenophyllum* (Wall.) P. Dop	NA
55.	Kutaja	*Holarrhena antidysenterica* (L.) Wall. ex A. DC	LC
56.	Kanju	*Holoptelea integrifolia* (Roxb.) Planch	NA
57.	Borang	*Hymenodictyon excelsum* (Roxb.) Wall.	NA
58.	Jheengan	*Lannea coromandelica*(Houtt.) Merr.	LC
59.	Dhauri	*Lagerstroemia parviflora* Roxb.	NA
60.	Maida	*Litsea umbrosa* (Nees) Nees	LC
61.	Mahua	*Madhuca longifolia* (J.Konig) J.F.Macbr.	NA
62.	Aam	*Mangifera indica* L	NA
63.	Kaphal	*Myrica esculenta* Buch.-Ham. ex D.Don	NA
64.	Domsal	*Miliusa velutina* (Dunal) Hook. f. & Thomson	NA
65.	Faldoo	*Mitragyna parvifolia* (Roxb.) Korth	NA
66.	Kaula	*Machilus odoratissima* Nees	NA
67.	Bakain	*Melia azedarach* L	LC
68.	Rohini	*Mallotus philippensis* (Lam.) Muell.Arg.	NA
69.	Shahtoot	*Morus alba* L	LC
70.	Saadan	*Ougeinia oojeinensis* (Roxb.) Hochr.	NA
71.	Beejasal	*Pterocarpus marsupium* Roxburgh	Vulnerable
72.	Jyoti	*Putranjiva roxburghii* Wall.	LC
73.	Aamra	*Spondias pinnata* (L.f.) Kurz	NA
74.	Udal	*Sterculia villosa* Roxb. ex Sm.	NA
75.	Kusum	*Schleichera oleosa* (Lour.) Oken	LC
76.	Jamun	*Syzygium cumini* (L.) Skeels	LC
77.	Sal	*Shorea robusta* Roth	LC
78.	Imli	*Tamarindus indica* L	NA
79.	Nona Jhau	*Tamarix dioica* Roxb. ex Roth	NA
80.	Toon	*Toona ciliate* M. Roem.	LC

S.No	Local Name	Scientific Name	IUCN Conservation Status
81.	Bahera	*Terminalia bellirica (Gaertn.) Roxb.*	NA
82.	Indroja	*Wrightia tomentosa* (Roxb.) Roem. & Schult.	NA
83.	Cheela	*Wendlandia exserta* DC.	NA
84.	Dhaula	*Woodfordia fruticosa* (L.) Kurz	LC
85.	Sallu	*Xylosma longifolium* Clos	NA
86.	Ber	*Ziziphus mauritiana* Lam.	NA
87.	Kathber	*Ziziphus xylopyrus* (Retz.) Willd.	NA
88.	Bamboo	*Bambusa bambos (L.) Voss*	LC
89.	Chiyura	*ploknema butyracea* (Roxb.) H.J.Lam	A

Among 89 species, one species is falling under the nearly threatened and one vulnerable status of IUCN conservation Status, while other species are coming under the least concern status. Similarly, six species of herbs/grasses and seven species of shrubs were recorded. They are as follows:

Table 3.36: Herbs and Shrubs of Buffer Area

S.No	Local Name	Scientific Name	IUCN Conservation Status
Herbs/grasses			
1.	Tulsi	*Ocimum sanctum,* Linn.	NA
2.	Gajar ghas	*Parthenium hysterophorus* L	NA
3.	Dub grass	*Cynodon dactylon* (L.) Pers.	NA
4.	Mirmis	*Mimosa pudica* L	LC
5.	Kaans	*Saccharum spontaneum* L.	NA
6.	Munj	*Saccharum bengalense Retz.*	NA
Shrubs			
1.	Besram	*Ipomoea carnea* Jacq.	NA
2.	Kaner	*Nerium oleander* L.	NA
3.	Arandi	*Ricinus communis* L.	NA
4.	Makoi	*Solanum nigrum* L.	NA
5.	Karonda	*Carissa carandas* L.	NA
6.	Kurri	*Lantana camara* L.	NA
7.	Peeli Kantili	*Argemone mexicana* L.	LC

3.8.4.4 Medicinal Plants:

Among, various plant species listed above, some species with medicinal properties are given below. The plants' parts are consumed either with water or without water for treatment of minor diseases as well as cuts, burns and other skin related problems etc.

Table 3.37: Medicinal Plants of the Study Area

S. No	Botanical Name	Local Name	Parts Used	Uses	Mode of treatment
1.	*Acacia catechu, Wild.*	Khair	Stem	In Urine problem, dysentery	One palmful stem decoction in half liter water is given four times a day

S. No	Botanical Name	Local Name	Parts Used	Uses	Mode of treatment
2.	*Aegle marmelos* (L.) Corrêa	Bel	Leaf, fruit, stem, root	Peptic ulcer, diarrhea, constipation, respiratory infections, jaundice	Bael Juice with water Bael Churna with water.
3.	*Albizia lebbeck* (L.) Benth.	Siris	Seeds, Leaves	Boils	Applied externally on skin
4.	*Bridelia retusa* (L.) A.Juss.	Khaja	Root	Abdominal pain	Root is boiled and consumed
5.	*Cynodon dactylon* (L.) Pers.	Dub grass	Whole plant	Cuts	The plant is grind and applies in cuts.
6.	*Emblica officinalis,* Gaertn.	Aula, Awla	Fruit	In eye disease/ good health	Two palmful fruits powder with fibrous food
7.	*Ficus benghalensis* L.	Banratha	Whole plant	Boils	Latex is applied externally on skin
8.	*Holarrhena antidysenterica,* Wall.	Quiar, Indraw	Seed & bark	In fever, Gastric & dysentery	The powder of bark/ seed decoction in water.
9.	*Ipomoea carnea* Jacq.	Besram	Latex	Skin Problem	Extract of the flower
10.	*Lannea coromandelica* (Houtt.) Merr.	Jheengan	Bark	Diarrhoea	Consumed internally for a treatment.
11.	*Mimosa pudica* L	Mirmis	Root	Cough	Consumed internally for a treatment.
12.	*Ocimum sanctum,* Linn.	Tulsi	Whole plant	In fever	Two palmful whole plant twice a day
13.	*Ricinus communis,* Linn.	Erind	Leaf	For internal injury	Oil of this plant is useful. Use of leaves in heat therapy
14.	*Solanum nigrum* L.	Makoi	Leaves	Skin problems	Fresh leaves are put on the skin to treat swelling, burns, and ulcers.
15.	*Syzygium cumini* (L.) Skeels	Jamun	Fruit	Diabetes control	Dried powder of seed is consumed
16.	*Terminalia bellirica* (Gaertn.) Roxb.	Bahera	Fruit	Cough, dysenteric-diarrhea	Decoction of the green fruit is used for cough. Pulp of the fruit is useful in dysenteric-diarrhea, dropsy, piles and leprosy.
17.	*Ziziphus mauritiana* Lam.	Ber	Fruits	Indigestion	Dried fruits
18.	*Pterocarpus marsupium* Roxburgh	Beejasal	Wood, Leaves	Diabetes, skin diseases	Leaves are used externally to treat boils, sores, and other skin. The water in a glass made up from the wood of this tree is used to control diabetes.

S. No	Botanical Name	Local Name	Parts Used	Uses	Mode of treatment
19.	*Tamarindus indica*L	Imli	Fruit	Constipation and stomach disorders	Partially dried fruit is consumed.

3.8.4.5 Faunal Diversity:

As mentioned above, the buffer zone comprises various reserved forests, elephant reserve and the ecosensitive zone of Nandhaur WLS. Almost 108 species of fauna were recorded belonging to different animal classes viz. Pisces (34 species), amphibians (four species), reptiles (eight species), avifauna (39 species) and mammals (23 species). The lists of species along with their conservation status are given below in Table 3.40.

Table 3.38: Fauna of Buffer Zone

S.No	Local Name	Scientific Name	Family	IWLPA 1972 Schedule Amended in 2021	IUCN Conservation Status
Fishes					
1.	Suhia	*Gudusia chapra*F. Hamilton	Clupidae	NA	LC
2.	*Patra*	*Notopterus notopterus*Pallas,	Notopteridae	NA	LC
3.	Moya	*Chitala chitala*F. Hamilton,		*NA*	*NT*
4.	Common carp	*Cyprinus carpio* Linnaeus	Cyprinidae	*NA*	*NA*
5.	Mahaseer	*Tor tor*Hamilton,		*NA*	*DD*
6.	Bhola	*Barilius bendelisis*F. Hamilton,		*NA*	*LC*
7.	Sidhari	*Puntius sophore*F. Hamilton,		*NA*	*LC*
8.	Sidhari	*Systomus sarana*F. Hamilton,		*NA*	*LC*
9.	Mrigal/Nain	*Cirrhinus mrigala*Hamilton,		*NA*	*LC*
10.	Raia	*Cirrhinus reba*Hamilton		*NA*	*LC*
11.	Kursa	*Labeo gonius*Hamilton		*NA*	*LC*
12.	Bata	*Labeo bata*F. Hamilton,		*NA*	*LC*
13.	Rohu	*Labeo rohita*F. Hamilton,		*NA*	*LC*
14.	Karaunch	*Labeo calbasu*F. Hamilton,		*NA*	*LC*
15.	Chilwa	*Salmostoma bacaila*F. Hamilton,		*NA*	*LC*
16.	Katla	*Labeo catla*F. Hamilton,		*NA*	*LC*
17.	Dariaitengar	*Mystus cavasius*Hamilton,	Bagridae	*NA*	*NA*
18.	Sutahawatengara	*Mystus cavasius*Hamilton,		*NA*	*LC*
19.	Tengara	*Mystus vittatus*Bloch,		*NA*	*LC*
20.	Dariaitengar	*Mystus cavasius*Hamilton		*NA*	*NA*
21.	Singhi	*Heteropneustes fossilis*Bloch,	Heteropneustidae	*NA*	*NA*
22.	Pabda	*Ompok siluroides*Lacépède,	Siluridae	*NA*	*NA*
23.	Padhani/ Lanchi	*Wallago attu*Bloch & Schneider,		*NA*	Vu
24.	Magur	*Clarias batrachus*Linnaeus,	Claridae	*NA*	*LC*
25.	Kauwa	*Xenentodon cancila*F. Hamilton,	Belonidae	*NA*	*LC*

S.No	Local Name	Scientific Name	Family	IWLPA 1972 Schedule Amended in 2021	IUCN Conservation Status
26.	Changa	*Channa gachua*F. Hamilton,	Channidae	*NA*	*LC*
27.	Saur	*Channa marulius*F. Hamilton,		*NA*	*LC*
28.	Girai	*Channa punctata*Bloch,		*NA*	*LC*
29.	Saur	*Channa striata*Bloch,		*NA*	*LC*
30.	Khosti	*Trichogaster fasciata*Bloch & J. G. Schneider,	Osphronemidae	*NA*	*LC*
31.	Chanari	*Parambassis ranga*F. Hamilton,	Ambassidae	*NA*	*LC*
32.	Dhebari	*Nandus nandus*Hamilton,	Nandidae	*NA*	*LC*
33.	Baam	*Mastacembelus armatus*Lacepède,	Mastacembelidae	*NA*	*LC*
34.	Malga/Patya	*Macrognathus pancalus*F. Hamilton,		*NA*	*LC*
Amphibians					
1.	Frog	*Hoplobatrachus tigerinus* Daudin	Dicroglossidae	II	*LC*
2.	Toad	*Duttaphrynus melanostictus* Schneider	Bufonidae	NA	*LC*
3.	Hill Frog	*Amolops formosus* Günther	Ranidae	NA	*LC*
4.	Indian Tree Frog	*Polypedates maculatus*J.E.Gray	Rhacophoridae	NA	*LC*
Reptiles					
1.	Mugger crocodile	*Crocodylus palustris* Lesson	Crocodylidae	I	Vu
2.	Common Indian monitor	*Varanus bengalensis* Daudin	Varanidae	I	LC
3.	Indian cobra	*Naja naja* Linnaeus	Elapidae	I	NA
4.	Krait	*Bungarus caeruleus* Schneider	Elapidae	I	NA
5.	King Cobra	*Ophiophagus Hannah* Cantor,	Elapidae	I	Vu
6.	Himalayan Pit viper	*Gloydius himalayanus* Günther,	Viperidae	NA	NA
7.	Green Wipe snake	*Hierophis viridiflavus*Lacépède,	Colubridae	NA	LC
8.	Rat Snake	*Ptyas mucosa*Linnaeus,		II	NA
Mammals					
1.	Long-eared hedgehog	*Hemiechinus auritus S.* G. Gmelin	Erinaceidae	NA	LC
2.	Hanuman langurs	*Semnopithecus entellus*Dufresne,	Cercopithecidae	II	NT
3.	Golden Jackal	*Canis aureus* Linnaeus	Canidae	II	LC
4.	Wild boar	*Sus* scrofa *Linnaeus*	Suidae	II	LC
5.	Tiger	*Panthera tigris* Linnaeus	Felidae	I	EN
6.	Asian elephant	*Elephas maximus* Linnaeus	Elephantidae	I	EN

S.No	Local Name	Scientific Name	Family	IWLPA 1972 Schedule Amended in 2021	IUCN Conservation Status
7.	Indian Flying Fox	*Pteropus giganteus* Brünnich	Pteropodidae	NA	LC
8.	Blue bull	*Boselaphus tragocamelus* Pallas,	Bovidae	II	LC
9.	Barking deer	*Muntiacus muntjak*Zimmermann,	Cervidae	I	DD
10.	Common Mangoose	*Urva edwardsii* É. Geoffroy Saint-Hilaire,	Herpestidae	II	LC
11.	Common House Rat	*Rattus rattus*Linnaeus,	Muridae	NA	LC
12.	Five stripped palm squirrel	*Funambulus pennantii*Wroughton,	Sciuridae	II	LC
13.	Indian Pangolin	*Manis crassicaudata* E. Geoffroy,	Manidae	I	EN
14.	Indian Wild Boar	*Sus scrofa*Linnaeus,	Suidae	II	LC
15.	Leopard	*Panthera pardus* Linnaeus,	Felidae	I	Vu
16.	Porcupine	*Hystrix indica*Kerr,	Erethizontidae	I	LC
17.	Monkey	*Macaca mulatta*Zimmermann	Cercopithecidae	II	LC
18.	Kharha	*Lepus timidus*Linnaeus,	Leporidae	NA	LC
19.	Sambar	*Rusa unicolor*Kerr,	Cervidae	II	Vu
20.	Small Indian Civiet	*Viverricula indica* Geoffroy Saint-Hilaire,	Viverridae	II	LC
21.	Small Indian Mongoose	*Urva javanica*É. Geoffroy Saint-Hilaire,	Herpestidae	II	LC
22.	Spotted Deer	*Axis axis* Erxleben	Cervidae	II	LC
23.	Grey Musk Shrew	*Suncus murinus* Linnaeus,	Soricidae	NA	LC
Avifauna					
1.	Creshed goshawk	*Accipiter trivirgatus indicus,* Hodgson.	Accipitridae	NA	LC
2.	Black Kite	*Milvus migrans* govinda, Sykes		NA	LC
3.	Teal	*Anas crecca* Linnaeus	Anatidae	II	LC
4.	Indian Pond Heron	*Ardeola grayii,* Skeys	Ardeidae	II	LC
5.	Cattle Egret	*Bubulcus ibis* Linnaeus		II	LC
6.	Pigeon	*Columba livia* Gmelin	Columbidae	II	LC
7.	Spotted dove	*Spilopelia chinensis* Scopoli		II	LC
8.	Indian roller	*Coracias benghalensis* Linnaeus	Coraciidae	II	LC
9.	Crow	*Corvus splendens* Vieillot	Corvidae	NA	LC
10.	Koel	*Eudynamys scolopaceus* Linnaeus	Cuculidae	II	LC
11.	Black Drongo	*Dicrurus macrocercus*	Dicruridae	II	LC

S.No	Local Name	Scientific Name	Family	IWLPA 1972 Schedule Amended in 2021	IUCN Conservation Status
12.	Sparrow	*Passer domesticus* Linnaeus	Passeridae	II	LC
13.	Grey Quail	*Coturnix coturnix,* Linnaeus	Phasianidae	II	LC
14.	Black partridge	*Francolinus francolinus asiae,* Bonaparte		II	LC
15.	Red Jungle fowl	*Gallus gallus* Robinson & Kless.		NA	LC
16.	Peafowl	*Pavo cristatus,* Linnaeus		I	LC
17.	Jungle bush quail	*Perdicula asiatica* punjaubi, Whistle		II	LC
18.	Baya	*Ploceus philippinus* Linnaeus	Ploceidae	II	LC
19.	Parrot	*Psittacula krameri* Scopoli	Psittaculidae	II	LC
20.	Bulbul	*Pycnonotus jocosus* Linnaeus	Pycnonotidae	II	LC
21.	The jungle owlet	*Glaucidium rediatum* Linnaeus	Strigidae	II	NA
22.	Myna	*Acridotheres ginginianus* Latham	Sturnidae	II	LC
23.	Warbler	*Protonotaria citrea*Boddaert,	Parulidae	NA	LC
24.	Jungle owlet	*Glaucidium radiatum*Tickell,	Strigidae	II	LC
25.	Green Pigeon	*Treron curvirostra*Gmelin,	Columbidae	II	LC
26.	Grey hornbill	*Ocyceros birostris*Scopoli,	Bucerotidae	NA	LC
27.	Cuckoo	*Cuculus canorus*Linnaeus,	Cuculidae	II	LC
28.	Snake bird	*Anhinga anhinga*Linnaeus	Anhingidae	NA	LC
29.	Harrier	*Circus aeruginosus*Linnaeus,	Accipitridae	I	LC
30.	Falcon	*Falco subbuteo*Linnaeus,	Falconidae	II	LC
31.	Quail	*Coturnix coturnix*Linnaeus,	Phasianidae	II	LC
32.	Wagtail	*Motacilla maderaspatensis* Gmelin,	Motacillidae	II	LC
33.	Large Egret	*Ardea alba* Linnaeus,	Ardeidae	II	LC
34.	Cormorant	*Phalacrocorax fuscicollis*Stephens,	Phalacrocoracidae	II	LC
35.	Grebe	*Tachybaptus ruficollis*Pallas,	Podicipedidae	II	LC
36.	Wood pecker	*Melanerpes superciliaris*Temminck,	Picidae	NA	LC
37.	Rose ringed parakeet	*Psittacula krameri*Scopoli,	Accipitridae	II	LC
38.	King fisher	*Alcedo atthis* Linnaeus,	Alcedinidae	NA	LC
39.	Sun bird	*Leptocoma zeylonica*Linnaeus,	Nectariniidae	II	LC

The summary of the conservation status are as follows:

Table 3.39: Summary of Conservation Status of Fauna

S.No	Category	IUCN Conservation Status									WLA 1972 (Amended 2021) (Schedules)		
		EX	EW	CR	EN	VU	NT	LC	DD	NA	I	II	NA
	Mammals	-	-	-	3	2	1	16	1	-	6	12	5
	Avifauna	-	-	-	-	-	-	38	-	1	2	28	9
	Reptile	-	--	-	-	2	-	2	-	4	5	1	2
	Amphibians	-	-	-	-	-	-	4	-	-	-	1	3
	Fishes	-	-	-	-	1	1	26	1	5	-	-	34
	Total	-	-	-	3	5	2	86	2	10	13	42	53

(Note: EX-Extinct, EW-Extinct in Wild, CR-Critically Endangered, E-Endangered, Vu-Vulnerable, NT-Near Threatened, LC-Least Concern, DD-Data Deficiency, NA-Not Available).

The fauna of buffer zone comes under Schedule I, II,& NA as per WLPA 1972 Amended 2021. Similarly, as per IUCN conservation status, the species are coming under EN, VU, NT, LC and DD. Three species are falling under the endangered status of IUCN conservation status whereas thirteen species are under Schedule I as per WLA 1972 (Amended 2021). This includes six species off mammal, two species from avifauna and five species from reptiles. The combined wildlife conservation plan has been suggested for the same and is detailed out in Chapter-X - section 10.3.9.3.

3.9 TRAFFIC STUDY:

Traffic study measurements were performed to assess impact on local transport infrastructure due to this industrial estate project. Traffic study is carried out by understanding the existing carrying capacity of the road in the vicinity of site and flow towards SH/MDR road in the area. Then depending on the capacity of the industries in State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. (SIIDCUL), Udham Singh Nagar, Uttarakhand, the number of PCU that will be added to the present scenario will be compared to the carrying capacity as recommended by Indian Road Congress (IRC). The monitoring was performed in December 2020 to Febuary 2021.

During the construction phase, transportation of construction material will involve generation of additional traffic and during the operational phase additional traffic (proposed ECS) will increase due to the movement of Cycle, 2 wheeler, 4 wheelers, LCV and Bus, truck/trailer etc. Traffic study measurements were performed to assess impact on local transport infrastructure due to this project. Site is 25.2km away in east direction from Rudrapur (District Headquarters of Udhamsingh Nagar). The site is only 6.1 km in north direction away from well developed area of Sitarganj. National Highway-125 is 7.2 km in south direction, National Highway-74 is 8.3 km in south direction, Lalkua Junction Railway Station- 16.6 km in NW, Pantnagar Airport at Phoolbagh is approx. 18.8 Km (aerial distance) from project site in NW direction. The service road is available along throughout the project site and will allow traffic in both directions. Presently, the land use around the project site is completely developed. The traffic density on the road network adjacent to project site is significantly high during peak hours. The typical approach road map (5 km) of study area is shown in Fig 1.

3.9.1 Traffic density analysis: The project site will contribute vehicular trips, especially more during the peak hours, in addition to the existing traffic along the road from the developmental traffic around the project site. This may lead to conflict at the access driveway outside the site, leading to congestion

along the driveways of the site as well as affect the Up /Down Traffic along the Arterial roads around it. A need exists to examine the likely Traffic Impact due to the proposed project and to suggest Mitigating Measures to alleviate the traffic impact.

3.9.2 Selection of Monitoring Locations: Traffic study measurements were performed at Pilibhit-Kathgodam road via Sitarjung, SIDCUL and Chorgaliayan to assess impact on local transport infrastructure due to the proposed project. 100% traffic load will be on SIDCUL road which is further connected with Kathgodam via Chorgallia. Total traffic generated from Industrial project out of which 40 % traffic will move towards railway siding which is approx 28 km (aerial distance) due to transportation of material.

3.9.3 Methodology for Traffic Density Survey:

A) Data Collection and Survey: The traffic surveys have been conducted for 1 day to assess travel characteristics of the Sitarganj-Kathgodam road via Chorgaliayan. Survey of the road have been conducted by estimating the trips generated from project site using parking data and also estimating the present traffic densities within 5 km radius from site or the project influence area (PIA).

B) Analysis:
Impact on the Level of Services outside
Primary Data of Traffic Survey
Study Area: 10 km Radius
The study area will include the following roads and location:
Road 1: Sitarganj-Kathgdam road via Chorgaliayan
Road 2: NH-9
Road 3: Towards railway siding Haldwani

Table 3.40: Transportation Distribution within 5 km Radius

Name of National//State Highway	Direction		Traffic Distribution
	UP	DOWN	%
SIDCUL road	Chorgallia	Sitargunj	30
NH-9	Khatim	Sitanganj	30
Towards railway siding Haldwani	Haldwani	SIIDCUL	40

3.9.4. Traffic Characteristics

Assessment of traffic characteristics is an essential pre-requisite to appreciate quantum of traffic within the influence area, the problems with respect to traffic movement and to understand the need for organizing the same in an efficient and economical manner.
Traffic Characteristics are expressed in terms of total flow, traffic composition and hourly variations.
Also when traffic is composed of different type of vehicles, it is normal practice to convert the flow into equivalent passenger car units by using certain equivalence factors. The flow is then expressed as PCU per hour. To establish the capacity of roads, the recommended capacity values in Indian Roads Congress (IRC: 106-1990) has been reviewed, and based on the speed-flow relations developed from the present study, the capacity values have been derived.

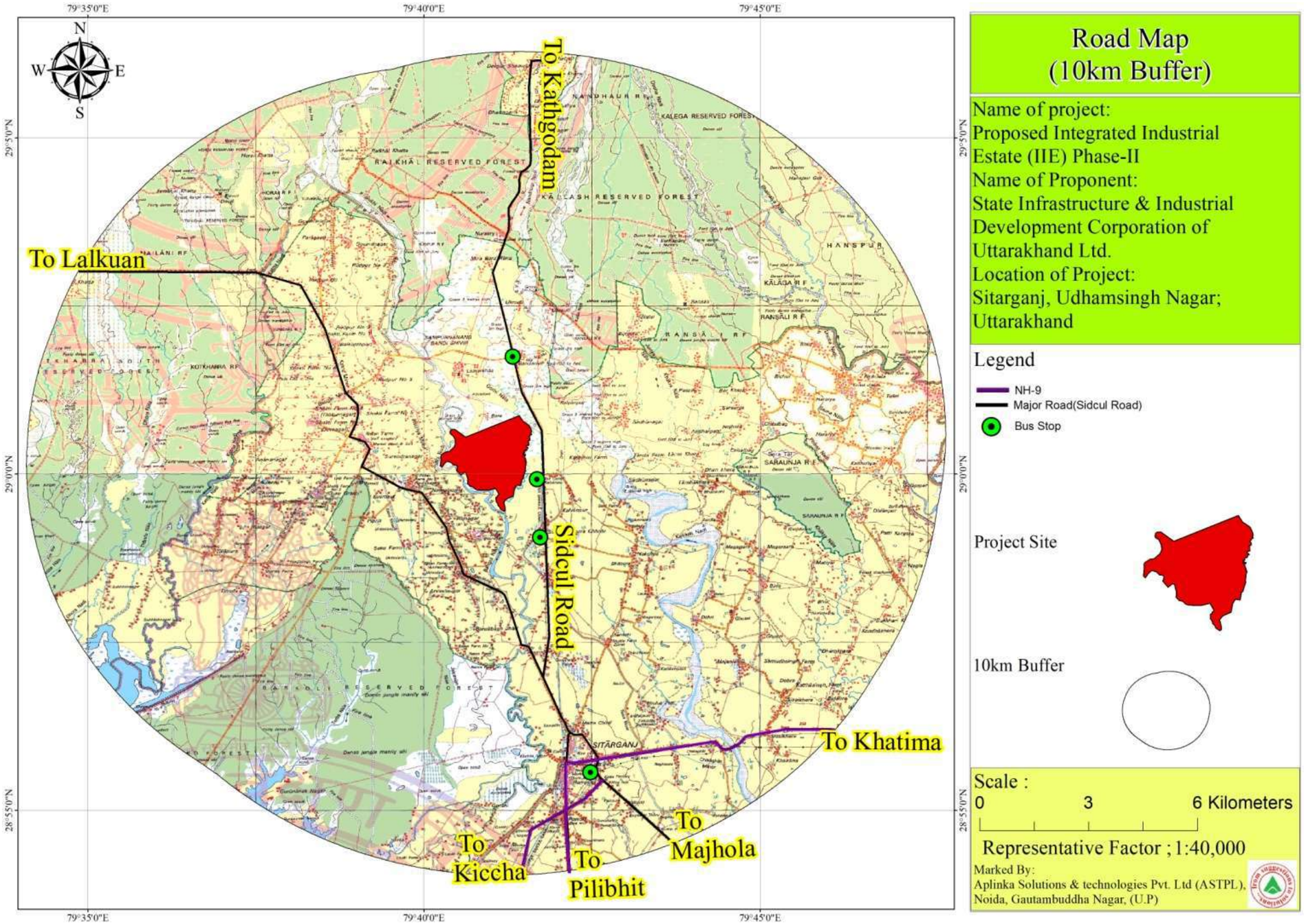


FIGURE 3.43: 10 KM ROAD MAP OF STUDY AREA

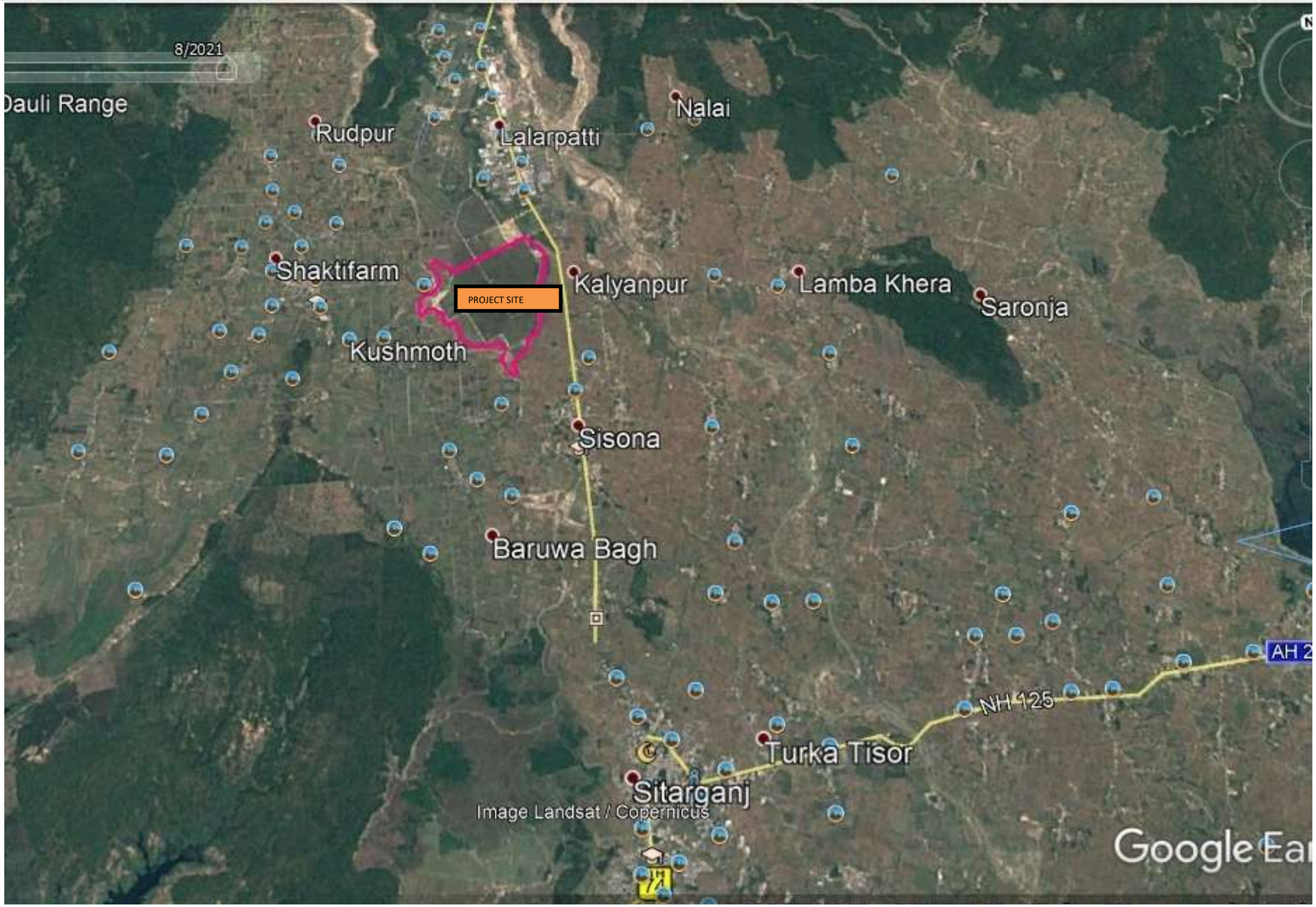


FIGURE 3.44: PROJECT LOCATION SHOWN ON GOOGLE EARTH

3.9.5 Trip Generation

The transport demand is a function of land use. The land use to be developed in parts/phases has been taken from the approved plan of industrial estate and has been used for traffic demand projections. The mode wise share has assumed to estimate vehicular trip generation from project site. The assumptions are presented in Table 3.53.

Table 3.41: Assumptions of Modal Split

Mode	Modal Split (% age)
Trucks/Bus	35
Light Commercial Vehicle	10
Cars	15
3 wheeler/cycle/cycle riska	10
Two-Wheeler	22
Tractor with Trailer	8
Total	100

To account for the interaction of the different kinds of vehicles moving on the route, the capacity of the roads has been converted into Passenger Car Unit as per IRC: 106-1990
Note: V= Volume in PCU's/hr & C= Capacity in PCU's/ hr

Table 3.42: Various levels of Service

LOS Value (Ratio of V/C)	LOS	Performance	Interference based on IRC1061990
0.0-0.2	A	Excellent	Represents a condition of free flow ;individual users are generally unaffected by others in the traffic and this condition is generally considered in the Excellent category
0.2-0.4	B	Very Good	Represents a condition of stable flow; individual users have a level of comfort and convenience but less that that A
0.4-0.6	C	Good/ Average/ Fair	Represents a condition of zonal stable flow; individual users are starting in a bit discomfort; users start to feel inconvenience due to presence of other users on the road. General level of discomfort increases and there is a noticeable decline in convenience.
0.6-0.8	D	Poor	Represents the level of stable flow; Level of comfort of user is poor and discomfort is significant in the flow of traffic. This category traffic streams are extremely susceptible to traffic problems.
0.8-1.0	E	Very Poor	Represents operating conditions close to capacity level; freedom to traffic stream is low and the speed is relatively uniform but very less. Comfort and convenience is relatively poor and discomfort is visible.
>1.0	F	Worst	Breakdown flow; These streams often and broken down, susceptible to long delays and therefore is huge

LOS Value (Ratio of V/C)	LOS	Performance	Interference based on IRC1061990
			discomfort in these streams.

TABLE: 3.43: Recommended PCU factors for various Types of Vehicles on Urban Roads

Vehicle Type	Equivalent PCU Factors Percentage composition of Vehicle type in traffic stream	
	5%	10% and above
Fast Vehicles		
1. Two wheelers Motor cycle or scooter etc.	0.5	0.75
2. Passenger car, pick-up van	1.0	1.0
3. Auto-rickshaw	1.2	2.0
4. Light commercial vehicle	1.4	2.0
5. Truck or Bus	2.2	3.7
6. Agricultural Tractor Trailer	4.0	5.0
Slow Vehicles		
7. Cycle	0.4	0.5
8. Cycle rickshaw	1.5	2.0
9. Tonga (Horse drawn vehicle)	1.5	2.0
10. Hand cart	2.0	3.0

Source: IRC -106-1990

1.0) TRAFFIC STUDY OF SITARGANJ-KATHGODAM ROAD:-

TABLE 3.44: CALCULATION OF PCU OF SITARGANJ-KATHGODAM ROAD

S. No.	Vehicles Distribution	Number of Vehicles Distribution/Day	Passenger	Total Number of Vehicle (PCU)/Day	Total Number of Vehicle (PCU)/HR
		SITARGANJ-KATHGODAM ROAD	Car Unit (PCU)	SITARGANJ-KATHGODAM ROAD	
1	Trucks/Bus	1300	3.7	4810	200
2	Cars/Jeep/Taxi	911	1.0	911	38
3	Tractor with Trailer	429	4.0	1716	72
4	Light Commercial Vehicle	880	2.0	1760	73
5	Two-Wheeler	3200	0.75	2400	100
6	Three-Wheeler	759	2.0	1518	63
7	Cycle	2539	0.5	1270	53
8	Cycle Rickshaw	345	2.0	690	29
Total				15075	628

(Source; IRC: 106 1990)

TABLE3.45 : EXISTING TRAFFIC SCENARIO & LOS OF SITARGANJ-KATHGODAM ROAD

Road	V (Volume in PCU/hr)	C (Capacity in PCU/hr)	Existing V/C Ratio	LOS
SITARGANJ-KATHGODAM ROAD	628	1200	0.52	C

Note: V= Volume in PCU's/hr& C= Capacity in PCU's/ hr

The existing Level of Mettaled road 1is "C"

2.0) TRAFFIC STUDY OF NH-9:-

TABLE 3.46: CALCULATION OF PCU OF NH-9

S. No.	Vehicles Distribution	Number of Vehicles Distribution/Day	Passenger	Total Number of Vehicle (PCU)/Day	Total Number of Vehicle (PCU)/HR
		NH-9	Car Unit (PCU)	NH-9	

1	Trucks/Bus	1406	3.7	5202	217
2	Cars/Jeep/Taxi	3201	1.0	3201	133
3	Tractor with Trailer	440	4.0	1760	73
4	Light Commercial Vehicle	776	2.0	1552	65
5	Two-Wheeler	1943	0.75	1457	61
6	Three-Wheeler	715	2.0	1430	60
7	Cycle	1257	0.5	629	26
8	Cycle Rickshaw	328	2.0	656	27
Total					662

(Source; IRC: 106 1990)

TABLE 3.47: EXISTING TRAFFIC SCENARIO & LOS OF NH-9

Road	V (Volume in PCU/hr)	C (Capacity in PCU/hr)	Existing V/C Ratio	LOS
NH-9	662	1200	0.55	C

Note: V= Volume in PCU's/hr& C= Capacity in PCU's/ hr

The existing Level of Mettaled road 1is "C"

3.0) TRAFFIC STUDY OF RAILWAY SIDING HALDWANI:-

TABLE 3.48: CALCULATION OF PCU

S. No.	Vehicles Distribution	Number of Vehicles Distribution/Day	Passenger	Total Number of Vehicle (PCU)/Day	Total Number of Vehicle (PCU)/HR
		TOWARDS RAILWAY SIDING HALDWANI	Car Unit (PCU)	TOWARDS RAILWAY SIDING HALDWANI	
1	Trucks/Bus	1500	3.7	5550	231
2	Cars/Jeep/Taxi	1000	1.0	1000	42
3	Tractor with Trailer	600	4.0	2400	100
4	Light Commercial Vehicle	750	2.0	1500	63
5	Two-Wheeler	2000	0.75	1500	63
6	Three-Wheeler	350	2.0	700	30
7	Cycle	1800	0.5	900	38
8	Cycle Rickshaw	300	2.0	600	25

Total				592

(Source; IRC: 106 1990)

TABLE 3.49: EXISTING TRAFFIC SCENARIO & LOS OF RAILWAY SIDING HALDWANI

Road	V (Volume in PCU/hr)	C (Capacity in PCU/hr)	Existing V/C Ratio	LOS
RAILWAY SIDING HALDWANI	592	1200	0.49	C

Note: V= Volume in PCU's/hr& C= Capacity in PCU's/ hr

The existing Level of Mettaled road 1is "C"

3.9.6. TRAFFIC IMPACT ANALYSIS

3.9.6.1 DURING OPERATION PHASE

TABLE 3.50: TRAFFIC SCENARIO (OPERATION PHASE)

SI.NO	MODE OF TRANSPORTATION	NO.OF VEHICLES USED PER DAY	PUC FACTOR	PUC/DAY	PUC/HR
1	Trucks/Bus	100	3.7	370	15
2	Cars/Jeep/Taxi	400	1.0	400	17
3	Tractor with Trailer	150	4.0	600	25
4	Light Commercial Vehicle	200	2.0	400	17
5	Two-Wheeler	1000	0.75	750	31
6	Three-Wheeler	150	2.0	300	13
7	Cycle	1000	0.5	500	21
	TOTAL			5590	139

TABLE 3.51: MODIFIED TRAFFIC SCENARIO & LOS (OPERATION PHASE)

Road	Increased PCU'S Highway	Increased Volume(V)	C (Capacity in PCU/hr)	Modified V/C Ratio	LOS
Sitarganj-Kathgodam Road	139	767	1200	0.63	D
NH-9	83	745	1200	0.62	D
Towards railway siding Haldwani	56	648	1200	0.54	C

*Note- 100% addition of operation phase traffic on connecting road. The above traffic study indicates that the value of LOS will change from C to D level.

3.9.7. TRAFFIC COMPOSITION& HOURLY VARIATION

Figure 2 presents the traffic composition at the roads which discussed during existing above. The share of Trucks observed in range of 13 to 18 %, two wheelers has been observed in the range of 24 to 31 % Car has been observed in the range of 9 to 12%, range of LCV has observed in the range of 9% and cycle has been observed in the range of 22 to 25 %.Hourly variation of traffic at the survey locations is presented in Figure 3 to Figure 5.

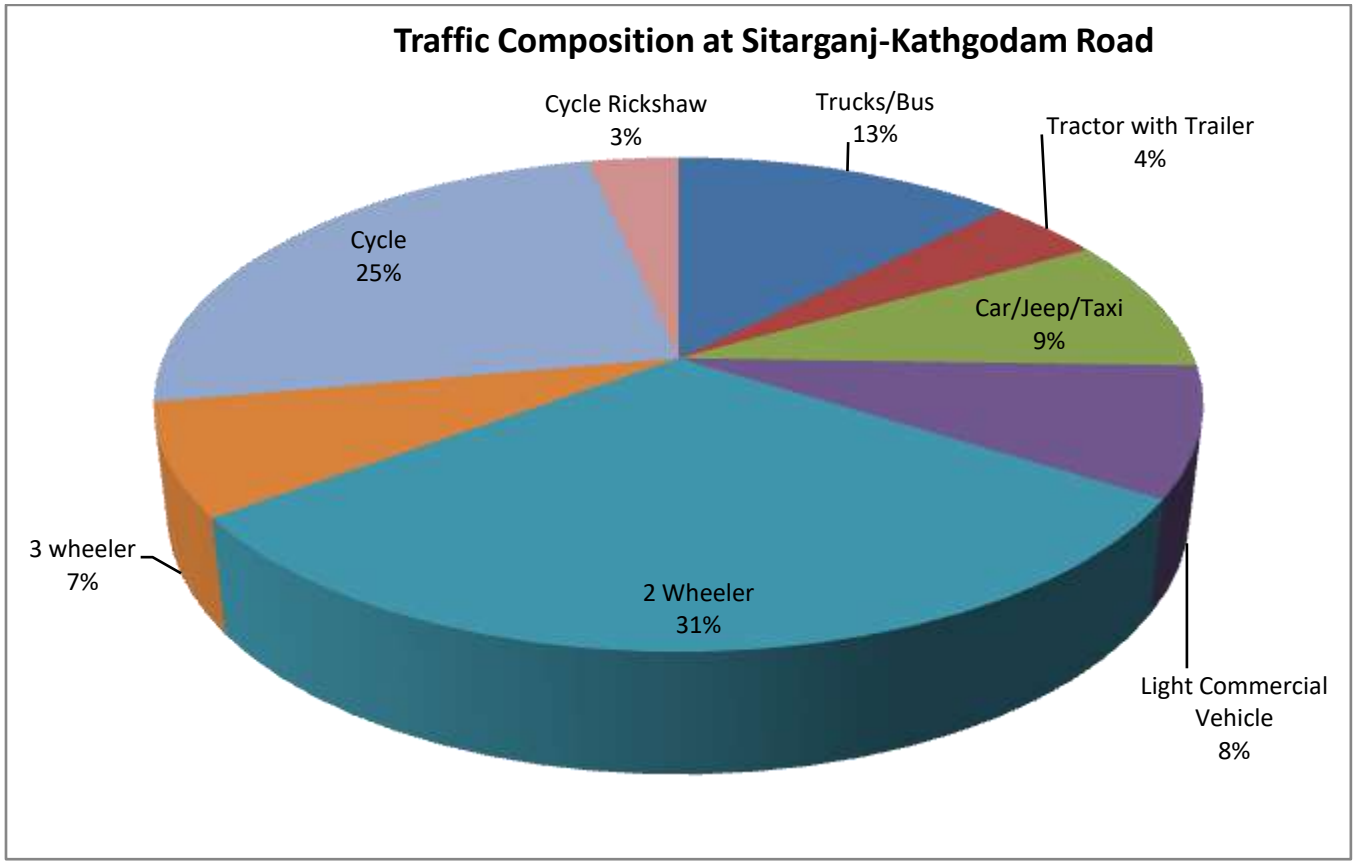


Figure 3.45:Traffic Composition at Sitarganj-Kathgodam Road

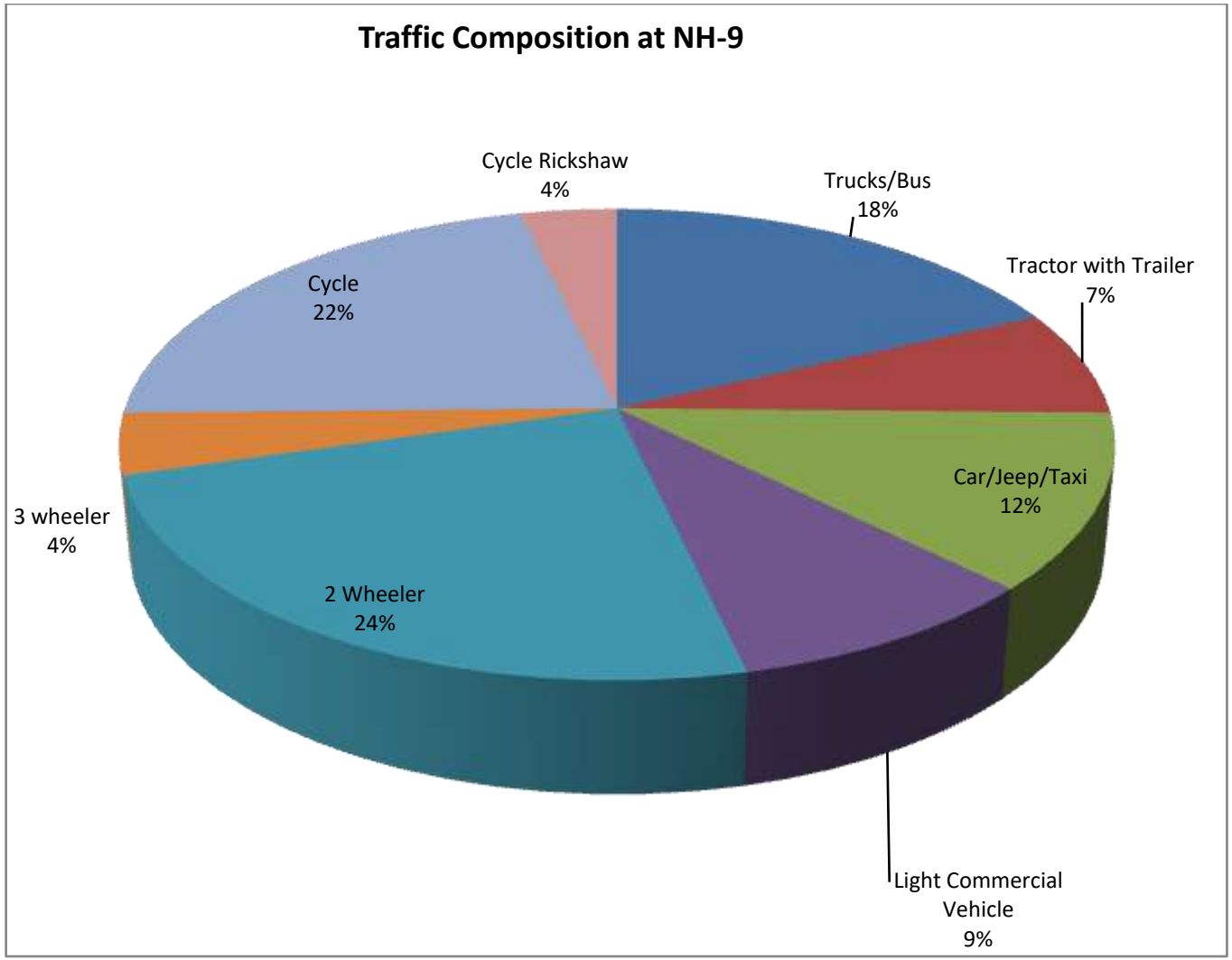


Figure- 3.46: Traffic Composition at NH-9

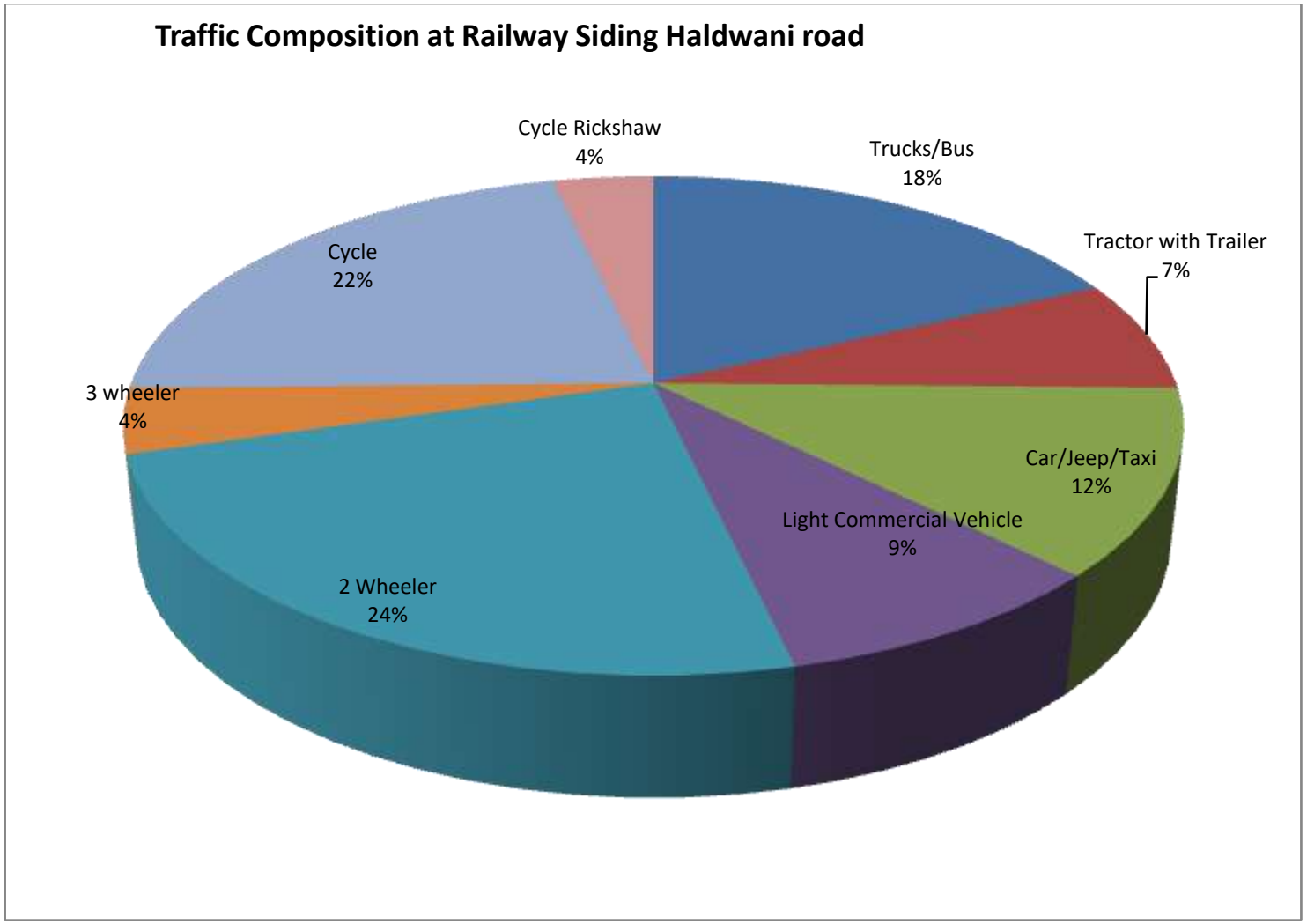


Figure 3.47: Traffic Compositionat Railway Siding Haldwani road

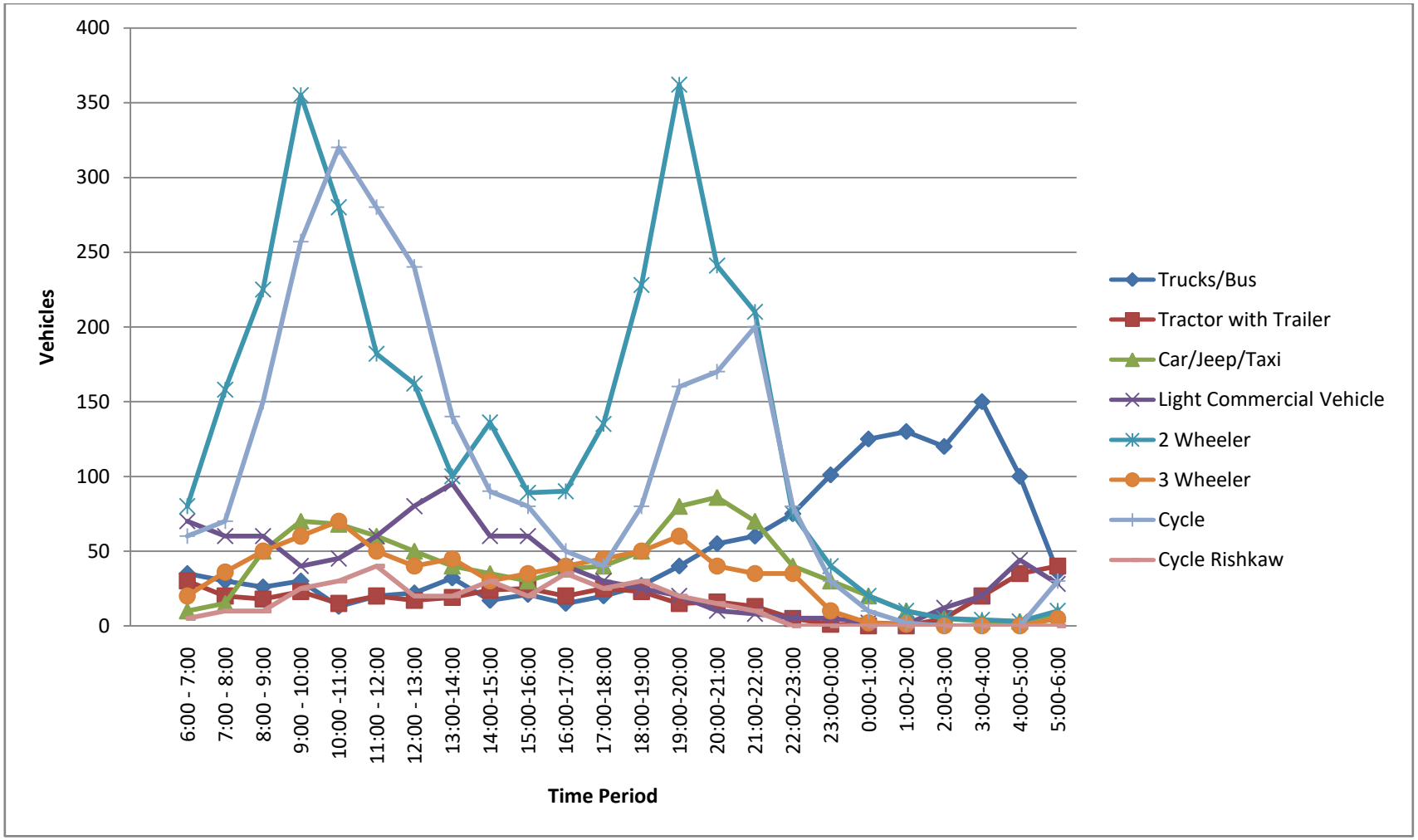


Figure 3.48: Daily Hourly variation in Traffic at Sitarganj-Kathgodam Road

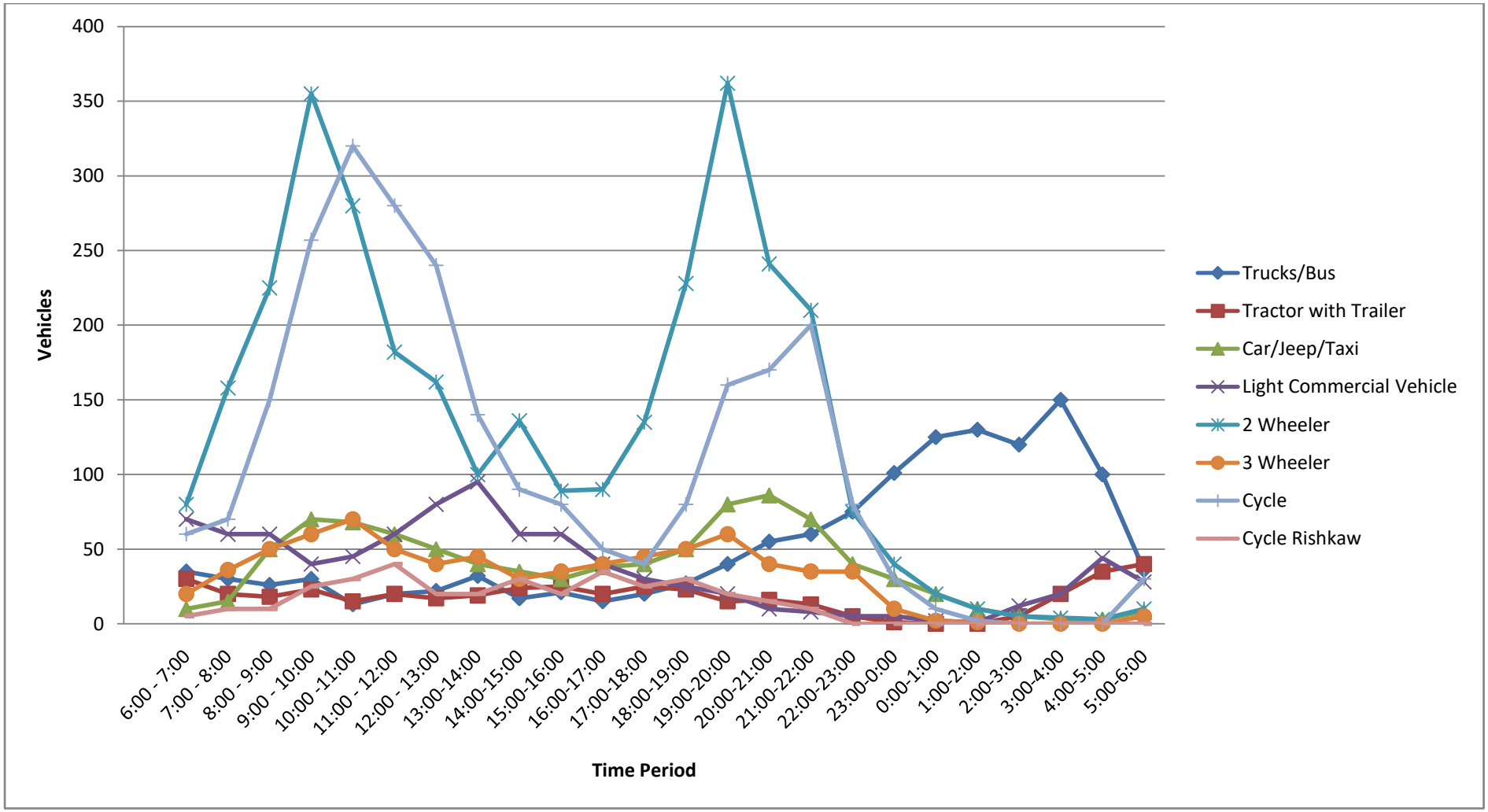


Figure 3.49: Daily Hourly variation in Traffic at NH-9

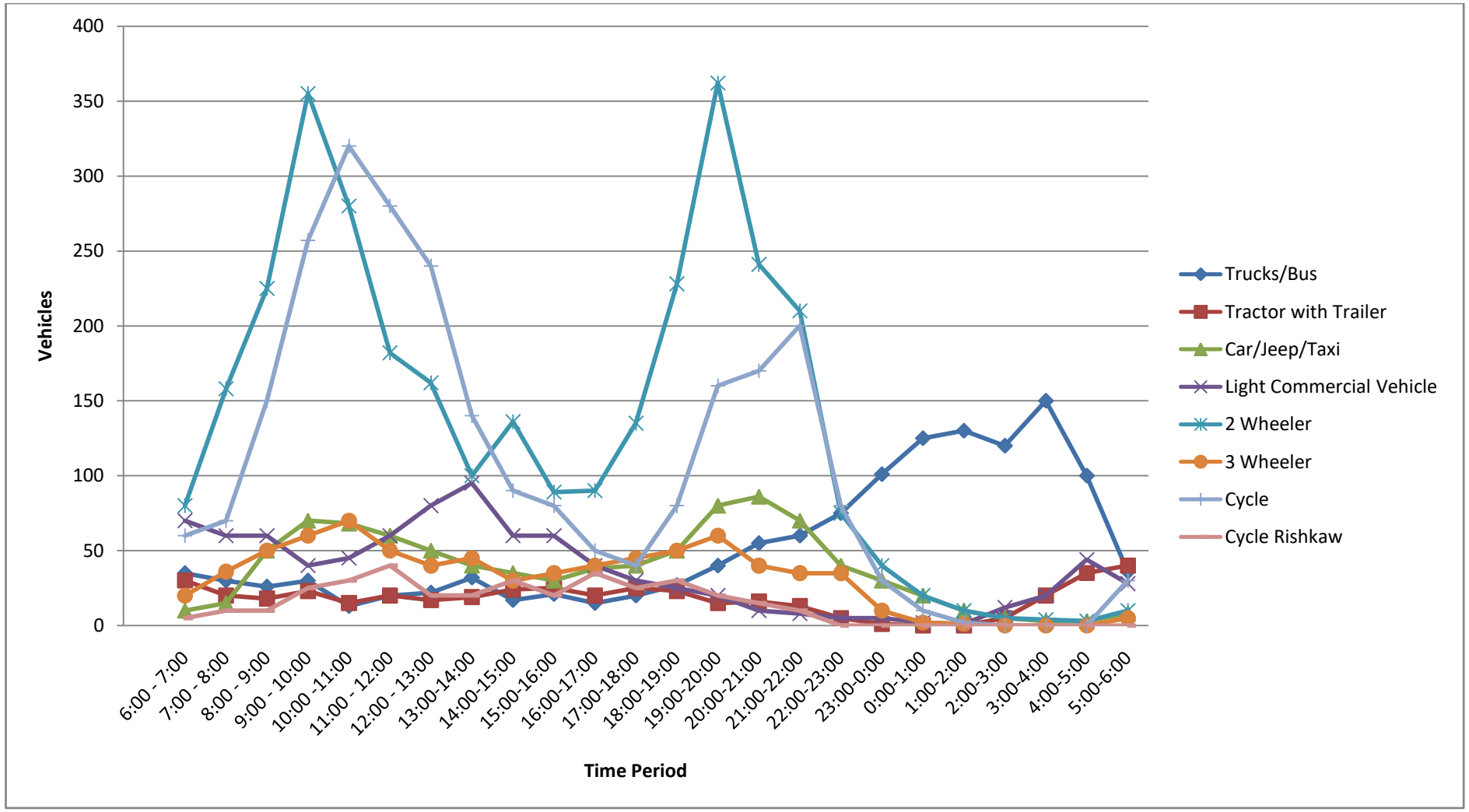


Figure 3.50: Daily Hourly variation in Traffic at Haldwani railway siding road

3.9.8 CONCLUSION

The traffic from site has been assumed, flow will be only towards Sitarganj to Kathgodam Road in either direction therefore computation has been done for both the roads using peak hourly traffic. From the above it may be concluded that the road has an average existing LOS of Category 'C' at a value of V/C equal to 0.54 based on traffic survey done on the sampling point described above. After proposed industrial estate, road will have same LOS as Category 'D'. The existing road is not capable enough to support the increase traffic due to proposed industrial state, hence, it's recommended that widen the road & make it four lanes at least from SIIDCUL to Sitarganj bypass.

3.9.8.1 MITIGATION MEASURES:

The Traffic impacts of the Proposed Project Site could be mitigated by adopting few measures.

