10 MLD CETP, Ankleshwar
Plot No. U-5 (Utility Plot), Adjacent to existing 22.5 MLD STP, GIDC, Ankleshwar, Di. Bharuch, Gujarat.

ENVIRONMENTAL IMPACT & RISK ASSESMENT REPORT FOR PROPOSED 10 MLD CETP AT GIDC, Ankleshwar

FILE No. SIA/GJ/IND2/19981/2017

March, 2017 to May, 2017

Prepared By:

NABL Accredited Testing Laboratory
ISO 9001:2008 Certified Company

Aqua-Air Environmental Engineers P. Ltd.

403, Centre Point, Nr. Kadiwala School, Ring Road, Surat – 395002 (Guj.)

ENVIRONMENTAL IMPACT & RISK ASSESSMENT REPORT

CLIENT	**:**	**NOTIFIED AREA AUTHORITY, ANKLESHWAR** **Plot No. : 618-619, AIA Community center,** **GIDC, Ankleshwar – 393 002** **DIST: BHARUCH, GUJARAT.**
PROJECT TITLE	**:**	**10 MLD CETP, ANKLESHWAR**
PROJECT NO.	**:**	**SIA/GJ/IND2/19981/2017**

Prepared By:

NABL Accredited Testing Laboratory
ISO 9001:2008 Certified Company

Aqua-Air Environmental Engineers P. Ltd.

403, Centre Point, Nr. Kadiwala School, Ring Road, Surat - 395002

INDEX

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXURES

Annexure No.	Particulars
Annexure - 1	NCTL Permission letter for treated effluent discharge
Annexure - 2	Undertaking for No bore well
Annexure - 3	Action by GPCB and response
Annexure - 4	Performance of FETP
Annexure - 5	Plot allotment from GIDC
Annexure - 6	Plant lay out
Annexure - 7	Schematic flow diagram
Annexure - 8	Treatability study report
Annexure - 9	NIO reports
Annexure - 10	Details of laboratory
Annexure - 11	Monitoring plan
Annexure - 12	Consultant stay order against NABET Accreditation
Annexure - 13	Map of upgraded Effluent conveyance pipeline
Annexure - 14	Copy of MoU
Annexure - 15	Policy of CETP

D. T. VASAVADA, IFS
MEMBER SECRETARY
SEIAA (GUJARAT)

सत्यमेव जयते

STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY GUJARAT

Government of Gujarat

By R P A D

No. SEIAA/GUJ/TOR/7(h)/1209/2017 Date: 30 NOV 2017 Time Limit

Sub: Terms Of Reference to M/s Office of the Chief Officer, Notified Area Authority, for setting up of 'CETP' plant at Adjacent to existing STP, Nr. Valia Chowkdi, GIDC Ankleshwar, Bharuch .

Ref: Your Proposal No: SIA/GJ/IND2/19981/2017.

Dear Sir,

This has reference to your online application dated 05/09/2017 along with Form-I submitted to SEIAA. The project activity is covered in 7(h) and is of 'B' Category.

The SEAC, Gujarat vide their letter dated 14/11/2017 had recommended to the SEIAA, Gujarat, to grant the Terms Of Reference for the above-mentioned project based on its meeting held on 27/09/2017.

The proposal was considered by SEIAA, Gujarat in its meeting held on 18/11/2017 at Gandhinagar. After careful consideration, the SEIAA hereby accords Terms Of Reference to above project under the provisions of EIA Notification dated 14th September, 2006. The copy of Terms Of Reference is attached herewith.

With regards,
Yours sincerely,

(D. T. VASAVADA)
Member Secretary

Encl: As Above

MEMBER SECRETARY
State Level Environment
Impact Assessment Authority
(SEIAA, Gujarat)
Gujarat Pollution Control Board,
"Paryavaran Bhawan"
Sector-10-A, Gandhinagar-10

Issued to:
Shri Umesh Chauhan
Dy. Engineer and I/c Notified Area Officer,
Notified Area Office,
GIDC Ankleshwar, Bharuch.

Office: Gujarat Pollution Control Board, *"Paryavaran Bhavan"* Sector-10 A, Gandhinagar-382010
Phone No.:- (079) 232-32152,232-41514 Fax No.:-(079) 232-22784
E-mail : msseiaagj@gmail.com Website:- www.seiaa.gujarat.gov.in

Sub: Terms of Reference (TOR) to **M/s. Office of the Chief Officer, Notified Area Authority, [Government of Gujarat],** for setting up of CETP at adjacent to existing STP, Nr. ValiaChowkdi, G.I.D.C, Ankleshwar, Dist. Bharuch.

Category of the unit : 7(h)
Project status: New

I. Salient features of the project are as under:

Sr. No.	Particulars	Details
A	Total cost of Proposed Project (Rs. in Crores):	Proposed: **Rs. 50.06 Crores**
	1. Capital cost for EMS (Environmental Management System): **50.6** Crores 2. Recurring cost towards the environmental protection measures: **Rs. 0.61 Crores** per Annum.	
B	Total Plot area (sq. meter)	Total: **35,000 m^2**
	Green belt area,/Tree Plantation area (sq. meter)	Total: **4500 m^2**
C	**Employment generation**	
	1. Direct	Proposed: **20 Nos.**
	2. Indirect	Proposed: **05 Nos.**
D	**Water**	
i	Source of Water Supply (GIDC, Bore well, Surface water etc...)	**GIDC, Ankleshwar**
	Status of permission from the concern authority. – Self supply, No permission required.	
ii	Water consumption (KL/day)	

	Proposed (KL/day)	Remarks
(A) Domestic	10.0	Potable fresh water
(B) Gardening	18.0	Treated sewage generated from adjacent STP will be utilized
(C) Industrial		
Process	-	
Washing (Plant flushing & cleaning)	5.0	
Boiler	-	
Cooling	-	
Others (Chemical Solution Preparation)	130.0	
Total	**10.0**	

iii	Waste water generation (KL/day)

MEMBER SECRETARY
State Level Environment
Impact Assessment Authority
(SEIAA-Gujarat)
Gujarat Pollution Control Board,
"Paryavaran Bhawan"
Sector-10-A, Gandhinagar-10

Category	Proposed (KL/Day)
(A) Domestic	8.0
(B) Industrial	
Process	-
Washing (Plant flushing & cleaning)	4.0
Boiler	-
Cooling	-
Others (Chemical Solution Preparation)	-
Total Industrial waste water	12.0

iv	Treatment facility with capacity (ETP, CETP, MEE, STP etc).	It is proposed to set up a **10 MLD** Common Effluent Treatment Plant for treating industrial wastewater generated from the industrial area of Ankleshwar so outlet of the proposed CETP shall be meets the inlet standards of the polishing treatment plant set up by M/s. NCTL. The member units shall discharge their effluent after having provided primary treatment to comply with the direction given by honorable Supreme Court. . The Proposed effluent treatment plant shall be set up adjoining to the existing 22.5 MLD STP. It is also proposed to use either treated or untreated sewage to provide nutrients and to reduce the TDS values of effluent with a view to enhance treatment efficiency and to bring down the treatment cost but overall hydraulic load from proposed CETP should not more than 10 MLD so there should not be additional hydraulic burden to FETP of M/s NCTL.

Major treatment units proposed for this CETP includes:
1. Oil & Grease trap, 2. Equalization tank, 3. Reaction tanks, 4. Clariflocculator, 5. Anoxic tanks, 6. Aeration tanks, 7. Secondary clarifier, 8. Reaction tanks, 9. Tertiary Clariflocculator, 10. Clarified water storage tank, 11. Sludge dewatering system, 12. Sludge removal units from conveyance system.

v	Mode of Disposal & Final meeting point	**Domestic:**	Domestic wastewater generated will be allowed in adjacent STP for further treatment & disposal.
		Industrial:	Wastewater generated will be allowed to CETP for further treatment & disposal.
vi	Reuse/Recycle details (KL/day)	Not proposed	
.vii	Details of rainwater harvesting	Not Proposed	
E	**Air**		
i	Flue gas emission details No. of Boilers/TFH/Furnaces/DG sets etc. with capacities viz. TPH, Kcal/hr, MT/hr, KVA etc.		

SR. No.	Source of emission With Capacity	Stack Height (meter)	Name of the fuel	Quantity of Fuel	APCM	Type of emissions i.e. Air Pollutants	Emission Standards
1	D. G Set (Stand By) (Capacity: 100 KVA)	5.00 m	HSD	12 Lit/hr	Not Required	PM SO_2 NO_x	≤ 150 mg/Nm^3 ≤ 100 ppm ≤ 50 ppm
2.	Anoxic Tanks	3.00 m above than tank	--	--	Not Required	Nitrogen	--

MEMBER SECRETARY
State Level Environment
Impact Assessment Authority
(SEIAA) - Gujarat
Gujarat Pollution Control Board,
"Paryavaran Bhavan"
Sector-10-A, Gandhinagar-10

ii Process gas i.e. Type of pollutant gases

Sr. no.	Source of emission	Stack/Vent Height (meter)	APCM	Type of emissions i.e. Air Pollutants	Emission Standards
Not Applicable					

iii Fugitive emission details with its mitigation measures.

During operation of CETP, there will be minor fugitive emission generation. Source of fugitive emission will be from chemical & hazardous waste storage area and due to vehicle movement.

Mitigation measures:

- Closed loop system will be developed for chemical & hazardous waste storage area.
- Only P.U.C. certified vehicle will be used.
- Paved roads will be maintained. Necessary repairs will be done immediately if the road is damaged.
- The speed of vehicles will be maintained to prevent dust generation.

F Hazardous waste
(as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016.

i

Sr. No.	Type/Name of Hazardous waste	Source of generation	Category & Schedule as per HW Rules.	Quantity (MT/Annum)	Disposal Method
1.	Chemical Sludge	ETP	I – 35.3	6000 MT/Annum	Collection, Storage, Transportation & Disposal by sending to TSDF site.
2.	Used Oil	D. G Set & Air Compressor	I – 5.1	0.10 MT/Annum	Collection, Storage, Transportation & Disposal by selling to registered reprocessor enlisted by GPCB.
3.	Discarded Drums	Raw Material packing material	I – 33.1	2.40 MT/Annum	Collection, Storage, Transportation & Disposal by selling to authorized recycler after Decontamination.
4.	Oil and grease skimming	ETP	I – 35.4	3.60 MT/Annum	Collection, Storage, Transportation & Disposal by sending to TSDF site.

ii Membership details of **CETP, TSDF, CHWIF, Common MEE** etc. — Unit will get membership of nearest TSDF site after getting EC but before start of CETP operation.

ii Details of Non-Hazardous waste & its disposal
(MSW and others)

Type of Waste	Source of Generation	Quantity	Category of Waste	Disposal
Domestic Waste (Food waste, Plastic, Paper etc.)	Employees working in the premises	0.15 MT/month	MSW	Collected in separate bin and disposed to bin of GIDC.
E-waste	Entire Plant	1 MT/year	--	Collection, Storage and disposal to M/s. Earth E-Waste Management Pvt. Ltd., Surat

MEMBER SECRETARY
State Level Environment
Impact Assessment Authority
(SEIAA), Gujarat
Gujarat Pollution Control Board,
"Paryavaran Bhavan"
Sector-10-A, Gandhinagar-10

Technical presentation was made by the project proponent. Committee noted that the proposal is to set up a new CETP for small scale units located within the GIDC Ankleshwar. PP informed that there would be @ 300 member units for the proposed CETP. Issued related to conveyance of waste water, waste water treatment methodology, Inlet-outlet norms etc. have been discussed in detail. Committee asked to set stringent inlet norms and to select best available technology to achieve outlet norms as per the regulatory authority. After deliberation on various aspects the project proponent was asked to include following additional TOR for the EIA study to be done covering 10 Km radial distance from the boundary of the project site:

1. Executive summary of the project – giving a *prima facie* idea of the objectives of the proposal, use of resources, justification, etc. In addition, it should provide a compilation of EIA report, including EMP and post project monitoring plan in brief. Need for the proposed CETP shall be justified in detail.
2. Justification for selecting the proposed unit size.
3. Permission letter from competent authority for additional discharge into NCT pipeline including design capacity, actual load and Spare capacity of pipeline for final discharge to FETP.
4. Permission letter from FETP regarding receiving of 10 MLD waste water.
5. Ratio of sewage to be mixed with industrial waste water with technical justification.
6. Legal undertaking regarding discharge of waste water to FETP shall not exceed 10 MLD.
7. Compliance of direction under section 18 (1) (b) of the Water (Prevention and Control of Pollution) act, 1974 issued by CPCB dated 31/03/2016 regarding compliance of CETP of FETP.
    a) Action initiated by GPCB, if any, against proposed unit regarding non-compliance of prescribed standards under the various environmental laws.
    b) Performance of CETP with respect to current hydraulic load & prescribed standards with No Objection Certificate of CETP regarding incorporation of the proposed unit for acceptance of waste water.
    c) Performance of TSDF site with respect to current load & prescribed standards with No Objection Certificate of TSDF site regarding incorporation of the proposed unit for acceptance of hazardous waste to the common infrastructure.
    d) Copies of quarterly action report taken for the above points submitted to the CPCB.
    e) Report of GPCB which have conducted monitoring as per the said direction by CPCB dated 31/03/2016.

Project description

8. Land possession documents from the concern authority.
9. Land requirement for the project including its break up for various purposes, its availability and optimization.
10. Details of proposed layout clearly demarcating various units within the plant.
11. Complete process flow diagram describing each unit, its processes and operations, along with material and energy inputs and outputs (material and energy balance).
12. Details on improved technologies.
13. Assessment of source of the water supply with adequacy of the same to meet with the requirements for the CETP. Permission obtained from the concerned authority for supply of water. Undertaking stating that no bore well shall be dug within the premises.
14. Expected quantity of sewage & wastewater from each industry and justification for selecting the proposed capacity of the treatment plant/modules. Measures to prevent flooding of the CETP in the rainy season.
15. List of member units including its location, type of industry, products, raw materials etc.
16. Characteristics of effluent and proposed scheme for segregation of streams from individual member industries.
17. Details of mode of effluent collection system either by tankers and/or above ground pipeline, etc., or proposed trouble-shooting mechanism.
18. Monitoring protocol for collection of effluent through tankers/ above ground Pipeline.
19. Details on physical, chemical and biological characteristics of the combined effluent and its concentrations and the basis for the same.
20. Details of equalization tank at least for 24 hrs; and guard ponds for holding treated wastewater or continuous monitoring facilities, if any.
21. Details of the proposed treatment schemes supported by the treatability studies including source separation of streams for specific mode of collection and treatment either at individual industry or at CETP (based on economic and operational ease considerations).
22. Built-in flexibility provisions to deal with quantitative and qualitative fluctuations.

23. Organizational setup for collection of pre-treated effluents, treatment and disposal of the treated effluents, etc. and deployment of qualified/skilled man power.
24. Details of O&M for maximum utilization of the designed capacity of the plant.
25. Proposed monitoring protocol for stage-wise quality control w. r. t. various characteristics and maintenance schedules followed for all rotating equipment including lubricating/oil fill, operational chemicals and laboratory chemicals.
26. For any sensitive environmental parameters such as heavy metals, fluorides, etc., details on improved material of construction of tanks and other equipments such as corrosion resistance, allowance, etc.
27. Details of power consumption and stand-by arrangements like the diesel generator (DG) sets, dual fuel (gas and oil) for uninterrupted operation of treatment plant. Protocol and mechanism to accept the effluent including the adequacy of the receiving/holding tanks, etc.
28. Impact of the project on local infrastructure of the study area such as road network, etc. If the study area requires any additional infrastructure, details of the agency responsible for the same should be included along with the time frame.
29. If the ultimate disposal is through a marine outfall then preliminary design of the outfall with estimated initial dilution. Study report from the NIO or any such institute of national repute shall be submitted.
30. Details of laboratory, workshop, database, library, waste exchange centers, etc. in CETP.
31. Availability of the land for proposed treatment for ultimate capacity and to accommodate required greenbelt development.
32. Details of the proposed methods of water conservation and recharging.
33. Management plan for solid/hazardous waste generation, storage, utilization and disposal.
34. Detailed plan of treated wastewater disposal/ reuse/ utilization / management.
35. Details regarding infrastructure facilities such as sanitation, fuel storage, restroom, etc. to the workers during construction and operation phase.
36. In case of expansion of existing industries, remediation measures adopted to restore the environmental quality if the groundwater, soil, crop, air, etc., are affected and a detailed compliance to the prior environmental clearance/consent conditions.

Description of the environment

37. The study area shall be up to a distance of 10 km from the boundary of the proposed site and all along the collection network/route map of effluent conveyance, treated wastewater carrying pipe-line and the receiving environment at the point of disposal.
38. Location of the project site and nearest habitats with distances from the project site to be demarcated on a toposheet (1: 50000 scale).
39. Land use based on satellite imagery including location specific sensitivities such as national parks / wildlife sanctuary, villages, industries, etc. for the study area.
40. Demography details of all the villages falling within the study area.
41. Topography details of the project area.
42. The baseline data to be collected from the study area w. r. t. different components of environment viz. air, noise, water, land, and biology and socio-economic. Actual monitoring of baseline environmental components shall be strictly according to the parameters prescribed in the ToR after considering the proposed coverage of parameters by the proponent in draft ToR and shall commence after finalization of ToR by the competent Authority.
43. One season Site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall should be incorporated.
44. Anticipated environmental impacts due to the proposed project/production may be evaluated for significance and based on corresponding likely impacts VECs (Valued Environmental Components) may be identified. Baseline studies may be conducted within the study area of 10 km for all the concerned/identified VECs and likely impacts will have to be assessed for their magnitude in order to identify mitigation measures.
45. One complete season base line ambient air quality data (except monsoon) to be given along with the dates of monitoring. The parameters to be covered shall be in accordance with the revised National Ambient Air Quality Standards as well as project specific parameters. Locations of the monitoring stations should be so decided so as to take into consideration the pre-dominant downwind direction, population zone and sensitive receptors. There should be at least one monitoring station in the upwind direction. There should be at least one monitoring station in the pre dominant downwind direction at a location where maximum ground level concentration is likely to occur.

MEMBER SECRETARY
State Level Environment
Impact Assessment Authority
(SEIAA), Gujarat
Gujarat Pollution Control Board,
"Paryavaran Bhawan"
Sector-10-A, Gandhinagar-10

46. Base line status of the noise environment, impact of noise on present environment dueto the project and proposed measures for noise reduction including engineering controls.
47. Geological features and geo-hydrological status of the study area.
48. Surface water quality of nearby water sources and other surface drains.
49. Details on ground water quality.
50. Details on water quality parameters such as pH, Temperature (o C), Oil and grease, Cyanide* (as CN), Ammonical nitrogen* (as N), Phenolic compounds* (as C6H5OH), Hexavalent Chromium*, Total chromium*, Copper*, Nickel*, Lead*, Arsenic*, Mercury*, Cadmium*, Selenium*, Fluoride*, Boron*, Radioactive materials*, Alfa emitters*, Hc/ml,Beta emitters*, Hc/ml*, etc. (* - as applicable).
51. Details on existing ambient air quality and expected, stack and fugitive emissions for PM10, PM2.5, SO2*, NOx*, VOCs*, carbon oxides (CO and CO2) etc., and evaluation of the adequacy of the proposed pollution control devices to meet standards for point sources and to meet AAQ standards. (* - As applicable).
52. Ecological status (terrestrial and aquatic) of the study area such as habitat type and quality, species, diversity, rarity, fragmentation, ecological linkage, age, abundance etc.
53. If any incompatible land use attributes fall within a 10 km radius of the project boundary, proponent shall describe the sensitivity (distance, area and significance) and propose the additional points based on significance for review and acceptance by the EAC/SEAC. Incompatible land use attributes include:
    - Public water supply areas from rivers/surface water bodies, from ground water
    - Scenic areas/tourism areas/hill resorts
    - Religious places, pilgrim centers that attract over 10 lakh pilgrims a year
    - Protected tribal settlements (notified tribal areas where industrial activity is not permitted)
    - CRZ
    - Monuments of national significance, World Heritage Sites
    - Cyclone, Tsunami-prone areas (based on last 25 years)
    - Airport areas
    - Any other feature as specified by the State or local government and other features as locally applicable, including prime agricultural lands, pastures migratory corridors, *etc.*
54. If ecologically sensitive attributes fall within a 10 km radius of the project boundary, proponent shall describe the sensitivity (distance, area and significance) and propose the additional points based on significance for review and acceptance by the EAC/SEAC. Ecological sensitive attributes include:
    - National parks
    - Wild life sanctuaries, Game reserve
    - Tiger reserve/elephant reserve/turtle nesting ground
    - Mangrove area
    - Wetlands
    - Reserved and Protected forests, etc.
    - Any other closed/protected area under the Wild Life (Protection) Act, 1972, any other area locally applicable
55. Environmental parameters – Temperature, sea level pressure, wind speed, mean relative humidity, visibility, salinity, density, rainfall, fog, frequency and intensity of cyclones, sediment transport, seismic characteristics, fresh water influx.
56. Details on marine biological parameters – microbiological population, pathogenic bacteria, plankton distribution, fish spawning grounds in the adjoining waters, commercial fisheries potential, vegetation including inter tidal, flora and fauna in the marine, benthal quality assessment for biological species and heavy metals and estuarine environment.

Anticipated environmental impacts and mitigation measures

57. Anticipated generic environmental impacts due to this project, which may be evaluated for significance and based on corresponding likely impacts VECs may be identified. Baseline studies may be conducted for all the concerned VECs and likely impacts will have to be assessed for their magnitude in order to identify mitigation measures.
58. Modelling indicating the likely impact on ambient air quality due to proposed activities. The details of model used and input parameters used for modeling should be provided. The air quality contours may be shown on location map clearly indicating the location of sensitive receptors, if any, and the habitation. The wind rose showing pre-dominant wind direction should also be indicated on the map. Impact due to vehicular movement shall also be

MEMBER SECRETARY
State Level Environment
Impact Assessment Authority
(SEIAA) Gujarat
Gujarat Pollution Control Board,
"Paryavaran Bhavan"
Sector-10-A, Gandhinagar-10

included into the prediction using suitable model. Results of Air dispersion modeling should be superimposed on satellite Image / geographical area map.

59. Tools as given in Section 4.4.3 of Technical Guidance Manual for CETP, Published by MoEF&CC may be referred for the appropriate assessment of environmental impacts.
60. While identifying the likely impacts, also include the following for analysis of significance and required mitigation measures:

- Impacts due to transportation of raw materials and end products on the surrounding environment.
- Impacts on surface water, soil and groundwater.
- Impacts due to air pollution.
- Impacts due to odour pollution.
- Impacts due to noise.
- Impacts due to fugitive emissions.
- Impact on health of workers due to proposed project activities.
- Impact on the disposal mode-specific receiving environment.

61. Proposed odour control measures.
62. Action plan for the greenbelt development – species, width of plantations, planning schedule etc. in accordance to CPCB published guidelines.
63. In case of likely impact from the proposed project on the surrounding reserve forests, Plan for the conservation of wild fauna in consultation with the State Forest Department.
64. Identify the mitigation measures based on source control and treatment.
65. Details in case, if the effluent conveyance system uses pipe lines, details regarding minimum (one day) storage tank with mixing facility to keep it in aerobic conditions at source industry and mechanism to ensure compliance with prescribed standards at this storage tank.
66. Details regarding soil and groundwater impacts and regular monitoring protocols suggested for ensuring no significant impacts, besides preventive measures.
67. Impacts due to laying of pipe lines for effluent collection and for the disposal of the treated wastewaters.
68. Bathymetric studies need to be conducted and models shall be applied to predict the dispersion patterns to determine the length of the outfall, if disposal is through a marine outfall.
69. Details of storm water collection network and utilization plan, etc.
70. Proposed measures for occupational safety and health of the workers.

Environmental monitoring program

71. Monitoring programme for pollution control at source.
72. Specific monitoring plan to ascertain that all the CETP member units send their effluent (contracted quantity) to the CETP and the effluent does not in any way find its way to other sources i.e. measures to eliminate by passing of the effluent.
73. Monitoring pollutants at receiving environment for the appropriate notified parameters – air quality, groundwater, surface water, etc. during operational phase of the project.
74. Specific programme to monitor safety and health protection of workers.
75. Appropriate monitoring network has to be designed and proposed, to assess the possible residual impacts on VECs.
76. Details of in-house monitoring capabilities and the recognized agencies if proposed for conducting monitoring.

Additional studies

77. Details on risk assessment and damage control during different phases of the project and proposed safeguard measures.
78. Details on socio-economic development activities such as commercial property values, generation of jobs, education, social conflicts, cultural status, accidents, etc.
79. Proposed plan to handle the socio-economic influence on the local community. The plan should include quantitative dimension as far as possible.
80. Details on compensation package for the people affected by the project, considering the socio-economic status of the area, homestead oustees, land oustees, and landless labourers.
81. A tabular chart for the issues raised and addressed during public hearing/consultation and commitment of the project proponent on the same should be provided. An action plan to address the issues raised during public hearing and the necessary allocation of funds for the same should be provided.

MEMBER SECRETARY
State Level Environment
Impact Assessment Authority
(SEIAA)
Gujarat Pollution Control Board,
"Paryavaran Bhavan"
Sector-10-A, Gandhinagar-10

82. Project proponent shall submit detail treatability report with interpretation of residual parameter to ensure further treatment efficiency of FETP of M/s NCT

Environmental management plan

83. Administrative and technical organizational structure to ensure proposed post-project monitoring programme for approved mitigation measures.
84. EMP devised to mitigate the adverse impacts of the project should be provided along with item-wise cost of its implementation (capital and recurring costs).
85. Allocation of resources and responsibilities for plan implementation.
86. Details of the emergency preparedness plan and on-site and off-site disaster management plan.
87. Certificate of accreditation issued by the NABET, QCI to the environmental consultant should be incorporated in the EIA Report.
88. An undertaking by the Project Proponent on the ownership of the EIA report as per the MoEF&CC OM dated 05/10/2011 and an undertaking by the Consultant regarding the prescribed TORs have been complied with and the data submitted is factually correct as per the MoEF&CC OM dated 04/08/2009. (Compliance of OM dated 05/10/2011 & 04/08/2009).
89. Project proponent shall submit mitigation plan / action plan for quality or quantity deviation happens during the operation.
90. Above points shall be adequately addressed in the EIA report at corresponding chapters.
91. A tabular chart with index for point-wise compliance of above.

The above mentioned project specific TORs/additional TORs and the model TORs available in the MoEF&CC's sector specific EIA Manual for CETP shall be considered as generic TORs for preparation of the EIA report in addition to all the relevant information as per the generic structure of EIA given in Appendix III in the EIA Notification, 2006.

The project proponent shall have to apply for Environmental clearance through online portal http://environmentclearance.nic.in/along with final EIA report.

Validity of ToR:

- The ToRs prescribed for the project will be valid for a period of three years for submission of EIA & EMP report. ToR will lapse after three years from date of issue.
- The period of validity could be extended for a maximum period of one year provided an application is made by the applicant to the Regulatory Authority, at least three months before the expiry of valid period together with an updated Form-I, based on proper justification and also recommendation of the SEAC.

MEMBER SECRETARY
State Level Environment
Impact Assessment Authority
(SEIAA), Gujarat)
Gujarat Pollution Control Board,
"Paryavaran Bhawan"
Sector-10-A, Gandhinagar-10

TOR COMPLIANCE

Sr. No.	TOR	Compliance
SPECIFIC TORs		
1	Executive summary of the project – giving a prima facie idea of the objectives of the proposal, use of resources, justification, etc. In addition, it should provide a compilation of EIA report, including EMP and post project monitoring plan in brief. Need for the proposed CETP shall be justified in detail.	The Executive Summary of the project is mentioned in **Chapter - 8**.
2	Justification for selecting the proposed unit size	Justification for selecting the proposed unit size is mentioned in **Section 2.4.2 of Chapter – 2, Page No. 2-15.**
3	Permission letter from competent authority for additional discharge into NCT pipeline including design capacity, actual load and Spare capacity of pipeline for final discharge to FETP	The permission from NCTL for discharge of treated effluent to FETP is attached as **Annexure - 1**.
4	Permission letter from FETP regarding receiving of 10 MLD waste water.	The permission from NCTL for discharge of treated effluent to FETP is attached as **Annexure - 1**.
5	Ratio of sewage to be mixed with industrial waste water with technical justification.	Ratio of sewage to be mixed with industrial waste water with technical justification is mentioned in **Section 2.4.2 of Chapter – 2, Page No. 2-15**.
6	Legal undertaking regarding discharge of waste water to FETP shall not exceed 10 MLD	Legal undertaking regarding discharge of waste water to FETP shall not exceed 10 MLD is attached as **Annexure - 2.**
7	Compliance of direction under section 18 (1) (b) of the Water (Prevention and Control of Pollution) act, 1974 issued by CPCB dated 31/03/2016 regarding compliance of CETP of FETP. a) Action initiated by GPCB, if any, against proposed unit regarding non-compliance of prescribed standards under the various environmental laws. b) Performance of CETP with respect to current hydraulic load & prescribed standards with No Objection Certificate of CETP regarding incorporation of the proposed unit for acceptance of waste water c) Performance of TSDF site with respect to current load & prescribed standards with No Objection Certificate of TSDF site regarding incorporation of the proposed unit for acceptance of hazardous waste to the common infrastructure.	a) Action initiated by GPCB against FETP of NCTL and response of FETP is attached as **Annexure - 3.** b) Performance of FETP with respect to current hydraulic load & prescribed standards is attached as **Annexure - 4**. The permission from NCTL for discharge of treated effluent to FETP is attached as **Annexure - 1.** c) Membership of TSDF site of BEIL shall be obtained before operation of CETP.

	d) Copies of quarterly action report taken for the above points submitted to the CPCB. e) Report of GPCB which have conducted monitoring as per the said direction by CPCB dated 31/03/2016.	
8	Land possession documents from the concern authority	Land possession documents are attached as **Annexure - 5.**
9	Land requirement for the project including its break up for various purposes, its availability and optimization	Land requirement for the project including its break up is mentioned in **Section 2.6.1 of Chapter - 2, Page No. 2-33**.
10	Details of proposed layout clearly demarcating various units within the plant (CETP LAYOUT+ ENTIRE LAYOUT WHERE CETP PROPOSED)	Details of proposed layout clearly demarcating various units within the plant is attached as **Annexure - 6**.
11	Complete process flow diagram describing each unit, its processes and operations, along with material and energy inputs and outputs (material and energy balance).	Complete process is mentioned in **Section 2.4.4 of Chapter – 2, Page No. 2-21.** The schematic flow diagram of CETP is attached as **Annexure - 7.**
12	Details on improved technologies	Details on improved technologies are mentioned in **Section 2.4.4.2 of Chapter – 2, Page No. 2-27.**
13	Assessment of source of the water supply with adequacy of the same to meet with the requirements for the CETP. Permission obtained from the concerned authority for supply of water. Undertaking stating that no borewell shall be dug within the premises.	The water will be sourced from GIDC. The supplied water is adequate to meet the requirements of CETP. The permission from water supply authority shall be obtained from water supply authority at the earliest.
14	Expected quantity of sewage & wastewater from each industry and justification for selecting the proposed capacity of the treatment plant/modules. Measures to prevent flooding of the CETP in the rainy season	Expected quantity of wastewater from each industry is mentioned in **Section 2.4.1 of Chapter – 2, Page No. 2-3**. The justification for selecting the proposed capacity of the CETP is mentioned in **Section 2.4.2 of Chapter – 2, Page No. 2-15.** Storm water drainage line throughout the CETP premises shall be constructed and rain water shall be drained into natural drain.
15	List of member units including its location, type of industry, products, raw materials etc	List of member units including its location, type of industry, products is mentioned in **Section 2.4.1 of Chapter – 2, Page No. 2-3.**
16	Characteristics of effluent and proposed scheme for segregation of streams from individual member industries.	Expected characteristics of effluent before and after treatment is mentioned in **Section 2.5.1 of Chapter – 2, Page No. 2-33.** Proposed scheme for segregation of streams from individual member industries is mentioned in **Section 7.4.2.2.2 of Chapter – 7, Page No. 7-6.**

17	Details of mode of effluent collection system either by tankers and/or above ground pipeline, etc., or proposed trouble-shooting mechanism	Details of mode of effluent collection system is mentioned in **Section 1.2.3 of Chapter – 1, Page No. 1-6.** Map of upgraded Effluent conveyance pipeline is attached as **Annexure - 13.**
18	Monitoring protocol for collection of effluent through tankers/ above ground Pipeline	Details of mode of effluent collection system is mentioned in **Section 1.2.3 of Chapter – 1, Page No. 1-6.**
19	Details on physical, chemical and biological characteristics of the combined effluent and its concentrations and the basis for the same	Details on physical, chemical and biological characteristics of the combined effluent and its concentrations are mentioned in **Section 2.5.1 of Chapter – 2, Page No. 2-33** and also mentioned in **Annexure - 8, Treatability study, Point No. 5.1.**
20	Details of equalization tank at least for 24 hrs; and guard ponds for holding treated wastewater or continuous monitoring facilities, if any	• In case of circumstances like maintenance / repairing of effluent conveying pipeline or CETP itself, emergency storage is provided in collection tank, secondary treated effluent sump and tertiary treated effluent sump. • The capacity of collection tank is kept such that in case of emergency situation, it could store 24 hour effluent. • Capacity of equalization tank: capacity 7500 KL, 24 hr storage. • Secondary treated effluent sump: capacity 1250 KL, 3 hr storage • Tertiary treated effluent sump: capacity 1250 KL, 3 hr storage.
21	Details of the proposed treatment schemes supported by the treatability studies including source separation of streams for specific mode of collection and treatment either at individual industry or at CETP (based on economic and operational ease considerations).	Details of the proposed treatment schemes is mentioned in **Section 2.4.4 of Chapter – 2, Page No. 2-21.** The treatability study for the same is attached as **Annexure - 8.**
22	Built-in flexibility provisions to deal with quantitative and qualitative fluctuations.	• In case of circumstances like maintenance / repairing of effluent conveying pipeline or CETP itself, emergency storage is provided in collection tank, secondary treated effluent sump and tertiary treated effluent sump. • The capacity of collection tank is kept such that in case of emergency situation, it could store 24 hour effluent. • Capacity of equalization tank: capacity 7500 KL, 24 hr storage.