1. Prohibiting on-street parking of vehicles and simultaneously developing-off street parking facilities.
2. The signage scheme in and around the Proposed industrial project site must provide adequate information in time and every time in a simple sign language which is appropriate for road users so that they can take safe measures.
3. On parking on approach roads outside the proposed industrial project site must be prohibited through regulatory measures. At the entry/ exit gates parking must be strictly avoided to facilitate easy entry and exit as well maintain site distance for entering and leaving traffic.
4. Provision of adequate facilities for pedestrians and cycles.
5. Banning certain conflicting movements at major intersections particularly during peak hours.
6. Improving traffic discipline such as proper lane use and correct over-taking through appropriate road markings, education and publicity.

****

CHAPTER – IV

ANTICIPATED IMPACTS AND MITIGATION MEASURES

4.0 Context of EIA: The existing state of the study area, the proposed project and regulatory guidelines and standards has been interfaced in order to achieve a good evaluation of the impacts of project activities on the environmental components. The various field activities of the proposed project often results in complex interactions between engineering and the environment. This chapter relates the impacts of the various stages of the project development on environmental components. The objectives of this Environmental Impact Assessment (EIA) are:

- To establish the significant potential impacts of the establishment of the new Industrial Estate in Sitarganj on the existing ecological and socio-economic conditions of the area.
- To predict impact magnitude, suggest alternatives and identify the best possible option for least environmental impact.
- To incorporate the recommendations of EIA into the decision making of the project at all stages of the life cycle of the project.

The components of the Project Environment and the indicators of the Potential Impacts are shown in Table 4.16. This section identifies, evaluates, predicts and illustrates the potential impacts on different environmental components due to the construction and operation of the proposed project. It describes all the potential impacts on physical and socio-economic components of the local environment due to the proposed activities and sub-activities. The Prediction of impacts is the most important component in the Environmental Impact Assessment studies.

Both qualitative and quantitative techniques and methodologies were used to conduct analysis of the potential impacts likely to occur because of the proposed development activities on physical, ecological and socio-economic environment. The predicted potential impacts were superimposed over the baseline status of the environmental quality to derive post-project scenario of environmental conditions. The prediction of impacts would help in minimizing the adverse impacts, therefore, to enhance the beneficial impacts on environmental quality both during pre and post project.

The environmental impacts in this section have, as such, been discussed separately for the construction phase and the operation stages of the proposed project. The environmental impact assessment approach used to evaluate the proposed project comprises of the sequential elements such as identification, prediction and evaluation.

The first step of the impact assessment process involves identifying the key issues associated with the construction and operation phases of the proposed project. Issues and concerns of the proposed project are scoped based on the knowledge and experience with respect to environmental setting and project elements. Accordingly, the existing environmental system is described and the components of the project are determined. This step involves identification of the environmental modification that may be significant, forecasting of the quality and spatial dimension of change in the environment identified and estimation of the probability that the impact will occur. This step involves determination of the incidence of benefit to end users and population affected by the project, specification and comparison of effects between various alternatives, and assessment of the likely effect of the project on the environmental, economical and social components indicating the nature & magnitude of impacts.

4.0.1 Impact Analysis: The major element involved in the process of environment impact assessment is identification of impacts as it leads to other elements such as quantification and evaluation of impacts. Although, in general, a number of impacts have been identified while describing the existing environmental status. It is necessary at this stage to assess the existing environmental status to facilitate the identification of the critical impacts that are occurring due to "the proposed project" upon various components of environment therein.

The network method has been adopted for the identification and evaluation of the environmental impacts. The method involves an understanding of cause-condition-effect relationship between an activity and the environmental indicators. The activities and actions as described here in before were considered for the evaluation of the impact. The method helps in recognizing the series of impacts that could be triggered by the "proposed project activities" in the area.

The concept for impact evaluation will, therefore, be accounted for the "proposed project activities" and thereby to identify the types of associated impacts, which are likely to occur. The subsequent steps will be selected to define each impact and to identify the secondary and tertiary impacts, which may induce because of the project activities. This process may be repeated until all possible impacts will be identified. The greatest advantage of this type of approach is that it allows identifying the impacts by selecting and tracing out the events as they are expected to occur due to existing activities.

The impact network has been developed for, proposed project activities impacting environment and areas of environment being impacted.

4.0.2 Size of the site: Large sites create congestion and transportation problems, and may be an obstacle to decentralized development, if this is a policy priority. Smaller sites are disproportionately expensive to develop, although there are some very successful public and private sector IEs specifically due to the presence of comparatively high value-added activities requiring limited amounts of space.

The Sitarganj IE site is comparatively small less than 500 ha. Hence the site can be well managed. As a rule, about more than one third of the site is proposed to be devoted to public areas including Commercial, Residential, Utility/ Reserve, Road & Parking and Green/parks/ canal at 38.8 %. The remaining half is available for industrial development and associated activities 61.2 %.Normally about half the site is built over, thus more than half of the estate when fully developed is covered with commercial or industrial buildings.

4.0.3 Site specifications: The ideal site for an IE for light and medium industry should have:

- A gentle slope for drainage - Slope is less than 05m/km
- The ground bearing is very good as per Soil Geotechnical test reports.
- Good access by main road to the city, railway station, and airport. The site is very well connected.
- An adequate water supply will be ensured through 2 bore wells
- Reliable electricity supply and telecommunications facilities will be ensured through the agreement with UVVNL and BSNL.
- An adequate storm water drainage network will be developed and the area is surrounded by drain on west and south side.

- A facility for treating industrial effluent and a means of disposing of the effluent after treatment in the form of CETP of 12 MLD is proposed.
- A satisfactory method of disposing of solid waste will also be developed via putting an approved solid waste disposal scheme.
- Processing areas such as manufacturing units and non processing areas such as offices,CSC, green areas, residential areas are very well planned. Processing areas are provided with security with restricted entry.

4.0.4 Risk based land use planning: Land use choices for new industrial activities should take into account the different levels of risk associated with various categories of industrial uses:

To assist planning authorities in improving their industrial land use classification within plans the following typology of industry is suggested, based on the chemicals produced.

- Type 1: industries presenting no major risks;
- Type 2: industries presenting some risk (e.g. producers or users of benzene, ammonia, vinyl chloride);
- Type 3: industries presenting moderate risk (e.g. Producers or users of hydrogen chloride, liquefied petroleum gas, or gasoline);
- Type 4: industries presenting high risk (e.g. producers or users of chlorine or ethylene oxide).

4.0.5 Identification of areas to be avoided for sitting of industrial estates: Sensitive areas are to be avoided for establishment of Industrial Estates to prevent adverse impact on ecologically rich habitats as well as sensitive locations. The proposed project is not proposed on any sensitive location as indicated below in table 4.1(a):

Table-4.1(a) - Identification of areas to be avoided for sitting of industrial estates

S/ No	Biological diversity of an area	Remarks
1	National parks	No
2	Wild life sanctuaries	No
3	Game reserve	No
4	Tiger reserve/elephant reserve/turtle nesting ground, breeding grounds	No
5	Core zone of biosphere reserve	No
6	Habitat for migratory birds	No
7	Mangrove area	No
8	Areas with threatened (rare, vulnerable, endangered flora/fauna, protected corals	No
9	Wetlands	No
10	Botanical gardens, Zoological gardens, Gene Banks	No
11	Reserved forests, Protected forests	No
12	Any other closed/protected area under the Wild Life (Protection) Act, 1972	No
13	Any other area as locally applicable	No

The natural life sustaining systems and some specific land uses are sensitive to industrial impacts because Operational Aspects of an EIA of the nature and extent of fragility. With a view to

protect such sites, the industries may maintain the following distances, as far as possible, from the specific areas listed below in table 4.1(b):

Table-4.1(b) - Identification of areas to be avoided for sitting of industrial estates

Sr. No	Sensitive/incompatible land uses	Remarks
1	Public water supply areas from rivers/surfacewater bodies - Up to 2 km from watersheds u/s of public water supply abstraction points in the rivers/surface water bodies	No. Up to 2km d/s of the project site there are no public water supply abstraction points.
2	Public water supply areas from ground water- 1 km around public water supply abstraction points from ground water	There is no water supply abstraction point within 1km radius.
3	Ground water recharge areas - 1/2 km ground water recharge areas	Ground water recharge area lies in Bhabhar zone which is more than ½ km from project site.
4	Scenic areas/tourism areas/hill resorts - 1 km from the periphery of the core areas of scenic areas/tourism areas/hill resorts with tourists/visitors more than 10 lakhs a year	None
5	Religious places, pilgrim centers - 1 km around core areas of religious places that attract over 10 lakhs pilgrims a year	None
6	Protected tribal settlements - notified tribal areas where industrial activity is not permitted	None
7	Coastal Regulatory Zone (CRZ)	None
8	Monuments of national significance - 1 km from monuments of national significance	None within 10 Km study area
9	Monuments of state significance – ½ km from monuments of state significance	None within 10 Km study area
10	Monuments of national significance – 100 m from monuments of local significance	None within 10 Km study area
11	World Heritage Sites - 2 km from World Heritage sites	No
12	Flood prone areas (based on flood in last 25 years)	No
13	Agricultural research stations	No
14	Air port areas	No
15	Any other feature as specified by the State or local government and other features as applicable (including prime agricultural lands, pastures, migratory corridors etc.)	No
16	Land availability - extent of land to suit to the industrialization demand, preferably waste lands	The project site is a wasteland. It is marshy and water logged at various parts.
17	Land ownership - government or private land lease in acquisition	Government Land acquired from Sampoornanand Jail and allocated to SIIDCUL
18	Electricity- nearness or distance of various pre final sites from nearest existing substation/ power plant	Project site is close to existing phase-1 having electric supply.
	Nearness to the major settlement - distance of	Sitarganj town is6.1km; S from the project site.

Sr. No	Sensitive/incompatible land uses	Remarks
	nearest major settlement from all the pre-final candidate sites	
	Water availability- distance from source of water supply for domestic and industrial purposes	10.14 MLD of water will be required for the project. Of this, 5.10 MLD will be for industrial use and 1.724 MLD for domestic use. Water will be sourced from groundwater through borewells and will also be recycled (3.58 MLD) and reused to reduce freshwater consumption.
	Distance from existing industrial areas	Project site is adjacent to existing IIE phase-1 site.
	Distance from sensitive zone	No sensitive zone in the buffer area.
	Drainage- distance of major rivers or drains from the pre-final sites	Begul river is adjacent from boundary of the project site. A drain runs adjacent to the IE at its northern and eastern boundaries.
	Nearness to transportation network for economic handling of both raw materials and finished goods	The site is well connected by road and rail network. The proposed site is not located at any environmentally sensitive area.
	Environmental sensitivity of the area to suit to the needed industrial development	No, as perform no. 1.
	Transportation facility: distance from existing railway line and highway	The IE is situated along the Sitarganj-Haldwani Road via Chorgalia. The nearest National Highway no 9 is approximately 10 km from IE. The nearest railway station Lalkuan Junction is 16.6 Km in North- west direction.

4.0.6 List of Important Physical Environment Components and Indicators of EBM (Environmental Baseline Monitoring).

Following are the Environmental Component and Environmental Indicators:

Climatic variables:	Topography	Drainage	Soil	Geology	Water quality	Air quality	Biological	Landuse
Rainfall patterns – mean, mode, seasonality	Slope form	Surface hydrology	Type and characteristics	Underlying rock type, texture	Raw water availability	Ambient	Species composition of flora and fauna	Landuse pattern, etc
Temperature patterns	Landform and terrain analysis	Natural drainage pattern and network	Soil health	Surgical material	Water quality	Respirable	Flora – type, density, exploitation, etc	
Extreme events	Specific landform types, etc	Rainfall runoff relationships	Porosity and permeability	Geologic structures (faults, shear zones, etc.)	Surface water (rivers, lakes, ponds, gullies) – quality, water depths, flooding areas, etc	Air shed importance	Fauna– distribution, abundance, rarity, migratory, species diversity, habitat requirements, habitat resilience, economic significance, commercial value, etc	
Climate change projections	Specific landform types, etc	Hydrogeology	Sub-soil permeability	Geologic resources (minerals, etc.)	Ground water – water table, local aquifer storage capacity, specific yield, specific retention, water level	Odour levels, etc	Fisheries – migratory species, species with commercial/recreational value, etc	

Climatic variables:	Topography	Drainage	Soil	Geology	Water quality	Air quality	Biological	Landuse
Prevailing wind - direction, speed, anomalies		Groundwater characteristics – springs, etc.	Run-off rate		Depths and fluctuations, etc			
Relative humidity			Infiltration capacity		Coastal			
Stability conditions and mixing height, etc.			Effective depth (inches/centimeters)		Floodplains			
			Inherent fertility		Wastewater discharges			
			Suitability for method of sewage disposal, etc		Waste discharges, etc			

4.1 Approach to Impact Analysis: Evaluating the significance of environmental effects is perhaps the most critical component of impact analysis. The interpretation of significance bears directly on the subsequent EIA process and also during environmental clearance on project approvals and condition setting. Impacts vary in how, when and whether they will arise, where and by how much it may affect the environment. The effects of a project may also interact to cause other impacts that might be more significant than the original impacts. Impacts vary in: nature (positive, negative, direct, indirect, cumulative, and synergistic);magnitude; extent/location (area/volume covered, distribution);timing (during construction, operation, decommissioning, immediate, delayed, rate of change); duration (short term, long term, intermittent, continuous); reversibility/irreversibility; likelihood (risk, uncertainty or confidence in the prediction); and Significance (minor, moderate, major, negligible).

4.1.1 Overall approach: The approach to impact analysis includes identification of both positive and negative impacts, which may be inclusive of following:

- Identification and summary of all anticipated environmental impacts.
- Description of all probable adverse impacts, which cannot be avoided, and are due to construction as well as operational phase of the project

4.1.2 Identification and Assessment of Impacts: In order to assess the impact of proposed project, following scenarios are to be considered.

(i) No project
(ii) Project without EMP
(iii) Project with EMP in place

The proposed development of Industrial Estate of SIIDCUL at Sitarganj would create impacts on the environment in two distinct phases:

During the construction/development (Provisioning of basic infrastructure for the establishment of the small industrial units) phase, which may be regarded as temporary or short – term.

The other during the operation stage (when the proposed project will become operational like industrial plotted units would be commissioned and operational) would have long term effects and hence require mitigation plan for management of impacts.

4.2 Impacts on Ambient Air Quality: The IE site proposed adjacent to the existing IIE-Phase -1 of SIIDCUL and its associated operations. Phase I has bottling plant, manufacturing plants for adhesives, light weight engineering works adhesives etc. These industrial activities have significant contribution to the existing baseline air quality.

The impacts on Ambient Air Quality due to the proposed project activities during the construction phase of the project will be temporary or short-term. $PM_{10}$and $PM_{2.5}$ would be the predominant pollutants generated from construction activities. The gaseous emissions such as SO_2, NOx, Benzene, hydrocarbons and CO would be generated from the construction equipment and vehicles.

During operational phase, the source of significant contributor to the air pollution would be industries and movement of vehicles in the industrial area (as line source of emission). Possible air contaminants would be Particulate matter SO_2, NOx, CO & THC etc.

4.2.1 Impacts during Construction Phase (development of Site and infrastructure): During construction phase, the project would have impacts on ambient air quality due to the emissions by construction equipment and vehicles, and an increase in dust level by the construction activities. Earth excavation work, foundation work, superstructure work, material storage, transportation and handling of construction materials together with wind erosion could be the major factors, which may produce a temporary and localized increase in Particulate matter levels.

The increased movement of heavy vehicles carrying construction materials would generate gaseous emissions. The degree of dust generated would depend on the soil compaction and moisture content of the ground surface during the construction. Dust and exhaust particulate emissions from heavy equipment operations would temporarily degrade air quality in the immediate construction zone.

The construction contractor has to ensure regular monitoring of dust levels in the vicinity of the proposed site during the construction activities. Dust suppression will have to be applied, using water tankers mounted on tractors, sprinklers and other means as necessary to suppress and curb dust pollution, in the event that high levels of dust are observed, and complaints about dust are received.

Other diffused source of gaseous emissions from the construction site would be if the construction labors uses fuel wood for cooking and heating during winters. The construction contractor will have to ensure that such practice would not be adopted by the labours and they should be provided with LPG cylinders for cooking in their labour camps.

4.2.2 Impacts during Operation: During operational phase, the significant contributor to the air pollution would be the industries and movement of vehicles in the industrial area (as line source of emission).

4.2.2.1 Prediction of Impacts

Vehicular emission will be the major source of air pollution from the development of the Institutional Estate. During post construction phase, Ground Level Concentration of pollutants (as added by the project) will depend upon the following:

- Emission of pollutants from additional traffic on the roads due to the project
- Meteorological conditions

Particulate Matter will be the main pollutants of primary concern released from traffic movement. Assuming that under cross wind condition perpendicular to the road, the dispersion of vehicular emissions would be confined within limited distance from the road and concentration will decrease with the increase in distance from road. It is anticipated that the contribution of vehicular emissions from the exhaust in ambient air quality will be marginal as Pollution under Control (PUC) Certified vehicles and branded make operated vehicle with diesel will be used. Ground Level Concentration (GLC) of pollutants is found to be well within the stipulated National Ambient Air Quality Standards due to traffic movement and vehicles used inside the premises. CPCB/MoEF & CC approved USEPA dispersion model - AERMOD have been used for prediction of impacts caused by vehicular movements. Emission data was used as per the AP42. Other primary data used as input for model were hourly meteorological data of Wind speed & direction, temperature stability class and mixing height. Mixing height used in the model was taken from secondary data source "Atlas of Hourly Mixing Height Assimilative Capacity of Atmosphere in India published in 2008 by IMD, Delhi".

The incremental load in the ambient air environment found to be very low as given in the report.

4.2.2.2 Model details and Frame work of Computation: The predictions for air quality during operation phase were carried using "AERMOD View" which is initially developed by the AERMIC (American Meteorological Society (AMS)/United States Environmental Protection Agency (EPA) Regulatory Model Improvement Committee). The model is based on planetary boundary layer theory which incorporated the popular USEPA models into one interface. AERMOD View fully incorporates the building wash algorithms, advanced depositional parameters, local terrain effects and advanced meteorological turbulence for the prediction of pollutants dispersion.

AERMOD View 9.6.5 model has been used to calculate the Ground Level Concentration (GLC) which can simultaneously simulate many sources with different shapes, at ground or elevated, buoyant or non-buoyant, emitting one or more pollutants and is capable to account for the non-homogeneous vertical structure of the boundary layer. Vertical mixing is limited in case of stable conditions.

AERMOD includes the several improvements of the standard Gaussian models as follows:

a- Turbulence : AERMOD uses the vertical continuous profiles of horizontal and vertical turbulence that are measured/computed as compared to the ground level releases of the dispersion parameters corresponding to the stability classes.

b- Dispersion under Convective Conditions: Under the convective conditions the plume is made of the three components – direct plume, indirect plume and a third plume (penetrating the mixing lid and dispersion more slowly in the stable layer above and re-enter in the mixing lid and reach the ground). AERMOD describes the non Gaussian vertical dispersion under convective conditions that are characterized by the presence of updraft and downdraft motions with different probability of occurrence and different intensity.

c- Dispersion under stable conditions: AERMOD took into account the boundary layer as compared to the assumption of infinite boundary layer for describing the horizontal and vertical dispersion.

d- Plume Buoyancy: Under stable atmospheric conditions; AERMOD uses the values at stack height at half distance from the final height due to buoyancy, while under convective conditions it superimposes the random displacements due to the random fluctuations of the convective velocities.

e- Nature of Source: Sources can be treated as rural or urban independently.

f- Complex Terrain: AERMOD has a terrain processor (AERMAP) that prepares the data for their use within the model by advanced algorithms that discriminate the streamline division based on a critical height.

4.2.2.3 Methodology: There are two input data processors that are regulatory components of the AERMOD modeling system: AERMET, a meteorological data preprocessor that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, and AERMAP, a terrain data preprocessor that incorporates complex terrain using USGS Digital Elevation Data.

A. Considerations/Control and model Input:

There are following considerations for this projects

a) Traffic Load has been using the traffic circulation and parking plan. Traffic movement of traffic has been considered.

b) As per norms of Government of India and Motor Vehicle Rules, BS-IV norms.

c) All the inputs related to positions of source and receptors are taken in UTM (Universal Transverse Mercator)

d) Reference point has been taken as the centre of the project site.
e) Project Site falling under datum 44R
f) Orientation Angle has been taken 0^0 as North and accordingly locations of sources have been defined in clockwise direction.
g) Reference of calculation of emission factors is AP-42 by USEPA
h) Only surface air data has been considered while upper air estimator has been used for running the model for upper air.
i) Model is run through the whole period of 3 months.

B. Identification of Source:

During the operation phase; the emission is reported from traffic movement. Location of internal roads is marked on the Grid and accordingly UTM coordinates have been taken along with the area. Traffic has been considered for the vehicles coming to the industrial estate which includes Trucks/Trailer, Cars, LCV, Buses, two wheelers and three wheelers. To and fro movement of all the vehicles is considered for prediction. All the vehicles as per the BS-IV norms shall be considered which will be having the Pollution under Control Certificates.

C. Emission due to transportation

Emission due to transportation has been calculated by dividing the part of road into 6 segments (Approach road) and width has been considered 18.0 m.

Emission factor for Transportation has been calculated with below mentioned formula

$$E=k\,(sL/2)^{0.65}\,(W/3)^{1.5} \text{kg PM10/VKT}$$

Emission of PM_{10}due to Transportation for Approach Road = 3.97 x 10-7 g/sec-m^2

Emission of $PM_{2.5}$due to Transportation for Approach Road = 2.04 x 10-7 g/sec-m^2

Where:

E = particulate emission factor (having units matching the units of k)

k = particle size multiplier for particle size range and units of interest (see below)

sL = road surface silt loading (grams per square meter) (g/m^2)

W = average weight (tons) of the vehicles traveling the road

Source: USEPA AP-42

D. Identification of receptors:

To identify the impact on receptors in 10 km radius a grid has been taken of 20 km x 20 km in North and East of the site considering centre of project site as the centre of the grid. A total of 21 points taken in both the sides and interval of 1000 m has been taken. All the intersection points are considered as the receptors and accordingly results have been obtained in form of isopleths showing the Ground Level Concentration (GLC). However, special emphasis has been given to receptor which is monitoring locations.

E. Meteorological Data

In dispersion of pollutants meteorology of the area plays very important role and disperse the pollutant within the atmosphere in the predominant downwind direction. Monitoring period has been considered for three months (December, 2020 to February 2021). Meteorological file has been prepared by taking the hourly data for three months period and consist of wind direction, wind speed,

temperature (in K), relative humidity, atmospheric pressure, precipitation and cloud cover. Metrological data is taken for the period of December, 2020 to February 2021 and procured from the average of 30 years as per Climatological Normals (1961-1991). Extrapolation of wind data has been done as per "Assessment of Impact to Air Environment: Guidelines for conducting Air Quality Modeling" published by CPCB, Delhi in 1998 (Ref: PROBES/70/1997-98). AERMET View version 9.6.5 has been used to create the SURFACE file (.SFC) and PROFILE file (.PFL).

4.2.2.4 Results and discussion

After filling all the details, software was run and following output obtained by AERMOD View.

1) Incremental Ground Level Concentrations for PM_{10}

Model was run with the meteorological data of December, 2020 to February 2021 and also been run through the worst condition for 24 hr average and 3 months average. During the operation phase; maximum GLC for the particulate matter for 24 hr period is predicted to be approx. 4.078 µg/m³ at approx. 0.080 km in North direction while for whole period (3 months) is predicted to be approx. 0.628µg/m³. The result summary is as follows in **Table 4.2.**

Table 4.2: Result Summary of the Incremental GLC of PM

Results Summary

C:\Users\Aplinka.SUSHANTGIRDHAR\Desktop\SIDCUL\MODELLING\AQM\1(C) AE

PM10 - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	4.07865	ug/m^3	371805.99	3210228.13	221.00	0.00	221.00	22-12-2020, 24
PERIOD		0.62861	ug/m^3	372805.99	3209228.13	221.00	0.00	221.00	

The isopleths of the different concentration of the $PM_{10}$for 24 hr period and the whole period (3 months) along with location of sampling locations as receptors on Google earth is shown below in **Fig. 4.2.**

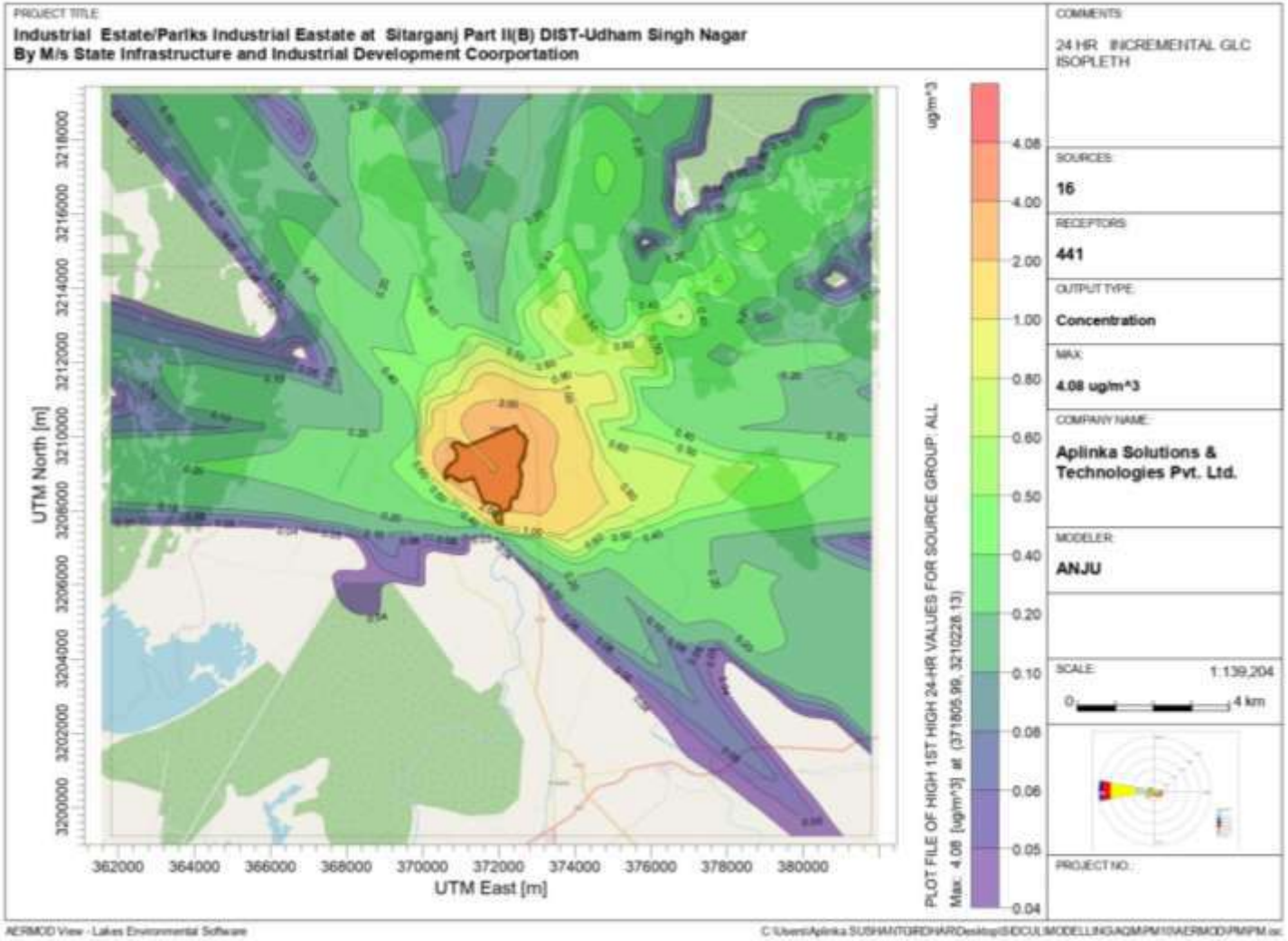


Figure 4.1: Spatial Distribution 24 hrs maximum incremental GLC of the PM_{10}

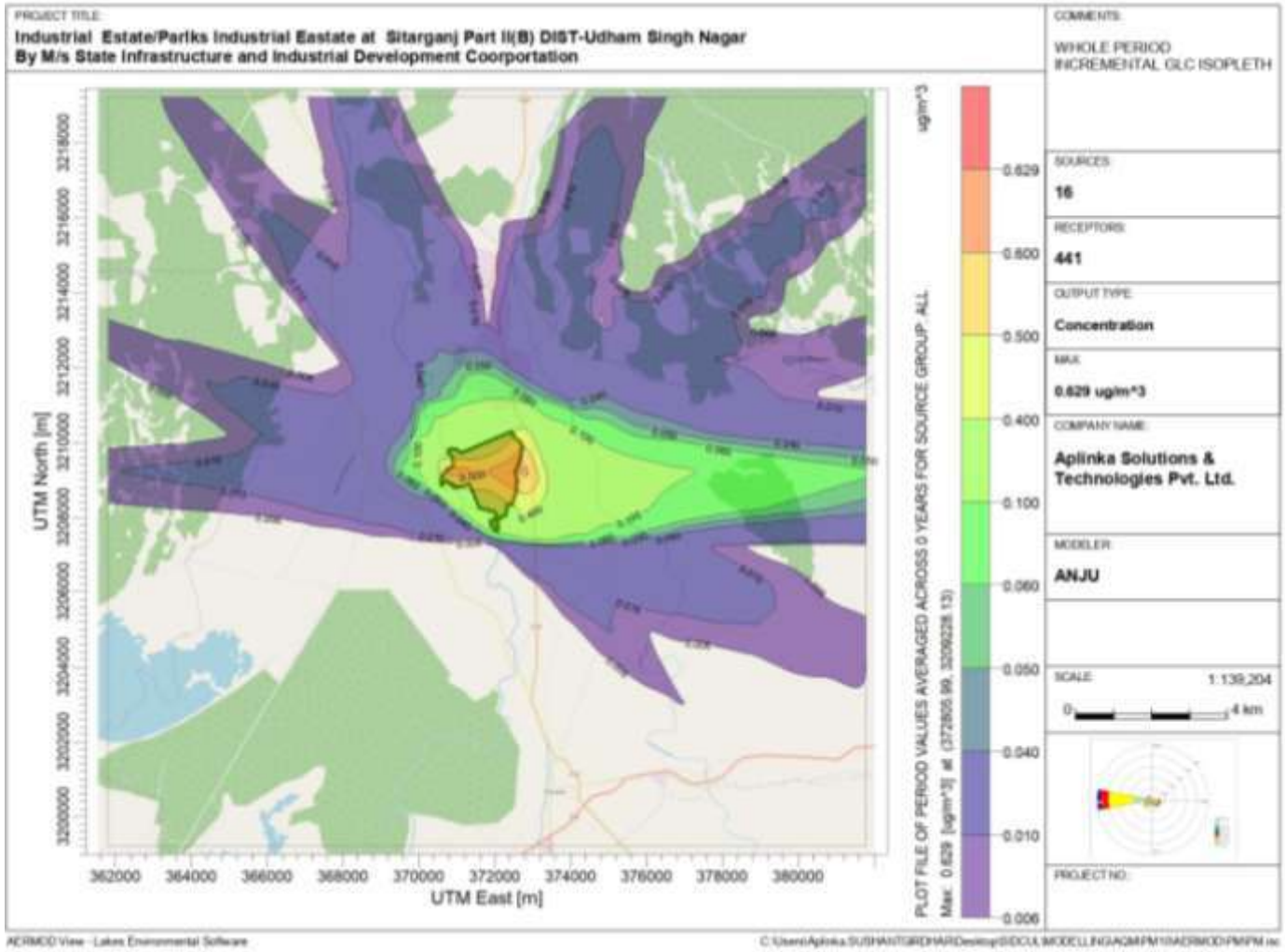


Figure 4.2: Spatial Distribution of 3 months (December 20220 – February 2021) maximum incremental GLC of the PM

The isopleths of the incremental GLC is exported to project site on the google earth pro which is shown below in Figure **4.3:**

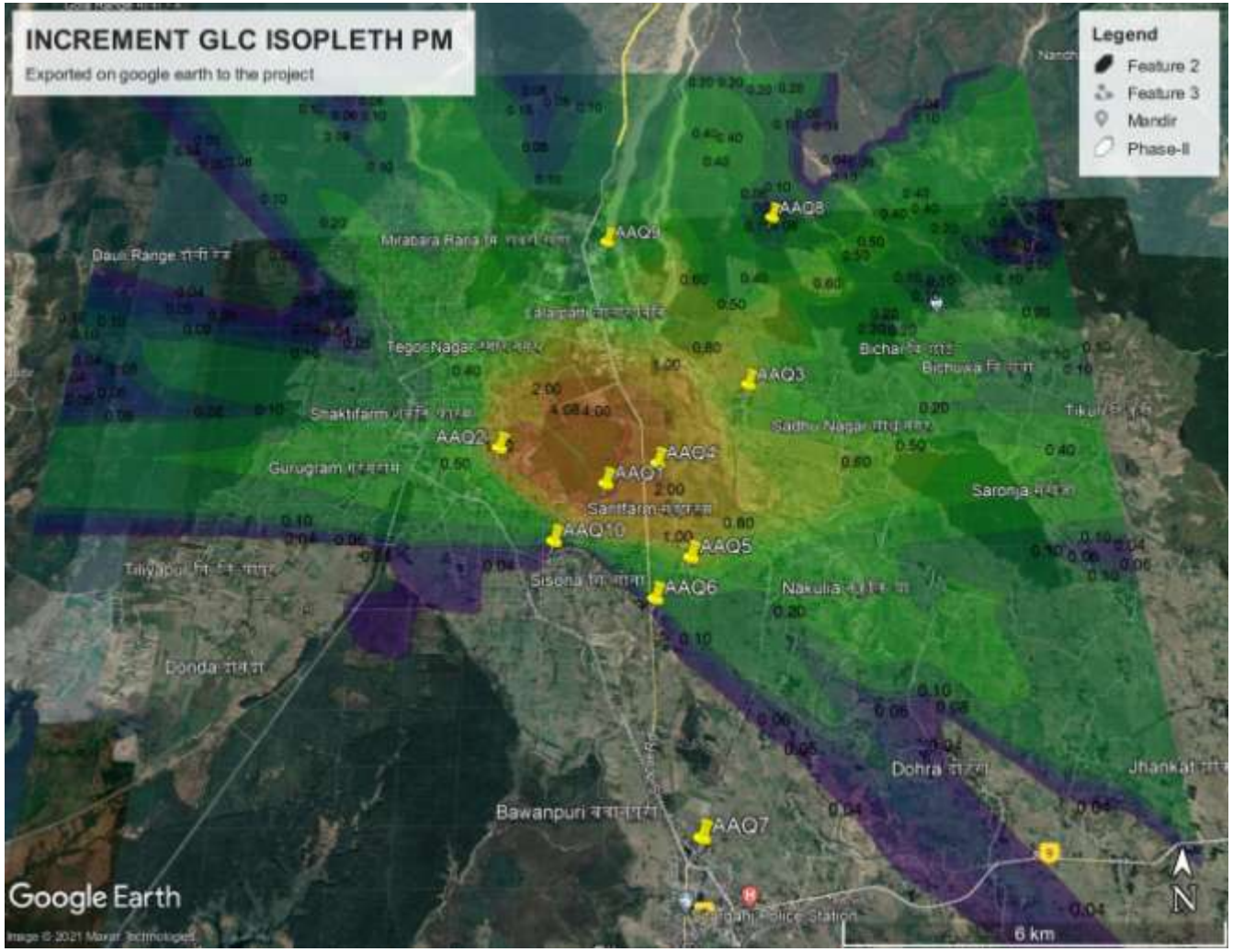


Figure 4.3: Spatial Distribution of the GLC of PM_{10} exported on google earth pro for 24 hours maximum

The maximum incremental GLC for PM_{10} is predicted to be 4.078 µg/m³ at approx 0.080 km distance from the project site in North direction. At approx. 1.0 km from the boundary of the project site in the East direction, the GLC isopleths is predicted to be 1.0 µg/m³ that gets further reduced to 0.80 µg/m3 at 1.8 km in the same direction from the project boundary. The impact is mainly predicted to be in the downwind direction (i.e. towards east direction) which got further reduced with the increase in distance from the project site. This is found to be in consonance with the wind rose plotted for the same period.

The incremental GLC at the ambient air monitoring station AAQ1, AAQ2, AAQ3, AAQ4, AAQ5, AAQ6, AAQ7, AAQ8, AAQ9 and AAQ10 is given at Table No 4.4.

2) Incremental Ground Level Concentrations for $PM_{2.5}$

Model was run with the meteorological data of December, 2020 to February 2021 and also been run through the worst condition for 24 hrs averages and 3 months average. During the operation phase; maximum GLC for the particulate matter for 24 hr period is predicted to be approx. 2.127 µg/m³ at approx. 0.019 km in North direction while for whole period (3 months) is predicted to be approx. 0.327 µg/m³. The result summary is as follows in **Table 4.3.**

Table 4.3: Result Summary of the Incremental GLC of $PM_{2.5}$

Results Summary

C:\Users\Aplinka.SUSHANTGIRDHAR\Desktop\SIDCUL\MODELLING\AQM\PM2.5\A

PM2.5 - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.12799	ug/m^3	371805.99	3210228.13	221.00	0.00	221.00	22-12-2020, 24
PERIOD		0.32797	ug/m^3	372805.99	3209228.13	221.00	0.00	221.00	

The isopleths of the different concentration of the $PM_{10}$for 24 hr period and the whole period (3months) along with location of sampling locations as receptors on google earth is shown below in **Figure. 4.6.**

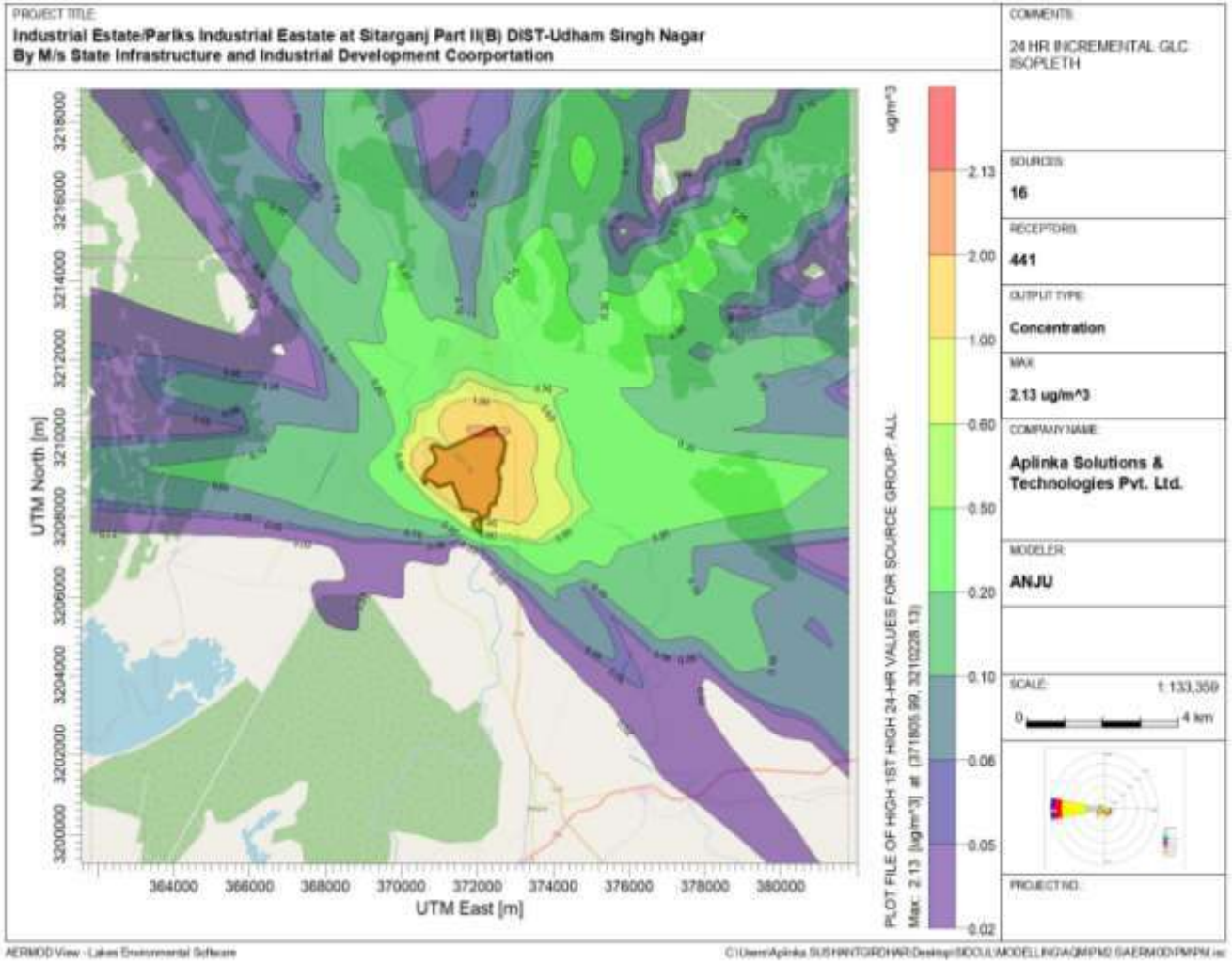


Figure 4.4: Spatial Distribution 24 hrs maximum incremental GLC of the $PM_{2.5}$

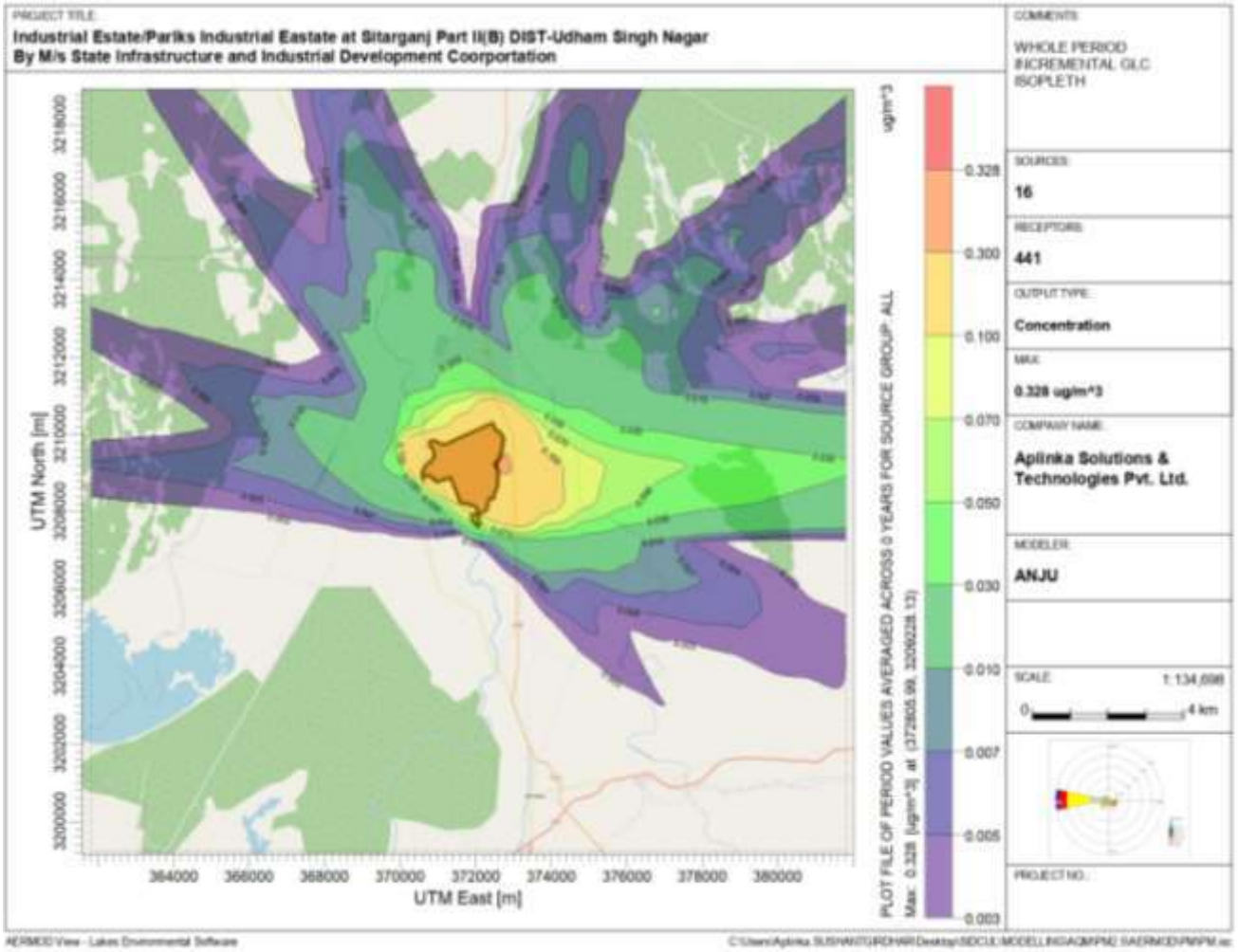


Figure 4.5: Spatial Distribution of 3 months (December 2020 – February 2021) maximum incremental GLC of the $PM_{2.5}$

The isolpleth of the incremental GLC is exported to project site on the google earth pro which is shown below in Figure 4.6**:**

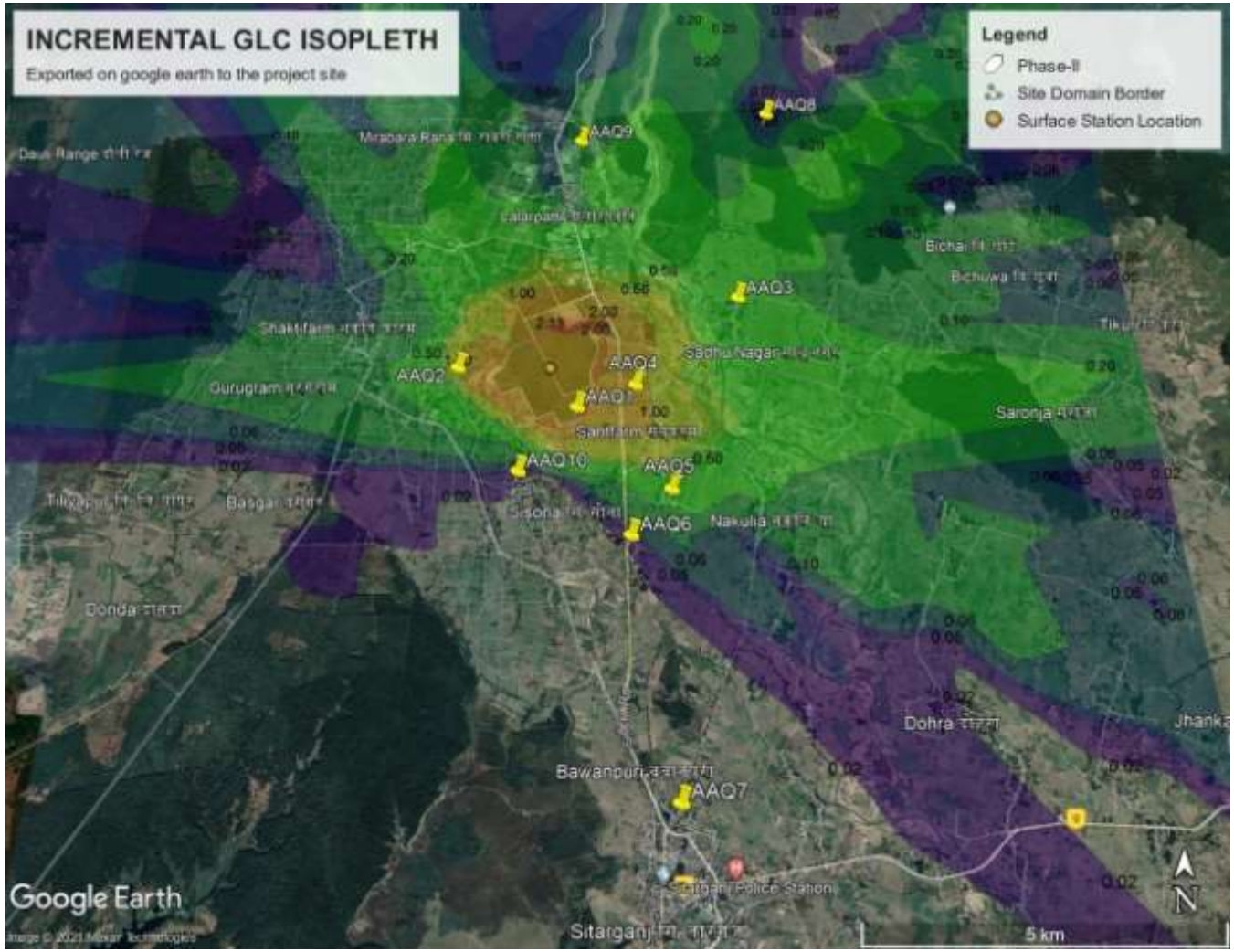


Figure 4.6: Spatial Distribution of the GLC of $PM_{2.5}$ exported on google earth pro for 24 hours maximum

3) Incremental Ground Level Concentrations for SO_2

Model was run with the meteorological data of December, 2020 to February 2021 and also been run through the worst condition for 24 hrs averages and 3 months average. During the operation phase; maximum GLC for the particulate matter for 24 hr period is predicted to be approx. 4.07µg/m³at project site itself and with increase the distance approx. 1.6 km it will be reduced even less than 2µg/m³ while for whole period (3 months) is predicted to be approx.0.628µg/m³. The result summary is as follows in **Table 4.4.**

Table 4.4: Result Summary of the Incremental GLC of SO_2

Results Summary

C:\Users\Aplinka.SUSHANTGIRDHAR\Desktop\SIDCUL\MODELLING\AOM\1(C) AE

SO2 - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	4.07865	ug/m^3	371805.99	3210228.13	221.00	0.00	221.00	22-12-2020, 24
PERIOD		0.62861	ug/m^3	372805.99	3209228.13	221.00	0.00	221.00	

The isopleths of the different concentration of the SO_2 for 24 hr period and the whole period (3 months) along with location of sampling locations as receptors on google earth is shown below in **Figure. 4.7.**

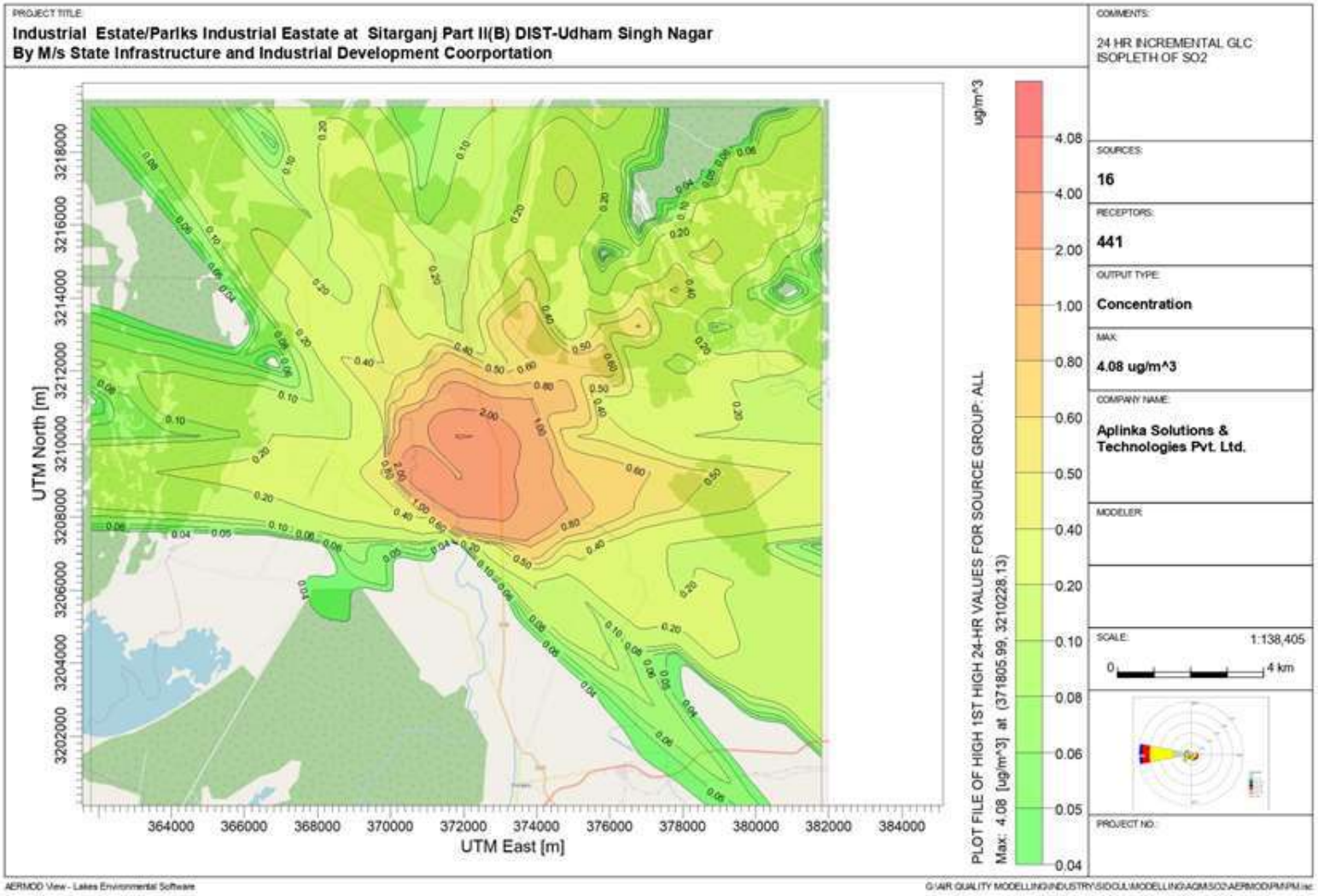


Figure 4.7: Spatial Distribution 24 hrs maximum incremental GLC of the SO_2

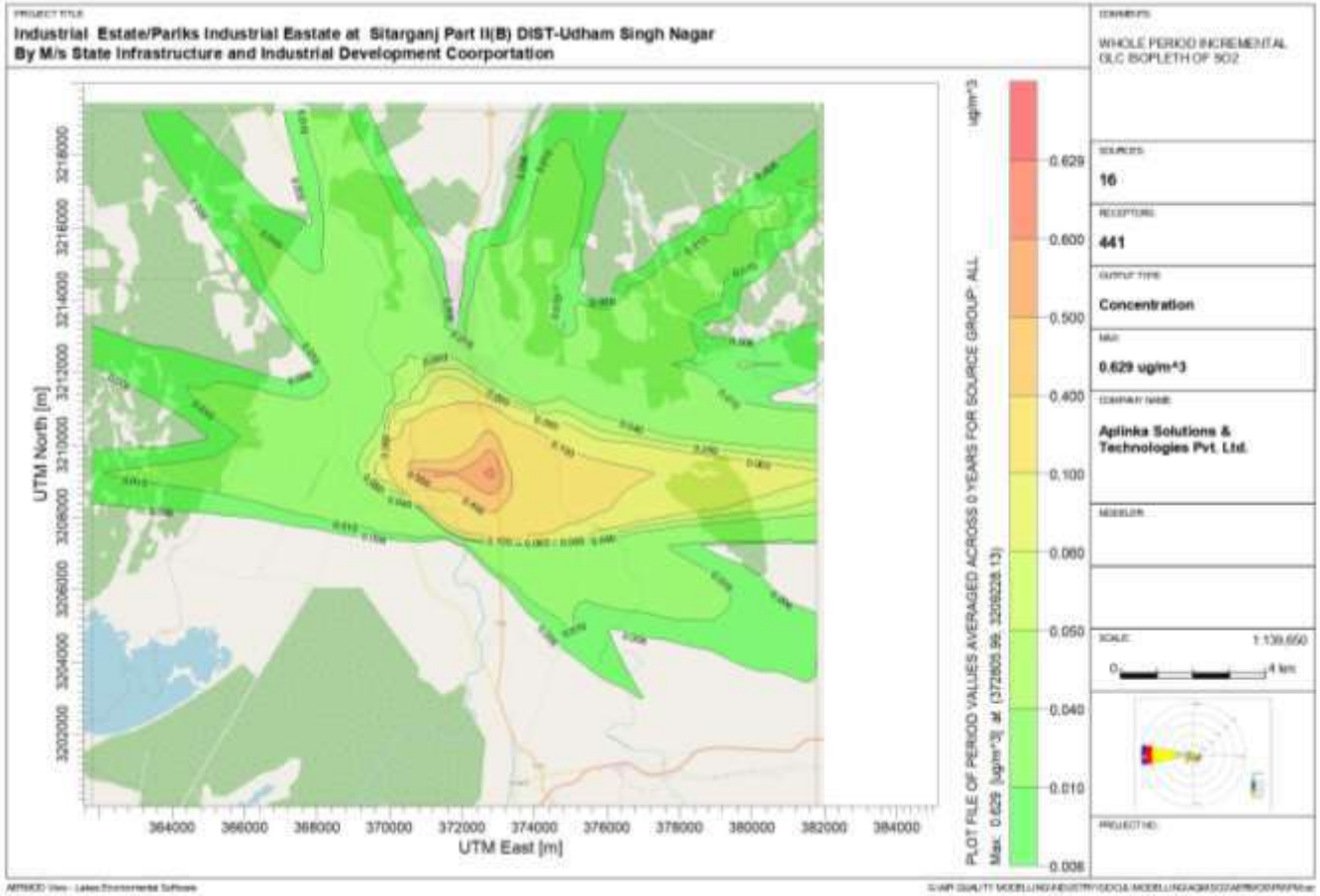


Figure 4.8: Spatial Distribution of 3 months (December 2020 – February 2021) maximum incremental GLC of the SO_2

The isolpleth of the incremental GLC is exported to project site on the google earth pro which is shown below in Figure 4.9:

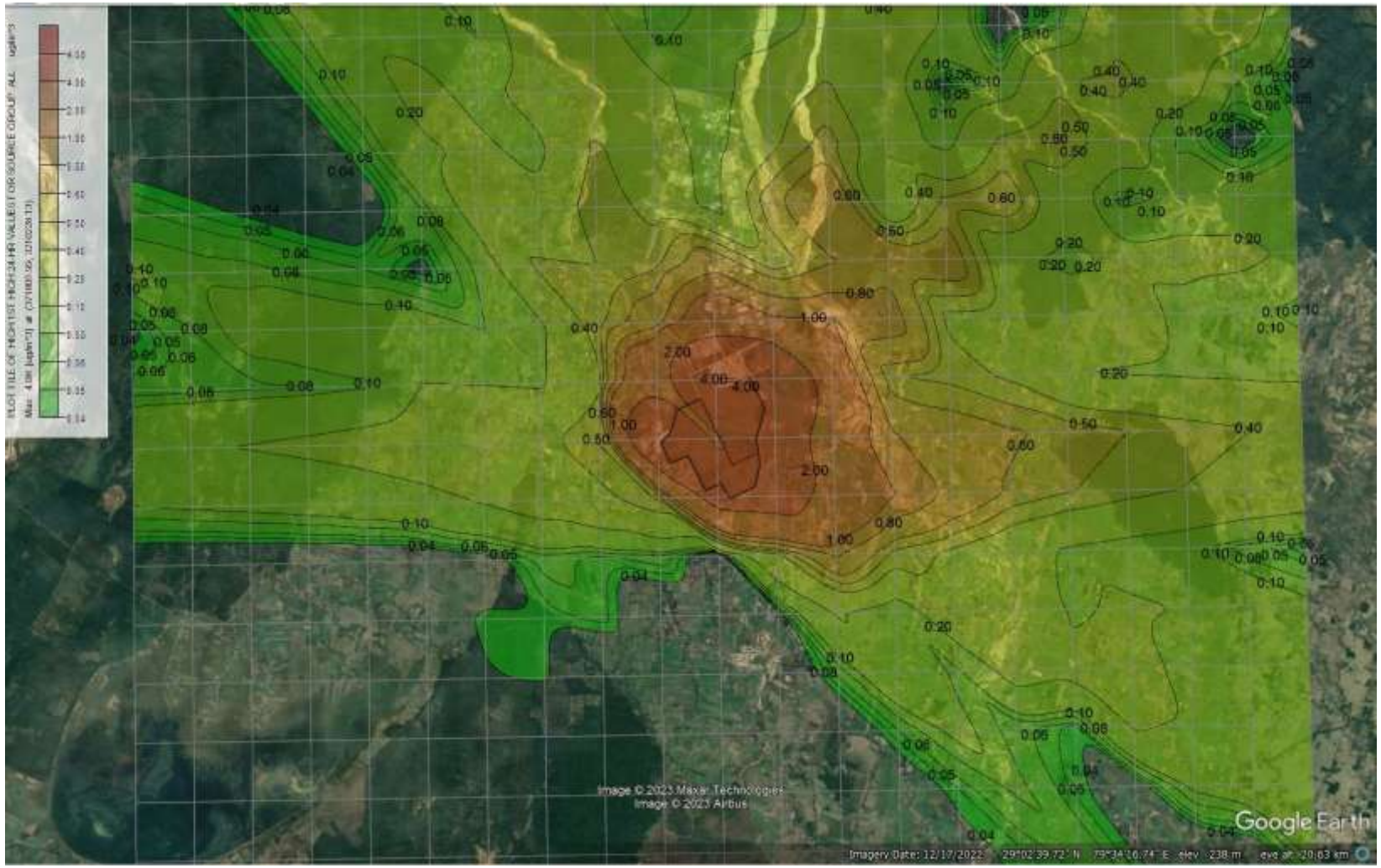


Figure 4.9: Spatial Distribution of the GLC of SO_2 exported on google earth pro for 24 hours maximum

4) Incremental Ground Level Concentrations for NOx

Model was run with the meteorological data of December, 2020 to February 2021 and also been run through the worst condition for 24 hrs averages and 3 months average. During the operation phase; maximum GLC for the particulate matter for 24 hr period is predicted to be approx. 3.05µg/m^3 at project site itself and with increase the distance approx. 21.9 km it will be reduced even less than 1µg/m^{3}while for whole period (3 months) is predicted to be approx.0.471µg/m^3 at project site. The result summary is as follows in **Table 4.5.**

Table 4.5: Result Summary of the Incremental GLC of NOx

Results Summary

C:\Users\Aplinka.SUSHANTGIRDHAR\Desktop\SIDCUL\MODELLING\AQM\1(C) AE

NOX - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.05906	ug/m^3	371805.99	3210228.13	0.00	0.00	0.00	22-12-2020, 24
PERIOD		0.47160	ug/m^3	372805.99	3209228.13	0.00	0.00	0.00	

The isopleths of the different concentration of the NOx for 24 hr period and the whole period (3 months) along with location of sampling locations as receptors on google earth is shown below in **Figure. 4.10.**

The impact is mainly predicted to be in the downwind direction (i.e. towards east direction) which got further reduced with the increase in distance from the project site. This is found to be in consonance with the wind rose plotted for the same period. 24 hr incremental GLC at the ambient air monitoring station AAQ1, AAQ2, AAQ3, AAQ4, AAQ5, AAQ6, AAQ7, AAQ8, AAQ9 and AAQ10 are given in Table No 4.6.

4.2.2.5 TOTAL POLLUTANT CONCENTRATION AT MONITORING STATION

The incremental load by the ground level concentration found to be maximum of all pollutants at the project site. The monitoring of the ambient air was done at the project site along with nine other locations. The total pollution concentration at all the location after considering the incremental ground level is shown in **Table 4.6** below.

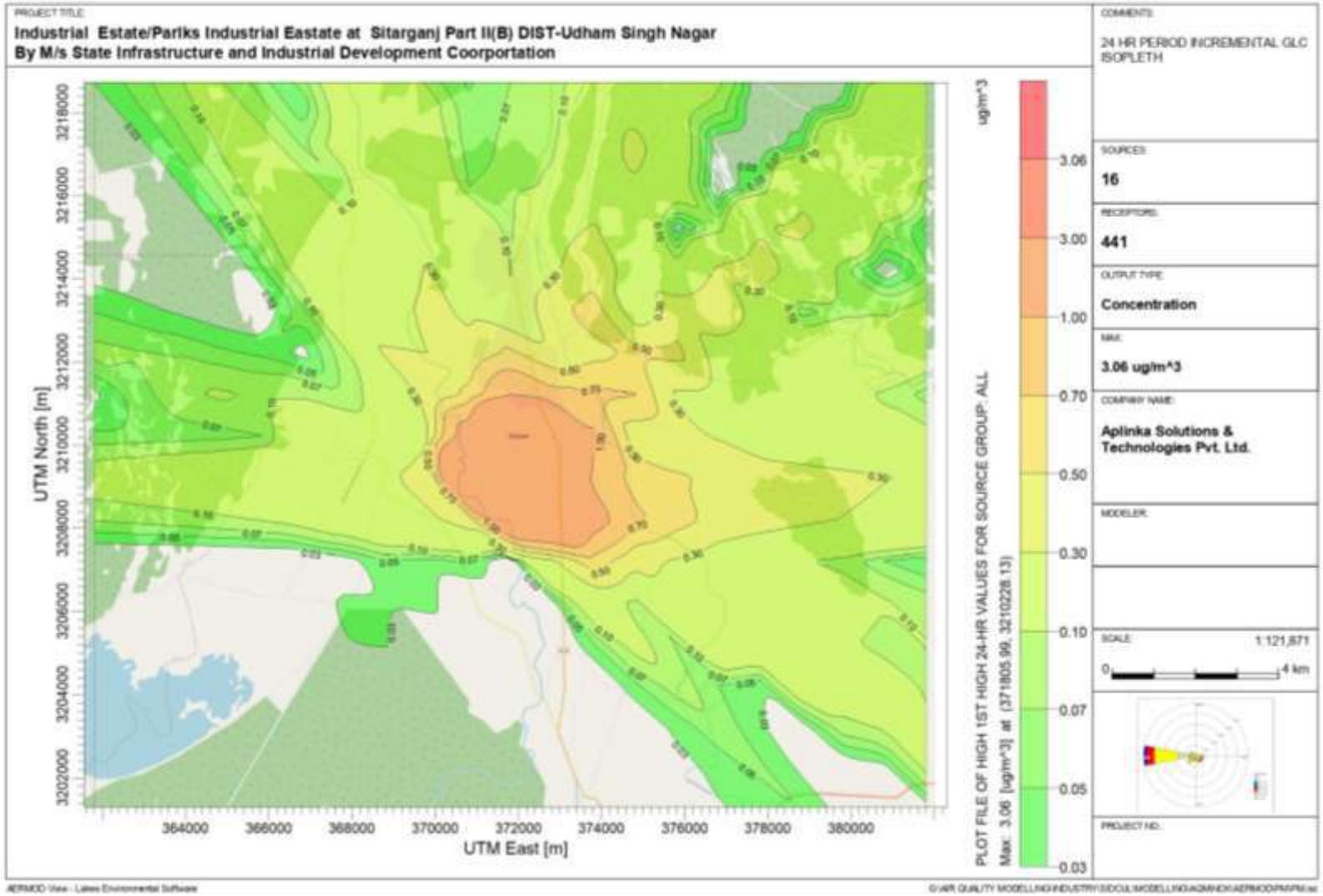


Figure 4.10: Spatial Distribution 24 hrs maximum incremental GLC of the NOx

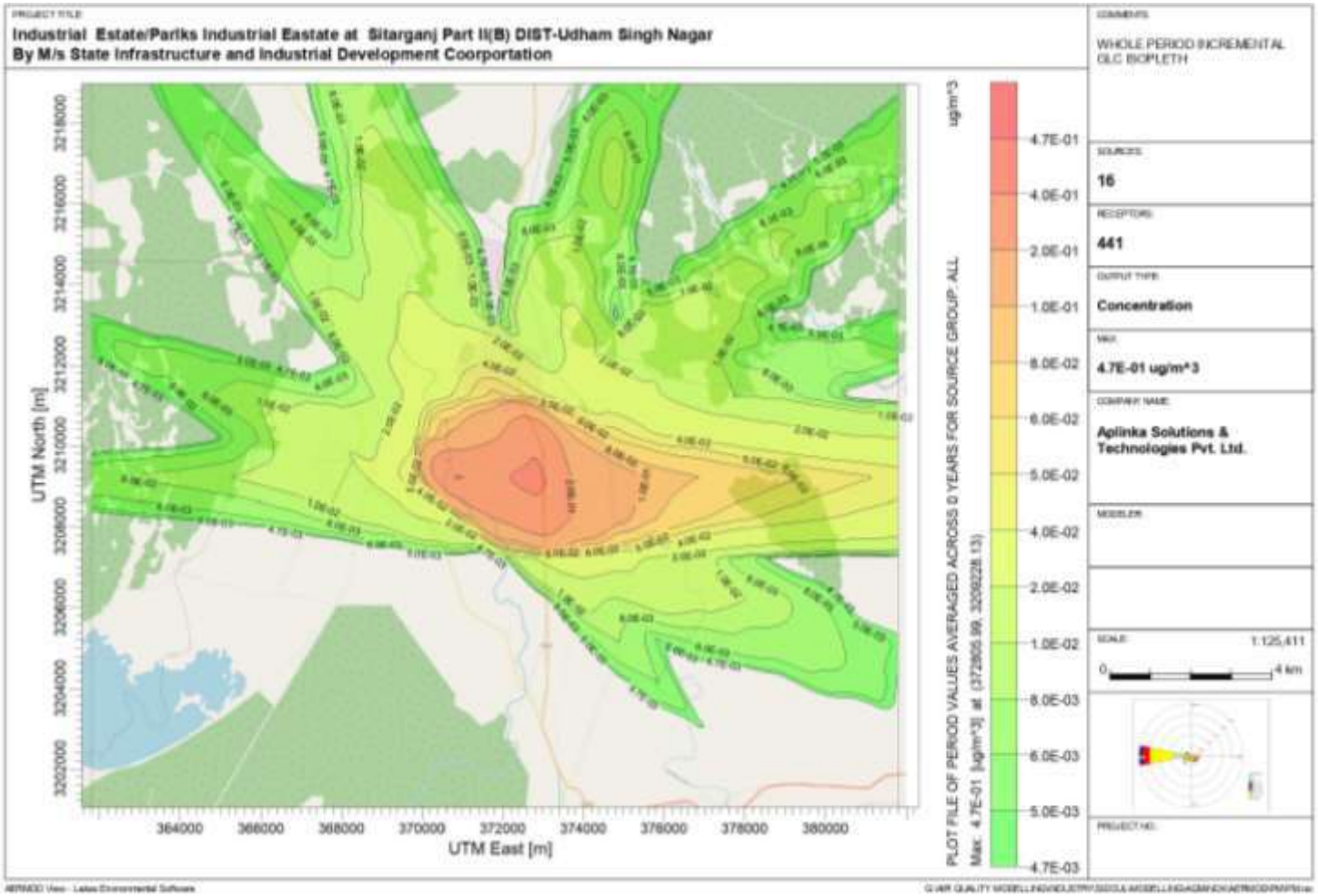


Figure 4.11: Spatial Distribution of 3 months (December 2020 – February 2021) maximum incremental GLC of the NOx

The isolpleth of the incremental GLC is exported to project site on the google earth pro which is shown below in Figure 4.12**:**

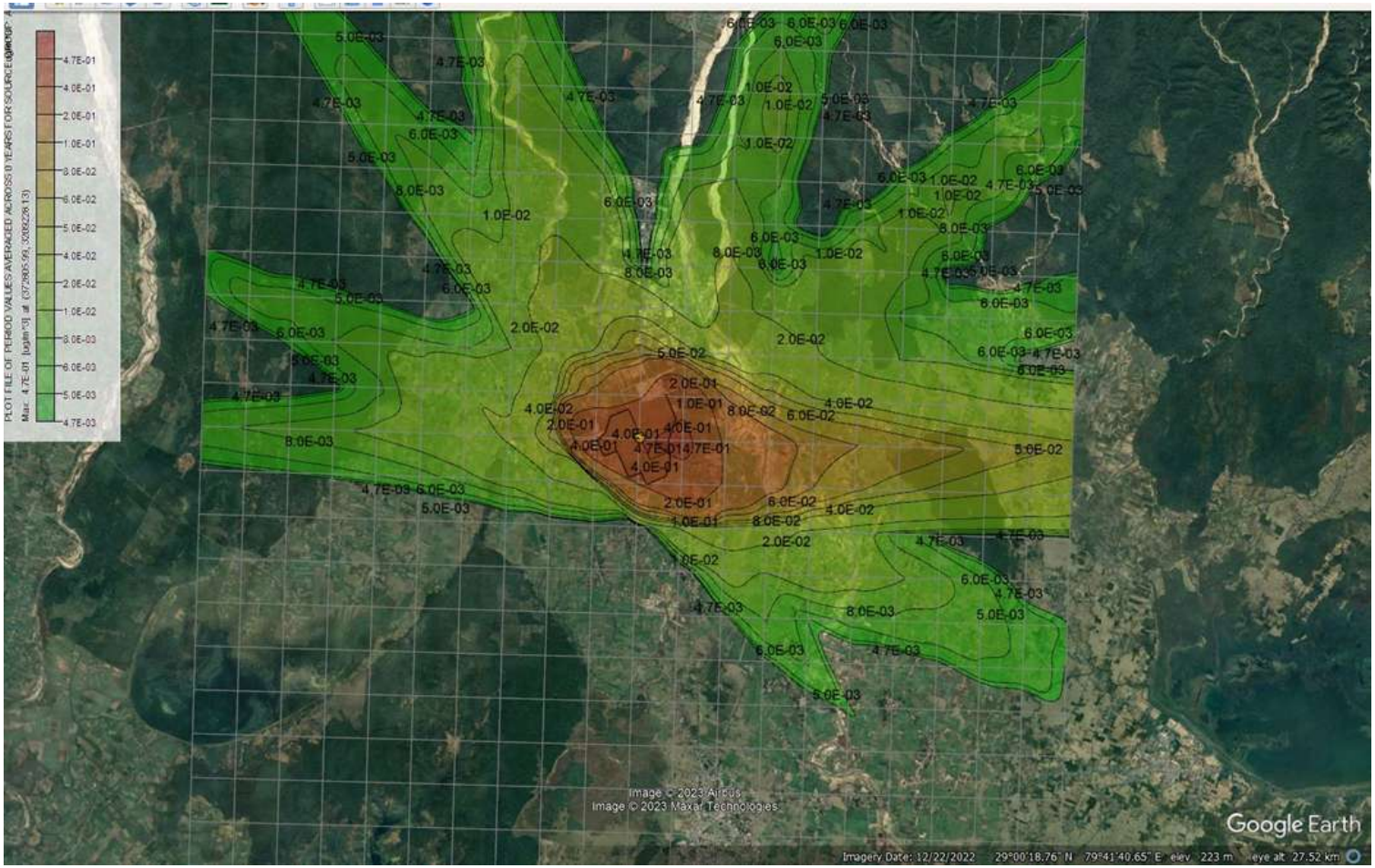


Figure 4.12: Spatial Distribution of the GLC of NOx exported on google earth pro for 24 hours maximum

Table 4.6: Total Pollution load at the Monitoring Locations

LOCATION CODE	Location	98 percentile concentration				24 hr Incremental GLC (µg/m³)				Total Concentration (µg/m³)			
		PM_{10}	$PM_{2.5}$	SO2	NOx	PM_{10}	$PM_{2.5}$	SO_2	NOx	PM_{10}	$PM_{2.5}$	SO_2	NOx
AAQ1	Project Site	59.74	36.64	11.88	15.45	4.0	2.0	4.0	3.0	63.74	38.64	15.88	18.45
AAQ2	Nirmal Nagar	67.54	39.42	12.84	15.45	1.0	0.80	0.20	0.10	68.54	40.22	13.04	15.55
AAQ3	Sadhu Nagar	63.35	37.95	11.81	14.40	0.80	0.20	0.80	0.50	64.15	38.15	12.61	14.9
AAQ4	Siidh Garbyang	71.40	39.29	12.16	15.71	2.0	1.0	1.0	0.70	73.4	40.29	13.16	16.41
AAQ5	Near Majra Chowk	85.81	47.10	16.50	24.81	0.20	0.20	0.2	0.05	86.01	47.3	16.7	24.86
AAQ6	Baruabag closed to Sisona	83.65	44.61	13.10	14.81	0.05	0.12	0.1	0.03	83.7	44.73	13.2	14.84
AAQ7	Sitarganj	87.60	49.93	17.42	27.03	0.0	0.0	0.0	0.0	87.6	49.93	17.42	27.03
AAQ8	Karha Pani Nursery	32.06	17.49	5.63	7.45	0.10	0.06	0.20	0.07	32.16	17.55	5.83	7.52
AAQ9	SIIDCUL Office	79.80	39.80	12.73	16.77	0.40	0.10	0.10	0.10	80.2	39.9	12.83	16.87
AAQ10	Prahlad Palsa	78.53	40.47	12.95	16.36	0.04	0.12	0.10	0.03	78.57	40.59	13.05	16.39

Figure 4.13: Illustrates the graphical representation of the ambient and total pollutant concentration of PM_{10}& $PM_{2.5}$at all the monitoring stations:

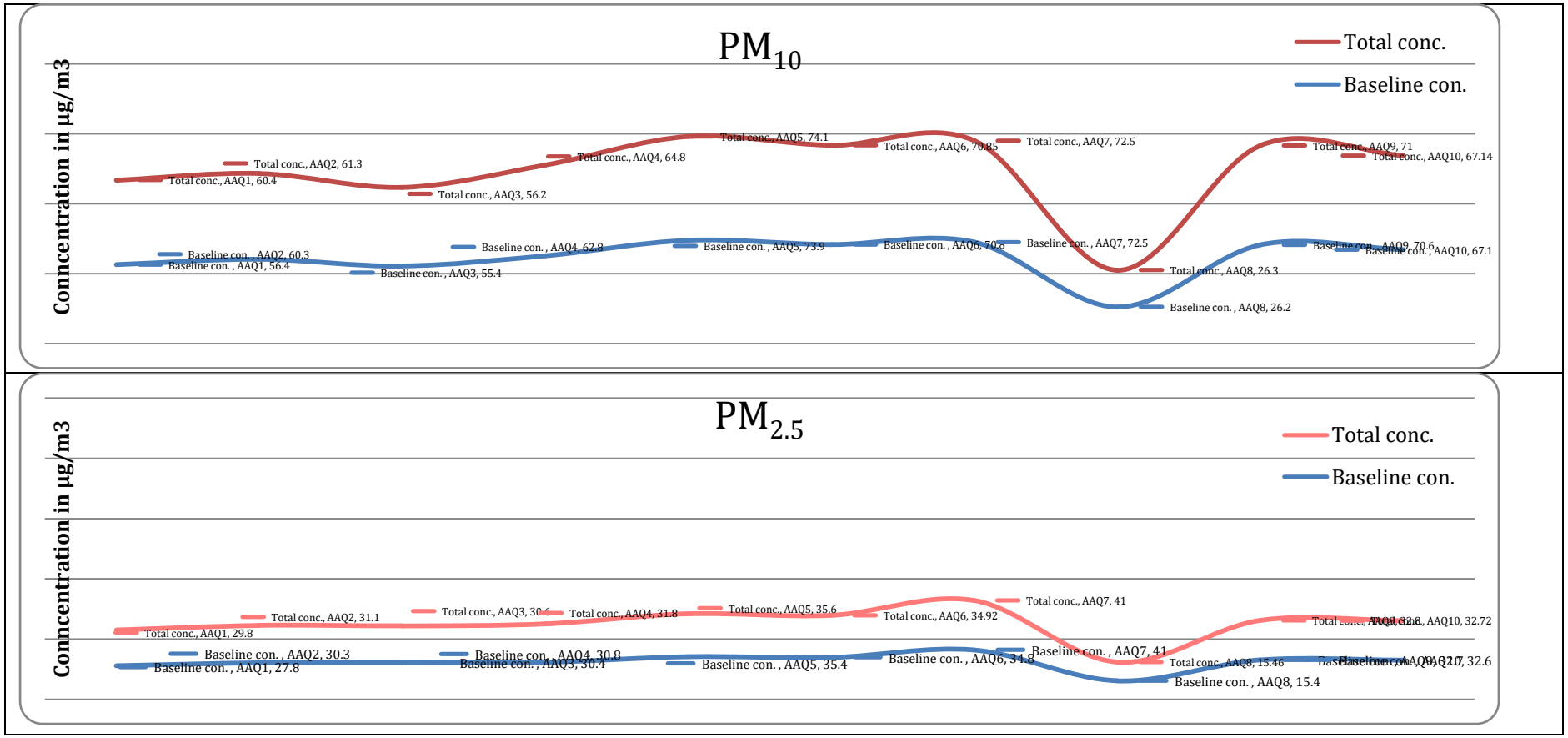


Figure 4.13: Graph showing pollutants at monitoring stations

4.2.3 Inference

The main impacted area due to air pollution is under 0.8 – 1.8 km towards the Eastern side. Parabolic curves have been observed up to a distance of less than 2.0 Km which are reducing gradually leading to the reduction in impacts. Major source of pollution is vehicular movement. It is proposed to reduce the pollution by providing the planned internal traffic circulation plan along with mitigation measures. Comparing the baseline data with incremental data; it has been observed that the increased Air Quality Index due to the incremental ground level concentration does not have impact on the prescribed color zone of the respective pollutants and the overall AQI remains in "Satisfactory" category.

Therefore, there is no significant impact on existing air quality owing to the project.

4.2.4 Proposed Air Pollution Control Measure

DURING CONSTRUCTION PHASE:

1. Suppression of dust by sprinkling of water twice or thrice a day depending upon weather conditions.
2. Movement of trucks shall be restricted and speed shall be maintained below 20 Km/hr.
3. PUC certified vehicles only shall be allowed to enter the project site.
4. Wheel washing bay shall be provided during construction phase. Extended area RCC shall be provided to prevent mud sticking to tyres.
5. Barricading of boundary wall shall be done 1/3rd of building height. As the building height increases, the height of wall shall also be increased up to mass of 10m.
6. All the DG sets on site shall be centralized and shall be closed acoustic type.
7. Stack height of DG sets shall be maintained above the roof top of highest building.
8. Planting of trees shall be done in parallel with construction.
9. All the loose construction materials shall be covered with tarpaulin sheets to avoid fugitive emissions.
10. No construction equipment shall be left idle when not in use.
11. All the welding work shall be done in open areas to provide proper dispersion and to avoid accumulation of Gases.
12. Loose materials in trucks/dumpers shall be covered while entering and going out from the site.
13. All the buildings shall be covered with suitable envelope to prevent dust emission due to cutting of bricks and tiles during plumbing and other works.
14. Over loading shall be avoided.
15. Covered shafts shall be prepared for waste material thrown from higher/upper floors to ground floor (construction and demolition material).
16. Options shall be searched for wet cutting and drilling for various construction operations.
17. Regular equipment maintenance shall be done.
18. Barricading shall be done towards construction area to prevent pollution in operation area.

DURING OPERATION PHASE:

1. Suppression of dust by sprinkling of water twice or thrice a day depending upon weather conditions.

2. All the parking made internal to avoid road congestion and shall reduce the impact of air pollution.
3. Green belt developed along the boundary wall to reduce the impact of air pollution from air coming from outside boundary.
4. Plant species which act as air purifiers shall be planted.
5. Internal roads will be maintained so that no fugitive dust emission is there.
6. Landscaping will be done to minimize dust emission. All the pavers will be surrounded with grass.
7. Sweeping of roads and paved areas will be carried out after sprinkling some water on roads.

4.3 Impacts on Ambient Noise Environment:

4.3.1 Impacts during Construction: Construction activities normally result in temporary and short term increases in noise levels. During the construction phase of project, noise will be generated from various sources. Some major sources of noise generation at project site are listed under:

- Movement of vehicles carrying materials and loading & unloading activities.
- Loading/ Unloading Fabrication, Operation of Power Shovels and other construction activities
- Excavation machines, hammering, concrete mixer; and other construction machines,
- Operation of D.G. Set,

Most of the construction activities will be carried out only during the daytime.

Table 4.7:- Noise Level Emission from Construction Equipments

Equipment Description	Acoustic Usage Factor (%)	Actual measured L max @ 50 feet (dBA slow) (Samples averaged)	No. of actual data samples (count)
All other equipment >5 HP	50	N/A	0
Auger Drill Rig	20	84	36
Backhoe	40	78	372
Bar Bender	20	N/A	0
Boring Jack Power Hit	50	83	1
Chain Saw	20	84	46
Clam Shovel (dropping)	20	87	4
Compactor (ground)	20	83	57
Compressor (Air)	40	78	18
Concrete Batch Plant	15	N/A	0
Concrete Mixer Truck	40	79	40
Concrete Pump Truck	20	81	30
Concrete Saw	20	90	55
Crane	16	81	405
Dozer	40	82	55
Drill Rig Truck	20	79	22
Soil Mix Drill Rig	50	N/A	0

Equipment Description	Acoustic Usage Factor (%)	Actual measured L max @ 50 feet (dBA slow) (Samples averaged)	No. of actual data samples (count)
Tractor	40	N/A	0
Vacuum Street Sweeper	40	85	149
Vacuum Excavator	10	82	19
Ventilation Fan	100	79	13
Vibrating Hopper	50	87	1
Vibratory Concrete Mixer	20	80	1
Vibratory Pile Driver	20	101	44
Warning Horn	5	83	12
Welder/torch	40	74	5

(Source: Construction Noise handbook –US Department of Transportation)

Noise during construction phase causes disturbance to residents around the project site as well as wildlife in the study area.

4.3.2 Mitigation Measures

To mitigate the impacts of noise from construction equipment during the construction phase on the site, the following measures are recommended for implementation.

- Noisy construction equipment will not be used at night time.
- Workers employed in high noise areas will be employed on shift basis. Hearing protection such as earplugs/muffs will be provided to those working very close to the noise generating machinery.
- D.G. Sets with proper acoustic enclosure for controlling noise will be installed. Green area in periphery of the DG Set will reduce the noise level significantly.

4.3.3 Impacts during Operation: The main source of noise pollution in the operation phase will be the movement of vehicles. The same shall be minimized through awareness to reduce honking and attenuation through green belt development.

Mitigation measures:

- Proposed landscaping will act as an effective means to control noise pollution.
- Honking will be discouraged.
- Properly designed internal road network will facilitate in free flow of traffic movement.

4.4 Water Environment

4.4.1 Construction Phase - Construction phase requires large quantities of water to be used in various processing such as material preparation in equipment's. Change in quality of water forms an important concern associated with the project particularly during the construction phase. Earthworks, crushing of stones, cutting and modification of the terrain, alteration of drainage systems and soil erosion are the major factors that affect the water quality during construction phase. The storage of used engine oil and lubricants as waste materials has a potential to create impacts if spillage occurs.

Wastewater will be generated from construction camp. Significant impact on water quality is envisaged if the sewage is discharged directly into the receiving waters without any prior treatment.

During rainy season, the run-off joining the water sources from nearby areas of the development sites will add more such debris and soil particles to enhance the level of suspended solids in the water bodies.

4.4.2 Mitigation Measures:

- Excavation shall be avoided during monsoon season
- Check dams shall be provided to prevent construction runoff from the site to the surrounding water bodies.
- Pit latrines and community toilets with temporary soak pits and septic tanks shall be constructed on the site during construction phase to prevent wastewater from entering the ground water or surrounding water bodies.
- To prevent surface and ground water contamination by oil/grease, leak proof containers shall be used for storage and transportation of oil/grease. These shall be stored in bundedareas that have drains with oil interceptors.
- Controlled withdrawal of groundwater during construction.

4.4.3 Storm Water Drainage

The topography of the proposed project site is like a saucer surrounded by hillocks on two sides and small catchments are located on the other sides. The terrain & topographical conditions, the rain water collected from the hills and catchments flow at much higher velocity and gushes through the untrained major drains, before reaching the downstream side of the project site. In the course of its journey to the downstream side, the rain water during heavy cyclonic rains results in bank erosion.

Storm water drains are existing along northern and eastern boundary of the project site. Internal storm water drains will be constructed and joined to these drains.

Identification of Impacting Activities -As discussed earlier, environmental impacts have been identified based on an assessment of environmental aspects associated with the project. The symbol **'N'** indicates a negative impact and **'P'** indicates a beneficial (positive) impact. Identified environmental impacts on Ground water quality due to the proposed project activities are as listed.

S.N	Project Activities	Impact (Type: O, N, A, E Duration: T, P)	Potential Environmental Impacts on Ground Water Environment	Remark
1.	**Pre-construction phase**			
1.1	Preparation of site / Change in topography	N & P	Alter drainage pattern and runoff characteristics	Contribution reduction
2.	**Construction /Establishment Phase**			
2.1	Excavation work	N & T	Alter drainage pattern and runoff characteristics	Contribution reduction
3.	**Operational & Maintenance Phase**			
3.1	Water Consumption	N & P	Groundwater Resource Depletion	Rainwater harvesting will be implemented at site. The stored water will be used for various purposes within site.
3.2	Storage and handling	N	Groundwater contamination	Good housekeeping to

	of Waste			be followed. Storage & handling shall be undertaken under supervision.
3.3	Discharge of wastewater	N	Groundwater and surface water (River Begul) contamination	Wastewater shall be treated in CETP. It shall be recycled for flushing, landscaping, washing and the excess shall be discharged in river Begul after 50% dilution.
3.4	Storm water management	N	Groundwater contamination due to mixing of process waste water with Storm water during heavy rains.	Run off generated during monsoon water will be used internally to the extent possible

Note: One Time: O, Normal: N, Abnormal: A, Emergency: E; Temporary: T, Long Term & Permanent: P

4.4.4 Mitigation Measures

Water conservation is the need of the hour and consumption of fresh water will be minimized by combination of water saving devices and other domestic water conservation measures. To ensure ongoing water conservation, an awareness program will be introduced for industry professionals. Specific measures proposed include:

- CETP installation for wastewater treatment
- Treated wastewater from STP will be used for flushing, cleaning and landscaping purposes. Surplus treated wastewater will be discharged into the Begul River after 50% dilution, as per local laws.
- Leak detection and repair techniques.
- Sweep with a broom and pan where possible, rather than hose down for external areas.
- Meter water usage: Implies measurement and verification methods.
- Monitoring of water uses is a precursor for management.
- Dual Plumbing lines will be used for reuse of water in Flushes of toilet.

Horticulture:

Plants with similar water requirements shall be grouped on common zones to match precipitation heads and emitters.

- Use of low-angle sprinklers for lawn areas.
- Select controllers with adjustable watering schedules and moisture sensors to account for seasonal variations and calibrate them during commissioning.
- Place 3 to 5 inches of mulch on planting beds to minimize evaporation.

4.4.5 Storm Water Management

Storm water may be contaminated from the following sources:

- Oil spills in the fuel storage area
- Waste spills in the waste storage area

- Oil spills and leaks in vehicle parking lots
- Silts from soil erosion in gardens
- Spillage of sludge from sludge drying area of CETP

Storm water management plan will incorporate best management practices which will include following:

- Regular inspection and cleaning of storm drains
- Clarifiers or oil/separators will be installed in all the parking areas. Both clarifiers and oil/water separators will be periodically pumped in order to keep discharges within limits
- Covered waste storage areas
- Avoid application of pesticides and herbicides before wet season
- Secondary containment and dykes in fuel/oil storage facilities
- Conducting routine inspection to ensure clean line
- abase made of bentonite, fly ash, fine sand and cement will be made to reduce the possibility/probability of any likely leakage of pollutant into underneath aquifer.

4.4.6 Impact scoring – Ground water quality

Based on the above discussion, the post mitigation impact score is presented in below table.

Table 4.8 - Impact Scoring – Ground Water Quality

Code	Impacting Activity	Impact Scoring			Remark
		Severity, S	Likelihood of Occurrence, L	Final Score, S x L	
C1	C2	C3	C4	C5	C6
1.	**Pre-construction phase**				
1.1	Preparation of site / Change in topography	-1	2	-2	Low Risk
2.	**Construction /Establishment Phase**				
2.1	Excavation work	-1	2	-2	Low Risk
3.	**Operational & Maintenance Phase**				
3.1	Storage and handling of Hazardous waste	-1	2	-2	Low Risk
3.2	Storm water management & existing drainage pattern	-1	2	-2	Low Risk Storm water generated from plant area will be stored and used internally Based on existing available data, peak rainfall will be considered for storage
3.3	Spillage of diesel, oil, lubes, etc.	-1	2	-2	Low Risk The storage is having impervious base and guard around the structure to restrict Flow

4.4.7 Impact scoring – Surface water quality

As per methodology described in above sections, likely impact scores on surface water quality due to the proposed project is as given in below table.

Code	Impacting Activity	Impact Scoring			Remark
		Severity, S	Likelihood of Occurrence, L	Final Score, S x L	
C1	C2	C3	C4	C5	C6
1.	Operational & Maintenance Phase				
3.1	Transportation of Rawmaterial, Fuel, etc.	-2	1	-2	Minor impact as proper spill control measures will be proposed.
3.2	Storage, handling & transportation of Raw material and finalproducts	-2	2	-4	Low impact as proper care shall be taken during handling to products to avoid spillage and leakage.
3.3	Manufacturing Process	-2	3	-6	Less impact as wastewater will be treated in CETP efforts will be made to use completely the treated water which reduces the fresh water demand. Excess treated water will be discharged after prior permission.
3.4	Equipment cleaning	-2	2	-4	Low impact, washing water will be further reuse in washing activities and then treated in CETP efforts will be made to use completely the treated water which reduces the fresh water demand. Excess treated water will be discharged after prior permission..
3.5	Treatment & Disposal of wastewater - Operation of ETP/STP	-2	2	-4	Minor impact as regular maintenance will be done to ensure meeting specified standards. There is a zero liquid discharge system will be adopted hence no wastewater will dispose outside the premises.
3.6	Water consumption due to domestic use,	-2	4	-8	Moderate impact. Fresh water demand will be reduced by reuse of treated water form CETP

	manufacturing process and landscape development				efforts will be made to use completely the treated water which reduces the fresh water demand. Excess treated water will be discharged after prior permission.
3.7	Operation of Utilities	-1	5	-5	Less impact as wastewater will be treated in CETP efforts will be made to use completely the treated water which reduces the fresh water demand. Excess treated water will be discharged after prior permission.

4.5 Impacts on Land Environment: The landuse of the proposed project site would be for the following phases:

- Acquiring of Land for IE
- Initial development of Industrial Estate.
- The gradual setting up of various types of industries in plots allotted by SIIDCUL
- Operation of industrial estate (Generation of produce)
- Maintenance of IE

4.5.1 Impacts on Land Use:

4.5.2 Construction Phase: The project proponent has acquired approximately291.56 Ha (720.47 acre) land in Khsara No: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28; 29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47; 48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68; 69; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88; 89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107; 122; 122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156; 157; 158; 159; 161; 162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153 at Village – Bara, PrahladPalsia, Kalyanpur; Tehsil: - Sitarganj; District:- Udhamsingh Nagar; State :- Uttarakhand; India. Site has been allotted to SIIDCUL for development of Integrated Industrial Estate and marked for industrial development by Chief Secretary, Government of Uttarakhand vide letter no. 2069/XX (4)-231/Kara-03/2006 dated 03.06.2006. The proposed development of IE Sitarganj would adhere to the Master Development Plan 2021 of SIIDCUL. It is issued by SIDA. The project for the development of Industrial Estate at Sitarganj is conceived specifically to provide a platform of services and facilities that would be beneficial for the creation of better infrastructure as well as create more employment opportunities for the local population.

Moreover, local landuse planning will control the type, density and location of development in the future. Development of green belt and other landscape on the proposed site would further enhance the visual and aesthetic quality of the area.

Erosion of soil may occur on account of removal of vegetation and different activities for construction. Loss of vegetation such as shrubs and trees will lead the area vulnerable to erosion.

4.5. 3 Construction Wastes: The generation of waste material is inevitable during the construction phase of the development. Wastes are generated at different stages of construction process. Wastes may include the clay, sand, gravel, cement etc. These will be re-used as filler within the same site. Other miscellaneous materials that could arise as waste include glass, plastic material, general refuse, scrap metal, cardboard, etc. and solid waste from the construction workers temporary housing. Efforts would be done to recycle the waste material to the extent possible. Non-recyclable solid wastes generated during construction will be disposed off to a designated landfill site in the project area. Hence, waste generated during the construction phase would not be of significant quantity and not have any significant potential impact.

Mitigation Measures:

- All construction activities will be essentially within the project site. No material dumping or parking of vehicles shall be done on adjoining fields
- Material for filling shall be brought from non-agricultural land
- The top soil excavated will be removed temporarily stored in an earmarked area for green area development.
- The top soil shall be covered with gunny bags and bunded with silt. They shall be stored in piles of no more than 2m height.
- Clearing of vegetation shall be done after monsoons
- No wastes shall be disposed in the agricultural fields around the project site
- No effluent shall be discharged in the agricultural fields around the project site

4.5.4 Operation Phase:

4.5.4.1 Impacts on Soil/Topography: The site clearing and preparation activities will involve removal of only scanty vegetation, mainly bushes, existing in the vicinity of proposed site. The project site is primarily dominated by tall grasses (Munj & Typha); unwanted bushes and some trees primarily along the periphery. As the topography in and around the site is a low lying area mostly plain with no significant slope great deal of filling (by Sand, Gravel and Soil) is required to get the land elevation up to plinth level. The project requires extensive work on the filling. Removal of soil will not be done and hence will permanently affect soil structure and stability, although a localized impact. The project proponent will adopt good construction practices that will ensure the environmental impacts of waste effluents generated on-site during construction would be minimized.

4.5.4.2 Soil Health: Terai region is bestowed with great agro-biodiversity in traditional heirloom rice cultivars. The important crop combinations observed within the study area are sugarcane-paddy; paddy-wheat and maize – wheat. Now a day's potato is also considered as a major crop in the study area. The physico-chemical properties of soil has undergone sea change in last three decades of changes in the cropping system. As per the soil health indices soils of the district are loamy and sandy loam, water logged condition, prone to flooding, soil fertility medium, medium to deep soil, and well irrigated. The Soil of the study area is low to medium in phosphorus, medium to high in potassium and high in organic matter. Deficient in zinc, rich in calcium carbonate. Use of granular insecticides in rice and sugarcane may disturb the soil biology. The soil health status has gone down. The project site is surrounded by agricultural land. Disposal of wastes or discharge of untreated effluent can adversely impact the soil quality and subsequently affect the crop yield as well as quality. However, a waste

management plan as well as effluent treatment is proposed. No significant impact is thus anticipated on soil quality.

Mitigation Measures:

- No wastes shall be disposed in the agricultural fields around the project site
- No effluent shall be discharged in the agricultural fields around the project site

4.6. Solid Wastes Generation and Disposal

WASTE MANAGEMENT

Construction Phase:

1. Other than domestic wastes, there will be other wastes like construction waste; Municipal solid waste; Hazardous waste, Plastic waste and E- waste generated at the proposed IE project. All waste management shall be carried out as per the provisions of:
   - Solid and Other Waste Rules, 2016
   - Construction and Demolition Waste Management Rules,2016
   - Solid Waste Management Rules, 2016
   - Plastic Waste Management Rules, 2016
   - E-waste Management Rules, 2016
   - Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016.

4.6.1 Anticipated Impact and Mitigation during Construction phase

Construction waste

- Construction and demolition waste include debris, concrete (often recycled and reused at the site), steel and other metals, pallets, packaging and paper products, fluorescent tubes, wood beams, joists, studs, baseboards, cabinets and cupboards, railings, brick, doors and casings, interior windows, bathroom fixtures, light fixtures, ceiling grid and tile, furnishings, replant trees, shrubs. All wastes generated during the construction phase shall be collected and segregated for disposal as per the standard practice.
- Construction debris is bulky and heavy and re-utilization and recycling is an important strategy for management of such wastes. As concrete and masonary constitute the majority of waste generated, recycling of this waste by conversion to aggregate can offer benefits of reduced landfill space and reduced extraction of raw material for new construction activity.
- During the development and construction phase, some amount of debris, cuttings of construction materials may be generated at construction site. However, the quantity of these waste materials would be very small and limited up to the construction site only. There will be no contamination due to this waste as it will be collected time to time during construction phase and disposed accordingly.
- Mixed debris with high gypsum, plaster, shall not be used as fill, as they may contaminate the soil, and will be sent to designated solid waste composting site.

Metal scrap from structural steel, piping, concrete reinforcement and sheet metal work shall be removed from the site by construction contractors. A significant portion of wood scrap will be reused on site. Recyclable wastes such as plastics, glass fiber insulation, roofing etc. shall be sold to authorized recyclers.

- Wastes generated from temporary make shift labor hutments will mainly comprise household domestic waste, which will also be disposed as per Solid Waste Management Rules, 2016. Mobile toilets will be provided.

4.6.2 Hazardous waste

Construction sites are sources of many toxic substances such as paints, solvents wood preservatives, pesticides, adhesives and sealants. Hazardous waste generated during construction phase shall be stored in sealed containers and disposed off as per the Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016. Some management practices to be developed are:

- Herbicides and pesticide will not be over applied (small-scale applications) and not applied prior to rain.
- Paintbrushes and equipment for water and oil based paints shall be cleaned within a contained area and will not be allowed to contaminate site soils, water courses or drainage systems.

Provision of adequate hazardous waste storage facilities: Hazardous waste collection containers will be located as per safety norms and designated hazardous waste storage areas will be away from storm drains or watercourses.

- Segregation of potentially hazardous waste from non-hazardous construction site debris.
- Well labelled all hazardous waste containers with the waste being stored and the date of generation.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Even with careful management, some of these substances are released into air, soil and water and many are hazardous to workers. With these reasons, the best choice is to avoid their use as much as possible by using low-toxicity substitutes and low VOC (Volatile Organic Compound) materials.

With regards to the disposal/treatment of waste, the management will take the services of the authorized agency for waste management and disposal of the same on the project site during its operational phase.

4.6.3 E-Waste management

Electrical and electronic wastes generated will be collected separately for transportation to the authorized recyclers approved by the state/Central pollution control boards as per E-waste (Management) Rules, 2016.

Operation Phase:

Assessment of industrial waste greatly varies depending on the nature of the industry, their location and mode of disposal of waste. In the absence of the knowledge about the number & type of industries that would be coming up in the proposed industrial area, it is not possible to estimate this quantity at this stage. For this reason, the industrial waste is proposed to be considered separately from the MSW and has to be dealt in accordance with the Hazardous Waste Management Rules, 2016, as applicable. Further, industries generating solid wastes will manage such wastes by themselves and are required to seek authorizations from State Pollution Control Boards (SPCBs) under relevant rules.

However, through joint efforts of SPCBs, local bodies and the industries, a mechanism could be evolved for better management. Following steps would be taken-up for better management of the waste to be generated in industrial estate.

4.6.3.1 Inventory Management and Improved Operations

- Inventorisation and tracing of all raw materials
- Procurement of fewer toxic and more non-toxic production materials
- Implementation of employees' training and management feedback
- Improving material receiving, storage, and handling practices.

4.6.3.2 Production Process Optimization

- Substitution of non-hazardous for hazardous raw materials
- Segregation of wastes by type for recovery
- Elimination of sources of leaks and spills
- Separation of hazardous from non-hazardous wastes
- Optimization of the process of raw material use
- Emphasis on reuse & recycling of wastes

4.6.4 Management Strategies for Industrial Solid Wastes/ Hazardous Wastes

4.6.4.1 Industrial Unit level: Industries have an important role to play in the management of hazardous wastes. As per the Hazardous Waste Management Rules 2016, the sole responsibility for the management of hazardous wastes lies with the industries. The industries generating hazardous wastes have to obtain authorization from State Pollution Control Board and dispose their wastes through an authorized agency. In order to have a cost-effective waste management system, the following strategy has to be adopted:

4.6.4.2 Waste Avoidance: The treatment and disposal of wastes costs money to the industries. Therefore, the first priority to the industries should be to avoid the generation of wastes right at the source to the large extent. The waste generation will be avoided by adopting waste minimization, resource recovery, recycle and reuse (on-site and off-site) options.

4.6.4.3 Storage: The unavoidable waste generated has to be stored properly for treatment and/ or disposal. The waste has to be stored in compatible containers with proper labeling and controlled access.

4.6.4.4 Transportation: Transportation is the weakest link in the entire hazardous waste management system. While transporting the waste, proper care must be taken and record should be maintained for the transported waste and the Manifest System followed. It must be ensured that the waste reaches the proper destination and is not dumped on the way.

E-Wastes, constructional wastes and bio-medical waste generated from different units shall be disposed through authorized agencies.

4.6.5 Municipal Solid Wastes: The primary sources of solid waste in the project area will be local households, commercial establishments, markets, hotels, restaurants, canteens etc. The total quantity of municipal waste generated per day will be approximately 2.75 tons per day (TPD) at a per-capita waste generation of 250 grams per day. Disposal of the untreated wastes will lead to open decaying causing stench, soil pollution and a breeding ground for various vectors. This may lead to outbreaks of diseases to the local population.

The total area of Industrial Estate is 720.46acres. Assuming the density of 17.59 persons per acre the population would be 12658. The total waste generation (solid waste + Industrial waste) would be (2.75+ 22.5)25.25 TPD.

Mitigation Measures

- An area for waste handling (15297 sq m) has been earmarked for waste handling.
- Collection, segregation and transportation shall be achieved by engaging a third party.
- Wastes shall be segregated into compostable and recyclable wastes (paper, glass, plastic)
- OWC (Capacity: - 16.45 Kg @1.3 Kg per person per day) will be provided for decomposition of organic matter. Manure so formed will be used within the site for greenbelt maintenance.

4.6.6 Impacts on the Drainage: The scheme of Storm Water Drainage has been prepared for the Industrial Estate, Sitarganj which is divided into two heads viz. Collection and Disposal.

4.6.6.1 Collection of Surface Water: Effective drainage increases the life of road. Proper camber, slope, properly constructed kerb channel and then placing of road gullies at proper spacing help in collection of surface water effectively. It is proposed to collect the surface water through road gullies, which will be constructed in channel portion of the road at a distance of about 30 m. These road gullies will be constructed on the upstream side near the manhole. The surface water collected through the road gullies will be discharged into the manhole through a pipe connection. The surface water so collected in the manholes will be carried through a network of drains to the point of disposal.

The storm water channels will be unlined at the bottom to allow percolation as possible.

4.6.6.2 Disposal of Surface Water: The surface water collected from the roads through road gullies will be carried through a designed network of circular storm water drains of various sizes ranging from 910 mm dia to 1520 mm dia and discharged into a sump proposed to be located near drain. The drain discharges into river Begul adjacent to project site.

4.7 Impacts on Socio-economic Environment: India has become one of the fastest growing economies in the world over the last two decades. The Industry sector contributes 25.92%. While Agriculture and allied sector share 20.19%. At 2011-12 prices, the Agriculture & allied, Industry, and Services sector's composition is 16.38%, 29.34%, and 54.27%, respectively. Share of primary (comprising agriculture, forestry, fishing, and mining & quarrying), secondary (comprising manufacturing, electricity, gas, water supply & other utility services, and construction), and tertiary (services) sectors have been estimated as 21.82 percent, 24.29 percent, and 53.89 percent. According to CIA Fact book, sector-wise Indian GDP composition in 2017 is as follows: Agriculture (15.4%), Industry (23%), and Services (61.5%). GDP of the Industry sector is $560.97 billion, and world rank is 6. India's world rank is eight in the Services sector, and its GDP is $1500 billion. The industry and services sector's contribution is lower than the world's average 30% for the Industry sector and 63% for the Services sector. (Source: NITI Ayog).

The current environment is likely to accelerate progress in the Industrial sector in India, considering the interest from government as well as private enterprises. The Government of India brought out the National Manufacturing Policy with the objective of increasing the share of manufacturing in the GDP to 25%. 'Make in India', the government's national initiative, places great importance on building best in class Industrial infrastructure. The Goods and Services Tax Bill (GST Bill) has amalgamated several central and state taxes into a single tax, thereby mitigating double taxation and facilitating a unified national market. Further, inter-state industrial corridors, such as the ambitious Delhi-Mumbai Industrial Corridor (DMIC), and freight corridors, such as the Western and Eastern Dedicated Freight Corridors, are gaining renewed focus.

The cumulative effect, places the onus on industrial sector for providing an opportunity for conferring social benefits.

Table 4.9: Magnitude of Impact of Proposed Integrated Industrial Estate (IIE) Phase –II

Impact	Type	Magnitude	Comments
Industrial Development	Long Term	Significant	The project will pave its way to ensure the adequate infrastructure for industrial development.
Employment Generation	Positive/ Long Term	Major	Increase in Petty Jobs, Vendors etc.
Local Area Development	Long Term	Significant	Increase in Infrastructural facilities such as water, electricity etc.
Nearby Inhabitants	Long Term	Significant	Increase in Land Prices, medical facility etc.
Gross Domestic Product- GDP	Long Term	Significant	A minute increase in Gross Domestic Product
Quality of Life	Long Term	Very significant	The HRQOL is an index that shows the quality of life health.
Social Equality of People	Long Term	Very significant	Industrial services help in bringing social equality among the people.

4.7.1 Socio-economic Impact: The population composition of a place changes due to various factors viz, topography, availability of water, agricultural practices, economic development, transport facilities and migration of people. Migration of people brings changes in population size, sex ratio, adult-child ratio and size & composition of labour force. During construction phase about 4000 individuals will be getting employment and most of them will be migrant laborers. They will be housed in labour hutments within proposed project site. Other places may be used for hutment is the need arise. In the present case migration of people from outside the study area will be significant as about 15,822 individuals (12658 permanent individuals & 3164 floating individuals) are expected to be recruited from outside. The detailed breakup of workers is as below in Table 4.7.

Table 4.10: Composition of Workers

S/n	Type of worker	Industrial worker	Administrative staff	Total
1	Total	12000	658	12658
2	Skilled	9000	650	9650
3	Semiskilled	2280	-	2280
4	Unskilled	720	8	728

4.7.2 Impact on employment generation& income: The Proposed Integrated Industrial Estate (IIE) Phase –II will provide employment to many people. According to the project authority direct employment opportunities will be given to 12658 persons. The 9650 persons will be skilled worker; semi-skilled workers will be 2280 and unskilled workers for the site services will be 728. There will be good earning opportunity for skilled as well as unskilled worker in the Proposed Integrated Industrial Estate (IIE) Phase –II. The skilled workers will get around Rs. 1,269,348,455/- annually; the semi-skilled workers will bet Rs. 281,283,600/- and Unskilled workers will get Rs. 83,935,633.6/- annually.

A Total of Rs. 1,634,567,689/- annually will be spent towards salaries and wages. The rates of minimum wages of Uttarakhand in year 2021 is Rs. 360.38/-per day for skilled labor; Rs. 338.00/- per day for semiskilled and Rs. 315.88/- per day for unskilled workers.

The skilled and unskilled workers will be recruited locally preferably. The local people may get employed in the project as semi-skilled workers after necessary training. Further, the project will provide indirect employment to around 18987 people who will be involved in business and service oriented industries such as grocery shops, medical shops etc. An increasing demand in tutor classes, domestic help, ironing shops, vegetable vendors, milk vendors etc is also expected due the coming industrial project.

Table 4.11 Expected Salaries and Wages in proposed Integrated Industrial Estate (IIE) Phase–II

S/n	Type of worker	Number of worker	Minimum wage as wef notification 1/Five/2015/9952-10151, effective from 1st April 2021	Number of working days	Total working days	Total Salary and Wages
1	Skilled	9650	360.38/-	365	3522250	1,269,348,455/-
2	Semi skilled	2280	338.00/-	365	832200	281,283,600/-
3	Un skilled	728	315.88/-	365	265720	83,935,633.6/-

S/n	Type of worker	Number of worker	Minimum wage as wef notification 1/Five/2015/9952-10151, effective from 1st April 2021	Number of working days	Total working days	Total Salary and Wages
	Total	12658			4620170	1,634,567,689/-

4.7.3 Impact on the Local Area Development: The industrial development in the area will bring other supportive facilities such as drinking water, road construction, electricity supply, basic phones or mobile phone connections. It will help in increasing the government revenue in terms of service charges or tax etc.

4.7.4 Impact on Urban Development: The urban development will get much required impetus due to Proposed Integrated Industrial Estate (IIE) Phase –II. It is expected that in the near future there will be increasing development in terms of permanent jobs especially in the surrounding areas. The local area will also observe increasing infrastructural development.

4.7.5 Impact on the nearby inhabitants: The local people will be benefitted with the Proposed Integrated Industrial Estate (IIE) Phase –II as new industrial development will be envisaged due to the Proposed Integrated Industrial Estate (IIE) Phase –II. The Industrial development will include better job opportunities, water electricity supply etc. It will help in increasing the localized employment structure as well as increasing further development opportunity and increase of land prices.

4.7.6 Impact on GDP: It will help in increasing the State revenue as new water, electricity connections will help in increasing the revenue, tax etc. However, a very minor contribution will be made on the Gross Domestic Product (GDP).

4.7.7 Impact on Social Equality of people: The Proposed Integrated Industrial Estate (IIE) Phase–II will help in creating social stability of the people. If families have greater economic stability, it reduces stress, helps children to concentrate in education. It also helps in financial safety of the family which helps in giving them a better lifestyle.

4.7.8 Quality of Life (Health) of people: The Proposed Integrated Industrial Estate (IIE) Phase –II may adversely impact the quality of life (Health) of people. Therefore it is imperative to conduct the community health camps for the nearby people.

4.7.9 Corporate Environmental Responsibility: The Corporate Environmental Responsibility (CER) will be planned and implemented as per the issues raised during public hearing by Project Proponent and the same will be part of final EIA Report.

4.7.10 Peoples' perception about the project: During the course of field survey the sample households were asked that are they aware of the upcoming Proposed Integrated Industrial Estate (IIE) Phase –II. Most of the sample size was positive about the upcoming project. However, few others were inquisitive about the Proposed Integrated Industrial Estate (IIE) Phase –II. The respondents

stated that they will support such development projects in future. The project will generate various employment opportunities for the residents of the impact area.

4.7.11 Mitigation Measures: During the construction phase, temporary hutments will be constructed at the earmarked space for the labour force. The labour colony shall be provided drinking water and sanitation facilities. Temporary toilets as per PHED norms will be constructed for the work force during construction period. Suitable septic tanks and soak pits of appropriate capacities will be constructed for treatment of sewage before disposal. Health and safety of the workers will be ensured during construction by making effective provisions for the basic facilities of sanitation, drinking water, safety of equipments or machinery etc. The following recommendations will be followed:

- Safety procedures, norms and guidelines (as applicable) as outlined in the document Part -7, Constructional practices and safety, 2005, National Building Code of India, Bureau of Indian Standards will be complied with.
- Clean drinking will be provided to all the workers.
- Adequate number of decentralized latrines and urinals will be provided to construction workers.
- All parts of dangerous machinery will be guarded.
- Hoists and lifts, lifting machines, chains, ropes and other lifting tackles will be kept in good condition.
- Protective equipments like helmets etc. will be provided to the workers.
- Fire extinguishers and buckets of sands will be provided in the fire-prone areas and elsewhere as measures to prevent fires.

Table 4.12: Safety procedures, norms and guidelines

S/n	IS Codes	Year of Publication	Applicability
1.	IS 3696-1	1987	Safety code of scaffolds and ladders, Part 1: Scaffolds
2.	IS 3696-2	1991	Scaffolds and Ladders - Code of Safety, Part 2: Ladders
3.	IS 3764	1992	Code of safety for excavation work
4.	IS 4014-2	1967	Code of Practice for Steel Tubular Scaffolding, Part II: Safety Regulations for Scaffolding
5.	IS 4081	1986	Safety code for blasting and related drilling operations
6.	IS 4082	1996	Recommendations on stacking and storage of construction materials and components at site
7.	IS 4130	1991	Safety code for demolition of buildings
8.	IS 4138	1977	Safety code for working in compressed air
9.	IS 4756	1978	Safety code for tunneling work
10.	IS 4912	1978	Safety Requirements for Floor and Wall Openings, Railings and Toe Boards
11.	IS 5121	1969	Safety code for piling and other deep foundations
12.	IS 5916	1970	Safety code for construction involving use of hot bituminous materials

S/n	IS Codes	Year of Publication	Applicability
13.	IS 7272-1	1974	Recommendation for Labour Output Constants for Building Work, Part I: North Zone
14.	IS 7293	1974	Safety code for working with construction machinery
15.	IS 7969	1975	Safety code for handling and storage of building materials
16.	IS 8989	1978	Safety code for erection of concrete framed structures
17.	IS 10067	1982	Material constants in building works
18.	IS 10291	1982	Safety code for dress divers in civil engineering works
19.	IS 10302	1982	Unified Nomenclature of Workmen for Civil Engineering
20.	IS 13415	1992	Protective Barriers in and Around Buildings - Code of Safety
21.	IS 13416-1	1992	Recommendations for preventive measures against hazards at workplaces, Part 1: Falling material hazards prevention
22.	IS 13416-2	1992	Recommendations for preventive measures against hazards at workplaces, Part 2: Fall prevention
23.	IS 13416-3	1994	Recommendations for preventive measures against hazards at workplaces, Part 3: Disposal of debris
24.	IS 13416-4	1994	Recommendations for preventive measures against hazards at workplaces, Part 4: Timber structures
25.	IS 13416-5	1994	Recommendations for preventive measures against hazards at workplaces, Part 5: Fire protection
26.	IS 13430	1992	Code of practice for safety during additional construction and alteration to existing buildings
27.	IS 15883-1	2009	Construction project management - Guidelines, Part 1: General
28.	IS 15883-2	2013	Construction project management - Guidelines, Part 2: Time Management
29.	SP 70	2001	Handbook on Construction Safety Practices

4.8 Impacts on Energy:

4.8.1 During construction phase of the project: Fossil fuels, such as diesel fuel, gasoline and oil will be used during the construction phase of the project for mechanical and electrical equipment to minimize adverse effects on renewable resources. Electricity will be used during construction to provide power to construction equipment and in operation for lighting of buildings and running utilities. Electricity consumption will be kept at a minimum whenever possible by adopting electricity conservation measures.

4.8.2 During operational phase of the project: SIIDCUL has an existing industrial area adjacent to the project site. The electricity supply is being done by UPCL (Uttarakhand Power Corporation Limited) for the existing industrial area; the same will be continued in the existing project. The street

lights shall be planned with high degree of aesthetics with lights on each road. About 10 percent of street lighting will be based on solar. All cabling shall be underground.

4.8.3 Measures for Minimization of Impact: The project proponent will ensure that best management practices are followed both during the construction & operational phases of the project to conserve renewable resources. These may include, but are not limited to:

- Lighting of only critical areas during non-working hours
- Efficient scheduling of construction crews
- Use of energy-efficient lighting;
- Minimizing idling of construction equipment and vehicles;
- Recycling of used motor oils and hydraulic fluids
- Emergency Water Sprinkling Tank
- Safety Accessories at working Time

4.9 Impacts on Biological Environment

4.9.1 Possible Impacts:

The existing flora and fauna has been discussed in Chapter-3. Development without impacts might not be possible; however, efforts should be made to mitigate them through proper management strategy. The project will not cause any loss of forest resource. The potential impacts and mitigation measures proposed due to development of the industrial estate project are described below in **Table 4.10.**

Table 4.13: Potential Impacts on Flora and Fauna from the Project.

S. No	Environment Components	Potential Impacts	Types of Impacts	Duration	Mitigation Measures
Terrestrial Ecosystem					
Preconstruction/Construction Phase					
1	Flora	**Loss of vegetation** ground vegetation; There are a total number of 380 trees of which 216 trees will be felled. The detailed tree cutting inventory is given as **Annexure 3.** Loss of mature trees is a loss to the local ecological services that are provided by them.	Direct	Long Term	i. The green belt will be developed with suggested native plant species including the species that are existing in the project site. 36,445 (@1tree per 80 Sqm of Plot areas) trees are proposed for plantation along the periphery. Suggested trees species are given in table 4.11 & 4.12 ii. The green belt will be developed as per the guidelines for developing green belt by CPCB, 2007. Details are given under Green belt development section. iii. Tree felling if needed will be carried out only after obtaining permission for the same and applicable rules will be followed.
		Dust particles settling on the surrounding vegetation and agriculture land due to project activities will make the growth of plants stunted.	Indirect	Short term	i. Suppression of dust by sprinkling of water twice a day depending upon weather conditions. ii. Covering the construction area with GI sheets.
	Fauna	Impact of noise on the faunal species (particularly on avifauna and small mammals) due to vehicle movement. Encountering wildlife species during the construction phase.	Indirect	Short term	The increase in noise level due to movement of vehicles and construction workers may impact faunal species. i. Wildlife habitat will not be affected as the project does not include any forest/wildlife protected area. ii. Proper maintenances of the vehicles, and machineries to reduce the noise. iii. Noisy construction equipments will not be used at night time. iv. If any wildlife species are encountered during the construction phase, it should be informed to forest department. v. Awareness program as well as training to workers on wildlife and its importance, conservation etc. vi. Wildlife conservation plans have been suggested to conserve the wildlife.

S. No	Environment Components	Potential Impacts	Types of Impacts	Duration	Mitigation Measures
Operation Phase:					
	Flora	The development of extensive green belt around the project will help to mitigate dust, noise and gaseous pollution of the project area.	Direct	Long term	Positive impacts. Broad leaved, dense foliage species shall be selected for this purpose.
	Fauna	The avifauna and small mammals will be benefited from the planted trees in the form of habitation and foodstuff.	Direct	Long term	Positive impacts.
		Noise from each industry and vehicular movement.	Indirect	Long term	Each industry will take appropriate care to reduce the noise level. It will include proper maintenance of vehicles, machineries and equipments, etc.
Aquatic Ecosystem					
Preconstruction/Construction Phase					
	Flora and Fauna	Impact on aquatic flora due to earth material runoff to surface water.	Indirect	Short term	i. Embankment development along Beghul river after obtaining necessary permission from Irrigation Department ii. Construction of drainages, silt traps, diversion ditches to avoid release of sediments into the water sources. iii. Proper storage of construction materials. iv. Regular monitoring of water sources.
Operation Phase					
	Flora and Fauna	Disturbance of aquatic ecosystem owing to degraded water quality from disposal of waste or discharge of untreated effluent.	Direct	Occasional	i. No untreated effluent shall be discharged in water bodies ii. Treated wastewater from CETP will be diluted to 50% and discharged in the River iii. No wastes shall be disposed in the river or its adjoining land. Waste Management shall be carried out through an approved agency

4.9.2 LANDSCAPING AND GREEN BELT DEVELOPMENT PLAN.

Landscaping/greenbelt means planting of special type of plants suitable to that particular agro climate zone and soil characteristics. It will make the area cooler, reduce air pollution, prevent soil erosion and further improve the soil fertility status. The plantation work can be started from the construction phase at the peripheral area with suggested native plant species, as they will grow to a full-fledged covered at the time of completion of the work. During the operation phase, the current ecology of the project site will be improved with following measures:

i. Plantation and landscaping
ii. Green Belt Development
iii. Avenue plantation

A. Plantation and landscaping

Selection of the plant species would be done on the basis of their adaptability to the existing geographical conditions and the vegetation composition observed.

B. Green Belt Development

Green belt to a width of 15 meters will be maintained in the periphery of the industrial area. Upto 33% of the allotted area will be under green area.

Greenbelt refers to planting of special type of plants that are suitable to that particular agro climate zone and soil characteristics. The development of green belt has been attributed a great importance and became an essential element of planning policy. The main objective of the green belt is to provide a buffer / barrier between the sources of pollution and the surrounding areas. The green belt helps to capture the fugitive emissions and attenuate the noise apart from improving the aesthetics quality of the region.

a) Guidelines & Techniques for Green Belt Development:

Extensive survey in the project area was undertaken to observe the structure and composition of vegetation. Hence a combination of plant is selected depending upon the topographical suitability and species selected as per "Guidelines for developing Greenbelt-CPCB 2007". The plantation will be done including large trees, smaller trees and shrubs, whereas some grasses and flowering plants are grown on lawns and garden.

b) Development of Green Belt:

The plantation matrix adopted for the green belt development includes pit of 0.3 m x 0.3 m size with a spacing of 2 m x 2 m. In addition, earth filling and manure may also be required for the proper nutritional balance and nourishment of the sapling. It is also recommended that the plantation has to be taken up randomly and the landscaping aspects could be taken into consideration. The plants selected for the plantation exhibits, following desirable characteristics

i. The species should be fast growing and providing optimum penetrability.
ii. The species should be wind-firm and deep rooted.
iii. The species should form a dense canopy.
iv. As far as possible, the species should be indigenous and locally available.
v. Species tolerance to air pollutants like particulate matters should be preferred.
vi. The species should be permeable to help create air turbulence and mixing within the belt.

vii. There should be no large gaps for the air to spill through.
viii. Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces.
ix. Ability to withstand conditions like inundation and drought.
x. Soil improving plants (Nitrogen fixing rapidly decomposable leaf litter).
xi. Attractive appearance with good flowering and fruit bearing.
xii. Bird and insect attracting tree species.
xiii. Sustainable green cover with minimal maintenance.

The tree and shrubs species suggested for the plantation are given in **Table 4.11** and **4.12**.

c) Preparation for Seedlings: To undertake plantation on site, following steps will be taken

- Obtaining Healthy seedlings from nursery
- Preparation of pits and preparing them for transfer of seedlings
- Take care of seedlings after plantation in pits

d) Pit and Soil Preparation:

- The pit size has been recommended as 45 cm x 45 cm x 45 cm for trees and 30 cm x 30 cm x 30 cm for shrubs.
- The spacing for trees is proposed 2 m while 1 m for shrubs plantation.
- The pits should be watered prior to plantation of seedlings.

e) Post Care Facilities:

- The growing plants are cared at least for the first 3 years under favorable condition of climate and irrigation.
- For healthy and vigorous growth adequate nutrient will be supplied.
- To avoid water stress condition regular watering will be done.

C. Avenue Plantation

- Gardens maintained for recreational and ornamental purposes will not only improve the quality of existing ecology at the project site but also will improve the aesthetic value.
- Avenue Plantation
- Trees with colonial canopy with attractive flowering.
- Trees with branching at 7 feet and above.
- Trees with medium spreading branches to avoid obstruction to the traffic.