		• Secondary treated effluent sump: capacity 1250 KL, 3 hr storage • Tertiary treated effluent sump: capacity 1250 KL, 3 hr storage.
23	Organizational setup for collection of pre-treated effluents, treatment and disposal of the treated effluents, etc. and deployment of qualified/skilled man power.	Organizational setup is mentioned in **Figure – 7.1, Section 7.3, Chapter – 7, Page No. 7-3.**
24	Details of O&M for maximum utilization of the designed capacity of the plant	The details of CETP management and maintenance of the CETP are mentioned in **Section 7.4, Chapter – 7, Page No. 7-4.**
25	Proposed monitoring protocol for stage-wise quality control w. r. t. various characteristics and maintenance schedules followed for all rotating equipment including lubricating/oil fill, operational chemicals and laboratory chemicals	Proposed monitoring plan is mentioned in **Section 5.2.2, Chapter – 5, Page No. 5-2.**
26	For any sensitive environmental parameters such as heavy metals, fluorides, etc., details on improved material of construction of tanks and other equipment such as corrosion résistance, allowance, etc	All the sensitive environmental parameters such as heavy metals, fluorides, etc. are considered and material of construction has been selected accordingly at the time of designing stage.
27	Details of power consumption and stand-by arrangements like the diesel generator (DG) sets, dual fuel (gas and oil) for uninterrupted operation of treatment plant. Protocol and mechanism to accept the effluent including the adequacy of the receiving/holding tanks, etc	The power requirement is met through 2500 KW connecting load of DGVCL (GEB) and emergency standby Diesel Generator Set (1 nos.) of 1000 KVA. The details of Power requirement are mentioned in **Section 2.6.4 of Chapter – 2, Page No. 2-34.** The details of Fuel requirement are mentioned in **Section 2.6.5 of Chapter – 2, Page No. 2-34.**
28	Impact of the project on local infrastructure of the study area such as road network, etc. If the study area requires any additional infrastructure, details of the agency responsible for the same should be included along with the time frame	Impact of the project on local infrastructure of the study area such as road network, etc. are mentioned in **Section 4.2.6, Chapter – 4, Page No. 4-10.**
29	If the ultimate disposal is through a marine outfall then preliminary design of the outfall with estimated initial dilution. Study report from the NIO or any such institute of national repute shall be submitted.	Study report from the NIO is attached as **Annexure - 9.**
30	Details of laboratory, workshop, database, library, waste exchange centers, etc. in CETP	Details of laboratory are attached as **Annexure - 10.**
31	Availability of the land for proposed treatment for ultimate capacity and to accommodate required greenbelt development	Land requirement for the project including its break up is mentioned in **Section 2.6.1 of Chapter - 2, Page No. 2-33**. Details of proposed layout clearly

		demarcating various units within the plant with green belt is attached as **Annexure -6.**
32	Details of the proposed methods of water conservation and recharging	Details of the proposed methods of water conservation and recharging are mentioned in **Section 7.4.2.2.4, Chapter – 7, Page No. 7-10.**
33	Management plan for solid/hazardous waste generation, storage, utilization and disposal	Management plan for solid/hazardous waste generation, storage, utilization and disposal is mentioned in **Section 2.8 of Chapter – 2, Page No. 2-35.**
34	Detailed plan of treated wastewater disposal/ reuse/ utilization / management	There is option available for reuse and recycle. The possibilities of recycle/reuse of treated effluent to nearby industries are to be explored.
35	Details regarding infrastructure facilities such as sanitation, fuel storage, restroom, etc. to the workers during construction and operation phase	Sufficient Infrastructure facilities such as sanitation, fuel storage, restroom etc. to the workers will be provided.
36	In case of expansion of existing industries, remediation measures adopted to restore the environmental quality if the groundwater, soil, crop, air, etc., are affected and a detailed compliance to the prior environmental clearance/consent conditions	The proposed 10 MLD CETP shall adopt a comprehensive Environmental management plan (EMP), which would cover several environmental protection measures, not only for abatement of environmental pollution resulting from the project, but also for the improvement in the ambient environment. All the conditions in environmental clearance/consent will be complied and compliance reports will be submitted regularly.
37	The study area shall be up to a distance of 10 km from the boundary of the proposed site and all along the collection network/route map of effluent conveyance, treated wastewater carrying pipe-line and the receiving environment at the point of disposal	The study area up to distance of 10 km with monitoring locations mentioned in **Section 1.4 of Chapter – 1, Page No. 1-11.**
38	Location of the project site and nearest habitats with distances from the project site to be demarcated on a topo sheet (1: 50000 scale).	Location of the project site and nearest locations with distances are mentioned in **Section 1.3.2 of Chapter – 1, Page No. 1-10.**
39	Land use based on satellite imagery including location specific sensitivities such as national parks / wildlife sanctuary, villages, industries, etc. for the study area	Land use pattern with satellite imagery is mentioned in **Section 3.9 of Chapter – 3, Page No. 3-43.**
40	Demography details of all the villages falling within the study area	Demography details of all the villages falling within study area are mentioned in **Section 3.11.1 of Chapter – 3, Page No. 3-50.**

41	Topography details of the project area	Topography details of the project area are mentioned in **Section 3.9 of Chapter – 3, Page No. 3-43.**
42	The baseline data to be collected from the study area w. r. t. different components of environment viz. air, noise, water, land, and biology and socio-economic. Actual monitoring of baseline environmental components shall be strictly according to the parameters prescribed in the ToR after considering the proposed coverage of parameters by the proponent in draft ToR and shall commence after finalization of ToR by the competent Authority	The baseline data has been collected from the study area w. r. t. different components of environment viz. air, noise, water, land, and biology and socio-economic. Actual monitoring of baseline environmental components has been done according to the parameters prescribed in the ToR.
43	One season Site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall should be incorporated	One season Site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall are mentioned in **Section 3.2, Chapter – 3, Page No. 3-2.**
44	Anticipated environmental impacts due to the proposed project/production may be evaluated for significance and based on corresponding likely impacts VECs (Valued Environmental Components) may be identified. Baseline studies may be conducted within the study area of 10 km for all the concerned/identified VECs and likely impacts will have to be assessed for their magnitude in order to identify mitigation measures	Details of anticipated environmental impacts due to the proposed project are mentioned in **Section 4.2 of Chapter – 4, Page No. 4-1**. Baseline studies are conducted within the study area of 10 km from project site.
45	One complete season base line ambient air quality data (except monsoon) to be given along with the dates of monitoring. The parameters to be covered shall be in accordance with the revised National Ambient Air Quality Standards as well as project specific parameters. Locations of the monitoring stations should be so decided so as to take into consideration the pre-dominant downwind direction, population zone and sensitive receptors. There should be at least one monitoring station in the upwind direction. There should be at least one monitoring station in the pre dominant downwind direction at a location where maximum ground level concentration is likely to occur	Details of One complete season base line ambient air quality data (except monsoon) are mentioned in **Section 3.4, Chapter – 3, Page No. 3-8.**
46	Base line status of the noise environment, impact of noise on present environment due to the project and proposed measures for noise reduction including engineering controls	Base line status of the noise environment is mentioned in **Section 3.5, Chapter – 3, Page No. 3-13.**
47	Geological features and geo-hydrological status of the study area	Details of Geological features and geo-hydrological status of the study area are

		mentioned in **Section 3.8, Chapter – 3, Page No. 3-35**.
48	Surface water quality of nearby water sources and other surface drains	Details of surface water quality of nearby water sources are mentioned in **Section 3.6.2, Chapter – 3, Page No. 3-16.**
49	Details on ground water quality	Details of ground water quality are mentioned in **Section 3.6.2, Chapter – 3, Page No. 3-16.**
50	Details on water quality parameters such as pH, Temperature (o C), Oil and grease, Cyanide* (as CN), Ammonical nitrogen* (as N), Phenolic compounds* (as C6H5OH), Hexavalent Chromium*, Total chromium*, Copper*, Nickel*, Lead*, Arsenic*, Mercury*, Cadmium*, Selenium*, Fluoride*, Boron*, Radioactive materials*, Alfa emitters*, Hc/ml,Beta emitters*, Hc/ml*, etc. (* - as applicable).	Details of water quality parameters are mentioned in **Section 3.6.2, Chapter – 3, Page No. 3-16.**
51	Details on existing ambient air quality and expected, stack and fugitive emissions for PM10, PM2.5,SO2*, NOx*, VOCs*, carbon oxides (CO and CO2) etc., and evaluation of the adequacy of the proposed pollution control devices to meet standards for point sources and to meet AAQ standards.(* - As applicable)	Details of existing ambient air quality are mentioned in **Section 3.4, Chapter – 3, Page No. 3-8.** Expected stack emissions and adequate pollution control measures are mentioned in **Section 2.7, Chapter – 2, Page No. 2-34.**
52	Ecological status (terrestrial and aquatic) of the study area such as habitat type and quality, species, diversity, rarity, fragmentation, ecological linkage, age, abundance etc	Ecological status of the study area is mentioned in **Section 3.10, Chapter – 3, Page No. 3-44.**
53	If any incompatible land use attributes fall within a 10 km radius of the project boundary, proponent shall describe the sensitivity (distance, area and significance) and propose the additional points based on significance for review and acceptance by the EAC/SEAC. Incompatible landuse attributes include: Public water supply areas from rivers/surface water bodies, from ground water Scenic areas/tourism areas/hill resorts Religious places, pilgrim centres that attract over 10 lakh pilgrims a year Protected tribal settlements (notified tribal areas where industrial activity is not permitted) CRZ Monuments of national significance, World Heritage Sites Cyclone, Tsunami-prone areas (based on last 25 years)	Nearby public water supply area - Narmada River No scenic/tourism/hill resort area within 10 km No religious/pilgrim area within 10 km No protected tribal settlements within 10 km CRZ - Not applicable (To be confirmed with location) No monuments/World heritage site within 10 km No cyclone, Tsunami prone area No airport within 10 km No specific areas by government The proposed CETP is within the premises of GIDC Ankleshwar Notified area.

	Airport areas Any other feature as specified by the State or local government and other features as locally applicable, including prime agricultural lands, pastures, migratory corridors, etc.	
54	If ecologically sensitive attributes fall within a 10 km radius of the project boundary, proponent shall describe the sensitivity (distance, area and significance) and propose the additional points based on significance for review and acceptance by the EAC/SEAC. Ecological sensitive attributes include: - National parks - Wild life sanctuaries, Game reserve - Tiger reserve/elephant reserve/turtle nesting ground - Mangrove area - Wetlands - Reserved and Protected forests, etc. - Any other closed/protected area under the Wild Life (Protection) Act, 1972, any other area locally applicable	No ecologically sensitive attributes fall within a 10 km radius of the project. The proposed CETP is within the premises of GIDC Ankleshwar Notified area.
55	Environmental parameters – Temperature, sea level pressure, wind speed, mean relative humidity, visibility, salinity, density, rainfall, fog, frequency and intensity of cyclones, sediment transport, seismic characteristics, fresh water influx	Environmental parameters monitored are mentioned in **Section 3.2, Chapter – 3, Page No. 3-2.**
56	Details on marine biological parameters – microbiological population, pathogenic bacteria, plankton distribution, fish spawning grounds in the adjoining waters, commercial fisheries potential, vegetation including inter tidal, flora and fauna in the marine, benthal quality assessment for biological species and heavy metals and estuarine environment	Details of marine biological parameters are mentioned in NIO report attached as **Annexure - 9.**
57	Anticipated generic environmental impacts due to this project, which may be evaluated for significance and based on corresponding likely impacts VECs may be identified. Baseline studies may be conducted for all the concerned VECs and likely impacts will have to be assessed for their magnitude in order to identify mitigation measures.	Details of anticipated environmental impacts due to the proposed project are mentioned in **Section 4.2 of Chapter – 4, Page No. 4-1**. Baseline studies are conducted within the study area of 10 km from project site.
58	Modelling indicating the likely impact on ambient air quality due to proposed activities. The details of model used and input parameters used for modelling should be provided. The air quality contours may be shown on location map clearly	Air quality modelling is mentioned in **Section 4.2.2.2, Chapter – 4, Page No. 4-4.**

	indicating the location of sensitive receptors, if any, and the habitation. The wind rose showing pre-dominant wind direction should also be indicated on the map. Impact due to vehicular movement shall also be included into the prediction using suitable model. Results of Air dispersion modelling should be superimposed on satellite Image / geographical area map	
59	Tools as given in Section 4.4.3 of Technical Guidance Manual for CETP, Published by MoEF&CC may be referred for the appropriate assessment of environmental impacts	Tools as given in Section 4.4.3 of Technical Guidance Manual for CETP, Published by MoEF&CC has been referred for the appropriate assessment of environmental impacts.
60	While identifying the likely impacts, also include the following for analysis of significance and required mitigation measures: Impacts due to transportation of raw materials and end products on the surrounding environment. Impacts on surface water, soil and groundwater. Impacts due to air pollution. Impacts due to odour pollution. Impacts due to noise. Impacts due to fugitive emissions. Impact on health of workers due to proposed project activities. Impact on the disposal mode-specific receiving environment.	Details of anticipated environmental impacts due to the proposed project are mentioned in **Section 4.2 of Chapter – 4, Page No. 4-1.** Baseline studies are conducted within the study area of 10 km from project site.
61	Proposed odour control measures	Odor management plan is mentioned in **Section 7.4.2.7, Chapter – 7, Page No. 7-14.**
62	Action plan for the greenbelt development – species, width of plantations, planning schedule etc. in accordance to CPCB published guidelines	Action plan for the green belt development is mentioned in **Section 7.4.2.6, Chapter – 7, Page No. 7-12.**
63	In case of likely impact from the proposed project on the surrounding reserve forests, Plan for the conservation of wild fauna in consultation with the State Forest Department	There is no reserve forest within a 10 km radius of the project. The proposed CETP is within the premises of GIDC Ankleshwar Notified area.
64	Identify the mitigation measures based on source control and treatment	Details of anticipated environmental impacts and mitigation measures due to the proposed project are mentioned in **Section 4.2 of Chapter – 4, Page No. 4-1.**
65	Details in case, if the effluent conveyance system uses pipe lines, details regarding minimum (one day) storage tank with mixing facility to keep it in aerobic conditions at source industry and mechanism to ensure compliance with prescribed standards at this storage tank.	The details of minimum storage tank with mixing facility at source industry is mentioned in monitoring plan attached as **Annexure - 11.**

66	Details regarding soil and groundwater impacts and regular monitoring protocols suggested for ensuring no significant impacts, besides preventive measures	Details regarding soil and groundwater impacts are mentioned in **Section 4.2.1.2 of Chapter – 4, Page No. 4-3.** Monitoring protocols suggested for ensuring no significant impacts are mentioned in **Section 5.2.2 of Chapter – 5, Page No. 5-2.**
67	Impacts due to laying of pipe lines for effluent collection and for the disposal of the treated wastewaters	Impacts due to laying of pipelines for effluent collection and for the disposal of the treated effluent are mentioned in **Section 4.2.2.1 of Chapter – 4, Page No. 4-3.**
68	Bathymetric studies need to be conducted and models shall be applied to predict the dispersion patterns to determine the length of the outfall, if disposal is through a marine outfall	Bathymetric studies and dispersion patterns are mentioned in NIO report attached as **Annexure - 9.**
69	Details of storm water collection network and utilization plan, etc	Storm water drainage line throughout the CETP premises shall be constructed and rain water shall be drained into natural drain.
70	Proposed measures for occupational safety and health of the workers	Health & Safety measures proposed are mentioned in **Section 10.5, Chapter 10, Page No. 10-3.**
71	Monitoring programme for pollution control at source	Monitoring plan is attached as **Annexure - 11**.
72	Specific monitoring plan to ascertain that all the CETP member units send their effluent (contracted quantity) to the CETP and the effluent does not in any way find its way to other sources i.e. measures to eliminate by passing of the effluent.	A specific monitoring plan shall be prepared to ascertain that all the CETP member units send their effluent to the CETP. A proposed effluent discharge system at individual member outlet is also shown in monitoring plan. Monitoring plan is attached as **Annexure – 11**.
73	Monitoring pollutants at receiving environment for the appropriate notified parameters – air quality, groundwater, surface water, etc. during operational phase of the project	Monitoring protocols suggested for ensuring no significant impacts are mentioned in **Section 5.2.2 of Chapter – 5, Page No. 5-2**.
74	Specific programme to monitor safety and health protection of workers.	Health & Safety measures proposed are mentioned in **Section 10.5, Chapter 10, Page No. 10-3.**
75	Appropriate monitoring network has to be designed and proposed, to assess the possible residual impacts on VECs	A specific monitoring plan shall be prepared to ascertain that all the CETP member units send their effluent to the CETP. Monitoring plan is attached as **Annexure – 11**.
76	Details of in-house monitoring capabilities and the recognized agencies if proposed for conducting monitoring	**ARAIL** (NABL Approved laboratory is already in place which shall be transferred under the management of AWML/AIA in

		future. Hence, the available laboratory facilities shall be utilized. However, CETP shall also set own laboratory within premises. Details of laboratory are attached as **Annexure - 10.**
77	Details on risk assessment and damage control during different phases of the project and proposed safeguard measures	Details on risk assessment and damage control during different phases of the project and proposed safeguard measures are mentioned in **Chapter - 10.**
78	Details on socio-economic development activities such as commercial property values, generation of jobs, education, social conflicts, cultural status, accidents, etc	Details of socio-economic activities are mentioned in **Section 7.5, Chapter - 7, Page No. 7-15.**
79	Proposed plan to handle the socio-economic influence on the local community. The plan should include quantitative dimension as far as possible	Details of socio-economic activities are mentioned in **Section 7.5, Chapter - 7, Page No. 7-15.**
80	Details on compensation package for the people affected by the project, considering the socioeconomic status of the area, homestead oustees, land oustees, and landless labourers	The proposed CETP is within the premises of GIDC Ankleshwar Notified area. No people will be affected by the project.
81	A tabular chartf or the issues raised and addressed during public hearing/consultation and commitment of the project proponent on the same should be provided. An action plan to address the issues raised during public hearing and the necessary allocation of funds for the same should be provided.	The proposed CETP is within the premises of GIDC Ankleshwar Notified area. Ankleshwar GIDC exists since 1978. Hence public hearing is not applicable.
82	Project proponent shall submit detail treatability report with interpretation of residual parameter to ensure further treatment efficiency of FETP of M/s NCT.	The detailed treatability study report is attached as **Annexure - 8.**
83	Administrative and technical organizational structure to ensure proposed post-project monitoring programme for approved mitigation measures	Organizational setup is mentioned in **Figure – 7.1, Section 7.3, Chapter – 7, Page No. 7-3.**
84	EMP devised to mitigate the adverse impacts of the project should be provided along with item-wise cost of its implementation (capital and recurring costs).	The total project cost is mentioned in **Section 2.2, Chapter - 2, Page No. 2-1.** The total capital and recurring costs are mentioned in **Section 7.6, Chapter - 7, Page No. 7-18.**
85	Allocation of resources and responsibilities for plant implementation	Allocation of resources and responsibilities shall be well planned and executed during the establishment of the CETP.
86	Details of the emergency preparedness plan and on-site and off-site disaster management plan	Details of the emergency preparedness plan and on-site and off-site disaster management plan are mentioned in **Chapter - 10**.

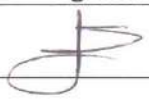
87	Certificate of accreditation issued by the NABET, QCI to the environmental consultant should be incorporated in the EIA Report	EIA Consultant: M/s. Aqua-Air Environmental Engineers Pvt. Ltd., Consultant has stay order against NABET Accreditation, please refer **Annexure - 12**.
88	An undertaking by the Project Proponent on the ownership of the EIA report as per the MoEF&CC OM dated 05/10/2011 and an undertaking by the Consultant regarding the prescribed TORs have been complied with and the data submitted is factually correct as per the MoEF&CC OM dated 04/08/2009. (Compliance of OM dated 05/10/2011 & 04/08/2009).	Undertaking by the project proponent and consultant are attached.
89	Project proponent shall submit mitigation plan / action plan for quality or quantity deviation happens during the operation.	All the mitigation plan / action plan for quality or quantity deviation happens during the operation are mentioned in **Chapter - 4**.
90	Above points shall be adequately addressed in the EIA report at corresponding chapters	
91	A tabular chart with index for point-wise compliance of above	
GENERAL TORs		
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 angle, 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 location of proposed 10 MLD CETP is within GIDC of Ankleshwar. GIDC has already allotted the proposed land (Plot) for CETP during the planning stage.
2	Details of the land use break-up for the proposed project. Details of land use around 10 km radius of the project site.	The total area acquired for the proposed 10 MLD CETP is 30000 m^2. The land area break up for various purposes is mentioned in **Section 2.6.1 of Chapter – 2, Page No. 2-34.** Present land use pattern of the study area is mentioned in **Section 3.9 of Chapter – 3, Page No. 3-43.**
3	Details of member units, its production capacity, waste generation, characteristic and details of primary treatment provided by the member units.	Details about the types of the industries that would be covered under the CETP are mentioned in **Table – 1.1, Section 1.1.1, Chapter – 1, Page No. 1-2.** The quantity of effluent from industries are mentioned in **Table - 2.3, Section 2.4.1, Chapter – 2, Page No.2-3.** All the industries will commit to achieve the norms to be prescribed by the GPCB.

		It is mandatory for the member units to provide a treatment plant based on the quality of their individual effluent to achieve the inlet norms of CETP. The details are mentioned in **Section 7.4.2.2.2, Chapter – 7, Page No. 7-6.** Policy of CETP shall be framed and all the member industries will have to follow and compliance the policy of CETP. A draft Policy of CETP is attached as **Annexure – 15.**
4	Details on present treatment and disposal systems	Presently all the effluent from pumping stations – A, B, C drained into Final Pumping Station (FPS). From FPS, entire effluent is pumped to FETP of NCT through underground pipeline.
5	Details of effluent collection system from member units level	Details of mode of effluent collection system is mentioned in **Section 1.2.3 of Chapter – 1, Page No. 1-6.** Map of upgraded Effluent conveyance pipeline is attached as **Annexure - 13.**
6	Details of hazardous waste collection. Sill proof arrangement.	Management plan for solid/hazardous waste generation, storage, utilization and disposal is mentioned in **Section 2.8 of Chapter – 2, Page No. 2-35.**
7	Examine and submit details of inlet characteristics.	Details on physical, chemical and biological characteristics of the combined effluent and its concentrations are mentioned in **Section 2.5.1 of Chapter – 2, Page No. 2-32** and also mentioned in **Annexure - 8, Treatability study, Point No. 5.1.**
8	Details of the CETP with design parameters. Layout plan of CETP. And open spaces.	Complete process is mentioned in **Section 2.4.4 of Chapter – 2, Page No. 2-21.** The schematic flow diagram of CETP is attached as **Annexure - 7.** Details of proposed layout clearly demarcating various units within the plant with green belt is attached as **Annexure - 6.**
9	Details of the adequate power back up facility, to meet the energy requirement in case of power failure from the grid.	The power requirement is met through 2500 KW connecting load of DGVCL (GEB) and emergency standby Diesel Generator Set (1 nos.) of 1000 KVA. The details of Power requirement are mentioned in **Section 2.6.4 of Chapter – 2, Page No. 2-34.**
10	Details of the usage of treated effluent for green belt development and horticulture.	The treated effluent shall be used for green belt development within CETP premises.

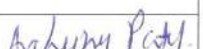
11	Submit a copy of MoU made between the Member units.	A draft of MoU is attached as **Annexure – 14**.
12	Details of storage facility available at the CETP.	There shall be provision for sufficient water storage all the time for use during emergency situation. All the Raw material shall be stored in dedicated storage area. Solid Hazardous waste shall be stored in dedicated storage area.
13	Examine and submit details of sludge / solid waste generated and method of disposal. MoU in this regard.	Management plan for solid/hazardous waste generation, storage, utilization and disposal is mentioned in **Section 2.8 of Chapter – 2, Page No. 2-35.** Membership certificate of TSDF of BEIL shall be obtained before the operation of CETP.
14	Details of water requirement, source and water balance chart.	The water will be sourced from GIDC. The supplied water is adequate to meet the requirements of CETP. The details of water requirement and water balance are mentioned in **Section 2.6.3, Chapter - 2, Page No. 2-34.**
15	Details of green belt	Action plan for the green belt development is mentioned in **Section 7.4.2.6, Chapter – 7, Page No. 7-12.**
16	Details of performance monitoring, lab facility with technical persons.	Details of laboratory are attached as **Annexure - 10.** Monitoring plan is attached as **Annexure - 11.**
17	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation pending against the project.
18	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The total project cost is mentioned in **Section 2.2, Chapter - 2, Page No. 2-1.** The total capital and recurring costs are mentioned in **Section 7.6, Chapter - 7, Page No. 7-18.**
19	Details of water meters for inflow and outflow monitoring etc.	Flow meter with totalizer shall be provided at inlet and outlet of CETP for monitoring of quantity of effluent on day to day basis.

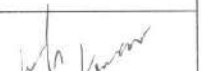
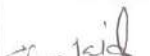
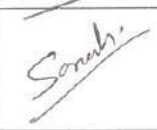
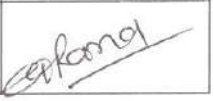
Declaration by Experts Contributing to the EIA Report of M/s. Gujarat Industrial Development Corporation (GIDC) for 40 MLD CETP, Dahej at Survey No. D-2/14A, Dahej Industrial Estate, PCPIR, Tal: Vagra, Dist: Bharuch, Gujarat.

EIA COORDINATOR

Name	Signature
Mr. Jayeshkumar S. Patel	

FUNCTIONAL AREA EXPERTS

Sr. No.	Name of the Experts	Qualification	Involvement (Task)	Signature
1	Mr. Jayeshkumar Somabhai Patel	B.E. (Civil), M.E. (Environmental), MIE, CE	Air Pollution Monitoring & Control (AP), Air Quality Modelling and Prediction (AQ), Water Pollution (WP) & Solid and Hazardous Waste Management (SHW)	
2	Mrs. Archana Jayeshkumar Patel	B.E. (Civil), AMIPHE	Water Pollution (WP), Noise and Vibration (NV), Hydrology, Water Conservation (HG) & Soil Conservation (SC)	
3	Mr. Chetan Ravjibhai Kabariya	B.E. (Chemical)	Air Pollution Monitoring & Control (AP), Air Quality Modelling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	
4	Mr. Dhaval Vijay Jhaveri	B.E. (Chemical)	Air Pollution Monitoring & Control (AP), Air Quality Modelling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	
5	Mr. Shailendra Bhanabhai Umrigar	B.Sc. (Chemistry), B.Sc. Tech. (Textile Chemistry), M. Tech. (Environmental Science)	Air Pollution Monitoring & Control (AP), Air Quality Modelling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	

6	Mr. Chirag Harishchandra Lavana	B.Sc. (Chemistry)	Air Pollution Monitoring & Control (AP), Water Pollution (WP), Noise and Vibration (NV) & Soil Conservation (SC)	
7	Mr. Henil Madhusudan Lankapati	B.Sc. (Chemistry), M.Sc. (Organic Chemistry)	Air Pollution Monitoring & Control (AP), Water Pollution (WP), Noise and Vibration (NV) & Soil Conservation (SC)	
8	Mr. Bhavin Dashrathlal Shah	B.Sc. (Geology), M.Sc. (Geology), M.Sc. Tech. (Geotech) (Empanelled Expert)	Landuse (LU), Hydrology, Water Conservation (HG), Geology (Geo) & Soil Conservation (SC)	
9	Mr. Mitesh Amrutbhai Patel	B.E. (Environmental)	Air Pollution Monitoring & Control (AP), Air Quality Modelling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	
10	Mr. Rushik Harishbhai Mistry	B.E. (Environmental)	Air Pollution Monitoring & Control (AP), Air Quality Modelling and Prediction (AQ), Risk and Hazard (RH) & Solid and Hazardous Waste Management (SHW)	
11	Mr. Mitesh Arvindbhai Patel	B.E. (Environmental)	Air Pollution Monitoring & Control (AP), Water Pollution (WP) & Noise and Vibration (NV)	
12	Mr. Ritesh Dipakbhai Mistry	B.E. (Environmental)	Water Conservation (HG) & Soil Conservation (SC)	
13	Mr. Sunny Yogeshkumar Jariwala	M.E. (Environmental)	Water Conservation (HG) & Soil Conservation (SC)	
14	Mr. Ankit Gobarbhai Talaviya	B.Sc. (Chemistry), M.Sc. (Organic Chemistry)	Air Pollution Monitoring & Control (AP), Water Pollution (WP) & Noise and Vibration (NV)	
15	Mrs. Sonali Shaishav Mistry	B.Sc. (Chemistry), M.Sc. (Environmental Science)	Ecology and Bio-diversity (EB) & Socio-Economics (SE)	
16	Mrs. Ishanee Alpesh Patel	B.Sc. (Micro.), M.Sc. (Environmental Science)	Ecology and Bio-diversity (EB) & Socio-Economics (SE)	
17	Mrs. Chaitali Dharmeshkumar Rana	B.Sc. (Micro.), M.Sc. (Environmental Science)	Ecology and Bio-diversity (EB) & Socio-Economics (SE)	

18	Mrs. Vaishali Yatinbhai Patel	B.Sc. (Chemistry), M.Sc. (Environmental Science)	Air Pollution Monitoring & Control (AP), Water Pollution (WP) & Ecology and Bio-diversity (EB)	
19	Ms. Mira Pareshbhai Gajera	M.Sc. (Bio Technology)	Air Pollution Monitoring & Control (AP), Water Pollution (WP) & Ecology and Bio-diversity (EB)	Mira Gajera
20	Ms. Rutu Dashrathbhai Patel	B.Sc. (Biotech), M.Sc. (Environmental Science)	Air Pollution Monitoring & Control (AP), Water Pollution (WP) & Ecology and Bio-diversity (EB)	

Declaration by Head of the Organization

I, Jayesh Patel hereby confirm that the above mentioned team members were involved in preparation of EIA Report of **M/s. Gujarat Industrial Development Corporation (GIDC) for 40 MLD CETP, Dahej**. I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.

Name of Consultant	Aqua-Air Environmental Engineers Pvt. Ltd., Surat
Name of Concerned Person	Mr. Jayesh Patel
Designation	Managing Director
Signature	
Contact Infomartion	aquaair_surat@hotmail.com aqua_eia@yahoo.com

NOTIFIED AREA OFFICE
(GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION)

Office of the Dy. Executive Engineer (Drainage)
Plot No. 618/619, AIA Community Centre,
GIDC, Ankleshwar-393 002.
Phone : 02646-251359
Fax : 02646-251750

Our Ref. No. : N.A./ANK/DEE/DRG/395

Date : 29 MAY 2018

UNDERTAKING

We, **Notified Area Authority, Ankleshwar**, own this EIA report for proposed project of 10 MLD CETP, Ankleshwar located at adjacent to existing STP, Nr. Valia Chowkdi, GIDC, Ankleshwar, Di. Bharuch, Gujarat.

For Notified Area Authority

UChauhan

Umesh Chauhan
Dy. Ex. Engineer,
NA, GIDC, Ankleshwar.

CHAPTER – 1
INTRODUCTION

1.1 BACKGROUND

- The Notified Area Authority (NAA) is a functional part of M/s. Gujarat Industrial Development Corporation (GIDC), an organization undertaken by Government of Gujarat and a nodal agency of the government of Gujarat for providing Industrial backbone of the state. GIDC identifies and develops locations suited for Industrial purpose.
- The Ankleshwar Industries Association (AIA) was established in 1978 by the industries located in Ankleshwar GIDC estate.
- AIA has promoted Ankleshwar Waste Management Limited (AWML) to carry out environment related activities in the most efficient manner.

1.1.1 GIDC ACTIVITIES:

- Identification aggregation of land
- Development of land
    a. Core infrastructure – developed industrial Plots, Roads, Storm water Drainage & streetlights, Water supply, Power supply network, Common facilities like Common Effluent Treatment Plant, Corridors for amenities – Gas, Telecom, Pipeline etc.
    b. Support Infrastructure – Skill up gradation center, Environment Conservation initiatives, Public amenities, Housing, Commercial spaces etc.
- Allotment of land

- NAA, Ankleshwar located at Notified Area Office, GIDC, Ankleshwar, Di. Bharuch, Gujarat. NAA, Ankleshwar along with Ankleshwar Waste Management Limited (AWML) proposed to set up a 10 MLD Common Effluent Treatment Plant (CETP) at Plot No. U-5 (Utility Plot), adjacent to existing 22.5 MLD STP, GIDC, Ankleshwar.
- A team of highly qualified scientists and engineers shall be engaged in this CETP. NAA/AWML will provide all facilities related to 10 MLD CETP within project premises. The location of proposed 10 MLD CETP is within GIDC of Ankleshwar. It is located about 0.4 km away from National highway number 8 joining Delhi - Mumbai and about 1.2 km away

from railway route from Ahmedabad - Mumbai. The plant is about 1.78 km away from Ankleshwar city and 350 km away from the commercial capital of India, Mumbai.

- The proposed plant is located in a well-developed industrial estate of GIDC Ankleshwar developed by Gujarat Industrial Development Corporation in early 70s. This industrial estate is spread over an area of 1600 hectares, which has all essential facilities such as water, power, fuel, post, telecommunication, bank, etc. It is one of the largest industrial estates of Asia encompassing number of industries. GIDC Ankleshwar is an Industrial Estate with more than 1200 industries consisting of Dyes & Chemicals, Chemical, Pesticides, Pharmaceuticals, Pigment, Textiles and other allied industries.
- There are several small, medium and large scale industries in operation in GIDC Ankleshwar. The types of Industries present in GIDC Ankleshwar are mentioned in Table – 1.1.

TABLE - 1.1

Types of Industries present in GIDC, Ankleshwar

Sr. No.	Type of Industry	No.
1	Chemical	294
2	Dyes & Intermediates	169
3	Textiles	17
4	Pulp & Paper	4
5	Pesticides (Technical & Formulation)	46
6	Pharmaceuticals (Technical & Formulation)	85
7	Others	199
	Total	**814**

- The Ankleshwar Industries Association (AIA) was established in 1978 by the industries located in Ankleshwar GIDC estate. Several activities are being undertaken by AIA. Activities include infrastructure development of estate through member's participation, providing guidelines to small scale industries to fulfill various legal requirements, green-belt development, activities related to environmental preservation and pollution control, disaster prevention and management, creating awareness among surrounding population about various issues, etc.
- AIA has established industrial and social infrastructure in the area. Today, the estate have Common Effluent Treatment Plant for treatment and safe disposal if industrial effluent,

Secured Landfill site for disposal of hazardous solid waste, Common Incinerator, Effluent Conveyance Pipeline project for safe conveyance of effluent to deep sea through 55 km long pipeline, Disaster prevention & Management Center for tackling and controlling safety hazards, a 60 bed full-fledged hospital for medical facilities, 8 schools for educational facilities and other social infrastructure.

- AIA has promoted Ankleshwar Waste Management Limited (AWML) to carry out environment related activities in the most efficient manner.
- Presently, the effluent generated from the small scale industries within the premises of GIDC Ankleshwar is either discharged directly into the FETP of NCT through underground effluent conveyance pipeline or into CETP of ETL through tankers and final pumping station.
- Now AWML along with Notified Area Authority (NAA), Ankleshwar has proposed to set up a 10 MLD Common Effluent Treatment Plant (CETP) to treat the industrial wastewater generated from the small scale industries within the premises of GIDC Ankleshwar so that it meets the inlet standards of the FETP set up by NCT. The treated effluent from the proposed CETP shall further discharged into FETP of NCT for further treatment and final disposal into the deep sea through 53 km (Onshore Pipeline: 43.6 km + Offshore Pipeline: 9.4 km) effluent conveyance pipeline.
- The proposed CETP falls under the item no. 7(h) i.e. Common Effluent Treatment Plants (CETPs) and under Category B as per the EIA notification-2006 (as amended timely). Hence it is required to apply for approval of Terms of Reference (TOR) with Form-I along with Pre-feasibility Report to the SEAC, Gandhinagar. The EIA study is required to comply with all the approved ToRs from SEAC. The proposed CETP is located within the premises of GIDC Ankleshwar. Hence, Public Hearing is exempted for the proposed project. Since this proposed plant require Environmental Impact Assessment Studies and Environmental Clearance, the Company has entrusted M/s. Aqua Air Environmental Engineers Pvt. Ltd., Surat for carrying out the EIA Studies as per the prevailing rules and regulations.
- Company has applied for Environmental Clearance to State Level Expert Appraisal Committee (SEAC), Gandhinagar on 5th September, 2017. The presentation to State Level Expert Appraisal Committee (SEAC) was done on 27th September, 2017. ToR has been finalized in the meeting, including certain additional points. M/s. Aqua Air Environmental

Engineers Pvt. Ltd. has carried out the EIA Studies as per the guidelines of Ministry of Environment & Forests, New Delhi. No alternative has been considered for the proposed project as GIDC has already reserved the proposed Plot for the CETP. The copy of plot allotment for CETP is attached as **Annexure – 5.** However, the suitability of the project site has been assessed in the report. A mitigation plan has been prepared and a detailed environmental management plan (EMP) is drawn out to effectively mitigate or minimize potentially adverse environmental impacts and the details are presented in the following chapters. This being CETP, there is no manufacturing activity. The total pollution load of the unit have been tried to evaluate in this report.

1.2 PROJECT DETAILS

The proposed project is a Common Effluent Treatment Plant of capacity 10 MLD located at Plot No. U-5 (Utility Plot), adjacent to the 22.5 MLD STP, GIDC, Ankleshwar, Di. Bharuch, Gujarat.

1.2.1 Scope

The scope of the project is to collect and treat the industrial effluent from small scale industries of GIDC Ankleshwar and after treatment dispose the final treated effluent into FETP of NCT for further treatment and finally disposed into deep Arabian Sea through 53 km (Onshore Pipeline: 43.6 km + Offshore Pipeline: 9.4 km) effluent conveyance pipeline.

1.2.2 Need for the proposed CETP:

- At GIDC, Ankleshwar there are several small, medium and large scale industries in operation. Also so many industries are planning for expansion of their existing unit by increasing the production capacity or adding the new products. Also there are new proposed industries to establish their manufacturing facility.
- Looking to the above expansion and new industries scenario the total effluent generation form the industrial estate going to increase.
- The GIDC Ankleshwar is very old GIDC and 70% industrial units are Small Scale Industries (SSI). The plot area of SSI are small and available space is limited. So it is difficult to upgrade/modify existing ETP.

- Presently, the effluent generated from the small scale industries within the premises of GIDC Ankleshwar is either discharged directly into the FETP of NCT through underground effluent conveyance pipeline or into CETP of ETL through tankers and final pumping station. NCT treat the effluent and after achieving discharge norms, dispose the treated effluent into deep Arabian Sea through 53 km (Onshore Pipeline: 43.6 km + Offshore Pipeline: 9.4 km) effluent conveyance pipeline.
- Now, Medium and Large scale industries are having their own Effluent Treatment Plant. Such industries are treating their effluent and discharging to GIDC drainage line to FETP.
- Small scale industries (SSI) have limited facilities for effluent treatment.
- Hence, to treat the effluent from SSIs of GIDC, Ankleshwar; NAA of Ankleshwar along with AWML proposed to set up a 10 MLD CETP. Looking to the current scenario, it is proposed to set up CETP for 7.5 MLD Ind. Effluent + 2.5 MLD sewage with primary, secondary and tertiary treatment facility. The proposed CETP shall treat only the effluent from SSIs of GIDC Ankleshwar. The treated effluent from the proposed CETP shall achieve the FETP norms and discharge the treated effluent to FETP for further treatment and disposal.
- Moreover, there are several advantages of CETP are,
    - Professional and trained staff can be made available for operation of CETP, which is not possible in case of individual plants.
    - Disposal of treated wastewater & sludge becomes more organized.
    - More organized and ease of monitoring for various regulatory authorities in ensuring pollution control requirement.
    - Small and medium scale industries are not required to treat their wastewater separately.
    - The Common treatment for effluent is cheaper than individual treatment. Hence, saving in Capital and Operating cost of treatment plant for individuals.
    - Benefits to small scale industries having limited space available for treatment of effluent.

1.2.3 Collection and distribution network:

1.2.3.1 Present scenario of collection and distribution network

- GIDC Ankleshwar has modified effluent conveyance system to final pumping station in last several years.
- The drainage system in Ankleshwar GIDC has been upgraded from time to time from 2005 onwards and till 2016 at a cost of more than Rs. 85 crore.
- The map showing the various upgraded effluent conveyance pipeline is attached as **Annexure – 13.**
- The details of such up gradation are given below:
    - ❖ GRP (Glass Fiber Reinforced Plastic) pipeline marked in BROKEN DARK BLUE color in the map attached as **Annexure – 13**. This is called IIUS (Industrial Infrastructure Up gradation Scheme). This is a gravity based line in which the flow is without any pumping.
    - ❖ GRP (Glass Fiber Reinforced Plastic) pipeline marked in UNBROKEN DARK BLUE color. This is called CIP (Critical Infrastructure Project) line. This is a gravity based line in which the flow is without any pumping.
    - ❖ HDPE (High-density polyethylene) pipelines marked in LIGHT BLUE color. (2015-2016).
    - ❖ HDPE (High-density polyethylene) pipelines marked in LIGHT GREEN color. (2015-2016).
    - ❖ HDPE pipelines (New Diversion Line) marked in Lighter Orange color (2015-2016).
    - ❖ Glass Fiber Reinforced Plastics (GRP) pipelines marked in Darker Orange (2015-2016).
- The drainage network in Ankleshwar GIDC consists of a large number of pipelines which have been laid down in recent years. The pipelines in Ankleshwar GIDC are working efficiently without any difficulties.
- In Ankleshwar GIDC, only about 775 units are chemical industries that discharge/generate trade effluent. Out of the 775 chemical units, about 245 units send effluent to CETP by tanker and not by pipeline.
- Monitoring mechanism for collection of effluent through pipeline:

- ❖ For monitoring and control purpose, NCT proposed to install Auto sampler and Flow meter at identified locations.
- ❖ The process of installing Auto Sampler and Flow Meter has already started in Ankleshwar GIDC. 2 Meters have already been installed and are functioning. 7 more Meters have already been ordered by NCT. In addition to the 2 Meters already installed, 18 more Meters are proposed to be installed at identified locations within the next two to three months. This entire system can be installed at a cost of about Rs.1 crore.

- One is IIUS main line accommodating large scale units(@57) contributing @13 MLD and second is CIP line accommodating SSI units contributing @10 MLD. With this the quality and quantity of small scale/large scale units is identified. The auto sampler and flow meter is provided at final pumping station. Thus, presently approx. 24 MLD effluent flow is going to FETP through both lines.
- Since implementation of underground drainage network, to ensure that a single drop of waste water is not flowing to the Amravati or other natural creek passing through the estate by setting up of 3 Pumping Stations – A, B & C and Sewage Treatment Plant by Ankleshwar Industries Association jointly with the NAA and GIDC. These Pumping Stations and Sewage Treatment Plant have been fully operating since then.
- Presently all the effluent from pumping stations – A, B, C drained into Final Pumping Station (FPS). From FPS, entire effluent is pumped to FETP of NCT through underground pipeline.
- After completion of proposed 10 MLD CETP the effluent from CIP line accommodating SSI units contributing @10 MLD shall be treated in proposed 10 MLD CETP. And the treated effluent confirming the FETP inlet norms shall be drained to FPS for further treatment in FETP of NCTL.

1.2.3.2 Present scenario of collection and distribution network

- GIDC Ankleshwar is already having an underground collection and distribution network for effluent conveyance as mentioned above.
- The existing network is working efficiently without any difficulties.
- Presently, the management and maintenance of effluent conveyance system is maintained by NAA.

- Only the CIP pipeline network will be utilized for collection of effluent from various industries in CETP.
- Proper Inspection of existing pipeline will be carried out.
- Cleaning of pipeline will be carried out as per requirement.
- The routine monitoring of entire pipeline shall be carried out.
- The entire CETP shall be operated on PLC-SCADA system.

1.2.3.3 Possibilities for above ground pipeline network

- GIDC proposed to install aboveground pipeline network for the collection of waste water generated from industries of GIDC Ankleshwar.
- The project for above ground pipeline network is under progress.
- Estimated project cost: Rs. 79.22 crores.

1.3 PROJECT SETTING

1.3.1 LOCATION

The proposed CETP will be located adjacent to existing 22.5 MLD STP, GIDC, Ankleshwar, Di. Bharuch, Gujarat at 21°36'49.87"N Latitude 73°0'12.85"E Longitude. The location of the proposed project is shown in **Figure – 1.1**. Detailed layout of the plant is attached as **Annexure – 6.**

Important places around GIDC Ankleshwar are:

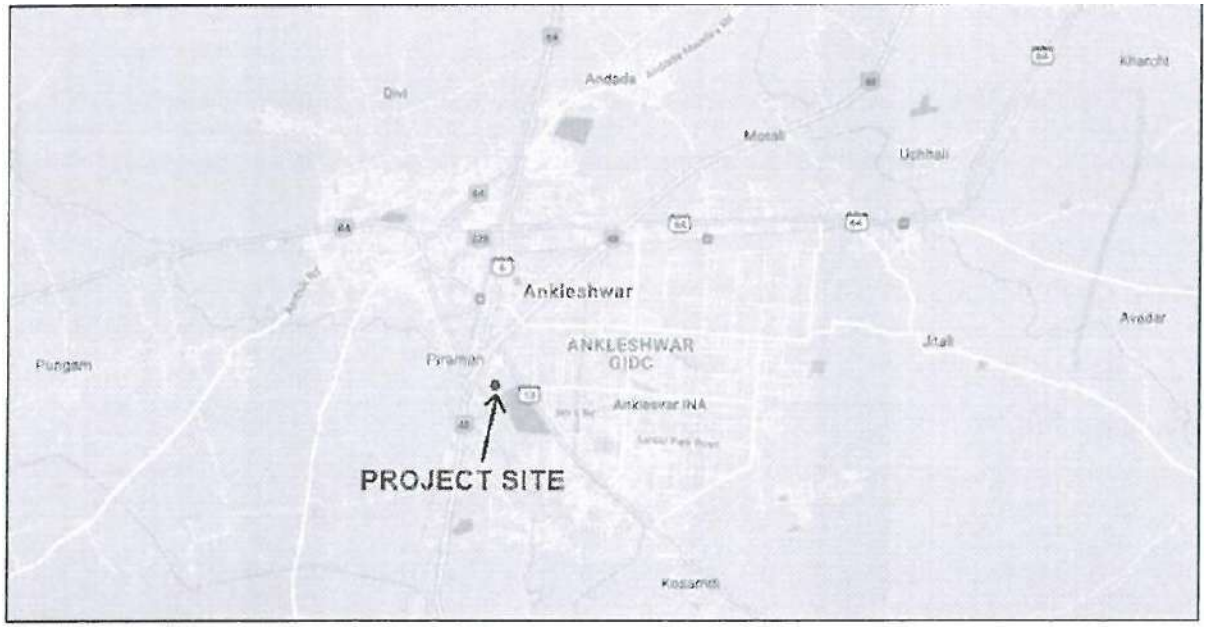
Ankleshwar city	- To the west
Surat City	- To the South
Gulf of Khambhat	- To the West

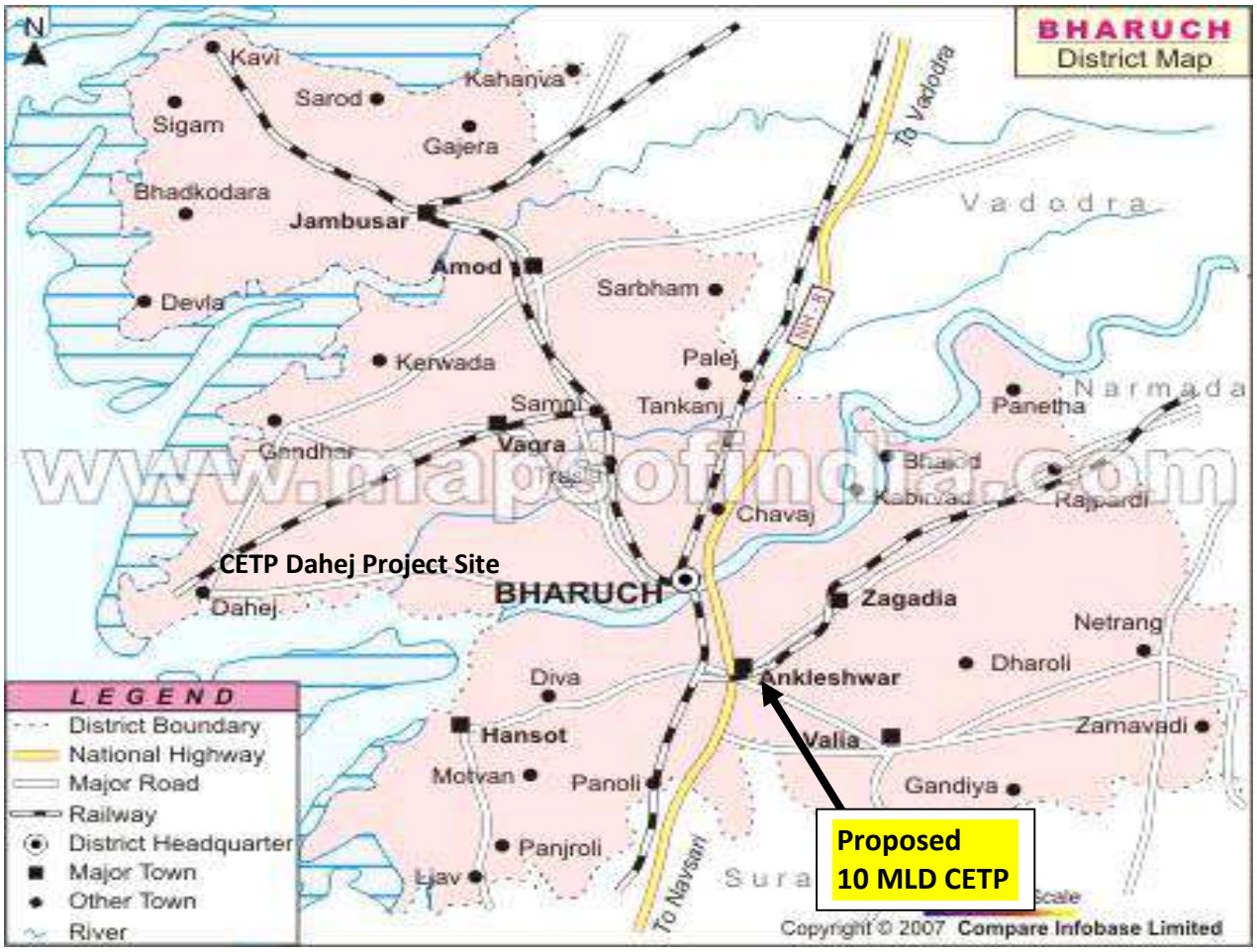
The proposed 10 MLD CETP will be located in industrial estate of GIDC Ankleshwar, which has all important industrial and commercial centers of Gujarat and India.

Location of the Project Site is shown in **Figure 1.1.**

FIGURE - 1.1

LOCATION OF THE PROJECT SITE





The nearest city is Ankleshwar located at about 1.8 km. The nearest large city is Surat, which is about 55 km away and has population of around 44.3 Lac. Natural Gas is supplied in the estate by Gujarat Gas Co. Ltd. through pipeline for industrial purpose. Water for industrial purpose is provided by NAA, Ankleshwar. Development of Communication systems is good in the region due to proximity to Bharuch and Surat. Sources of water in the region include Canal, river, and ground water resources.

1.3.2 The salient features of the site are as under:

1. Minimum distances:
   a. Town : Ankleshwar (1.8 km)
   b. Railway station : Ankleshwar (1.3 km)
   c. Historical Site : None within 10 km radius area
   d. Sanctuaries : None within 10 km radius area
   e. Highway : N. H. No – 8 (0.34 km) & S. H. No – 6 (0.35 km)
   f. River/Streams : Narmada River (7.2 km)
   g. Airport : Surat (60 Km)
2. Use of forest land : None
3. Use of prime agricultural land : None
4. Planned submergence : None
5. Displacement of population : None

1.3.3 KEY INFRASTRUCTURE FEATURES AND SETTLEMENTS

1.3.3.1 METHOD OF DATA PREPARATION

Key infrastructure features have been extracted from Survey of India (SoI) topographical maps of 1:50,000 scale. The features have been updated using satellite data and have been verified with ancillary information derived from TTK maps and guide maps. The locations of the settlement have been extracted from Census of India (CoI) maps and have been verified by using SoI topographical maps and satellite data.

1.3.3.2 DISTANCE OF NEAREST KEY INFRASTRUCTURE FEATURES FROM PROJECT SITE

The distance of railways and National and State highways are presented in Table 1.2 below:

TABLE - 1.2

DISTANCE OF NEAREST KEY INFRASTRUCTURE FEATURES FROM PROJECT SITE

SR. NO.	NEAREST INFRASTRUCTURE FEATURE	DISTANCE FROM PROJECT SITE
1.	Western Railway Main Line	0.5 km
2.	National Highway NH-8	0.34 km
3.	State Highway	0.34 km

(Courtesy: Environmental Information Centre, New Delhi)

1.3.3.3 MAP OF KEY INFRASTRUCTURE FEATURES AND SETTLEMENTS

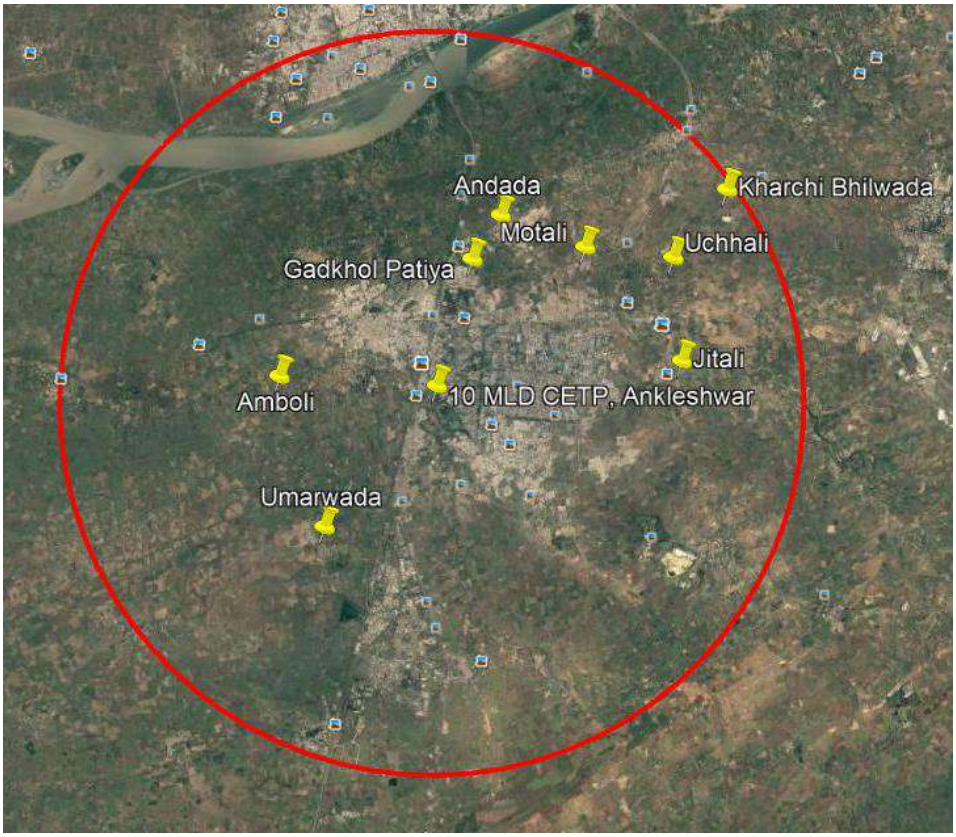
A map depicting administrative boundaries up to Taluka level, showing locations of towns and villages along with National and State highways, major and medium roads and railways is presented as **Figure 1.1**. The map also shows the water bodies and forest boundaries for better understanding of project area. The map marks the area within 10 km with the project site as the center.

1.4 Study area for the proposed project

The study area for the proposed 10 MLD CETP, Ankleshwar is 10 km from the boundary. The study area of the project is shown in **Figure 1.2**.

FIGURE-1.2

STUDY AREA – 10 KM



1.5 Purpose of EIA

The purpose of EIA study is to critically analyzed the construction and operation phase activity of proposed project activity of CETP with respect to effluent transportation, operation activities, material consumption, air emission, hazardous waste generation and control measures to reduce the pollution and to delineate environmental management plan along with recommendations and suggestions based on the finalized TORs by SEAC, Gujarat.

1.6 Objectives of EIA

The main objectives of the study are,

1) To assess the background environmental status.
2) To identify potential sources of pollution.
3) To predict and evaluate the impact on environment along with pollution control measures taken.
4) To prepare a comprehensive Environment and Disaster Management Plan.

1.7 Methodologies For EIA

Taking into consideration proposed project activities, guidelines and TORs, an area of 10 km radius from the center of the project has been selected and is designated as the study area for the purpose of EIA study. All the components of TORs were studied and incorporated in this report.

1.7.1 Base Line Environmental Condition

The samples of ambient air, ground and surface water and soil are collected and analyzed as per the standard methods for establishing the baseline data and to determine the impact of proposed activity on the same.

1.7.1.1 Ambient Air Environment

The air environment around the plant was studied by setting up ten locations within the study area of 10 km radius from the project site and collection and monitoring the site specific meteorological data, viz. wind speed and direction, humidity, rainfall and ambient temperature. Design of network for ambient air quality monitoring location is based on guidelines provided by CPCB. The ambient air samples were collected and analyzed for PM_{10}, $PM_{2.5}$, SO_2 and NOx for prediction, evaluation and assessment of potential impact on ambient air environment.

1.7.1.2 Ground And Surface Water Environment

The water required for domestic and industrial uses is being made available from NAA, Ankleshwar only. Hence, to assess the Physico-chemical quality of the water, a number of water samples were collected and analyzed for pollution parameters viz., pH, TDS, TSS, Turbidity, BOD_3, COD, Fluorides, Chlorides, Sulphates, Nitrates, Ammonical Nitrogen, Hardness, Alkalinity, Iron, Oil & Grease, etc. and heavy metals, in order to find out the contamination, if any.

1.7.1.3 Noise Environment

Noise pollution survey was conducted in the study zone for evaluating existing status. The anticipated noise sources were automobile activities, which are likely to be increased due to proposed activity. Noise levels were also recorded at the noise generating places and in the surrounding villages for evaluating general scenario of the study area. Hourly equivalent sound levels (Leq) were also recorded for calculating Day and Night noise levels in the surrounding villages.

1.7.1.4 Soil Environment

Soil sampling and analysis was carried out to assess physico-chemical characteristics of the soils and delineate existing cropping pattern, existing land use and topography, within the study area.

1.7.1.5 Biological Environment

Keeping in view, the importance of biological component of total environment due to the proposed project, biological characterization of terrestrial and aquatic environments, changes in species diversity of flora and fauna in terrestrial as well as aquatic systems were studied for impact analysis due to proposed project activity.

1.7.1.6 Socio-economic Environment

Demographic and related socio-economic data was collected from census handbook and EIC to assess socio-economic status of study area. Assessment of impact on significant historical, cultural, and archeological sites/places in the area and economic and employment benefit arisen out from the project is studied.

1.7.2 Identification of Source of Pollution

CETP operation's all aspects are evaluated for source of pollution. Also, evaluations are made about the source of additional effluent and its characteristics.

1.7.3 Evaluation of Pollution Control and Environmental Management System

The qualitative and quantitative analyses of various pollution sources as well as evaluation of pollution control system have been carried out.

1.7.4 Evaluation of Impact

A comprehensive evaluation of environmental impact with reference to proposed activities are carried out.

1.7.4.1 Preparation of Environmental Management Plan

A comprehensive Environmental Management Plan has been prepared covering all the aspects of pollution prevention measures, Air and Water Pollution Control measures, Hazardous Waste Management, Environmental Surveillance and Environmental Management Plan.

The present EIA report is prepared as per the TORs and monitoring carried out during post monsoon season of March, 2017 to May, 2017. The baseline environmental conditions have been established through field monitoring and literature survey. The contents of EIA report, details of data collection and source of secondary data are presented in **Figure 1.3.**

1.8 Structure of report

Environment Impact and Risk Assessment (EIRA) study is carried out as per guidelines prescribed by MoEF&CC, New Delhi & TORs given by SEAC, Gujarat.

Chapter-1: Introduction

This chapter provides an Introduction of Industry, their premises and surrounding areas. It is also expressing the basic objectives and methodologies for EIA studies and work to be covered under each Environment component.

Chapter-2: Project Description and Infrastructural Facilities

This chapter includes Project Description and Infrastructure facilities delineating all industrial and environmental aspect of GIDC construction and operation phase activities as well as process details of proposed scenario. This chapter gives information about storage and handling, water and wastewater quantitative details, air pollution and control system, sludge storage facility, utilities, greenbelt and safety measures for proposed project. It also provides information about Environmental Management facilities to be available at the project site.

Chapter-3: Baseline Environmental Status

This chapter provides Base Line Environmental Status delineating meteorological details and identification of base line status of Environmental components (primary data) of surrounding area.

Chapter-4: Identification, Prediction and Evaluation of Impact with Environment Management System

This chapter includes Identification and Prediction of Impact, which provides quantification of significant impacts of the proposed activities of plant of various environmental components. Evaluation of the proposed pollution control facilities is also carried out in this chapter.

Chapter-5: Environmental Monitoring Plan

This chapter includes Environment Monitoring plan with monitoring parameters, monitoring and analysis methods, monitoring frequency, documentation and records.

Chapter-6: Project benefits

This chapter includes project benefits to environment and society.

Chapter-7: Environmental Management Plan

This chapter includes Environment management, pollution control measures.

Chapter-8: Executive summary

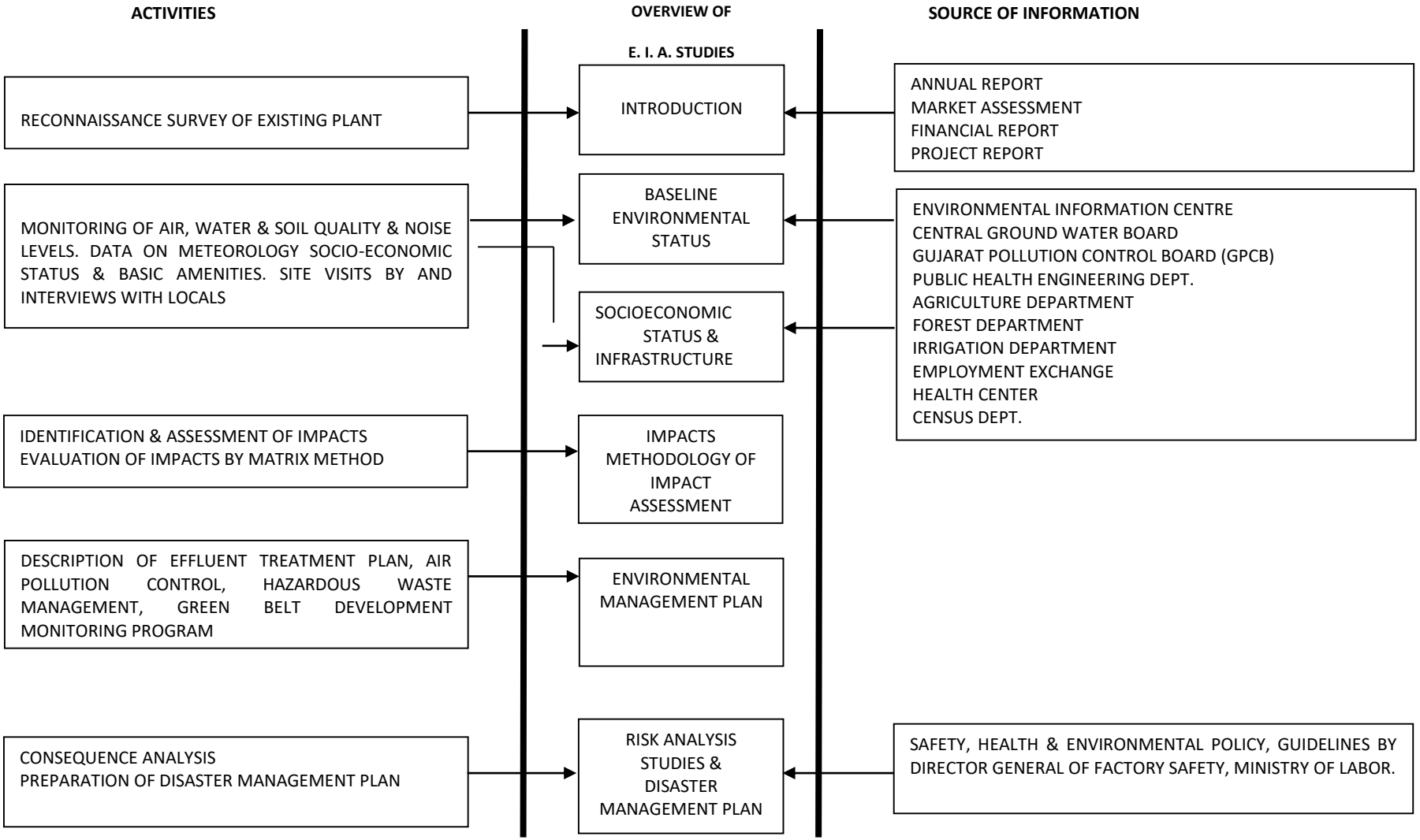
This chapter includes summary of projects giving a prima facie idea of the objectives of the proposal, use of resources, justification, etc. In addition, it provides a compilation of EIA report, including EMP and post project monitoring plan in brief.