Table 4.14: List of Trees suggested for Greenbelt Development

S. no.	Binomial Name	Family	Common Name	Height (Meters)	Regeneration method	Flowering season	Crown shape
1.	*Azadirachta indica*	Meliaceae.	Indian Lilac	20	By seeds	Jan - March, Aug. - Sept.	Spreading.
2.	*Acacia dealbata*	Mimoseae	Silver wattle	15	By seeds	April-June	Oblong
3.	*Acer campbellii*	Aceroceoe.	Himalayan maple.	1 2	By seeds		Spreading
4.	*Actinodophne angustifolia*	Lauroceoe.		13	By seeds	May - June, Nov.	Flowerings
5.	*Aegle mormelos*	Rutoceoe	Beat tree	12	By seeds, root cuttings.	May - July	Oblong
6.	Albizia procera	Mimoseae	White siris	20	White siris	June- September	Round/Oblong
7.	*Bischofia javanica*	Bischofiaceae	Bishopwood	15	By seeds	April –September	Oblong
8.	Celtis australis	Ulmaceae	European Nettle tree	12	By seeds, stump - planting	-	Oblong
9.	*Eucalyptus citriodora*	Myrtaceae	Lemon Scented Gum	20	By seeds	Feb - April. Oct - Dec	Conical
10.	*Ficus gibbosa*	Moroceoe	Dye fig	10	By cuttings, seeds	April - May	Spreading
11.	*Milletio peguensis*	Fabaceae	Moulmein rosewood	10	By seeds	Aug. - Oct.	Round/oblong
12.	Ouginiao ojeinensis	Fabaceae	Beng - Ttnts	12	By seeds	Feb. - March	
13.	*Populus alba*	Solicoceoe	White poplar	15	By seeds, stem, root cutting, root sucker		Oblong.
14.	*Salix alba*	Salicaceae.	European willow	20	By stem cutting, root cutting.	Mar. - May.	Oblong/Round.
15.	*Spondia spinnata*	Anocordioceoe.	Wild Mango	15	By seeds	Feb. - Apr	Round
16.	*Terminalis arjuna*	Combretoceoe.	Arjun	15	By seeds,	April –July	Oblong/Round

Source: Guidelines for developing greenbelt- CPCB-2007

Table 4.15: List of Shrubs Suggested for Greenbelt Development

S/n	Binomial Name	Family	Common Name	Height (Meters)	Regeneration method	Flowering season	Crown shape
1.	*Acacia leucophloea Wdld.*	Mimoseae		3	By seeds	Jan -Fab	Oblong
2.	*Phanera variegata*	Fabaceae	Kachnar	3	By seeds	June	Oblong / Round.
3.	*Ixora chinensis*	Rubiaceae		6	By cutting	March	Oblong
4.	*Cariaria nepalensis*	Mussorie berry tree	Coriaceae	5	By seeds	Deciduous	Round
5.	*Nerium indicum*	Pink oleander	Apocynaceoe	5	By cutting	Throughout year	Oblong /Round
6.	*Tecoma stans*	Kon - Koreneklor	Bignonioceoe	5	By seeds, cutting	Feb- April	Oblong

Source: Guidelines for developing greenbelt- CPCB-2007

4.10 Evaluation of impacts: The environmental impacts of projects or actions generally include a comprehensive range of impacts. All these impacts vary in magnitude, as well as in their beneficial or adverse effects.

According to the industrial estates company's policy in India, planning the industrial units follows specific patterns and in each estate separated sites have been envisage for different industries. However, the type of industries in the industrial estate is not final yet. However, the impacts from the IE have been evaluated using Environmental Impacts Leopold's Matrix.

4.10.1 Objectives and applicability: To identify the direct impacts of a series of activities in the given project and the respective quantification on two levels: magnitude and importance (or significance).

4.10.2 District of the Study Area: In this study, development planning of the industrial estate, located in the Sitarganj, Udhamsingh Nagar district in Uttarakhand state was evaluated. The current area of the industrial estate is 291.56 Ha (720.47 acre) and its extent development future planning is >2000 hectares. The expected types of industries in the proposed project are adhesive manufacturing, breweries, automotive spare part manufacturing etc.

Materials and Methods: Environmental evaluation of Sitarganj IE was conducted by the following processes. Identifying Effective Factors in Environmental Degradation, including climate, geology, hydrology data, and some degradation factors in the region; such as its location, different types of pollutants, land use, socioeconomic and ecological/biological data

Collecting and Entering Data: The collection of information on the site and surroundings of the proposed development (baseline information) is essential in EIA in the implementation plan. Data Analysis: The required data was generated at site in the core and buffer zone and maps from different. The data analysis was done to identify the current situation of the region, and scale at which it is affected by pollutants and then they were scored.

4.10.3 Description

This system consists of listing according to a method of matrices. The activities of a project are placed in the column, and the environmental features/aspects that are affected by such activities are in top row. The aspects are considered from the point of view of their physical and chemical characteristics, their cultural importance, ecological relationships and any other factors that may be deemed necessary for the accomplishment of the project. The cells represents an interaction between project activities and the environmental aspects that are affected by such activities. The left portion is to be filled with the magnitude ratings and the right with ratings by order of importance/significance according to the intensity of each impact, ranging from 1 to 10.

4.10.3.1 Usefulness and applicability: The usefulness of the method resides in the support it provides to the most frequent activities of a project and the environmental aspects, it is going to influence. Furthermore, the method is multi-disciplinary.

These positive features recommend it as a suitable method for a first evaluation of environmental impact of a project. As far as its applicability in this project is concerned, this method is only useful in bringing together the main activities developed in the case study area and in listing the different points that are part of its environment. The method is best suited for

undertaking the analysis of a specific project while its application to any area is affected by the size and multiple activities in the area being evaluated.

4.10.3.2 Working Method: The environmental aspects were divided into ten groups as per area of concern and characteristics of the area under study, and their set up is as follows:-

1) Air Environment
2) Noise Environment
3) Water Environment
4) Land Environment
5) Topography and Aesthetic
6) Biological Environment
7) Infrastructure, human welfare and amenities
8) Employment Potential and R&R
9) Economy of the Region
10) Effect on Human Health

After identification of possible impacts criteria was setup for calculating the magnitude of interference of activities proposed for the area. Later on the aspects were regrouped to establish the relative degree of importance.

4.10.3.3 Magnitude: The criteria for determining the magnitude of the impact of each item in the group of activities were set in order dependent on the level of danger of parameters that define environmental characteristics. These parameters vary in a scale whose minimum limit is 1(one) and the maximum is 10 (ten).

Values from 1 to 10 were prescribed to the following parameters:
for archeological and prehistoric sites: scientific exploration, conservation, depredation and total destruction, for historic monuments: preserve as historic site, recuperate, abandon, depredate, detract from inherent characteristics and demolish, for folklore: foster and detraction from inherent characteristics, cultural impact and extinction; for landscape: recovery, constructions unsuitable to the environment, cutting down of forest cover, demolishing of vegetation and slopes and formation of points of erosion; A weighting procedure was defined for the environmental characteristics on a scale going from 1 to 10, after the establishment of an order factors appearing on the matrix. Then each degree of magnitude was multiplied by the weight of the corresponding environmental characteristic.

Table -4.16: Environmental characteristics (Significance)

Sr No	Environment Aspects	Significance
1	Air Environment	7
2	Noise Environment	6
3	Water Environment	8
4	Land Environment	5
5	Topography and Aesthetic	4
6	Biological Environment	6

Sr No	Environment Aspects	Significance
7	Infrastructure, human welfare and amenities	7
8	Employment Potential and R&R	4
9	Economy of the Region	6
10	Effect on Human Health	6

4.10.3.4 Computations

A general analysis of results is provided by the last row and column computation. Each value corresponds to sum of the importance given in the build through matrix and is related with the rows (environmental characteristics) at the right side and with the columns (activities) at the down side.

Discussion on the results of applying the Leopold Matrix

The magnitude values in most cases included the relative importance. The environmental characteristics were established through weighting, without taking into account the specific interference of each particular action and the environmental dynamics of the various components.

Evaluation with Quantitative Method by Using the Matrix: Quantitative evaluation method was done by using the matrix of Rau and Wooten, that is, the other format of Leopold Matrix.Net score for impact = magnitude of effect × importance (significance) of effect.

In each project, the effect magnitude of activities is defined based on environmental parameters classifying each group of pollutants; in this study, the range of importance of effect is defined with the numbers of 1 to 10 as it presented in Table 4.13.

Positive or negative signs are assigned to the impact value to show the beneficial or adverse effects. The impact is quantified using (1-10) Scale in the increasing order of severity as per the rating given below:

Table -4.17: Analysis of Impact of I.E. Sitarganj Project on Environment

Sl No	Environment Aspects	Significance	Possible impacts for IE					
			Duration		Reversibility		Spatial extent	
			ST	LT	RE	IR	L	R
1	Air Environment	-7		√		√		√
2	Noise Environment	-5		√	√		√	
3	Water Environment	-6		√		√		√
4	Land Environment	4		√		√	√	
5	Topography and Aesthetic	4		√		√	√	
6	Biological Environment	-7		√	√			√
7	Infrastructure, human welfare and amenities	8		√		√		√
8	Employment Potential and R&R	8		√		√		√
9	Economy of the Region	8		√		√		√
10	Effect on Human Health	-5		√	√		√	

Note: ST-Short term LT-Long Term RE-Reversible/Partly Rev. IR-Irreversible L- Local R- Regional

Effect magnitude	Score

Effect magnitude	Score
No effect	0- 1
Low and intermittent	2-3
Low and continuous	4-6
Medium and intermittent	7-8
Medium and continuous	9
High and continuous	10

Table -4.18: Matrix for Impact Analysis

Impact	Scale (0-1000)	Impact Management
No Impact (NI)	0- 100	No impact, negligible
Low and Intermittent (LII)Short term	101-300	No significance & can be absorbed by assimilative capacity of nature
Low and Continuous (LCI)	301-600	Can be addressed by appropriate measures
Medium and Intermittent (MII)	601-800	Can be reverted by appreciable control measures
Medium and Continuous (MCI)	801-900	Can be reverted by major control/ policy measures
Permanent Impact (PI)	901-1000	High and continuous, Permanent damage & not reversible

Table 4.19 Matrix for EIA of the proposed industrial estates at Sitarganj

S/n	Project Activity/ actions	Air Environment			Noise Environment			Water Environment			Land Environment			Topography & Aesthetic			Infrastructure; Human welfare and amenities			Employment Potential & R & R			Economy of the Region			Effect on Human Health			Total Impact Factor
		S	M	T	S	M	T	S	M	T	S	M	T	S	M	T	S	M	T	S	M	T	S	M	T	S	M	T	
1	Change in Landuse										-4	9	-36																-36
2	Filling; and embankment							6	9	54	4	9	36							8	3	24							114
3	Clearing of Land												0																0
4	Construction Activities							-6	7	-42	-4	7	-28	4	6	24	8	9	72				8	3	24	-5	7	-35	15
5	Operation of industrial units	-7	9	-63	-5	9	-45	-6	10	-60	-4	8	-32				8	9	72	8	10	80	8	9	72	-6	8	-48	-24
6	Industrial solid/ MSW waste and hazardous waste generation	-7	3	-21				-6	6	-36	-4	9	-36	-4	7	-28	8	9	72				8	9	72	-6	8	-48	-25
7	Water withdrawal from GW							-6	6	-36																5	7	35	-1
8	Operation of CETP							6	10	60	4	9	36				8	9	72				8	3	24	3	3	9	201
9	Discharge of industrial effluent							-6	10	-60	-4	8	-32													-6	8	-48	-140

10	Recycling of treated waste water							6	10	60	4	6	24				8	9	72							6	8	48	204
11	Greenbelt development and horticulture	7	9	63	5	9	45	-6	3	-18	4	8	32	4	6	24	8	2	16							4	3	12	174
12	Traffic movements; loading and unloading and parking	-7	8	-56	-5	8	-40										8	4	32	8	3	24	8	5	40	-5	3	-15	-15
	Total action impact	-14	29	-77	-5	26	-40	-24	71	-78	-4	73	-36	4	19	20	56	51	408	24	16	128	40	29	232	-10	55	-90	467

4.10.4 Discussions: Industrial ecosystem is an important approach for sustainable development. In an industrial estate, a group of industries are interconnected through mass and energy exchanges for mutual benefits. However, some mass and energy exchange activities may have unexpected environmental impact. Industrial development could be defined as providing the foundation for industrial expansion and social stability with reducing the environmental adverse impacts.

To achieve above mentioned goals, it is necessary to merge environmental concerns with different levels of policy making and management. Thus, matrix analyzing tool has been used for evaluation of impacts to predict, identify, and determine accurate analysis of positive and negative effects of an environmental project on natural and man-made environments.

Results of quantitative analysis of the effects of environmental factors on the Industrial Estate development project by the matrix method demonstrated that the sum of scores allocated to impact of the project activities on different environmental factors is "+467," which means that the overall impact from the project through the life of the project is positive effects outweighing the drawbacks owing to the provisions of the various mitigation measures, when applied. It is to be noted that the project will have an overall adverse impact on landuse, owing to industrial operation, waste generation, groundwater withdrawal, wastewater discharge and increased traffic movement. The mitigation measures proposed for the same along with their Management Plan shall be followed to mitigate their impacts. Refer Table no 4.10. Significant positive impacts are anticipated from recycling of treated wastewater, greenbelt development, local infrastructural amenities and local as well as regional income generation.

Moreover, considering all factors including socioeconomic factors that have special effect on development process, performing of the project with residual negative consequences should be provided.

****

CHAPTER – V

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.0 Introductions:

This chapter discusses the assessment of various options that may be available for different components of the project in terms of environmental suitability. Consideration of alternative technologies to be used in building material and energy conservation are to be addressed in this chapter. The various applicable options are thus evaluated for their suitability or availability to project site and environment.

5.1 Alternative of site:

The land has been allocated to SIIDCUL by Chief Secretary, Government of Uttarakhand vide letter no. 2069/XX(4)-231/Kara-03/2006 dated 03.06.2006, for development of industrial estate and land has already been acquired. The land was earlier a part of Sampurnanand Jail. The concept of open prison in the form of Sampurnanand camp, Sitarganj was developed from the time of undivided UP, which was established on February 16, 1960. The Jail Campus was located in an area of 5965 acres; later on the Govt of UP distributed some land through lease. After the formation of Uttarakhand, the jail land was allotted to SIIDCUL, BSF, SSB, Central Jail, and Power House. After the establishment of SIIDCUL, 2900 acres of land was transferred to SIIDCUL in two phases.

5.2 Alternative for technology and other parameters

5.2.1 Building materials

The construction material like Stone Aggregate (10 mm -20 mm), coarse sand, Fly ash, Cement, and Reinforcement steel will be procured from the nearby vendors. Analysis of alternative building materials as compared to conventional technologies or methods of construction, which are energy intensive in nature, can help to identify sources which can lead to energy conservation to a great extent thereby taking a step forward towards sustainability. Scope of this section covers the selection guidelines for alternate materials and technologies at various stages of building construction.

The proposed project will be using several economic strategies to ensure the most eco-friendly construction possibly including the use of lightweight eco-friendly and zero maintenance building materials like:

5.2.1.1 Use of recycled materials

Recycled materials will be used in roads as well as for pavers, if locally available. Also materials with low embodied energy will be used in construction which will significantly result in energy savings. The total savings in terms of roads and paving ranges between 10% - 20%. The efforts will also be made for the use of fly-ash based cement in the project.

Reusable materials will be segregated and reused at site to the extent feasible in road construction. Non-reusable materials will be sent to C&D waste recycling centers as per Construction and Demolition Waste rules, 2016 approx. The recycled material made from C&D waste shall be allowed to be used with prior intimation to Engineer- in charge for non-structural works, such as:

i. Cement Concrete Blocks
ii. Pavers, footpath tiles/slabs
iii. Manhole covers, precast service ducts

iv. Graded aggregate of size 10 mm- 5 mm and up to 150 mm will be used for sub base of internal roads & paths.

The recycled material produced from C&D waste shall be conforming to prevailing IS codes and specifications according to their uses.

As per the guidelines of CPCB, new construction work involves about 40-60Kg of waste per square meters of new construction. As the proposed project will comprise Integrated Industrial Estate development in an area of 291.56 Ha (720.47 acre), expected construction waste generation is about 71376.73 tons of the construction waste will be produced. Considering the construction will be complete in 5 years, approximately 39 ton of construction waste will be generated on each working day.

Saving that will be achieved:

- Approximately 31 ton will be recycled during the complete construction of project which will help in saving ample amount of raw material. The remaining shall be stored within premises with suitable cover or deposited at the collection center made by local body.
- Save the space of landfill site.
- Reduce the fuel consumption as part of transportation involved in bringing the raw material at site and sending the waste generated to the landfill site.
- Decrease the burden on the existing resources by about 20%.
- Reduction of environment pollution which otherwise would have been caused due to excessive movement of vehicles for transportation of materials.

5.2.1.1.1 Walls

5.2.1.1.2 Conventional material

Clay bricks with cement mortar. The conventional practice of clay, and brick consumes large quantity of energy in terms of coal and other fuels which are primarily non- renewable and highly polluting. The strength of these construction materials cannot be compromised which will otherwise pose a threat to the life and property of the occupants. However, presently, materials with similar properties are available that are made of waste products, thereby reducing the waste burden and conserving natural resources.

5.2.1.1.3 Alternatives

In this project, for constructing walls, mainly AAC Blocks, which are light in weight and has sufficient strength, will be used. These blocks will also be following ECBC norms for heating and cooling effects.

The following will be considered for wall openings such as doors and windows:

- Use of Precast thin lintels, use of ferro-cement-sunshade cum lintel etc.
- Use of Renewable timber for doors and windows
- Use of Steel manufactures from recycled content
- Aluminum from verified recycled content
- Saw dust based doors and window frames
- Ferro-cement shutters, PVC doors and windows, Rice husk boards, Natural fibre- reinforced polymer composite door panels
- Polymer composite door panels

- Bamboo based products, bamboo strips boards.
- Alternatives for finishes are of Fly ash, Ceramic tiles, Terrazzo floors

5.2.1.1.3.1 Earth blocks

Earth blocks stabilized with 5%–15% of cement are good choice for low cost, low-rise construction in hot-humid climates.

5.2.1.1.3.2 Fly ash-based lightweight aerated concrete blocks

Fly ash based light weight aerated concrete blocks are manufactured for walls and roofing purposes by mixing fly ash, quick lime, or cement and gypsum with a foaming agent like aluminum powder. These are considered excellent products for walling blocks.

5.2.1.1.3.3 Bricks and block

Bricks and block products with waste and recycled contents such as fly ash (waste from coal burning plants), blast furnace slag, sewage sludge, waste wood fiber, rice husk ash, etc.

5.2.1.1.3.4 Concrete blocks

Concrete blocks using lime or waste wood fiber provide reduction of waste and saves energy. Fly ash can be used to replace about 15% to 35% of the total cementation material. The slag content can be used to replace the same between 20% and 25%.Perforated bricks can be used for wall structures.

5.2.2 Roofs

5.2.2.1 Conventional material

Roofing is RCC, as it is suitable for longer spans. The constituents of RCC, i.e., cement, sand, aggregate and steel are all energy intensive materials and have high embodied energy content.

5.2.2.2 Alternatives

5.2.2.2.1 Lightweight synthetic aggregate

The example is fly ash based aggregate, which is suitable for manufacture of brick, blocks, and is good substitute for clinker and natural aggregates.

5.2.2.2.2 Pre-cast/aerated cellular concrete walling blocks and roofing slabs

These are manufactured by the aerated cellular concrete manufacturing process. When used in multi-storied structures, they reduce the weight, resulting in a more economical design. In this project, insulation in the roof will be done by using insulating material containing bubble wrapping by metal sheets. This will also help in decreasing carbon footprints.

5.2.3 Structural frame

5.2.3.1 Conventional material

Structural frame of building comprises of footing, columns, beams and lintels, over which the envelope of building is supported.

5.2.3.2 Alternatives

5.2.3.2.1 Ferro cement

The composite Ferro cement system is simple to construct and is made of Ferro cement.

5.2.3.2.2 Metals

A variety of metals are used in buildings, but the major building material used structurally is steel. Steel has a high-embodied energy and recyclable content, as well as scrap value.

5.2.3.2.3 Recycled aggregates

Crushed concrete, brick, glass, or other masonry waste can also be used in conventional mixes.

5.2.3.2.4 Light weight concrete

Aluminum powder when added to lime reacts and form hydrogen bubbles, and a lightweight cementitious material is formed which could be used in conventional mixes. Structure will be completed with RCC, as per the government norms for loading and to provide structural stability to withstand earthquakes as this project is falling under zone IV.

5.2.4 Roads & open spaces

Use of grass pavers along the road side, parking and pedestrian areas is a potential solution to reduce the heat island effect. Recycled materials will be used for construction of road as well as for paver.

5.2.5 Permeable paving

Permeable (porous) paving will be provided to facilitate infiltration of surface water runoff and ground water recharge. The traffic areas will however continue to be impermeable.

5.2.6 Gravel/crusher fines

Loose aggregate materials from masonry wastes will be used to cover pedestrian surfaces.

5.2.7 Drainage system

Drainage syst5em is placed under gravels for collection of rain water and will be collected in sump.

5.2.8 Natural hazard prone areas

The project is situated in moderate earthquake risk area. Special attention is thus given to the structural design of foundation, elements of masonry, timber, plain concrete, reinforced concrete, pre-stressed concrete, and structural steel. All applicable guidelines (National Building Code Annexure 12) will also be followed in this regard to ensure safety of the building and its occupants.

5.2.9 Energy conservation

The following measures are being taken care of and being incorporated in the project's power consumption plan to increase energy savings.

i. All provisions of ECBC – 2017, SUPER ECBC BUILDING shall be followed
ii. Light power density for working areas including classrooms, labs, staff lounge etc. – 0.5W/SQ.FT
iii. Light power density for basements, service areas, utility areas – 0.10 W/SQ.FT
iv. Light fixtures (internal & external) with luminous efficacy > 120 LM/W

v. Entire academic building on daylight and occupancy sensors. All internal and external lights shall be centralized control system for scheduled turn on/off.
vi. High energy efficient bee 5 star rated equipment including fans, workstations, printers, etc. Wherever available
vii. Light power density for residential areas – 0.40 W/SQ.FT.
viii. All motors shall be minimum ie-3 rated
ix. Entire academic building on daylight and occupancy sensors
x. Motorized shade management system shall be used in the building
xi. All internal and external lights shall be centralized control system for scheduled turn on/off
xii. Major MEP services shall be monitored and controlled through building management system

Following measures have been proposed to reduce energy consumption for Electrical installations:

In the operational phase, appropriate energy conservation measures and management plan will be adopted in order to minimize the consumptions of non-renewable fuel. The following measures are suggested to be adopted:

- Solar lighting will be provided in open area.
- Use of LED instead of GLS/CFL lamps for Common Areas.
- Entire academic building on daylight and occupancy sensors.
- All internal and external lights shall be centralized control system for scheduled turn on/off. High energy efficient BEE-5 star rated equipment including fans, workstations, printers,etc will be used wherever available.

5.3 Conclusion

The proposed industrial estate is feasible as per analysis done from location and building material and technologies perspectives.

****

CHAPTER – VI

ENVIRONMENTAL MONITORING PROGRAM

6.1. INTRODUCTION:

Environmental monitoring provides assessment of the actual environmental impacts of the project. The monitoring results help to estimate the effectiveness of mitigation measures in protecting the environment. They are also used to ensure compliance with environmental standards, and to facilitate any needed project design or operational changes. An environmental monitoring program is important as it provides useful information and helps to:

- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures
- Define the responsibilities of the project proponents, contractors and environmental regulators and provides means of effectively communicating environmental issues among them.
- Define monitoring mechanism and identify monitoring parameters.
- Evaluate the performance and effectiveness of mitigation measures proposed in the Environmental Management Plan (EMP) and suggest improvements in management plan, if required.
- Find out pollution level inside the facility and in nearby areas.
- Compile pollution related data for remedial measures.
- Find out efficiency level of pollution control measures adopted.

6.2. ENVIRONMENTAL MONITORING SCHEDULE

Environmental monitoring refers to the tools and techniques that are designed to observe and characterize the environmental quality. This aids to assess the potential problems that result from the proposed facility, changes in environmental conditions and effectiveness of implemented mitigation measures. Regular monitoring in a systematic and standardized manner helps in assessment of current environment and provides information on operational performance of installed pollution control facilities. The monitoring parameters required to be defined along with the monitoring locations, and frequencies for effective monitoring of the project activities. Proposed schedule of environmental monitoring for both construction and operation phase is presented in table given below in **Table 6.1** and **Table 6.2** respectively.

Table 6.1: Environmental Monitoring Plan – Construction Phase

S.No.	Environmental Components	Parameters to be Monitored	Monitoring Locations	Frequency of Monitoring
1	Ambient Air Quality	Particulate Matter ($PM_{2.5}$)	Ten locations –	Twice a week (24 hourly) for one month once in six months.
		Particulate Matter (PM_{10})	1. Within boundary of the project site.	
		Sulphur Dioxide (SO_2)	2. Nirmal Nagar –W	
		Nitrogen Oxides (NO_2)	3. Sadhu Nagar- E	
		Carbon monoxide (CO)	4. Kalyanpur –NE	
		NH_3	5. Near Majra Chowk –SE	
		Ozone	6. Baruabag closed to Sisona –SE	
		Lead	7. Sitarganj – S	
		Nickel	8. Karha Pani Nursery –SE	
		Arsenic	9. Govind Nagar- NW	
		Benzo @ Pyrene	10. Prahalad Palsa –SSW	
2	Ambient Noise	Day and night noise level	Ten locations –	Twice a week (24 hourly) for one month once in six months.
			1. Within boundary of the project site.	
			2. Nirmal Nagar -W	
			3. Sadhu Nagar- E	
			4. Kalyanpur -NE	
			5. Near Majra Chowk -SE	
			6. Baruabag closed to Sisona -SE	
			7. Sitarganj - S	
			8. Karha Pani Nursery -SE	
			9. Govind Nagar- NW	
			10. Prahalad Palsa –SSW	

3	Surface Water	• **Physical Parameters:** pH, Turbidity, Colour, Odour, Taste,	Five Locations	Once in six months
		• **Chemical Parameters:** TDS, Total Hardness, Calcium hardness, Magnesium hardness, Chloride, Fluoride, Sulphate, Nitrates, Alkalinity, Boron.	1. Within boundary of the project site.	
		• **Heavy metal:** Iron, Copper, Manganese, Mercury, Cadmium, Flouride, Arsenic, Cyanide, Lead.	2. Down Stream Adjacent to project Site -W	
		• **Biological parameters** – Total coliform, Faecal coliform.	3. Near Entry point of Nalla-N	
		• (As per the classes suggested by CPCB).	4. Down Stream near village Alipura -S	
			5. Up Stream Adjacent to project Site	
4	Ground water	• **Physical Parameters**- pH, temperature.	Four Locations	Once in six months
		• **Chemical parameters**- Total dissolved solids, alkalinity, hardness, conductivity, NO_3, Cl, SO_4, Na, K, Ca, Mg, Phenolic compounds, dissolved oxygen, BOD and COD.	1. Within boundary of the project site Near Rajnagar Village -W	
		• **Heavy metals**- Cyanide, Aluminum, Arsenic, Cadmium, Chromium, Iron, Copper, Lead, Manganese, Zinc and Mercury.	2. Adjacent to project Site Village -E	

		• **Biological parameters** – Total coliform, Faecal coliform. • (Drinking Water Parameters, as per IS - 10500: 2012)	3. Near Rudpur Village-W 4. Prahald Palsa -SSW	
5	Soil	• **Physical Parameters**: pH, conductivity, WHC, Soil Texture, Porosity, Permeability, Bulk density, • **Chemical Parameters**: Na, Nitrogen, P, K, Ca, Mg, SAR, CEC, organic carbon, silica content, • **Heavy metals**- Cadmium, Chromium, Copper, Lead, Manganese, Zinc **(As per IS standard)**	Four Locations 1. Within Project Boundary 2. Rajnagar Village -S 3. Near Rudpur Village -W 4. Kailash Reserve Forest near Karha Pani Nursery - E	Yearly or as per conditions mentioned in EC letter or Consent letter
6	Occupational Health Monitoring	Periodical check up: Spirometry, Blood test (RBCs), Anemia, Hepatitis etc.	Workers can get tested from nearby heath center / project site	Once in a year

Table 6.2: Environmental Monitoring Plan – Operation Phase

S.No.	Environmental Components	Parameters to be Monitored	Monitoring Locations	Frequency of Monitoring
1.	DG set emissions	PM, SO_2, NO_2	DG stacks	Twice in a year or as per requirement of SPCB

2.	DG set noise	Noise level	At 1 m distance from enclosure.	Twice in a year or as per requirement of SPCB
3.	ETP (inlet and outlet)	• **Physical Parameters:** Temperature • **Chemical Parameters:** pH, TSS, BOD, COD, Oil and grease, Phenolic Compound, Ammonical Nitrogen, Boron, Percent Sodium, Chloride, Flouride, Sulphate, sulphide, Cyanide. • **Heavy Metal:**, Chromium, Arsenic, Copper, lead, Nickel, Zinc, Selenium. (As per requirement of norms (Environment Protection Rule 1986)).	Inlet and Outlet	Daily and as per requirements norms.
4.	Ambient Air Quality	$PM_{2.5}$, PM_{10}, SO_2, NO_2, CO	At project site boundary.	Twice a week (24 hourly) for one month once in six months.
5.	Ambient Noise	Day and night noise level	At project site and its boundary. Kalyanpur –NE Near Majra Chowk -SE	Twice a week (24 hourly) for one month once in six months.

6.	Surface Water	• **Physical Parameters:** pH, Turbidity, Colour, Odour, Taste, • **Chemical Parameters:** TDS, Total Hardness, Calcium hardness, Magnesium hardness, Chloride, Fluoride, Sulphate, Nitrates, Alkalinity, Boron. • **Heavy metal:** Iron, Copper, Manganese, Mercury, Cadmium, Flouride, Arsenic, Cyanide, Lead. • **Biological parameters** – Total coliform, Faecal coliform. (As per the classes suggested by CPCB).	One location within in Begul river adjacent to the site	Once in six months.
7.	Ground water	• **Physical Parameters**- pH, temperature, and conductivity and dissolved oxygen. • **Chemical parameters**- Total dissolved solids, alkalinity, hardness, NO_3, Cl, SO_4, Na, K, Ca, Mg, Phenolic compounds, BOD and COD. • **Heavy metals**- Cyanide, Aluminum, Arsenic, Cadmium, Chromium, Iron, Copper, Lead, Manganese, Zinc and Mercury. • **Biological parameters** – Total coliform, Faecal coliform. (Drinking Water Parameters, As per IS - 10500: 2012)	Project site. Kalyanpur –NE Near Majra Chowk -SE	Once in six months.
8.	Green Belt/ Plantation Area	1. Survival of trees 2. Type of trees planted,	Green belt area and plantation area.	Annual

The monitoring programme will be carried out as per the SPCB guidelines by engaging MoEF&CC/ NABL accredited laboratories only both during the construction and operation phase. The budget allocated for the monitoring the environmental monitoring both during construction and operation phase is explained in the **section 6.3**.

6.3. BUDGET

The monitoring and evaluation process will require a contingency budget. The cost required for the Environmental Monitoring Program both for construction and Operation phases are given in **Table 6.3** and **6.4** respectively.

Table 6.3: Budget for Environmental Monitoring Plan during Construction Phase

S.No.	Environmental Components	Annual Recurring cost (INR)
1.	Ambient Air Quality (twice a year)	100,000/-
2.	Ambient Noise (twice a year)	20,000/-
3.	Ground Water (twice a year)	40,000/-
4.	Surface Water (twice a year)	16,000/-
5.	Soil (Yearly)	40,000/-
	Total	**216,000/-**

(Note: Occupational Health Monitoring cost has been included under the EMP budget and given in chapter 9).

Table 6.4: Budget for Environmental Monitoring Plan during Operation Phase

S.No.	Environmental Components	Annual Recurring cost (INR)
1.	CETP	40,000/-
2.	Ambient Air Quality (twice in year)	8,000/-
3.	Ambient Noise (twice in year)	2,000/-
4.	Ground water (twice in year)	8,000/-
5.	Surface Water (twice a year)	8,000/-
6.	**Total**	**76,000/-**

The total annual monitoring cost of environmental components during the construction phase is Rs. 2, 16,000/- while that of operation phase is Rs. 76,000/-However the total budget of whole construction and operation phase is clearly given in Chapter-9 of this report.

In order to maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary. For this, the applicant has taken decision to formulate an Environmental Management Cell. The Environmental Monitoring Cell will co-ordinate entire monitoring program and generate data/information, which will be furnished as per statutory requirements. The structure of the Environmental Monitoring Cell is explained in Environmental Management Plan Chapter and training required by them.

****

CHAPTER – VII

ADDITIONAL STUDIES

7.1 Introduction

This chapter covers the risk assessment and disaster management plan. Emergency prevention through good design, operation, maintenance and inspection are essential to reduce the probability of occurrence and consequential effect of any eventualities. The overall objective of the Emergency Response Plan ERP is to make use of the combined resources at the site and outside services to achieve a disaster management plan to minimize the risks, onsite and offsite emergency management plans also covers the transport management & transport study along with occupational health and safety aspects of the project.

7.2 Public Hearing

This Draft EIA report will be placed in public domain for carrying out Public Hearing in presence of DM/DC/ADM as per the provisions of EIA Notification 2006 as amended thereof. Copies of executive summary will be distributed to the local people in both the languages (English and Hindi). Whole Draft EIA report will be placed in public domains for suggestions and objections. During hearing all the comments and suggestions received will be noted down and clarification along with the suggestions/commitments of client will be made and noted in the PH Minutes. Various concerns and issues put up while conducting public hearing and project proponent response along with plan of action & budge allocation will be given in the Final EIA report in the form of corporate environmental responsibility plan (CER-plan) and will be submitted to State Environment Impact Assessment Authority (SEIAA).

7.3 Risk assessment

A risk analysis is defined as an assessment of the likelihood of a release of HAZMAT (hazardous materials) and the consequences that may result, based on information gathered during the hazard identification and vulnerability analyses. Risk analysis requires evaluation of existing base and local community plans, response capabilities, and previous incidents.

- In order to determine the risk factor at each facility as the base, the following information was evaluated:
- Procedures for storing, handling, shipping, and transferring of HAZMAT;
- Facility information including: physical features and location of storm and sanitary sewer systems;
- Site measures for managing and controlling HAZMAT releases; and,
- Base emergency response and preparedness programs

7.3.0 Methodology:

The Risk Analysis Study was carried out under the following task heads:

7.3.1 System Study:

The system description covers the plant description, storage & handling of fuels / chemicals, etc.

7.3.2 Hazard Identification:

The hazards associated with the proposed industrial area have been discussed in terms of material & process hazards.

7.3.3 Frequency of Hazard Occurrence:

Based on the available international statistics and in-house risk database, the frequencies of occurrence for the different accident scenarios were determined. The frequencies were derived from the historical data base that has been checked with the possible hazard scenario identified during hazard identification.

7.3.4 Consequence Analysis

Based on the identified hazards, accident scenarios and the frequency of occurrence, consequence modeling was carried out for calculating the spreading distances (zone of influence) or risk distance for Pool fires and Explosions etc.

7.3.5 Risk Reducing Measures

Necessary risk reducing measures have been suggested based on the consequence scenarios. The main hazard potentials in the proposed industrial area are categorized as below:

- Material hazards; High Speed Diesel (HSD), Light Diesel Oil (LDO), as an auxiliary fuel for start-up and flame stabilization, and coal as raw materials used in the proposed Cement Plant.
- Process hazards due to loss of containment during handling of hazardous materials or processes resulting in fire, explosion, bursting of cyclones due to high pressure in the pre-heater circuit, etc Mechanical hazards due to "mechanical" operations such as welding, maintenance, falling objects etc. - basically those NOT connected to hazardous materials.
- Electrical hazards: electrocution, high voltage levels, short circuit, etc.

Out of these, the material and process hazards are the one with a much wider damage potential as compared to the mechanical and electrical hazards, which are by and large limited to very small local pockets.

7.3.6 Risk Mitigation Measures

The materials handled at the proposed installation are inflammable and reactive substances and based on the consequence analysis; the following measures are suggested as risk mitigation measures.

- The storage area, process area as well as road tankers loading/unloading areas• where there is maximum possibility of presence of flammable hydrocarbons in large quantities, it should be ensured that combustible materials are not placed here such as oil filled cloth, wooden supports, oil buckets etc. to reduce the probability of secondary fires in case of release.
- Hydrocarbon, smoke and fire detectors should be suitably located and linked to firefighting system to reduce the response time and ensure safe dispersal of vapours before ignition can occur.
- Tank fires result in little damage at ground levels. Damage at tank height is such as to damage adjacent tanks. Hence tank cooling provisions, particularly upper sections of the tank must be ensured to prevent explosion. Foam for arresting roof fires must be started immediately.
- Pool fires resulting from tanker/pump/pipeline leakage are dangerous since the liquid pool

becomes unconfined. Training in firefighting, escape action, operation of emergency switches etc. is vital.

- Pump loading line failures have also a possibility of causing major damage. Strict inspection, maintenance and operation procedures are essential for preventing escalation of such incidents.
- Emergency procedures should be well rehearsed and state of readiness to be achieved.

7.3.7 Fire Fighting Measures

Fire, Explosion and Toxicity Indexing is a rapid ranking method for identifying the degree of hazard. In preliminary hazard analysis, chemical storages are considered to have Toxic and Fire hazards. The application of FETI would help to make a quick assessment of the nature and quantification of the hazard in these areas. However, this does not provide precise information.

- Respective Material Factor (MF),
- General Hazard Factors (GHF)
- Special Process Hazard Factors (SPH)

The above-mentioned parameters are computed using standard procedure of awarding penalties based on storage handling and reaction parameters. The application of FETI would help to make a quick assessment of the nature and quantification of the hazard in these areas. However, this does not provide precise information.

- It can be used to classify separate elements of plant within an industrial complex. Before indexing is done, the plant is divided into plant elements. Depending upon the material in use, material factor is decided upon. A number of parameters, such as exothermic reactions, handling hazards, pressure of system, flash point, operating temperature, inventory of flammable material, corrosive property, leakage of points and toxicity are taken into consideration in determining a plant/ equipment /operation hazard. A standard method of awarding penalties and comparing the indices is used.
- However, this method does not give absolute status of the equipment or section. But it can comparatively identify hazards among others.
- These risks must be controlled by the development of a safe system of work, which can be defined as the set of controls necessary to minimize the risks associated with the work.

Furthermore, it is recommended that additional measures for safety be taken. These measures include inspecting all other piping and appurtenances for damage and corrosion to prevent the unexpected leakage of HSD, LDO and Petrol establishing an Emergency Plan, Employee Emergency Plans and Fire Prevention Plans." Following are the recommendations:

- Store in tightly closed containers in a cool, well-ventilated area away from Water, Heat, Combustibles (such as wood, paper and oil) and light.
- Store away from incompatible materials such as flammable materials, oxidizing materials, reducing materials, strong bases.
- Use corrosion-resistant structural materials and lighting and ventilation systems in the storage area.
- Wood and other organic/combustible materials should not be used on floors, structural materials and ventilation systems in the storage area.
- Use airtight containers, kept well sealed, securely labeled and protected from damage.
- Use suitable, approved storage cabinets, tanks, rooms and buildings.

- Suitable storage may include glass bottles and carboys.
- Storage tanks should be above ground and surrounded with dikes capable of holding entire contents.
- Limit quantity of material in storage. Restrict access to storage area.
- Post warning signs when appropriate. Keep storage area separate from populated work areas. Inspect periodically for deficiencies such as damage or leaks.
- Have appropriate fire extinguishers available in and near the storage area.

The following measures are suggested for reducing the risk involved in pipeline systems.

- Preventive Maintenance:
- Routine inspection of equipment/facilities at the unit.

Instruments: All the instruments like pressure, temperature transmitters/gauges and alarms switches and safety interlocks should be tested for their intended application as per the preventive maintenance schedule. Similarly, the emergency shutdown system should be tested as per the preventive maintenance schedule.

7.3.7.1 Location of fire station

The nearest fire station is Police fire station SIIDCUL Sitarganj at a distance of 1.7km in North East direction.

7.3.7.2 Fire rescue plan

- Provision of Automatic water sprinklers.
- Provision of separate fire hydrant pipe.
- Provision of Overhead water storage tank.
- There is provision of firefighting pumps.
- Optical type smoke detectors shall be used in most areas.

Fire officer will be the commanding officer of the fire fighting services. Additional strength for firefighting which is beyond the control of the station will come from security and maintenance personnel and if required from outside fire stations.

7.4 Emergency Preparedness Plan

- This may have following components:
- Information on the preliminary hazard analysis:
- Type of accident
- System elements or events that can lead to a major accident
- Hazards
- Safety relevant components
- Details about the site
- Location of dangerous substances.
- Seat of key personnel
- Emergency control room
- Description of hazardous chemicals at plant site:
- Chemicals (Quantities and toxicological data)
- Transformation if any, which could occur.

- Purity of hazardous chemicals.
- Likely dangers to the plant.
- Enumerate effects of Accident
- Stress and strain caused during normal operation
- Fire and explosion inside the plant and effect if any, of fire and explosion outside.

7.5 Electrical safety

The Indian Electricity (IE) Rules, 1956 was made under section 37 of the Indian Electricity Act, 1910 and redefined after enactment of The Electricity Act, 2003. CEAR namely Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 came into effect from 20th September 2010, in place of The Indian Electricity Rules, 1956.

IE rules mainly dealt with

- Appointment of inspectors & their duties
- Licensing provisions.
- General safety requirements
- Conditions relating to supply and use of energy.
- Electric supply lines and systems for LV & MV
- Electric supply lines and systems for HV & EHV.
- Overhead lines, underground cables and generating stations
- Electric traction.
- Precautions in mines & oil fields

7.6 Handling Earthquake Emergencies

DO'S

- If any damage is suspected, turn the system off from the main valve or, switch.
- Clean up household chemical spills, toxic and flammable materials to avoid any chain of unwanted events.
- Gather information and necessary instructions from battery operated radios.
- Obey Public safety precautions.
- Leave a message stating where you are going if you must evacuate your residence.
- Take your earthquake survival kit with you.
- It should contain all necessary items for your protection and comfort.
- Check your water and electrical lines for defects.

DON'T s

- Do not fill the overhead tank completely.
- Do not carry out haphazard repairs.
- Repairs should be done only under the supervision of a structural engineer.
- Do not put additional supports without the guidance of an experienced/qualified structural engineer.
- Do not use the lift until it has been checked and certified by the lift company.

7.7 Department details and inventory of resources: Department details and inventory of resources for Udham Singh Nagar is given in table 7.1 to 7.17.

Table 7.1: District at a Glance

S/n	Details	Period	Unit	Description
1.	Geographical area	2011	Sq Km	2542
2.	Forest area	2011	Sq Km	918
3.	Tehsils	2021	Nos	08
4.	Sub Tehsils	2021	Nos	01
5.	Community Block	2021	Nos	07
6.	PanchayatiAdalat	2021	Nos	27
7.	Gram Panchayat	2021	Nos	376
8.	Inhabited revenue village	2020-21	Nos	620
9.	Uninhabited revenue village	2020-21	Nos	12
10.	Inhabited forest village	2020-21	Nos	18
11.	Uninhabited forest village	2020-21	Nos	3
12.	Nagar Nigam	2020-21	Nos	02
13.	Nagar Palika Parishad	2020-21	Nos	07
14.	Nagar Panchayat	2020-21	Nos	07
15.	Vikash Pradhikaran	2020-21	Nos	01
16.	VidhansabhaKshetra	2020-21	Nos	09
17.	Police station (Rural)	2020-21	Nos	07
18.	Police station (Urban)	2020-21	Nos	10
19.	GRP station	2020-21	Nos	01
20.	Veterinary Hospital	2020-21	Nos	22
21.	Movable Veterinary Hospital	2020-21	Nos	01
22.	Veterinary service centre	2020-21	Nos	73
23.	Artificial insemination centre	2020-21	Nos	95
24.	Horticulture Mobile Teams	2020-21	Nos	14
25.	Fruit preservation centre	2020-21	Nos	03
26.	Nursery	2020-21	Nos	03
27.	Govt Park	2020-21	Nos	03
28.	Khadi& Village Industries	2020-21	Nos	447
29.	SSI Units	2020-21	Nos	629
30.	Workers in Khadi& Village Industries	2020-21	Nos	2722
31.	Workers in SSI Units	2020-21	Nos	3950
32.	Factories	2020-21	Nos	1214
33.	Workers in factories	2020-21	Nos	248967
34.	Colleges	2020-21	Nos	2385
35.	Primary school	2020-21	Nos	1225
36.	Junior high school	2020-21	Nos	674
37.	High school & intermediate	2020-21	Nos	486
38.	UG/PG College	2020-21	Nos	13

S/n	Details	Period	Unit	Description
39.	University	2020-21	Nos	1
40.	ITI (private)	2020-21	Nos	13
41.	Capacity of ITI (private)	2020-21	Nos	914
42.	Govt Polytechnic	2020-21	Nos	05
43.	Capacity of Govt Polytechnic	2020-21	Nos	2383
44.	DIET	2020-21	Nos	01
45.	Capacity of DIET	2020-21	Nos	50

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.2: List of sailors in Tehsil

S/n	Name & address	Mobile No
1.	Swaran Singh, S/o Jagtar Singh, R/o Devipura	8958024323
2.	Makhan Singh, S/o Harnama Singh, R/o Devipura	9012610107
3.	Kulvant Singh, S/oBalvir Singh, R/o Devipura	7500152173
4.	MalkitSingh, S/o Jarnail Singh, R/o Devipura	9837208890
5.	Baljindra Singh, S/o Surjit Singh, R/o Devipura	9927469085
6.	Malkit Singh, S/o Arjun Singh, R/o Devipura	9012226827
7.	Sukhdev Singh, S/o JeetSingh, R/o Devipura	9105672492
8.	Gurmeet Singh, S/o Mehar Singh, R/o Devipura	9927979163
9.	Baljindra Singh, S/o Bhud Singh, R/o Devipura	7248187504
10.	RanjeetSingh, S/o Kashmir Singh, R/o Devipura	9105758435
11.	Mangal Singh, S/o Kulvant Singh, R/o Devipura	8958986223

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.3: Contact details of Govt. Officers

S/n	Name	Designation	Mobile No
1	Shri Tushar Saini	SDM- Sitarganj	9456500033
2	Shri Suresh Chandra Budlakoti	Tehsildar- Sitarganj	9412129137
3	Shri Harish Chandra Joshi	BDO- Sitarganj	9837432072
4	Dr Rajesh Kumar Arya	Medical officer –Sitarganj	9410364519
5	SmtSushma Gaurav	BEO- Sitarganj	7830502277
6	SmtSarita Rana	Executive officer - Sitarganj	9837022731
7	Shri R. P. Bijwal	Executive officer – Saktigarh	9897759770
8	Ms. Saroj Gautam	Executive officer - Nanakmatta	7088652222
9	SmtManjulata Yadav	CDPO- Sitarganj	9761941380
10	Shri ArvindNegi	Executive engineer	9249635477
11	Shri Veer Singh	Circle officer- Sitarganj	9411112998
12	Shri Prakash Singh Danu	Officer Incharge	9411112905
13	Shri Suresh Chandra	SHO - Sitarganj	9412474869
14	Shri Sachin Kanojiiya	Veterinary Medical officer- Nanakmatta	9639287268

S/n	Name	Designation	Mobile No
15	Shri Shyam Narayan	Veterinary extension officer- Lamakhera	956379445
16	Dr. Jitendra	Veterinary Medical officer- Sitarganj	9917665920
17	Shri Dharmendra Prasad	Veterinary extension officer- Tiliapur	8650353601
18	Shri B. V. Joshi	Executive engineer- Sitarganj	9412091264
19	Shri Manish Joshi	Executive engineer- Nanakmatta/ Saktifarm	9411108050
20	Shri Pramod Kumar Suyal	Executive engineer- PWD Khatima	9997461227
21	Shri Lalit Mohan Pandey	Secretary Mandi Samiti Sitarganj	7983520874
22	Shri Dharmendra Singh Dhami	Supply inspector - Sitarganj	7310641405

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.4: Contact details of tent house owner

S/n	Name of tent house/ owner	Location	Mobile No
1	Kuldeep tent house	Nanakmatta	9837814870
2	Rana tent house	Nanakmatta	9837349844
3	Purushottam Tent house	Nanakmatta	8937928304
4	Sagar Tent house	Nanakmatta	9012782903
5	Balaji tent house	Nanakmatta	9837896902
6	Deshmesh tent house	Sitraganj	9837677021
7	Bharat Tent House	Sitarganj	9837443255
8	Shahji Tent house	Sitarganj	9837626112
9	Shedana Tent house	Sitarganj	9837054061
10	Swami Tent house	Sitarganj	9412327302
11	Joshi Tent house	Sitarganj	9720003666
12	Mohit Tent house	Sitarganj	8057968205
13	Savan Tent house	Sitarganj	7088250111
14	Delhi Tent house	Nanakmatta	9012929035
15	Swami Tent House	Sitarganj	9690418180
16	Kamboj Tent House	Sesoona	9012818454
17	Alok Tent house	Sesoona	9837419179

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.5: List of Rasan Dealers

S/n	Name of Rasan Dealers	Location	Mobile No
1	Somandra Singh (Gootha)	Khamariya	9568216023
2	Bacchu Singh (Sesoona)	Sitraganj	8057251428

S/n	Name of Rasan Dealers	Location	Mobile No
3	Krishnautth (Ghiddhor)	Deyudee	6396377798
4	Narayan Singh (Jhade)	Vidora	7500237222
5	Ramdulara (Ward – 06, Sitraganj)	Pachpera	9756024183
6	Vijendra Prashad(Nirmalnagar)	Veechuva	9897476153
7	Arun Singh (Kherana)	Nanakmatta	9927169032
8	Dighvijay Singh (Veechuva)	Shadunagar	9837528222
9	Uttam Singh Mazudar (Bhaktinagar)	Ghidhor	9997997554
10	Reena Rani (Shadunagar)	Magarsada	8193867308
11	Arun Singh (Nakuliya)	Sitarganj	9911430454
12	Iqubal Singh (Bijtte)	Ajaniya	9927292652
13	Vishwajeet (Arvindnagar)	Thiliyapur	9012763848
14	Rambhorasha (Tharuthisoor)	Anand Nagar	746606311
15	Hardev singh (sarooja)	Dev Nagar	9917716150
16	Arjun Singh (Balkhera)	Dev Nagar	9837486154

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.6: List of Hospital Government

S. No.	Type of Hospital	Location	Numbers of Beds	Ambu lances	Doctor /Incharge	Mobile No.
1	Community Health Center Sitraganj	Sitarganj	30	01	Dr. Rajesh Arya	941036451
2	Primary Health Center Shakti farm	Shakti farm	02	-	Dr. Narendra Kumar Bhatt Farma	843938659
3	Primary Health Center Nanakmatta	Nanakmatta	10	-	Dr. Palak Silpe	975679040
4	Wellness Center Mainaajhundee	Mainaajhund	02	-	K.K. Ratudi Farmosist	735188304

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

7.7: List of Hospitals Private

S. No.	Type of Hospital	Location	Numbers of Beds	Ambu lances	Doctor /Incharge	Mobile No.
1	Durna Max Hospital	Sitarganj	100	01	Dr. Sukhvinder Singh Durna	
2	Kuldeep Clinic	Sitarganj	-	-	Dr. Kuldeep Singh	9837065562
3	Saxena Nursing Home	Sitarganj	12	-	Dr. Mamta Saxena	9456324448
4	Omansh Clinic	Sitarganj	01	-	Dr. Omkar Singh	8533906666
5	Dr. Mahendra Clinic	Sitarganj	-	-	Dr. Mahendra Singh	9412139113
6	Triveni Hospital	Sitarganj	-	-	Dr. Hem chad	7579229661

S. No.	Type of Hospital	Location	Numbers of Beds	Ambu lances	Doctor /Incharge	Mobile No.
					Upadhyay	
7	Anand Dental Care	Sitarganj	-	-	Dr. Vikram Anand, Dr. Anupriya Anand	9837004424
8	Irfan Clinic	Sitarganj	-	-	Dr. Bhagwan Saran	8057233100
9	Bhagwan Saran Clinic	Sitarganj	-	-	Dr. Mo. Irfan	9457540113
10	Das Dental Clinic	Sitarganj	-	-	Dr. Hemant Kumar	9410843450
11	City Dental Clinic	Sitarganj	-	-	Dr. Gaurav Tiwari	9997172749
12	Jaswant Clinic	Sitarganj	-	-	Dr. Vikash Arora	
13	Jai Santoshi Ma Poly Clinic	Sitarganj	-	-	Dr. J.K. Kashyap	8279595294
14	Brijlal hospital	Sitarganj	70			
15	Sachan Clinic	Sitarganj	-	-	Dr. Rakesh Sachan	9837309306
16	Dr. Shoyab Ahmad Clinic	Sitarganj	-	-	Dr., Shoyab Ahmad	9837514012
17	Kothari Dental Clinic	Saktifarm	-	-	Dr. Usha Kothari	8477839123
18	Acharya Clinic	Saktifarm	-	-	Dr. Jaswant	
19	Guru Ramdas Hospital	Nanakmatt	20	-	Dr. Kashmer Singh	9897818483
20	Pant Ratan Baba Harbansh Singh Tahal Singh Charitable Hospita	Nanakmatt	-	-	Dr. Subhash Chandr Yadav	
21	Dr. Om Chauhan/Deshmesh Clinic/Mandal Medical Store Shakti farm	Saktifarm/ Sitarganj	--	-	Dr. OM Chahuan	9837283283
22	Satya Netraalay	Sitarganj	-	-	Dr. Abhishek Bansa	9458695778

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.8: List of Army Hospital

S.no.	Location	Number of Bed	Ambulance	Doctor /Incharge	Mobil No.
-	-	-	-	-	-

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.9: Facilities in Government Hospital

S. No.	Type of Facilities	Hospital Name	Quantity
1	Out Patient Medical Room	Community Health Center Sitraganj	30
2		Primary Health Center Shakti farm	04
3		Primary Health Center Nanakmatta	04
4		Wellness Center Mainajhundi	04

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.10: Facilities in Private Hospital

S. No.	Type of Facilities	Hospital Name	Quantity
1	Pediatrician, Orthopedist, Gynecologists	Durna Max Hospital	100
2	Physician	Kuldeep Clinic	-
3	Gynecologists	Saxena Nursing Home	12
4	Physician	Omansh Clinic	01
5	Physician	Dr. Mahendra Clinic	-
6	Physician	Triveni Hospital	-
7	Dentist	Anand Dental Care	-
8	Physician	Irfan Clinic	
9	Physician	Bhagwan Saran Clinic	-
10	Dentist	Das Dental Clinic	
11	Dentist	City Dental Clinic	-
12	Physician	Jaswant Clinic	-
13	Physician	Jai Santoshi Ma Poly Clinic	-
14	Physician	Brijlal hospital	70
15	Physician	Sachan Clinic	-
16	Physician	Dr. Shoyab Ahmad Clinic	-
17	Physician	Dr. Bhanu Pratap Clinic	-
18	Dentist	Kothari Dental Clinic	-
19	Physician	Acharya Clinic	-
20	Physician	Guru Ramdas Hospital	20
21	Physican	Pant Ratan Baba Harbansh Singh Tahal Singh Charitable Hospital	-
22	Physican	Dr. Om Chauhan/Deshmesh Clinic/ Mandal Medical Store Shakti farm	-
23	Eye Physician	Satya Netraalay	

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.11: List of Volunteers

S. No.	Name	Mobile No.	Location
1.	Mr. Sanjay Goyal	8379951111	Sitarganj
2.	Roshanlal Agarwal	9837044936, 7055178555	Sitarganj
3.	Mahesh Mittal	9837290856	Sitarganj
4.	Shiv Kumar Mittal	9837044936	Sitarganj
5.	Suresh Singhal	9827093154	Sitarganj
6.	Anwar Ahmad	9837759221	Sitarganj
7.	Rakesh Gupta	9837051197	Sitarganj
8.	Ajay Agarwal	8532800000	Sitarganj
9.	Suresh Jain	9837205811	Sitarganj
10.	Samasul Hak Malik	9837232422	Sitarganj

11.	Aamil Malik	9756349786	Sitarganj

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.12: List of NGOs

S. No.	Facilities	
1.	Tents as shelter for affected people	It is Available
2.	Facilities Within Tents	It is Available
	• Solar Lanterns	It is Available
	• Emergency Lights	It is Available
	• Sleeping Bags	It is Available
	• Blankets	It is Available
	• Pillows	It is Available
	• Quits	It is Available
	• Mattresses	It is Available
3.	Medicals relief tents	It is Available
4.	Storage Tents	It is Available
5.	Cooking Area tents- Utensils	It is Available
6.	Signage's	No
7.	Mobile toilets	No
8.	Emergency Communication	Yes
9.	Hygiene kits	No
10.	Help Disk	No
	• Wireless	Yes
	• Fax	Yes
	• Computer	Yes
	• Printer	Yes

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.13: List of Critical Zones

S. No.	Name of the Critical Area	Location	Block
1.	Rudrapur	Sitarganj - – Saktifarm Road	Sitarganj
2.	Rajnagar	Sitarganj - – Saktifarm Road	
3.	Surendra Nagar	Sitarganj - – Saktifarm Road	
4.	Bamanpuri	Sitarganj - – Saktifarm Road	
5.	Sitarganj	Sitarganj - Road	
6.	Rampura	Sitarganj – Road	
7.	Baruvaabaag	Sitarganj - haldvaanee choragaliya	
8.	Lokka	Kichaa Sitarganj Road	
9.	Gotha	Kichaa Sitarganj Road	
10.	Chikaaghaat	Sitarganj Khatimaa Road	
11.	Cova Asraf	Sitarganj bijatee Marg	

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.14: List of Machines

S. No.	Name of the Machines	Location	Quantity	Operator
1.	JCB	Sitarganj	9837288210	Seemaab raza khaan
2.	JCB	Sitarganj	9837205811	Suresh Kumar Jain

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.15: List of Gangs

S. No.	Name of the Gangs Man	Location	Block & Tehsil
1.	Puran Singh % Mohan Lal	Lok nirmaan vibhaag Sitarganj	Sitarganj
2.	Bharat Chandra % Vijay Dhār	Lok nirmaan vibhaag Sitarganj	Sitarganj
3.	Suresh % Gangaram	Lok nirmaan vibhaag Sitarganj	Sitarganj
4.	Gopal Singh % Hari Singh	Lok nirmaan vibhaag Sitarganj	Sitarganj
5.	Khalil Ahmad % Chutkan	Lok nirmaan vibhaag Sitarganj	Sitarganj
6.	Radheshyam % Ramswaraup	Lok nirmaan vibhaag Sitarganj	Sitarganj
7.	Rakesh Tyagi % Amir Chand	Lok nirmaan vibhaag Sitarganj	Sitarganj
8.	Naresh Kumar % Vishwanath	Lok nirmaan vibhaag Sitarganj	Sitarganj
9.	Dhan Singh % Bhajji Singh	Lok nirmaan vibhaag Sitarganj	Sitarganj
10.	Bhim Singh % Munshi Singh	Lok nirmaan vibhaag Sitarganj	Sitarganj
11.	Sukhdev Singh % Nand Kishore	Lok nirmaan vibhaag Sitarganj	Sitarganj
12.	Ram Singh % Bhaagapat	Lok nirmaan vibhaag Sitarganj	Sitarganj
13.	Dashrath Singh % Sipaahee	Lok nirmaan vibhaag Sitarganj	Sitarganj
14.	Subhash Singh % Jayadu Prasad	Lok nirmaan vibhaag Sitarganj	Sitarganj

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.16: List of communication Media/Equipment's

S. No.	Name Communication	No's	Location	Contact Person	Phone
1.	Wireless Set	01	Kotavaalee Sitarganj	Parabharee Neerakshak Sitarganj	05948/24439
2.	Satellite Phones	-	-	-	-
3.	DSPT Terminals	-	-	-	-
4.	Community Radio	-	-	-	-
5.	HAM Radio	-	-	-	-

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

Table 7.17: Search & Rescue Equipment List

S. No	Name of items	No's	Location Thana/Chock /Tehsil Fire Station/DDMA Office	Contact Officer	Mobile Number
1.	Sirens/	1	Tehsil – Sitarganj	Tehsil	05948-

S. No	Name of items	No's	Location Thana/Chock /Tehsil Fire Station/DDMA Office	Contact Officer	Mobile Number
	Alarms				
2.	Loudhailers/ PA	1			
3.					
4.		1	Thana Sitarganj	01 Thana Sitarganj	
5.	Torchers-Batteries				
6.	ASKA Lights (Inflatable)				
7.	Ropes	5	ShaktifarmChoki and Thana Sitarganj	ShaktifarmChoki 03 thana Sitarganj 02	
8.	Cordon – off tags				
9.	Life jackets	10	Thana Sitarganj and ShaktifarmChoki	Shaktifarmchoki 5 thana	
10.	Body bags	10	Thana Sitarganj and ShaktifarmChoki	Shaktifarmchoki 5 thana	
11.	Cutters				
12.	Lifters				
13.	Stretchers	1	Thana Sitarganj	Thana Sitarganj 01	
14.	Tents				
15.	Uniforms				
16.	Signage's	1	Thana Sitarganj	Thana Sitarganj	
17.	Tape Sling	21	Thana Sitarganj	Thana Sitarganj 21	
18.	Rope Ladder				
19.	Carabineers	1	Thana Sitarganj	Thana Sitarganj 1	
20.	Hammer Piton	14	Thana Sitarganj	Thana Sitarganj 14	
21.	Seat Harness	11	Thana Sitarganj	Thana Sitarganj 11	
22.	Zumar	14	Thana Sitarganj	Thana Sitarganj 14	
23.	Descender	12	Descender	Thana Sitarganj 12	
24.	Helmet with torch fitted	17	Thana Sitarganj Saktifarm Choke	Thana Sitarganj 7 , 10 Saktifarm Choke	
25.	Gaiti with Wooden handle	15	Thana Sitarganj Saktifarm Choke	Thana Sitarganj 5 , 10 Saktifarm Choke	

S. No	Name of items	No's	Location Thana/Chock /Tehsil Fire Station/DDMA Office	Contact Officer	Mobile Number
26.	Bailcha with wooden handle	7	Thana Sitarganj	Thana Sitarganj 7	
27.	Phavara with wooden handle	7	Thana Sitarganj Saktifarm Choke	Thana Sitarganj 5 , 2 Saktifarm Choke	
28.	Sabbal (big + small)	12	Thana Sitarganj	Thana Sitarganj 12 big	
29.	Hand Axe with Wooden handle	4	Thana Sitarganj Saktifarm choke	Thana Sitarganj 2, 2, chokesaktifarm 2	
30.	Tasla	7	Thana Sitarganj	Thana Sitarganj 7	
31.	Nylon torpline				
32.	Patro Max	2	Thana Sitarganj	Thana Sitarganj 2	
33.	Four cell torch	11	Thana Sitarganj Saktifarm Choke	Thana Sitarganj 7, choke shaktifarm 4	
34.	Rain Suit	13	Thana SitarganjShaktifarm Choke	Thana Sitarganj 8, shaktifarm 5	
35.	Mitton (2 pair each)	21	Thana Sitarganj	Thana Sitarganj 7	
36.	Carry Mat`	21	Thana Sitarganj	Thana Sitarganj 21	

Source: District Disaster management Plan; Udhamsingh Nagar 2022-23

7.8 Health & Emergencies

Medical surveillance program (also termed as medical surveillance for workers) can aid in the early recognition of a relationship between exposure to a hazard and disease and in the assurance of the safety of new substances. It is the systematic collection, analysis, and dissemination of disease data on groups of workers and is designed to detect early signs of work-related illness. The Factories Act, 1948 and the rules framed there under provide for pre-employment and periodical medical examinations of workers employed in industries with hazardous processes and dangerous operations under section 41-C and section 87 respectively. Chemicals Exposed to Workers Directly or indirectly are Formaldehyde and Styrene and other chemicals as described in raw material storage inventory. Pre-employment medical checkup and periodically medical examination will be done. Liver function testis will be carried out during pre-placement and periodical examination. In addition to the above, following safety equipment will be provided.

Action plan for Occupational Health and safety of worker:

Monitoring of occupational hazards like noise, ventilation, chemical exposure etc. will be carried out

regularly and its record will be maintained. x Good housekeeping, use of PPE, Engineering controls, Enclosure processes, display of safety boards, SOP of loading / unloading, local exhaust ventilation, safety shower etc. All necessary safety measures will be taken to keep all chemicals within TLV. x Appropriate personal protective equipment will be provided & ensure the usage of them. x Workers will be trained on safe material handling of hazardous chemicals. x Prepared & display the safe operating procedure for hazardous chemicals storage, handling & transporting or using. x Periodical medical examination of the workers & Liver Function Testes will be done. x Register (Form no.37) for work place air monitoring will be done regularly. x Employee training and education will be carried out regularly. x Control the noise at source by substitution, isolation, segregation, barriers will be done. x Local Exhaust ventilation will be installed where it is required to reduce fumes, vapors, temperature and heat stress. The details of available health facilities are given in table 7.6 to 7.10.