Chapter-10: Risk Analysis & Disaster Management Plan

This chapter provides details of Risk Analysis and Disaster Management Plan; it provides basis for what should be type and capacity of its on-site and off-site emergency plan also what types of safety measures are required.

FIGURE-1.3

E.I.A. PLAN & PROCEDURE



CHAPTER – 2

PROJECT DESCRIPTION AND INFRASTRUCTURAL FACILITIES

2.1. BACKGROUND

- The Notified Area Authority (NAA) is a functional part of M/s. Gujarat Industrial Development Corporation (GIDC), an organization undertaken by Government of Gujarat and a nodal agency of the government of Gujarat for providing Industrial backbone of the state. GIDC identifies and develops locations suited for Industrial purpose.
- The Ankleshwar Industries Association (AIA) was established in 1978 by the industries located in Ankleshwar GIDC estate.
- AIA has promoted Ankleshwar Waste Management Limited (AWML) to carry out environment related activities in the most efficient manner.

2.2. Project cost

- Total capital investment for the proposed project activities is Rs. 70.54 crores. It includes site development, building, plant machineries, environment protection measures cost, etc. Break up of proposed investment is shown in Table-2.1.

TABLE-2.1

BREAK UP OF PROPOSED PROJECT COST

Sr. No.	DESCRIPTION	Cost of component Rs. in corers
1	Civil	33.83
2	Mechanical	21.21
3	Electrical	5.31
4	Process Imstruments	3.21
5	Laboratory equipments	1.15
	Cost Of CETP	**64.71**
	PMC charges @5%	3.24
	QC charges @1%	0.65
	Add 3% contingency	1.94
	TOTAL ESTIMATED PROJECT COST	**70.54**

2.3. PROJECT ACTIVITIES

2.3.1. PRE CONSTRUCTION ACTIVITIES

The proposed project is located within GIDC, Ankleshwar. Since, there is a clear provision of land for proposed project and proposed project is located on level ground which does not require any land filling for area granding work and any

cutting of the plantation at the site. The site is to be cleaned and leveled in a way so that there is no additional soil to be brought from out side. Approach road is readily available to access the site hence no major pre-construction activities are anticipated.

2.3.2. CONSTRUCTION ACTIVITIES

All Construction and commissioning activities of proposed project activities shall be carried out after getting Environmental Clearance from SEAC, Gujarat. Erection of various machineries shall start simultaneously. Since this is developed area, there is no site development activity.

- Minor site clearance activities shll be carried out to clear srubs and weed.
- Constuction of CETP units which include excavation.
- Construction of internal roads for reaching various sections of units.
- Construciton of sheds and other essential utilities shall be carried out.

Construction materials required for the project like steel, cement, crushed stones, sand, rubble, etc. shall be procured from the local market of the region.

2.3.3. RAW MATERIAL HANDLING AND STORAGE

The major raw materials like hydrate lime, Poly Aluminium Chloride (PAC), Polyelectrolyte, Phosphoric acid, Sodium busulfite, Activated carbon, Chlorine etc. used at proposed CETP. All these raw materials shall be received in bags (lime), drums and rubber lined tankers. All the raw materials shall be stored within premises in separate storage area. Raw Material consumption details is given in Table-2.2.

TABLE-2.2

RAW MATERAIL CONSUMPTION

Name of Raw material	Consumption of reagent		
	Kg/m^3	Mt/ day	Mt/ month
PRIMARY			
Lime	1.500	18.750	450.000
12-13 % PAC (Poly Alluminium Chloride)	1.200	15.000	360.000
PE	0.001	0.013	0.399
50 % phosphoric acid	0.040	0.500	12.000
TERTIARY			
Lime	1.000	12.500	300.000
Chlorine	0.350	4.375	105.000

Sodium bisulfite	0.150	1.875	45.000
Activated carbon	0.066	0.825	19.800
PAC	0.500	**6.250**	150.000
PE (Polyelectrolyte)	0.001	0.013	0.399

2.4. PROJECT DESCRIPTION

The GIDC, Ankleshwar is occupied by industries involved in manufacturing of Dyes & Chemicals, Dye intermediates, Pharmaceutical, Pesticide, Pigment, textiles industries, etc. The proposed designed capacity of the common effluent treatment plant (CETP) is 10 MLD.

2.4.1. DETAILS OF EXISTING INDUSTRIES FOR PROPOSED 10 MLD CETP

The details of expected member industries for proposed 10 MLD CETP in GIDC, Ankleshwarin are shown in Table – 2.3.

TABLE-2.3

DETAILS OF MEMBER INDUSTRIES FOR PROPOSED 10 MLD CETP

SR. NO.	NAME OF INDUSTRIES	ADRESS/PLOT NO	CATEGORY	Qty. of effluent to CETP, KLD
1	PARISHI CHEMICALS	C1B/6916-17-18,	Dyes	60
2	KASTURI POLYMERS & PIGMENTS	,4517,	Pigment	15
3	AKSHAR ASSOCIATES	.C1/B/3902	Dyes & Chemical	8
4	SHREE MAHAKALI DYES & CHEMICALS	C1/413,	Dyes & Chemical	14
5	CARDKEM PHARMA P LTD	.2301-02.	pharma	50
6	JAY AGRO INDUSTRIES	.5805 G	Chemical	10
7	ALEX INDUSTRIES	9109/4-5	Chemical	15
8	ALEX life science (UNIT-II)	A1-7808	Chemical	10
9	ANADI KRISHNA COLOURS	9113/2	Pigment	35
10	SHREE AMBE COLOR CHEM	729	Pigment	15
11	LAXMI HEALTHCARE	6120/1	pharma	33
12	VARNIRAJ CHEMICALS	6611	Chemical	7
13	SNEHAL DYES INDUSTIRES	C-/6819	Dyes	14
14	SHREENATH CHEMICAL INDUSTIRES	.6814-18	Chemical	18
15	SHRRENATH CHEMICAL INDUSTIRES (UNIT-II)	.5902 /1	Chemical	30
16	SHREE AVANI PHARMA	.J/1204.	pharma	20
17	PRAGNA CHEMICAL INDUSTIES	2303/A	Chemical	35
18	RUDRAAKSH SILK MILL	.A-2/2215,	Chemical	8
19	VIBHA LIFE SCIENCES P LTD	.J-1203	pharma	15
20	CHEM-PACK INDUSTRIES	4707/A/1	Chemical	3

21	BHARAT INDUSTIRES	4707/A/2	Chemical	3
22	RAGHUVIR CHEMICALS	.6217/4 &5	Chemical	3
23	CHEVRON PHARMA	6505.	pharma	30
24	K.K. TEXTILES (UNIT-1)	5063	Chemical	10
25	K.K. TEXTILES (UNIT-2)	5904/2&5905/4	Chemical	50
26	KRISHNA CHEMICALS	6911	Chemical	15
27	KOHINOOR CHEMICALS	C-1/7014	Chemical	16
28	KOHINOOR COLURS P LTD (UNIT-1)	7204 & 7205	pigment	15
29	KOHINOOR COLOURS P LTD (UNIT-2)	5107	pigment	7
30	KENOOR DYE CHEM	7210	Dyes	15
31	KENOOR ORGANICS P LTD	5006	Pharma	10
32	MEETA COSMETICS	4315	pharma	4
33	SIGMA CHEMOPHARMA P LTD	C-1/B-4755 & 4756	pharma	10
34	RELIANCE CHEMICALS	4794	Chemical	7
35	UNITY CHEMICALS	4801	Chemical	4
36	DANOPHARM CHEMICALS PVT LTD	C-1/7131.32.33	Chemical	100
37	V R CHEMICAL	5149	Chemical	70
38	ANJANI INDUSTRIES	7616	Chemical	50
39	KEVAL DYECHEMI	7606	Dyes	50
40	COLOCHEM INDIA	C1/4766	Pharma	16
41	AMSAL CHEM P LTD	A-1 ,401 TO 403	Pharma	0
42	CAB CHEMICALS	221/222	Chemical	22
43	RISHABH DYE CHEM INDUSTIRES	223	Dyes & chemical	14
44	RUKUL INDUSTIRES	1705	Dyes & chemical	20
45	MARUTI INDUSTRIES	4801/A/1	Chemical	50
46	MICRO TECH INDIA	5046	Chemical	50
47	POOJA INDUSTREIS	317,PANOLI	Chemical	50
48	GUJRAT GLYCOLS P LTD	7503	Chemical	50
49	SAHYOG INDUSTRIES	3212,PANOLI	pigment	50
50	TECHNO CHEM INDUSTIRES	9102/2	Chemical	50
51	HI-TECH PACKAGING	C1B/7106	Chemical	5
52	BLITZKRIG ORAGANICS & BIOCHEMICALS IND	5067	Chemical	10
53	A.S.CHEMICALS	9108/1	Chemical	3
54	WHITEX CHEMICALS	6808	Chemical	40
55	VASANT CHEMICALS	3918	Chemical	10
56	HARISH CHEMICAL ENGG.ENTERPRISE	3903	Chemical	50
57	MANIsH INDUSTRIES	3921	Dyes & chemical	40
58	MAHENDRA DYES AND CHEMICAL	C-1/6828	Dyes & chemical	40
59	RIDDHI PHARMA	A-2/2509-10-11	Pharma	20
60	JAY LIFESCIENCES P LTD	5184-5185	Pharma	34
61	JAY CHEM INDUSTIRES	6713-14/1	Chemical	44
62	SHREE CHEMOPHARMA ANKLESHWAR P LTD (UNIT-II)	312-323	Pharma	10
63	SHREE CHEMOPHARMA ANKLESHWAR P LTD	313/13,14	Pharma	13

64	JIGAR INDUSTRIES	3709/5 & 3710/10/2/A	pigments	150
65	FINORNIC CHEMICALS INDIA P LTD	6234	Chemical	20
66	SHREEJI PIGMENT	C /1/B/3416	Chemical	22
67	TVISHA IMPEX	501/B	pigments	10
68	M.R. ENTERPRISE	502/21	Chemical	10
69	RUSHITOYA INDUSTRIES (UNIT-1)	3459	Pigment	10
70	RUSHITOYA INDUSTREIS (UNIT-2)	3458	Pigment	10
71	RASHDEEP CHEMICALS	3451/A/B,3452	Chemical	15
72	RMG PHARMACHEM	11005	Pharma	12
73	HOLYLAND CORPORATION	3302/D	go	15
74	STERLING CHEMICAL INDUSTRIES	113/2	Chemical	15
75	ANJU LIFE SCIENCE	6007/1	Chemical	20
76	MITTOLIA CHEMICAL IND	113/1	Chemical	15
77	SULESHVARI HEALTHCARE	2806/C	Pharma	40
78	SULESHVARI PHARMA	6012/1	Pharma	30
79	HEM DEEP ORGANICS P LTD	3801/2	Pharma	30
80	DARSHAN PHARMACHEM P LTD	3609	Pharma	150
81	VISHWA CHEMICALS	4801/A/ A-13	Chemical	3
82	PERFECT CHEMICALS	4801/A/15	Chemical	3
83	EFKAM ORGANICS	4801/A/10 & 11	Chemical	3
84	SHARMIK CHEMICALS	6904	Dyes & Chemical	7
85	SAFFRON EXIM	C1-B-7112	Dyes	7
86	SHREE MAHAKALI PHARMACHEM	5106	Pharma	3
87	RADHESHWAR RASAYAN	A-2/4004	Chemical	10
88	DWARKESH TRADE LINK	4505	Chemical	10
89	ADJ LINK	5186	Chemical	10
90	M-CHEM CORPORATION	6409	Chemical	10
91	MAMATA CHEMICALS	6704	Chemical	10
92	JAY GANESH CHEMICALS	5733	Chemical	10
93	APEX HEALTHCARE LTD	4710	Pharma	50
94	PALCHIN CHEMICALS	5236	Chemical	1
95	ASTIK DYESTUFF P LTD	707 /B&C	Dyes	10
96	JAY PROCESS	5732	Chemical	10
97	JAY COLOURS	285/2	Pigment	10
98	K.D.ENTERPRISE	2900/91	Chemical	4
99	SHIPURA INDUSTIRES	L/6219/3	Dyes	4
100	RONAK CHEMICALS	4709/1	Chemical	15
101	POONAM PROCESSORS P LTD	A-1/164	Textile	49
102	CHEMET WEST & FLOWS P LTD	129/C/2	Chemical	5
103	CHEMET CHEMICALS P LTD	6230/6231/6215	Chemical	20
104	SYNTHETIC DRUGS & INTERMEDIATES	6503	Pharma	12
105	MAKSONS FINE CHEM P LTD	327,P.B.NO.36	Pharma	60
106	GALAXY DYESTUFF INDUSTIRES	1101/2	Dyes	10
107	GLOBE CORPORATION	1410/C	Chemical	7

108	SUN WHITE CHEMICALS	C1B,3421	Chemical	7
109	SUN WHITE CHEMICALS	C1B,3420	Chemical	7
110	SUNIT DYE CHEM INDUSTRIES	C1-3430	Dyes	2
111	MEDICARE INDUSTRIES	4734	Pharma	3
112	SURYA LIFE SCIENCES LTD	3606 & 3616	Pharma	25
113	KANGAROO INDUSTIRES	A1-4906/10	Pigment	2
114	KANGAROO INDUSTIRES	1806-1807	Pigment	25
115	PAYAL CHEMICALS	5251	Chemical	20
116	BASIC PHARMA LIFE SCIENCE P LTD	146/B	Pharma	10
117	ASIATIC GREEN AGRICO P LTD	5056	Chemical	10
118	POONAM INDUSTRIES	7314/5	Chemical	10
119	AKHILESH ENTRPRISE	A-1/4012	Chemical	10
120	BHAKTI PRODUCTS	J-1714	Chemical	7
121	CHEM STAR CROP SCIENCE	6106/A	Chemical	8
122	AGRO CHEM INDUSTRIES	J-1715	Chemical	7
123	M J FINE CHEM	9109/6	Chemical	5
124	PARIMAL INDUSTRIES	9109/3	Chemical	3
125	MAHADEV INDUSTIRES	1505	Chemical	10
126	SHREE MAHADEV INTERMEDIATE	1509	Chemical	15
127	SHIV CORPORATION (UNIT-1)	502/22	Chemical	20
128	SHIV CORPORATION (UNIT-2)	502/22	Chemical	7
129	SHIV INTERNATIONAL	712/B	Chemical	10
130	SHREEJI ENTERPISE	3002/39	pigment	0
131	SUN INDUSTRIES	7830/2	Pharma	30
132	HEMA PHARMACEUTICALS P LTD	6201/A	pharma	105
133	SHREENEEL CHEMICALS	281	Chemical	40
134	JACKSON CHEMICAL INDUSTRIES	502/4,5,6	Chemical	39
135	GOLD STAR CHEMICALS P LTD	5902	Chemical	8
136	NEPTUNE INUSTRIES	A-6104/1 &2	Chemical	15
137	J.S.CHEMICALS	4801/A/B	Chemical	15
138	PROLIFE HAIR HEALTH CAR P LTD	1106/B	pharma	5
139	SHREE RAM CHEMICALS	C1-7009	Chemical	5
140	NAVADIA PLAST	5706/2 & 5707	pigment	10
141	SHAI AMBICA ORGANIC CHEMICALS	6721	Chemical	3
142	BHAGAVATI CHEM TECH	6807	Chemical	2
143	REE MAAN RASAYAN	4772	Chemical	3
144	SUPERNOVA INTERMEDIATES PRIVATE LIMITED	1212	Chemical	15
145	DYNEMIC COLOURING LIVES	3710/3	pigment	0
146	DYNEMIC COLOURING LIVES	3709/6	pigment	0
147	DYNEMIC COLOURING LIVES	6401,6402,	pigment	0
148	KETIX CHEMICALS	501	Chemical	13
149	RAJJESH CHEMICALS INDUSTIRES	1818 TO 1820	Chemical	16
150	VANDANA CHEMICALS	7409	Chemical	16
151	INNOVATIVE LIFE SCIENCE	9107/02	Pharma	0

152	REINE LIFESCIENCE	5901	Pharma	0
153	DOLPHINE CHEM	6506	Chemical	35
154	SHUBH LIFE SCIENCE	703/1	Pharma	3
155	TAO CHEMICALS	6222	Chemical	15
156	INTEGRAL CHEMICAL FACTORY	6226	Chemical	14
157	ACQURATE ENGITECH LTD	147-148	Chemical	0
158	WINGS OSHO COMPONENTS	A-1/447	Chemical	25
159	DAYARAM HEALTHCARE	A-1/4906/17	Pharma	5
160	HEPRA HEALTHCARE LIMITED	11/10/3809	Pharma	20
161	M.G TRADING	11005	Pharma	12
162	M.G CHEMICALS	1502/1	Chemical	2
163	SIDDHI SAMRAT	6405	Dye& Chemical	20
164	MEHUL DYE-CHEM INDUSTRIES	1803	Dye& Chemical	31
165	DHOLARIA ORGANICS	6207	Chemical	30
166	DHOLARIA INDUSTRIES	6207/1	Chemical	27
167	AKRUTI CHEMICALS	5163	Chemical	21
168	EFFLUX INDUSTRIES	C-1/435	Dyes&chemical	9
169	ELEGANT COLOURS	C-1/436	Pigment	12
170	SUNBHEM PHOTOCHEM PVT.LTD	4787	Chemical	1
171	ZCL CHEMICALS LTD	3102/B	Chemical	155
172	SEJAL CHEM TECH-INDUSTRIES	C1 B - 7118	Chemical	40
173	ANMOL MARKETING	5905/4/A	CHEMICAL	45
174	NILKANTH DYESTUFF INDUSTRIES	C/1-6820	DYES	20
175	MOHAN POLYFAB PRIVATE LIMITED	65,096,510		60
176	NORRIS MEDICINES LIMITED	801/P	pharma	2
177	RAJSHREE INDUSTRIES	7515	dyes	5
178	ADVANCE DYE-CHEM INDUSTRIES	A2/2214	dyes	26
179	J.S. INDUSTRIES	1517		20
180	UMA ORGANIC & CHEMICALS	3816	CHEMICAL	20
181	HEMANI INDUSTRIES LIMITED UNITT 2	3207/A&B	Pharma	40
182	KA MALLE PHARMACEUTICAL LTD	6005	Pharma	91
183	ROCKY CHEMICALS	4729	CHEMICAL	67
184	SURAJ DYE CHEM	1106/C	dyes & chemical	20
185	SIDDHI DYES & CHEMICALS	C1-B-5406-07	dyes& chemical	7
186	KASA COLOUR CHEM	7517	dyes& chemical	8
187	S.B.CHEM FAB	5217	Chemical	1
188	S.B.CHEM-O-PHARMA	C1-B/2015	dyes	1
189	S.B.INDUSTRIES	5217	pigments	1
190	SIDDHARTH INTERCHEM PVT LTD	6232	Dyes&chemical	5
191	PRUDENCE PHRMA CHEM	7407	Pharma	7
192	PGC DRUGS PVT.LTD	6104	dyes	24
193	MUGAT DYE CHEM	1923	pigments	10
194	JAY INDUSTRIES	601	Chemical	15
195	MODEHESHWARI CHEMICALS	A-1/1511	Chemical	30
196	MODEHESHWARI CHEMICALS	A-1/2402	Chemical	30

197	MODEHESHWARI CHEMICALS	j/7017	Chemical	30
198	PRAGNA DYECHEM PVT.LTD	1210	Chemical	20
199	SHIVAM PRODUCTS	4797	Chemical	10
200	MAYUR ASSOCIATES	4705	Chemical	10
201	MAYUR COLOUR& CHEMICALS	5148	pigments	10
202	MAYUR DYE CHEM	4705	dyes	5
203	STRIDE INDUSTRIES	7613/1	Pharma	3
204	KRISHNA ENTERPRISE	7612	Chemical	3
205	BRILLIANT COLOURS	1601/5	Pigments	10
206	SHREE HARI CHEMICALS	C1B/2518	Chemical	7
207	SHREE SULPHUICS PVT.LTD	2801/A	Chemical	0
208	NARUSA INDUSTIES	6724	Chemical	1
209	OCEAN CHEMICAL INDUSTRIES	6810	PIGMENTS	5
210	NILKANTH REFINES	C1/5508/9	Chemical	24
211	MANGLAM CHEMICALS	4705/1/5	CHEMICALS	24
212	NAVADIA FINE CHEM	1309	CHEMICALS	24
213	NAVADIA REFINES	1308	CHEMICAL	24
214	SKOVA PHARMACHEMS	6110	Pharma	15
215	ANMOL CHEMICALS PVT LTD.	A-2/4006	CHEMICAL	11
216	SHREYAS CHEMICALS	1801	CHEMICAL	4
217	SIDDHI DYES & CHEMICALS UNIT - 2	51583	CHEMICAL	20
218	ADARSH DYE CHEM		DYE CHEM	33
219	LAURAL LIFE SCIENCE	6507	PHAEMA	10
220	NIVIKA CHEMO PHARMA	16,021,603	Pharma	33
221	NIVIKA CHEMO PHARMA PVT.LTD	1808,1809/2	Pharma	33
222	SAMIP CHEMICALS PVT LTD	703,704/1	DYES	20
223	OHM SAI INDUSTRIES	C-1/B-2017	DYES	13
224	NIRAJAN CHEMICALS	5142	CHEMICAL	15
225	VIBHAO LIFE SCIENCES PVT.LTD	J-1203	PHARMA	15
226	SHIVAM ORGANICS	9106/1&2		1
227	MAITRY NANO INDUSTRIES	J-7823,7828/4&5		20
228	GALAXY LIFE SCIENCE	6104/13/A2	PHARMA	23
229	JIYA OVERSEAS	4707,A/15		8
230	KAVYA CORPORATION	4707,,A/14		5
231	PARVATI OVERSEAS	712A/713		5
232	BM PHARMACHEM910PVT LTD	4507	pharma	2
233	S-TECH ENTERPRISE	4707,a/13		5
234	PRAYOSHA HEALTH CAR PVT LTD	6209		7
235	OM SHIV INDUSTRIES	6606		7
236	SHREE CHEMOPHARMA ANKLESHWAR PVT LTD	313/10,11		4
237	K.D ENTERPRISH	2900/91	DYES	1
238	AVINASH INDUSTRIES	2900/3	pigments	25
239	PEARL CHEM	2900/118	pharma	30

240	AVI INDUSTRIES	303/A	pigments	25
241	ADVANCE DYE STUFF INDUSTRIES	9104/1		2
242	BHUMI TECHNO PACK	4906/A		2
243	RONAK CORPORATION	2513 A/C-1B		10
244	WEST COAST PIGMENTS CORPORATION	2408		10
245	KAYUR CORPORATION	440/C-1		10
246	VIOLET PIGMENT& CHEMICALS INDUSTRY	2521		10
247	JAY OVERSEAS	A/2,4002		3
248	MAHAVIR LABORATORIES	3702		4
249	SHRADDHA CHEMICALS (UNIT 2)	6802		6
250	SHRADDHA CHEMICALS	6803		12
251	LAXMI HEALTHCARE	6120/1		15
252	SEMIENITE EXPORTS	C1B-3910		3
253	RADAR FINECHEM INDUSTRIES	1501		5
254	DEXTER BIOCHEM PVT LTD	A1,5302/03		20
255	S-TECH ENTERPRISE	4707,A/13		5
256	NIRANJAN LABORATORY	313/16/3		5
257	NIRANJAN PETRO CHEM	C1B-5230/5229		17
258	OSWAL UDYOG	8006/3		10
259	OSWAL UDYOG	8006/2		10
260	OSWAL UDYOG	8006/1		10
261	KASTURI POLYMERS & PIGMENTS	4517		4
262	PARISHI CHEMICALS	6916-6918		5
263	DIPEN INDUSTRIES	1702&1706/10		120
264	GRO RECLAIM RUBBER	618-619		25
265	ZENI LIFESCIENCES	2806/A		10
266	ZENI BIOTECH	A2-7801		5
267	ABHILASHA PHARMA PVT LTD	14,081,409		20
268	SHREE MAHAKALI INDUSTRIES	5404		5
269	SHIV SHAKTI CHLORIDE &CHEMICALS	5018		5
270	SHREE MAHAKALI DYES &CHEMICALS	C1/413		14
271	INDOKEM LIMITED	2900		1490
272	OMKAR CHEMICALS	9103/2		10
273	SHREE SATYA SAI INDUSTRIES			20
274	DATTATREY CHEMICALS			5
275	JINESH INDUSTRIES	4728		15
276	ZELIANT INDUSTRIES	2900/25,26,27		30
277	ZELIANT INDUSTRIES	2900/32,33,34		30
278	MAHESH INDUSTRIES	C-1-4767		5
279	SUKHA CHEMICAL	4705/1/6,7		5
280	STANDARD CHEMICALS	4506		15
281	BASIC PHARMA LIFE SCIENCE PVT LTD	146/B		20
282	STARLET INDUSTRIES	4314		5
283	ATRI CHEMOPHARMA PVT LTD	5729&30		14
284	BAKUL PHARMA PRIVETE LIMITED	6202		60

285	NEERASHRUTI CHEMICALS	313/16/4		5
286	PREETEN HEALTHCARE PVT LTD	C-1/7103		5
287	KETIX CHEMICALS	501/K		5
288	UMIYA CHEM INTERMEDIATES	4705/1		15
289	SHREE UMIYA INTERMEDIATES	5108		20
290	BASF	0		0
291	AXIS PHARMA CHEM	C1/3916		7
292	BHAGAVATI CHEM TECH	6807		2
293	SHRI AMBICA ORGANIC CHEMICALS	6721		3
294	REE MAAN RASAYAN	4772		3
295	MEDI CARE INDUSTRIES	4734		5
296	VORA INDUSTRIES	1510		70
297	DARSHAN PHARMA CHEM	A1,3621		100
298	ADARSH DYE CHEM UNIT 2	A1/3620		50
299	BHARAT CHEMICAL INDUSTRIES	7905		5
300	PEARL CHEMICAL INDUSTRIES	3416		5
301	VIVEK CHEMICALS	C1-B-3910		10
302	K. D. ENTERPRISE	2900/91		1
303	D. N. CHEMICALS	6007		25
304	PRERANA CHEMICALS	702/4		25
305	CHIRAG PACKAGING	284/2		30
306	SUPREME CHEMICALS	7840/2		4
307	AVDHOOT CHEMICALS	4801/A/14		10
308	SAURASHTRA DYES& CHEMICALS	6232		5
309	PLATINUM TANNING INDUSTRIES	2805/A		2
310	BHAVESH DYES INDUSTRIES	4776		1
311	RATNAMANI BIO - CHEMICAL & PHARMA	6112&13		30
312	PALCHIN CHEMICAL	5236		3
313	VARAHI PHARMA CHEM	9108/2		18
314	ALPHARD PHARMA	C-1,4333		
315	NIRANJAN CORPORATION	5126/4		3
316	BHUMI ELECTRO CHEM	A-2/54		1
317	VAKPATI CHEMICALS	7507		2
318	FERGUSON CHEMICALS	6217/2		
319	NARMADA CHEMICALS	A-2-2212		15
320	SUGV INDUSTRIES	4707/A/6		3
321	TULSI INDUSTRIES	4707/A/3		3
322	KRISHNA INDUSTRIES	5722		5
323	SHREE RAM INDUSTRIES	5117		3
324	GHANSHYAM CHEMICALS	7401		2
325	HARPAL DYE CHEM INDUSTRIES	735		5
326	PNCHMAHAL DYESTUFF INDUSTRIES	736		5
327	Fflorence industries	10006/b		60
328	SPC LIFE SCIENCES	284/1,2,3		10
329	VIHITA CHEM PVT LTD	305		10

330	VIHITA CHEM PVT LTD UNIT 2	3709/1&2		5
331	NEPEL CHEMICALS	4763/64		15
332	MONAL COLOUR CHEM PVT	4805		20
333	NANDOSAL INDUSTRIES			30
334	VIHITA DRUGS & INTERMEDIATE	C-1B/4754		20
335	VIHITA BIO CHEM PVT LTD	304/A		20
336	SODAR INDUSTRIES	1503		3
337	RAVI CHEM INDUSTRIES	7402		10
338	AMBICA CHEMICALS	702/3		10
339	RANGODADHI CHEMICALS PVT LTD	705		10
340	SUNNY CHEMICALS	6811		8
341	PRO ACTIVE PHARMA	A-2/2215		35
342	SKYLARK PHARMACEUTICALS PVT LTD	7910		3
343	SHREENATHJI INDUSTRIES	5188/A		10
344	SHYAM DYE CHEM	69,196,901		10
345	REE ATHARVA LIFE SCIENCES PVT LTD	5178		5
346	RANKE ATHARVA ENTERPRISE PVT LTD	5157,58		5
347	ATHRAVA ENTERPRISE	J-5231		10
348	CHEM PACK PVC SHRINK FILM	11012/3		4
349	LEO TEX INDUSTRIES	J-1917		15
350	KHWAHISH HELTHCARE			10
351	RAGHUVIR CHEMICALS	6217/4,5		10
352	SURESHBHAI H SHIROYA	708		10
353	SAYONA CROP CARE	B/155		10
354	SAYONA CROP CARE	3608		10
355	AGRO PACK	5041-43,48-50		10
356	ASSOCIATED ENTERPRISE	140/1		10
357	AGRO PACK	140/3,141/1		20
358	SHREE SULPHAMIC CHEMICALS	4518		1
359	MADHAV CHEMICAL INDUSTRIES	3450/B		10
360	PRINCE CHEMICALS	9111/3		10
361	DEXO FINE CHEM PVT LTD	K1-7707/6		1
362	PLASTO TECH POLYMERS	C1B/7107		1
363	ARTI ENTERPRISE	5047		2
364	AQUAL FINE CHEM	A/2,4002		5
365	GOLDEN FINECHEM PVT LTD	4801/A/15		2
366	FARBE FIRMA	2900/28,29		20
367	FARBE FIRMA	1508		20
368	GOPAL CHEMICALS	4521		3
369	SHIRIJI CHEMOPHARMA	2900/104		2
370	ASIAN COLOUR CHEM	6106/B/A		40
371	AMIDE INDIA	502/20		3
372	KETUL CHEM PVT LTD	1706/13		2
373	ITALIA INCORPORATION	C-1B-7810		5
374	RAVI RAJ CHEMICALS	C1B7120/21		5

375	MERIT CHEMICALS	6725		8
376	SHREE DHSRAMJIVAN CHEMICALS	3706/A		8
377	ADITYA LIFE SCIENCES	5125		20
378	ADITYA PHARMA CHEM	5124		15
379	SHREE UMIYA TRADELINK	150/A		15
380	DUTT CHEM ENTERPRISE	5904/2/B		10
381	SHREE GANESH CHEMICALS	6711		10
382	SHREE GANESH CHEMICALS	6711		2
383	NIKUNJ CHEMICALS	J-7820		4
384	NAVNEET PRODUCTS	5905/8		5
385	SHREE KRISHNA CHEM	1601/2		5
386	SONAL CHEMICALS	4758		45
387	GRP INDUSTRIES	2900/23		10
388	ASHOK PHARMA CHEM	6714-15		3
389	ELEMENT CHEMILINK PVT LTD			85
390	OM MASTERATCHES	1704		2
391	POLE STAR INDUSTERIS	616		15
392	SARJAK PHARMA CHEM	5137		5
393	VISHAL INDUSTRIES	6912/13		10
394	SATYAM INDUSTRIES	C-1/7110		10
395	FERRIC ALUM INDUSTRIES	2807/1		25
396	ELEMENT CHEMILINK PVT LTD UNIT 2	313/6,7,8		50
397	VISHAL ORGANICS	7903/A,B		10
398	AMAR CHEMICAL INDUSTRIES	C1/B,6830		10
399	BANSI ASSOCIATES	5102/A		20
400	PURE CHEM PVT LTD	4717		10
401	ELAM PHARMA PVT LTD	3709/4		80
402	SAYAN GREENOCHEM P LTD	6001/3,4		134
403	AGRO PACK	902,905		10
404	SAYONA CROP CARE	5008		10
405	SHREE LAXMI ENTYERPRISE	5252		4
406	RADHE CEHMICALS INDUSTRIES	4931		4
407	DEXO CHEM LABORATORIES	L-6219-6		1
408	BHARAT PRODUCTS LTD UNIT 2	3206/B		20
409	ELEMENT CHEMILIMK PVT LTD UNIT 1	C1/5504		100
410	MECLIN CHEMICALS	3302/C		16
411	SUYOG DYE CHEMIE P LTD UNIT 2	2404-5		31
412	SNEHAL IMPEX PVT LTD UNIT 1	1108/A		10
413	SUYOG LIFE SCIENCES PVT LTD	145/B		30
414	SAHYOG CHEMICAL INDUSTRIES	C1-B/7004		13
415	SUYOG DYE CHEMIE P LTD UNIT 1	6716		14
416	SIDDHARTH INTERCHEM PVT LTD	6905,6914,15		3
417	POOJA CHEMICALS	702/2		7
418	NAVDURGA DYES & CHEMICALS			3
419	SHREE F PRISE			1

420	RHYTHAM ENVIRO CARE			25
421	REVA CHEMICALS	3920		4
422	SATYEM CHEMICALS	C-1/B-4741		5
423	SHREE RANG CHEMICAL			20
424	ADITYA INFRA	5716		25
425	UMIYA INDUSTRIES	4405		2
426	AMITA CHEMICAL INDUSTRIES	4784		10
427	KING ACID & CHECIMAL CO	313/9		50
428	ADVAITYA DYE CHEM	4785/86		10
429	SHREE DATTATREYA CORPORATION	5129		4
430	KHATU SHREE CHEM	6501		10
431	ABAD CHEMICALS	4774/75		10
432	GAYATRI CHEMSYNTH PVT LTD	A-1/1404		4
433	CHANDAN CHEMICALS	J-3434		33
434	SHREE MAHAKALI TARDES	4927		4
435	S.B INDUSTRIES	5217		4
436	S.B CHEM O PHARMA	C-1-B/2015		4
437	S.B CHEM TECH	254		4
438	HEMAL IMPEX	C-1B-7812		3
439	CHANDAN CHEMICALS	3422/23		35
440	CROP LIFE SCIENCES LTD	5151		1
441	CROP LIFE SCIENCES LTD	5165		1
442	ACQUIRE CHEMICALS	7901/D		5
443	APEX PHARMA CHEM	7904/F		5
444	PARAM PHARMACEUTICAL	6001		5
445	BALMUKUND CHEICALS	4765		2
446	HITESH CHEMICALS INDUSTRIES	303/B		10
447	MEET SERVICE STATION	1,2,7,8		4
448	DHANLAXMI CHEMICALS UNIT 2	4801/A/9		10
449	BONNY CHEMICALS	J-7016		7
450	SHREE VARDAYINI CHEMICALS INDUSTRIES			17
451	VARDAYINI ENTERPRIESE			10
452	JAYDEV CHEM INDUSTIRES	502/19		5
453	MACSON PRODUCTS UNIT 2	6006/2B		20
454	PROLIFE HAIR AND HEALTH CARE PVT LTD	6,8,10,12		4
455	SKY & SKYLARK INDUSTRIES PRODUCTS	2513/B		33
456	AASHRAY CHEMO PHARMA	6602		2
457	NIMISH CHEMICALS	07/02/4705		4
458	RAJESH CHEMICAL INDUSTRIES	1818,19,20		31
459	RADHE INDUSTRIES	1410/B		3
460	ALLIED CHEMICALS	A-1/7309		7
461	KISHAN CORPORATION	285/1		20
462	K.M SHAH & SONS	C1B-7123		0
463	BHARAT DRUM SUPPLYING CO.	C-1B/,7122		0
464	OM SHANTI INDUSTRIES	C1/2525		4

465	CLEAN CHEMICALS INDUSATRIEWS	1502		4
466	KENNYT PHARMA PVT LTD	6902&3		9
467	NAVADIA PLAST	5706/2		20
468	SPAN REMEDIES PVT LTD	502/16		7
469	SURIL PHARMA	76,087,614		8
470	RIDDHI CHEMICALS	5057-58		4
471	RIDDHI PHARMA UNIT 3	6120/2		34
472	ABHI ENTERPRISE	9102/3		5
473	LAXMI CHEMICALS	6006/1/B		35
474	VASUDEV DYES AND CHEMICALS	6006/1/A		35
475	SHAH AND CO.	2900/111		20
476	BHANUSHALI BARREL SUPPLER CO.			0
478	NIRANJAN CHEMICAL			2
479	SHREE ENTERPRISE			7
480	AEGIS INTERMEDIATES			10
481	SHYAM LIFE SCIENCES	69,196,901		4
482	UNIVARSAL AROMATICS			41
483	UNIVARSAL CHEMO PHARMA			34
484	BANSIDHAR PHARMA			7
485	SHIVA PIGMENTS PVT LTD			7
486	SHREE RAM DYE CHEM			7
487	COLOURS INDIA			7
488	PIGMENTS INDIA			4
489	DEEP CHEM			70
490	ANNEXY IMPEX			7
491	ANNEXY CHEMO PHARMA INDUSTRIES			7
492	YTATVA CHUNTAN PHARMA CHEM PVT LTD			3
493	RUSHABH ENTERPRISE			4
494	P R ENTERPRISES	E/38		0
495	VANDANA BARREL	1		0
	Total booked qty., KLD			**9632**
	Total booked qty., MLD			**9.63**

2.4.2. Capacity of proposed CETP:

- At GIDC, Ankleshwar there are several small, medium and large scale industries in operation. Also so many industries are planning for expansion of their existing unit by increasing the production capacity or adding the new products. Also there are new proposed industries to establish their manufacturing facility.
- Looking to the above expansion and new industries scenario the total effluent generation form the industrial estate going to increase.

- The GIDC Ankleshwar is very old GIDC and 70% industrial units are Small Scale Industries (SSI). The plot area of SSI are small and available space is limited. So it is difficult to upgrade/modify existing ETP.
- Presently, the effluent generated from the small scale industries within the premises of GIDC Ankleshwar is either discharged directly into the FETP of NCT through underground effluent conveyance pipeline or into CETP of ETL through tankers and final pumping station. NCT treat the effluent and after achieving discharge norms, dispose the treated effluent into deep Arabian Sea through 53 km (Onshore Pipeline: 43.6 km + Offshore Pipeline: 9.4 km) effluent conveyance pipeline.
- Now, Medium and Large scale industries are having their own Effluent Treatment Plant. Such industries are treating their effluent and discharging to GIDC drainage line to FETP.
- GIDC Ankleshwar has modified effluent conveyance system to final pumping station since Jan 2018.
- One is IIUS main line accommodating large scale units(@57) contributing @13 MLD and second is CIP line accommodating SSI units contributing @10 MLD. With this the quality and quantity of small scale/large scale units is identified. The auto sampler and flow meter is provided at final pumping station. Thus, presently approx. 24 MLD effluent flow is going to FETP through both lines.
- Small scale industries (SSI) have limited facilities for effluent treatment.
- From the Table-2.3, the total expected effluent load for the proposed CETP shall be 9.6 MLD. The expected effluent load from the GIDC shall be increased up to 10.0 MLD. To reduce the TDS load and better and easier treatment of effluent, addition of sewage from the nearby STP shall be provided. The additional sewage shall be about 2.5 MLD. Hence the total treatment capacity of proposed CETP shall be 10 MLD.
- Ratio of sewage to be mixed with industrial waste water shall be kept minimum. The mixing ratio of sewage to Industrial waste water shall be from 0.25 to 0.30.

- Hence, to treat the effluent from SSIs of GIDC, Ankleshwar; NAA of Ankleshwar along with AWML proposed to set up a 10 MLD CETP. Looking to the current scenario, it is proposed to set up CETP for 7.5 MLD Ind. Effluent + 2.5 MLD sewage with primary, secondary and tertiary treatment facility. The proposed CETP shall treat only the effluent from SSIs of GIDC Ankleshwar. The treated effluent from the proposed CETP shall achieve the FETP norms and discharge the treated effluent to FETP for further treatment and disposal.
- The proposed 10 MLD CETP shall be design such as that the proposed CETP will treat all the effluent in above said ratio of sewage to industrial effluent to achieve the prescribed norms.

2.4.3. Collection and distribution network

2.4.3.1. Present scenario of collection and distribution network

- GIDC Ankleshwar has modified effluent conveyance system to final pumping station in last several years.
- The drainage system in Ankleshwar GIDC has been upgraded from time to time from 2005 onwards and till 2016 at a cost of more than Rs. 85 crore.
- The map showing the various upgraded effluent conveyance pipeline is attached as **Annexure – 13.**
- The details of such up gradation are given below:
  - ❖ GRP (Glass Fiber Reinforced Plastic) pipeline marked in BROKEN DARK BLUE color in the map attached as **Annexure – 13.** This is called IIUS (Industrial Infrastructure Up gradation Scheme). This is a gravity based line in which the flow is without any pumping.
  - ❖ GRP (Glass Fiber Reinforced Plastic) pipeline marked in UNBROKEN DARK BLUE color. This is called CIP (Critical Infrastructure Project) line. This is a gravity based line in which the flow is without any pumping.
  - ❖ HDPE (High-density polyethylene) pipelines marked in light blue color. (2015-2016).
  - ❖ HDPE (High-density polyethylene) pipelines marked in light GREEN color. (2015-2016).

- ❖ HDPE pipelines (New Diversion Line) marked in Lighter Orange color (2015-2016).
- ❖ Glass Fiber Reinforced Plastics (GRP) pipelines marked in Darker Orange (2015-2016).

- The drainage network in Ankleshwar GIDC consists of a large number of pipelines which have been laid down in recent years. The pipelines in Ankleshwar GIDC are working efficiently without any difficulties.
- In Ankleshwar GIDC, only about 775 units are chemical industries that discharge/generate trade effluent. Out of the 775 chemical units, about 245 units send effluent to CETP by tanker and not by pipeline.
- Monitoring mechanism for collection of effluent through pipeline:
  - ❖ For monitoring and control purpose, NCT proposed to install Auto sampler and Flow meter at identified locations.
  - ❖ The process of installing Auto Sampler and Flow Meter has already started in Ankleshwar GIDC. 2 Meters have already been installed and are functioning. 7 more Meters have already been ordered by NCT. In addition to the 2 Meters already installed, 18 more Meters are proposed to be installed at identified locations within the next two to three months. This entire system can be installed at a cost of about Rs.1 crore.
- One is IIUS main line accommodating large scale units(@57) contributing @13 MLD and second is CIP line accommodating SSI units contributing @10 MLD. With this the quality and quantity of small scale/large scale units is identified. The auto sampler and flow meter is provided at final pumping station. Thus, presently approx. 24 MLD effluent flow is going to FETP through both lines.
- Since implementation of underground drainage network, to ensure that a single drop of waste water is not flowing to the Amravati or other natural creek passing through the estate by setting up of 3 Pumping Stations – A, B & C and Sewage Treatment Plant by Ankleshwar Industries Association jointly with the NAA and GIDC. These Pumping Stations and Sewage Treatment Plant have been fully operating since then.

- Presently all the effluent from pumping stations – A, B, C drained into Final Pumping Station (FPS). From FPS, entire effluent is pumped to FETP of NCT through underground pipeline.
- After completion of proposed 10 MLD CETP the effluent from CIP line accommodating SSI units contributing @10 MLD shall be treated in proposed 10 MLD CETP. And the treated effluent confirming the FETP inlet norms shall be drained to FPS for further treatment in FETP of NCTL.

2.4.3.2. Present scenario of collection and distribution network

- GIDC Ankleshwar is already having an underground collection and distribution network for effluent conveyance as mentioned above.
- The existing network is working efficiently without any difficulties.
- Presently, the management and maintenance of effluent conveyance system is maintained by NAA.
- Only the CIP pipeline network will be utilized for collection of effluent from various industries in CETP.
- Proper Inspection of existing pipeline will be carried out.
- Cleaning of pipeline will be carried out as per requirement.
- The routine monitoring of entire pipeline shall be carried out.
- The entire CETP shall be operated on PLC-SCADA system.

2.4.3.3. Possibilities for above ground pipeline network

- GIDC proposed to install aboveground pipeline network for the collection of waste water generated from industries of GIDC Ankleshwar.
- The project for above ground pipeline network is under progress.
- Estimated project cost: Rs. 79.22 crores.
- The underground pipeline drainage network is shown in Figure – 2.1.

FIGURE – 2.1

MAP SHOWING EXISTING PIPELINE NETWORK IN ANKLESHWAR GIDC

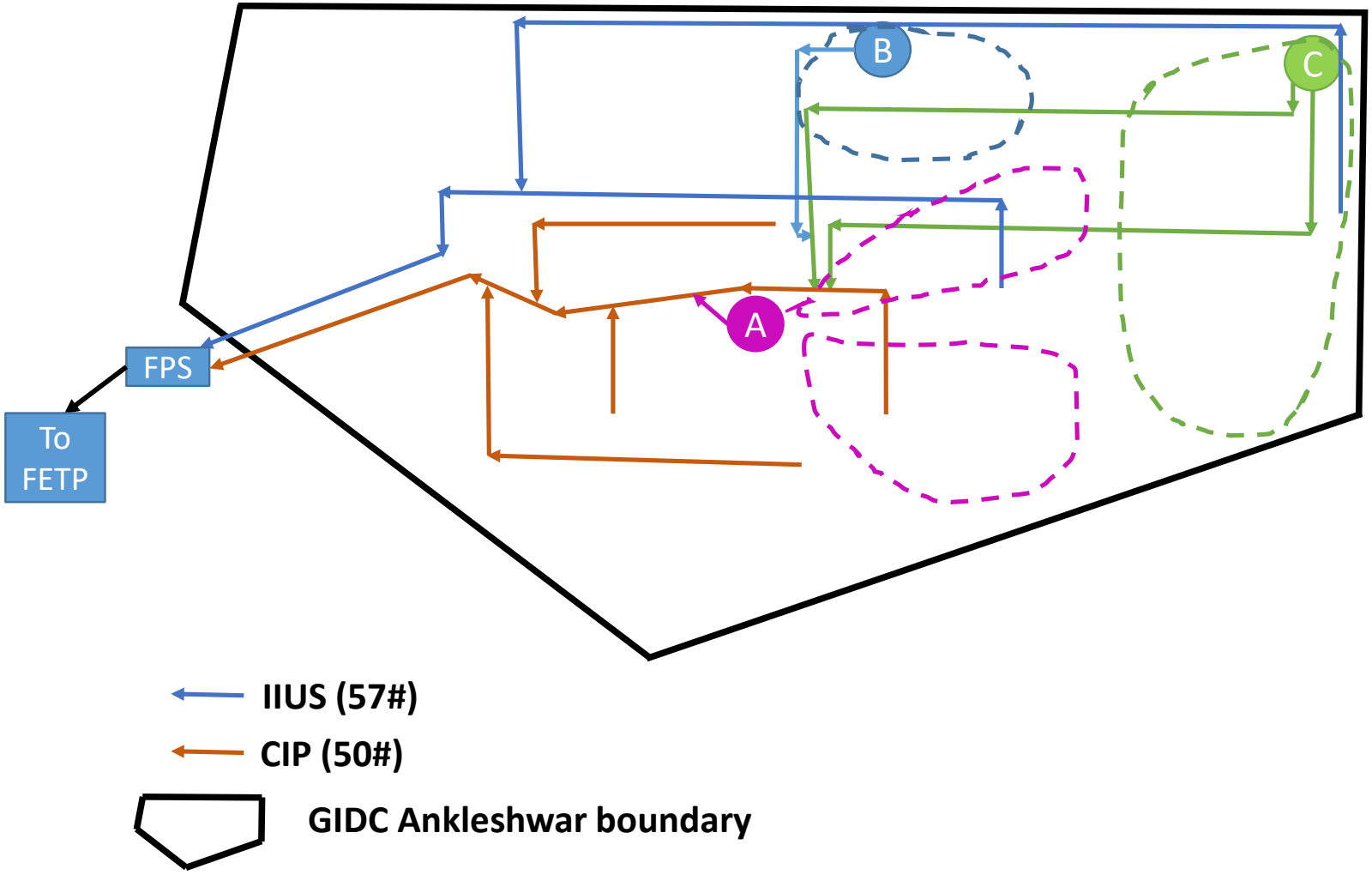
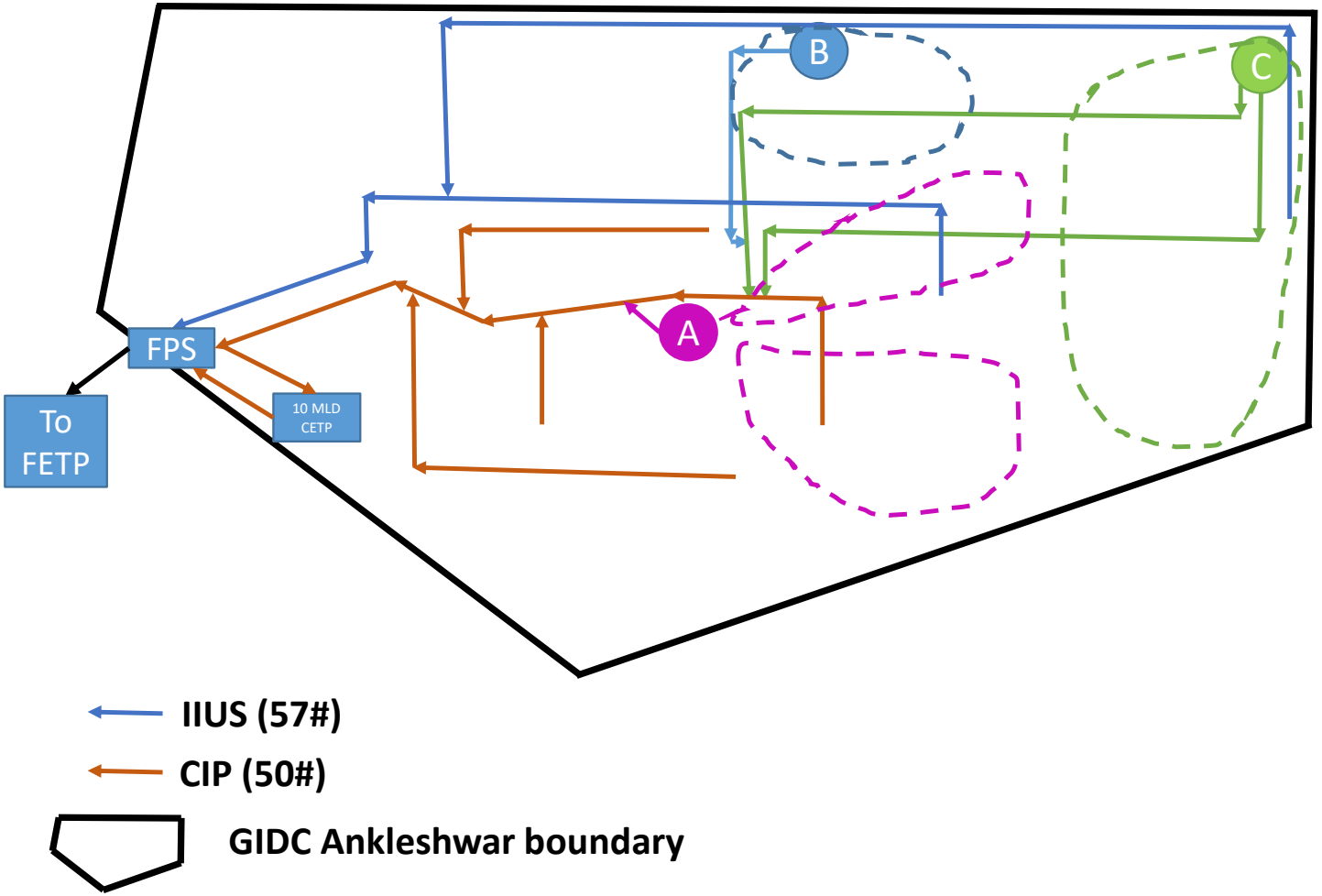


FIGURE – 2.2

MAP SHOWING PIPELINE NETWORK IN ANKLESHWAR GIDC WITH PROPOSED CETP



2.4.4. PROCESS DESCRIPTION OF CETP

- The proposed 10 MLD CETP is a common treatment facility for industries located within the GIDC, Ankleshwar. The facility will be comprising of conveyance, collection, treatment and disposal of treated effluent from small scale industries of GIDC, Ankleshwar. The treatment scheme comprising of collection, Primary treatment, Secondary treatment, Tertiary treatment and final treated effluent shall be sent to Final pumping station and further to FETP of NCT for further treatment and after achieving discharge norms, dispose the treated effluent into deep Arabian Sea through 53 km (Onshore Pipeline: 43.6 km + Offshore Pipeline: 9.4 km) effluent conveyance pipeline.
- The design criteria/inlet norms for proposed CETP are as under.

TABLE – 2.4

DESIGN CRITERIA/INLET NORMS OF 10 MLD CETP, ANKLESHWAR

No.	Effluent parameters	Unit	Inlet norms for CETP
1	pH	pH units	6.5-8.5
2	Color	Pt.Co. scale	300.00
3	Oil and grease	mg/L	10.00
4	Total dissolved solids	mg/L	18000.00
5	Suspended solids	mg/L	500.00
6	Ammonical Nitrogen (NH3-N)	mg/L	500.00
7	COD	mg/L	11000.00
8	BOD	mg/L	3600.00
9	Cr+	mg/L	2.00
10	Cr+6	mg/L	0.10
11	Cu	mg/L	3.00
12	Ni	mg/L	3.00

2.4.4.1. BRIEF PROCEE DESCRIPTION OF PROPOSED CETP

A. Preliminary Treatment (Physical Unit Operations)

Common physical unit operations include among other processes screening, Grit Chamber, Parshall flume, Oil and Grease removal Tank, Flow Equalization Sedimentation etc.

- **Screening:** A screen with openings of uniform size is used to remove large solids such as cloths, rags, papers, plastics etc. which may damage

process equipment, reduce the effectiveness of the common effluent treatment plant.

- **Grit Chamber:** Grit includes sand, dust, cinder, bone chips, coffee grounds, seeds, eggshells and other materials in wastewater that are non-putrescible and are heavier than organic matter. It is necessary to remove these materials in order to 1) protect moving mechanical equipment and pumps from unnecessary wear abrasion, (2) prevent clogging in pipes and heavy deposits in channels.
- **Oil and Grease Removal:** Oil and grease removal unit removes oil and grease from the incoming effluent prior to the further biological process.
- **Flow Equalization:** CETP's are designed to treat wastewater that has a more or less constant flow and quality that fluctuates. The equalization tank overcomes this by collecting and storing the waste, allowing it to mix and become a regular homogeneous quality before it is pumped to the treatment units at a constant rate. To determine the require volume of an equalization tank the hourly variation of flows needs to be determined. The equalization tank has submersible mixers for efficient equalization of organic load.

B. Primary Treatment (Chemical Unit Process)

- Chemical unit processes are always used with physical operations and may also be used with biological treatment processes, although it is possible to have a purely physico-chemical plant with no biological treatment. Chemical processes use the addition of chemicals to the wastewater to bring about changes in its quality. They include pH control, coagulation, chemical precipitation for the removal of heavy metals and oxidation.
- **Neutralization Tank (pH control):** Effluent from various industries is rarely pH neutral. It is therefore necessary to adjust the pH in the

treatment process to adjust the pH neutral. This is particularly important if biological treatment is being used, as a microorganisms used in biological treatment require a pH in the range of 6-8 and will be killed by highly acidic or alkali wastewater. For the acidic wastes (low pH) calcium hydroxide is added among other things. For the alkali wastes (high pH) sulphuric acid or hydrochloric acid may be added. The equalized volume of flow shall be pumped to the Neutralization tanks followed by Flash mixer for pH correction where heavy metals will be removed by maintaining different pH values. The neutralization tanks shall have air spargers for stripping ammonia at 9.5 pH. In the neutralization section, pH of the effluent is raised to @ 9.5 by mixing with lime slurry under agitation for precipitating out heavy metals as metal hydrauxides. Air is passed through the first two reaction tanks of neutralization tanks through a sparger, which removes the ammonical nitrogen upto 35%. Higher removal of ammonical nitrogen is also possible by further raising the pH to about 10 – 10.5.

- **Primary Clariflocculator (chemical coagulation and flocculation):** In this system an effluent after flash mixer shall be subjected to Primary Clariflocculation. Coagulation is a complex process but generally refers to collecting into a larger mass the minute solids particles dispersed in a liquid. Chemical coagulants such as poly alumimium chloride or ferrous Sulphate may be added to waste water to improve the attraction of fine particles so that they come together and form larger particles called flocs. A chemical flocculent, usually a polyelectrolyte, enhances the flocculation process by bringing together particles to form larger flocs, which settle out more quickly. This also helps in removal of heavy metals as hydroxides and color. Flocculation is aided by gentle mixing which causes the particles to collide. The Clariflocculator shall be provided with flocculator and Clarifier Mechanism. The sludge from the clariflocculator shall be taken to Sludge Thickener through Primary Sludge Pumps.

C. Biological Unit processes

- From the clariflocculator, an effluent shall be sent to single stage biological treatment called advanced Oxidation ditch based on extended aeration type activated sludge process. The objective of a biological treatment of industrial wastewater is to remove or reduce the concentration of, organic and inorganic compounds. Biological treatment process can take many forms but are all based around microorganisms, mainly bacteria. These microorganisms use component of the effluent as their "food" and in doing so break them down into less complex and less hazardous compounds. In the process the microorganisms increase in number.
- There are two main type of processes, these involve attached microbial growth (e.g. fixed film) in biotower, suspended microbial growth (e.g. activated sludge process). The biotower reduces nearly 35 - 40 % BOD and COD at very low power consumption. With both approaches large population of microorganisms are brought into contact with effluent in the presence of an excess of oxygen. In both systems the microbial population has to be retained in a tank referred to as the reactor.
- With suspended growth systems microbes grow in a small aggregates or "flocs" (these is known as activated sludge). Activated sludge leaves the reactor with the treated effluent but is settled out in a clarifier and returned to the aeration unit to recycle the bacteria. If the amount of Activated Sludge is excessive some may be disposed of rather than recycled.
- The Design of Oxidation Ditch with Aspirator type Process aerators shall ensure the better performance of anoxic and aerobic zones which also enhance and give efficient process of denitrification and nitrification treatment. The denitrification process shall release the oxygen in the anoxic zone and hence reduce the overall energy requirement for total biological nutrient process in the oxidation ditch. The biological

reduction of ammonical nitrogen below the guaranteed discharge standard shall also reduce the chemical cost during operation and maintenance period

- Biological treatment plants must be carefully managed as they use live microorganisms to digest the pollutants. For example some of the compounds in the waste water may be toxic to the bacteria used, and pretreatment with physical operations or chemical processes may be necessary. It is also important to monitor and control pH as adverse pH may result in death of microorganisms. The CETP must be properly aerated and must be operated 24 hours a day, 365 days a year to ensure that the bacteria are provided with sufficient "food" (i.e. wastewater) and oxygen to keep them live.

- **Secondary Clarifier:** Biologically treated effluent from ditch shall be sent to the secondary clarifier for separation and return of activated sludge back to the aeration tank for maintaining MLSS. Balance quantity of activated sludge is drained into secondary sludge storage tank. The overflow from the secondary clarifier shall be sent. The aeration tank and secondary clarifier units are provided along with the sludge re-circulation arrangement. From the aeration tanks, the effluent shall be taken to Secondary Clarifiers wherein the sludge shall be settled out and overflow shall be taken to secondary treated effluent collection sump. The biologically treated effluent shall be subjected to further tertiary treatment. The treated effluent after tertiary treatment shall be discharged to existing final pumping station (FPS).

- The sludge from the bottom of the secondary clarifier shall be collected in the Sludge Sump from where it is recirculated back to the inlet of the aeration tank through Sludge Recirculation Pumps.The excess sludge along with primary sludge shall be collected in Thickener Unit from where after thickening the sludge will be collected in the sludge sump

and then it will be pumped to the Membrane filter press unit for dewatering.

- The Polyelectrolyte shall be injected from its dosing tanks through Metering Pumps. The dewatered cake from the Membrane filter press shall be collected in the Tractor Trolley for disposal.
- Overflow of sludge thickener and filtrate from Filter press shall flow by gravity to the Leachate collection cum backwashed water sump.

D. Tertiary Treatment Scheme:

- The untreated effluent contains ammonical nitrogen as one of the major pollutant and sometimes refractory COD, and residual color, which cannot be degraded biologically under aerobic conditions and therefore require tertiary treatment after secondary treatment.
- **Removal of Ammonical Nitrogen:** Balance ammoniacal nitrogen is removed by super chlorination in the tertiary treatment section. The treated effluent from secondary section is pumped into a static mixer, wherein chlorine gas is first measured through a rota-meter, mixed with lime slurry in a ventuary, and the calcium hypo chlorite so prepared is mixed with the effluent. pH is controlled by addition of lime slurry whereas chlorine dozing is monitored by ORP control.
- The excess chlorine is treated with sodium bisulfite in static mixer; pH is controlled by addition of lime slurry. The effluent is further treated with activated carbon and then the effluent is passed through a Clariflocculator, wherein PE is dozed to remove suspended solids.
- The clarified effluent is passed through decline type gravity sand filter and activated carbon filter and finally discharged into final pumping station of GIDC. Any residual color is removed by activated carbon.

E. Sludge Dewatering: Advance System:

- PLC Scada controlled Automatic Membrane Filter Press shall be installed.
- After the filtration cycle is over, water is filled in membranes surrounding recessed filter plate at 16 bar pressure, which squeezes the wet cake to achieve 60 % solid content in wet cake.
- The wet cake is transferred to the silo by conveyor belt, for transferring the wet cake directly into trailer/ truck for direct disposal into approved landfill site.
- All conventional system like belt press, RVF, decanter centrifuge can achieve 25 - 30 % solid content, which has to be further solar drying to achieve 55- 60 % streanght before disposal into landfill site, involving lot of labour cost.

2.4.4.2. COMPARISON BETWEEN CONVENTIONAL AND ADVANCED OXIDATION DITCH SYSTEM:

Sr. No.	Conventional	Advanced Oxidation ditch
1.	Primary Treatment System: Pretreatment, equalization, neutralization, coagulation, flocculation, sedimentation and sludge dewatering.	Primary Treatment System: Pretreatment, equalization, neutralization, coagulation, flocculation, sedimentation and sludge dewatering.
2.	Extended aeration type activate sludge process, at a relatively long hydraulic retention time and sludge age, partially removes ammoniacal nitrogen	Extended aeration type activate sludge process with anoxic (Denitrification) and oxic zone (Nitrification) for simultaneous removal of Ammoniacal Nitrogen
3.	Two stage aeration tank followed by two stage secondary clarifier with RAS sump and pump for recirculation of activated sludge. The whole process is aerobic.	Anoxic/ Oxic / Aerobic Zone with internal sludge recirculation, followed by single stage secondary clarifier with RAS pump.
4.	Total retention time for two stage aeration 63 hours (Ist stage 48, 2nd stage 15 hrs)	Total retention time including Anoxic and Oxic zone 63 hours
5.	Aeration Syestem: Alternative 1: Diffused aeration system with diffusers and twin lobe/ tri lobe air blowers.	Aeration Syetm: Aeration with the help of aspirator type aerators. Comparatively less power consumption

	Alternative 2: Aeration with the help of aspirator type aerators. Comparatively less power consumption	
6.	Tertiary treatment system for the removal of NH3-N and residual COD system requires chlorination with pH control, dechlorination with SBS, dozing of coagulants, flocculants and sedimentation, followed by polishing treatment in PSF and ACF. Less chlorine and other chemicals required as NH3-N removed in oxidation ditch.	Tertiary treatment system for the removal of NH3-N and residual COD system requires chlorination with pH control, dechlorination with SBS, dozing of coagulants, flocculants and sedimentation, followed by polishing treatment in PSF and ACF. Full-fledged chlorine treatment rerquired for the removal of NH3-N, color and refractory COD.