7.8.1Fire stations

The nearest fire station is Police fire station SIDCUL Sitarganj at a distance of 1.7km in North East direction.

7.8.2 Industrial Health and Safety

OBJECT:

The Factory Act, 1948 is Central legislation provides for the Health Safety, Welfare, and Healthy work environment. The various provisions of this Act & Rule made there under are ensured through inspection of factory.

Applicability of the Factory Act:

This Act is applicable to the Factories

i. where on ten or more workers are working, or were working on any day of the preceding twelve months, and in any part of which a manufacturing process is being carried on with the aid of power, or is ordinarily so carried on, or
ii. Where on twenty or more workers are working, or were working on any day of the preceding twelve months, and in any part of which a manufacturing process is being carried on without the aid of power, or is ordinarily so carried.

No building in a factory shall be constructed reconstructed or extended nor shall any manufacturing process be carried or in any building constructed or extended or taken into use as factory or part of a factory after the date of the enforcement of this rule, unless previous permission in writing is obtained from the State Government or the Chief Inspector.

The Registration/Renewal of all such units which covered by definition of Factory Act, 1948 is being done by Asstt Director of Factory, Dy. Director Factory and Chief Inspector of Factories. Asset Director of Factory, Dy. Director Factory ensure the Safe and Healthy work environment to the workers and due welfare facilities under the law and also advise to the management of factories, so safe working condition are ensured and industrial Accidents are prevented in factories.

The powers for plan approved registrants and license renewal of factors under Factories Act 1948 are designated as under:

1.	Factories employing less than 300 workers	Asstt. Director of Factories & Boilers
2.	Factories employing less than 300 or More workers	Dy. Director of Factories & Boilers

3.	Major Accident hazard Factories	Chief Inspector of Factory

On the application by the owner the renewal of license except Hazardous and MAH Factories of all others factories is being done for 5 Year at a time.

The license fee for the issue of license and renewal thereof charged on the basis of installed Horse Power and Maximum number of person employed on any day during the calendar Year. To ensure the provision of Factory Act 1948 inspection of the factories are being carried out by the Dy. Director Factory/ Asstt Director Factory & Boilers. If occupier\Factory Manager negligent in the compliance of the provision of the Factory Act, 1948 and rules made there under the prosecution are launched in the competent court of law. All fatal and non fatal accidents are investigated to avoid recurrence of such accidents by Asstt Director Factories& Boilers. The State Government under the Factories Act, 1948 and Ministry of Environment & Forest, Govt. of India under the Environment protection Act 1986 have notified following specific rule in view of the use, handling and storage of Hazardous substance in the factories and to ensure the safety of workers and public residing nearby. The officers of Factory and Boilers also ensure compliance of specific safety provision stipulated in these rules:

1) **The Uttarakhand factories (Control of industrial Major Accidents Hazards) Rules, 1996 (under the Factories Act, 1948)**
2) **The Manufacturer, Storage and Import of Hazardous Chemicals Rules, 1989 (amended 2000) (under the Environment protection Act, 1986)**
3) **The Chemical Accidents (Emergency planning preparedness and Response) Rule, 1996 (Under the Environment Protection Act, 1986)**

In the State of Uttarakhand there are 733 factories of hazardous nature, wherein hazardous substance are being handled, used and stored and there is possibility of impairment to the health of workers employed there in as well as pollution of the general environment. The Asstt. Director of Factory and Boilers keeps vigilant eye on such units through inspection so that necessary and adequate safety arrangements are ensured in view of industrial activities and use of hazardous substances.

Out of these 733 hazardous factories there 41 factories, which are major accident hazard prone and where in the use or storage of hazardous substance is equal to or more then the quantity specified in above citied rules. All the Major Accident hazardous Factories are advised to ensure the provision of MSIHC Rules, 1989 (amended 2000) and presently these 41 major accident hazard factories are situated in 4 districts. District Crisis Groups in all the 4 Districts have been constituted under the chairmanship of District Magistrate of respective districts.

OBLEGATION OF OCCUPIER:

An employer is under statutory obligation to safeguard the health, safety and welfare of workers through proper maintenance of plant, machinery and appliances and instructions trainee supervisions over workers to ensure the health and safety of all workers at work

7.8.3 Police Stations: The details of govt officers including police stations have been given in table No 7.3.

7.8.4 Red Cross, Human Resource: The details of medical workforce available in the study area are given in table 7.6 to 7.10.

7.9 District Incident Response System (IRS):

The IRS organization functions through Incident Response Teams (IRTs) in the field. In line with our

administrative structure and DM Act 2005, Responsible Officers (ROs) have been designated at the State and District level as overall in charge of the incident response management. The RO may however delegate responsibilities to the Incident Commander (IC), who in turn will manage the incident through IRTs. The IRTs will be pre-designated at all levels; State, District, Sub-Division and Tehsil/Block. On receipt of Early Warning, the RO will activate them. In case a disaster occurs without any warning, the local IRT will respond and contact RO for further support, if required. A Nodal Officer (NO) has to be designated for 2 National Disaster Management Guidelines: Incident Response System 14 Incident Response System proper coordination between the District, State and National level in activating air support for response. Apart from the RO and Nodal Officer (NO), the IRS has two main components;

a) **Command Staff**.

The Command Staff consists of Incident Commander (IC), Information & Media Officer (IMO), Safety Officer (SO) and Liaison Officer (LO). They report directly to the IC and may have assistants. The Command Staff may or may not have supporting organizations under them. The main function of the Command Staff is to assist the IC in the discharge of his functions

b) **The General Staff**

- **Operations Section (OS)**: The OS is responsible for directing the required tactical actions to meet incident objectives. Management of disaster may not immediately require activation of Branch, Division and Group. Expansion of the OS depends on the enormity of the situation and number of different types and kinds of functional Groups required in the response management.
- **Planning Section (PS):** The PS is responsible for collection, evaluation and display of incident information, maintaining and tracking resources, preparing the Incident Action Plan (IAP) and other necessary incident related documentation. They will assess the requirement of additional resources, propose from where it Overview of Incident Response System Incident Response System 15 can be mobilised and keep IC informed. This Section also prepares the demobilization plan.
- **Logistics Section (LS)**: The LS is responsible for providing facilities, services, materials, equipment and other resources in support of the incident response. The Section Chief participates in development and implementation of the IAP, activates and supervises Branches and Units of his section. In order to ensure prompt and smooth procurement and supply of resources as per financial rules, the Finance Branch has been included in the LS

7.10 R&R Action Plans: The project site was given by Gov. of Uttarakhand to SIIDCUL for the development of an industrial estate. No person is residing the project site hence R & R is not applicable.

****

CHAPTER – VIII

PROJECT BENEFITS

8.1 Introduction

Any industrial activity helps in improving the socio-economic benefits in areas like employment, communication, educational etc.

Industries that will be located in IIE Sitarganj, will benefit from economies of scale in terms of land development, construction, and common facilities with collective access to utilities, roads, and telecommunications. Other common facilities which may be available include waste collection, effluent treatment, pollution prevention and energy conservation measures, tool rooms, testing, quality control, and heat treatment, and security services.

These can be of particular value to small and medium enterprises (SMEs), which cannot afford these on an individual basis. Close proximity may encourage cooperation among firms in the IIE. This way the IIE will make a contribution to equitable and sustainable development at the local, regional, and national level.

8.2 Improvements in the physical infrastructure

The proposed IIE will help in the improvement of the socio-economic environment and the progress of the area. The infrastructural facilities like pucca roads, communication, electricity, water supply, educational and recreational facilities, hospitals, dispensaries, libraries etc. for the local society may be provided by the project proponents and the companies who set up their establishments in IIE.

Beneficial socio-economic impact in terms of increased jobs and flow of money to the workers and villagers settled nearby are expected during the construction period. In addition, during the construction period a number of jobs for both skilled and unskilled workers will be created and it is anticipated to be an increase in demand for local goods and services. Migration of workers population is expected to be minimal, as local workers from the nearby area will obviously be preferred for temporary /permanent employment.

The involvement of the local residents in project activities may bring about significant effects on their socio-economic life. The project would provide permanent employment and a more stable income, thereby providing an opportunity for them to improve their basic living standards while also stimulating the local economy.

Green belt with various suitable species will be developed all along the inside boundary of the IIE. Staggered rows of suitable species will be planted all along the boundary and plots to provide a screen of foliage to prevent any dispersal of dust outside the IIE boundary which will also help in abating the noise. This will also help in attenuating the noise levels.

ENERGY CONSERVATION

Energy is an integral component of a modern economy. It is an essential ingredient in nearly all goods and services, but its use exacts heavy financial, environmental, and security costs. A key method of reducing energy's costs while retaining its benefits is to use it more efficiently. The industrial sector is one of the major consumers of energy in India and hence the best candidates on which to focus energy efficiency efforts. Industrial estates consume large quantities of energy for heating, cooling, lighting, manufacture and transport. As well as achieving economic savings for companies and the estate, energy efficiency leads to environmental benefits and contributes to national and global climate

change goals.

It is estimated that estate's total energy usage, including that used by infrastructure and tenant companies, could be reduced by 50% if the following recommendations are implemented:

1. Promoting use of solar water heating.
2. Use of energy efficient appliances & lighting.
3. Constant monitoring of energy consumption and defining targets for energy conservation
4. Adjusting the settings and illumination levels to ensure minimum energy used for desired comfort levels.
5. Installing programmable on/off timers and sensors for low occupancy areas
6. Use of CFLs for lighting.
7. Incorporating features to reduce impact of development on community transportation systems.
8. Renewable energy sources for plant lighting and air conditioning.
9. Public areas will be cooled by natural ventilation as opposed to air conditioning.

8.3 Improvements in the social infrastructure

The perception of social and economic impact of the local community has been assessed during the SIA study. The overall public opinion on the IIE project is positive. A large majority of the people welcome this project. If the results of the opinion survey are summarized, the local people support this project for the following list of benefits that they expect from this IIE project.

1. Employment Opportunity for the local people would increase both during the construction and after commissioning of the IIE project.
2. This would augment family income for a large number of people and expand the scope for expansion of trade and business activities.
3. The road and transport facilities for their villages will improve.
4. The availability of reliable supply of electricity for domestic and industrial use.
5. The IIE project, which will cater to the needs of the project staff, will conduct medical camps, mobile dispensary, etc and in case of emergency availability of a full CSR/CER for the local inhabitants.
6. Separate allocation of funds towards welfare activities for the local people as raised during Public Hearing.
7. Some basic amenities, viz. education welfare, safe drinking water supply, street lighting, roads facilities in the villages may be taken up by project authorities.
8. Construction of bus shelters in near-by project villages.

Control Measures for Occupational Safety & Health

Health risks due to dust, gases & noise will be taken care of by sequential rotation of jobs & workers. Good drinking water, canteen, market will add to other provisions.

8.4 Employment potential

The establishment of the IIE would aid in the overall social and economic development of the region. The estate will give direct employment to people; in addition, there will be indirect employment to many more people in the form of contractual jobs, business opportunities, service facilities etc. This will enhance the economic status.

Apart from the jobs, the companies located in the IIE may provide medical and educational facilities to

the employees which can also be availed by the people living in nearby villages. Adequate recreational facilities for the staff of the industries and the local people may also be created.

8.5 Conclusion

The proposed IIE project intends to develop industrial plots along with primary infrastructure for water, transportation and electricity. Integrated Industrial Estate will provide facilities like dedicated Substation with a string of feeder substations, Common Effluent Treatment Plants, connectivity, logistic centers, and zone wise distribution of industrial, residential and commercial areas, while abiding by all the applicable rules. The environment management plan has been proposed to minimize predicted adverse impacts.

****

CHAPTER – IX

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.0 INTRODUCTION

Environmental Cost Benefit Analysis was not recommended at the scoping stage; hence not given in this DEIA.

CHAPTER – X

ENVIRONMENTAL MANAGEMENT PLAN

10.1 The Objective & Scope for EMP: Environment Management Plan (EMP) for construction and operation phase is required to ensure mitigation of adverse impacts and strengthening of positive impact resulting from the new proposed Phase –II industrial Estate project SIIDCUL Sitarganj. The objective of EMP is to identify the project specific environmental actions that will need to be undertaken, not only to mitigate impacts but also improve environmental aesthetics for the proposed at SIIDCUL Sitarganj.

10.1.1 Major Targets of EMP: The major target of the EMP is an action plan aiming to control pollution at the source level to the possible extent with the available and affordable technology followed by treatment measures before they are discharged. It encompasses the mitigation measures that are proposed in order to synchronize the economic development of the study area with the environmental protection of the region.

10.1.2 Environment Management Plan for Proposed Project (Salient Features): The project proponent to manage the key environmental issues associated with the construction and operation of the proposed industrial estate project will initiate the Environmental Management Plan for the proposed project activities. The major concerns for the EMP of the proposed project activities would be:

- Delineation of mitigation and compensation measures for all the identified significant impacts.
- Delineation of unmitigated impacts
- Physical planning including work programme, time schedule and locations for putting mitigation and compensation systems in place.

Environmental Management Plan (EMP) is the process to ensure that environmental considerations are integrated into the project scope. These are tools for mitigating or offsetting the potential adverse environmental impacts resulting from various activities of the project. The environmental management plan (EMP) would, therefore, consist of the following main components:

- To mitigate potential impacts (positive or negative) through, environmental mitigation measures implementation schedule, and monitoring plans.
- To describe the potential environmental impacts and proposed management associated with each stage of the project development.
- To control environmental impacts to levels within acceptable standards, and to minimize possible impacts on the community and the workforce of foreseeable risks during the construction and subsequent operational phases of the project.
- To highlight that the environmental mitigation measures shall be used in consonance with good management practices and good engineering design, construction and operation practices

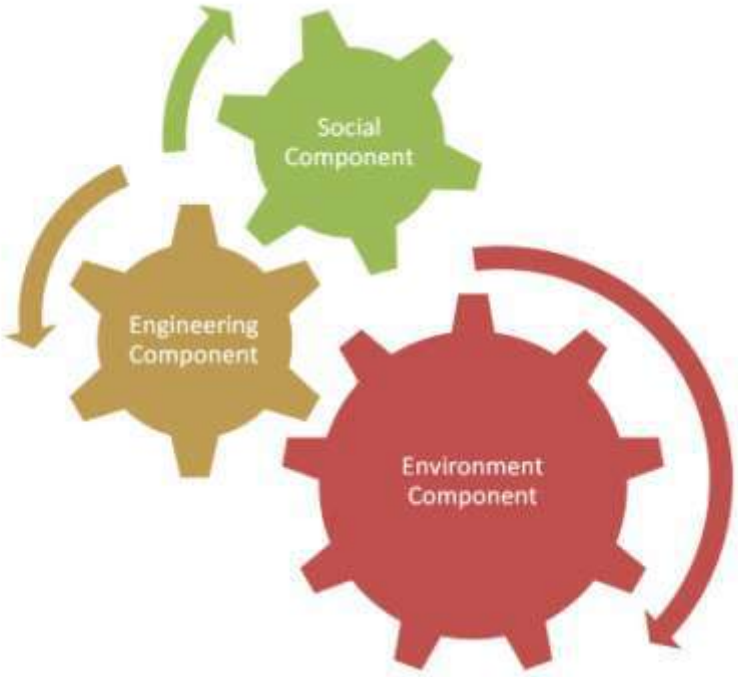


Figure- 10.1 Components of Environmental Management Plan

Table 10.1: Environment Management Plan – Construction Phase

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
1.	Air Quality	Direct impact: Dust Emissions	• All construction activities • Movement of vehicles	i. Provision for regular sprinkling in open areas. ii. Provision to cover the construction site with GI sheets 1/3rd of the building height. iii. Provision to cover ○ construction material during transportation ○ stored loose material iv. Provision of on-site ready mix concrete plant. v. Provision for carrying dust generating activities (such as cutting) in the covered working area. vi. Regular maintenance of equipments and keeping the records of the same. vii. Arrangement of wheel wash.	3/- Capital and 0.45 lac recurring 11.4/- Capital and 1.71 lac recurring 1/- Capital and 0.5 lac recurring	The Air (Prevention and Control of Pollution) Act 1981.	Contractor	Project Engineer

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				viii. Use of existing idle control technologies with power saving mode, which automatically off the engine at preset time and reduces emissions, without intervention from the operators. ix. Air monitoring shall be carried out as per the environment monitoring plan.	0.75 lac recurring			
		Direct impact: Emissions of PM, SO_2, NO_2 and CO.	• Operation of construction equipments and vehicles during site development. • Welding operations	i. Planned construction and maintenance of equipment. ii. Welding to be done in open spaces. iii. Vehicles to be checked for PUC	2.0 lac recurring		Contractor	Project Proponent
2.	Noise Environment	Direct: Increase in noise level.	• Operation of machineries. • Transportation of materials. • Construction activities.	i. Provision of GI sheets around construction site. ii. Regular maintenance of machineries or equipments. iii. Limiting the use of noisy	11.4/- Capital and 1.71 lac recurring	Noise Pollution (Prevention & Control) Rules 2000.	Contractor	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				construction equipments only to day time. iv. Noise monitoring shall be carried out as per the Environment Monitoring Plan.	0.75 lac recurring			
3.	Ground Water	Indirect Impact: Ground water contamination.	Sewage generated from construction camps	i. Provision of mobile toilets. ii. Proper handling of oil and grease ○ Use of leak-proof containers for storage and transportation of oil and grease. ○ Keep the floors of oil and grease handling area effectively impervious. ○ Drain any wash off from the oil and grease handling area through impervious drains.	8/- Capital and 1.2 lac recurring	The Water (Prevention And Control of Pollution) Act, 1974.	Contractor	Project Proponent
	Resource Depletion	Freshwater Consumption	Cement Curing Dust Suppression	i. Water meters shall be installed ii. Water use shall be monitored	1/- lac Capital			

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				iii. Chemicals shall be used for cement curing to conserve water	3.5/- lac Capital			
4.	Surface Water Quality	Indirect impact: Surface water contamination	Surface runoff from site and uncontrolled waste dumping during construction activity to nearby surface water i.e. Beghul River.	i. Provision for silt traps, diversion ditches or garland drains to control surface run-off. ii. Proper handling of oil and grease. iii. Stormwater drains bordering the site at north and east direction shall be well maintained and desilted prior to monsoons. iv. Waste management shall be carried out as per the Waste Management Plan.	4/- Capital and 1. lac recurring 4.7/- Capital and 0.7 lac recurring	The Water (Prevention and Control of Pollution) Act, 1974.	Contractor	Project Proponent
5.	Surface/ Ground Water Quantity	Ground Water Depletion	Surface and Ground water will not be used during construction phase.	• Not Applicable			None	Not applicable
6.	Land Environment	Direct/Indirect Impact: Soil	• Disposal of construction debris.	i. Construction debris will be collected and suitably used on site as per the	4.7/- Capital and 0.7 lac	Solid Waste Management Rules, 2016.	Contractor	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
		contamination.	• Spills or Leakages of oil, paints, etc. • Untreated sewage discharge	solid waste management plan. ii. If the waste generation from the project is estimated to be more than 20 tons/day or 300 tons/month, project proponent shall submit a C&D waste management plan to the local authority and implement the same. iii. Mobile toilets will be provided. iv. Awareness among labors to prevent open defecation and use toilets. v. Timely checking of spills and leaks.	recurring 8/- Capital and 1.2 lac recurring 2.0 lac recurring	Construction and Demolition Waste Rules, 2016		
7.	Solid waste management	Soil and Water pollution	• Construction Activities • Construction camps	i. Provision for recycling the construction waste. ii. Proper management and storage of top soil. iii. Implement the solid	4.7/- Capital and 0.7 lac recurring	Solid Waste Management Rules, 2016.		

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				waste management plan.				
8.	Biological Environment (flora)	Direct impact: Removal of ground vegetation Impact on aquatic flora due to runoff to surface water.	Site Development	i. Clearing of vegetation shall be carried out in phases. ii. Restriction of construction activities to defined project areas. iii. Protection of existing trees/shrubs species and merged with landscape plan. iv. Provision to start developing green belt during construction phase itself. v. Covering loose material during transportation to reduce dust emission and thereby their deposition on roadside vegetation. vi. Silt fencing along the length of Begul River adjacent to project area to prevent runoff from	5.7/- Capital and 1.2 lac recurring 11.4/- Capital and	National Forest Policy, 1988 (NFP).	Contractor	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				the site reaching the river. vii. Awareness program among workers on importance of preserving and protection of biological species either terrestrial or aquatic species before starting the construction work.	1.71lac recurring 2.0 lac recurring			
9.	Biological Environment (Fauna)	Indirect Impact: • Impact of noise on the fauna. • Impact on aquatic fauna due to runoff to surface water. Encountering wildlife species during the	Noise from construction activities and vehicle's movement.	i. Provision of regular maintenances of the vehicles to reduce noise. ii. Restriction of using noisy construction equipments to night time only. iii. Awareness program among workers on importance on fauna or wildlife conservation and protection.	0.75 lac recurring 2.0 lac recurring	Wildlife Protection Act, 1972.	Contractor	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
		construction phase.		iv. Silt fencing along the Begul River adjacent to project area to prevent runoff from the site reaching the river. v. Management measures as suggested in surface water quality. vi. If any wildlife species are encountered during the construction phase, it should not be harmed and the forest department informed. vii. The workers will be given training on wildlife awareness.	11.4/- Capital and 1.71 lac recurring			
9.	Socio-Economic Environment	Direct impact: Employment	Construction activities Supply of materials	i. Provision for appointing local people for construction work. ii. Implementing the social management plan	2.5/- lac recurring		Contractor	Project Proponent
10.	Occupational Health and	Indirect Impact:	Sewage and waste generation	i. Provision for health check up for the	20.0/- Capital and	National Policy on Safety, Health And	Contractor	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
	safety	Heath impacts from different activities.		workers. ii. Proper first aid facilities and other emergency requirements. iii. Training programmes on health and safety. iv. Strict enforcement for use of PPEs for workers.	8.0/- lac recurring 2.0 lac recurring 6.0/- Capital and 1.0/- lac recurring	Environment At Work Place (2009).		
11.	Traffic Management	Indirect impact: Increase in vehicular traffic	Movement of heavy vehicles during construction	i. Restriction of heavy vehicles movement to day time only and allowing adequate parking facility within project site. ii. No vehicles shall be parked outside the project site. iii. Provision to wash vehicles carrying loose construction material prior to returning back to road. iv. Proper signage to be	1/- Capital and 0.5 lac recurring 0.4 lac recurring		Contractor	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				provided within the project sites for the ease of the drivers in the site.				

Table 10.2: Summary of Management Measures and Responsibility –Operation Phase

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
1.	Air Quality	Direct impact: Emissions of PM, SO_2, NO_2 and CO	Emission from industrial units vehicular traffic.	• Installation of proper air pollution control measures by respective user industry depending upon the type of the company. • Provision for footpath and pedestrian ways within the site to avoid slowing down of traffic. • Green belt	70.0/- Capital and 10.0/- lac recurring	The Air (Prevention and Control of Pollution) Act 1981.	Project Proponent	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				development. • Proper maintenance of equipment. • Reduce idling time. • Proper management of traffic movement within the project site. • Create awareness for adoption of cleaner production technologies by respective user industries.				
2.	Noise Environment	Direct impact: Increase in noise level	Vehicular movement	• Provision of noise shields or engineering noise control measures by respective user industries. • Provision of 44.49 ha of landscaping within site. • Honking shall be	70.0/- Capital and 10.0/- lac recurring	Noise Pollution (Prevention & Control) Rules 2000.	Project Proponent	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				discouraged.				
3.	Ground and Surface Water Quality	Indirect impact: Surface and ground water contamination.	Untreated wastewater discharge from the project site. Uncontrolled waste dumping	• Proper treatment of wastewater from all industrial and commercial establishments in CETP. • The treated waste water shall be used within site for landscaping, washing and flushing. • The excess water from CETP will be tested before discharging into theBegul River. • Waste shall be managed as per the waste management plan. • Wastes shall be segregated at the	900.0/- Capital and 8.0/- lac recurring 7.0/- Capital and 0.75/- lac recurring	The Water (Prevention and Control of Pollution) Act, 1974.	Project Proponent	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				material recovery facility provided within the site. • No waste shall be dumped outside their designated area.				
4.	Ground Water Quantity	Direct impact: Ground Water Depletion	Ground water use during operation phase	• Awareness Campaign to reduce the water consumption. • Treated wastewater from CETP will be recycled for flushing, washing and landscaping. This will bring down the freshwater consumption by about 35%. • Adopting water conservation measures.	900.0/- Capital and 8.0/- lac recurring 11.0/- Capital and 1.25/- lac recurring	The Water (Prevention And Control of Pollution) Act, 1974	Project Proponent	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
5.	Land Environment	Indirect impact: Soil contamination	Generation of municipal solid waste Spills or Leakages of oil, paints, etc	• Solid Waste Management as per Solid Waste Management Rules, 2016 by specific industries. • Collection, segregation, transportation and disposal of solid waste as per Solid Waste Management Rules, 2016 • Wastes shall be collected in the material recovery facility and segregated according to compostable and recyclable wastes. • Compostable wastes	7.0/- Capital and 0.75/- lac recurring	Solid Waste Management Rules, 2016. Hazardous & other wastes (Management &Transboundary movement) Rules, 2016 Biomedical Waste Management Rules, 2016 E-waste Management Rules, 2016 Construction & Demolition Waste Management Rules, 2016	Project Proponent	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				shall be treated in the organic waste converter. • The manure will be used in greenbelt development. • E-wastes, Bio-medical wastes and C&D wastes will be disposed/treated through authorized waste handling agencies.				
6.	Flora and fauna	Direct impact: Green belt development: 44.49 ha of land will be developed as green. Habitation to avifauna and small		• 36445 trees are proposed to be planted in the greenbelt. • Species of plants for the green belt shall be carefully selected. They should be native, have dense foliage to	70.0/- Capital and 10.0/- lac recurring	National Forest Policy, 1988 (NFP).	Project Proponent	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
		mammals from green belt development.		mitigate air pollution and provide effective noise barrier. • Fruit bearing plants shall also be planted to attract insects, birds and small mammals over time.				
7.	Biological Environment (Fauna)	Indirect Impact: Impact of noise on the fauna.	Noise from industries and vehicular movement. Injury to animals spotted within site.	• Mitigation measures as suggested under Noise environment will help reduce the ambient noise. • Fruit bearing plants shall also be planted to attract insects, birds and small mammals over time. • Staff engaged by SIIDCUL shall be made aware of not to harm any animal	70.0/- Capital and 10.0/- lac recurring	Wildlife Protection Act 1972.	Contractor	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				spotted within the site, and to inform Forest Department, if need be.				
8.	Socio-Economic Environment	Direct impact: Employment	Operation of individuals industries. Staff engagement by SIIDCUL	• Provision to provide employment opportunities to the local people in terms of service personnel (guards, securities, gardeners etc.) during operations. • This will improve the income generation of the local people. • This will also provide the local people will alternate sources of income, apart from farming. • The project will give an impetus to the local			Project Proponent	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
				business such as shops etc.				
9.		Energy consumption	Operation of individuals industries.	• Adoption of energy conservation measures: • Provision for use of renewable energy such as solar energy. • Use of energy efficient appliances • Green area development • Implementing Energy conservation Plan	6.0/- Capital and 0.5/- lac recurring 70.0/- Capital and 10.0/- lac recurring	ECBC Guidelines		
10.	Traffic Management	Indirect impact: Increase in vehicular traffic Inadequate parking leading to	Increased Traffic from project site	• Vehicular movement will be regulated inside the project site with adequate roads and parking lots. • All the parking will be fully internal to prevent any kind of	-		Project Proponent	Project Proponent

S. No	Environmental Issues	Potential Impacts (Direct/ Indirect)	Potential Source of Impact	Management Measures	Cost (Rs. In Lacs)	Applicable National Regulations/ Standards	Responsibility	
							Execution/ Civil Work	Supervision
		parking of vehicles along road and thereby disrupting traffic		obstruction to traffic. • 65.12 acres is provided for parking facility. • Loading and unloading areas shall be separately provided so that no roads are blocked.				

10.2 Environment Management Plan during Construction Phase: The impacts during the constructional Stage of the proposed Industrial Area on the environment would be basically of temporary in nature and are expected to reduce gradually on completion of the constructional activities.

10.2.1 Air Quality Mitigation Measure: In the proposed Industrial Area, leveling and grading will be carried out, where ever possible to maintain the natural elevations they will not be disturbed, only leveling activity will be carried out for providing roads, sewage network, storm water system, and places required for providing buildings for administrative, production/manufacturing plant and other utility erections.

According to the engineering assessment; most of the excavated material shall be reused within the proposed Industrial Area. Most of the construction dust will be generated by the movement of carrying vehicles on unpaved roads. Unloading and loading of constructional materials shall also act as a potential source for dust nuisance. The control measures proposed to be taken up are given below.

- Water sprinkling on main haul roads in the proposed Industrial Area will be done, this activity will be carried out at least twice a day, if need arises frequency will be increased on windy days, in this way around 50% reduction on the dust contribution from the exposed surface will be achieved.
- Temporary tin sheets of sufficient height (3m) will be erected around the proposed construction site as barrier for dust control.
- All the vehicles carrying raw materials will be covered with tarpaulin / plastic sheet, unloading and loading activity will be stopped during windy period.
- To reduce the dust movement from civil construction site to the neighborhoods the external part of the building will be covered by plastic sheets.

Given the implementation of proper control measures for dust suppression, no adverse impacts are expected and compliance with the Ambient Air Quality is achieved at ASR's (Air pollution Sensitive Receivers) at all time.

10.2.2 Noise Level Mitigation Measure: Noise generating equipment will be used during day time for brief period of its requirement. Proper enclosures will be used for reduction in noise levels, where ever possible the noise generating equipment will be kept away from the human habitation. Temporary thin sheets of sufficient height (3m) will be erected around the noise generating activity or all around the proposed site as barrier for minimizing the noise travel to surrounding areas given as below in point wise. Therefore, impact on noise environment due to proposed Industrial Area would be insignificant.

- All vehicles entering into the proposed site will be informed to maintain speed limits,
- Not blow horns unless it is required.
- Personal protective equipment like earmuffs, helmets covering ears would be provided to the workers working near noise generating equipment
- Workers use the protective gadgets regularly.

10.2.3 Water Resource Mitigation Measure: During the development of proposed Industrial Area necessary precautions will be taken, so that the runoff water from the proposed site gets collected to working pit and if any over flow is, will be diverted to nearby greenbelt / plantation area. At the time

of construction in the proposed Industrial Area, all the equipment's washed water will be diverted to working pit to arrest the suspended solids if any and the settled water will be reused for constructional purposes, and for sprinkling on roads to control the dust emission, etc. The waste generated from the proposed project site work shop, will be segregated like used oil, lubricants, etc. and disposed to authorized recyclers the waste like soiled cotton, paper, etc will be disposed to municipal bins or sold out to the authorized agencies. The domestic wastewater generated from temporary toilets used by the work force will be treated through sewage treatment plant and reused. Therefore, impact on water quality due to the proposed Industrial Area would be insignificant.

10.2.4 Waste Mitigation Measure: The solid waste generated during constructional period being predominantly inert in nature, construction and demolition waste does not create any chemical or biochemical pollution. However maximum effort would be made to reduce, reuse and recycle them. The most of the solid waste material will be used for filing/ leveling of low-lying areas. All attempts will be made to stick to the following measures.

- All construction waste shall be stored within the proposed site itself. A proper screen will be provided so that the waste does not get scattered.
- Attempts will be made to keep the waste segregated into different heaps as far as possible so that their further gradation and reuse is facilitated.
- Materials, which can be reused for purpose of construction, leveling, making roads/ pavement will also be kept in separate heaps from those which are to be sold or land filled.
- The local body or a private company may be arranged to provide appropriate number of skip containers/ trolleys on hire.

The use of the construction material basically depends on their separation and conditions of the separated material. A majority of these materials are durable and therefore, have a high potential for reuse. It would, however, be desirable to have quality standards for the recycled materials. Construction waste can be used in the following manner. Reuse of bricks, tiles, stone slabs, timber, piping railings etc to the extent possible and depending upon their conditions.

- Sale/ auction of materials which cannot be used at the proposed site due to design constraint.
- Plastics, broken glass, scrap metal, used cement bags etc can be sold out to the authorized agencies.
- Rubble/ brick bats can be used for building activity, such as leveling, under coat of lanes where the traffic does not constitute heavy moving loads.
- Larger unusable pieces can be sent for filing up low lying areas.
- Fine material such as sand, dust, etc can be used as cover material
- The unearthed soil can be used for leveling as well as for lawn development
- The broken pieces of the flooring material can be used for leveling in the building or can be disposed off.
- The unused or remaining paints/varnishes/wood can either be reused or can be disposed off to the authorized agencies.

10.3 Environment Management Plan during Operational Phase: Necessary control measures will be undertaken at the design stage to meet the statutory requirements and towards minimizing environmental impacts. The design basis for all member industries will lay special emphasis on

measures to minimize the effluent generation and emission control at source. The specific control measures related to gaseous emissions, liquid effluent discharges, noise generation, solid waste disposal etc. are described below:

10.3.1 Air Quality Management: -

Reduction of emissions at source to control the dust particulates from the stacks to meet the MoEF & CC standards through appropriate air pollution control equipments is proposed. To control SO_2 and NOx emissions from DG set of member industries with sufficient height is proposed to meet the MoEF&CC guidelines. b) Air pollution Control the main sources of air pollution from the proposed Industrial Area are Diesel Generator (DG) & boiler emissions. The Diesel Generator (DG) & Boilers are being proposed & operated by the member industries in the Industrial Area. The appropriate capacity of DG set & Boilers are calculated for total IA and kept as backup power during power failure & emergency and other purposes. The air pollution control measures to be adopted are summarized in table No -10.3

Table 10.3 Air Pollution Control Measure

Air pollutant	Source	Control
$PM_{10}/PM_{2.5}/SO_2$/NOx& CO	Construction Activities	Ambient Air pollution control equipments meeting CPCB/MoEF&CC regulations
Process Emissions Of Member Industries /	Fugitive in nature during material flow	Standardization of Equipments and accessories (Engineering Standards)
PM/SO_2/NOx& CO	DG sets & Boilers Of Member Industries	Stack height and air pollution control equipments meeting MoEF&CC

The Permissible AAQ standard limits as per Ministry of Environment and Forests for Industrial, Residential and other areas are 60 $\mu g/m^3$ for $PM_{2.5}$& 100$\mu g/m^3$ for PM_{10}using Respirable/Fine Dust Sampler (RDS) by gravimetric method. The common industries operating in the proposed Industrial Area, as part of an agreement - must include the provision air pollution control equipment's to attain the prescribed limits of NAAQ Standards 2009 Indus. Residential, Rural & Others for Particulate Matter.

10.3.2 Noise Level Management:-All the noise generating equipments in the Industrial Area must be designed not to exceed the noise levels 85-90 dB (A) as per the OSHA (Occupational Safety and Health Administration) Standards. The equipments shall be provided with acoustic shields or enclosures to minimize the sound level inside the member industries of the proposed Industrial Area. The greenbelt will be developed to prevent noise generation beyond the IA or boundary. The following measures are suggested to keep the noise levels within the permissible standards in member industries.

- Noise barriers will be placed around the stationary noise generating equipment of the Industrial Area and also along the side of moving objects.
- All noise generating machines like pumps, compressors, etc shall be properly serviced and mounted on anti- vibration pads to reduce the noise generation.
- The DG set shall be provided by Acoustic enclosure.
- Proper maintenance of transportation vehicles.

In addition to this, the entire open area and in the proposed Industrial Area boundary shall be provided with adequate green belt to minimize the noise levels. The proponents of member industries during operation of their plants would monitor the noise levels within and outside the plant on regular basis to attain national standards for air quality with respect to noise are strictly adhered to. Corrective action would be initiated immediately in case of any deviations are found during the course of monitoring.

10.3.3 Water Quality Management: -

10.3.3.1 Water Management: -The source of water for the proposed Industrial Area is ground water. The major part of this water will be supplied to the member industries used for domestic requirement.

10.3.3.2 Wastewater Generation:- It is necessary /recommended to install full-fledged treatment plant for treating the industrial effluents and sewage generated by the member industries & from common utilities in the proposed Industrial Area. But all the upcoming member industries may be small and medium and not having their financial capacity to install full-fledged treatment plant, they are discharging their substandard effluent on land and due to that the problems of ground water pollution in the said area may be created. Hence, it is necessary /recommended to install Common Effluent and Sewage Treatment Plants (CETP/CSTP) for treating the industrial effluents and sewage generated from such type of small and medium scale industries. A Common Effluent and Sewage Treatment Plants (CETP/CSTP) has been conceptualized and recommended for effective treatment and disposal of effluents from the proposed Industrial Area to meet the statutory requirements for disposal and reuse.

In the operation phase of proposed project, the water will be conserved following the basic principles of minimizing water consumption and promoting reuse of water after treatment and development of closed loop systems for different water streams. The water conservation is the need of the hour and the consumption fresh water will be minimized by combination of water saving devices and other domestic water conservation measures. Further, to ensure ongoing water conservation, an awareness program will be introduced for the staffs. The following section discusses the specific measures, which will be implemented to for water conservation:

10.3.3.3 Domestic and Commercial Usage

- CETP will be constructed and treated water will be used within the project site.
- Use of water efficient plumbing fixtures: Water efficient plumbing fixtures use less water with no marked reduction in quality and service.
- Meter water usage: Implies measurement and verification methods.
- Leak detection and repair techniques.
- Monitoring of water uses is a precursor for management.

10.3.3.4 Storm Water Management

All along the road network of Industrial Area, storm water drains would be provided to collect water during rains. The existing nala in the proposed project (west to east) would be straightened to develop major storm water drain. They would adequately size to prevent flooding of the site. It is proposed to

have rainwater harvesting structures for recharge of roof top rainwater and rain water of paved surface at respective buildings. As the ground water table is quite high; the water recharge is not possible in the proposed project site. Hence it is proposed to construct an underground water sump for collection of rainwater during rainy season and its use during non rainy season. Due to storm water and rain water harvesting measures 75% of precipitation of project area may lead to natural drain, around 20% of precipitation is collected in rain water harvesting cum storage structures and 5% will be collected in storage tanks for reuse.

Storm water from the proposed site will be channelized through storm water drains of adequate size. Thus, proper management of water resource is a must to ensure that it is free from contamination. Storm water management plan will incorporate best management practices which will include the following:

- Regular inspection and cleaning of storm water drains.
- Clarifiers or oil/separators will be installed in all the parking areas. Oil/grease separators installed around parking areas and garages will be sized according to peak flow guidelines. Both clarifiers and oil/water separators will be periodically pumped in order to keep discharges within limits.
- Covered waste storage areas.
- Avoid application of pesticides and herbicides before wet season.
- Secondary containment and dykes in fuel/oil storage facilities.
- Conducting routine inspection to ensure cleanliness.
- Provision of slit traps in storm water drains.

10.3.3.5 Promotion of water reuse after treatment

- The wastewater treatment plan comprises of following infrastructures:
- Wastewater collection and conveyance system
- Wastewater treatment and disposal arrangement

10.3.3.6 Wastewater collection and conveyance system: As per the design report from SIDCUL, wastewater collection and conveyance system will be an underground drainage network. This network will collect wastewater from each and every industry and commercial area; and finally convey it to one point for treatment. There will be separate pipelines for the use this treated wastewater. It shall be used for AC makeup, landscaping, toilet flushing, car washing, and road washing. The scheme for recycled water network is shown below:

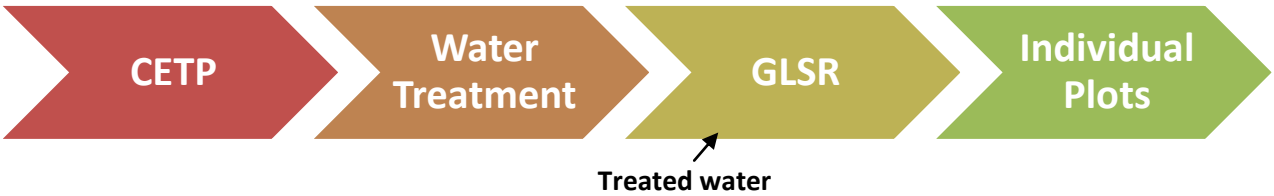


Figure 10.2: Scheme of Recycle Water Network

10.3.3.7 Wastewater treatment and disposal arrangement: The waste water will undergo physical, chemical and biological treatments, which includes screening, grit removal mechanism, oil removal, clarification and filtration. During the process, the sludge from clarifiers will be collected in a

sludge sump from where it will be pumped to the sludge thickener. The sludge will be pumped through Solid Bowl Centrifuge for Primary Dewatering to achieve 20% dry solids consistency. Dewatered Sludge from Centrifuge will be taken to Sludge drying area where it will be further dewatered under sun to achieve 40% dry solids consistency. The diagrammatic representation of general process is explained below in **Figure 10.3.**

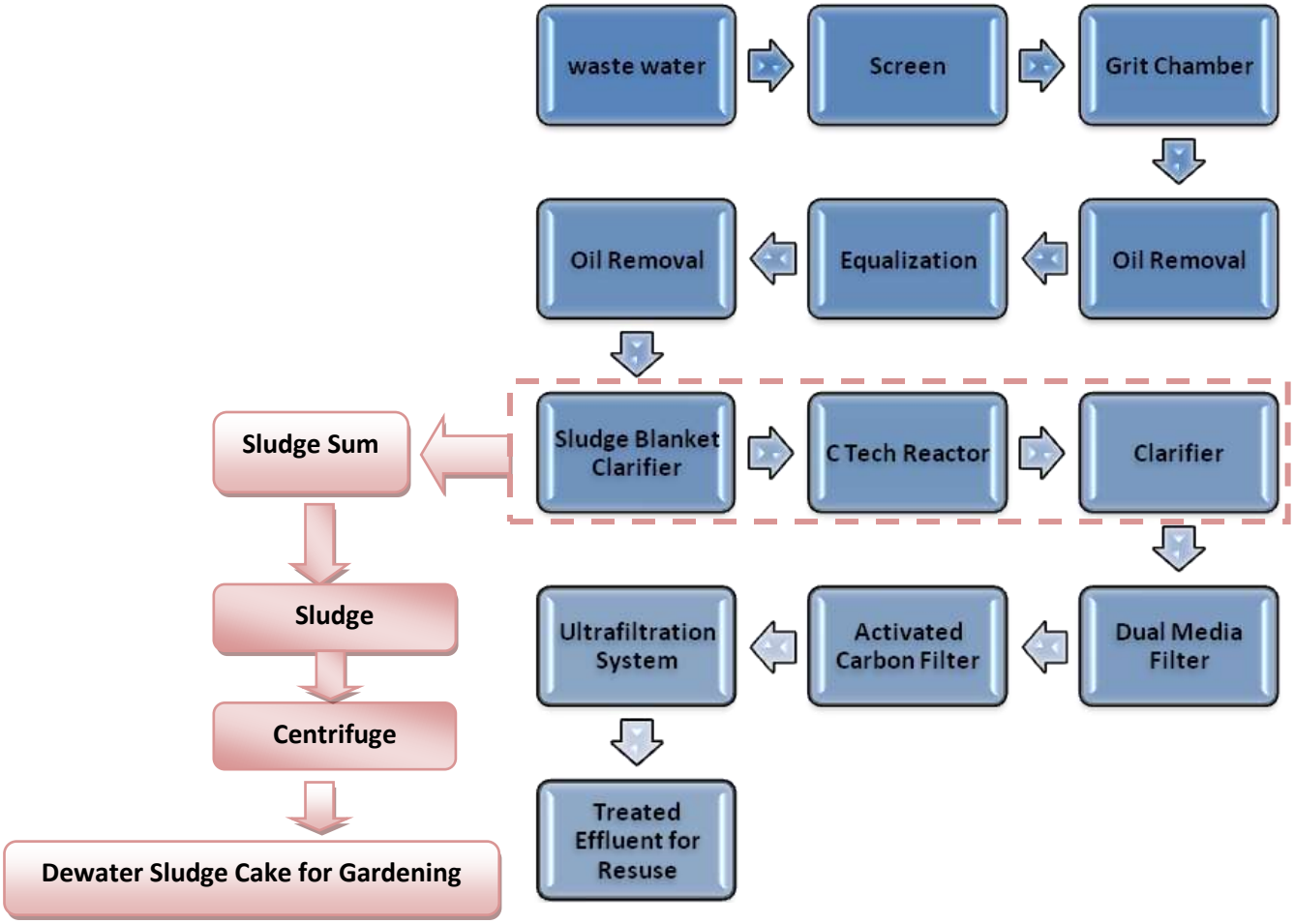


Figure 10.3: Diagrammatic Representation of Waste Water Treatment Plan

10.3.4 Waste Management- The waste generated by the member industries / manufacturing units can be classified as Manufacturing Process Waste.

- May fall under the hazardous waste category
- Waste from Utilities such as ash, paper etc.
- Plastic and other packing waste Pollution Control facilities
- Primary ETP sludge etc.

All the member industries coming up in the proposed Industrial Area, With respect to the category and type of waste, member industries will segregate and store the waste temporarily in an earn marked area, if required will utilize the services of the Common Hazardous Waste Management Facility (CHWMF). All the hazardous waste from member industries will be transported to CHWMF facility for treatment and for further safe disposal as per the statutory requirement and procedures.

Safe storage and transportation of the produced solid and hazardous waste is the total responsibility of the member industry. Municipal Solid Waste would be collected and stored in an earmarked storage yard and further hand over to the authorized facility for treatment and disposal by the member industries & by the developer.

10.3.4.1 MSW Handling & Management: With the adoption of sustainable development as an approach to manage the environment, quality waste management techniques is essential. The principle aim of waste management is to sustain the environment by ensuring that waste does not contaminate the environment at such a rate or in such a form or quantity as to overload natural assimilative processes and cause pollution. Eliminating or minimizing waste generation is becoming crucial, both environmentally and economically, for reducing waste-related liabilities and costs. Awareness would be created among industrial associations & housing societies to adopt following practices:

10.3.4.1.1 Organic waste: Such type of waste (food waste, wood or other, Biodegradable waste) can be composed and later used as manure.

10.3.4.1.2 Recyclable waste: Wastes like plastic, metals, etc. can be recycled

10.3.4.1.3 Other wastes: The sludge generated from the combined effluent treatment plant (CETP) at the Site.

10.3.4.2 Storage of Wastes

Appropriate provisions would be made for storage of solid wastes. Adequate means of access would also be provided from the place of storage to a collection point specified by the waste collection authority.

- Colored wheeled bins would be provided such as
- Dark grey for non-recyclable waste
- Green for kitchen food/ compostable garden waste
- Blue for paper (generally used for flats, schools, offices etc).
- In addition, boxes would be provided for the collection of other recyclable materials;
- A green box can be used for paper
- A black box can be used for cans and plastic collections.

10.3.4.3 Bin area design and layout- characterization: It is suggested that an 1100 liter bin will be set out by individual industries. A minimum clearance of 150 mm will be provided around all sides of the bins. Design and choice of construction materials for the bin area will be finalized by individual industries.

10.3.4.3.1 Construction Debris Management

Construction debris is bulky and heavy; re-utilization and recycling is an important strategy for management of such waste. C & D waste Rules as prescribed by GOI will be complied with to manage such waste. C & D waste basically comprises concrete and masonry as the majority of generated waste.

Recycling of this waste by conversion to aggregate can offer benefits of reduced landfill space and reduced extraction of raw material for new construction activity. Mixed debris with high gypsum, plaster, shall not be used as fill, as they are susceptible to contamination, and will be sentto Construction and Demolition waste processing and recycling facility.Metal scrap from structural steel, piping, concrete reinforcement and sheet metal work shall be removed from the site by construction contractors. A significant portion of wood scrap will be reused on site. Recyclable wastes such as plastics, glass fiber insulation, roofing etc. shall be sold to recyclers.

10.3.4.3.2 Hazardous Waste Management

Construction sites are sources of many toxic substances such as paints, waste oil, preservatives, pesticides, adhesives and sealants. Hazardous waste generated during construction phase shall be stored in sealed containers and disposed off as per the Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016.

- Herbicides and pesticide will not be over applied (small-scale applications) and not applied prior to rain.
- Provision of adequate hazardous waste storage facilities. Hazardous waste collection containers will be located as per safety norms and designated hazardous waste storage areas will be away from storm drains or water courses.
- Segregation of potentially hazardous waste from non-hazardous construction site debris.
- Well labeled all hazardous waste containers with the waste being stored and the date of generation.
- Any storage to be done on site will be intimated to regional pollution control board in Form-IV.
- MoU will be signed by the authorized recycler to pick the hazardous waste as per the norms and provide the manifest.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Even with careful management, some of these substances are released into air, soil and water and many are hazardous to workers. With these reasons, the best choice is to avoid their use as much as possible by using low-toxicity substitutes and low VOC (Volatile Organic Compound) materials.

During the **Operational Phase**, the philosophy of solid waste management i.e. four R's principle- Reduction, Reuse, Recycling and Recovery (materials & energy) will be followed. Regular public awareness meetings will be conducted to involve the residents/staff in the proper segregation and storage techniques. The Environmental Management Plan for the solid waste focuses on three major components during the life cycle of the waste management system i.e., collection and transportation, treatment or disposal and closure and post-closure care of treatment/disposal facility. Each individual industry will follow the respective solid waste management system. It will includes

10.3.4.3.2.1 Collection and Transportation

- Proper guidelines for segregation, collection and storage will be prepared as per Solid Waste Rules, 2016 by each individual industry.
- The solid waste of each project site will be segregated by each industry as per the Solid Waste Rules, 2016. Biodegradable waste will be treated by organic waste converter. The recyclable wastes will be sent off to recyclers. Proper guidelines for segregation, collection and storage will be prepared as per Solid Waste Rules, 2016

- Care would be taken such that the collection vehicles are well maintained and generate minimum noise and emissions. During transportation of the waste, it will be covered to avoid littering.

10.3.4.3.2.2 Disposal

The waste will be disposed as per the Solid Waste Rules, 2016 by each individual industry. With regards to the disposal/treatment of waste, the individual industry will take the services of the authorized agency for waste management and disposal of the same.

10.3.5 Land Environment Management: The following measure shall be adapted by the Project Proponent to prevent/ reduce the soil erosion and contamination:

- It will be ensured that no construction spoils of any unsuitable material are disposed off on roadside or any other place in the project area. Litter, fuel, oil drums, used grease cartridges will be collected and removed properly. Dustbins shall be placed at requisite locations.
- Lubrication waste oil shall be collected separately in drums and shall be disposed of as per standard practice.
- Solid waste (building material, metal scrap, wood, plastic etc) generated during the construction phase shall be properly segregated. The recyclable plastic, metal etc waste should be separately stored. Other material will be used for land filling or the designated Solid waste disposal sites.
- Construction debris will be collected and suitably used on site as per construction waste management plan. The project proponent will take prior permission from the competent authority for disposal of construction waste on landfill site in the project area.
- Careful attention will be given for design and maintenance of earthwork and drainage systems during construction to avoid creation of significant habitat areas for mosquito larvae. Use of larvicides may be required to prevent mosquito breeding in silt traps.

10.3.5.1 Land Use Pattern and Ecology Management: Disturbance during the construction phase shall be of much localized. To keep the disturbance at a minimum, the following measures are recommended:

- Land clearing for the construction site will be kept at the absolute minimum practicable Construction site will be designed to minimize the removal of soil and vegetation
- Topsoil will be cleared and stored for later reinstatement purposes by piling along the boundary of the site

10.3.6 Traffic Movement Management: In order to minimize impact of Traffic Movement, following measures would be taken up:

- Planning vehicle movements would ensure the minimal use of road and help in reducing the adverse impacts, if any.
- Appraisal to traffic police about the construction activities shall be help in better management.
- Road crossings to be used during the construction period shall be well marked to prevent the accidents.
- Spray down dirt roads if too dusty

10.3.7 Socio-economic Environment Management: The Project Proponent would ensure the favorable impacts on socio -economic environment and would envisage measures to minimize the

adverse impacts, if any.

- The construction contractor would ensure that kerosene or cooking gas to be provided to construction workers on-site so that they do not resort to using fuel wood for cooking.
- The construction contractor would ensure that temporary sanitary facilities should be provided on-site to workers so that proper hygienic conditions could be maintained.
- Provide temporary employment generation opportunities
- Conditions of employment would address issues like minimum wages and medical care for the workers. Contractors would be required to abide to employment priority towards locals and abide by the labor laws regarding standards on employee terms and conditions.

10.3.7.1 Improved Working Environment for Employees

The proposed project would provide safe and improved working conditions for the workers during construction and operation phase. Following measures would be taken to improve the working environment of the area:

- Developing a proper interface between the work and the human resource through a system of skill improvement
- Provision of facilities for nature care and recreation e.g. indoor games facilities
- Measures to reduce the incidence of work related injuries, fatalities and diseases
- Maintenance and beautifications of the industrial area and the surrounding roads.

10.3.7.2 Construction Workers Health & Safety Plan: In order to ensure the health and safety of construction workers, project proponent would advise construction contractors to envisage adequate steps, as described below.

- To allocate adequate & appropriate place to construction workers so that they can make temporary sheds for dwelling under hygienic conditions.
- To provide potable water at site so that workers should not get exposed to water borne diseases.
- To provide first-aid facilities in the proximity of the construction sites and to work on the modalities for providing immediate ambulance services for the any event or any major injury by which workers can avail the hospital services quickly.
- To provide all necessary safety gadgets (Personnel Protective Equipment, PPE) to construction workers like helmets, protective footwear and gloves. The personnel engaged in the work of mixing, cement, lime mortars, concrete etc. to be provided with masks to reduce the direct inhalation of micro particles. Persons to be engaged in welding activities to be provided with protective eye-shields to ensure safety during welding. Earplugs are to be provided to workers exposed to high noise areas. Labors working on elevated platforms to be provided with safety belts.
- The construction contractor will strictly adhere to the statutory child labour act.
- The construction contractor will also ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. Facemasks will be provided for use to the workers when paint is applied in the form of spray.
- Adequate safety measures will be ensured for workers during handling of materials at site. The contractor will adhere to all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, and safe means of entry and exit.

- The construction contractor will take adequate precautions to prevent danger from electrical equipment.
- All machines to be used in the construction will conform to the relevant Indian Standard Codes, and will be kept in good working order. These would be regularly inspected and properly maintained as per the provision of standard.
- The construction contractor would ensure that no danger or inconvenience to be caused to any person or the public by placing or stacking the material for construction.
- All necessary fencing and lights will be provided to protect the public.
- Utmost efforts would be put-up by construction contractor to maintain the aesthetic quality of the area as well as maintain the optimum lightening in the area to avert any mis-happening.
- To provide regular safety training to the workers, specially related to construction. Display of common safety manual in different languages including local languages, emergency plan etc.

10.3.8 Landscape: The Landscape concept for the development of Industrial Estate at Sitarganj evolves a system of open spaces, which have the potential to develop into a landscape with distinctive visual qualities, fulfilling the required ecological and recreational functions. The location and alignment of the existing landscape features would have been used to structure the development. Advantage would be taken of topographic assets such as the natural drainage as well as major rural open spaces along these corridors, wide entrance, gates, wide avenue along central Road, integrating. Essentially the proposed landscape comprises of the following interlinked but hierarchical distinct components.

The informal naturalistic component along two rivers will serve as a green belt. The more formal and organized component serving as a local space system on the central green.

10.3.8.1 Objective of the development of green belt: The objective of optimal development of greenbelt in the project area would be as per the pattern of State PWD norms.

- Attenuation of air/ noise pollutants
- Recycling of wastewater
- Balancing the ecology of the area
- Enhancing the aesthetics and visual quality of the area

10.3.8.2 Area for the development of greenbelt

10.3.8.3 Green Belt - In order to comply with the MoEF & CC guidelines for greenbelt development within the proposed Industrial Area, SIIDCUL is planning to develop thick green belt of tall and evergreen plants 15m along the periphery and on the either sides of the roads within the individual industrial units of the Industrial Area and additional greenbelt will be developed under CSR activity in nearby open areas (Schools, gardens etc.). The width of the shelter belt will vary in different areas depending on the availability of land. The greenbelt with a density of about 1000 plants per hectare will be developed. If the area is suitable, three storey or three tier plantations are also planned. SIIDCUL will also instruct and make an agreement (MOU) with member industries to develop green belt @ 33% inside and along the periphery of the member industries. All plants are locally adapted and the present site can support their growth with suitable horticultural practices. Sufficient space, resources and man power for development and maintenance are provided in the plan. Green belt

development is one of the most effective environmental pollution control measure. Trees play vital role in the environment in preventing the horizontal dispersion of the pollutants to the surrounding areas. They are very effective in trapping the pollution causing agents viz. dust and gaseous pollutants. They are also considered to be excellent indicators of excessive ground level concentrations. The green belt is being proposed for the following objectives.

- Mitigation of fugitive dust emissions
- Noise pollution control
- Prevention of soil erosion
- Balancing eco environment
- Aesthetics Apart from the bulk plantation in vacant areas, roadside avenue plantations, parks will also be taken up. The placement of the plants would be designed as follows:
- Trees growing up to 10m or more in height with thick canopy cover and perennial foliage would be planted around the proposed Industrial Area.
- Planting of trees would be done in rows with minimum three rows encircling perimeter of the installation. While planting the trees care would be taken that the installation structure would be difficult to see through foliage when seen from a point outside the green envelope. For preventing the horizontal dispersion of pollutants, if any, the trees planted in alternate rows would fall in straight line.
- Trees would be planted on roadside for containment of vehicular traffic emission and fugitive emissions due to the movement of vehicles.
- Tree trunk being free foliage up to a height of 2 to 3m, it is proposed to grow shrubs in front of trees so as to give coverage to the open portion.
- Local Species would be planted in patches along the entire green belt to work as an indicator of pollution potential.

In addition to the above selected species, some other plants will also be considered for pollution abatement

10.3.8.4 Road side plantation: Gardens maintained for recreational and ornamental purposes will not only improve the quality of existing ecology at the project site but also will improve the aesthetic value.

Avenue Plantation

- Trees with colonial canopy with attractive flowering.
- Trees with branching at 7 feet and above.
- Trees with medium spreading branches to avoid obstruction to the traffic.
- Fruit trees to be avoided because children may obstruct traffic and general movement of public

10.3.8.5 Boundary wall: No boundary wall is proposed in the proposed industrial estate to make it a thoroughfare; however the individual industries will raise the boundary wall and make their own security arrangements.

10.3.8.6 Green maintained by individuals' industrial units: It is proposed that each individual industry will develop and maintain their own greenbelt (including hardscape as well as softscape) on 33 % of their plot. The green area will have 1tree per 80 Sqm as per MoEF & CC norms. The green plan will be approved by SIDA for each industry.

Table 10.4 Tree Species with Higher Air & Noise pollution abatement characteristics

S. No	Binomial Name	Family	Common Name	Hindi Name	Height (meters)	Regeneration By	Flowering season	Crown shape
1	*Acacia nilotica* (Linn) Willd	Momoseae	Indian Gum	Babul	8 m	By Seeds	Aug- Jan	Spreading
2	*Azadirachta indica* A. juss.	Meliaceae	Indian Lilac	Nim	20m	By Seeds	Jan - March, Aug. - Sept.	Spreading
3	*Buchanania lanzan* Spreng	Anacardiaceae	Almonde tree	Chiranji	13m	By Seeds, Root suckers	Jan- Mar	Round
4	*Cassia fistula* linn	Caesalpinaceae	Golden Showers Indian laburnum	Amlatas	12m	By seeds, Suckers	Mar - May	Round
5	*Hibiscucrosa-sinensis* Linn	Malvaceae	Jasud	Jasum	3m	By Cutting	hroughout the yea	Round / Oblong
6	*Lagerstroemia Parvifflora* Roxb	Lythraceae		Phurush	20m	By Seeds	June	Round / Oblong
7	*Lagerstroemia speciosa*(Linn)	Lythraceae	Queen crape Myrte	Jarool	10m	By Seeds	April - June.	Oblong
8	*Managifera Indica* Linn	Anacardiaceae	The mango tree	Am	15m	Almost all methods	uth India -Jan -M	Round / Oblong
9	*Morus alba* Linn.	Moraceae	Tuti	Tut	8m	By Seeds, Cutting,	Feb.- June	Oblong
10	*Pithecellobium ducle*(Roxb.) Benth	Mimosaceae	Manila tamarind, Madras thorn	Vilayatimili	8m	By Seeds, Cutting	Jan. - Feb.	Oblong
11	*Polyalthia longifolia* (Sonn.)	Anonaceae		Devdaru	15 or 5 m	Through seeds (fresh)Evergreen	April - June	nical or Round
12	*Terminalia arjuna* (Roxb)Wight &Arn	Combretaceae	Arjun,	Arjuna	15m	By Seeds, cutting, Air layering	April - July	Oblong/ Round

Source: Guidelines for developing Greenbelt – CPCB: 2007.

Table 10.5 Shrubs Species with Higher air pollution abatement characteristics

S. No	Binomial Name	Family	Common Name	Hindi Name	Height (meters)	Regeneration By	Flowering season
1	*Acacia catechu,* Willd	Mimoseae	The cutch tree	Khair	3m	By Seeds.	Oblong
2	*Bougainvillea spectabilis* Willd	Nyctaginvillea	Bougainvillea		8m	By cuttings	Oblong/ Round
3	*Calotropis procera*(R.Br.)Ait	Asclepiadaceae	Swallowwort	Akada	6m	By Seeds, Cuttings	Oblong/ Round
4	*Nerium indicum* Mill	Apocynaceae	Pink oleander	Kaner	5m	By Seeds, Cutting	Oblong / Round
5	*Tabernaemonatana divaricata* Linn	Apocynaceae		Tagar	3m	By Cutting	Round

Source: Guidelines for developing Greenbelt – CPCB: 2007.

10.3.8.7 Plantation Technique: The plantation technique proposed to be followed can be described as follows.

a) **Preparation for Seedlings:** To undertake plantation on site, following steps will be taken
   - Obtaining Healthy seedlings from nursery
   - Preparation of pits and preparing them for transfer of seedlings
   - Take care of seedlings after plantation in pits

b) **Pit and Soil Preparation:**
   - The pit size has been recommended as 45 cm x 45 cm x 45 cm for trees and 30 cm x 30 cm x 30 cm for shrubs.
   - The spacing for trees is proposed 2 m while 1 m for shrubs plantation.
   - The pits should be watered prior to plantation of seedlings.

c) **Post Care Facilities:**
   - The growing plants are cared at least for the first 3 years under favorable condition of climate and irrigation.
   - For healthy and vigorous growth adequate nutrient will be supplied.
   - To avoid water stress condition regular watering will be done.

10.3.9 Wild Life Management

10.3.9.1 Background: The Combined wildlife conservation plan of the project SIDCUL has been prepared for the purpose of environmental clearance as per the requirement of MOEF. It is prepared considering the eco-sensitivity of the area. The study area comprises of different types ecosystem viz. Forests ecosystem; Riparian ecosystem and Marshy ecosystem. This conservation plan focus on maintaining the ecosystem services of the area which will be beneficial for the wildlife and the Environment.

10.3.9.2 Project brief: The project will involve the development of industrial estate in an area of 291.56 ha (720.47 acre). It will include developing industrial plots along with primary infrastructure such as water, transportation and electricity. The facilities in these integrated industrial estates comprise dedicated substation with a string of feeder substations, common effluent treatment plants, connectivity, logistic centers, along with zone wise distribution of industrial, residential and commercial areas. The project site is situated at State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. (SIIDCUL), Sitarganj, Udham Singh Nagar, Uttarakhand. The site is connected to Sitarganj by two lane wide State Road.