❖ **ADVANTAGES OF ADVANCED OXIDATION DITCH TECHNOLOGY :**

- Efficient performance with power saving to the tune of nearly 25%.
- Treatment of ammoniacal nitrogen biologically with the help of nitrification/denitrification.
- Design and operational flexibility.
- Lower installation and operation costs.
- Clean and elegantly simple layout.
- Ease of operation and maintenance.
- Maximize system redundancy.
- Maximize treatment efficiency.
- Deep mixing capability.

- **FINAL DISPOSAL OF TREATED EFFLUENT:**
  - From CETP the treated effluent shall be pumped to existing Final pumping station where the effluent from other pumping stations are mixed and finally pumped into FETP of NCT for further treatment and finally dispose the treated effluent into deep Arabian Sea through 53 km (Onshore Pipeline: 43.6 km + Offshore Pipeline: 9.4 km) effluent conveyance pipeline with diffuser approx. 10 km in Sea. Necessary clearances like CRZ, EC have been already obtained for the said pipeline.

- The schematic diagram of final treated effluent disposal from FETP to Arabian Sea is shown in Figure 2.3.
- List of units of proposed CETP with their size are given in Table-2.5.

TABLE – 2.5

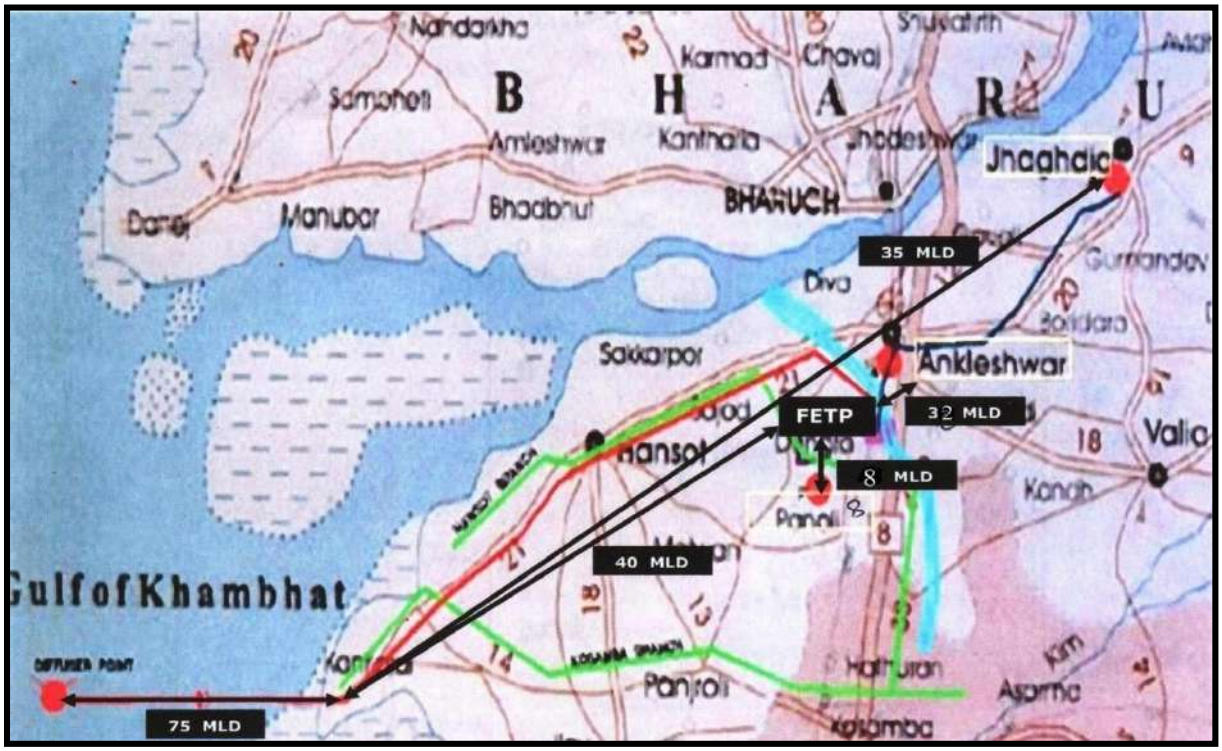
LIST OF ETP UNITS OF 10 MLD CETP, ANKLESHWAR

Sr. No.	Particulars	Dimension, m				Capacity, m3	No.	Total capacity, m3	MOC
		Length/Dia.	Width	Height	SWD/FB				
1	Inlet chamber	1.80	1.80	2.00	0.50	6.48	1	6.48	RCC
2	Screen channel with coarse bar & medium bar	3.00	0.45		1.00		1		RCC
3	Greet chamber	3.00	3.10	1.00	0.50	9.30	1	9.30	RCC
4	Oil & Grease chamber with FRP packing	8.00	8.00	1.85	0.50	118.40	1	118.40	RCC
5	FRP packing	4.25	4.25	1.20		21.68	1	21.68	RCC
6	Oil collection chamber	1.50	1.50	1.85	0.50	4.16	1	4.16	RCC
7	Equalization tank	48.90		4.00	0.50	7508.40	1	7508.40	RCC
8	Pump room for equalization tank with roof and EOT crane	8.00	4.00	4.10	0.50	131.20	1	131.20	RCC
9	Neutralization tank with acid proof tie lining	5.00	5.00	4.00	0.50	100.00	3	300.00	RCC
10	Flash mixer	5.00	5.00	4.00	0.50	100.00	1	100.00	RCC
11	Primary clarifloculator	24.00		3.50	0.50	1582.56	1	1582.56	RCC
12	Primary sludge sump	7.50	4.00	2.50	0.50	75.00	1	75.00	RCC
13	Dry sump for pump	4.00	3.50	3.60	0.50	50.40	1	50.40	RCC
14	Lime slurry preparation tank	5.00	5.00	1.25	0.50	31.25	2	62.50	RCC
15	Lime slurry feed tank	5.00	5.00	1.25	0.50	31.25	1	31.25	RCC
16	Ferrous sulphate/PAC preparation tank	5.00	5.00	1.25	0.50	31.25	2	62.50	RCC
17	Polyelectrolyte preparation tank	2.50	2.50	1.00	0.50	6.25	2	12.50	RCC
18	Bio tower with media	30.00		7.20	0.50	5086.80	1	5086.80	RCC
19	Bio tower feed sump	16.50		4.00	0.50	854.87	1	854.87	RCC
20	Bio tower circulation sump	16.50		4.00	0.50	854.87	1	854.87	RCC
21	Advanced Oxidation Ditch	176.00	30.00	6.00	0.50	31680.00	1	31680.00	RCC
22	Secondary Clarifier	32.60		3.50	0.50	2919.93	1	2919.93	RCC

23	RAS sludge sump	4.00		4.85	0.50	60.92	1	60.92	RCC
24	Secondary treated effluent sump	21.30		3.50	0.50	1246.51	1	1246.51	RCC
25	Lime slurry preparation tank	5.00	5.00	1.25	0.50	31.25	2	62.50	RCC
26	Lime slurry feed tank	5.00	5.00	1.25	0.50	31.25	1	31.25	RCC
27	Ferrous sulphate/PAC preparation tank	5.00	5.00	1.25	0.50	31.25	1	31.25	RCC
28	Polyelectrolyte preparation tank	2.50	2.50	1.00	0.50	6.25	1	6.25	RCC
29	SBS reagent tank	5.00	5.00	1.00	0.50	25.00	1	25.00	RCC
30	Chlorine shed	15.00	10.00			0.00	1	0.00	RCC
31	Static mixer for lime-hypo mixing with baffles	10.00	1.00	0.75	0.50	7.50	1	7.50	RCC
32	Hypo reaction tank	5.00	5.00	4.00	0.50	100.00	2	200.00	RCC
33	Static mixer for SBS-lime mixing with baffles	10.00	1.00	0.75	0.50	7.50	1	7.50	RCC
34	SBS reaction tank	5.00	5.00	4.00	0.50	100.00	2	200.00	RCC
35	Static mixer for lime-Ferrous mixing with baffles	10.00	1.00	0.75	0.50	7.50	1	7.50	RCC
36	Tertiary clarifloculator	28.30		3.50	0.50	2200.45	1	2200.45	RCC
37	Tertiary sludge sump	5.00	4.00	3.50	0.50	70.00	1	70.00	RCC
38	Tertiary treated effluent collection sump	21.30		3.50	0.50	1246.51	1	1246.51	RCC
39	Tertiary Dual media filter	4.50	10.50			47.25	2	94.50	
40	Filter back wash tank	7.00		3.00	0.50	115.40	2	230.79	RCC
41	Activated Carbon Filter	4.00		2.50		31.40	4	125.60	
42	Sludge Thickner	24.00		4.50	0.50	2034.72	1	2034.72	RCC
43	Thickened sludge sump with pump house	7.60	6.00	4.50		205.20	1	205.20	RCC
44	Pump house	6.00	5.00	4.50		135.00	1	135.00	RCC
45	Filter press house	20.00	22.00				1	0.00	RCC
46	Membrane Filter press	1.50	1.50				2	0.00	
46	Dirty water leachate collection sump	10.00		1.50		117.75	1	117.75	RCC
47	Urea preparation tank					2.00	1	2.00	HDPE
48	Phosphoric acid preparation tank					2.00	1	2	HDPE

FIGURE – 2.3

SCHEMATIC DIAGRAM OF TREATED EFFLUENT DISPOSAL



2.5. DESIGN DETAILS

To establish the CETP, design and capacity of CETP must be required to finalize. And for the same purpose, a treatability study of effluent from various industries which is going to be treated in CETP is required to be carried out. Clean Enviro Projects Consultancy Pvt. Ltd. as a Master Consultant has conducted a survey of GIDC, Ankleshwar and carried out the treatability study of above said effluent.

The treatability study of combined samples has been carried out. The detailed treatability study is attached as Annexure – 8.

2.5.1. CHARACTERISTICS OF UNTREATED & TREATED EFFLUENT:

- The characteristics of untreated and treated effluent with CETP disposal norms in terms of various parameters are as shown in below Table - 2.6.

TABLE – 2.6

Expected characteristics of untreated and treated effluent

No	Parameter	Unit	Before Treatment	After Treatment	CETP disposal norms
1	pH	pH units	7.80	7.9	6.5 to 8.5
2	Color	Pt.Co. scale	380.00	80-90	< 100
3	Oil and grease	mg/L	15.80	4 to 5	< 10
4	Total dissolved solids	mg/L	19500.00	14000-15000	
5	Suspended solids	mg/L	540.00	70-80	< 100
6	Ammonical Nitrogen (NH3-N)	mg/L	512.00	35-45	< 75
7	COD	mg/L	10800.00	400-500	< 500
8	BOD	mg/L	5126.00	70-80	< 100
9	Cr+	mg/L	2.20	0.7	< 1
10	Cr+6	mg/L	0.18	0.08	< 0.1
11	Cu	mg/L	3.42	0.7	< 1
12	Ni	mg/L	1.80	0.6	< 1

2.6. INFRASTRUCTURE FACILITIES

2.6.1. LAND

The total land area allotted by GIDC for proposed CETP is about 30,000 m^2. Provisions are made for administrative building, laboratory, hazardous waste storage area, chemical storage area, fresh water sump, D.G. Set room, vehical parking, etc. Land requirement for the project including its break up for various purposes, its availability and optimization is mentioned in Table 2.7.

TABLE – 2.7

LAND AREA BREAK UP

Sr. No.	Particulars	Area, m^2
1	CETP Process Area	23070.00
2	Administration & Lab	450.00
3	Internal Road	3080.00
4	Green belt	3400.00
	Total	**30000.00**

2.6.2. TRANSPORTATION FACILITIES

Transportation of all major materials shall be primarily by road only.

2.6.3. WATER & WASTE WATER

The industrial and domestic water requirement at proposed CETP is met through NAA water supply. Daily water consumption in proposed CETP is 228 KL/day. Details of water consumption pattern is given in table 2.8.

TABLE – 2.8

TOTAL WATER CONSUMPTION & EFFLUENT GENERATION

Sr. No.	Particular	Qty., KL/day		Remarks
		Water consumption	Effluent generation	
1	**Construction Phase**	**6.75**	5.5	Septic tank/Soak Pit
2	**Operation Phase**			
I	Domestic	30	24	Septic tank and CETP
II	**Industrial**			
a	Process	130	0	Consumed for chemical preparation and washing and shall be treated in CETP only.
b	Washing	50	40	
II	**Total Industrial (I+II)**	**180**	**40**	
III	**Gardening**	**18**	**0**	
	Total (I+II+III)	**228**	**64**	

2.6.4. ELECTRICITY REQUIREMENT

The power requirement is met through 2500 KW connecting load of DGVCL (GEB) and emergency standby one Diesel Generator Set of 1000 KVA.

2.6.5. FUEL REQUIREMENT

Diesel is used as fuel at rate of 205 L/hr for D.G. Set which is used in emergency only.

2.7. POLLUTION POTENTIAL AND ITS CONTROL MEASURE

2.7.1. AIR POL LUTION AND CONTROL SYSTEM

2.7.1.1. The flue gas emission and its control measures are mentioned in Table-2.9.

TABLE – 2.9

THE DETAILS OF FLUE GAS EMISSION

Sr. No.	Stack attached to	Stack height, m	Type of fuel	Fuel Cons., L/Hr	Emission Parameters	Unit	Concentration	Air Pollution Control Equipment
1	D. G. Set – 1000 KVA	12.5	HSD	205	PM	mg/Nm^3	< 150	Stack with 12.5 m Height with Stack Monitoring Facility (SMF)
					SO_2	ppm	< 100	
					NOx	ppm	< 50	

2.7.1.2. Chlorine gas emission is likely to be generated form chlorine tonner in case of leakage only. However, to take care of this leakage, caustic scrubber along with safety hood shall be provided as Air Pollution Control equipment. Detail is given in Table-2.10.

TABLE – 2.10

THE DETAILS OF PROCESS GAS EMISSION

Sr. No.	Source of Emission	Type of Emission	Scrubber	Stack Height, m	Stack Diameter, m	Outlet chlorine conc.
1	Chlorine tonner safety hood	Chlorine gas	750 dia. x 5000 mm FRP common Scrubber with alkali circulation tank, pump and blower	10	0.1	5 mg/nm^3

2.8. Solid & Hazardous waste Generations and disposal system

Four categories of hazardous wastes shall be generated from proposed CETP and shall be disposed as per Hazardous and Other Wastes (Management and & Transboundary Movement) Rules, 2016. The hazardous wastes generated are ETP Sludge from Common Effluent Treatment Plant, Used oil from lubrication of equipment, Discarded Containers and Oil & Grease from skimming. These Hazardous wastes are stored in scientifically designed and constructed hazardous waste storage area within the premises. CETP sludge shall be sent to Common TSDF of M/s. Bharuch Enviro Infrastructure Ltd. (BEIL), Ankleshwar. Used oil shall be sold to registered refiners. Discarded Containers shall be sold to GPCB approved recyclers. Oil & Grease from skimming shall be sent to registered refiners or to Common Incineration of TSDF of

M/s. Bharuch Enviro Infrastructure Ltd. (BEIL), Ankleshwar. Proposed hazardous waste generation quantity and category are given in Table-2.11.

TABLE – 2.11

SOLID & HAZARDOUS WASTE GENERATION QUANTITY AND CATEGORY

Sr. No.	Particulars	Unit	Category	Quantity	Hazardous waste disposal/Management
1	ETP Sludge	MT/month	I - 35.3	900	Collection, Storage, Transportation & Disposal by TSDF
2	Used Oil	Lit/year	I - 5.1	100	Collection, Storage, Transportation & Disposal by selling to registered refiners.
3	Discarded Drums	kg/month	I - 33.3	200	Collection, Storage, Transportation & Disposal by GPCB/CPCB/MoEF approved recyclers.
4	Oil & Graese skimming	MT/month	I - 35.4	1.5	Collection, Storage, Transportation & Disposal by selling to registered refiners or to Common Incineration of TSDF.

2.9. Noise level and CONTROL SYSTEM

The source of noise pollution at site will pumps, blowers, D.G. set (standby), etc. Extensive oiling & lubrication and preventive maintenance will be carried out to reduce noise generation at source to the permissible limit. However, at place where noise levels can exceed the permissible limit, Earplugs and Earmuffs will be provided to those working in such area.

2.10. DETAILS OF GREENBELT

The main objective of the green belt is to provide a barrier between the plant and surroundings areas. NAA and AWML will develop green belt within CETP premises. About 3400 m^2 of the total land area will be developed as greenbelt and other forms of greenery. GIDC will plan native places in consultation with the local horticulture.

2.11. MANPOWER REQUIREMENTS

Approx 150 nos. of people will get direct employment during construction phase. During the operation phase approximately 50 nos. of people will be required to operate the proposed CETP.

2.12. DETAILS OF RAW MATERIAL AND PRODUCTS TO BE MANUFACTURED BY INDUSTRIES.

Type of products manufactured and Raw materials consumption by Member industries are mentioned in Table – 2.12.

TABLE – 2.12

TYPE OF PRODUCTS MANUFACTURED AND RAW MATERIALS CONSUMED

TYPE OF PRODUCTS MANUFACTURED	RAW MATERIALS CONSUMPTION	
• Bulk Drugs & Bulk Drugs Intermediates	• HCl (30-32%)	• Acetone
• Specialty Chemicals	• H2SO4 (98%)	• IPA
• Synthetic Organic Chemicals	• Methanol	• Sodium Methoxide
• Pesticides	• Toluene	• Bromine
• Dyes and Dyes Intermediated	• Xylene	• Thionyl Chloride
• Solvents Distillation	• n-Hexane	• MDC
• Formulations	• Ammonium Chloride	• EDC
• **ETC.**	• Chlorine	• Activated Carbon
	• Acetic Acid	• Hyflow
	• Acetic Anhydride	• DMF
	• Formaldehyde	• DMS
	• NaOH	• Potassium Chloride
	• Sodium Sulphite	• Potassium Carbonate
	• Sodium Bisulphite	• Urea
	• **ETC.**	• **ETC.**

CHAPTER – 3
BASELINE ENVIRONMENT STATUS

3.1. Introduction

This chapter describes the description of the existing environmental status of the study with reference to the prominent environmental attributes. The study area covers 10 km radius around the project site. The land use and socio-economic aspects were studied with respect to 10 km radius around the site.

The existing environmental setting is considered to adjudge the baseline conditions which are described with respect to climate, atmospheric conditions, water quality, soil quality, ecology, socio-economic profile, land use and places of archaeological importance.

The baseline status of environmental quality in the vicinity of project site serves as the basis for identification, prediction and evaluation of impacts.

The baseline environmental quality has been assessed in the summer season (March, 2017 to May, 2017) in a study area of 10 km radial distance from the project site. Knowledge of baseline environmental status of the study area is useful for Impact Assessment-Process of assessing and predicting the environmental consequences of the significant actions. Significant action depicts direct adverse changes caused by the action and its effect on the health of the biota including flora, fauna and human being, socio-economic conditions, current use of land and resources, physical and cultural heritage properties and biophysical surroundings. Baseline data generation of the following environmental attributes is essential in EIA studies.

1. Meteorology
2. Ambient Air Quality
3. Ambient Noise Quality
4. Surface and Ground water Quality
5. Soil Quality & Geological Features
6. Land use pattern
7. Socio-economic status survey

3.2. Meteorology

Air borne pollutants is dispersed by atmosphere motion. Knowledge of these motions, which range is scale from turbulent diffusion to long-range transport by weather systems, is essential to simulate such dispersion and quality of impacts of air pollution on the environment. The purpose of EIA is to determine whether average concentrations are likely to encounter at fixed locations (Known as the receptor), due to the given sources (locations and rates of emission known), under idealized atmospheric conditions. It is imperative that one should work with idealized condition and all analysis pertaining to air turbulence and ambient air or noise pollution should be done with meteorological conditions, which can at best be, expected to occur. The details of measurement technique, instruments, specification of measurement standards and accuracy of instruments are adopted from the Indian Standard: 8829-1978 “Guideline for micrometeorological technique in Air Pollution Studies.” Care is taken to install the anemometer within a distance of six times the height of nearest vertical terrain elements (house, trees etc.) and height of 10 m from the average ground level of the fetch area.

3.3. Micro-Meteorology of the area

The climate of Gujarat is varied, as it is moist in the southern districts and dry in the northern region. The Arabian Sea and the Gulf of Cambay in the west consequently reducing the temperature and render the climate more pleasant and healthy. Bharuch lies along the southern part of the state and experiences a climate with aridity index of 15 to 20 per cent indicating adequate moisture availability in the soils for most part of the year.

3.3.1. TEMPERATURE DETAILS

Minimum, Maximum and Average Temperatures for Ankleshwar Station of the year 2016 are given in Table 3.1.

TABLE-3.1

Temperature Details

Month (2016)	Minimum Temperature (^{0}C)	Maximum Temperature (^{0}C)	Average Temperature (^{0}C)
January	17	34	25
February	19	37	28
March	19	40	29
April	25	39	31
May	28	41	32
June	26	37	31
July	25	33	29
August	25	32	29
September	8	33	28
October	19	37	28
November	17	34	25
December	15	35	24

3.3.2. RELATIVE HUMIDITY

Minimum, Maximum and Average Monthly Relative Humidity for Ankleshwar Station of the year 2016 is given in Table 3.2.

TABLE-3.2

Relative Humidity (%) Details

Month (2016)	Minimum R.H.%	Maximum R.H.%	Average R.H.%
January	6	55	25
February	6	100	25
March	6	82	28
April	6	70	30
May	6	69	37
June	11	77	34
July	19	94	52
August	65	100	91
September	16	100	72
October	6	97	39
November	6	39	15
December	6	39	14

3.3.3. RAINFALL

Rainfall data for Ankleshwar Station of the year 2016 is presented in Table 3.3.

TABLE-3.3

Rainfall Details

Month (2016)	Monthly Total (mm)	Numbers of Rainy Days
January	0	0
February	0	0
March	0	0
April	0	0
May	0	0
June	25	7
July	159	25
August	118	17
September	94	12
October	100	3
November	0	0
December	0	0
Total	**496**	**64**

Total rainfall, during the monsoon period, has been recorded as 496 mm.

3.3.4. Wind Speed

Wind speed for Ankleshwar Station of the year 2016 is given in Table 3.4.

TABLE-3.4

Wind Speed Details

Sr. No.	Month (2016)	Average Wind speed (KMPH)
1.	January	0.4
2.	February	0.9
3.	March	1.5
4.	April	2.4
5.	May	6.1
6.	June	6.7
7.	July	5.3
8.	August	6.9
9.	September	4.1
10.	October	1.9
11.	November	1.8
12.	December	2.6
Average		**3.3**

The site specific data were collected for March, 2017 to May, 2017. Data are tabulated in Table 3.5.

TABLE-3.5

Site Specific Meteorological Data (Period: March - 2017 to May - 2017)

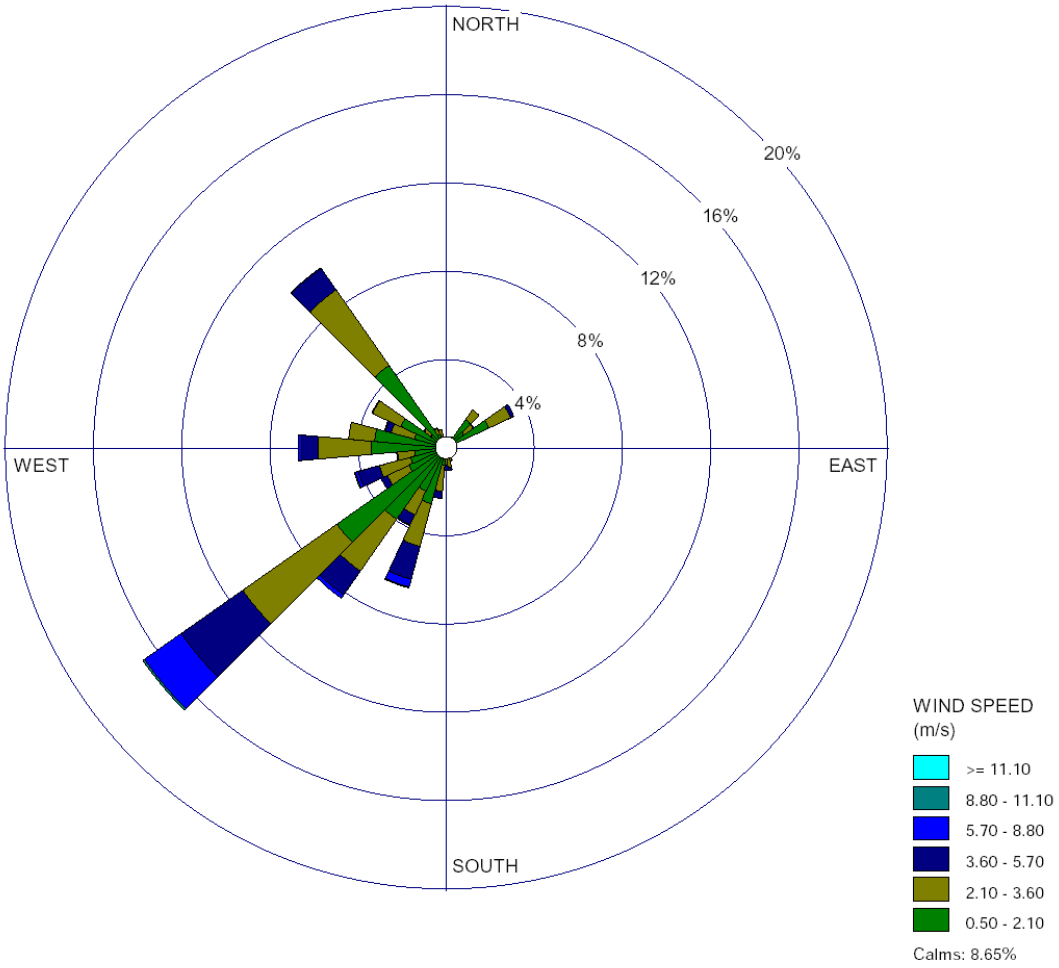
METEOROLOGICAL PARAMETER	MONTH		
	MARCH-2017	APRIL-2017	MAY-2017
Temperature (^{0}C)			
Min.	21.1	20.6	27.5
Max.	40.9	42.4	40.2
Avg.	30.4	27.2	30.8
Relative Humidity (%)			
Min.	6.0	6.9	8.1
Max.	92.1	86.8	98.2
Avg.	26.5	28.1	39.1
Wind Speed (km/h)			
Min.	0	0	0
Max.	10.2	11.7	13.7
Avg.	1.4	2.5	5.7

FIGURE – 3.1 A

Wind Rose Diagram

WIND ROSE PLOT:
10 MLD CETP, Ankleshwar

DISPLAY:
Wind Speed
Direction (blowing from)

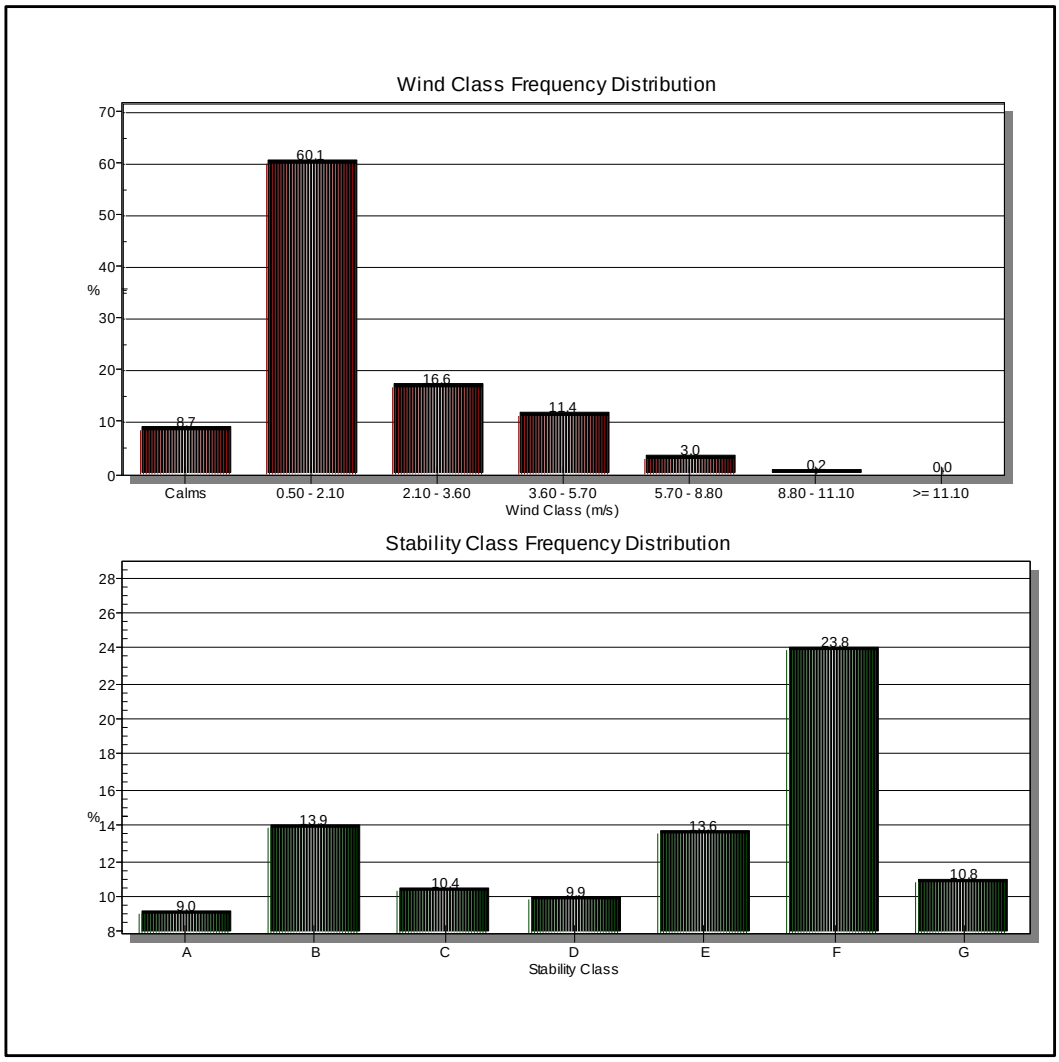


COMMENTS:	DATA PERIOD: **Start Date: 01/03/2017 - 00:00** **End Date: 31/05/2017 - 23:00**	COMPANY NAME: **M/s 10 MLD CETP, Ankleshwar**	
		MODELER:	
		TOTAL COUNT: **2207 hrs.**	
	AVG. WIND SPEED: **2.14 m/s**		PROJECT NO.:

WRPLOT View - Lakes Environmental Software

FIGURE – 3.1 B

Stability Class Distribution



3.4. Air Environment:

3.4.1. DESIGN OF NETWORK FOR AMBIENT AIR QUALITY MONITORING LOCATIONS

The air quality status in the impact zone is assessed through a network of ambient air quality monitoring locations. The tropical climatic conditions mainly control the transport and dispersion of air pollutant emissions during various seasons.

The baseline studies for air environment include identification of specific air pollutants prior to implement of the project. The Rapid Environmental Impact Assessment (REIA) study requires monitoring of baseline air quality during one season. Accordingly, air quality monitoring was carried out in the season from March - 2017 to May - 2017. The baseline status of the air environment is assessed through a systematic air quality surveillance program, which is planned based on the following criteria:

- Topography / terrain of the study area
- Regional synoptic scale climatologically normal
- Densely populated areas within the region
- Location of surrounding industries
- Representation of regional background
- Representation of valid cross-sectional distribution in downwind direction

3.4.2. RECONNAISSANCE

Reconnaissance was undertaken to establish the baseline status of air environment in the study region. Eight Ambient Air Quality Monitoring (AAQM) locations were selected based on guidelines of network sitting criteria. All AAQM locations were selected within the study area of 10 km radial distance from the project site.

3.4.3. METHODOLOGY FOR AMBIENT AIR QUALITY MONITORING

The ambient air quality monitoring was carried out in accordance with National Ambient Air Quality Standards (NAAQS). Ambient Air Quality Monitoring (AAQM) was carried out at eight locations during the study period. SEAC

suggested that there should be at least one monitoring station in the pre dominant downwind direction at a location where maximum ground level concentration is likely to occur. Accordingly, locations of the different stations with respect to its distance and direction from project site are shown in Table-3.7 and Figure-3.2 respectively.

The conventional and project specific parameters such as Particulate Matter ($PM_{2.5}$), Particulate Matter (PM_{10}), Sulphur Dioxide (SO_2), Oxides of Nitrogen (NOx), Ozone (as O_3), Lead (as Pb), Carbon Monoxide (as CO), Ammonia (as NH_3), Benzene (as C_6H_6), Benzo (a) Pyrene (BaP) particulate phase only, Arsenic (as As), Nickel (as Ni), HCl, Cl_2, HBr, HF and Volatile Organic Compounds (VOCs) were monitored at different locations.