List of schedule 1 Animals is as follows.

S.No	Local Name	Scientific Name	Family	IWLPA 1972 Schedule Amended in 2021	IUCN Conservation Status
1.	Mugger crocodile	*Crocodylus palustris* Lesson	Crocodylidae	I	Vu
2.	Common Indian monitor	*Varanus bengalensis* Daudin	Varanidae	I	LC
3.	Indian cobra	*Naja naja* Linnaeus	Elapidae	I	NA

S.No	Local Name	Scientific Name	Family	IWLPA 1972 Schedule Amended in 2021	IUCN Conservation Status
4.	Krait	*Bungarus caeruleus* Schneider	Elapidae	I	NA
5.	King Cobra	*Ophiophagus hannah* Cantor,	Elapidae	I	Vu
6.	Tiger	*Panthera tigris* Linnaeus	Felidae	I	EN
7.	Asian elephant	*Elephas maximus* Linnaeus	Elephantidae	I	EN
8.	Barking deer	*Muntiacus muntjak*Zimmermann,	Cervidae	I	DD
9.	Indian Pangolin	*Manis crassicaudata* E. Geoffroy,	Manidae	I	EN
10.	Leopard	*Panthera pardus* Linnaeus,	Felidae	I	Vu
11.	Porcupine	*Hystrix indica*Kerr,	Erethizontidae	I	LC
12.	Peafowl	*Pavo cristatus,* Linnaeus	Phasianidae	I	LC
13.	Harrier	*Circus aeruginosus*Linnaeus,	Accipitridae	I	LC

10.3.9.3 Wildlife conservation: Within 10km of the project boundary, Shivalik Eleplant Reserve (almost at 4.3km) and eco-sensitive zone of Nandhour Wildlife Sanctuary (almost at 6.6 km) is present. Similarly, Begul River is present within 50 m of the project. Within 10km of the boundary, the area comprises a number of important species of mammal, reptiles, and avifauna. Considering it, this combined wild life conservation plan has been prepared.

It includes three conservation plans such as

- Avifauna Conservation plan
- Amphibian and Reptilian conservation plan
- Mammalian conservation plan

However, no scheduled species are present in the core zone. The conservation plan is prepared considering habitat improvement, community sensitizations, and institutional supports the proper management of wildlife in the area.

The steps that will be involved in the Wildlife Conservation Plan are as follows:

- Floating of RFP/tender for Wildlife conservation action plan implementation
- Finalization of Wildlife conservation plan implementation organisation
- Memorandum of Understanding and award of Wildlife conservation action plan
- Monitoring & Evaluation
- Reporting

The implementation step for each conservation activity will be same above. The total budget allocated for the conservation plan is almost 15 lakhs. The budgetary break down is given at the end of each conservation plan:

10.3.9.3.1 AVIFAUNA CONSERVATION PLAN

10.3.9.3.2 Proposed Conservation Measures

10.3.9.3.3 Development of grassland: Some bird species such as peacock are grassland dwellers and forage around the cultivated lands. The development of grasslands will be beneficial for such species.

The grasslands can be developed on government and/ or community lands. The grassland so developed can be the area for nesting and laying eggs.

10.3.9.4 Construction of ponds: Concerted efforts to construct and maintain at least a minimum number of water sources every year depending upon the budgetary allocations are necessary. The project proponent will create water bodies on the diverted calls to serve as water holes for avifauna in consultation with Forest Department. This would help to meet its water requirement and wouldn't be forced to stray in nearby villages for water requirement

10.3.9.4.1 Construction of feeding platforms and enclosures: Feeding platforms may be created in the forest area/tree planted area for the local wild species. Feeding material should be distributed by the project proponent every week. Peachicks are often victims of prey. They are hunted by dogs and other common predators. Protection will be provided to two such identified nesting areas of peacocks through consultation with wildlife department and NGOs working in related fields

10.3.9.4.2 Artificial nest on tree: Artificial nests will be built in and around the study area on trees preferred by birds for nesting. Ornithologists shall be consulted for the same.

10.3.9.4.3 Awareness promotion: It is important to create awareness among community or schools to protect wildlife. Awareness programmes shall be held to sensitise the local people against man-animal conflict. Competitions such as lectures, debates, essays and quizzes, film shows, printing and distribution of literature may be undertaken. Suggestions for better conservation of wildlife will be invited and appropriate reward may be distributed. Dialogues may be initiated with the local communities around the peacock conservation areas to understand the problems faced by them from the peacock population.

10.3.9.4.4 Budget Allocation for Avian Conservation Plan

The budget allocated for each activities area as follows:

Table 10.6 Budget for Avian Conservation Plan

S. No.	Activities	Total cost
A	Development of grassland in consultation with Forest Department	150000/-
B	Construction of Pond.	100000/-
C	Construction of feeding platforms and enclosure for protection of fowls	100000/-
D	Putting artificial nests	100000/-
E	Awareness program among school/college students through NGO/CBOs.	50000/-
	Total	500000/-

The year wise brief budget is outlined as follows:

Table 10.7 Year wise activity budget distribution for Avian Conservation Plan

S. No.	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	Total cost (in Lakh)

A	Development of grassland	50000/-	-	50000/-	-	50000/-	-	-	150000/-
B	Construction of Pond.	-	50000/-	-	-		50000/-		100000/-
C	Construction of feeding platforms and enclosures	50000/-	-	50000/-		-		-	100000/-
D	Putting artificial nest of tree					25000/-	-	25000/-	50000/-
E	Awareness generation	-	-	-	50000/-	-	-	-	50000/-
Total Wildlife Conservation Action Plan Budget		100000/-	50000/-	100000/-	50000/-	75000/-	50000/-	25000/-	500000/-

10.3.9.4.5 Project Implementation Schedule:

This conservation plan will be implemented for about seven years. The implementation schedule for each year is as follows. Each year the implementation will be done in new location. Therefore, the overall implementation for each year remains the same.

Project Implementation Plan for 1st year to 7th Year

Table 10.8 Project Implementation Plan for Avian Conservation

S. No.	Activities/ Month	1	2	3	4	5	6	7	8	9	10	11	12
A	Development of grassland												
a	Floating the RFP, and selection of the best implementation organization												
b	Identification of locations for grassland development												
c	Development of grassland and maintenance												
d	Monitoring and reporting												
B	Construction of ponds												
a	Floating the RFP, and selection of best implementation organization												
b	Identification of locations for pond's construction or salt licks												
c	Construction of ponds or salt licks												
d	Monitoring and reporting												
C	Construction of feeding platforms and enclosures												
a	Floating the RFP, and selection of best implementation organization												

S. No.	Activities/ Month	1	2	3	4	5	6	7	8	9	10	11	12
b	Identification of locations of feeding platforms and requirement of enclosures of wildlife conservation												
c	Construction of feeding platform and purchase of wildlife enclosures												
d	Monitoring and reporting												
D	Putting artificial nest of tree												
a	Floating the RFP, and selection of best implementation organization												
b	Identification of locations of artificial nests												
c	Purchase and installation of artificial nests over trees												
d	Monitoring and Reporting												
E	Awareness generation												
a	Floating the RFP, and selection of best implementation organization												
b	Making linkages with school, colleges, etc. in the study area												
c	Organizing wildlife awareness activities as rally, painting competition, essay competition etc.												
e	Monitoring and Reporting												

10.3.9.5 REPTILE CONSERVATION PLAN

10.3.9.5.1 Proposed Conservation Measures

10.3.9.5.2 Increase tree coverage: Increasing the tree cover will provide habitat and roosting to the small birds, small mammals which can be important part of food chain of the reptiles. This can be achieved by planting of trees (a group of trees that grow close together, generally without many bushes or other plants) in buffer zone of the project area. Vacant places such as edges of agricultural fields, village Gauchar, Panchayat's common land, neighbourhood of people inhabiting, road side avenue tree plantation, open scrubs, school compounds can be selected for plantation activities.

10.3.9.5.3 Protection/Maintenance of water resources available in the area: The water sources and wetland within 10km will be studied and maintained with necessary implementation activities.

10.3.9.5.4 Awareness programmes (community and school level) for conservation of reptiles in the project area through organizing presentations, competitions, celebrating important days etc.

10.3.9.5.5 Carrying out census and research projects to know the potential threats and population status of the species in collaboration of colleges, panchayat and forest department.

10.3.9.5.6 Budget Allocation

The budget allocated for each activities area as follows:

Table 10.9 Budget for Reptile Conservation Plan

S. No.	Activities	Total cost
A	Increase Tree Coverage	200000/-
B	Protection/Maintenance of water Resources	100000/-
C	Awareness program	100000/-
D	Carrying out census and research projects	100000/-
	Total	500000/-

The year wise brief budget is outlined as follows:

Table 10.10 Year wise activity budget distribution for Reptile Conservation Plan

S. No.	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	Total cost (in Lakh)
A	Increase Tree Coverage	-	100000/-	-	100000/-	-	-	-	200000/-
B	Protection/Maintenance of waterResources	50000/-	-	50000/-	-	-	-	-	100000/-
C	Awareness program	-	-	-	-	50000/-	-	50000/-	100000/-
D	Carrying out census/research projects	-	-	-	-	50000/-	50000/-	-	100000/-
Total Wildlife Conservation Action Plan Budget		50000/-	100000	50000/-	100000/-	100000/-	50000/-	50000/-	500000/-

10.3.9.5.7 Project Implementation Schedule:

This conservation plan will be implemented for about seven years. The implementation schedule for each year is as follows. Each year the implementation will be done in new location. So, the overall implementation plan for each year will remain the same.

Project Implementation Plan for 1st year to 7th Year

Table 10.11 Project Implementation Plan for Reptile Conservation

S.No.	Activities/ Month	1	2	3	4	5	6	7	8	9	10	11	12
A	Increase Tree Coverage												
a	Floating the RFP, and selection of best implementation organization												
b	Identification of locations of tree plantation												
c	Trees plantation and maintenance												
d	Monitoring and reporting												

S.No.	Activities/ Month	1	2	3	4	5	6	7	8	9	10	11	12
B	Protection/Maintenance of water Resources												
a	Floating the RFP, and selection of best implementation organization												
b	Identification of locations and ponds												
c	Maintenance of ponds												
d	Monitoring and reporting												
C	Awareness program												
a	Floating the RFP, and selection of best implementation organization.												
b	Identification of schools, colleges etc. in the project area and making linkages with them.												
c	Identification of activities and organizing awareness activities (Such as rally, presentations, competition, essay competition etc.).												
d	Monitoring and Reporting												
D	Carrying out census and research projects												
a	Floating the RFP, and selection of best implementation organization/institute												
b	Identification of locations for the study												
c	Carrying out census and research												
d	Monitoring and Reporting												

10.3.9.6 MAMMAL CONSERVATION PLAN

10.3.9.6.1 Proposed Conservation Measures

10.3.9.6.2 Plantation Program: Plantation program is of paramount importance and it will augment present vegetation, check soil erosion, make the ecosystem more stable and functional, and restore water balance. The main objective of the plantation programme is to provide an amenable habitat for wildlife to thrive. The various steps that will be taken for habitat conservation and restoration of plantation and afforestation within as well as outside the project are essential components.

10.3.9.6.3 Retain Water Availability: Water is an important element for any life. Therefore to ensure the availability of water, efforts shall be taken to construct and maintain water sources every year depending upon the budgetary allocations. It will be done by construction of a variety of water impoundments such as stop dams, earthen tanks, small dams, etc.

10.3.9.6.4 Awareness program: An awareness program will be conducted among communities/school by conducting awareness programs and through local media etc.

10.3.9.6.5 Strengthening of Patrolling: To improve the vigilance and to monitor the wildlife movement, and to check the poaching, the project will support purchase of equipments like, cameras, binoculars, sleeping bags, search lights, health kits, maintenance of watch tower, etc to Forest Department in consultations with Forest Department.

10.3.9.6.6 Budget Allocation Mammal Conservation Plan
The budget allocated for each activities area as follows:

Table 10.12 Budget for Mammal Conservation Plan

S. No.	Activities	Total cost (in lakhs)
A	Plantation Program	200000/-
B	Retain Water Availability	150000/-
C	Awareness program	50000/-
D	Strengthening of Patrolling	100000/-
	Total	500000/-

The year wise brief budget is outlined as follows:

Table 10.13 Year wise activity budget distribution for Mammal Conservation Plan

S. No.	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	Total cost (in Lakh)
A	Plantation Program	50000	50000	50000		50000		-	200000/-
B	Retain Water Availability		-	-	50000	-	50000	-	100000/-
C	Awareness program		50000	-	-	-	50000	-	100000/-
D	Strengthening of Patrolling	-	-		-	50000.00	-	50000	50000/-
Total Wildlife Conservation Action Plan Budget		50000	100000	50000	50000	100000	100000	50000	500000/-

10.3.9.6.7 Project Implementation Schedule:
This conservation plan will be implemented for about seven years. The implementation schedule for each year is as follows. Each year the implementation will be done in new location.
Project Implementation Plan for 1st year to 7th Year

Table 10.14 Project Implementation Plan for Mammal Conservation

S. No.	Activities/ Month	1	2	3	4	5	6	7	8	9	10	11	12

S. No.	Activities/ Month	1	2	3	4	5	6	7	8	9	10	11	12
A	Plantation Program												
a	Floating the RFP, and selection of best implementation organization												
b	Purchase of the tree saplings and identification of locations of tree plantation												
c	Plantation of trees and maintenance												
d	Monitoring and reporting												
B	Maintaining Water Availability												
a	Floating the RFP, and selection of best implementation organization												
b	Identification of locations												
c	Maintenance/construction activities												
d	Monitoring and reporting												
C	Awareness program												
a	Floating the RFP, and selection of best implementation organization												
b	Identification of community/group												
c	Conducting awareness programs												
d	Monitoring and reporting												
D	Strengthening of Patrolling												
b	Identification of requirements												
c	Purchase and handing over the equipments.												
d	Monitoring and Reporting												

10.3.9.7 Budget for combined conservation plan:

Table 10.15 Combined budgets for conservation plan

S. No.	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	Total cost
Avifauna Conservation Plan									
A	Development of grassland	50000/-	-	50000/-	-	50000/-	-	-	150000/-
B	Construction of Pond.	-	50000/-	-	-		50000/-		100000/-
C	Construction of feeding platforms and enclosures	50000/-	-			-		50000/-	100000/-
D	Putting artificial nest of tree					25000/-	-	25000/-	50000/-
E	Awareness generation	-	-	-	50000	-	-	-	50000/-
Sub-Total		100000/-	50000/-	50000/-	50000/-	75000/-	50000/-	75000/-	500000/-
Reptile Conservation Plan									
A	Increase Tree	-	100000/	-	100000	-	-	-	200000/-

S. No.	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	Total cost
	Coverage		-		/-				
B	Protection/Maintenance of water Resources	50000/-	-	50000/-	-	-	-	-	100000/-
C	Awareness program	-	-	-	-	50000/-	-	50000/-	100000/-
D	Carrying out census/research projects	-	-	-	-	50000/-	50000/-	-	100000/-
Sub Total		50000/-	100000/-	50000/-	100000/-	100000/-	50000/-	50000/-	500000/-
Mammal Conservation Plan									
A	Plantation Program	50000/-	50000/-	50000/-		50000/-		-	200000/-
B	Retain Water Availability		-	50000	50000	-	50000	-	150000/-
C	Awareness program		50000	-	-	-	50000	-	100000/-
D	Strengthening of Patrolling	-	-		-	50000	-	50000	50000/-
	Sub Total	50000/-	100000/-	100000/-	50000/-	100000/-	100000/-	50000/-	500000/-
	Total	200000/-	250000/-	250000/-	200000/-	275000/-	200000/-	175000/-	1500000/-

The total allocated budget for wildlife conservation plan of SIIDCUL is Rs. 15 lakhs.

10.3.10 ENERGY CONSERVATIONPLAN

Energy conservation program will be implemented through measures taken both on energy demand and supply.

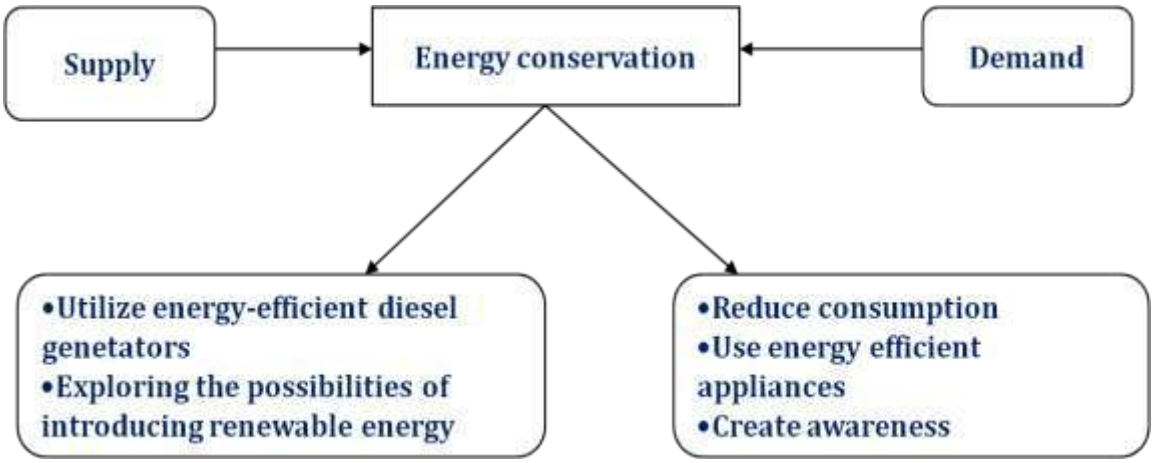


Figure 10.4: Energy Conservation measures

Energy conservation will be one of the main focuses during the proposed project planning and operation stages. The conservation efforts depend on the following attributes:

Energy Saving Practices	Each individual industry will follow the efficient measures to save the energy that will include: Energy efficient lamps will be provided within the project site. Constant monitoring of energy consumption and defining targets for energy conservation. Adjusting the settings and illumination levels to ensure minimum energy used for desired comfort levels.
Behavioral Change on Consumption	Promoting staff's awareness on energy conservation Training staff on methods of energy conservation and to be vigilant to such opportunities

The detail energy conservation measures that will be followed such as

- About 10% of the total electrical load will be met via solar power that will connect to the common areas.
- Landscape and green areas will be so spaced so as to cool the surrounding environment, which will reduce energy consumption.
- Lesser opening will be provided on the west facing walls
- Green area at the site will be maintained by the project proponents, which would have an overall cooling effect on the surroundings.
- Feasibility for installation of solar photovoltaic cells for street lighting will be assessed by each individual industry.
- Use of LED`s & CFL lamps instead of GLS lamps for Common area Lights.

10.3.11 FIRE & SAFETY PLAN

i. Fire Fighting Designed: As per National Building Code (NBC) 2016.
ii. Provision of Automatic water sprinklers.
iii. Provision of separate fire hydrant pipe.
iv. Provision of Overhead water storage tank.
v. There is provision of firefighting pumps.
vi. Optical type smoke detectors shall be used in most areas.

Environment management plan may require proper arrangement within the project to implement the suggested management plan properly and efficiently. Therefore, environmental management system is proposed.

10.4 ENVIRONMENTAL MANAGEMENT SYSTEM

For the effective and consistent functioning of EMP, an Environmental Management system (EMS) will be established at the project. The EMS would include the following:

- Environmental management cell.
- Environment Policy of the project
- Environmental Monitoring.
- Personnel Training.
- Regular Environmental audits and Correction measures.

Documentation

10.4.1 Environmental & Climate Change Management Cell

It is proposed to have a permanent organizational set up charged with the task of ensuring its effective implementation of mitigation measures and to conduct environmental monitoring. The major duties and responsibilities of Environmental & Climate Change Management Cell shall be as given below:

- To implement the environmental management plan.
- To assure regulatory compliance with all relevant rules and regulations.
- To ensure regular operation and maintenance of pollution control devices.
- To minimize environmental impact of operations as by strict adherence to the EMP.
- To initiate environmental monitoring as per approved schedule.

Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit.

Maintain documentation of good environmental practices and applicable environmental laws for a ready reference.

- Maintain environmental related records.
- Coordination with regulatory agencies, external consultants, monitoring laboratories.
- Maintenance of log of public complaints and the action taken.

10.4.2. Structure of Environmental & Climate Change Management Cell

The project site will be supervised and controlled by the management supported by adequate team of technically and statutorily qualified personnel apart from the operating staff of skilled, semi skilled, unskilled and other categories. Hierarchical representation of the system developed for management of Environment and to control pollution due to activities is given below.

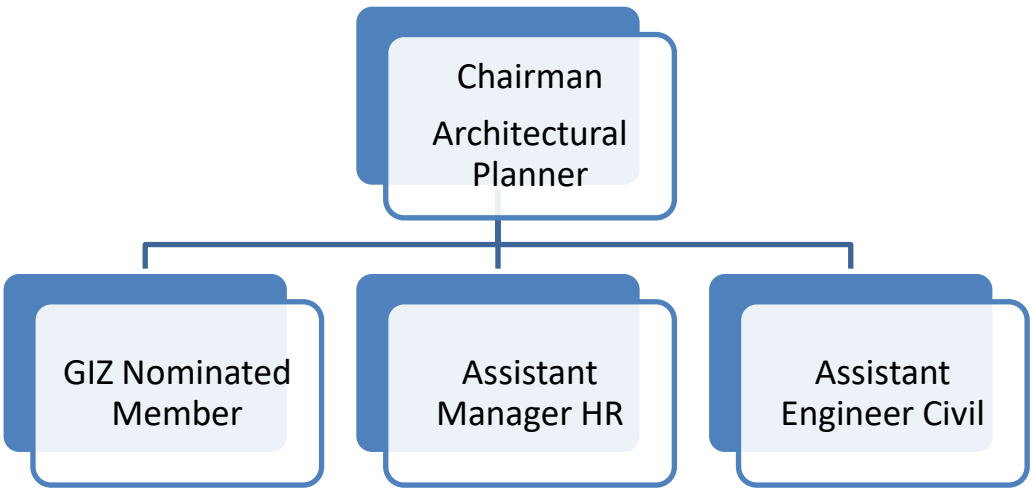


Figure 10.5: Environmental & Climate Change Management Cell

A hierarchical arrangement as shown above is having properly distributed responsibilities and are as below:

10.4.2.1 Chairman (Architectural Planner): Chairman will be basically heading the Environmental & Climate Change Management Cell. All the matters will be brought to the chairman. There is a possibility that a third party is hired for maintenance of industrial estate. In that case also the chairman will be the whole sole decision maker for the industrial estate.

10.4.2.2 Assistant Manager (HR): Assistant Manager (HR) is primarily responsible for man power management during construction and operation for proposed industrial estate. The Chairman may assign additional responsibility to Assistant Manager (HR)

10.4.2.3 Assistant Engineer (Civil): Assistant Engineer (Civil) will be responsible for looking after operation &maintenance of whole industrial estate. All kind of mechanical, electrical or plumbing related problems or issues will be dealt by the Assistant Engineer (Civil).

10.4.2.4 GIZ Nominated Member: GIZ Nominated Member is primarily responsible for guiding and complying environmental conditions as per EC letter and as per other pollution control board norms. Environmental & Climate Change Management Cell will hire qualified Environment Engineers and other staff and labours as per the requirement.
Environmental & Climate Change Management Cell will be responsible for

- Operation of CETP
- Proper functioning of CETP
- Landscaping and beautification of green environment
- Water conservation by using treated water from CETP
- Obtaining Consents from PCBs
- Complying all the conditions of in synchronization with other departments in the company
- Escalation of issues related to Environment to the management
- To get tie up with the authorized vendors of Municipal waste, Hazardous waste and E-Waste for whole development of the project.
- Filing Forms as per notifications/policy of state boards
- Filing six monthly compliance report to concerned authority,
- Conducting Environment and Energy Audits for the project site time to time.

Escalation of the Issue
Escalation of the issue related to environment will be done by the Environment Engineer, who will further communicate the same with Environmental & Climate Change Management Cell followed by Management of the project. After escalation of the issue and getting green signal from management, issue must be resolved.

10.4.3 Environmental Policy of the Project:
The environmental policy will ensure that the activities have been operated in accordance with prescribed standards while complying with all applicable environmental, health and safety laws and regulations.

10.4.3.1 Objectives

Policy shall be complied by following objectives

- Establish and maintain a well-defined environmental, health and safety management to guide its operations.
- Provide operations with the necessary resources, expertise and training to effectively carry out its EHS management programs.
- Provide regular basis training program to the labors working on project site.
- Engage workers and other staff at all levels in programs directed towards minimizing adverse effects on the environment resulting from Construction activity.
- Work proactively with governments and the public in the development of cost effective and realistic regulations that promote enhanced environment and safety protection.
- Promote environmental awareness among its employees, and labours
- Require those who provide services and products to practice good environmental stewardship.
- Organize regular health check-up camp on project site for workers.
- Mitigate environmental impacts through efficient use of resources and the reduction of input materials and waste.
- Maintain a high degree of emergency preparedness on site.

10.4.4 Environmental Monitoring

The monitoring will be carried out as per the monitoring schedule (given in Chapter VI).

10.4.5 Environmental Awareness Training

Environmental Awareness training will help to ensure that the requirements of the EMP are clearly understood and followed by all project personnel throughout the project period. The training shall focus on

- To maintain highest standards of occupational health, safety and environment protection.
- To comply with all applicable guidelines and requirements to promote occupational health, safety and environment protection.
- To be always alert, equipped and ready to respond to emergencies.
- To take all actions necessary to protect the integrity of the system in order to avoid accidental release of hazardous substances.
- To enhance awareness and involvement in promotion of Occupational health, safety and environment protection wherever we work and reside.

10.4.6 Internal Audit

The internal audit will be conducted on periodic basis and any non-conformities/violation to environment law will be closed and discussed in Management Review Meeting of Board of Director/Partners. To assess whether the implemented EMP is adequate, periodic environmental audits will be conducted by the project proponent's Environmental division. These audits will be followed by Correction Action and Preventive Action Plan (CAPA) to correct various issues identified during the audits and to stop the recurrence of the same.

10.4.7 Documentation

It includes documenting standards operation procedures Environmental Management Plan and other records.

10.4.8 BUDGETS FOR ENVIRONMENT MANAGEMENT PLAN

The cost of the complete project including land and development cost and other contingencies is Rs. 130.96crores.Below mentioned budget will be provided to the Environment Management Cell for implementation of EMP and monitoring of Environmental parameters.

TABLE-10.16-EMP BUDGET DETAILS-CONSTRUCTION PHASE

S.No	Component	Capital Cost (Rs. In Lacs)	Recurring Cost (Rs. In Lacs/Annum)
1.	EMP cost of Construction phase(tarpaulin cover to cover the construction material and GI Sheet)	11.4/-	1.71/-
2.	Water sprinkling for dust suppression (water tanker)	3/-	0.45/-
3.	Wheel wash arrangement during construction phase	1/-	0.5/-
4.	Sanitation for labors septic tank	8/-	1.2/-
5.	Handling of construction waste material	4.7/-	0.7/-
6.	PPE for workers	6/-	1/-
7.	Health check up and medical facilities (Workers)	20/-	8/-
8.	Capacity enhancement program -Awareness program on biological conservation, sanitation	-	2/-
9.	Environmental Monitoring and six monthly compliances	-	4/-
10.	Signage for drivers	0.4/-	-
11.	Implementation of Social Management Plan	-	2.5/-
12.	Clearing of Vegetation	5.7/-	1.2/-
13.	Water meter	1/-	-
14.	Chemical for cement curing	3.5/-	-
15.	Provision of silt traps &desilting of drains	4.0/-	1.0/-

S.No	Component	Capital Cost (Rs. In Lacs)	Recurring Cost (Rs. In Lacs/Annum)
16.	Environment Management Cell	-	20/-
17.	Regular maintenance/servicing of equipments and vehicles	-	2/-
18.	**Total**	**68.7/-**	**46.26/-**

TABLE-10.17-EMP BUDGET DETAILS-OPERATION PHASE

S.No	Component	Capital Cost (Rs. In Lacs)	Recurring Cost (Rs. In Lacs/Annum)
1.	Storm Water Management System	11/-	1.25/-
2.	Solid Waste Management (organic waste converter)	7.00/-	0.75/-
3.	CETP	900/-	8.0/-
4.	Environmental Monitoring and six monthly compliances	-	3.00/-
5.	Green Area/ Landscape Area	70.00/-	10/-
6.	Installation of Solar PV	6.0/-	0.5/-
7.	Environment Management Cell	-	20/-
8.	Regular maintenance/servicing of equipments	-	3.8/-
	Total	**994/-**	**47.30/-**

The total EMP budget of both construction and operation phases are summarised below:-

TABLE-10.18-TOTAL EMP BUDGET

S. No.	Particular	Cost in lacs
1.	EMP budget (Capital cost)	1062.7/-
2.	EMP budget (Recurring cost)	93.56/-
3.	Wildlife Conservation Plan	15.00/-
	Total	**1171.26/-**

Hence, a total of **Rs. 1171.26/-Lakhs** is allocated as Environmental Management and Monitoring Cost. The total capital cost is estimated to be **Rs. 1062.7/- Lakhs** while the recurring cost to be **Rs.93.56/- Lakhs**. Almost 30 lakhs is allocated for the wild life conservation program from the project.

10.4.9 Conclusion

The industries are of utmost importance for the development of any region or nation. There are many impacts on nature and human beings that can be avoided through the proper environment management plan and its implementation in true letter & sprit. Although the study area is having high productivity, cheap labour and amenable environment, the negative impact will be minimized by the various activities proposed in the EMP and the proposed industrial estate will contribute in the national development.

****

CHAPTER – XI

SUMMARY & CONCLUSION

11.0 INTRODUCTION

State Integrated Industrial Development Corporation is planning to develop an industrial estate near its existing industrial estate at Sitarganj. The present draft EIA Report is being prepared for public hearing and the final EIA incorporating the issues raised by the public; action proposed to close or minimize them along with budget and timeline will be submitted to SEIAA- Uttarakhand for securing the environmental clearance for proposed industrial estate. The present project is to develop an industrial estate near its existing industrial estate at Khsara : 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28; 29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47; 48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68;69; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88; 89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107;122;123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156;157; 158; 159; 161; 162; 163; 164; 167; 168;169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153, Village :- Bara; Prahlad Palsia and Kalyanpur;Tehsil: - Sitarganj; District: - Udhamsingh Nagar; State: - Uttarakhand; India.

11.1 PROJECT DESCRIPTION

Project Details:

Name of the Project	:	IIE Sitarganj Part II (B) Khsara No: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26;27; 28;29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47; 48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68; 69; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88; 89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107; 122; 122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156; 157; 158; 159; 161; 162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153 at Village – Bara, Prahlad Palsia, Kalyanpur.
Tehsil	:	Sitarganj
District	:	Udhamsingh Nagar, Uttarakhand; India
Land Area	:	29, 15,600 sq. m (291.56 hectares)

Project Proponent Details:

Name and Address of the Project Proponent:

Name	:	Mr. Rohit Meena
Address	:	SIIDCUL, 29, IIE Sahastradhara Road, (IT Park), Dehradun.
Phone No.	:	0135- 2607292, 2708100
Pin code	:	248001

.TABLE-11.1-PROJECT DETAILS

Items	Details
Proponent Name	State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. (SIIDCUL)
Location	Khsara No: 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 16; 25; 26; 27; 28; 29; 30; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 47;48; 49; 50; 51; 52; 55; 56; 57; 58; 59; 60; 66; 67; 68; 69; 71;72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 88;89; 90; 91; 92; 93; 95; 96; 98; 99; 100; 101; 103; 104; 105; 106; 107; 122; 122; 123; 124; 125; 128; 131; 132; 133; 146; 147; 149; 149; 150; 153; 154; 155; 156; 157; 158; 159; 161; 162; 163; 164; 167; 168; 169; 170; 171; 172; 173; 174; 175; 177; 178; 180; 182; 183; 184; 186; 165/189; 188/153 at Village – Bara, Prahlad Palsia, Kalyanpur. Tehsil :- Sitarganj; District:- Udhamsingh Nagar; State :- Uttarakhand; India
Latitude	29° 0'12.04“ North
Longitude	79°41'0.67"East
Project area	291.56 ha (720.47 acre)
Land use	Industrial
Green Area	44.49 ha
Road & parking	44.61ha
Utility/ Reserve	24.02ha
Residential	25.00ha
Commercial	8.34ha
Industrial	145.11ha
Nearest Habitat/Town	Sitarganj; 6.1km; S
Nearest Railways Station	Lalkua Junction Railway Station (16.6 km towards NW direction)
Nearest Airport	Pantnagar Airport at Phoolbagh (18.8 km towards NW direction)
Nearest Highway	NH-125–7.2Km towards S Direction
Education Facility	Primary Govt. School 370m; W, Govt. Girls Inter college Shaktifarm1.8km; W
Water Demand and Supply source	During construction phase 0.540 MLD water will be required the same will be met through existing CETP. The total water requirement in operation phase will be approx. 11 MLD. Fresh water (7 MLD) will be obtained from ground water. Rest will be met via CETP treated wastewater (4 MLD).
Seismic Zone	Zone –IV (As per BMTPC)
Proposed Production process	Industries such as Brewery, Bottling and food processing units; Mixed Food products; Auto Industries; Auto components; packaging; Light engineering etc.
Estimated Project Cost	Rs. 130.96/- Crore
Ground water level	In the unconfined aquifer, the depth to water level in pre monsoon and post monsoon varies from 2.09 to 7.08 m bgl and from 1.99 to 6.89 m bgl, respectively. The seasonal fluctuation varies from 0.09 to 3.56 m.(Source: CGWA district brochure- Udhamsingh Nagar)
Working Days	340

Man Power	4000 individuals during construction phase and 12658individuals during operation phase.
Total Power demand and supply source	123 MW electricity will be supplied by UPCL (Uttarakhand Power Corporation Limited) during operation phase and 60 KW during construction phase through temp connection
Total Goods to be manufactured	35107 tons/day
Total Traffic to be generated (PCU)	30932
Total Waste Generation	22.75 MT/day Industrial process waste 2.75 MT/day Municipal Solid waste
Wildlife Sanctuary	Nandhour Wildlife Sanctuary is 12.6 Km in NE
Ecosensitive Zone	ESZ of Nandhour Wildlife Sanctuary is 6.6 Km in NE
Begul River	50 meter (adjacent to Project site)
CETP Capacity	12 MLD

Source: Detailed Project Report, SOI OSM Map, Wikimapia, Google earth, BMTPC, IMD

11.2 STUDY AREA AT GLANCE

The Study area has been covered 10 Kilometer radius around project boundary. Various Physical environmental components, Socio economic, Biological components were monitored in this zone.Team of experts from ASTPL and laboratory team from Noida testing laboratories conducted the baseline study along with officials of State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. Field studies were conducted for a period of three months December 2020 to February 2021 (winter season) to determine the existing conditions of various environmental attributes. Salient features of study area are as under: -

TABLE-11.2-SALIENT FEATURES OF STUDY AREA (10 KM RADIUS)

S/No	Details	
1.	Demography within 10 km radius (Projected population for 2021 based on Census 2011)	
	Total Population	180626 individuals
	Total Male	93433 individuals
	Total female	87194 individuals
	Total Worker	69837 individuals
2.	Climatology (December 2020 to February 2021)	
	Maximum Temperature (°C)	31
	Minimum Temperature (°C)	4
	Highest Relative Humidity (%)	100
	Lowest Relative Humidity (%)	25
3.	Seismic Zone	Seismic Zone IV (Source:- Building Material technology promotion council)
4.	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Gorhi Neleala Adjacent in E Sukhi Nadi Adjacent in W Bahgul Nadi Adjacent in S Upper Bahgul Canal 300 m; E Kailash Nadi 1.3 km; E Nandhaur Nadi 2.4 m; NE Katna Nadi 5.6 km; W Terha Nala 6.0 km; SW

S/No	Details	
		Phawr Nadi 6.9 km; E Dhora Nala 7.0 km; W Seena Nala 7.1 km; E Deoha Nadi 8.0 km; SE Khakra Nala 8.11 km; SE Bhainsiya Nala 8.3 km; NE Sher Nala 9.6 km; NW Bhuta Nala 9.8 km; SW
5.	National Park, Wild Life Sanctuaries, Biosphere Reserves Protected Forest etc. within 10 Km radius study area	There is no national park; WLSeco-sensitive area and critically polluted area in 10km radius from the project site. Kailash RF 1.0 Km in NE Barkoli RF 2.0 km; SW Raikhal RF 3.1 Km: N Ransali RF 3.6 km; E Shivalik Elephant Reserve 4.3 Km; N Tunikhal RF 4.5 km; NW Saraunja RF 5.3 km; E Kotkharra RF 5.9 km; NW Kalaga RF 7.0 km; NE Horai RF 7.9 km; NW Mailani RF 8.3 km; NW Hanspur RF 8.9 km; NE Nandhaur RF 9.0 km; N Kalega RF9.1 km; NE
6.	State and Interstate Boundary	• Interstate Boundary of Uttarakhand and Uttar Pradesh is at 12.0 Kms in South Direction
8.	National Highway and nearby road	• NH-125–7.2Kmtowards S Direction
9.	Nearest Airport	• Pantnagar Airport at Phoolbagh (18.8 km towards NW direction)
10.	Nearest Railway Line	• Lalkua Junction Railway Station (16.6 km towards NW direction)
11.	Nearest, Habitation/village Town and City	• Sitarganj; 6.1km; S
	School/ college	• Govt Primary school;Nirmalnagar; 0.38km; W • Govt High school; Rajnagar; 1.06km; SE • Govt Degree collage; Sisona; 1.74km; SE • Govt Inter collage; Shaktifarm ; 1.90km; S • Govt Primary school; Ukrauli; 2.34km; N • Govt Inter collage;Rudpur; 2.74km; N
	Medical facilities and Hospitals	• Prayas hospital and research center; 0.97km;E • Health and wellness center ;Nakulia; 4.00km;SE • Govt. Hospital Deorakala; Sitarganj; 7.18km; S • Triveni clinic ; Sitarganj; 7.24km; S • Satya Eye hospital , Sitarganj; 7.56km;S • Dr.Turna Max Surgical hospital, Sitarganj; 7.84km;S

S/No	Details	
	Police station	• Police fire Station SIDCUL; Sitarganj; 1.64km; N • Police Station; Sitarganj; 7.00km; S

Source: - Site Visit and Survey of India Toposheet

TABLE-11.3-ENVIRONMENTAL MONITORING RESULTS

PARAMETERS	DESCRIPTION	
	Monitoring Period	December 2020 to February 2021
Ambient Air Quality Monitoring (10 locations)		1. As per the analysis the minimum concentration of PM_{10} was found 21.0 µg/m³at AAQ8 (Near Karhapani Nursery) and maximum concentration found 89.5 µg/m³ at AAQ7 (Sitarganj) due to highway road, dense market, construction activities in town. However at the other placesthe monitoring results of PM_{10} are within the prescribed limit 100 µg/m³ as per CPCB respectively. 2. The monitoring results of $PM_{2.5}$ reveal that the minimum concentrations of 12.5µg/m3was found at AAQ8 (Near Karhapani Nursery) while the maximum concentration of 51.0µg/m³ is found at AAQ7 (Sitarganj). However at other places the monitoring results of $PM_{2.5}$ are within the prescribed limit 60 µg/m³ as per CPCB respectively. 3. The gaseous pollutants SO_2 and NO_2 are well within the prescribed CPCB limit of 80 µg/m³ for Industrial, residential and rural areas at all monitoring stations. The minimum concentration & maximum concentrations of SO_2 were found to be 3.5 µg/m³ at AAQ8 (Near Karhapani Nursery) & 17.4 µg/m³ at AAQ7 (Sitarganj) respectively. The minimum & maximum concentrations of NO_2 were found to be 5.1 µg/m³at AAQ8 (Near Karhapani Nursery) & 27.5µg/m³ at AAQ7 (Sitarganj) respectively. In Sitarganj gaseous pollutants concentration has been slightly increases due to heavy traffic, connecting road, dense population & dense urban area. 4. CO concentration ranges between 0.1 to 1.9 mg/m³ at AAQ8 and AAQ7 respectively. 5. Ozone concentration ranges between 13.0 µg/m³ at to 25.0 µg/m³ respectively. 6. The other pollutants like Ammonia, Heavy metal (Pb, As & Ni), Benzo@pyrene were found not detected at all the monitoring locations.
Noise Level Monitoring (10 locations)		As per selected monitoring station for noise level, it is observed that the maximum concentration were reported at ANQ7 (Sitarganj) 63.5 dB(A) in the day time monitoring period & minimum concentration were reported at ANQ8 (Kahra Pani Nursery) 45.4 dB(A)in the day time monitoring period. The maximum concentration were reported at ANQ7 (Sitarganj) 50.6 dB (A) in the night time monitoring period & minimum concentration were reported at AAQ8 (Kahra Pani Nursery) 35.9 dB(A) in the night time monitoring period. It is concluded that, the

PARAMETERS	DESCRIPTION	
	Monitoring Period	December 2020 to February 2021
		Sitarganj area is major road connectivity & there are found more traffic due to main highway SH9. In kahra Pani nursery is a silence zone, so noise level is very low at location comparatively to other selected locations for noise monitoring
Water Sampling	Surface water sampling was carried out at 4 locations	As per analysis of surface water it was found that the surface water is indicating minor pollution in studies location area. The total coliform & faecal coliform count also indicated that the surface water is out of limit in two location SW1 &SW2 in the prescribed limit.so it cannot be used directly for any purposes. As per the analysis results found Faecal Coliform parameter results are falling under the Class C, BOD parameter results are falling under the Class Below E, pH parameter results are under the Class A, B, C, D & E, Dissolced oxygen parameter results are under the Class B &Electrical conductivity& Faecal Coliform results are falling under the Class Below E according to water quality criteria by CPCB.
	Ground Water sampling was done at 5 locations	According to baseline study within 10 km radius,It can be concluded from ground water analysis results that all parameters for all monitoring locations are within permissible limit as per IS: 10500-2012 "Specifications for Drinking Water". It is a fit for drinking purpose after RO filtration.
Soil Quality (4 locations)		It is observed that the soil quality- does not indicate any noticeable pollution and contamination. The soil qualities of villages are suitable for agriculture and can be improved by application of fertilizers in order to grow vegetation/plantation.

Source: - Environmental Monitoring via Noida Testing Laboratory

11.3 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION

Summary of anticipated adverse environmental impacts and mitigation measures are tabulated below

TABLE-11.4-ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION

Particular	Project Activities	Impacts	Mitigation Measures	Remark
Air Quality	Filling of low lying area to elevate the plinth level up to the road level	Increase in PM levels in ambient air due to dust generation and SOx concentration levels in ambient air due to vehicular emissions.	1. Exposed area will be limited to the minimum requirement. 2. Installation of spray systems (mist guns) for dust suppression at temporary dumping. 3. Minimization of drop distance for all materials-handling process through	All the filling will be done by the tenants under supervision of SIIDCUL. The filling material carriedout to the project site is

Particular	Project Activities	Impacts	Mitigation Measures	Remark
			appropriate design of operations. 4. Covering of filling site through barricading of adequate height	proposed to be utilized on the same day. Storage of filling material the project site will not be allowed. Anti-smog guns will be installed at selected places if required. Regular Air monitoring will be carriedout and CAAQMS will be installed if required. Air pollution control devices i.e. ESP; bag filter; wetjetand fixed water sprinklers will be installed by tenants if the need arises. Only PUC verified vehicles will be allowed to enter in the proposed industrial area. Stacks will be as per the direction of SPCB/CPCB. Regular health checkup of workers will be carried out by tenant industries.
	Transportation of Soil and stone aggregate to the project site	Increase in PM level due to dust generation and SOx concentration levels in ambient air due to vehicular emissions.	1. Regular watering of approach and access roads. 2. Approach roads will be clearly defined using marker posts so that vehicle traffic is controlled in the area. 3. Approach Roads no longer required will be re-vegetated as soon as Possible. 4. Approach roads to be maintained by surface grading to minimize excessive road surface wearing. 5. Covered transport of Soil and stone aggregate will be carried out.	
	Unloading operation of filling material	Elevate PM concentrations in ambient air.	Speed limit of vehicles will be controlled and in no case it will be beyond 40 Km/hrs. Mechanical unloading reduces air borne dust hence it if recommended for unloading the filling material.	
	Operation of industries	Excessive occupational Exposures to airborne particulate matter.	1. Occupational exposures to air pollutants will be assessed at regular intervals. 2. Where exposures exceed the regulatory limits, appropriate engineered controls, management measures or, as a last resort, the provision of personal protective equipment will be implemented.	

Particular	Project Activities	Impacts	Mitigation Measures	Remark
Noise Levels Control	General activities including machine & transportation of soil and stone aggregate Transportation of industrial raw material and finished products Production process	Increase in noise levels Occupational hazard due to noise exposures and Increase in ambient Noise	1. An analysis of measured noise levels, meteorological parameters, and industrial operations will be undertaken to determine the risk of excessive noise impacts during industrial operations. 2. Industrial operation and service vehicle movement will be limited to the daytime. 3. Occupational noise exposures will be assessed. Where Leq (8 hour) noise exposures have the potential to exceed 85 dB(A), mitigation through engineered noise controls, management measures or, as a last resort, through the provision of personal protective equipment will be implemented.	Six monthly/ Quarterly monitoring as per norms of SPCB and CPCB
Water Resources and Quantity	Dewatering	Reduction in groundwater availability for domestic or local business purposes Reduction in groundwater availability for irrigation Purposes. Changes to hydraulic regime.	1. Rainwater collection and harvesting will be practiced in the upstream Bhabhar Area. 2. Rain water will be collected in the sump for future use. 3. Water conservation methods will be practiced.	Rain water harvesting will be practised in the upstream Bhabhar region in association with forest department.
Water Resources and Quality	Wastewater generated from domestic usage at proposed industrial estate.	Deterioration in ground water and soil quality when discharged untreated. Untreated waste water will be	1. All the generated waste water will be treated in a CETP of 12MLD capacity, the treated water will be used to the maximum possible expert and the excess treated water will be discharged in the adjacent stream after	

Particular	Project Activities	Impacts	Mitigation Measures	Remark
		affected the aquatic flora & fauna downstream. The human health will also be adversely affected by the untreated sewerage/ waste water.	prior permission from pollution control board, Uttarakhand. 3. Waste water or treated water will not be allowed to mix with rain water and will be flowing through the storm water drains. 4. The regular testing of CSTP outlet will be carried out and in any case treated water not meeting discharge standards will not be allowed to enter any stream.	
Hydrogeology and Drainage pattern	Industrial activities	No in change regional hydrology and drainage	1. Prior to each phase of Industrial estate, update and implement the relevant EMP to include phase-specific control and mitigation measures. 2. Install diversion drains and sediment fences prior to starting earthworks.	
Landuse and Soil Characteristics	Commencement of Industrial Operations.	Existing land use of the core zone will remain same (industrial) however the land cover will be changed. Land degradation due to temporarily disposal of wastes. Exposure of topsoils to wind and water erosion.	1. All the tenant industries will be directed to include phase-specific control and mitigation measures. 2. Planned change will reduce the chances to soil contamination. 3. The vegetative measures to make the area aesthetically beautiful will be undertaken. 4. Any tree cutting will be compensated on a ratio of 1:10.	Project site is a plain land. SIIDCUL have secured the permission to clearfell 710 trees and have evacuated then in two phases of 330 trees and 380 trees. Any tree felling will be carriedout by the tenant after obtaining prior permission from the forest department.
Flora and Fauna	Industrial development	No direct Habitat loss was observed	1. The conservation plan will be implemented in	1. Project area is govt. Vacant

Particular	Project Activities	Impacts	Mitigation Measures	Remark
	and operations	however the potential for Adverse changes to species diversity and abundance cannot be ruled out.	coordination with forest department. 2. Locally native species will be used in landscaping works.	fallow land. 2. No National parks within 10 Km radius Few Schedule -I fauna were reported in the core zone and conservation plan have been proposed for the same.
Occupational Health &Safety	Overall Industrial Operation.	Annoyance, sleep disturbance, and health impacts from noise emissions that exceed the safe limits. Community annoyance from dust deposition. Potential for risk of harm to personnel and the local Community.	1. Implementation of noise and fugitive dust emission controls and management measures. Implementation of water quality management and control measures. 2. Development of an emergency response plan that includes installation of emergency response equipment to combat events such as spillage and fire. 3. On-site first aid facilities will be provided and employees will be extended to the local community in emergencies. 4. Non-active sides of the industrial area will be suitably fenced. 5. Industrial area will be suitably guarded and any approach to industry will be restricted and prohibited. 6. Protective safety boots, goggles, hand glove and helmets will be provided to the person working in the Industry. 7. Employee will be adequately trained and educated for involvement and commitment in to the	Adoption of OSHAS and other guidelines for industrial health & safety of workers Constitution of Disaster management cell headed by local authority Dist. Collector.

Particular	Project Activities	Impacts	Mitigation Measures	Remark
			implementation of health and safety guidelines. 8. Provision of all necessary resources for safety and health of employees and contractors engaged in industry. 9. Proper ear plugs and muffs will be provided to industrial workers in high noise area to protect them from noise hazards. 10. The industrial area will be managed such that at all stages of the project, access to active industrial areas will be restricted to authorized personnel only.	

11.4 ENVIRONMENT MANAGEMENT PLAN

The cost of the complete project including land and development cost and other contingencies is Rs. 130.96crores. Below mentioned budget will be provided to the Environment Management Cell for implementation of EMP and monitoring of Environmental parameters.

S. No.	Particular	Cost in lacs
1.	EMP budget (Capital cost)	1062.7/-
2.	EMP budget (Recurring cost)	93.56/-
3.	Wildlife Conservation Plan	30.00/-
	Total	**1186.26/-**

Hence, a total of **Rs. 1186.26Lakhs** is allocated as Environmental Management and Monitoring Cost. The total capital cost is estimated to be **Rs. 1062.7Lakhs** while the recurring cost to be **Rs.93.56 Lakhs**. Almost 30 lakhs is allocated for the wild life conservation program from the project

11.5 CONCLUSION

There is no development without industrialization. But this should go hand in hand with environment protection. The proposed project of would take all precautionary measures to keep environment clean and green as it is or even take steps to improve it further.

****

CHAPTER – XII

DISCLOSURE OF CONSULTANT

12.0 INTRODUCTION

Aplinka Solutions & Technologies Pvt. Ltd., Noida, India (ASTPL) was established in the year 2013 as a private limited company under the Companies Act, 1956, having its corporate office at A-48, Ground Floor, Sector – 64, Noida, Uttar Pradesh,. ASTPL operates with a team of 40 fulltime employees. Mr. Darpan Bajaj, Mr. Sushant Girdhar & Mr. Ashish Rana lead the company as Directors.

It is a leading consultancy company offering specialized strategic services all over India in the areas of Environmental, Social and Health & Safety Impact Assessments & Management Systems, and Ecology & Biodiversity. It has also served as project delivery consultant on a number of Sewage Treatment plants & effluent treatment plants for many industries, housing & institutional projects, hotels and restaurants. We have a strong technological background consisting of environmentalists, policy makers, geologists, chemists, engineers, hydro geologists, industrial hygienists, technicians, research associates, sociologists and others with expertise in various niche areas.

ASTPL undertakes the in the following sectors:

- EIA of Building & Construction projects,
- Area Development & Township projects
- Mining of Minerals (major & minor),
- Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes
- Highways,
- Social Impact Assessment.
- Designing, Installation, Erection & commissioning of ETP, STP, RO water plant and DM water plant, Ultraviolet filtration.
- AMCs of the ETP, STP, RO water plant, DM water Plant & Ultraviolet filtration.
- NBWL Clearances
- Forest Clearances
- Environmental audits

12.1 DESCRIPTION OF EXPERTS INVOLVED:

1.0 Ms. Anasua Nag (Empanelled Expert):- Ms. Anasua Nag is Master of Science in Environment Management from Forest Research Institute, Dehra Dun and has approx 15 plus years of experience. She is multifarious expert having accreditation by NABET as EIA Coordinator for Building & Large construction, Township and Area Development, Industrial Park and Highway and as a Functional Area Expert of Ecology & Biodiversity (Category "A") and SHW (Category "A").

2.0 Mr. Sushant Girdhar (Director):- Mr Sushant Girdhar is a Master of Technology in Energy Studies and Environment Management having more than 8 years of experience in the field of Environment and carrying out studies related to Environment Impact Assessment and preparation of Environment

Management Plan for various units. He is also accredited as both Environment Coordinator and Functional Area Expert, as per NABET Scheme for EIA Consultant Organization, for Open Cast Mining (1 a (i)), Building and Construction projects (8 (a)) and Area Development and Township Projects (8(b)) and Functional Area Expert in Category A for Water Pollution monitoring, prevention & control (WP), Metrology, Air Quality Modeling and Prediction (AQM). He has worked for Designing and installation of various STP in the region. Various assignments related to Environment Audit, EIA/EMP and implementation of environmental measures on projects sites at lowest possible cost have been successfully completed. Mr Girdhar has worked on numerous projects for preparation of Hydro geological reports and for obtaining NOC for water extraction from Central Ground Water Authority. He has also assisted in designing RainWater Harvesting systems for many projects. Mr Girdhar has also been elected as Technical Member for the District Mineral Fund committee - Karnal.

3.0 Mr. Ashish Rana (Director):- Mr. Ashish Rana is Master of Technology in Energy Studies and Environment Management having 8 plus years of experience in the field of Environment and more than 4 years experience in the field of Environment Impact Assessment for various sectors and completed various assignments related to Environment. He has been accredited as an EIA Coordinator for Building and Large construction and Township and area development and Functional Area Expert in the areas of SHW (Cat A) and Water Pollution (WP)(Cat B) by QCI NABET. He has the experience of working for various EIA/EMP projects previously in the sectors like Construction, Township, Industrial Estates and Municipal Solid Waste.

4.0 Dr. Shekhar Upadhyay (Head of Department):- Dr Upadhyay is PhD in Environmental Geography having 23 plus years of experience. He has worked for a period of 8 years with INGO's like European Union; Concern India Worldwide; ChristianAid; etc. He is multifarious expert having accreditation by NABET-QCI as EIA Coordinator for Building & Large construction; Township & Area Development and Mining of Minerals (Open Cast Only) and as a Functional Area Expert of Social –economic (Category "A"), Ecology & Biodiversity (Category "B") and Land Use/ Landcover (Category "A"). He had provided consultancy services in the field of EIA, BIA, SIA, and CSR. He has contributed expert inputs for social components , Landuse & Land cover and ecology and biodiversity in more than 180 of EC/ EIAs as QCI-NABET EIA Coordinator/ Functional Area Expert for Category A;B1&B2 Projects.

5.0 Mr. Periasamy Radha Krishnamoorthy (FAE):-Mr. P Radhakrishna Moorthy is an empanelled expert with 40 plus years of experience. He is a QCI accredited functional area expert for Land Use (LU), Geology (GEO) & Hydrology, Groundwater and Water Conservation (HG) under category A.

6.0 Ms. Anju Saini (Deputy Manager):- Ms. Saini is Masters of Environmental Science and Engg having more than 8 years of experience in field of Environment and carrying out studies related to Environment Impact Assessment and preparation of Environment Management Plan for Various Projects. She had done diploma in Industrial Safety from Annamalai University and Post Graduate Diploma in labour laws, industrial relationship and personal management from Rajasthan University. Anju Saini is Functional Area Expert in Air Pollution (AP), Air Quality (AQ), Water Pollution (WP) and Solid Waste (SW) (Category-

B) and efficient in baseline data generation and interpretation, modeling. Preparation of proposals for Mining(Minor & Major Mineral) and large construction projects including township and area development projects, industries, hospitals and shopping malls., presentations and public hearings in the field of mining is her USP in service sector, She has also industrial experience which includes YKK India Private Ltd, a renowned Japanese company and Frigo glass India Pvt. Ltd.

7.0 Mr Vikas Tripathi (FAE):- He is M. Tech in Environmental Engineering having more than 12 years of experience in the field of Environment and carrying out studies related to Environment Impact Assessment and preparation of Environment Management Plan for various units. He is also accredited as Functional Area Expert as per NABET Scheme for EIA Consultant Organization in Category B for Air Pollution Monitoring and Control (AP) & Risk and Hazard (RH)..

8.0 Mr Pradyumna Arvind Deshpande (Empanelled Expert):- Mr Pradyumna Arvind Deshpande is a QCI-NABET accredited EIA coordinator & a Functional Area Expert. He got his accreditation for Sector 36 & FAE (WP) right during the inception of EIA accreditation was introduced in the year 2009-10. Gradually he has enhanced the sectors, 9, 22 & 1 by actively working in the projects of the respective sectors. Also the FAE expertise was enhanced in the category of Soil. He is in the profession of EIA since past 10 years. Before that he has the experience of working at NEERI, where he was involved in few EIA projects. His cumulative experience in the field of Environmental Management is about 26 years. Right now he is working as an empanelled expert with 4 NABET accredited EIA consulting firms. So far he has undertaken more than 10 EIA projects as an EIA coordinator & has been involved in more than 150 EIA projects in the capacity of FAE; (WP) & (SC). He had been an integral part of the EIA team for the purposes of field visits, ToR presentations, Public Hearing & presentation for EC before the State & National Appraisal committees. Also, he has worked extensively in Mines with lease area less than 5 Ha.

9.0-Mr. Kailash Chandra (Team Member):- Mr. Kailash Chandra is Master in Geography having 20 plus years of experience. He has worked for a period of 6.9 years with Bharti Infotel Limited, Mapping Consultancy Services, Infotech Geospatial Ltd, in the field of Object Oriented GIS, Market and field survey GIS Data Validation and incorporation in the GIS network. He has also worked as a Business Development Coordinator for a period of 5.8 years along with Kimobi Agencies, and T.J. Green Energy R&D Pvt Ltd. He has also worked with Geography Department, D.S.B. Campus, Kumaun University, as Geo-Spatial Consultant (Socio-Economic and Land Use/Land Cover) for a period of 2.1 Years through International agencies i.e International Water Management Institute [IWMI] and Asia Pacific Network for Global Change Research [APN], Japan. He has a working experience as a development professional for a period of 4.5 years along with local NGOs in Uttarakhand funded by National and International i.e NABARD, SIDBI and Uttrakhand Govt etc. He is proposed as a Team Member under NABET-QCI scheme For Social –economic and Land Use.

10.0 Mr. Dibyendu Banarjee (EC & FAE):-He is Phd in Environmental Science (Specialization in Noise , GIS Modeling , Public Health) having more than 12 years of experience in field of Environment and carrying out studies related to Environment Impact Assessment and preparation of Environment

Management Plan for various units. He is also accredited as both Environment Coordinator and Functional Area Expert, as per NABET Scheme for EIA Consultant Organization, for Sectors : Open Cast Mining (1), Metallurgical industries (8), Offshore and Onshore oil and gas exploration, development and production (2),Cement Plants (9)and Functional Area Expert in Category A for Air Quality Modeling and Prediction (AQM) ,Noise & Vibration (NV) and Category B for Solid and Hazardous Waste Management (SHW) , Air Pollution Monitoring , Prevention & Control (AP) and to carry out Environment Impact Assessment studies in various sectors (Projects).

11.0 Mr. Swatantra Kumar Verma (Assistant Manager): Mr. Swatantra Kumar Verma is a Masters of Environmental Science and has 8 plus years of experience in EIA, Industrial waste water treatment & Environmental Laboratory Field. Mr. Swatantra Kumar Verma is Team Member in Air Pollution (AP), Water Pollution (WP), Water Pollution (WP) and Air Pollution (SW) and efficient in baseline data generation and interpretation for Mining (Minor & Major Mineral) and building construction projects including township and area development projects, industries, hospitals and shopping malls. Mr. Swatantra Kumar Verma is attending public hearings in the mining & constructions field.

12.0 Ms. Shakshi Garg: Ms. Sakshi is Master of Science in Environment Studies having 1.5 years of experience in the field of Environment Impact Assessment for Building and Construction projects. She has been accredited as a Functional Area Associate in the areas of SW and AQ by esteemed QCI NABET.

13.0 Dr. Meenakshi Singh: Dr Singh is Master in Environment science having 13 plus years of experience. She has worked for a period of 7.0 years in research work. She has two years of EIA related experience and proposed as a Team Member in WP and EB under NABET-QCI scheme.

14.0 Ms. Trapti Diwan(EC & FAE):- Ms. Trapti Diwan is M. Sc in Environment Management from Institute of Environment Management & Plant Sciences, Ujjain, Madhya Pradesh & M. Phil in Energy & Environment from School of Eng. & Environmental Studies, Devi Ahilya Vishwavidyalaya, Indore, M.P. with 11 plus years of experience. Ms. Trapti Diwan has worked with international organizations "German Technical Cooperation (GTZ)", and with Central Pollution Control Board, New Delhi, Society for Development Alternatives, New Delhi. She has also worked with a well known environmental consultancy. She is accredited from NABET for the Sectors: 1 (Mining of Minerals, Cat B) and 38 (Building and Construction Projects, Cat B) & 39 (Town ship & Area Development).Approved FAE in Air Pollution Monitoring, Prevention and Control (AP); Water Pollution Monitoring, Prevention and Control (WP) and Solid and Waste management (SW & HW).

****

ANNEXURE - I

TOR LETTER

कार्यालय राज्य स्तर पर्यावरण समाघात निर्धारण प्राधिकरण (SEIAA) व
राज्य विशेषज्ञ अंकन समिति (SEAC), उत्तराखण्ड।
653, इन्दिरा नगर कालोनी, सीमाद्वार रोड, देहरादून–248006 ।

****

पत्र संख्या– 221 /SEAC दिनांक– 15 जून, 2021

To,

M/s State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd. (SIIDCUL), 29, IIE Sahastradhara Road, (IT Park), Dehradun.

Sub- Regarding Environmental Clearance for Proposed establishment of Industrial Estate/Parks Integrated Industrial Estate at Sitarganj, Part- II (B) Dist- Udham Singh Nagar.

Dear Sir/Madam,

Kindly take reference of your submitted vide proposal no SIA/UK/NCP/60967/2021 on dated 20th March, 2021, regarding above proposal. The SEAC in its meeting dated 2nd June, 2021 examined the proposal submitted by you. After through discussion and deliberation, it has been conveyed that SEAC desires Rapid EIA report of this proposal after due public consultation conducted by Uttarakhand Environment Protection and Pollution Control Board. The terms of reference (TOR) for the EIA report is being out lined below:-

7(c): STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR INDUSTRIAL ESTATES/ PARKS/ COMPLEXES/ AREAS, EXPORT PROCESSING ZONES (EPZS), SPECIAL ECONOMIC ZONES (SEZS), BIOTECH PARKS, LEATHER COMPLEXES AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

1) Reasons for selecting the site with details of alternate sites examined/rejected/selected on merit with comparative statement and reason/basis for selection. The examination should justify site suitability in terms of environmental damage, resources sustainability associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weightage criteria for short-listing selected site.
2) Submit the details of the land use break-up for the proposed project. Details of land use around 10 km radius of the project site. Analysis should be made based on latest satellite imagery for land use with raw images. Check on flood plain of any river.
3) Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/villages and present status of such activities.
4) Examine the impact of proposed project on the nearest settlements.
5) Examine baseline environmental quality along with projected incremental load due to the project taking into account of the existing developments nearby.
6) Environmental data to be considered in relation to the project development would be (a) land, (b) groundwater, (c) surface water, (d) air, (e) bio-diversity, (f) noise and vibrations, (g) socio economic and health.
7) Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area, and any obstruction of the same by the project.
8) Details regarding project boundary passing through any eco- sensitive area and within 10 km from eco-sensitive area.
9) Green buffer in the form of green belt to a width of 15 meters should be provided all along the periphery of the industrial area. The individual units should keep 33% of the allotted area as a green area.
10) Submit the details of the trees to be felled for the project.
11) Submit the details of the infrastructure to be developed.
12) Submit the present land use and permission required for any conversion such as forest, agriculture etc.
13) Submit details regarding R&R involved in the project
14) Zoning of the area in terms of 'type of industries' coming-up in the industrial area based on the resource requirement along with likely pollutants with quantity from the various industries.
15) The project boundary area and study area for which the base line data is generated should be indicated through a suitable map. Justification of the parameters, frequency and locations shall be discussed in the EIA.
16) Submit Legal frame work for the implementation of Environmental Clearance conditions - to be clearly spelt out in the EIA report.
17) Submit Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of EP Act.

18) Site justification of the identified industry sectors from environmental angle and the details of the studies conducted if any.
19) Ground water classification as per the Central Ground Water Authority.
20) Submit the source of water, requirement vis-à-vis waste water to be generated along with treatment facilities, use of treated waste water along with water balance chart taking into account all forms of water use and management.
21) Rain water harvesting proposals should be made with due safeguards for ground water quality. Maximize recycling of water and utilization of rain water. Examine details.
22) Examine soil characteristics and depth of ground water table for rainwater harvesting.
23) Examine details of solid waste generation treatment and its disposal.
24) Examine and submit details of use of solar energy and alternative source of energy to reduce the fossil energy consumption.
25) In case DG sets are likely to be used during construction and operational phase of the project, emissions from DG sets must be taken into consideration while estimating the impacts on air environment. Examine and submit details.
26) Examine road/rail connectivity to the project site and impact on the traffic due to the proposed project. Present and future traffic and transport facilities for the region should be analysed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city.
27) A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.
28) Examine the details of transport of materials for construction which should include source and availability.
29) Examine the details of National Highways/State Highways/ expressways falling along the corridor and the impact of the development on them.
30) Examine noise levels - present and future with noise abatement measures.
31) Identify, predict and assess the environmental and sociological impacts on account of the project. A detailed description with costs estimates of CSR should be incorporated in the EIA / EMP report.
32) Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.
33) Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.
34) The Public hearing should be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the TOR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.
35) A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the Ministry in accordance with the Notification.
36) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
37) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
38) Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "http://moef.nic.in/Manual/Industrial Estate".

Note: *1) The study area shall comprise of radial distance of 10 KM from the project site and the study period is three months. The impact on each of the above parameter as a result of proposed project site shall be assessed through appropriate modeling and prediction methods considering base line data.*

Hence you are kindly requested to kindly submit EIA report for further necessary action.

(Rajiv Dhiman)
Member Secretary,
SEAC, Uttarakhand

Copy to:- Member Secretary, Gaura Devi Paryavaran Bhavan Environment Protection and Pollution Control Board, IT, Park Dehradun for necessary action.

(Rajiv Dhiman)
Member Secretary,
SEAC, Uttarakhand

ANNEXURE - II

CONSULTANT NABET CERTIFICATE

QUALITY COUNCIL OF INDIA
Creating an Ecosystem for Quality

National Accreditation Board for Education and Training

Certificate of Accreditation

Aplinka Solutions & Technologies Private Limited

A-48, Tapovan Building, Sector-64, Noida, Uttar Pradesh – 201301

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast/underground mining	1	1 (a) (i)	A
2	Distilleries	22	5 (g)	B
3	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
4	Highways,	34	7 (f)	A
5	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
6	Building and construction projects	38	8 (a)	B
7	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated September 16, 2022 and supplementary assessment minutes dated December 9, 2022 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/22/2543 dated October 3, 2022. The accreditation needs to be renewed before the expiry date by Aplinka Solutions & Technologies Private Limited, Noida following due process of assessment.

Sr. Director, NABET
Dated: January 4, 2023

Certificate No.
NABET/EIA/2225/RA 0261_Rev 02

Valid up to
May 20, 2025

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

ANNEXURE - III

LAND ALLOCATION LETTER

संख्या–2069 / XX(4)–231 / का0–03 / 2006

प्रेषक,

एस0के0दास,
प्रमुख सचिव,
उत्तरांचल शासन।

सेवा में,

जिलाधिकारी,
उधमसिंहनगर।

राज्य औद्योगिक विकास निगम लि0 उत्तराखण्ड सिडकुल

सचिव,
औद्योगिक विकास विभाग,
उत्तरांचल शासन।

गृह अनुभाग–4 देहरादून: दिनांक: 03-6-2006

विषय–औद्योगिक आस्थान स्थापित किये जाने हेतु, सम्पूर्णानन्द शिविर सितारगंज की भूमि औद्योगिक विकास विभाग को हस्तान्तरित किये जाने के सम्बन्ध में।

महोदय,

उपर्युक्त विषयक जिलाधिकारी, उधमसिंहनगर के पत्रांक–265–270, दिनांक 18–5–2006 के संदर्भ में मुझे यह कहने का निदेश हुआ है कि सम्यक् विचारोपरान्त शासनादेश संख्या–1015 / XX(2)–231 / का0 / 2003, दिनांक 10 जून, 2004 को अतिक्रमित करते हुये, श्री राज्यपाल महोदय, उत्तरांचल सम्पूर्णानन्द शिविर सितारगंज,उधमसिंहनगर की 909.0220 हैक्टेयर (2226.4704 एकड़) भूमि औद्योगिक आस्थान के प्रयोजन हेतु औद्योगिक विकास विभाग को निम्न शर्तों के अधीन हस्तान्तरित किये जाने की सहर्ष स्वीकृति प्रदान करते हैं:–

1. जिस परियोजना के लिये प्रश्नगत भूमि हस्तान्तरित की जा रही है, वह एक अनुमोदित परियोजना हो और उसके लिये आवश्यक प्राविधान किया जा चुका हो।
2. भूमि पर कोई धार्मिक अथवा एतिहासिक महत्व की इमारत न हो।
3. हस्तान्तरित भूमि यदि प्रस्तावित कार्य से भिन्न प्रयोजन के लिये उपयोग की जाय तो उसके लिये मूल विभाग से पुनः अनुमोदन प्राप्त करना होगा।
4. जेल शिविर को जाने वाली सड़क 60 मीटर चौड़ा किया जायेगा, जिसका धरणाधिकार राज्य सरकार के पास बना रहेगा एवं यह मार्ग स्थापित हो रहे केन्द्रीय कारागार, शिविर वासियों, कार्मिकों के लिए स्थायी रूप से उपलब्ध रहेगा।
5. एक 100 मीटर चौड़ा access मार्ग औद्योगिक आस्थान के प्रारम्भ से पूर्व एवं एक 100 मीटर चौड़ा access मार्ग औद्योगिक आस्थान के समाप्ति के बाद उपलब्ध कराया जायेगा जिससे जेल कैम्प हेतु approach बनी रहेगी एवं जिसका धारणाधिकार राज्य सरकार के पास रहेगा।
6. औद्योगिक विकास विभाग द्वारा प्रस्तावित औद्योगिक क्षेत्र में वर्तमान में स्थित बंदरिया ब्लाक, बरा ब्लाक, मीरापाना ब्लाक के शिविर कैम्पों तथा वहाँ पर प्रवासित कारागार कार्मिकों हेतु जेल मैनुवल के

प्राविधानों के अनुरूप समुचित निर्माण लालरखास ब्लाक में किया जाए, जब इस प्रकार अवस्थापना सुविधाऐं उपलब्ध हो जायेगी, तभी उक्त तीनों कैम्पों के शिविर को स्थानान्तरित किया जाय। तब तक इन परिसरों में किसी प्रकार की छेड़छाड़ औद्योगिक विकास विभाग द्वारा नहीं की जायेगी, लेकिन दिनांक 31 मार्च, 2007 की सीमा को ध्यान में रखते हुए दोनों विभाग अभी से समयबद्ध कार्यवाही करेंगे। इस पर आने वाला समस्त व्यय भार औद्योगिक विकास विभाग द्वारा वहन किया जायेगा।

7. भविष्य में इन हस्तांतरित भूखण्डों पर स्थित वृक्षों से जो भी आय औद्योगिक विकास विभाग को होगी वह समस्त धनराशि राजकोष में जमा की जायेगी।

8— औद्योगिक आस्थान हेतु हस्तान्तरित होने वाली भूमि का विवरण निम्नानुसार है:—

क्र0 सं0	ग्राम का नाम	खसरा संख्या	रक्बा (हैक्टेयर में)
1.	लालरपट्टी	26, 27, 28, 29, 30, 31, 32, 33, 34, 37, 41ए, 46, 79, 36, 39, 42, 44, 47, 50ए, 51, 52, 53, 54ए, 55, 56, 57, 58, 59, 60, 61, 62, 64, 65बी, 69, 66बी, 70, 71, 72बी, 63ए, 76बी, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 91, 92ए, 93ए, 95, 102बी, 103, 104, 106, 108, 107, 94, 97, 111, 113, 114, 115ए, 117, 119, 121, 122, 126, 130ए, 131ए, 132, 133, 134, 139, 141, 142, 146, 145, 149, 157, 129, 159, 160, 161, 162, 163, 164, 165ए, 166ए, 167, 168, 169, 122/173(172/173), 41ए, 49, 60बी, 54बी, 72ए, 73, 74, 75, 76ए, 77, 78, 86बी, 92बी, 105, 115बी, 127, 93बी, 130बी, 131, 141, 164बी, 128, 165बी, 143बी, 123, 124, 139, 140, 158, 158, 171, 25, 63ए, 65ए, 66ए, 67, 68, 98, 100, 118, 134बी, 135, 136, 137, 143ए, 144, 147, 146, 142, 154, 170, 123/174(133/174), 43, 85, 150, 151, 153, 155, 35, 39बि, 40, 96, 99, 125, 46, 110, 116, 165, 45, 101, 102बी, 109, 112, 120	242.520
2.	मेराबारहाना	9, 11, 12, 14, 15, 20, 21, 22, 23ए, 24, 28, 30/1, 26ए, 31, 32ए, 33बी, 35ए, 10, 13, 19, 38बि, 8, 10, 16,	223.466

		23बी, 25, 27, 28, 29बी, 30बी, 35बी, 36, 34, 37, 17, 32बी, 5, 1, 4, 23, 46, 40, 39, 7, 41, 45, 43, 6, 42, 44	
3.	उकरौली	1, 2, 3, 4, 5ए, 6, 10ए, 12/1, 13, 15, 35, 54बी, 7	17.544
4.	कल्याणपुर	1, 2, 3, 4, 5, 6, 12ए, 29, 30, 70	34.607
5.	बारा	36, 37, 38, 46, 56, 57, 58, 59, 60, 61, 62, 114, 55, 41, 49, 48, 47, 51, 53, 50ए, 39मि, 40मि, 52, 54, 63, 64, 65, 77, 78, 79, 80, 81, 82, 83, 88, 90, 93, 96, 97, 94, 101, 102, 103, 105, 105/1, 112, 113, 118, 120, 119, 121, 122, 123, 124, 125, 126, 127, 129, 130, 132, 131, 133/2, 135, 138, 139, 140, 141, 142, 143/2, 144, 145, 146, 147, 148, 150, 155, 156, 157, 154, 158, 173/1, 175, 159, 160, 161/1, 163/1, 164, 165/3, 166, 167, 168, 169/3, 172, 174/1, 178, 180, 152, 153, 183/1, 149, 162, 182/1, 128, 185/1, 176/2, 184, 182/2, 183/2, 185/2, 54बी, 100, 105बी, 143ए, 145, 169बी, 50/2, 81/191, 84, 91, 133/1, 68, 70, 72, 75, 86, 66, 76, 92, 95, 98, 116, 161, 153बी, 174बी, 173बी, 178/1, 177, 137, 170, 58/186, 153/188, 99, 106, 108, 109, 111, 115, 117, 134, 136, 151, 171, 74, 85, 87, 181, 186, 89, 165/2, 179, 165/188, 69, 73, 67, 107, 110	224. 606
6.	परलाद पल्सिया	9/1, 10, 11/2, 12/2, 16, 17, 13/2, 18, 20, 22/2, 25, 26, 27, 19, 28, 29, 30, 34, 35/1, 36/1, 37/1, 38/1, 39/1, 45/1, 53/63, 40/1, 54/1, 55/1, 57/1, 59/1, 35/2, 36/2, 37/2, 38/2, 39/2, 40/2, 41/1, 42/1, 43/2, 44, 45/2, 47/2, 48/1, 49/2, 54/2, 55/2, 56, 57/2, 58, 60/1, 59/2, 49/1, 58/2, 2, 4, 5, 7, 9/2, 11/1, 11/2, 12/1, 12/3, 13/1, 14, 22/1, 23, 50/2, 51, 60/2, 13/3, 6, 24, 3, 8, 16, 21, 31, 32, 33, 43/1, 50/62, 46, 47/1, 53, 1, 52, 61	150.279
		कुल —	902.02208हेक्टेयर 2228.4704एकड़

9— कृपया उपरोक्तानुसार समस्त कार्यवाही आयुक्त कुमायूँ मण्डल के मार्गदर्शन में जिलाधिकारी, उधमसिंह नगर एवं वरिष्ठ अधीक्षक, सम्पूर्णानन्द शिविर, सितारगंज, उधमसिंह नगर द्वारा सम्पन्न की जायेगी।

भवदीय,

(एस0के0दास)
प्रमुख सचिव।

संख्या एवं दिनांक उपरोक्त।

प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषितः—

1. आयुक्त, कुमाऊँ मण्डल, नैनीताल।
2. जिलाधिकारी, उधमसिंहनगर।
3. महानिरीक्षक कारागार, उत्तरांचल, देहरादून।
4. प्रबन्ध निदेशक, सिडकुल, देहरादून।
5. स्टाफ आफिसर, मुख्य सचिव,उत्तरांचल शासन, देहरादून।
6. वरिष्ठ अधीक्षक, सम्पूर्णानन्द शिविर, सितारगंज, उधमसिंह नगर।
7. गार्ड फाइल।

आज्ञा से,

(भास्करानन्द)
अपर सचिव।

2226.47
186.67
2413.14

संख्या– 6(अ)/XX(4)–231/कारा0–03/2006

प्रेषक,

[illegible]रानन्द,
अपर सचिव,
उत्तराखण्ड शासन।

सेवा में,

सचिव,
औद्योगिक विकास विभाग,
उत्तराखण्ड शासन।

मुख्य विभाग। देहरादूनः दिनांक [illegible] फरवरी, 2007

विषयः औद्योगिक आस्थान स्थापित किये जाने हेतु सम्पूर्णानन्द शिविर सितारगंज की भूमि औद्योगिक विकास विभाग को हस्तान्तरित किये जाने के सम्बंध में।

महोदय,

प्रबन्ध निदेशक, सिडकुल, देहरादून के पत्र संख्या–5516 एम0डी0/सिडकुल/सितारगंज/2007, दिनांक 9 फरवरी, 2007 के संदर्भ में मुझे यह कहने का निदेश हुआ है कि श्री राज्यपाल महोदय, उत्तराखण्ड सम्पूर्णानन्द शिविर सितारगंज, ऊधमसिंहनगर की 186.67 एकड़ भूमि (जिसका विवरण निम्नानुसार है) औद्योगिक आस्थान के प्रयोजन हेतु औद्योगिक विकास विभाग को निम्न शर्तों के अधीन हस्तान्तरित किये जाने की सहर्ष स्वीकृति प्रदान करते हैं:–

1. उक्त भूमि सर्किल रेट पर भुगतान के शर्त पर हस्तान्तरित की जाएगी।
2. जिस परियोजना के लिये प्रश्नगत भूमि हस्तान्तरित की जा रही है, वह राज्य सरकार द्वारा एक अनुमोदित परियोजना हो और उसके लिये आवश्यक प्राविधान किया जा चुका हो।
3. भूमि पर कोई धार्मिक अथवा एतिहासिक महत्व की इमारत न हो।
4. हस्तान्तरित भूमि यदि प्रस्तावित कार्य से भिन्न प्रयोजन के लिये उपयोग की जाय तो उसके लिये मूल विभाग से पुनः अनुमोदन प्राप्त करना होगा।
5. जेल शिविर को जाने वाली सड़क 60 मीटर चौड़ा किया जायेगा, जिसका धरणाधिकार राज्य सरकार के पास बना रहेगा एवं यह मार्ग स्थापित हो रहे केन्द्रीय कारागार, शिविर वासियों, कार्मिकों के लिए स्थायी रूप से उपलब्ध रहेगा।
6. औद्योगिक विकास विभाग द्वारा जेल मैनुवल के प्राविधानों तथा इस विभाग प्रतिपादित सिद्धान्तों के अनुरूप शिविरवासियों (बंदीगण) के ब्लाकों तथा वहां पर प्रवासित कारागार कार्मिकों हेतु आवास लालखास ब्लाक (केन्द्रीय कारागार, सितारगंज) में किया जाएगा, जब इस प्रकार आवश्यक अवस्थापनायुक्त निर्माण कार्य पूर्ण हो जाएंगे, तभी उक्त ब्लाकों के शिविरों को स्थानान्तरित किया जायेगा। तब तक इन परिसरों में किसी प्रकार की छेड़छाड़ औद्योगिक विकास विभाग द्वारा नहीं की जायेगी। इस पर आने

आल समस्त व्यय भार औद्योगिक विकास विभाग द्वारा वहन किया जायेगा।

7. भविष्य में इन हस्तांतरित भूखण्डों पर स्थित वृक्षों से जो भी आय औद्योगिक विकास विभाग को होगी वह समस्त धनराशि राजकोष में जमा की जाएगी।

8. औद्योगिक आस्थान हेतु हस्तान्तरित होने वाली भूमि का विवरण निम्नानुसार है:–

ग्राम का नाम	क्रमांक	खसरा संख्या	एरिया (हेक्टेयर में)
बारा	1.	1	2.118
	2.	3	8.366
	3.	4	0.054
	4.	5	1.853
	5.	6	0.762
	6.	7	1.122
	7.	8	2.659
	8.	9	0.177
	9.	10	0.616
	10.	11	0.079
	11.	12	0.253
	12.	13	0.051
	13.	14	0.366
	14.	15	1.113
	15.	16	1.355
	16.	17	3.958
	17.	18	0.013
	18.	19	0.051
	19.	20	2.059
	20.	21	0.126
	21.	22	0.243
	22.	23	0.635
	23.	24	0.158
	24.	25	2.599
	25.	26	1.809
	26.	27	2.498
	27.	28	8.233
	28.	29	0.114
	29.	30	8.978
	30.	34	0.237
	31.	35	0.319
	कुल		52.974 (130.9 एकड़)

mutation e

(180)

ग्राम का नाम	क्रमांक	खसरा संख्या	एरिया (हेक्टेयर में)
कल्याणपुरी	1.	145	1.200
	2.	146	3.75
	3.	147	7.557
	4.	148	0.081
	5.	149	2.680
	6.	152	1.100
	7.	72	6.201
कुल			22.569 (55.76 एकड़)
सम्पूर्ण योग			186.67 एकड़

9. कृपया उपरोक्तानुसार समस्त कार्यवाही आयुक्त कुमायूँ मण्डल के मार्गदर्शन में जिलाधिकारी, ऊधमसिंहनगर एवं वरिष्ठ अधीक्षक, सम्पूर्णानन्द शिविर, सितारगंज, ऊधमसिंहनगर द्वारा सम्पन्न की जायेगी।

भवदीय,

(भास्करानन्द)
अपर सचिव।

संख्या एवं दिनांक उपरोक्त।

प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित:-

1. आयुक्त, कुमाऊँ मण्डल, नैनीताल।
2. जिलाधिकारी, ऊधमसिंहनगर।
3. महानिरीक्षक कारागार, उत्तराखण्ड, देहरादून।
4. प्रबन्ध निदेशक, सिडकुल, देहरादून।
5. वरिष्ठ अधीक्षक, सम्पूर्णानन्द शिविर, सितारगंज, ऊधमसिंहनगर।
6. गार्ड फाइल।

आज्ञा से,

(भास्करानन्द)
अपर सचिव।

संख्या–671/बीस–4/2013–1(231)/2003

प्रेषक,

ओम प्रकाश,
प्रमुख सचिव,
उत्तराखण्ड शासन।

सेवा में,

प्रमुख सचिव,
औद्योगिक विकास विभाग,
उत्तराखण्ड शासन।

गृह अनुभाग–4 देहरादून: दिनांक: 17 मई, 2013

विषय– सम्पूर्णानन्द शिविर सितारगंज की भूमि औद्योगिक विकास विभाग को हस्तान्तरित किये जाने के सम्बन्ध में।

महोदय,

कृपया उपरोक्त विषयक आपके पत्र संख्या– 747/VIII–1/2013/203–उद्योग/2005, दिनांक 08–04–2013 एवं जिलाधिकारी, उधमसिंहनगर के पत्र संख्या–381/सात–स0भू0अ0/2013, दिनांक 05–02–2013 के सन्दर्भ में मुझे यह कहने का निदेश हुआ है कि श्री राज्यपाल सम्पूर्णानन्द शिविर, सितारगंज, उधमसिंह नगर की 197.295 हेक्टेयर भूमि औद्योगिक विकास विभाग को निम्न शर्तों के अधीन हस्तान्तरित किये जाने की सहर्ष स्वीकृति प्रदान करते है:–

1. जिस परियोजना के लिये प्रश्नगत् भूमि हस्तान्तरित की जा रही है, वह राज्य सरकार द्वारा अनुमोदित परियोजना हो और उसके लिये आवश्यक प्राविधान किया जा चुका हो।
2. भूमि पर कोई धार्मिक अथवा ऐतिहासिक महत्व की इमारत न हो।
3. हस्तान्तरित भूमि यदि प्रस्तावित कार्य से भिन्न परियोजना के लिये उपयोग की जाय तो उसके लिये मूल विभाग से पुनः अनुमोदन प्राप्त करना होगा।
4. जेल शिविर को जाने वाली सड़क को पर्याप्त चौड़ा रखा जायेगा, जिसका धारणाधिकार राज्य सरकार के पास बना रहेगा एवं यह मार्ग स्थापित हो रहे केन्द्रीय कारागार शिविर वासियों, कार्मिकों के लिये स्थायी रूप से उपलब्ध रहेगा।
5. यदि हस्तान्तरित की जाने वाली भूमि में कारागार विभाग के कैम्प/आवासीय/अनावासीय भवन स्थित है, तो ऐसी दशा में औद्योगिक विकास विभाग द्वारा जेल मैनुअल के प्राविधानों तथा इस निमित्त प्रतिपादित सिद्धान्तों के अनुरूप शिविरवासियों (बन्दीगण) के ब्लाकों तथा वहां पर प्रवासित कारागार कर्मिकों हेतु आवास केन्द्रीय कारागार/शिविर, सितारगंज में निर्मित किये जायेगें, तभी हस्तान्तरित भूमि पर स्थित भवनों को रिक्त किया जायेगा। तब तक इन परिसरों में किसी प्रकार की छेड़छाड़ औद्योगिक विकास विभाग द्वारा नहीं की जायेगी। इस पर आने वाला समस्त व्ययभार औद्योगिक विकास विभाग द्वारा वहन किया जायेगा।

6. भविष्य में इन हस्तान्तरित भूखण्डों पर स्थित वृक्षों से जो भी आय औद्योगिक विकास विभाग को होगी वह समस्त धनराशि राजकोष में जमा की जायेगी।
7. केन्द्रीय कारागार/सम्पूर्णानन्द शिविर सितारगंज के अवशेष निर्माण कार्यो को पूर्ण किये जाने तथा उनके सुदृढ़ीकरण हेतु औद्योगिक विकास विभाग द्वारा आवश्यकतानुसार वित्तीय सहयोग उपलब्ध कराया जायेगा।
8. औद्योगिक विकास विभाग को हस्तान्तरित की जाने वाली भूमि का विवरण निम्नानुसार है:–

क्र0सं0	ग्राम का नाम	खाता संख्या	खसरा संख्या	रकबा(हेक्टेयर)
1.	लालरपट्टी	01	1	1.900
			2	2.153
			12	0.582
			20	1.550
			21	1.354
		03	16	9.083
		योग		16.622
2.	मीराबाराराना	1	38/2	39.000
3.	लालरखास	1	9	0.417
			10	2.961
			11	35.568
			12	2.090
			16/1	6.798
			18	7.519
			26	0.702
			28	2.343
			29	7.519
			30	0.133
			31	0.682
			32	0.174
			33	1.315
			34	0.256
			35	8.420
		योग		77.005
4.	लालरखास	03	2	24.053
			5	24.161
			8	3.603
			73	2.498
		योग		54.515
5.	लालरखास	04	6	0.095
			7	0.240
			15	4.284
			17/2	1.113
		योग		5.732
6.	लालरखास	05	16/2	0.291
			17/1	1.201

		योग		1.492
7.	लालरखास	08	3 24मि0	1 265 0.500
		योग		1.765
8.	लालरखास	09	14	0.016
9.	लालरखास	10	13 27	0.632 0.066
		योग		0.698
10.	लालरखास	11	23मि0 25मि0	0.150 0.300
		योग		0.450
कुल लालरखास की भूमि का योग				141.673
सभी ग्रामों की भूमि का कुल योग				197.295

9. कृपया उपरोक्तानुसार समस्त कार्यवाही आयुक्त कुमायूँ मण्डल के मार्गदर्शन में जिलाधिकारी, उधमसिंहनगर एवं वरिष्ठ अधीक्षक, सम्पूर्णानन्द शिविर, सितारगंज, उधमसिंहनगर द्वारा सम्पन्न की जायेगी।

भवदीय,

(ओम प्रकाश)
प्रमुख सचिव।

संख्या– 671(1)/दीस–4/2013–1(231)/2003 तददिनांक

प्रतिलिपिः– निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषितः–

1– महानिरीक्षक कारागार, उत्तराखण्ड ,देहरादून।
2– स्टाफ अफसर, मुख्य सचिव, उत्तराखण्ड शासन।
3– आयुक्त, कुमाऊँ मण्डल, नैनीताल।
4– जिलाधिकारी, उधमसिंहनगर।
5– वरिष्ठ अधीक्षक, सम्पूर्णानन्द शिविर, सितारगंज, उधमसिहनगर।
6– गार्ड फाईल।

आज्ञा से,

(विक्रम सिंह यादव)
अनु सचिव।

ANNEXURE - IV

LITIGATION PENDING AGAINST PROJECT

SIIDCUL

State Infrastructure and Industrial Development Corporation of Uttarakhand Ltd

.....Letter of Declaration.....

Ref. No. 5738/RM/SIIDCUL/22. Date: 01/06/2022.

It is to declare that the following information is correct, which is being managed by the Regional office, IIE Sitarganj of SIIDCUL which is in the district: Udham Singh Nagar:

Sr.	Requirements	Remarks	Declaration from the Regional Office of SIIDCUL
1	Land ownership document	Khasra no of Area included in our development site and plan of same.	Government order no- 2069 /XX(4)-281/jAIL-03/2006, 6(A)/XX(4)-231/JAIL-03/2006, 671/Twenty-4/2013-1(231)/2003 with Khasra nos.'s of our industrial site and plan of same enclosed with this document.
		Details of litigation pending against the project. **(Affidavit or Certificate)**	Four plots under litigation in IIE Sitarganj Phase 2 sector-1, plot no – 1, 2 & 2A ,11 & Sector -2,Plot -T-10. Documents are enclosed with this letter.
2	Distance of the state boundary from the site	Certified by competent authority. **(Affidavit or Certificate)**	Distance of the state boundary from the site **34** Minute **(20.5** km).

Regional Manager
Regional Office, IIE Sitarganj
SIIDCUL, Sitarganj

BEFORE THE ARBITRAL TRIBUNAL
COMPRISING OF
Hon'ble Mr. Justice Vimlesh Kumar Shukla
(Former Judge Allahabad High Court)
SOLE ARBITRATOR

IN THE MATTER OF:

Golden Infracon Pvt. Ltd. ...Claimant

Versus

Government of Uttarakhand & Others ...Respondents

Session of Arbitration
Held on 26th March, 2022
By Virtual Hearing at 1 P.M.

1. On the matter being taken up, keeping in view, the order of Apex Court dated 10.01.2022, mandate of Arbitrator to continue with Arbitration proceedings, as consented by parties, would continue till 25.08.2022.

2. SIDCUL, through its counsel, submits that before the next date fixed, they would produce authority letter on behalf of State of Uttrakhand, authorising SIDCUL to represent, State of Uttrakhand also. Let needful be done.

3. Further mention has been made, that to the documents filed alongwith Rejoinder Affidavit, SIDCUL would file its Admission/Denial of documents. Let needful be done by the next date fixed.

4. Claimants would produce their witness for cross-examination, on the next date fixed.

5. In the facts of the case, parties as per their convenience have agreed for next sitting to be held at Delhi.

6. The matter will be taken up next **on 09.04.2022 at 1 pm** at the venue to be booked by the Claimant. The information of the venue to be given to all stakeholders in advance.

7. Parties should ensure compliance on fees front, as per earlier directive.

Justice V.K.Shukla
Sole Arbitrator
Date: 26.03.2022

BEFORE THE ARBITRAL TRIBUNAL
COMPRISING OF
Hon'ble Mr. Justice Vimlesh Kumar Shukla
(Former Judge Allahabad High Court)
SOLE ARBITRATOR

IN THE MATTER OF:

Dharampal Satyapal Pvt. Ltd. ...Claimant

Versus

Government of Uttarakhand & Others ...Respondents

Session of Arbitration

Held on 29th April, 2022

By Virtual Hearing at 5 P.M.

1. Claimant's counsel informed, that information has been received, of conciliation meeting, to be held within next 3 weeks.

2. Matter is adjourned with the consent of parties, to be taken up **on 30.05.2022 at 5 pm** by way of virtual hearing. Necessary arrangement be made by Claimant and link be shared with all the stakeholders.

Justice V.K.Shukla
Sole Arbitrator
Date: 29.04.2022

High Court of Uttarakhand

Daily Status
High Court of Uttarakhand
In The Court Of :Justice
Case Number :WPMS/0002978/2017
M/s INNOVATIVE TEXTILES LTD.. **Versus** STATE OF UTTARAKHAND THROUGH SECRETARY
Date : 10-05-2018

Business	: FIX ON 18.05.2018
Short Order	: 1-NONE
Next Purpose	: ADMISSION MATTERS -25
Next Hearing Date	: 18-05-2018

Justi

google.com/maps/dir/IIE+Sitarganj+Regional+Office,+Mirabara+Rana,+Uttarakhand/नन्धौर+वाइल्डलाइफ...+Nandhaur+Wildlife+Sanctuary/@29.0923042,79.6...

आइए सितारगंज रीजनल ऑफिस, 2MXQ+G6G, I

नन्धौर वाइल्डलाइफ सैंक्चुरी, Tarai Purvi van pra

मंज़िल जोड़ें

अभी चलने पर

विकल्प

अपने फ़ोन पर दिशा निर्देश भेजें

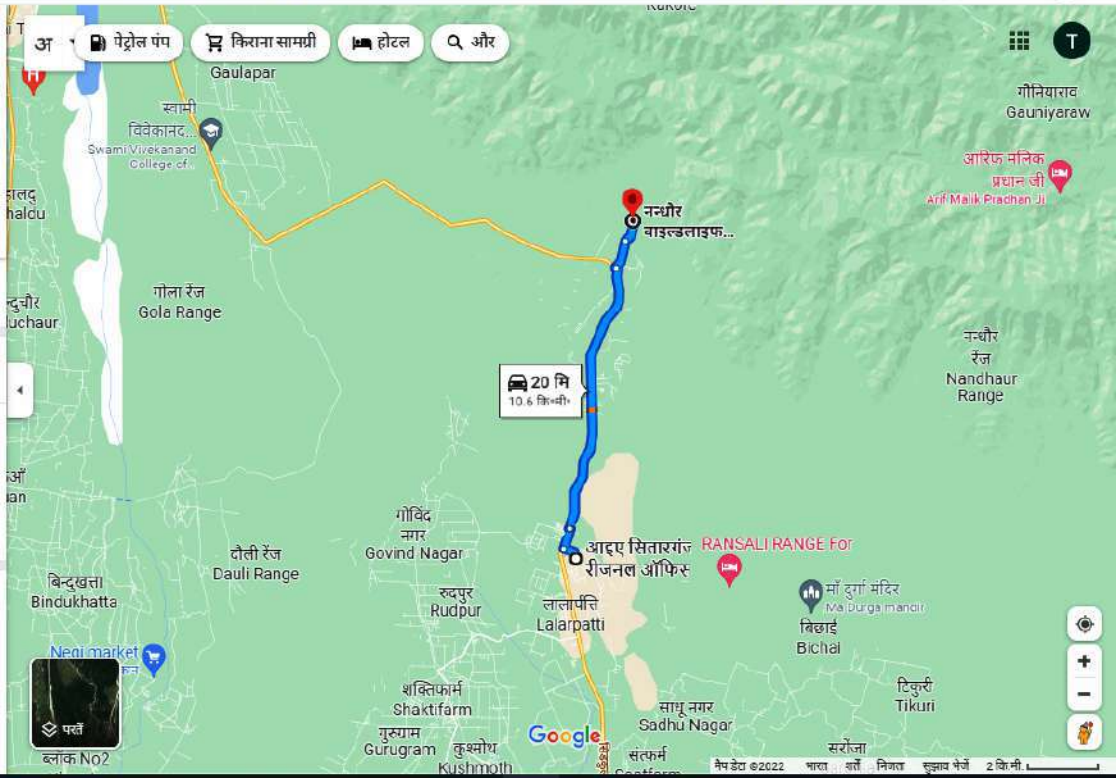
नन्धौर सैंक्चुरी एंट्रेंस मार्ग होकर 20 मि

ट्रैफ़िक को देखते हुए, फ़िलहाल यह सबसे अच्छा रास्ता है 10.6 कि.मी.

विवरण

आपकी मंज़िल के आस-पास की लोकप्रिय जगहें

रेस्टोरेंट होटल पेट्रोल पंप पार्किंग की जगह ज़्यादा



google.com/maps/dir/आइए+सितारगंज+रीजनल+ऑफिस,+2MXQ%2BG6G,+Unnamed+Rd.,+Mirabara+Rana,+Uttarakhand/बाबा+मेनर+सिंघ+जी+Baba+Manor+Si...

आइए सितारगंज रीजनल ऑफिस, 2MXQ+G6G, U

बाबा मेनर सिंघ जी, VPG3+7R8, National High

मंज़िल जोड़ें

अभी चलने पर ▾ विकल्प

अपने फ़ोन पर दिशा निर्देश भेजें

सिडकुल मार्ग होकर 34 मि

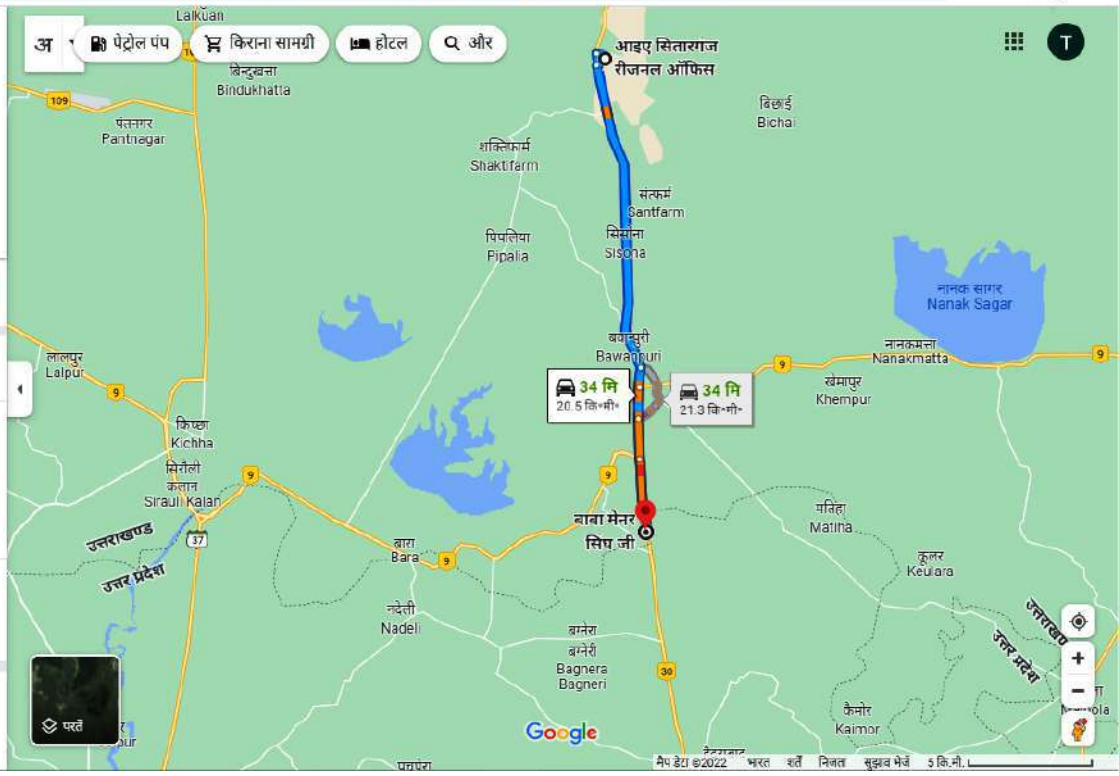
ट्रैफ़िक को देखते हुए, फ़िलहाल यह सबसे अच्छा रास्ता है 20.5 कि.मी.

विवरण

सिडकुल मार्ग और NH30 होकर 34 मि

21.3 कि.मी.

आपकी मंज़िल के आस-पास की लोकप्रिय जगहें



ANNEXURE - V

PERMISSION FROM DFO AND LIST OF FELLED TREES

Annex - 8

कार्यालय प्रभागीय वनाधिकारी तराई पूर्वी वन प्रभाग, हल्द्वानी

पत्रांक: 4544 /23–3 दिनांक: हल्द्वानी: 15/01/ 2019

सेवा में,

वन क्षेत्राधिकारी,
किशनपुर।

विषय: **औद्योगिक आस्थान सिडकुल सितारगंज फेज–2 में विभिन्न प्रजातियों के स्वीकृत 710 वृक्षों में से अवशेष 380 वृक्षों से उत्पादित प्रकाष्ठ की निकासी।**

संदर्भ:– आपकी पत्र संख्या 159/23–1 दिनांक 26.12.2018 एवं इस कार्यालय की पत्र संख्या 9/23–3 दिनांक 04.07.2017

इस कार्यालय के पत्रांक 9/23–3 दिनांक 04.07.2017 से औद्योगिक आस्थान सिडकुल सितारगंज फेज–2 में स्थित विभिन्न प्रजातियों के 710 वृक्षों के पातन की अनुमति जारी की गई है। आप द्वारा संदर्भित पत्र से अवगत कराया गया है कि उक्त स्वीकृत 710 वृक्षों में से विभिन्न प्रजाति के 330 वृक्षों के पातन के उपरान्त निकासी की जा चुकी है। निकासी हेतु अवशेष विभिन्न प्रजाति के 380 वृक्षों से उत्पादित प्रकाष्ट की निकासी की संस्तुति आप द्वारा एवं उप प्रभागीय वनाधिकारी, गौला द्वारा की गई है।

आपकी एवं उप प्रभागीय वनाधिकारी, गौला से प्राप्त रिर्पोट के आधार पर औद्योगिक आस्थान सिडकुल सितारगंज फेज–2 में स्वीकृत 710 वृक्षों मे से निकासी हेतु अवशेष 380 वृक्षों से उत्पादित प्रकाष्ठ की निकासी निम्न प्रकार निम्न प्रतिबन्धों के अन्तर्गत जारी की जाती है।

क्र0सं0	प्रजाति	व्यास वर्ग (से0मी0 में	वृक्षों की संख्या	उत्पादित प्रकाष्ठ घ0मी0 में
1	शीशम	20-30=**16**, 30-40=**11** 40-50=**05**	32	13.21 घ0मी0(145 नग)
2	सेमल	20-30=**05**, 30-40=**02** , 40-50=**02**, 7 से ऊपर= **02**	11	09.868 घ0मी0 (42नग)
3	यूकेलिप्टस	30-35=**02**, 35 से ऊपर =**11**	13	10.346 घ0मी0 (80 नग)
4	खैर	20-30=**149**, 30-40=**68**, 40-50=**07**, 50-60=**01**	225	75.974 घ0मी0 (1987 नग)
5	कोकाट	20-30=**42**, 30-40=29, 40-50=12, 50-60=**08**, 60-70=**04**, 7 से ऊपर=04	99	43.163 घ0मी0 (433 नग)
		योग–	**380**	**152.561** घ0मी0 (**2687** नग)
		मिश्रित सोख्ता लगभग–		**600** कुन्टल
		मिश्रित जड़ लगभग–		**500** कुन्तल

प्रतिबन्ध–

1. प्रकाष्ठ की निकासी स्वयं की रेख देख या जिम्मेदार वन दरोगा की रेख देख में सम्पन्न कराई जाय।
2. उक्त निकासी हेतु 30 (तीस) **अभिवहन** पास जारी करने की अनुमति दी जाती है।
3. सुनिश्चित कर लिया जाय कि स्वीकृत वृक्षों के अतिरिक्त किसी भी प्रकार से अन्य वृक्षों का पातन न होने पावे।
4. जारी अभिवहन पास में निकासी से पूर्व वाहन का नम्बर, चालक का नाम अंकित करते हुए चालक के हस्ताक्षर अनिवार्य रूप से ले लिये जाय।
5. निकासी कार्य औद्योगिक आस्थान सितारगंज के सक्षम प्राधिकारी की उपस्थिति में सम्पन्न कराया जाय।
6. वृक्षों एवं भूमि के स्वामित्व के संबंध में किसी भी विवाद के लिये वन विभाग उत्तरदायी नहीं होगा।
7. नियमानुसार अभिवहन शुल्क वसूल कर लिया जायं।
8. नियमानुसार घन पंजीकरण कराना होगा।
9. उक्त प्रकाष्ठ की निकासी दिनांक.....तक पूर्ण कर जाय।

प्रभागीय वनाधिकारी
तराई पूर्वी वन प्रभाग,हल्द्वानी

संख्या /उक्तदिनांकित

प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित–

1. उप प्रभागीय वनाधिकारी, गौला।
2- क्षेत्रीय प्रबन्धक, सिडकुल सितारगंज।
3- उप जिलाधिकारी, सितारगंज।

प्रभागीय वनाधिकारी
तराई पूर्वी वन प्रभाग,हल्द्वानी

D:\Pant TC\Tarai East 2016-17\Napland 2017-18\Sidkul Metter to Tree\Sidkul Sitarjung to 150 Aker land to Tree Filling Report to SDo Goula.doc

STATE INFRASTRUCTURE AND INDUSTRIAL DEVELOPMENT CORPORATION OF UTTARAKHAND LTD.
Regional Office: IIE-Sitarganj, Sector – C, Near Heliport, Sitarganj
Website:- www.sidcul.com Telefax: 05948-256085

सर्वत्र विकासाय

Ref No. 3196 /R.M./SIIDCUL/2017-18 Dated: 15/07/2017

सेवा में,

महाप्रबन्धक (परि0 एवं प्रशा0)
सिडकुल,
देहरादून।

विषयः–Ease Doing Business के अन्तर्गत वृक्षों के सर्वे के सम्बन्ध में।

महोदय,

आप विदित हि है कि Ease Doing Business के अन्तर्गत सभी औद्योगिक आस्थानों में वृक्षों का सर्वे कार्य किया जाना है। ततक्रम में अवगत कराना है कि उक्त सर्वे कार्यो के सम्पादन हेतु आवश्यक उपकरणों तथा कुल्हाड़ी, पेन्ट, ब्रश, गमबुट इत्यादि एवं लेबर की आवश्यकता होती है। ज्यादातर स्थानो मे अत्यधिक झाड़ियॉ होती है जिनके कटान में काफी कठिनाईयॉ आती है। उक्त सर्वे कार्य के सुचारू निष्पादन हेतु धनराशि की आवश्यकता होगी।

उक्त परिप्रेक्ष्य में संज्ञान में लाना है कि सिडकुल, सितारगंज एवं भीमताल में लगभग 1500 एकड़ भूःभाग में स्थित 863 वृक्षों का सर्वे कार्य पूर्ण किया जा चुका है। पूर्व में उक्त सर्वे कार्य में लगभग रू0 6500/–का व्यय हुआ था, जिसकी प्रति पूर्ति हेतु Imprest के माध्यम से पक्के बिल भुगतान हेतु मुख्यालय प्रेषित किये गये थे, जिस पर Imprest मद से भुगतान किये जाने हेतु प्रबन्धक लेखा, सिडकुल द्वारा स्वीकृति प्रदान नही की गयी।

अतः आपसे अनुरोध कि अवशेष सर्वे कार्य के पूर्ण सम्पादन हेतु रू0 18,000/– की अग्रिम धनराशि स्वीकृत करने का कष्ट करें, जिससे कार्यालय के कार्मिकों पर अतिरिक्त आर्थिक बोझ न पड़े एवं कार्य सुचारू एवं ससमय् पूर्ण किया जा सके।

15/07/17

O/C

(जी0एस0रावत)
क्षेत्रीय प्रबन्धक,
सिडकुल, सितारगंज।

DHARAMPAL SATYAPAL GROUP SECTOR -01 PLOT NO -11 (43.88 ACRES)

Sl. No	Tree No	Name of Tree Species	Location (Plot No)	Condition of Tree (Dry/Fallen/Green)	Circumference at Breast height (137 cm)	Height of tree (M) Approx	Estimated Volume of the tree (Cum.)
1	1	Jamun	Sec-01, Plot-11	Green	150	5	1.020
2	2	AAM		"	160	10	1.713
3	3	GULLAR		"	160	10	1.770
4	4	EUCALYPTUS		"	165	16	1.023
5	5	EUCALYPTUS		"	145	15	1.023
6	6	EUCALYPTUS		"	215	20	1.023
7	7	SHISHAM		"	180	12	1.770
8	8	EUCALYPTUS		"	160	15	1.023
9	9	EUCALYPTUS		"	140	13	1.023
10	10	EUCALYPTUS		"	145	18	1.023
11	11	EUCALYPTUS		"	160	18	1.023
12	12	EUCALYPTUS		"	170	15	1.023
13	13	Jamun		"	155	10	1.020
14	14	SEMAL		"	185	18	2.513
15	15	EUCALYPTUS		"	150	17	1.023
16	16	EUCALYPTUS		"	260	20	1.023
17	17	SHISHAM		"	140	15	1.060
18	18	EUCALYPTUS		"	170	22	1.023
19	19	EUCALYPTUS		"	140	16	1.023
20	20	EUCALYPTUS		"	160	22	1.023
21	21	EUCALYPTUS		"	147	18	1.023
22	22	Jamun		"	200	6	2.570
23	23	EUCALYPTUS		"	155	18	1.023
24	24	EUCALYPTUS		"	100	14	1.023
25	25	EUCALYPTUS		"	140	15	1.023
26	26	SHISHIAM		"	70	7	0.183
27	27	EUCALYPTUS		"	145	12	1.023
28	28	EUCALYPTUS		"	165	18	1.023
29	29	EUCALYPTUS		"	115	12	1.023
30	30	EUCALYPTUS		"	165	15	1.023
31	31	EUCALYPTUS		"	160	15	1.023
32	32	EUCALYPTUS		"	140	15	1.023

37	37	GULLAR	Sec-01, Plot-11	"	220	18	1.023
38	38	AAM		"	195	10	3.732
39	39	AAM		"	160	17	1.023
40	40	AAM		"	150	5	1.770
41	41	AAM		"	230	8	1.104
42	42	SEMAL		"	155	5	2.322
43	43	AAM		"	180	4	1.104
44	44	AAM		Dry	350	5	1.713
45	45	AAM		"	120	5	5.208
46	46	AAM		"	165	4	0.595
47	47	AAM		"	80	4	1.713
48	48	PIPAL		"	120	4	0.255
49	49	GULLAR		"	155	4	0.595
50	50	JAMUN		"	125	4	1.104
51	51	AAM		"	115	3	0.531
52	52	AAM		"	90	2	0.531
53	53	AAM		"	152	4	0.170
54	54	AAM		"	166	3	1.104
55	55	AAM		"	91	5	1.713
56	56	AAM		"	150	3	0.255
57	57	AAM		"	95	4	1.104
				"	95	2.5	0.255
				"	350	2.5	0.255
						8	2.322

For SIIDCUL
राकेश कु० पाण्डेय,
सर्वेयर सितारगंज

मुकेश कु० मण्डल
अवर अभि० (सिविल)
सितारगंज

Forest Department
के० एल० मेहरा
डिप्टी रेंजर
किशनपुर

Detail of Inspection carried out & Estimation of Tree Volume (Cum)-

DHARAMPAL STYAPAL GROUP PLOT NO - 2 (200 ACRES)

Sl. No	Tree No	Name of Tree Species	Location (Plot No)	Condition of Tree (Dry/Fallen/Green)	Circumference at Breast height (137 cm)	Height of tree (M) Approx	Estimated Volume of the tree (Cum.)
58	1	KUKAAT	Sector-01, Plot No- 2	GREEN	75	4	0.255
59	2	KUKAAT		,,	87	4	0.255
60	3	KUKAAT		,,	80	3	0.255
61	4	KUKAAT		,,	90	3	0.255
62	5	PIPAL		,,	190	3	2.661
63	6	SHISHAM		GREEN BUT FALLEN	160	8	1.77
64	7	SHISHAM		GREEN	74	2	0.183
65	8	SHISHAM		,,	75	3	0.183
66	9	KUKAAT		,,	90	2	0.255
67	10	KUKAAT		,,	63	2	0.255
68	11	KUKAAT		,,	70	1.5	0.255
69	12	EUCALYPTUS		,,	150	12	1.023
70	13	KUKAAT		,,	100	5	0.595
71	14	KUKAAT		,,	80	3	0.255
72	15	KUKAAT		,,	63	2	0.255
73	16	KUKAAT		,,	80	3	0.255
74	17	KUKAAT		,,	80	3	0.255
75	18	KUKAAT		,,	65	2	0.255
76	19	KUKAAT		,,	90	2	0.255
77	20	KUKAAT		,,	100	3	0.595
78	21	KUKAAT		,,	75	2.5	0.255
79	22	SHISHAM		,,	55	2	0.016
80	23	KUKAAT		,,	90	2	0.255
81	24	KUKAAT		,,	100	2.5	0.595
82	25	KUKAAT		,,	90	3	0.255
83	26	KUKAAT		,,	95	3	0.595
84	27	SHISHAM		,,	87	3	0.016
85	28	SHISHAM		,,	115	4	0.531

86	29	KUKAAT	Sector-01, Plot No- 2	"	110	4	0.595
87	30	KUKAAT		"	70	2.5	0.255
88	31	KUKAAT		"	85	1.5	0.255
89	32	KUKAAT		"	63	1.5	0.255
90	33	KUKAAT		"	77	2.5	0.255
91	34	SEMAL		"	110	15	0.935
92	35	SEMAL		"	120	12	0.935
93	36	SEMAL		"	140	17	1.595
94	37	SEMAL		"	110	15	0.935
95	38	KUKAAT		"	100	3	0.595
96	39	BER		"	130	3	1.104
97	40	SHISHAM		"	130	10	1.06
98	41	SHISHAM		"	105	10	0.531
99	42	SHISHAM		DRY	125	10	0.531
100	43	SHISHAM		GREEN	110	7	0.531
101	44	SHISHAM		"	110	10	0.531
102	45	SHISHAM		"	130	8	1.060
103	46	SHISHAM		"	130	8	1.060
104	47	SHISHAM		"	63	5	0.016

Note: Plot nos. 1, 2A, 3 & 4 of Sector -01 have no trees.

For SIIDCUL
राकेश कु० पाण्डेय
सर्वेयर
सिडकुल सितारगंज

मुकेश कु० मण्डल
अवर अभि० (सिविल)
सिडकुल सितारगंज

Forest Department
के० रक्षा० भदरा
डिप्टी रेंजर
किशनपुर

Detail of Inspection carried out & Estimation of Tree Volume (Cum)-

SECTOR -02 Plot No- C 1

Sl. No	Tree No	Name of Tree Species	Location (Sector No-2)	Condition of Tree (Dry/Fallen/Green)	Circumference at Breast height (137 cm)	Height of tree (M) Approx	Estimated Volume of the tree (Cum.)
105	1	SEMAL	Sector-2 Plot No-C1	Green	168	15	2.513
106	2	SEMAL		"	195	13	3.739
107	3	SEMAL		"	185	12	2.513
108	4	SEMAL		"	175	13	2.513
109	5	KUKAAT		"	135	10	1.104
110	6	GULLAR		"	180	10	1.77
111	7	KHAIR		"	130	10	1.104
112	8	KUKAAT		"	90	4	0.225
113	9	KUKAAT		"	90	4	0.225

For SIIDCUL
राकेश कु० पाण्डेय
सर्वेयर
सिडकुल सितारगंज

मुकेश कु० मल्ला
अवर अभि० (सिविल)
सिडकुल सितारगंज

Forest Department
के० एस० मेहरा
डिप्टी रेंजर
किशनपुर

Detail of Inspection carried out & Estimation of Tree Volume (Cum)-

SECTOR -2 , Plot No-C2

Sl. No	Tree No	Name of Tree Species	Location (Sub Station)	Condition of Tree (Dry/Fallen/Green)	Circumference at Breast height (137 cm)	Height of tree (M) Approx	Estimated Volume of the tree (Cum.)
114	1	KUKAAT	Sector -02, Plot No-C2	Green	120	3	0.595
115	2	KUKAAT		"	155	8	1.104
116	3	SEMAL		"	100	8	0.935
117	4	KHEAR		"	75	8	0.255
118	5	KUKAAT		"	80	8	0.255
119	6	KUKAAT		"	95	8	0.255
120	7	KUKAAT		"	145	8	1.104
121	8	SEMAL		"	205	8	3.739

For SIIDCUL
राकेश कु० पाण्डेय
सर्वेयर सिडकुल सितारगंज

मुकेश कु० मल्ला
अवर अभि० (सिविल) सितारगंज

Forest Department
के० एस० मेहरा
डिप्टी रेंजर किशनपुर

Detail of Inspection carried out & Estimation of Tree Volume (Cum)-

Sl. No	Tree No	Name of Tree Species	Location (Plot No)	Condition of Tree (Dry/Faden/Green)	Circumference at Breast height (137 cm)	Height of tree (M) Approx	Estimated Volume of the tree (Cum.)
122	1	SHISHAM	Sector-3 Plot No-174	GREEN	130	12	1.060
123	2	SHISHAM		"	145	10	1.060
124	3	KUKAAT		"	120	4	0.595
125	4	SHISHAM		"	120	12	0.531
126	5	KUKAAT		"	105	4	0.595
127	6	JAMUN		"	90	3	0.170
128	7	KUKAAT		"	135	5	1.104
129	8	SHISHAM		"	105	5	0.531
130	9	SHISHAM		"	110	7	0.531
131	10	SHISHAM		"	105	8	0.531
132	11	SHISHAM		"	135	8	1.060
133	12	KUKAAT		"	100	4	0.595
134	13	SEMAL		"	190	16	3.739
135	1	SHISHAM	Sector-3 Plot No 173	"	130	12	1.060

For SIIDCUL
राकेश कु० पाण्डेय
सर्वेयर
सिडकुल सितारगंज

मुकेश कु० मण्डल
अवर अभि० (सिविल)
सिडकुल सितारगंज

Forest Department
के० एल० मेहरा
डिप्टी रेंजर
किशनपुर

Detail of Inspection carried out & Estimation of Tree Volume (Cum)-

Sl. No	Tree No	Name of Tree Species	Location (Plot No)	Condition of Tree (Dry/Fallen/Green)	Circumference at Breast height (137 cm)	Height of tree (M) Approx	Estimated Volume of the tree (Cum.)
136	1	KUKAAT	Sector-3 Plot No-172	GREEN	90	2	0.255
137	2	JAMUN		"	80	3	0.170
138	3	KUKAAT		"	115	5	0.595
139	4	KUKAAT		"	80	2	0.255
140	5	SHATUT		"	110	3	0.595
141	1	SEMAL	Sector-3 Plot No-171	GREEN	165	16	2.513
142	2	SHISHAM		"	115	6	0.531
143	3	SHISHAM		"	115	10	0.531
144	4	SEMAL		"	220	17	5.208
145	5	SEMAL		"	225	17	5.208
146	6	ROHANI		"	90	2.5	0.255
147	7	ROHANI		"	100	4	0.255
148	8	JAMUN		"	215	8	2.570
149	9	GULLAR		"	175	4	1.770
150	10	JAMUN		"	165	6	1.710
151	11	SEMAL		"	155	10	1.595
152	12	KUKAAT		"	125	5	0.595
153	13	SHISHAM		"	125	8	0.531
154	14	SHISHAM		"	140	10	1.060
155	15	SHISHAM		"	105	7	0.531
156	16	SHISHAM		"	160	10	1.770
157	17	SHISHAM		"	130	8	1.060
158	18	SHISHAM		"	85	6	0.183
159	19	SHISHAM		"	135	7	1.060

For SIIDCUL
राकेश कु० पाण्डेय
सर्वेयर
सिडकुल सितारगंज

मुकेश कु० मंडल
अवर अभि० (सिविल)
सिडकुल सितारगंज

Forest Department
के० एल० मेहरा
डिप्टी रेंजर
किशनपुर

Detail of Inspection carried out & Estimation of Tree Volume (Cum)-

SL. NO.	TREE No	Name of Tree Species	Location (Plot No)	Condition of Tree (Dry/Fallen/Green)	Circumference at Breast height (137 cm)	Height of tree (M) Approx	Estimated Volume of the tree (Cum.)
160	1	AAM	Sector-02, PLOT NO-9	Green	105	2	0.595
161	2	AAM		,,	100	2	0.595
162	3	AAM		,,	65	2	0.255
163	4	AAM		,,	100	2.5	0.595
164	5	SEMAL	Sector-02, PLOT NO-8	,,	80	2	0.450
165	6	SEMAL		,,	70	2	0.450
166	7	KUKKAT		,,	95	2	0.595
167	8	AAM	Sector-02, Tool ROOM	,,	65	2	0.255
168	9	AAM		,,	63	1.5	0.255
169	10	AAM		,,	63	1.5	0.255
170	11	SEMAL		,,	80	5	0.450
171	12	AAM		,,	65	1.5	0.255
172	13	AAM		,,	70	2	0.255
173	14	KATAHAL		,,	65	2	0.255
174	15	SEHTUT		,,	70	3	0.255
175	16	AAM		,,	65	1.5	0.255
176	17	AAM		,,	65	1.5	0.255
177	18	AAM		,,	75	2.5	0.255
178	19	AAM		DRY	350	8	2.322
179	20	SEMAL		GREEN	70	3	0.450
180	21	KUKKAT		,,	110	4	0.595
181	22	AAM		,,	65	1.5	0.255
182	23	SEMAL		,,	105	7	0.935
183	24	AAM		,,	70	1.5	0.255
184	25	SEMAL		,,	360	18	5.208
185	26	PIPAL		,,	530	8	3.732
186	27	SEMAL	Sector-02, PLOT NO-C5	,,	420	20	5.208
187	28	SEMAL		,,	290	20	5.208
188	29	KUKKAT		,,	120	4	0.595
189	30	HALDU		,,	75	4	0.210
190	31	JAMUN	Sector-02, PLOTNO-	,,	100	4	0.510

191	32	SEMAL	10	,,	150	15	1.595
192	1	SEMAL	Sector-03, PLOT NO	,,	150	10	1.595
193	2	KHAIR	-80	,,	145	8	1.104
194	1	AAM		,,	130	2.5	1.104
195	2	AAM		,,	160	7	1.713
196	3	AAM		,,	110	4	0.595
197	4	AAM		,,	70	4	0.255
198	5	AAM		,,	120	3	0.595
199	6	AAM		,,	195	5	2.322
200	7	AAM		,,	100	6	0.595
201	8	AAM		,,	140	7	1.104
202	9	AAM		,,	120	7	0.595
203	10	AAM		,,	75	4	0.255
204	11	AAM	Sector-03, PLOT NO-	,,	100	4	0.595
205	12	AAM	81	,,	65	3	0.255
206	13	AAM		,,	80	1	0.255
207	14	AAM		,,	70	1	0.255
208	15	AAM		,,	120	8	0.595
209	16	AAM		,,	95	5	0.595
210	17	NIM		,,	245	15	2.322
211	18	NIM		,,	140	6	1.104
212	19	SEMAL		,,	63	4	0.450
213	20	DAK		Fallen BUT GREEN	65	4	0.255
214	21	KHAIR		GREEN	64	2.5	0.255
215	22	KHAIR		,,	65	3	0.255
216	1	SHISHAM	Sec -2, Plot -T-01	,,	110	4	0.531

For SIIDCUL
राकेश कु० पाण्डेय
सर्वेयर
सिडकुल सितारगंज

मुकेश कु० बडोला
अवर अभि (सिविल)
सिडकुल सितारगंज

Forest Department
के० एस० मेहरा
डिप्टी रेंजर
किशनपुर

ANNEXURE - VI

METHODOLOGY OF EB & SE, LU

Methodologies for Socio- economic; Ecology and biodiversity and Landuse analysis

Objectives:

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

1. To study the socio-economic status of the people living in the study area.
2. To assess the impact on socio-economic environment due to proposed development.
3. To suggest Community Development measures that needs to be taken for the study area.

Methodology:

Socio economic impact assessment is the systematic analysis used during EIA to identify, assess, mitigate, monitor and evaluate the potential socio-economic and cultural impacts of a proposed development on the lives and circumstances of people, families and communities. Impacts are potential changes caused – directly or indirectly, in whole or in part, for better or for worse – by development activities.

There are five steps for studying socio economic impact assessment

1. Desktop review for relevant documentation
2. Delineation of study area
3. Site visit & Collection of baseline information
4. Impact prediction & Evaluation
5. Mitigation measures & Monitoring

1. Desktop review of relevant documentation: A literature review will be done from secondary sources using relevant reports and documentation pertaining to the project area of influence, government publications and legislation, and previous social and resettlement project reports; which will help in providing wider socio-economic context for the social assessment and an initial understanding of the project area for fieldwork preparation. The secondary data collected needs to be verified and validated from authentic sources.

2. Delineation of study area for the assessment: A pre-site visit map based on collateral information, maps & topo-sheet will be prepared showing the subzones with a buffer study zone of approximately 10 km from the periphery of the project site. The sub-zonation of study area in to 0 to 2 Km 2-5; 5-7 & greater than 7 Km will help in spatial analysis of social attribute. The Socioeconomic fieldwork will include the directly affected villages and also those identified within the buffer zone of the project site.

3. Site visit & Collection of Baseline Information: A preliminary resonance survey of site visit will provide an opportunity for primary data collection. The study will begin with the compilation of a baseline description.

The baseline description will be derived from a range of secondary data (pertaining to census data, existing reports, development plans and other strategic planning documents) and primary data collection. The primary data used for the baseline is gathered from directly-affected landowners and issues raised through the public consultation process. This will include the collection of baseline demographic and socio-economic information through door-to-door survey, Focused group discussion and observation sheet focusing on household composition, population, literacy,

employment pattern, general health, tribal, transport, communication & welfare facilities such as hospitals, educational institutions, project awareness amongst the public, infrastructure facilities, economic resources, cultural and aesthetic attributes etc. At least 10 % households if total households in the zone is less than 100 and 5 % households if total households in the zone is between 100 to 500 and 2 % households if total households in the zone is more than 500 is necessary to be covered for any statistical analysis.

Criteria:

The criteria of selection of villages are as follows.

(a) Distance; direction and elevation of village.
(b) Approach or connectivity of village.
(c) Infrastructural amenities in village.
(d) Dominant society (higher caste & SC/ST) of village.
(e) Time allocated for the assignment.