The values for mentioned concentrations of various pollutants at all the monitoring locations were processed for different statistical parameters like average and percentile values. The existing baseline levels of SPM, $PM_{2.5}$, PM_{10}, SO_2, NOx, O_3, Pb, CO, NH_3, C_6H_6, Benzo (a) Pyrene (BaP) particulate phase only, As, Ni and VOCs are expressed in average as given in Tables-3.8.

To establish the baseline status around the project site of the study region monitoring was conducted at 10 Ambient Air Quality Monitoring (AAQM) Stations in and around the study region during March - 2017 to May - 2017.

TABLE-3.6

Details of Monitoring Locations

Sr. No.	Name of village	Bearing w.r.t. project site	Approximate radial distance from project site (km)	Ambient Air	Noise	water	Soil	TYPE OF AREA
1	Project site	--	--	A1	N1	GW1	S1	Industrial
2	Andada	N	3.95	A2	N2	GW2	S2	Residential
3	Jitali	SE	1.75	A3	N3	GW3	S3	Residential
4	Uchhali	NE	2.42	A4	N4	GW4	S4	Residential
5	Motali	NE	2.24	A5	N5	GW5	S5	Residential
6	Kharchi Bhilwada	NE	4.89	A6	N6	GW6	S6	Residential
7	Gadkhol Patiya	NW	4.02	A7	N7	GW7	S7	Residential
8	Amboli	SW	8.68	A8	N8	GW8	S8	Residential
9	Umarwada	SW	8.86	A9	N9	GW9	S9	Residential
10	Umarwada Pond	SW	8.87	-	-	SW11	-	-

FIGURE – 3.2

Location of Ambient Air Quality Monitoring Stations

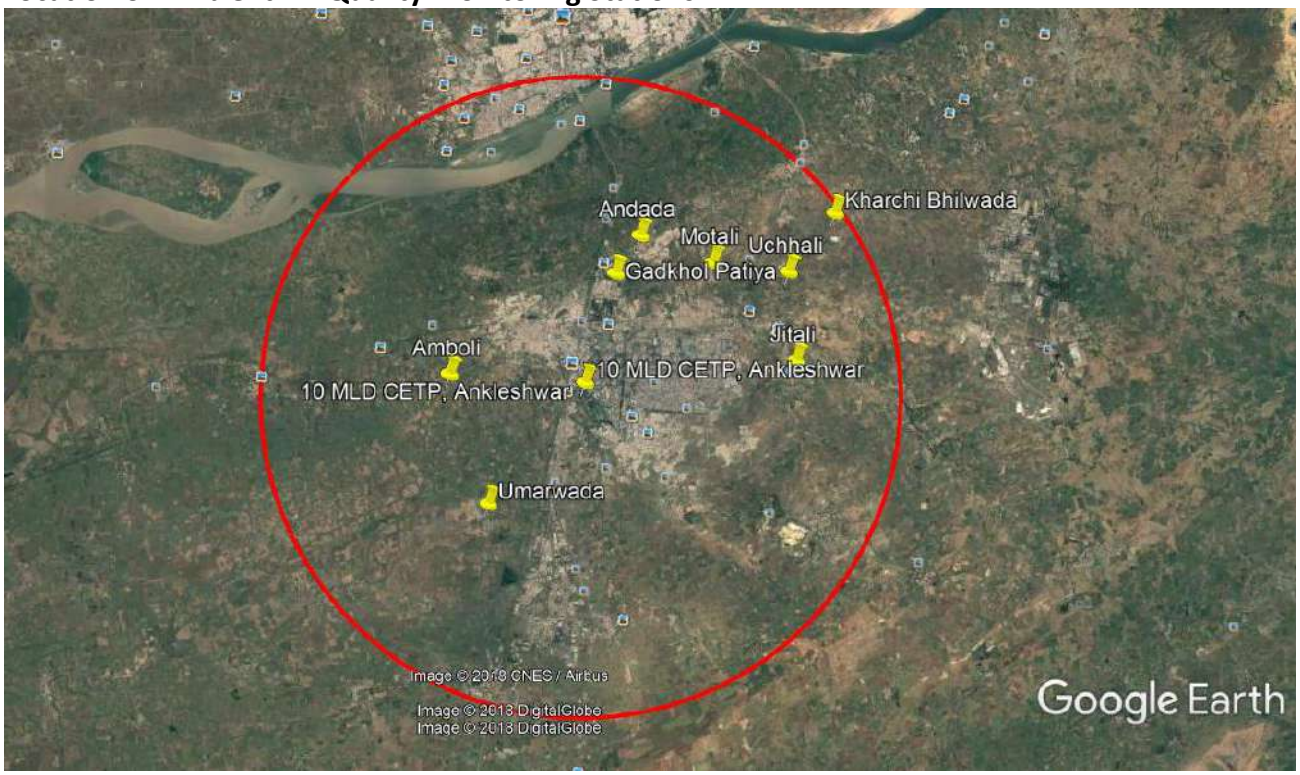


TABLE-3.7

Details of Ambient Air Quality Monitoring Locations

Sr. No.	Name of village	bearing w.r.t. project site	Approximate radial distance from project site (km)	Ambient Air
1	Project site	--	--	A1
2	Andada	N	3.95	A2
3	Jitali	SE	1.75	A3
4	Uchhali	NE	2.42	A4
5	Motali	NE	2.24	A5
6	Kharchi Bhilwada	NE	4.89	A6
7	Gadkhol Patiya	NW	4.02	A7
8	Amboli	SW	8.68	A8
9	Umarwada	SW	8.86	A9

TABLE-3.8

Ambient Air Quality Status (March - 2017 to May - 2017) Unit: μg/m³

Sr. No.	Sampling Location	Sampling duration	SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_x	NH_3
			μg/m³					
1	Project site : (A1)	24 hours	118.50	88.40	49.40	16.21	25.31	BDL
2	Andada (A2)	24 hours	136.60	94.63	49.57	16.42	18.16	BDL
3	Jitali(A3)	24 hours	136.40	96.39	48.29	18.31	20.56	BDL
4	Uchhali (A4)	24 hours	123.20	89.54	47.00	17.29	21.02	BDL
5	Motali (A5)	24 hours	122.80	81.34	44.69	16.93	18.25	BDL
6	Kharchi Bhilwada (A6)	24 hours	140.80	97.30	51.72	19.66	23.05	BDL
7	Gadkhol Patiya (A7)	24 hours	122.70	82.13	48.06	18.96	20.33	BDL
8	Amboli (A8)	24 hours	121.10	78.35	43.98	16.87	19.03	BDL
9	Umarwada (A9)	24 hours	143.00	92.40	57.51	20.42	21.64	BDL
NAAQS			**200**	**100**	**60**	**80**	**80**	**400**

Sr. No.	Sampling Location	O_3	HBr	Pb	As	Ni	C_6H_6
		μg/m³			ng/m³	ng/m³	μg/m³
1	Project site : (A1)	11.22	BDL	BDL	BDL	11.20	BDL
2	Andada (A2)	10.55	BDL	BDL	BDL	10.62	BDL
3	Jitali(A3)	11.02	BDL	BDL	BDL	10.81	BDL
4	Uchhali (A4)	10.85	BDL	BDL	BDL	10.77	BDL
5	Motali (A5)	10.88	BDL	BDL	BDL	10.73	BDL
6	Kharchi Bhilwada (A6)	11.19	BDL	BDL	BDL	10.74	BDL
7	Gadkhol Patiya (A7)	10.76	BDL	BDL	BDL	10.57	BDL
8	Amboli (A8)	10.65	BDL	BDL	BDL	10.48	BDL
9	Umarwada (A9)	10.76	BDL	BDL	BDL	10.56	BDL
NAAQS		**180**	**300**	**1**	**6**	**20**	**5**

Sr. No.	Sampling Location	HC	CO	VOC	HCl	Cl_2	HF
		ppm	mg/m³	ppm	μg/m³		
1	Project site : (A1)	BDL	1.50	1.00	10.48	BDL	BDL
2	Andada (A2)	BDL	1.27	0.70	9.94	BDL	BDL
3	Jitali(A3)	BDL	1.90	0.50	9.94	BDL	BDL
4	Uchhali (A4)	BDL	1.25	0.40	8.43	BDL	BDL
5	Motali (A5)	BDL	1.22	0.40	6.34	BDL	BDL
6	Kharchi Bhilwada (A6)	BDL	1.20	0.50	10.45	BDL	BDL
7	Gadkhol Patiya (A7)	BDL	1.23	0.60	8.24	BDL	BDL
8	Amboli (A8)	BDL	1.28	0.40	7.76	BDL	BDL
9	Umarwada (A9)	BDL	1.29	0.50	22.49	BDL	BDL
NAAQS		--	**5**	--	**200**	**100**	**60**

Note: BDL: Below Detectable Limit
Detectable Limit of Instrument:
Pb : 0.5 μg/m^3
CO : 1.14 mg/m^3
C_6H_6 : 2.0 μg/m^3
BaP : 0.5 ng/m^3
As : 2.0 ng/m^3
Ni : 10.0 ng/m^3
NH_3 : 1.0 μg/m^3
HCl : 1.0 μg/m^3
HBr: 1.0 μg/m^3
Cl_2: 5.0 μg/m^3
HF: 1.0 μg/m^3
VOC : Aeroqual Series 300 (Sensor 0 – 25 ppm) l
Minimum Detectable Limit : 0.1 ppm

3.4.4. SUMMARY:

The statistical interpretation of observed ambient air quality concentrations is presented in Table-3.8. They represent the cross sectional distribution of the baseline air quality status of the study region.

The maximum concentration of SPM (143 μg/m^3), PM_{10} (97.3 μg/m^3), $PM_{2.5}$ (57.51 μg/m^3), SO_2 (20.42 μg/m^3), maximum concentration of NOx (23.05 μg/m^3), maximum concentration of O_3 (11.22 μg/m^3), maximum concentration of CO (1.90 μg/m^3), maximum concentration of VOC (1.0 ppm), was recorded in study area.

The minimum concentration of SPM (118.5 μg/m^3), PM_{10} (78.35 μg/m^3), $PM_{2.5}$ (43.98 μg/m^3), SO_2 (16.21 μg/m^3), minimum concentration of NOx (18.16 μg/m^3), minimum concentration of O_3 (10.55 μg/m^3), minimum concentration of CO (1.20 μg/m^3), minimum concentration of VOC (0.4 ppm), was recorded in study area.

The PM_{10} and $PM_{2.5}$ concentrations at all the AAQM locations were primarily caused by local phenomena including industrial & vehicular activities and natural dust getting air borne due to manmade activities and blowing wind. PM_{10} and $PM_{2.5}$ concentrations were observed below stipulated standards of CPCB for Industrial, Residential, Rural and Other Area at all air quality

monitoring locations during the monitoring period.

3.5. NOISE ENVIRONMENT

The objective of the noise pollution survey around the project site was to identify existing noise sources and to measure background noise levels. The study was carried out in the following steps:

- Reconnaissance
- Identification of noise sources and measurement of noise levels
- Measurement of noise levels due to transportation
- Community noise levels

3.5.1. RECONNAISSANCE

The details of locations are given in Table-3.8 and shown in Figure-3.3.

3.5.2. METHODOLOGY FOR NOISE MONITORING

The noise monitoring was carried out at eight locations in day time and at night time in the study area covering all the areas i.e. industrial, commercial, and residential and silence zones as mentioned in Noise (Pollution and Control) Rules, 2000. Hourly Equivalent noise levels Leq (day) and Leq (night) were measured at each monitoring locations. The Details of Ambient Noise Quality Monitoring Locations are given in Table – 3.9. Monitoring from March 2, 2017 during day and night time was carried out at all the locations. The noise level measured in study area at different locations is given in Table 3.10

TABLE-3.9

Details of Ambient Noise Quality Monitoring Locations

Sr. No.	Name of village	bearing w.r.t. project site	Approximate radial distance from project site (km)	Noise	TYPE OF AREA
1	Project site	--	--	N1	Industrial
2	Andada	N	3.95	N2	Residential
3	Jitali	SE	1.75	N3	Residential
4	Uchhali	NE	2.42	N4	Residential
5	Motali	NE	2.24	N5	Residential
6	Kharchi Bhilwada	NE	4.89	N6	Residential
7	Gadkhol Patiya	NW	4.02	N7	Residential
8	Amboli	SW	8.68	N8	Residential
9	Umarwada	SW	8.86	N9	Residential

FIGURE – 3.3

Location of Noise Level Monitoring Stations

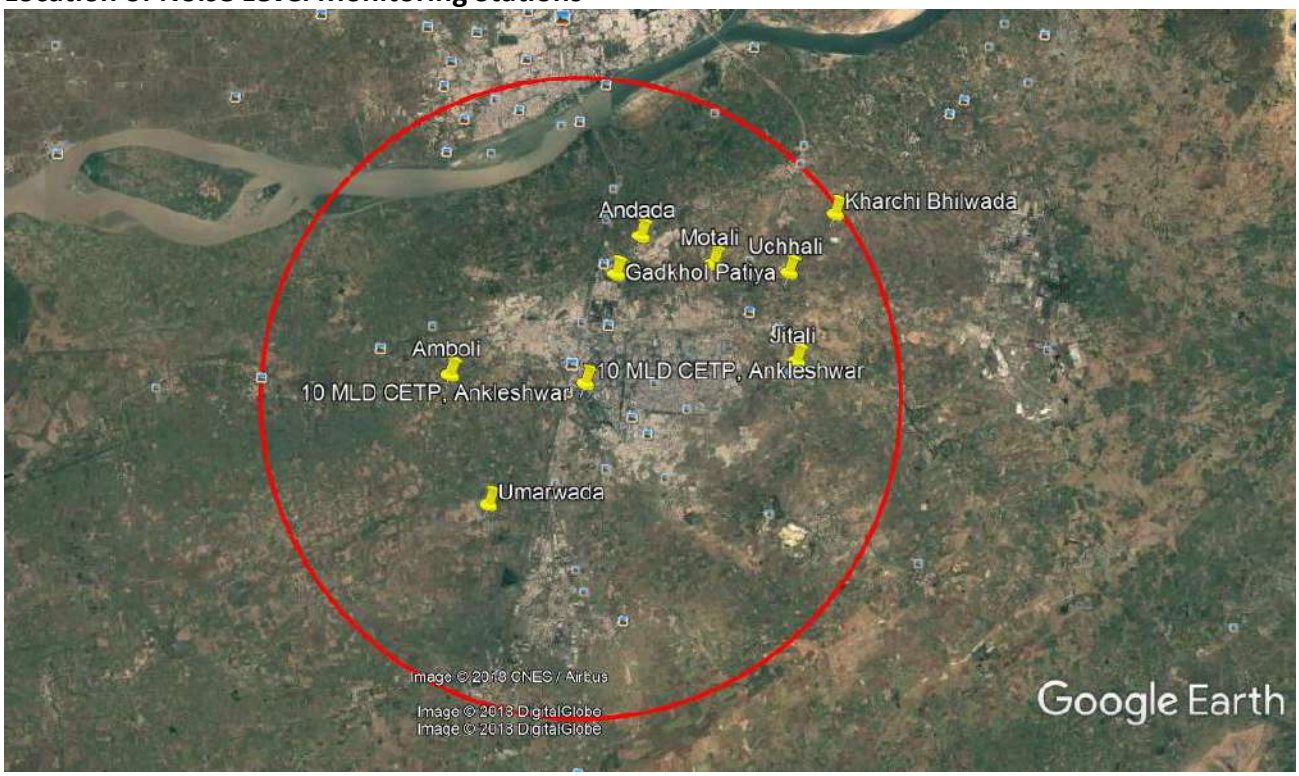


TABLE-3.10

Background Noise Levels

Sr. No.	Location	Noise Level in dB(A)			
		Day		Night	
		Min.	Max.	Min.	Max.
	Industrial/Residential Area				
1	Project site (N1)	65.1	70.1	59.8	63.4
2	Andada (N2)	47.3	51.9	37.3	42.1
3	Jitali (N3)	48.4	53.2	37.2	41.5
4	Uchhali (N4)	47.5	52.7	38.2	42.7
5	Motali (N5)	46.7	51.5	39.1	43.1
6	Kharchi Bhilwada (N6)	47.8	53.1	39.4	44.9
7	Gadkhol Patiya (N7)	49.4	54.6	38.2	44.8
8	Amboli (N8)	47.2	53.2	37.2	43.2
9	Umarwada (N9)	47.1	52.8	38.1	42.5

NOTE:

Type of Test **:** On Site Testing

Type of Test : Instrumental Method (SLM/Lutron-4001)

TABLE-3.11

NATIONAL NOISE QUALITY STANDARDS (CPCB)

AREA CODE	CATEGORY OF AREA	LIMIT dB (A) Day Time	LEQ dB (A) Night Time
N1	Industrial	75	70
N2	Commercial	65	55
N3	Residential	55	45
N4	Silence Zone	50	40

3.5.3. NOISE LEVELS DUE TO TRANSPORTATION

Noise levels were also measured at three different locations on March 2, 2017. The equivalent noise level Leq (60 min average) measured at a distance of 10 m and 20 m from the edge of the road at each of the locations are presented in Table 3.12.

TABLE-3.12

Noise Levels Due to Transportation

Sr. No.	Location	Noise Level in dB(A)			
		Day		Night	
		Min.	Max.	Min.	Max.
	Commercial Area (Transportation)				
1	Nr. Valia Chowkdi	61.3	64.7	51.8	53.3
2	Nr. Asian Paint Chowkdi	58.2	61.8	48.2	51.1
3	Nr. Kondh By Pass Road	61.2	63.3	47.2	49.3
4	Nr. Jitali By Pass Road	60.9	62.5	50.4	52.7
5	Nr. Uchhali By Pass Road	58.3	60.2	51.2	52.5
6	Nr. Ankleshwar Bus Station	62.2	64.8	53.3	54.5
7	Nr. Kharchi By Pass Road	56.3	60.8	47.9	51.1
8	Nr. Amboli By Pass Road	55.7	61.2	45.2	47.7

3.6. WATER ENVIRONMENT :

3.6.1. RECONNAISSANCE

The average annual rainfall in the region is about 496. The baseline water quality status in the region is established by analyzing eco water and ground water. Water requirement is met through GIDC water supply.

3.6.2. METHODOLOGY FOR WATER QUALITY MONITORING

Physico-chemical parameters have been analyzed to ascertain the baseline status of fresh water in the existing surface water and ground water bodies. Samples were collected during the study period of March 2, 2017 to March 3, 2017 and analyzed as per the Standard Methods of Water and Wastewater Analysis (APHA).

The details of surface and ground water sampling locations are given in Table 3.13 and sampling locations of water quality monitoring are shown in Figure 3.4**.**

The Physico-chemical characteristics of the different water samples are presented in the Tables 3.14.

TABLE-3.13

Sampling Locations for Monitoring Surface and Ground Water Quality

Sr. No.	Name of village	bearing w.r.t. project site	Approximate radial distance from project site (km)	water
1	Project site	--	--	GW1
2	Andada	N	3.95	GW2
3	Jitali	SE	1.75	GW3
4	Uchhali	NE	2.42	GW4
5	Motali	NE	2.24	GW5
6	Kharchi Bhilwada	NE	4.89	GW6
7	Gadkhol Patiya	NW	4.02	GW7
8	Amboli	SW	8.68	GW8
9	Umarwada	SW	8.86	GW9
10	Umarwada Pond	SW	8.87	SW1

GW= Ground water
SW= Surface water

FIGURE – 3.4

Locations of Water Sampling Stations

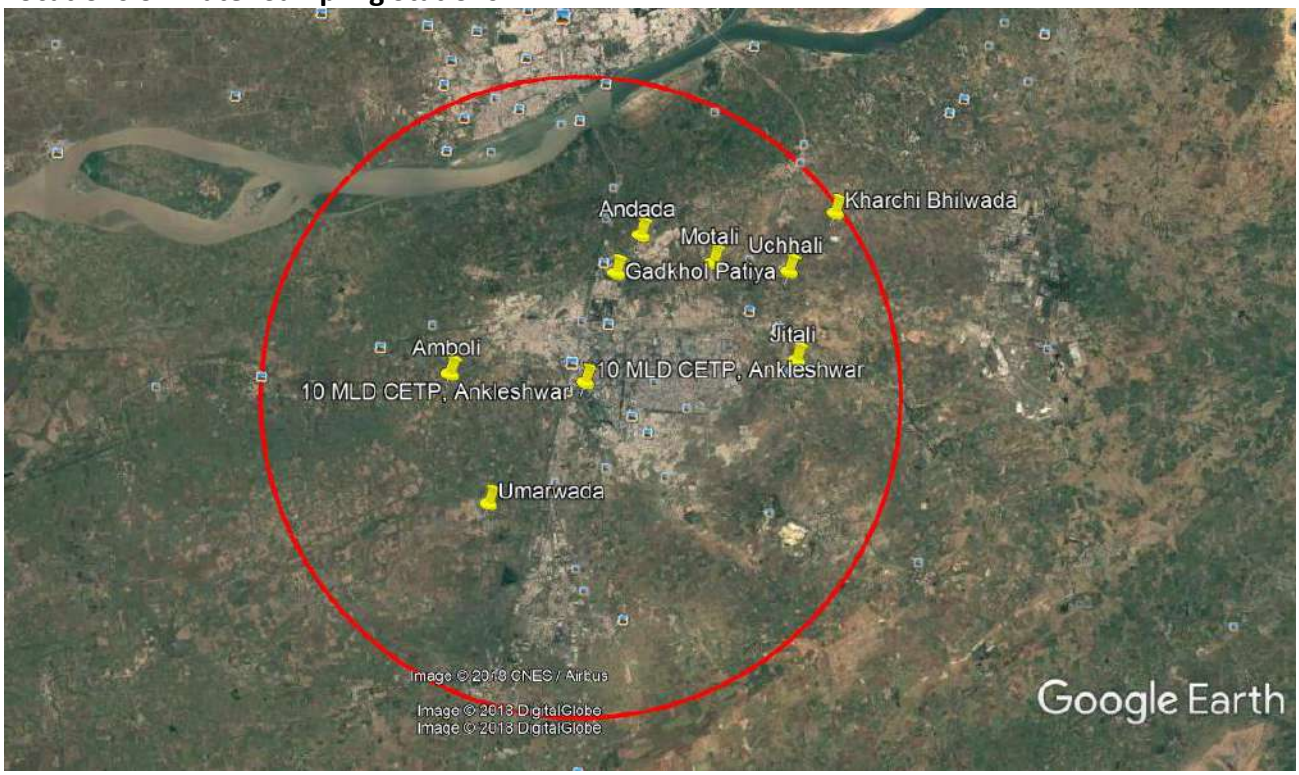


TABLE-3.14

Water Quality (Ground Water)

Sr. No.	PARAMETER	UNIT	LOCATION/LAB ID				TEST METHOD
			JITALI	UCHHALI	MOTALI	KHARCHI BHILWADA	
			06/EIA/16/GW/V1	06/EIA/16/GW/V2	06/EIA/16/GW/V3	06/EIA/16/GW/V4	
			RESULTS				
1	pH	--	6.91	7.10	7.22	6.92	IS:3025 (P-11):1983
2	Temperature	°C	24.80	24.90	25.10	25.00	IS:3025 (P-9):1984
3	Salinity	ppt	1.26	1.59	2.33	2.11	Electrometric Method (Instrumental) & Operational Manual
4	Electrical Conductivity	mS/cm	2.08	2.62	3.82	3.48	IS:3025 (P-14):1984
5	Turbidity	NTU	0.50	0.48	0.86	0.30	IS:3025 (P-10):1984
6	Dissolved Oxygen	mg/L	6.41	5.86	5.06	6.27	IS:3025 (P-38):1989
7	Total Dissolved Solids (TDS)	mg/L	1346.00	1460.00	2244.00	2886.00	IS:3025 (P-16):1984
8	Total Suspended Solids (TSS)	mg/L	5.00	28.00	40.00	20.00	IS:3025 (P-17):1984
9	Total Solids (as TS)	mg/L	1351.00	1488.00	2284.00	2906.00	IS:3025 (P-15):1984
10	Chemical Oxygen Demand (COD)	mg/L	8.61	6.61	21.82	2.64	APHA & AWWA.22nd Ed.5220-B.(5-17)
11	Biochemical Oxygen Demand (BOD_3^{27})	mg/L	BDL	BDL	BDL	BDL	IS:3025 (P-44):1993
12	Chlorides (as Cl^-)	mg/L	377.20	463.20	857.40	862.30	IS:3025 (P-32):1988
13	Sulphates (as SO_4^{-2})	mg/L	67.52	141.00	98.66	101.30	APHA & AWWA. 22nd Ed.-4500-SO_4^{2-}-E.(4-190)
14	Total Alkalinity	mg/L	392.30	539.60		108.90	IS:3025 (P-23):1986

	(as $CaCO_3$)						
15	Total Hardness (as $CaCO_3$)	mg/L	535.10	429.40	596.70	1251.90	IS:3025 (P-21):1983
16	Calcium Hardness	mg/L	382.50	233.90	191.50	653.20	APHA & AWWA.22nd Ed.3500 Ca-B (3-67)
17	Magnesium (as Mg)	mg/L	33.28	47.51	98.46	145.50	APHA & AWWA.22nd Ed. 3500 Mg-B (3-84)
18	Ammonical Nitrogen (as NH_3-N)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA.22nd Ed.4500-NH_3 B & C.(4-110,111,112)
19	Copper (as Cu)	mg/L	BDL*	BDL*	BDL*	BDL*	APHA & AWWA.22nd Ed.3500-Cu B.(3-74)
20	Fluoride (as F^-)	mg/L	BDL*	BDL*	BDL*	BDL*	APHA & AWWA.22nd Ed.4500-F^--B & D.(4-84,87)
21	Total Iron (as Fe)	mg/L	BDL*	0.14	0.17	0.13	IS:3025 (P-53):2003
22	Phenol (as C_6H_5OH)	mg/L	BDL*	BDL*	BDL*	BDL*	APHA & AWWA.22nd Ed.5530-B.5-47 & D.(5-49)
23	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	IS:3025 (P-39):1991
24	Hexavalent Chromium (as Cr^{+6})	mg/L	BDL*	BDL*	BDL*	BDL*	APHA & AWWA.22nd Ed.3500-Cr.-B (3-69)
25	Nickel (as Ni)	mg/L	BDL*	BDL*	BDL*	BDL*	IS:3025 (P-54):2003
26	**Total Chromium (as Cr^{+3})	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.3111. B-AAS
27	**Zinc (as Zn)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
28	**Lead (as Pb)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
29	**Sodium (as Na)	mg/L	146.31	36.53	71.74	105.20	APHA & AWWA. 22nd Ed.-3111. B-AAS

30	**Potassium (as K)	mg/L	11.35	3.08	22.46	58.32	APHA & AWWA.22nd Ed.3500 K B- Flame Photometer
31	**Arsenic (as As)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3112. B-AAS
32	**Cadmium (as Cd)	mg/L	BDL	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS

TABLE-3.14

Water Quality (Ground Water) (Cont'd.)

Sr. No.	PARAMETER	UNIT	LOCATION/LAB ID			TEST METHOD
			Gadkhol Patiya	Amboli	Umarwada	
			06/EIA/16/GW/V5	06/EIA/16/GW/V6	06/EIA/16/GW/V7	
			RESULTS			
1	pH	--	7.2	7.31	7.15	IS:3025 (P-11):1983
2	Temperature	°C	25	24.9	25	IS:3025 (P-9):1984
3	Salinity	ppt	1.83	1.84	2.24	Electrometric Method (Instrumental) & Operational Manual
4	Electrical Conductivity	mS/cm	3.01	3.02	3.65	IS:3025 (P-14):1984
5	Turbidity	NTU	0.07	0.06	0.63	IS:3025 (P-10):1984
6	Dissolved Oxygen	mg/L	5.87	6.67	5.6	IS:3025 (P-38):1989
7	Total Dissolved Solids (TDS)	mg/L	1984	1564	2536	IS:3025 (P-16):1984
8	Total Suspended Solids (TSS)	mg/L	26	20	34	IS:3025 (P-17):1984
9	Total Solids (as TS)	mg/L	2010	1584	2570	IS:3025 (P-15):1984
10	Chemical Oxygen Demand (COD)	mg/L	14.54	5.29	10.58	APHA & AWWA.22nd Ed.5220-B.(5-17)

11	Biochemical Oxygen Demand (BOD_3[27])	mg/L	BDL	BDL	BDL	IS:3025 (P-44):1993
12	Chlorides (as Cl^-)	mg/L	512.5	586.4	768.7	IS:3025 (P-32):1988
13	Sulphates (as SO_4^{-2})	mg/L	77.95	92.37	183.2	APHA & AWWA. 22nd Ed.-4500-SO_4^{2-}-E.(4-190)
14	Total Alkalinity (as $CaCO_3$)	mg/L	351.50	470.30	628.70	IS:3025 (P-23):1986
15	Total Hardness (as $CaCO_3$)	mg/L	556.40	338.70	909.20	IS:3025 (P-21):1983
16	Calcium Hardness	mg/L	60.48	86.68	483.80	APHA & AWWA.22nd Ed.3500 Ca-B (3-67)
17	Magnesium (as Mg)	mg/L	120.50	61.23	103.40	APHA & AWWA.22nd Ed. 3500 Mg-B (3-84)
18	Ammonical Nitrogen (as NH_3-N)	mg/L	BDL	BDL	BDL	APHA & AWWA.22nd Ed.4500-NH_3 B & C.(4-110,111,112)
19	Copper (as Cu)	mg/L	BDL*	BDL*	BDL*	APHA & AWWA.22nd Ed.3500-Cu B.(3-74)
20	Fluoride (as F^-)	mg/L	BDL*	BDL*	BDL*	APHA & AWWA.22nd Ed.4500-F^--B & D.(4-84,87)
21	Total Iron (as Fe)	mg/L	0.16	0.22	0.14	IS:3025 (P-53):2003
22	Phenol (as C_6H_5OH)	mg/L	BDL*	BDL*	BDL*	APHA & AWWA.22nd Ed.5530-B.5-47 & D.(5-49)
23	Oil & Grease	mg/L	BDL	BDL	BDL	IS:3025 (P-39):1991
24	Hexavalent Chromium (as Cr^{+6})	mg/L	BDL*	BDL*	BDL*	APHA & AWWA.22nd Ed.3500-Cr.-B (3-69)
25	Nickel (as Ni)	mg/L	BDL*	BDL*	BDL*	IS:3025 (P-54):2003
26	**Total Chromium (as Cr^{+3})	mg/L	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.3111. B-AAS

27	**Zinc (as Zn)	mg/L	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
28	**Lead (as Pb)	mg/L	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
29	**Sodium (as Na)	mg/L	69.88	118.50	246.45	APHA & AWWA. 22nd Ed.-3111. B-AAS
30	**Potassium (as K)	mg/L	11.50	32.10	91.50	APHA & AWWA.22nd Ed.3500 K B-Flame Photometer
31	**Arsenic (as As)	mg/L	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3112. B-AAS
32	**Cadmium (as Cd)	mg/L	BDL	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS

TABLE-3.14

Water Quality (Ground Water) (Cont'd.)