Procedure:

a. The details of the population/ demographic structure to be obtained from Census and secondary sources.
b. The developed tools i.e. Household Questionnaire (Rural Area); Household Questionnaire (Urban Area) Site Observation sheet; Group Discussion sheet and 15D HRQOL questionnaire need to uses as per following criteria.
   i The Social components for Rapid EIA (Category – B) need to use Household Questionnaire (Rural Area); Household Questionnaire (Urban Area) Site Observation sheet; Group Discussion sheet.
   ii However Rapid EIA (Category – A) or CEIA need to use Household Questionnaire (Rural Area); Household Questionnaire (Urban Area) Site Observation sheet; Group Discussion sheet and 15D HRQOL questionnaire.
   iii Primary data to be collected by a door-to-door survey, Focused group discussion, observation sheet, covering at least 10 % households if total households in the zone is less than 100 and 5 % households if total households in the zone is between 100 to 500 and 2 % households if total households in the zone is more than 500.
   iv More attention need to be given for core zone and 2 Km buffer for Infrastructural projects, while for mining; industrial estate; highway and thermal power plant the whole 10 Km buffer need to considered for social survey.
   v All the data collected through the tools need to be tabulated and data redundancies need to removed before analysis of data.
   vi The data analysis need be carried out using statistical and spatial analysis software to establish the social baseline.
   vii The project details need to derived form detailed project report; prefeasibility report and plans (approved/ proposed)
c. The future scenarios need to be developed using Geographic Information System (GIS) for various spatial analysis through integration of spatial and non spatial data i.e. buffer; overlay and extract etc and impact assessment quantitatively.
d. The positive impacts need to indentified and ensured to make it happen; while negative impact if any need to be indentified for its brevity in terms of scale/ magnitude; duration and probability of occurrence.
e. Plans involving timeline and budget for all the anticipated negative impacts need to make using; corporate social responsibility (CSR) and/ or corporate environmental responsibility (CER).

FLOW CHART SHOWING THE PROCESS FLOW FOR PREPARATION OF SOCIO-ECONOMIC EXPERT INPUT IN EIA

Type of Data:

The types of data collected from primary & secondary sources.

1. Demography & Occupational structure: - Total population, male, female, children, occupations, General & OBC caste schedule caste and schedule tribe; total worker; total non worker; main and marginal worker; cultivator; Ag labour; household worker; other worker etc.
2. Social traditions and customs: - Customs of marriage, death, birth; festivals; fair; haat/ market; clubs; Jim; theater; malls; sports; hunting; fishing etc.
3. Administrative setup of study area: - The revenue hemlet; village, gram panchayat, block, tehsil, police station, district and state.
4. Infra-structural amenities:-

a. Social amenities (Bus stand, railway station, temple, mosque, church, hotels, Dharamsala, cinema halls, Schools, hospitals, post office, police stations, GP office etc).
b. Physical amenities (national highway, state highway, district road, village road, main canal, feeder canal, dams, power lines, gas lines, sewer lines, vehicles {type and numbers}, public transport etc).

5. Natural Phenomena: River; mountain; fords; meander; plain; plateau; hills, escarp, masrh; cliff; spur; valley; islands, desert; Barkhans etc.
6. Agriculture & Horticulture: - The area under cultivation, major crops and area under each (crop net area sown), agricultural crop output, carrying capacity of crop land; fertilizer consumption; crop production; main fruits tree grown in area; fruit production and processing etc.
7. Health & nutrition: - Major epidemics in the area extent and fatality, number of deaths and infant child mortality, maternal death, availability of food during lean months; number of hospitals (allopathic; homeopathic Unani and ayurvedic, Number of beds; No of medical professionals etc.
8. Social crimes: - The girl child infanticide, eve teasing, atrocities against female, dowry, divorce, social ostracisation etc.
9. Poverty: - BPL & APL persons, the dependency of BPL on resources, homeless persons etc.
10. QOL: - Quality of Life for major cities in state and country and its dimensions.

4. Impact Prediction and Evaluation: The potential socio-economic impacts that are likely to arise as a result of the proposed project will be identified, such as impact on the local community including demographic changes; Impact on economic status; impact on human health and impact of increased traffic etc. It will also involve determining whether a proposed development is likely to cause significant adverse impacts on valued socio-economic components. The impacts on economic aspects, education, public orders, infrastructure & services, security & safety, and health & cultural aspects during pre-construction, construction, operation and maintenance phase of the project needs to be studied. The impact assessment will be done according to the following methodology:

- *Direction of an impact* may be positive, neutral or negative with respect to the particular impact.
- *Magnitude* is a measure of the degree of change in a measurement or analysis and is classified as none/negligible, low, moderate or high.
- The categorization of the impact magnitude may be based on a set of criteria pertinent to each of the discipline areas and key questions analyzed. Appropriate, widely-recognized standards will be used as a measure of the level of impact.
- *Duration* refers to the length of time over which an environmental impact may occur: i.e. transient (less than 1 year), short-term (0 to 5 years), medium term (5 to 15 years), long-term (greater than 15 years with impact ceasing after closure of the project) or permanent.
- *Scale/Geographic extent* refers to the area that could be affected by the impact and is classified as site, local, regional, national, or international.
- *Probability of occurrence* is a description of the probability of the impact actually occurring as improbable (less than 5% chance), low probability (5% to 40% chance), medium probability (40 % to 60 % chance), highly probable (most likely, 60% to 90% chance) or definite (impact will definitely occur).

5. Recommending Measures: - The measures are of two types' preventive and remedial measures and in EIA only preventive measures can be proposed as it is being carried out at planning stage. The CSR or CER are regulatory tools for prescribing the preventive measures and ensuring holistic sustainable development. Both of these plans need to prepare as per local need

and in compliance of govt. guidelines. Budget; timeline; along with measurable outcome should be an integral part of CSR and CER plans. The social dimension needs to grow and forms a better society is the ultimate goal of development/ projects. Predicted adverse impacts require mitigation. Mitigation includes strategies, plans and programs to reduce avoid or manage impacts. Good mitigation for socio-economic impacts requires good monitoring mechanism to ensure the mitigation is working effectively, and, when necessary, the mitigation is adapted as required.

List of requirements for providing socio-economic expert input not involving any resettlement & rehabilitation.

- Name of Project
- Name of project proponent
- Area/ tonnage/ capacity of project
- Number of worker during construction phase involving male/female division if females are also involved
- Number of residents/ occupants/ staff/ visitors/ workers involving male/female division if females are also involved
- Social infrastructure to be provided during construction phase
- Services to be provided during operation phase
- Demolition of any structure i.e. temple, tube well, old building,
- Cost of the project
- Minimum wages applicable in state
- CSR policy of the company
- CSR thrust areas
- DPR of the project
- Site visit for primary social survey based on well designed questionnaire and field observation sheet by trained field workers
- Secondary data i.e. Administrative Atlas, Census data, Department of economics and statistics, Survey of India, Niti Ayog, and other sources
- Photographs of society(Man, women, children, old fellow, Persons with disabilities etc) , houses (kuccha, pucca, semipucca) , transport (national highway, state highway, main district roads, sector roads, village roads, railway line) , drinking water source (tap, well, bore well, water tanks) , shops (grocery, hardware, medical, computers,), schools (pre-primary, primary, middle, secondary, higher secondary, college, IIT, Polytechnic) , canals & drainages (village drain, irrigation drain, Waste water drain, pipeline), waste dumps (community dump, household dump) , animal husbandry (cow, buffalo, goat, dog, cat, hen, duck), Religious (temples, mosque, church) Social amenities (electric transformers, bus stand, post office, telephone DP, fire brigade, police out post) , conducting social survey & GD.
- Any social problem pre identified

List of Major Sources of Secondary data:

The major sources of secondary data are as follows.

1. Census of India
2. Ministry of Statistics and Programme Implementation
3. National Sample survey organization
4. Ministry of Tribal welfare

5. Revenue department
6. Transportation department
7. Women and Child welfare department
8. Survey of India
9. National remote sensing agency (BHUVAN)
10. Department of Economics and Statistics
11. Planning commission
12. State mining department
13. Indian bureau of mines
14. Confederation of Indian Industry (CII)
15. Federation of Indian Chambers of Commerce and Industry (FICCI)
16. Forest Department
17. Health & Medical department
18. Education department
19. Agriculture department
20. Horticulture department
21. Fisheries department
22. Industries department
23. Central Ground water authority (WRIS, Mera Bhujal)
24. Ministry of Surface Water
25. University research reports and other survey reports.
26. District level NIC
27. Google earth, Wikimapia and other social sites.
28. Ministry of Drinking Water & Sanitation.
29. District Gazetteers
30. ENVIS centre
31. Centre of excellence
32. Ministry of Law

Does and Don'ts during Social Survey

Does

Photographic survey: The photographic survey need to cover the following.

- Photographs of society(Man, women, children, old fellow, Persons with disabilities etc) ,
- Photographs of houses (kuccha, pucca, semipucca) ,
- Photographs of transport (national highway, state highway, main district roads, sector roads, village roads, railway line) ,
- Photographs of drinking water source (tap, well, bore well, water tanks) ,
- Photographs of shops (grocery, hardware, medical, computers,),
- Photographs of schools (pre-primary, primary, middle, secondary, higher secondary, college, IIT, Polytechnic) ,
- Photographs of canals & drainages (village drain, irrigation drain, Waste water drain, pipeline),
- Photographs of waste dumps (community dump, household dump) ,
- Photographs of animal husbandry (cow, buffalo, goat, dog, cat, hen, duck),
- Photographs of Religious (temples, mosque, church)

- Photographs of Social amenities (electric transformers, bus stand, post office, telephone DP, fire brigade, police out post) ,
- Photographs of conducting social survey & GD.

Don'ts
Don't Get Too Familiar
Don't Get Too Nosey
Don't Make It Complex & lengthy.
Don't Make The Survey Too Academic.
Don't Be stuck to your hypothesis.
Don't Forget your survey goals.

Ecology and biodiversity

1. Introduction: The convention of biodiversity (CBD) in Rio in 1992 which was attended by 150 countries defines biodiversity as "the variability among the living organisms from all sources including inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part of: this includes diversity within species, between species and of ecosystems" Biodiversity comprises of life forms starting from the tiniest microbes to the largest whale and gigantic trees. The biodiversity is usually classified in to three categories on the basis of level of organization: (i) genetic diversity, which is concerned with the variation in gene with in particular species; (ii) species diversity, which embraces the variety of living organisms in the earth, and (iii) ecosystem diversity, which is related to the variety of habitats. The biodiversity can also be classified on the basis of its ultimate use as medicinal biodiversity, agricultural biodiversity etc. However the floral biodiversity and faunal biodiversity are two major groups of biodiversity.
In order to perpetuate the eco-stability the biodiversity is most essential. It ensures the maintenance of gaseous composition of the atmosphere; climate-control by forest and ocean ecosystems; biological control of pests and weeds; pollination by insects, birds, bats; conservation of soil, water and proper cycling of nutrients and energy. The implications of biodiversity are of two types of viz. utilitarian and aesthetic. The utilitarian group includes those relationships, which are directly or indirectly associated with the sustenance of man such as food, fiber, shelter, medicine, timber, implements, etc. The biodiversity also carries the aesthetic aspects including eco-tourism, bird chanting, gardening, horticulture, trekking etc.

1.1 Fundamentals: The important steps that need to be followed are as follows.

- Before conducting the ecological baseline surveys, the key ecosystem components and processes as well as the target taxa groups of the study site that are considered relevant, important, valuable, susceptible and sensitive to changes or fundamental to the functioning of the ecosystem should be selected as the focal points of the survey.
- In addition, efforts should also be focused on locations or target taxa groups where impacts are likely to be significant.
- The ecological baseline survey aims at collecting ecological data through sampling- – which - would generally depend on the physical size of the site, diversity of the habitats, flora and fauna, seasonal variation of the target taxa groups under study and availability of existing ecological baseline information.

- Functional Area Experts in consultant with EIA coordinator determine the appropriate amount of sampling effort in each case based on their professional judgement and actual site situations.
- In all cases, there should be adequate samplings to ensure that the data obtained are representative to address both spatial and temporal variations.
- Standardized survey methods should be applied wherever appropriate so that results can be compared with those arising from other studies.
- If the methods used vary from accepted methods in order to meet the specific needs of a study, the justifications and reliability of the results should be thoroughly presented in the EIA report.
- The surveys should also be carried out by personnel with adequate knowledge and field experience of the target taxa groups to be surveyed.
- Besides recording the species of the target taxa groups at the site through sampling, the dominant flora and fauna as well as any species of conservation importance should also be noted.
- The ecological baseline survey should also aim at providing insight into the ecological functions and importance of the habitats in question. For instance, during a bird survey, any notable behavior such as feeding, roosting or breeding of the birds and the associated habitats and vegetation where they show such behaviours should be recorded.
- In fact, any special species-habitat relationships observed during the survey should be noted down. Such information is relevant and essential for subsequent impact identification, evaluation and mitigation.
- In essence, an ecological baseline survey aims at revealing the ecological profile of the study area to facilitate the subsequent impact assessment and mitigation.
- -An additional requirements on the ecological baseline survey taking into account the nature of the project, site conditions and valid concerns of the public should be recorded for EIA if applicable.
- Further investigations to address specific issues may be required during the course of the EIA study and be presented in the EIA report.

2. <u>Main Objectives:</u> An ecological assessment is part of an EIA study for a development project which may have an impact on the natural environment including existing flora, fauna and wildlife habitats. The main objectives of Ecology and Biodiversity Assessment are as follows.

- To study the existing ecosystem structure and function.
- To evaluate the changes in biodiversity/ species richness, finally affecting the ecosystem functioning.
- To suggest the mitigation measures to reduce the ecological impact.

2.1 Duration of Survey: - Generally, the duration of an ecological baseline survey should be commensurate with the scale of the proposed development at hand, and the duration specified in the EIA study brief should be regarded as the minimum requirement. Representative information could be obtained in a reasonable period of time if appropriate survey and sampling methods are adopted.

The duration of an ecological baseline survey for a proposed development is generally dependent on the following factors:

- The geographical coverage of the study area

- The diversity of habitats within the study area
- The diversity of flora and fauna within the study area
- Presence of ecologically important species or habitats which exhibit distinct seasonal patterns (e.g. migratory animals, seasonal wetlands)
- Availability of existing ecological information of the study area

The EIA notification 2006 specifies the area of study as 10 Km from the boundary of project site/ lease area or core zone, also known as buffer zone for one season other than monsoon.

2.2 Seasonality: - An ecological survey of a longer duration with regard to seasonal variations may be required if the area in question is likely to be supporting species of conservation importance which exhibit distinct seasonal patterns or when information on the site is inadequate. Agro-climatic zone, average monthly temperature; rainfall, seasons, transitional months must be considered while planning survey programme and interpreting results. The recommended survey seasons for the target taxa groups that are usually included in ecological baseline surveys are shown in Figure 1. It should be noted that the figure only serves as a reference for the period of a year when different faunal or floral groups are generally more conspicuous. The actual timing of survey may need to be adjusted if a target species has special seasonal or diurnal pattern (e.g. egretry should be surveyed during the breeding season of egrets and herons between March and August; it would be more effective to conduct survey for amphibians at night time during wet season) or for special habitat types where certain target species groups are expected.

Figure 1: Time of the year to survey major floral and faunal groups

Months/ Flora & Fauna	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
	Winter			Summer			Rainy Season			Autumn		
VERTEBRATES												
Terrestrial Mammals	Active throughout the year, no distinct seasonality											
Marine Mammals	Active throughout the year, with seasonal distribution and abundance											
Resident Birds	Active throughout the year											
Overwintering Birds	Winter migrants									Visiting Period		
Passage Migratory Birds	Migratory Birds									Visiting Period		
Amphibians							Active Period for most frog and toad species					
Reptiles	Active period						Active period for most reptiles					
Freshwater Fish	Active throughout the year											
INVERTEBRATES												
Butterflies	Active period						Active period for most reptiles					
Odonates				Active period								
VEGETATION												
Higher Plants	Active throughout the year											

3. **Methodology:** Following steps needs to be followed for the ecology & biodiversity study in the context of EIA.

A. Desktop Research & Planning, Data collection using various tool and techniques.
B. Data processing and analysis
C. Predictions of Impact.
D. Suggesting mitigation measures including conservation plan, if required.

A. Desktop Research & Planning, Data collection using various tool and techniques: Desktop research and planning is of immense importance for ecology and biodiversity assessment. The desktop research involves mainly a review of existing information available with various organizations. - In desktop research we seek the following information.

- About the key stone species, protected species Schedule-1 & 2 (as per ILWPA-1972) and critically endangered and endangered species (as per IUCN) and Prohibited species as per CITES, Migratory species internationally protected reported to be found in the study area or zone.
- Plants and Animals of ecological significance reported in the study area or zone.
- Ethno-medicinal plants and animals reported in the study area or zone.
- Man-animal conflicts reported in the study area or zone.
- Ecological traditions in religious context being practiced in the study area or zone.
- Carrying capacity, Energetics, ecological accounting and biomass studies in the study area or zone.
- Data on forest conservation, protection, and level of utilization and other important studies carried out in the study area or zone.

A good planning is a half work done; therefore it is of utmost importance to plan the work before venture out in to the field for data collection. The planning involves the following steps.

i Area Demarcation and zonation
ii Development of project specific tools
iii Testing, Review and approval of tools
iv Training of field team
v Data collection by expert along with field executives
vi Data tabulation and removal of redundancies:

I. Area Demarcation and zonation: -. The study area for EIA projects have been fixed for 10 Km radius from the boundary of the project site or lease area, have been called as buffer zone. The core zone is commonly taken as lease area or project area. The buffer zone may further be subdivided into 0-2, 2-5, 5-7 and 7-10 Km zone as B1, B2, B3 and B4 respectively. The land use and land cover plays very important role in selection of sites for ecological sampling involving quadrate analysis. The location and area of prominent land use i.e. forest & tree cover, grassland, scrub land, crop land, settlements etc., in the study area is main factor for deciding the number of quadrates to be laid in the sampling sites. The sampling sites must cover 10% of the concerned land use, i.e. forest & tree cover, grassland, scrub land, crop land, settlements etc.; for reliable statistical analysis.

II. Development of project specific tools: The tools must be compatible and justifying the objectives, therefore it is imperative to develop the tools keeping the features of the development project. The important tools for ecological and biodiversity data collections are checklist, field observation sheets, questionnaire for the stakeholders i.e. households, community, practitioners of

naturopathy, hunters and gathers, traders, researchers, official of Government and NGO's CBO's and PRI's etc. A filed log book will also be must for the experts conducting the site visit. The preside visit maps involving SOI toposheets, and other sources of spatial and non spatial data must be developed as they will help during the data collection.

III. Testing, Review and approval of tools: Each and every tool developed i.e. checklist, field observation sheets, questionnaire for the stakeholders (*Refer: Tools for Ecological data collection*) must be tested for their relevance, practicality, approach etc. There must be a review by expert on the basis of field testing and approval by the management as per recommendation of expert and incorporation of necessary changes if any.

IV. Training of field team: The ecology and biodiversity data collection is a huge task needs to be completed by the expert and field team. The training of field team is essential for correct and meaningful data collection. All the field team members must be well versed with professional ethics and necessary precautions. Expert must be at the field along with field workers to ensure the proper data collection and encourage the field team members through motivations.

V. Data collection by expert along with field executives: The expert will lead the team and will carry out the data collection. He will ensure the quality and accuracy of the data collected by him and his field team. All the tools designed and tested during earlier stages will be used in the data collection and records will be generated for further analysis.

VI. Data tabulation and removal of redundancies: The collected records from filed will be tabulated after removing redundancies. The tabulated data will be used for analysis for various phyto-social and other statistical parameters by the expert, which will be used in drafting the baseline status.

B. <u>Data processing and analysis:</u> All the data gathered and tabulated need to be processed and analyzed before using it in expert input. Ecological significance and economic significance of plants and animals needs to be verified with the plants and animals enumerated. The zone wise list helps to identify the impact and thereby mitigation measures. The above analysis helps to establish the baseline ecological status in the study area along with the spatial distribution.

Inventorisation: Botanical or floristic inventories have a wide variety of uses and about as many methods of data collection and management. A simple inventory list is preferred, and the functional area expert conducting the inventory will need familiarity with nearly all the regional species that could appear across a number of ecosystems and plant communities. A functional area expert needs to recognize less dominant species or, at the very least, be able to place an unidentified species in a larger taxonomic group and use botanical keys and laboratory equipment to complete the identification. Ideally, inventories should -visits –in accordance with requirement for REIA or CEIA.

C. <u>Predictions of Impact:</u> Based on the project profile and gathered ecological baseline information, the assessment shall identify and predict potential ecological impacts caused by the proposed development. There may be direct or primary impacts such as loss of habitats and species. However, some ecological impacts are induced or secondary such as loss of feeding

grounds. Hence an ecosystem perspective highlighting the existing key relationships between different species and the surrounding environment shall be adopted.
All potential impacts, including direct, indirect, on-site, off-site, primary, secondary, induced, additional, synergistic, cumulative impacts, etc. shall be listed out. Suitable methodology such as checklists (descriptive, scaling, etc.), matrices, networks, features mapping, etc. shall be used and clearly stated wherever applicable. Predictions must be made with sound scientific basis.

Evaluation of Impacts

Impact significance is a product of the magnitude and scale of an impact and the asserted importance of the species or habitat(s) likely to be affected. However, it shall be noted that evaluating nature conservation interest is a difficult and complex process. Value or professional judgments are involved. Nevertheless the conservation value of a site or species and hence the significance of an impact shall be evaluated as systematically as practicable.

D. Suggesting mitigation measures including conservation plan, if required: The general policy for mitigating impacts on important habitats and wildlife, in the order of priority, are:

a. Avoidance

- Potential impacts shall be avoided to the maximum extent practicable such as adopting suitable alternatives (e.g. change of site, design, construction method, alignment, layout, programme, etc.).
- In extreme cases when the ecological assessment identifies some very serious impacts which could not be mitigated, the "no-go" alternative may be the only realistic option and shall be included and assessed against all other options.

b. Minimizing

c. Unavoidable impacts shall be minimized by taking appropriate and practicable measures such as transplanting important plant specimens, confining works in specific area or season, restoration (and possibly enhancement) of disturbed areas, drawing of conservation plan etc.

d. Compensation

The loss of important species (e.g. trees) and habitats (e.g. woodland) may be provided elsewhere (on-site or off-site) as a compensation. Enhancement and other conservation measures shall always be considered, whenever possible.

1.1 All mitigation measures recommended shall be feasible to implement. The effectiveness of the proposed mitigation measures shall be carefully evaluated and the significance of any residual impacts after implementing them shall be clearly stated.

1.2 From an ecological point of view, mitigation measures for ecological impact shall preferably be carried out on-site and well in advance of the works rather than off-site, and after the completion of works.

1.3 Where off-site mitigation measures are involved, they shall be considered along with other alternatives e.g. change of site, layout, species specific conservation plan etc., including modifying or abandoning the project.

1.4 The need for and the type and scope of the off-site ecological mitigation measures to be adopted for a particular project shall be determined according to the following guidelines:

a. All possible design measures and all practicable on-site ecological mitigation measures shall be fully investigated in the EIA study and exhausted to minimize the loss or the damage caused by the project to the ecological habitats or species;
b. With the on-site ecological mitigation measures in place, the residual impacts on ecological habitats or species shall be defined, quantified and evaluated according to the methods and criteria laid down. Before off-site ecological mitigation measures are to be adopted, the EIA study needs to confirm that it is necessary to mitigate the residual ecological impacts based on ecological considerations and that such residual impacts arise from the project in question;
c. If the residual ecological impacts require mitigation and all practicable on-site ecological mitigation measures have been exhausted, off-site ecological mitigation measures shall be provided;
d. The off-site mitigation measures shall be on a "like for like" basis, to the extent that this is practicable. That is to say, any compensatory measures to be adopted for mitigating the residual ecological impacts must be directly related to the habitats or species to be protected.
e. Either the same kind of species or habitats of the same size shall be compensated, or the project proponent shall demonstrate that the same kind of ecological function and capacity can be achieved through the measures to compensate for the ecological impacts. For example, the loss of a natural woodland shall be compensated by the replanting of native trees where possible;
f. The off-site ecological mitigation measures shall only be implemented within the boundaries of same microhabitat, and must be technically feasible and practicable;
g. The extent of such mitigation measures shall be limited to what is necessary to mitigate the residual ecological impacts arising from the project; and
h. Any proposed off-site mitigation measures shall not require further EIA study for their implementation.
i. Their feasibility, constraints, reliability, design and method of construction, time scale, monitoring, management and maintenance shall be confirmed during the EIA study.

Ecological Monitoring Programmes:

The purposes of ecological monitoring and audit are:

a. To verify the accuracy of the predictions of the ecological assessment study;
b. To detect any unpredicted ecological impacts arising from the proposed development;
c. To monitor the effectiveness of the mitigation measures; and
d. To recommend action plans in response to unpredicted impacts, and/or failed mitigation.

LIST OF SECONDARY DATA SOURCES FOR ECOLOGY AND BIODIVERSITY

- Botanical Survey of India with its 9 regional centers
- Zoological Survey of India with its 16 regional centers
- Forest Survey of India, Dehradun
- Indian Institute of Remote Sensing, Dehradun
- French Institute, Pondicherry
- Indian Council of Forestry Research and Education, Dehradun
- Salim Ali Institute of Ornithology and Natural History (Coimbatore)
- Tropical Botanical Garden and Research Institute (TGBRI), Coimbatore
- Kerala Forest Research Institution, Peechi, Kerala

- Wildlife Institute of India, Dehradun
- Indian Institute of Science, Bangalore
- Centre of Ecological Sciences, Bangalore
- G.B. Pant Institute of Himalayan Environment & Development, Almora
- Institute of Bio-resources, Shillong
- Central Arid Zone Research Institute, Jodhpur
- Bombay Natural History Society, Bombay
- World Wide Fund, New Delhi
- National Institute of Oceanography, Goa
- Central Marine Fisheries Institute, Barrackpur
- M.S. Swaminathan Research Foundation, Chennai
- Madras Science Foundation, Chennai
- Central Marine Fisheries Research Institute, Goa
- The Indira Gandhi Conservation Monitoring Centre, New Delhi

LIST WEB SOURCES FOR ECOLOGY AND BIODIVERSITY

1. www.unesco.org/mab/wnbr.htm
2. www.ramsar.org/index_about_ramsar.htm
3. whc.unesco.org/heritage.htm
4. www.wetlands.org/
5. www.unep-wcmc.org/protected_areas/data/nat2.htm
6. wcpa.iucn.org/wcpainfo/aboutwcpa.html
7. www.birdlife.org.uk/action/science/sites/index.htm
8. www.biodiversityhotspots.org
9. www.panda.org/resources/programmes/global200/pages/mainmap.htm
10. www.biodiv.org/convention/partners-websites.asp
11. iucn.org/themes/cem/
12. Biodiversity Conservation Network (BCN) [www.bcnet.org]
13. Eco-Portal environmental search engine [www.Eco-Portal.com]
14. Conserve On line [www.conserveonline.org]
15. Expert Center for Taxonomic Identification [www.eti.uva.nl]
16. FAO Forestry [www.fao.org/forestry]
17. Fish Base [www.fishbase.org/home.htm]
18. DIVERSITAS [www.icsu.org/DIVERSITAS]
19. Forest Conservation [forests.org/forsite.html]
20. The Global Biodiversity Information Facility (GBIF)[www.gbif.org]
21. Reef Base [www.reefbase.org]
22. Global Forest Information Services (GFIS) [www.iufro.org]
23. Tropical Rain Forest Information Center (TRFIC)[www.bsrsi.msu.edu/trfic/home.html]
24. Global Forest Watch [www.globalforestwatch.org]
25. Virtual School of Biodiversity [vsb.nott.ac.uk/vsb/Virtschl7.htm]
26. World Fish Center [www.worldfishcenter.org]
27. Millennium Ecosystem Assessment (MA) [www.millenniumassessment.org/en]
28. Oceanic Research Group [www.oceanicresearch.org/index.html]
29. World Fish Center [www.worldfishcenter.org]
30. Indigenous Peoples Biodiversity Information Network [www.ibin.org]

Landuse analysis

Introduction: The terms Land -Use (LU) and Land Cover (LC) - is often used interchangeably, but each term has its own -different meaning. Land cover–refers to the characteristics and surface cover of Earth's Surface, as represented by natural elements like vegetation, water, bare earth, impervious surface and other physical features of the land. Identification of land cover establishes the baseline information for activities like thematic mapping and change detection analysis. Land use–refers to the activity, economic purpose, intended use, and/or management strategy placed on the land cover type (s) by humans or land managers. Changes in intent or management practice likewise constitute land use change. When used together the phrase Land Use (LU)/ Land Cover (LC) generally refers to the categorization or classification of human activities and natural elements on the landscape within a specific time frame based on established scientific and statistical methods of analysis of appropriate source materials. Land cover is the physical material at the surface of the earth. Land use is the description of how people utilize the land for the socio-economic activity – urban and agricultural land uses are two of the most commonly recognized high-level classes of use. At any one point or place, there may be a multiple and alternative land uses, the specification of which may have a great dimension. Hence, Land use is the activity for which land is used by the man. The rapidly developing technology of remote sensing offers an efficient and timely approach to the mapping and collection of basis land use and land cover data over large area. The satellite imageries are potentially more amenable to digital processing because the remote sensor output can be obtained in digital format. Land use data are needed in the analysis of environmental processes and problems that must be understood if living conditions and standards are to be improved from or maintained at current levels.

Objectives: -In Rapid EIA land use studies have following main objectives.

a. To prepare the landuse-landcover map of study area based on recent satellite imageries.
b. To assess the impact of proposed project on existing land use and land cover
c. To suggest mitigations measures

Geographical location of the study area: - The geographical location as per agro-climatic zone affects the prominent landuse and land cover of study area. The survey of India open series map is to be used for georeferencing the study area.

For analysis and interpretation, and preparation of LU/LC map, two types of data are needed.

1. Basic data
2. Ground data

1) Basic data includes

- Remotely sensed Data (Indian Remote sensing satellite IRS Resourcesat2-LISS III, LISS IV)- From NRSC.

- Topographic data-The Survey of Indian topographical map on 1:50,000 scales is used as reference map for geo-referencing of the remote sensing data. These maps helped to select the ground truth collection sites.
- Local knowledge
- Area map on any scale to transfer details
- Reports and other literature of the study area

2) Ground data: Ground data is very much essential to verify and to increase the accuracy of the interpreted classes and also to minimize the field work. The equipment used during the present investigation include hand held GRMIN 12 GPS receiver for ground truth collection, besides the visual observation and analysis.

Garmin 12 GPS receiver: - Global Positioning System is based on a constellation of 24 satellites orbiting the Earth at a very high altitude of 20,200 km, which allows anyone with a GPS receiver to determine the precise 3-D location. The GARMIN 12 GPS Receiver in stand-alone mode was used to collect the information regarding the geographical location of the ground truth sites during the present investigation.

It offers advantages of accuracy, speed, versatility and economy while in use as an aid for position based data collection. GPS owes its popularity to the dependable high accuracy with which position and time can be determined. The termination of selective availability from first May 2000 has instantly increased the accuracy of stand-alone mode GPS to at least five fold and things are going to get even better in the near future. The GPS was conceived as a ranging system from known positions of satellites in space to unknown positions on land, sea and space. GPS uses pseudo ranges derived from the broadcast satellites. The pseudo ranges were derived either from measuring the travel time of the (coded) signal and multiplying it by its velocity or by measuring the phase of the signal. The antenna detects the electromagnetic waves arriving from the satellites, converts the wave energy into an electric current, amplifies the signal strength and sends the signals to the receiver electronics

Satellite data: - The Indian Remote sensing satellite IRS-Resourceset-2 LISS III images will be used for preparation of FCC (False Color Composite) and LU/LC (Land Use/ Land Cover).

Topographical maps of the study area: -The Survey of India open series map (OSM) will be used as reference map for geo-referencing of the remote sensing data. These maps will help to select the ground truth collection sites.

Ancillary data: - Information will be derived from the remotely sensed data and it will be verified using field data. Field data is used to improve the information extraction, to calibrate either data or the information and to assess the accuracy of the derived information. Field data used in the study was of different types such as maps of Survey of India, data collected in the field sampling, and information derived from statistical data from revenue department.

Computer hardware and software: - LG computer with Intel Pentium CPU G3240 @ 3.10 GHz with 32 bit operating system with ERDAS IMAGINE 8.5 image analysis software will be used for processing and analysis of the remote sensing data. Arc View 3.2 will be used for making land use maps.

Spatial observations: - Spatial measurements need to be made with the help of hand held GPS to get the spatial coordinates along with type of land use photographs also need to be collected.

The raw LISS III spectral information's need to be collected in the four bands as detailed below:

Band 2: Green region, 520-590 nm
Band 3: Red region, 620-680 nm and
Band 4: Near infrared region, 770-860 nm
Band 5: Short Wave Infrared region, 1550-1700nm

Methodology:-
Digital image analysis: - The various steps involved in the digital image analysis of remote sensing data are as follows.

- For digital image processing and analysis, preliminary work like collection of maps, reports, remote sensing images, collection and study of collateral and ground truth data need to be done first.
- Among all, ground truth data collection is very important for subsequent digital analysis.
- The LG computers with Intel Pentium CPU G3240 @ 3.10 GHz with 32 bit operating system with ERDAS IMAGINE 8.5 software need to be used for processing and analysis of remote sensing data.
- The toposheets of the study area on1:50,000 scales were scanned and need to be geometrically corrected in the DATA PREPARATION panel of ERDAS IMAGINE.
- The IRS-Resourceset-2 LISS III Image of the study area needs to be loaded into the ERDAS IMAGINE using the IMPORT option.
- Later, geometric correction of the image need to be done with the help of the geometrically corrected SOI Toposheets and Ground Control Points (GCPs) collected with the GPS receiver.
- The raw image data when viewed on the display showed the difficulty in distinguishing all features.
- Preliminary interpretation of the satellite data need to be conducted and GCPs, which need to be distributed randomly throughout the image with minimum root mean square (rms) error of less than 0.5.
- Polynomial transformation of 1st order need to be used because the correction program runs faster with it and it also avoids geometric distortion in areas of very few GCPs.
- After completing geometric correction of the image, study area boundary overlay need to be done.
- The study area boundary comprising of project tehsil need to be digitized from SOI toposheets using AOI tools polygon and vector options, saved as AOI layers.
- This AOI layer needs to be used as administrative boundary mask and the subsets of the respective blocks need to be prepared using subset image option of data preparation panel.
- The unsupervised classification need to be used to prepare the LULC map of the study area.
- The NRSC LULC scheme along with color code need to followed while composing the LULC map
- The percentage landuse change needs to marked and impact assessment utilizing professional judgment need to be done, along with mitigation measures to be suggested.

5) Visual Interpretation: Visual Interpretation is carried out based on the image characteristics like tone, size, shape, pattern, texture, location, association, background etc in conjunction with exiting maps/literature.

6) Land Use/Land Cover map: After visual interpretation, we categories the study area in several classes.

The National Remote Sensing Agency (NRSA) conducted a land use survey using Remote Sensing Technique in the year 1988-89 at the behest of the Planning Commission in which they had classified the land by visual interpretation technique and digital techniques into twenty two types. The definitions of the 22 categories adopted by them are as follows:

Level-I	**Level-II**	**Level-III**
1. Built-up Land	1.1 Built-up land	1.1.1 Urban (towns & cities)
2. Agricultural land	2.1Crop land	2.1.1 Irrigated crop land
	(i) Kharif	2.1.2 Unirrigated crop land
	(ii) Rabi	
	(iii) Double cropped	
	2.2 Fallow	
	2.3 Plantation	
3. Forest	3.1 Evergreen/Semi-evergreen	3.1.1 Dense/closed
	3.2 Deciduous	3.1.2 Open
	3.3 Degraded scrub land	
	3.4 Forest blank	3.4.1 Degraded forest
		3.4.2 Forest Blank
	3.5 Forest plantation	3.5.1 Types of plantation e.g teak, sal etc.
	3.6 Mangrove	
4. Wastelands	4.1 Salt affected land	
	4.2 Water logged land	
	4.3 Marshy/swampy land	
	4.4 Gullied/ravinous land	
	4.5 Land with or without scrub	
	4.6 Sandy area (Coastal & desertic)	Minimum mappable unit is 2.25 Ha on 1:50,0000 scale
	4.7 Barren rocky/stony waste/sheet rock areas	
5. Water bodies	5.1 River/stream	
	5.2 Lake/reservoir/tank/canal	
6. Others	6.1 Shifting cultivation	6.1.1 Current
		6.1.2 Old/abandoned
	6.2 Grassland/grazing land	6.2.1 Grassland/grazing/land
	6.3 Snow covered/glacial Area	6.3.1 Snow covered/glacial area
	6.4Mining area	6.4.1 mining dumps

Note: Land use/Land cover categories at different levels and corresponding scales for mapping are as follows:

Level-I-Categories – 1: 1000,000 scale

Level-II-Categories – 1: 250,000 scale

Level-III-Categories – 1: 50,000 scale and 1: 25,000 scale

(Sources: Description and classification of land use/land cover: NRSA-TR-LU & CD-01-90)

DETAILS OF LANDUSE CLASSES

1. Built up Land

It is defined as an area of human habitation developed due to non-agricultural use and that which has a cover of buildings, transport, communication utilities in association with water vegetation and vacant lands.

2. Agricultural Land

It is defined as the land primarily used for farming and for production of food, fiber and other commercial and horticultural crops. It includes land under crops (irrigated and un-irrigated), fallow, plantation etc.

2.1 Crop land

It indicates those lands with standing crop (per se) as on the date of the satellite imagery. The crops may be of either *Kharif* (June-September) or *Rabi* (October-March) or *Kharif Rabi* seasons.

2.2 Fallow land

It is describes as agricultural land which is taken up for cultivation but is temporarily allowed to rest un-cropped for one or more seasons, but not less than one year. These lands are particularly those which are seen devoid of crops at the time when the imagery is taken of both seasons.

2.3 Plantations

It is described as an area under agricultural tree crops, planted adopting certain agricultural management techniques. It includes tea, coffee, rubber, coconut, areca nu, citrus, orchards and other horticultural nurseries.

3. Forest

It is an area (within the notified forest boundary) bearing an association predominantly of trees and other vegetation types capable of producing timber and other forest produce.

3.1 Evergreen/Semi-evergreen forest

An evergreen forest is forest made up of evergreen trees. They occur across a wide range of climatic zones, and include trees such as conifers, live oak, and holly in cold climates, eucalypts, acacias and banksias in more temperate zones, and rainforest trees in tropical zones and Semi-evergreen is a botanical term which refers to plants that lose their foliage for a very short period, when old leaves fall off and new foliage growth is starting.

3.1.1 Dense/closed

All land with a forest cover having a canopy density of 40 percent and above.

3.1.2 Open

All land with a forest cover having a canopy density between 10 to 40 percent.

3.2 Deciduous

A deciduous forest is a biome dominated by deciduous trees which lose their leaves seasonally. The Earth has temperate deciduous forests, and tropical and subtropical deciduous forests, also

known as dry forests. Another name for these forests is broad-leaf forests because of the wide, flat leaves on the trees.

3.3 Degraded scrub land

It is a plant community characterized by vegetation dominated by shrubs, often also including grasses, herbs, and geophytes. Scrubland may either occur naturally or be the result of human activity.

3.4 Forest blank

A patch within a forest which bears few or no trees will be considered as forest blank.

3.5 Forest plantation

Plantation forests are a type of managed forest in which the trees are planted (as opposed to naturally regenerate), of the same age and generally of the same species, and are intended to maximize the production of wood fiber.

3.6 Mangrove

The mangrove is a tropical tree or shrub that grows in swampy areas and has tangled roots located above ground, or a tidal swamp with a number of these types of trees and shrubs.

4.1 Salt affected land

Salt affected soils "in which salts interfere with normal plant growth". Salt-affected soils can be divided into saline, saline-sodic and sodic, depending in salt amounts, type of salts, amount of sodium present and soil alkalinity.

4.2 Water logged land

Something such as soil or land that is waterlogged is so wet that it cannot absorb any more water, so that a layer of water remains on its surface.

4.3 Marshy/Swampy land

Marshy land is that which is permanently or periodically inundated by water and is characterized by vegetation, which includes grasses and weeds. Marshes are classified into salt/brackish or fresh water depending on the salinity of water. These exclude Mangroves.

4.4 Gullied/Ravenous land

The gullies are formed as a result of localized surface runoff affecting the friable unconsolidated material in the formation of perceptible channels resulting in undulating terrain. The gullies are the first stage of excessive land dissection followed by their networking which leads to the development of ravenous land. The 'ravine' is usually associated not with an isolated gully but a network of deep gullies formed generally in thick alluvium and entering a nearby river, flowing much lower than the surrounding high grounds. The ravines are extensive systems of gullies developed along river courses.

4.5 Land with or without scrub

They occupy (relatively) higher topography like uplands of high grounds with or without scrub. These lands are generally prone to degradation or erosion. These exclude hilly and mountainous terrain.

4.6 Sandy area (Costal and Desertic)

These are the areas, which have stabilized accumulations of sand in-site or transported in coastal riverine or inland (desert) areas. These occur either in the form of sand dunes, beaches, channel (river/stream) islands, etc.

4.7 Barren rocky/Stony waste/Sheet rock area

It is defined as the rock exposures of varying lithology often barren and devoid of soil cover and vegetation and not suitable for cultivation. They occur amidst hill forests as openings or scattered as isolated exposures or loose fragments of boulders or as sheet rocks on plateau plains. It includes quarry or gravel pit or brick kilns.

5. Water bodies

It is an area of impounded water, areal in extent and often with a regulated flow of water. It includes man-made reservoirs/lakes/tank/canals, besides natural lakes, river/streams and creeks.

5.1 River/Streams

It is course of flowing water on the land along definite channels. It includes from a small to a big river and its branches. It may be perennial or non- perennial.

5.2 Reservoir/Lakes/Tanks/Canal

It is a natural or man-made enclosed water body with a regulated flow of water. Reservoirs are larger than tanks/lakes and are used for generating electricity, irrigation and for flood control.

6. Others: The other land use classes include shifting cultivation; Grassland/grazing land; Snow covered/glacial Area and Mining area.

7. Impact assessment & Mitigation measures:

- The impact assessment is carried out by overlaying the proposed plan on existing landuse.
- The expert judgement is the main method to extract the anticipated impact of any development project, which may be positive or negative.
- The landuse impact affects many other parameters that are crucial for maintaining amenable environment.
- The interrelation with soil, ecology & biodiversity, air; water need to be kept in mind while analyzing the LULC impact.
- The landuse zoning has to be considering with special reference to the natural hazard prone areas identified.
- The mitigation measures are a set of tasks that are multifunctional area in nature.
- Landuse must be in conformation of existing/ proposed master plan of the area, any deviation from that will require the change of landuse (CLU) along with additional stringent mitigation measures.

ANNEXURE - VII

DEMOGRAPHY AND DRINKING WATER AVAILABILITY

Demography and Drinking water availability

S/n	villages	Tap water from treated source	Tap water from un-treated source	Covered well	Un-covered well	Hand pump	Tube well/Borehole	Spring	River/ Canal	Tank/ Pond/ Lake	Other sources	Within premises	Near premises	Away
1	KatanKhanwal	4	47	0	0	33	2	0	14	0	0	49	31.4	20
2	Bechpur Pargai	92	0	0	0	0	0	0	8.3	0	0	70.8	16.7	13
3	Madanpur	50	0	0	0	14	0	0	36	0	0	17.9	75	7.1
4	Gobindpur	0	0	0	0	11	0	0	90	0	0	5.3	89.5	5.3
5	Umedpur No1	75	25	0	0	0	0	0	0	0	0	75	25	0
6	ChorgaliaTalla Amkhera	5	14	0	0	81	0	0	0	0	0	28.7	33.8	38
7	Haripur Mahtoliya	93	0	0	0	0	0	0	7.1	0	0	71.4	14.3	14
8	Umedpur No2	52	3.4	0	0	31	0	0	14	0	0	48.3	3.4	48
9	Parasurampur	17	3.4	0	0	21	0	0	45	0	#	13.8	44.8	41
10	Devpur Sanwal	0	75	0	0	13	0	0	0	0	#	75	12.5	13
11	Chorgalia Kotaliya	35	0	0	0	0	6	0	59	0	0	17.6	41.2	41
12	Chorgalia Jasura	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Dharamgarh	4	1.9	0	0	94	0	0	0	0	0	3.8	0	96
14	Gangapur	0	0	0	0	82	18	0	0	0	0	0	18.2	82
15	PachuwaKhera	38	0	0	0	5.9	0	0	56	0	0	35.3	2.9	62
16	Daulabadpur	94	0	0	0	6.2	0	0	0	0	0	43.8	31.2	25
17	Dharampur	9	0	0	0	87	0	0	4.3	0	0	4.3	13	83
18	Ghoosapur	47	0	0	0	53	0	0	0	0	0	47.1	0	53
19	Mukhani Kharku	8	0	0	0	92	0	0	0	0	0	8.3	0	92
20	Mukhani Joga	0	0	0	0	0	0	0	0	0	0	0	0	0

S/n	villages	Tap water from treated source	Tap water from un-treated source	Covered well	Un-covered well	Hand pump	Tube well/Borehole	Spring	River/ Canal	Tank/ Pond/ Lake	Other sources	Within premises	Near premises	Away
21	Dauli Range	0	0	0	0	100	0	0	0	0	0	0	100	0
22	Nandhaur Range	26	0	2.3	0	66	0	0	4.6	0	1	1.5	42.3	56
23	Dauli Range	0	0	0	0	0	0	0	0	0	0	0	0	0
24	Govind Nagar	14	0.4	0	0	85	1	0	0	0	0	69.1	29.5	1.5
25	Baikunthpur	9	7	0.2	0	73	8	0	0.7	0.2	3	67.3	19.3	13
26	Rudpur	17	29	0.2	0	54	0	0	0	0	0	71.9	15.9	12
27	Pipalhattha	0	0	0	0	100	0	0	0	0	0	72.7	27.3	0
28	MirabaraRana	0	0	0	0	100	0	0	0	0	0	28.6	71.4	0
29	Ukrauli	0	0	0	0	96	4	0	0	0	0	95.7	4.3	0
30	Lalarpatti	33	0	0	0	67	0	0	0	0	0	41.7	58.3	0
31	Lalarkhas	0	0	0	0	7.5	93	0	0	0	0	76.1	23.9	0
32	Surendra Nagar	41	6.6	0	0	52	0	0	0	0	0	95	5	0
33	Tegor Nagar	59	1.8	0	0	38	0	0	0	0	1	81.3	17.5	1.2
34	Dev Nagar	25	0.3	0	0	47	28	0	0	0	0	67.7	24.2	8.1
35	Tiliyapur	11	4.6	0	0	76	9	0	0	0.2	0	60.9	29.5	9.6
36	Gurugram	12	0.4	0	0.1	80	7	0	0	0	0	85.4	12.8	1.8
37	Kushmoth	1	0.7	0	0	99	0	0	0	0	0	88.8	9.1	2.1
38	Nirmal Nagar	39	0.7	0	0	57	3	0	0	0	0	78.4	17.8	3.8
39	Raj Nagar	0	0	0.2	0	100	0	0	0	0	0	82	16.6	1.4
40	Bara	0	0	0	0	0	0	0	0	0	0	0	0	0
41	Kalyanpur	2	0.6	0	0	83	1	0	0	0	#	81.7	7.7	11
42	Nakulia	19	51	0	0	29	1	0	0	0	0	74.1	18.4	7.5
43	Sisona	2	1.9	0.4	0.1	93	1	0	0	0	1	78	20.3	1.7
44	PrahladPalsia	0	0	0	0	100	0	0	0	0	0	100	0	0
45	Arvind Nagar	23	15	0	0	51	7	0	0.1	0	5	78.4	13.1	8.4
46	Pipalia	1	9.9	0	0	89	0	0	0	0	0	78.5	14.9	6.6

S/n	villages	Tap water from treated source	Tap water from un-treated source	Covered well	Un-covered well	Hand pump	Tube well/Borehole	Spring	River/ Canal	Tank/ Pond/ Lake	Other sources	Within premises	Near premises	Away
47	Basgar	32	15	0	0	45	8	0	0	0	0	84.9	15.1	0
48	Donda	1	0	0.5	0	98	1	0	0	0	0	42.5	39.8	18
49	BaruwaBagh	49	0	0	0	49	0	0	0	0	2	97.4	1.7	0.9
50	Bawanpuri	19	66	0.9	0	14	0	0	0	0	1	63.9	26.5	9.6
51	Chaumhala	19	59	0	0	19	0	0	0	0	2	71	21.5	7.5
52	TharuTisor	3	0	0	0	96	0	0	0	0	0	60.2	28.2	12
53	TurkaTisor	0	6.4	0.5	0	93	0	0	0	0	0	84.5	13.4	2.1
54	Chikaghat	49	16	0	0	35	0	0	0	0	0	70.5	13.3	16
55	Baghora	95	0	0	0	0	1	0	0	0	4	94.7	5.3	0
56	Nalai	50	2.6	1.3	0	44	0	0	0	0	3	17.4	75.5	7.1
57	Ranshali	14	0.7	0	0	61	1	0	0	0	#	53.5	45.1	1.4
58	Bichai	0	0	0	0	93	0	0	0	0	7	20.2	72.3	7.4
59	Bichuwa	24	0.3	0	0	65	0	0	0	0	#	59.1	37.7	3.3
60	Tikuri	13	0	0.2	0	85	1	0	0	0	2	83.1	15.3	1.6
61	Haraiya	0	0	0	0	99	1	0	0	0	0	88.1	11	0.8
62	Pahsheni	2	3.4	0	0	91	0	0	0	0	4	21.6	67.6	11
63	Sadhu Nagar	2	0.3	0	0	97	0	0	0	0	1	83.3	15.9	0.8
64	LambaKhera	0	0	0	0	99	0	0	0	0	1	70.9	24.3	4.7
65	Bharauni	1	1.5	0	0	98	0	0	0	0	0	70.3	23.3	6.4
66	Saronja	1	0	0.3	0	99	0	0	0	0	0	71.6	25.7	2.7
67	Kaithulia	58	27	0	0	0.4	1	0	0	0	#	63.3	21.7	15
68	Dhayanpur	95	1.7	0	0	1.7	0	0	0	0	2	75.4	16.9	7.6
69	Nagala	39	46	0.3	0	9.6	0	0	0	0	5	82.7	13.6	3.7
70	Magarsara	1	94	0	0	0.5	0	0	0	0	5	89.6	9.4	0.9
71	Audala	0	0	0	0	100	0	0	0	0	0	66.7	33.3	0
72	Dohari	86	0	0	0	14	0	0	0	0	0	80.5	17.7	1.8

S/n	villages	Tap water from treated source	Tap water from un-treated source	Covered well	Un-covered well	Hand pump	Tube well/Borehole	Spring	River/ Canal	Tank/ Pond/ Lake	Other sources	Within premises	Near premises	Away
73	Bereya	1	39	0	0	59	0	0	0	0	1	74.5	23.5	2
74	DhumKhera	22	73	0	0	3.9	1	0	0	0	0	14.6	69.9	16
75	KaundhaKhera	97	1.5	0	0	1.5	0	0	0	0	0	36.8	57.4	5.9
76	Dohra	10	1.8	0.2	0	86	1	0	0	0	2	71.2	22.9	5.9
77	Raikhal Range	0	0	0	0	100	0	0	0	0	0	96.7	3.3	0
78	Barkoli Range	0	0	0.6	0	99	1	0	0	0	0	78.5	19	2.5
79	Shaktigarh (NP)	29	0.8	0.2	0	70	0	0	0	0	0	75.4	17.8	6.8
80	Sitarganj (NPP)	44	7.1	0	0	47	0	0	0	0	1	93.2	4.6	2.1

**Source: Census Village Amenities Data, 2011*

Table: 3.30Demography of Study area

S/no	Name	No of house hold	Total population	Total male	Total female	Sex Ratio	Children	Schedule caste	Schedule tribe	General caste	Literate	Illiterate	Total workers	Non workers	Main workers	Cultivator	Ag Labour	Household Worker	Other Worker
1	KatanKhanwal	77	402	206	196	954	58	145	5	252	246	156	196	206	185	119	42	0	24
2	BechpurPargai	24	128	64	65	1021	26	31	0	97	89	39	38	91	32	16	12	0	4
3	Madanpur	43	214	119	95	795	26	14	0	200	154	60	133	81	105	78	23	0	4
4	Gobindpur	81	411	200	211	1054	50	85	0	326	277	134	275	137	220	131	73	0	16
5	Umedpur No1	8	53	23	30	1294	3	0	0	53	45	8	49	4	47	46	0	0	1

S/no	Name	No of house hold	Total population	Total male	Total female	Sex Ratio	Children	Schedule caste	Schedule tribe	General caste	Literate	Illiterate	Total workers	Non workers	Main workers	Cultivator	Ag Labour	Household Worker	Other Worker
6	ChorgaliaTallaAmkhera	104	514	265	249	939	87	99	0	415	339	174	231	283	151	57	69	0	26
7	HaripurMahtoliya	19	85	45	41	909	7	0	0	85	65	20	82	3	82	74	5	1	1
8	Umedpur No2	38	219	108	111	1025	30	0	0	219	165	54	110	110	108	65	31	0	12
9	Parasurampur	39	215	112	103	916	24	20	0	195	168	47	105	110	104	82	11	3	8
10	DevpurSanwal	11	39	22	18	813	7	0	0	39	32	7	26	14	26	18	3	0	5
11	ChorgaliaKotaliya	23	128	61	68	1111	24	0	0	128	78	50	24	104	16	3	0	0	14
12	ChorgaliaJasura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Dharamgarh	73	396	210	187	890	50	312	0	84	281	115	127	269	61	27	5	0	28
14	Gangapur	22	73	41	32	800	14	0	0	73	53	20	32	41	27	8	1	7	11
15	PachuwaKhera	53	298	154	143	930	45	0	0	298	208	89	269	28	268	246	19	3	0
16	Daulabadpur	26	147	76	72	946	22	7	0	141	119	28	37	111	23	5	0	0	18
17	Dharampur	32	149	82	66	803	7	0	7	142	126	23	34	115	23	7	0	3	14
18	Ghoosapur	23	145	76	69	911	15	27	0	118	116	28	61	84	54	43	0	1	9
19	MukhaniKharku	50	283	151	131	866	24	23	0	260	223	60	92	191	69	58	0	0	11
20	MukhaniJoga	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Dauli Range	126	672	346	326	941	77	91	0	582	354	318	480	192	476	4	8	4	460
22	Nandhaur Range	199	917	486	431	889	134	383	1	533	653	264	327	590	207	7	14	3	184
23	Dauli Range	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	Govind Nagar	1144	6194	3197	2997	937	890	9	0	6184	3551	2643	2601	3593	2526	1072	1056	76	322

S/no	Name	No of house hold	Total population	Total male	Total female	Sex Ratio	Children	Schedule caste	Schedule tribe	General caste	Literate	Illiterate	Total workers	Non workers	Main workers	Cultivator	Ag Labour	Household Worker	Other Worker
25	Baikunthpur	1559	8243	4360	3883	891	1078	536	0	7707	4963	3279	3083	5159	2989	1247	970	93	679
26	Rudpur	1082	5838	3020	2818	933	688	30	0	5808	3630	2208	2070	3768	1488	695	298	58	437
27	Pipalhattha	28	127	65	62	958	27	23	0	104	60	68	43	84	39	3	37	0	0
28	MirabaraRana	8	35	23	12	529	3	7	0	28	22	14	15	20	14	0	0	0	14
29	Ukrauli	247	1436	745	691	927	279	1143	7	287	878	559	460	976	410	288	107	4	11
30	Lalarpatti	26	119	61	58	956	14	19	0	100	101	18	42	77	38	0	0	0	38
31	Lalarkhas	84	661	521	141	270	32	197	14	450	536	126	421	241	417	0	319	0	97
32	Surendra Nagar	435	2344	1218	1125	923	299	0	0	2344	1527	817	794	1550	764	196	364	55	149
33	Tegor Nagar	821	4322	2263	2060	910	471	27	0	4295	2951	1371	1868	2455	1543	276	626	174	467
34	Dev Nagar	851	4429	2302	2127	924	429	111	0	4318	2763	1666	2304	2125	1947	467	955	197	329
35	Tiliyapur	903	5128	2568	2560	997	732	1918	0	3211	3342	1786	1927	3201	1627	452	956	31	188
36	Gurugram	1135	6209	3281	2928	892	855	1432	0	4777	3746	2463	3058	3151	2112	613	889	169	442
37	Kushmoth	196	884	453	431	952	147	60	0	825	450	434	295	590	118	92	0	1	24
38	Nirmal Nagar	1102	6091	3143	2948	938	791	72	0	6019	3615	2476	2809	3282	2321	843	890	69	519
39	Raj Nagar	655	3472	1793	1678	936	427	15	0	3457	2111	1360	1344	2127	1197	330	538	76	253
40	Bara	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

S/no	Name	No of house hold	Total population	Total male	Total female	Sex Ratio	Children	Schedule caste	Schedule tribe	General caste	Literate	Illiterate	Total workers	Non workers	Main workers	Cultivator	Ag Labour	Household Worker	Other Worker
41	Kalyanpur	500	2410	1212	1198	989	379	903	77	1429	1673	737	853	1557	598	265	1	105	226
42	Nakulia	815	5165	2618	2547	973	753	120	2437	2607	2683	2482	1454	3711	1428	832	513	5	78
43	Sisona	952	5622	2843	2779	978	676	752	3177	1693	3697	1924	1666	3956	1385	694	335	9	346
44	PrahladPalsia	12	51	26	26	1000	5	0	0	51	37	15	20	31	14	14	0	0	0
45	Arvind Nagar	1162	5879	3173	2706	853	761	0	0	5879	3624	2254	2256	3623	1570	664	441	55	410
46	Pipalia	166	876	418	458	1097	124	7	0	870	526	350	269	607	253	124	91	4	34
47	Basgar	369	2118	1074	1044	972	283	206	0	1912	1266	852	765	1352	322	189	91	9	32
48	Donda	252	1135	603	531	881	185	0	0	1135	572	563	357	778	142	91	47	3	1
49	BaruwaBagh	315	1816	959	857	894	247	422	437	957	1158	659	887	929	448	118	264	1	65
50	Bawanpuri	296	1546	780	765	981	210	111	536	899	1074	472	771	775	335	112	57	4	162
51	Chaumhala	124	709	371	338	912	53	65	586	58	541	168	224	484	223	220	3	0	0
52	TharuTisor	395	2253	1181	1072	908	252	1177	811	265	1559	694	729	1524	373	253	53	4	64
53	TurkaTisor	257	1563	795	768	966	202	127	897	540	921	642	477	1086	406	264	107	5	30
54	Chikaghat	170	857	449	408	910	156	108	23	726	483	375	276	582	275	60	145	3	68
55	Baghora	104	599	314	285	909	19	26	283	291	506	93	304	295	252	87	60	8	97
56	Nalai	219	1379	690	690	1000	137	99	507	774	957	422	545	834	525	77	306	1	141

S/no	Name	No of house hold	Total population	Total male	Total female	Sex Ratio	Children	Schedule caste	Schedule tribe	General caste	Literate	Illiterate	Total workers	Non workers	Main workers	Cultivator	Ag Labour	Household Worker	Other Worker
57	Ranshali	183	920	500	419	838	128	0	0	920	458	461	219	701	215	0	214	0	1
58	Bichai	134	717	377	339	900	111	0	179	538	395	322	288	429	96	69	5	0	22
59	Bichuwa	504	2866	1442	1424	988	394	0	1081	1785	1457	1409	1451	1415	1346	517	686	37	107
60	Tikuri	595	3417	1693	1724	1018	500	0	734	2683	2085	1332	878	2540	441	408	4	4	24
61	Haraiya	162	916	468	448	957	120	0	609	307	580	335	503	412	503	103	392	0	8
62	Pahsheni	199	1143	567	576	1017	149	0	534	609	676	467	492	650	358	128	156	11	64
63	Sadhu Nagar	488	2766	1385	1381	997	353	711	1669	385	1734	1032	1791	975	834	448	329	1	57
64	LambaKhera	199	1287	661	626	947	124	0	749	538	818	469	799	488	410	346	49	0	15
65	Bharauni	279	1667	845	822	973	169	11	1262	395	1229	438	688	979	507	245	89	0	173
66	Saronja	411	2056	1055	1001	949	254	0	893	1163	1191	864	1072	983	898	510	277	4	107
67	Kaithulia	307	1607	817	790	967	214	0	392	1214	871	736	582	1025	472	257	200	4	11
68	Dhayanpur	319	1862	928	934	1007	249	12	1045	805	1012	851	788	1074	298	207	58	28	4
69	Nagala	427	2390	1181	1209	1024	270	16	1348	1025	1690	699	895	1494	587	461	7	14	105
70	Magarsara	284	1785	899	886	985	168	73	1352	360	1191	594	728	1058	724	242	417	3	62
71	Audala	12	61	32	28	875	1	0	0	61	37	24	19	42	19	0	0	0	19
72	Dohari	154	925	496	429	864	92	614	0	311	671	254	189	736	161	104	30	0	27

S/no	Name	No of house hold	Total population	Total male	Total female	Sex Ratio	Children	Schedule caste	Schedule tribe	General caste	Literate	Illiterate	Total workers	Non workers	Main workers	Cultivator	Ag Labour	Household Worker	Other Worker
73	Bereya	275	1513	787	726	923	138	9	830	673	1075	438	703	810	622	253	276	8	85
74	DhumKhera	141	724	366	357	974	99	0	0	724	442	281	298	426	296	166	110	5	15
75	KaundhaKhera	95	615	318	298	936	76	0	310	306	392	223	224	391	210	173	23	3	11
76	Dohra	1122	6056	3105	2951	950	690	542	3258	2256	4190	1866	2775	3281	1754	820	419	57	458
77	Raikhal Range	35	246	127	119	936	38	61	0	185	91	156	122	124	122	0	30	85	7
78	Barkoli Range	212	1035	531	503	947	176	7	0	1028	375	660	327	707	292	9	256	8	19
79	Shaktigarh (NP)	1727	8532	4361	4171	956	1091	494	8	8030	6033	2499	3397	5135	2264	128	556	100	1479
80	Sitarganj (NPP)	7569	40524	21128	19396	918	5746	3050	918	36556	25759	14765	12891	27633	10869	241	540	514	9575
total		**33291**	**180627**	**93433**	**87194**	**931**	**23680**	**16556**	**26974**	**137097**	**113767**	**66860**	**69836**	**110790**	**54679**	**17566**	**15951**	**2134**	**19028**

Note-Projected Data of 2011 Based on 5 decade decadal population

ANNEXURE - VIII

PHOTOGRAPH OF BASELINE DATA COLLECTION

BASELINE DATA COLLECTION PHOTOGRAPHS

AAQ - Baruabag

AAQ- Sadhu Nagar

AAQ -Sitarganj

AAQ – Sisona Road

BASELINE DATA COLLECTION PHOTOGRAPHS

AAQ –Project Site

AAQ –PrahladPalsa

AAQ –Nirmal Nagar

AAQ –MajraChauk

BASELINE DATA COLLECTION PHOTOGRAPHS

AAQ - Kalyanpur

ANQ - Kalyanpur

AAQ –Kahra Pani Narsari

AAQ –Govind Nagar

BASELINE DATA COLLECTION PHOTOGRAPHS

ANQ -Sitarganj

ANQ - Sisona Road

ANQ – Sadhu Nagar

ANQ –Nirmal Nagar

BASELINE DATA COLLECTION PHOTOGRAPHS

	
ANQ – Project Site	ANQ – MajraChauk