Sr. No.	PARAMETER	UNIT	LOCATION/LAB ID		TEST METHOD
			Andada	ANKLESHWAR GIDC WATER	
			06/EIA/16/GW/V9	06/EIA/16/GW/V10	
			RESULTS		
1	pH	--	6.47	8.26	IS:3025 (P-11):1983
2	Temperature	°C	24.9	25.1	IS:3025 (P-9):1984
3	Salinity	ppt	0.25	0.23	Electrometric Method (Instrumental) & Operational Manual
4	Electrical Conductivity	mS/cm	412	373	IS:3025 (P-14):1984
5	Turbidity	NTU	0.29	0.36	IS:3025 (P-10):1984

6	Dissolved Oxygen	mg/L	6	6.88	IS:3025 (P-38):1989
7	Total Dissolved Solids (TDS)	mg/L	182	146	IS:3025 (P-16):1984
8	Total Suspended Solids (TSS)	mg/L	4	2	IS:3025 (P-17):1984
9	Total Solids (as TS)	mg/L	186	148	IS:3025 (P-15):1984
10	Chemical Oxygen Demand (COD)	mg/L	5.95	10.32	APHA & AWWA.22nd Ed.5220-B.(5-17)
11	Biochemical Oxygen Demand (BOD_3^{27})	mg/L	BDL	BDL	IS:3025 (P-44):1993
12	Chlorides (as Cl^-)	mg/L	44.34	49.27	IS:3025 (P-32):1988
13	Sulphates (as SO_4^{-2})	mg/L	10.69	6.95	APHA & AWWA. 22nd Ed.-4500-SO_4^{2-}-E.(4-190)
14	Total Alkalinity (as $CaCO_3$)	mg/L	316.80	108.90	IS:3025 (P-23):1986
15	Total Hardness (as $CaCO_3$)	mg/L	90.72	112.90	IS:3025 (P-21):1983
16	Calcium Hardness	mg/L	46.36	64.51	APHA & AWWA.22nd Ed.3500 Ca-B (3-67)
17	Magnesium (as Mg)	mg/L	10.77	11.75	APHA & AWWA.22nd Ed. 3500 Mg-B (3-84)
18	Ammonical Nitrogen (as NH_3-N)	mg/L	BDL	BDL	APHA & AWWA.22nd Ed.4500-NH_3 B & C.(4-110,111,112)
19	Copper (as Cu)	mg/L	BDL*	BDL*	APHA & AWWA.22nd Ed.3500-Cu B.(3-74)
20	Fluoride (as F^-)	mg/L	BDL*	BDL*	APHA & AWWA.22nd Ed.4500-F^--B & D.(4-84,87)
21	Total Iron (as Fe)	mg/L	0.16	0.14	IS:3025 (P-53):2003
22	Phenol (as C_6H_5OH)	mg/L	BDL*	BDL*	APHA & AWWA.22nd Ed.5530-B.5-47 & D.(5-49)
23	Oil & Grease	mg/L	BDL	BDL	IS:3025 (P-39):1991
24	Hexavalent Chromium	mg/L	BDL*	BDL*	

	(as Cr^{+6})				APHA & AWWA.22nd Ed.3500-Cr.-B (3-69)
25	Nickel (as Ni)	mg/L	BDL*	BDL*	IS:3025 (P-54):2003
26	**Total Chromium (as Cr^{+3})	mg/L	BDL	BDL	APHA & AWWA. 22nd Ed.3111. B-AAS
27	**Zinc (as Zn)	mg/L	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
28	**Lead (as Pb)	mg/L	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
29	**Sodium (as Na)	mg/L	2.86	3.74	APHA & AWWA. 22nd Ed.-3111. B-AAS
30	**Potassium (as K)	mg/L	0.92	1.32	APHA & AWWA.22nd Ed.3500 K B-Flame Photometer
31	**Arsenic (as As)	mg/L	BDL	BDL	APHA & AWWA. 22nd Ed.-3112. B-AAS
32	**Cadmium (as Cd)	mg/L	BDL	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS

TABLE – 3.14

Water Quality (Surface Water) (Cont'd.)

Sr. No.	PARAMETER	UNIT	LOCATION/LAB ID UMARVADA POND 06/EIA/16/SW1 RESULTS	TEST METHOD
1	pH	--	7.69	IS:3025 (P-11):1983

2	Temperature	^oC	25	IS:3025 (P-9):1984
3	Salinity	ppt	0.56	Electrometric Method (Instrumental) & Operational Manual
4	Electrical Conductivity	mS/cm	906	IS:3025 (P-14):1984
5	Turbidity	NTU	0.76	IS:3025 (P-10):1984
6	Dissolved Oxygen	mg/L	5.46	IS:3025 (P-38):1989
7	Total Dissolved Solids (TDS)	mg/L	248	IS:3025 (P-16):1984
8	Total Suspended Solids (TSS)	mg/L	12	IS:3025 (P-17):1984
9	Total Solids (as TS)	mg/L	260	IS:3025 (P-15):1984
10	Chemical Oxygen Demand (COD)	mg/L	25.13	APHA & AWWA.22nd Ed.5220-B.(5-17)
11	Biochemical Oxygen Demand (BOD_3^{27})	mg/L	BDL	IS:3025 (P-44):1993
12	Chlorides (as Cl^-)	mg/L	19.71	IS:3025 (P-32):1988
13	Sulphates (as SO_4^{-2})	mg/L	47.19	APHA & AWWA. 22nd Ed.-4500-SO_4^{2-}-E.(4-190)
14	Total Alkalinity (as $CaCO_3$)	mg/L	222.80	IS:3025 (P-23):1986
15	Total Hardness (as $CaCO_3$)	mg/L	167.30	IS:3025 (P-21):1983
16	Calcium Hardness	mg/L	50.4	APHA & AWWA.22nd Ed.3500 Ca-B (3-67)
17	Magnesium (as Mg)	mg/L	28.41	APHA & AWWA.22nd Ed. 3500 Mg-B (3-84)
18	Ammonical Nitrogen (as NH_3-N)	mg/L	BDL	APHA & AWWA.22nd Ed.4500-NH_3 B & C.(4-110,111,112)
19	Copper (as Cu)	mg/L	BDL*	APHA & AWWA.22nd Ed.3500-Cu B.(3-74)
20	Fluoride (as F^-)	mg/L	BDL*	APHA & AWWA.22nd Ed.4500-F^--B & D.(4-84,87)
21	Total Iron (as Fe)	mg/L	0.36	IS:3025 (P-53):2003
22	Phenol (as C_6H_5OH)	mg/L	BDL*	APHA & AWWA.22nd Ed.5530-B.5-47 & D.(5-49)
23	Oil & Grease	mg/L	BDL	IS:3025 (P-39):1991
24	Hexavalent Chromium (as Cr^{+6})	mg/L	BDL*	APHA & AWWA.22nd Ed.3500-Cr.-B (3-69)

25	Nickel (as Ni)	mg/L	BDL*	IS:3025 (P-54):2003
26	**Total Chromium (as Cr^{+3})	mg/L	BDL	APHA & AWWA. 22nd Ed.3111. B-AAS
27	**Zinc (as Zn)	mg/L	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
28	**Lead (as Pb)	mg/L	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS
29	**Sodium (as Na)	mg/L	8.09	APHA & AWWA. 22nd Ed.-3111. B-AAS
30	**Potassium (as K)	mg/L	2.26	APHA & AWWA.22nd Ed.3500 K B- Flame Photometer
31	**Arsenic (as As)	mg/L	BDL	APHA & AWWA. 22nd Ed.-3112. B-AAS
32	**Cadmium (as Cd)	mg/L	BDL	APHA & AWWA. 22nd Ed.-3111. B-AAS

GW: Ground Water, SW: Surface Water, BDL: Below Detectable Level

Detectable Limit of Instrument:

Copper : 0.05 mg/L, Sulphate : 2.0 mg/L, Iron : 0.01 mg/L, Phenol : 0.01 mg/L, Total Phosphorus : 0.01 mg/L, Nitrate Nitrogen : 0.01 mg/L

SUMMARY

3.6.3. BASELINE GROUND WATER QUALITY

pH of ground water samples varied from 6.47 to 8.26. Turbidity was found 0.06 to 0.86 NTU, Total Dissolved Solids varied in the range of 146.0 to 2244.0 mg/L. DO and COD are found in range of 5.06 to 6.88 mg/L, and 2.64 to 21.82 mg/L respectively. BOD_3 was found to be BDL. Total Hardness (as $CaCO_3$) varied from 90.72 to 1251.9 mg/L. Total Alkalinity varied from 108.9 to 539.6 mg/L. Chlorides and Sulfates are found in the range of 44.34 to 862.3 mg/L and 6.95 to 101.3 mg/L respectively.

3.6.4. BASELINE SURFACE WATER QUALITY

pH of surface water samples was found 7.69. Turbidity was found 0.76 NTU, Total Dissolved Solids was found 248.0 mg/L. DO and COD are found 5.46 and 25.13 mg/L respectively. BOD_3 was found to be BDL. Total Hardness (as $CaCO_3$) are found 167.3 mg/L. Total Alkalinity varied from 222.8 mg/L. Chlorides and Sulfates are found 19.71 mg/L and 47.19 mg/L respectively.

3.7. LAND ENVIRONMENT

3.7.1. METHODOLOGY FOR SOIL MONITORING

Soil samples were collected from nine locations during March 2 & 3, 2017 within the study area to assess its physico-chemical characteristics. The locations selected for collection of soil samples are shown in Figure 3.5 and presented in Table 3.15. The analysis results of soil samples are given in Table 3.16.

TABLE – 3.15

Soil Sampling Locations

Sr. No.	Name of village	bearing w.r.t. project site	Approximate radial distance from project site (km)	Soil
1	Project site	--	--	S1
2	Andada	N	3.95	S2
3	Jitali	SE	1.75	S3
4	Uchhali	NE	2.42	S4
5	Motali	NE	2.24	S5
6	Kharchi Bhilwada	NE	4.89	S6
7	Gadkhol Patiya	NW	4.02	S7
8	Amboli	SW	8.68	S8
9	Umarwada	SW	8.86	S9

FIGURE – 3.5

Locations of Soil Sampling Stations

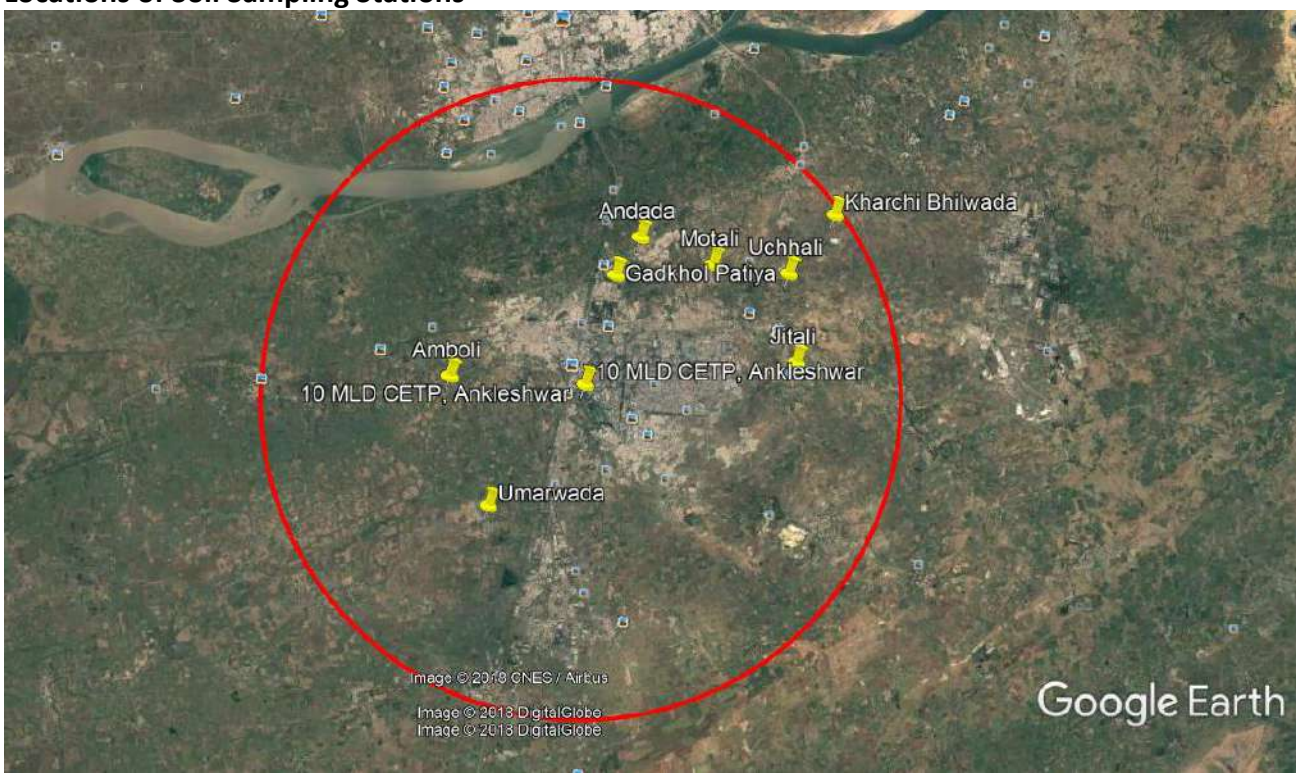


TABLE – 3.16

Physico-Chemicals Characteristics of Soil

Sr. No.	PARAMETER	UNIT	LOCATION/LAB ID				TEST METHOD
			JITALI	UCHHALI	MOTALI	KHARCHI BHILWADA	
			06/EIA/16/SO/V1	06/EIA/16/SO/V2	06/EIA/16/SO/V3	06/EIA/16/SO/V4	
1	Moisture Content	%	5.37	4.75	4.8	7.11	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-10.5
	*Total Solids	%	94.63	95.25	95.2	92.89	
2	pH	--	7.41	7.34	7.49	7.61	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.1
3	Temperature	^oC	24.9	25.2	25.1	25	
4	Bulk Density	gm/cm^3	1.25	1.15	1.25	1.15	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-10.4
5	Porosity	%	52.83	56.6	52.83	56.6	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-10.4
6	Water Holding Capacity (WHC)	%	64.57	69.16	67.31	65.97	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-10.7
7	*Specific Gravity	--	2.52	2.84	2.73	2.68	IS:2720 (P-3/S-1):1980
8	*Total Hardness (as $CaCO_3$)	--	552	726	714	592	IS:3025 (P-21):2009
9	Calcium (as Ca^{+2})	mg/Kg	210.4	280.6	210.4	220.4	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.15
10	Magnesium (as Mg^{+2})	mg/Kg	6.05	4.85	44.95	9.7	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.15
11	Chlorides (as Cl^-)	mg/Kg	149.9	199.9	149.9	124.9	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.16

12	Total Phosphorus	mg/Kg	12	16.75	19.25	14.5	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.9
13	Available Phosphorus	mg/Kg	3.85	4.32	5.02	2.98	Vol.2:, Edition: 2011, S.K.Maiti-11.8, pg no.177
14	Organic Matter (OM)	%	6.3	6.87	7.02	6.47	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.5
15	*Total Alkalinity (as $CaCO_3$)	mg/Kg	594	1014	668.3	272.3	IS:3025 (P-23):1986
16	Total Nitrogen	mg/Kg	122.5	131.7	119.8	98.54	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.6
17	*Nitrate Nitrogen (as NO_3^--N)	mg/Kg	4.05	0.45	0.8	1.8	APHA & AWWA.22nd Ed.4500-NO_3^- B. (4-122)
18	*Sulphates (as SO_4^{-2})	mg/Kg	2.1	8	6.4	4.8	IS:2720(P-27):1977
19	*Total Iron (as Fe)	mg/Kg	1.05	0.89	4.37	4.53	IS:3025 (P-53):2003
20	*Copper (as Cu)	mg/Kg	BDL*	BDL*	BDL*	BDL*	APHA & AWWA.22nd Ed.3500-Cu B. (3-74)
21	*Nickel (as Ni)	mg/Kg	BDL*	BDL*	BDL*	BDL*	IS:3025 (P-54):2003
22	**Lead (as Pb)	mg/Kg	1.81	2.06	BDL*	0.94	USEPA-3500-B/AAS
23	**Arsenic (as As)	mg/Kg	BDL*	BDL*	BDL*	BDL*	USEPA-3500-B/AAS
24	**TOC	mg/Kg	21.48	28.45	18.94	17.68	USEPA-3500-B/AAS
25	**Color	--	Blackish brown	Light brown	Yellowish brown	Light brown	USEPA-3500-B
26	**Sodium (as Na)	mg/Kg	485.6	657.4	814.5	562.8	USEPA-3500-B/AAS
27	**Potassium (as K)	mg/Kg	366.2	408.9	576.2	393.5	
28	**Cadmium (as Cd)	mg/Kg	BDL*	BDL*	BDL*	BDL*	
29	**Permeability	cm/sec	4.28×10^{-3}	3.69×10^{-4}	3.68×10^{-3}	4.21×10^{-3}	IS: 2720 (Part-16):2006
30	**Grain Size Analysis:**						
	Gravel	%	2	0	0	34	IS:2720 (Part-4):2006
	Coarse Sand	%	2	1	1	9	
	Medium Sand	%	5	7	4	4	

	Fine Sand	%	51	20	64	31	
	Silt + Clay	%	40	72	31	22	

Sr. No.	PARAMETER	UNIT	LOCATION/LAB ID					TEST METHOD
			Gadkhol Patiya	Amboli	Umarwada	Andada	Project site	
			06/EIA/16/SO/V5	06/EIA/16/SO/V6	06/EIA/16/SO/V7	06/EIA/16/SO/V09	06/EIA/16/SO/V10	
1	Moisture Content	%	4.77	7.04	3.86	2.13	4.65	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-10.5
	*Total Solids	%	95.23	92.96	96.14	97.87	91.45	
2	pH	--	7.74	7.72	7.95	7.09	7.58	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.1
3	Temperature	^{o}C	25	25.1	25	25.1	25	
4	Bulk Density	gm/cm^3	1.2	1.24	1.11	1.15	1.21	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-10.4
5	Porosity	%	54.71	53.2	58.07	56.49	53.27	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-10.4
6	Water Holding Capacity (WHC)	%	71.5	58.56	65.57	46.53	69.37	Handbook of methods in environmental studies.Vol.2,

								Edition: 2011, S.K.Maiti-10.7
7	*Specific Gravity	--	2.88	2.36	2.46	2.66	2.57	IS:2720 (P-3/S-1):1980
8	*Total Hardness (as $CaCO_3$)	--	615	512	655	392	583	IS:3025 (P-21):2009
9	Calcium (as Ca^{+2})	mg/Kg	240.5	200.4	210.4	120.2	234.1	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.15
10	Magnesium (as Mg^{+2})	mg/Kg	2.4	2.4	24.3	21.85	2.51	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.15
11	Chlorides (as Cl^-)	mg/Kg	125.1	99.95	250	374.9	136.2	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.16
12	Total Phosphorus	mg/Kg	18	18	20.25	17.75	17.5	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.9

13	Available Phosphorus	mg/Kg	3.29	3.73	4.29	4.58	3.31	Vol.2:, Edition: 2011, S.K.Maiti-11.8, pg no.177
14	Organic Matter (OM)	%	6.6	7.22	6.23	3.52	6.38	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.5
15	*Total Alkalinity (as $CaCO_3$)	mg/Kg	767.2	519.2	742.5	643.5	742.4	IS:3025 (P-23):1986
16	Total Nitrogen	mg/Kg	156.4	96.28	109.6	96.22	151.3	Handbook of methods in environmental studies.Vol.2, Edition: 2011, S.K.Maiti-11.6
17	*Nitrate Nitrogen (as NO_3^--N)	mg/Kg	0.45	9.35	2.45	7.25	0.57	APHA & AWWA.22nd Ed.4500-NO_3^- B. (4-122)
18	*Sulphates (as SO_4^{-2})	mg/Kg	10.65	4.65	29.4	7.25	11.52	IS:2720(P-27):1977
19	*Total Iron (as Fe)	mg/Kg	1.66	2.2	1.97	0.98	1.58	IS:3025 (P-53):2003
20	*Copper (as Cu)	mg/Kg	BDL*	BDL*	BDL*	BDL*	BDL*	APHA & AWWA.22nd Ed.3500-Cu B. (3-74)
21	*Nickel (as Ni)	mg/Kg	BDL*	BDL*	BDL*	BDL*	BDL*	IS:3025 (P-54):2003
22	**Lead (as Pb)	mg/Kg	BDL*	BDL*	1.74	2.13	BDL*	USEPA-3500-B/AAS

23	**Arsenic (as As)	mg/Kg	BDL*	BDL*	BDL*	BDL*	BDL*	USEPA-3500-B/AAS
24	**TOC	mg/Kg	25.62	23.84	22.56	18.36	24.71	USEPA-3500-B/AAS
25	**Color	--	Light brown	Blackish brown	Yellowish brown	Yellowish brown	Light Brown	USEPA-3500-B
26	**Sodium (as Na)	mg/Kg	680	783	838	1124	692	USEPA-3500-B/AAS
27	**Potassium (as K)	mg/Kg	302	562	792	988	382	
28	**Cadmium (as Cd)	mg/Kg	BDL*	BDL*	BDL*	BDL*	BDL*	
29	**Permeability	cm/sec	3.90×10^{-3}	4.64×10^{-4}	7.37×10^{-5}	2.17×10^{-6}	3.82×10^{-3}	IS: 2720 (Part-16):2006
30	**Grain Size Analysis:**							
	Gravel	%	0	2	2	0	0	IS:2720 (Part-4):2006
	Coarse Sand	%	0	1	2	3	0	
	Medium Sand	%	2	2	12	5	8	
	Fine Sand	%	56	48	12	10	52	
	Silt + Clay	%	42	47	72	82	40	

BDL – Below Detectable Limit

Detectable Limit of Instrument:
Copper: 0.05 mg/kg
Phenol: 0.1 mg/kg
Iron: 0.01 mg/kg
Phosphorus: 0.1 mg/kg
Nickel: 0.03 mg/kg

3.7.2. SUMMARY ON SOIL QUALITY

Parameters like Porosity, Water Holding Capacity, Bulk Density, etc. were considered. Based on the soil analysis report, the following can be concluded:

The porosity of soils varied from 52.83% to 58.07% and can be considered as moderate to good for air and water movement in the soil. The Water Holding Capacity varied from 46.53% to 75.56%. Bulk Density varied from 1.11 to 1.25 g/cm^3. The moisture content varied from 2.13% to 8.46%. pH varied from 7.09 to 7.95. Calcium varied from 120.2 to 511.0 mg/kg. Total Hardness varied from 390 to 1540 mg/kg. Magnesium varied from 1.35 to 64.35 mg/kg. Total Phosphorus varied from 12 to 20.25 mg/kg. Organic Matter varied from 3.52 to 10 mg/kg. Nitrate-Nitrogen varied from 0.45 to 9.35 mg/kg. Total Iron varied from 0.89 to 8.39 mg/kg.

3.8. GEOLOGICAL & HYDROLOGICAL DATA

3.8.1. METHOD OF PREPARATION

The geological classification map has been prepared by extracting the areas under different geological classification from the 1:2 million scale maps prepared by Geological Survey of India (GSI) for the Ankleshwar, District: Bharuch of Gujarat. The map text has been modified in consultations with the Department of Geology, University of Delhi. The project area, towns and village locations have been added for ease of spatial reference. Locations of towns and villages have been extracted from CoI maps, SoI topographical maps and confirmed with satellite data.

3.8.2. DESCRIPTION OF GEOLOGICAL CLASSIFICATION AND AREA UNDER DIFFERENT FORMATIONS

Table 3.17 provides the major geological features and area under different formations.

3.8.3. GEOLOGICAL MAP

A map depicting the major geological features in the project area is presented in Figure 3.6. The map also marks the area within 10 km with project site as a

center. Town and village locations are also depicted to facilitate ease of reference.

TABLE – 3.17

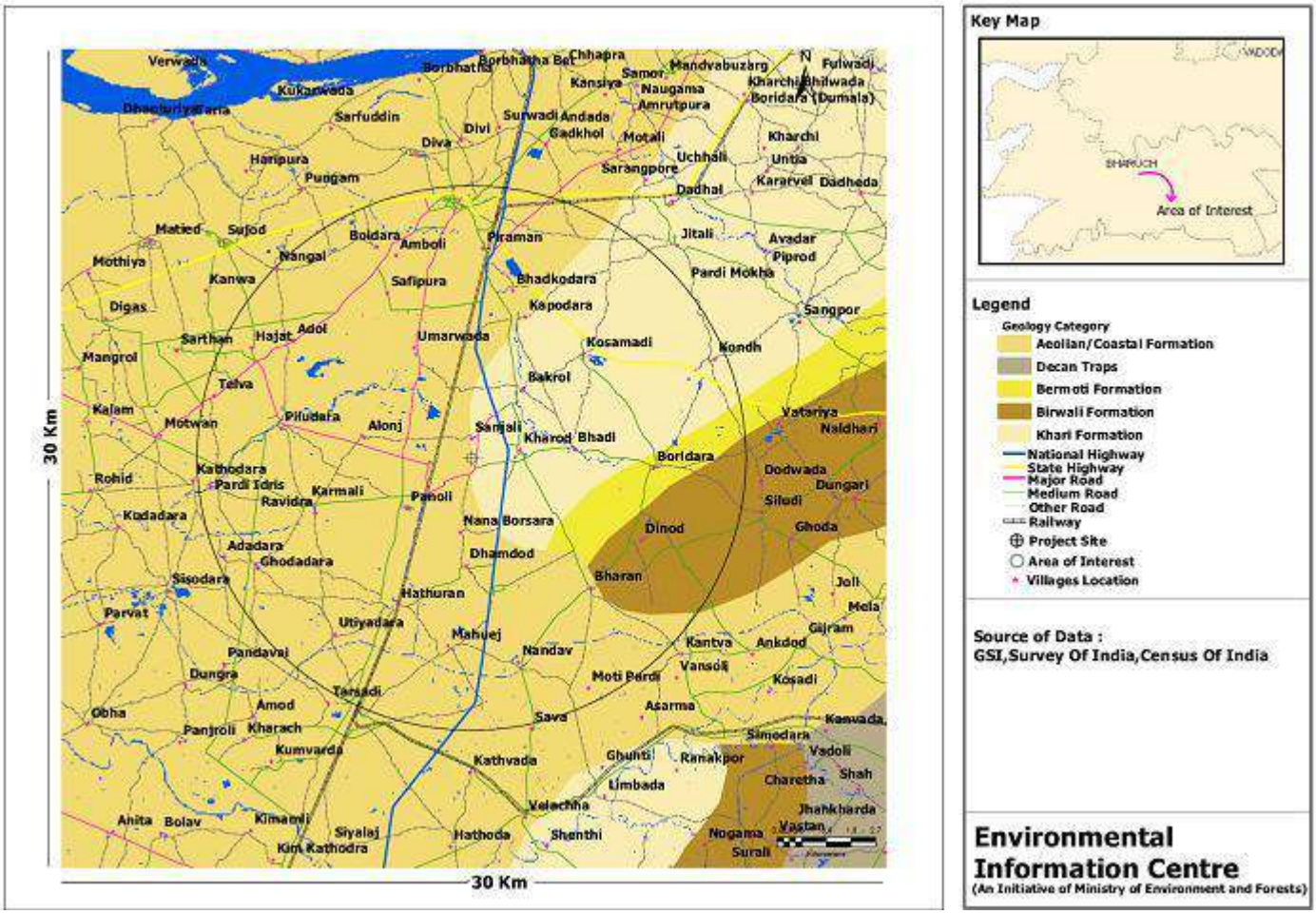
Description of geological classification and area under different formations

STRATIGRAPHY	AREA (SQ. KM.)	AGE	DESCRIPTION
Q = Undifferentiated fluvial/ Aeolian/ coastal sediments	212.73	Holocene in Quaternary period (1 million year to recent)	Some gypsum deposits are found in these Quarternary sediments. High potential for yielding significant quantities of ground water.
N1k = Khari Formation	67.83	Miocene (23.8 to 5.3 million years)	Comprises variegated siltstones, and grey gypseous marls deposited in a quiet epi-neritic basin. The upper part of this formation has yielded a rich assemblage of Miocene fossils. It unconformably overlies the Bermoti Formation. Poor potential for ground water.
Pg3b = Bermoti Formation	12.18	Oligocene (33.7 to 23.8 million years)	Comprises greenish grey marl, and argillaceous limestone succession with a basal bed of bouldery clayey marl. This bouldery bed characterizes the unconformity with the lower Berwali Formation. Poor potential for ground water.
Pg2b = Berwali Formation	21.21	Eocene (54.8 to 33.7 million years)	Comprises gypseous and ochreous clays, lignite, oolitic sandstone and marl. Contains fossils of Foraminifera and Molluscs in the lower part, overlain by dense fossiliferous fragmental limestone. Potential for ground water reserves may vary from poor to good, depending on the rock type encountered.

(Courtesy: Environmental Information Centre, New Delhi)

FIGURE – 3.6

Major Geological Features

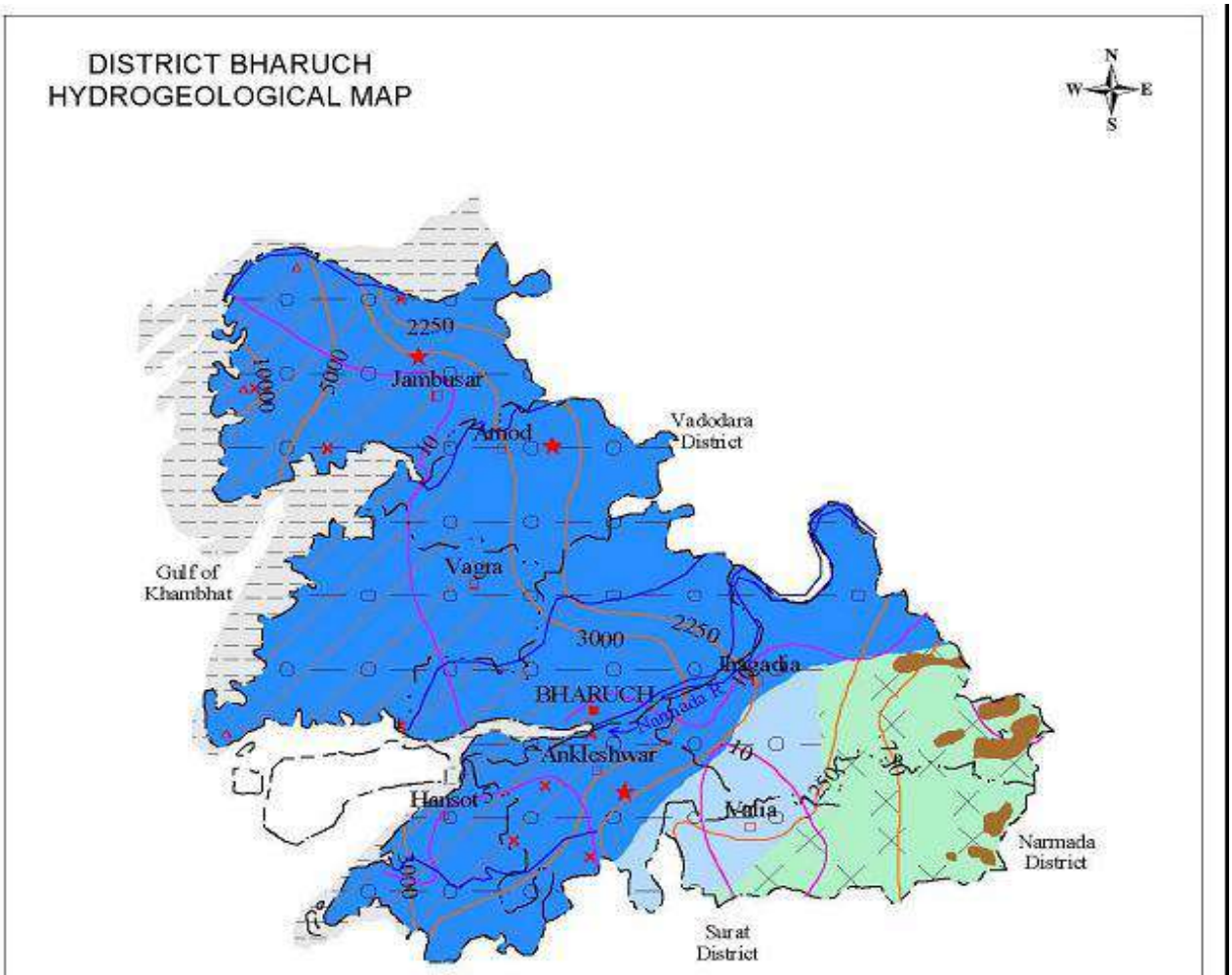


3.8.4. Hydrology

The geology of the district with vast area affected by inherent/coastal salinity, presents a complex hydrogeological pattern. Hydrogeological map is shown. The hard rocks, the semi-consolidated Cretaceous, and Tertiary formations and unconsolidated alluvial deposits, all comprise multi – aquifer systems thereby presenting unconfined as well as confined groundwater conditions in the entire district. Tertiary formations, are inherently saline and contain poor quality of groundwater. Groundwater occurs under unconfined conditions in the limestone and sandstone aquifers of Bagh beds. Occurrence and movement of groundwater is restricted mainly to the fractures and joints in the limestone and sandstones. The discharge in dug wells varies from 30 to 50 m3 /day. The bagh beds, where overlain by Deccan Trap are likely to yield groundwater under confined conditions. The Deccan Trap have given rise to multi-layered stratified aquifers. Each individual flow comprises two distinct units, namely the upper vesicular basalt and the lower massive basalt. The massive basalt is hard and compact with primary porosity but the vesicular basalts exhibit porosity. The movement of groundwater is therefore controlled by the secondary porosity developed by the presence of fractures and joints. The pale weathering which is invariably observed at depth near the top of every flow, has given rise to good aquifers at depth. The yield of the dug wells in Deccan traps, which range in depth from 5 to 25m bgl, sustain pumping from 1/2 hour to 10 hour with discharge varying from 200 to 1200 litre per minute (LPM) for drawdown of 4 to 7 m. Bore well tapping deeper zones down to 150m below ground level (bgl), have yielded 100 to 600 LPM for a drawdown of 6 to 15m. The sandstone are the main aquifers in the Tertiary formations but the limestone also yield significant quantities of groundwater wherever karstic development have taken place. Deep tube well tapping the Tertiary formations is capable of yielding 300 to 3000 LPM of water for meager drawdown of 1 to 7m. The alluvium formations in the western most part of the area do not constitute potential aquifers on account of inferior quality of water.

FIGURE – 3.7

HYDROGEOLOGICAL MAP

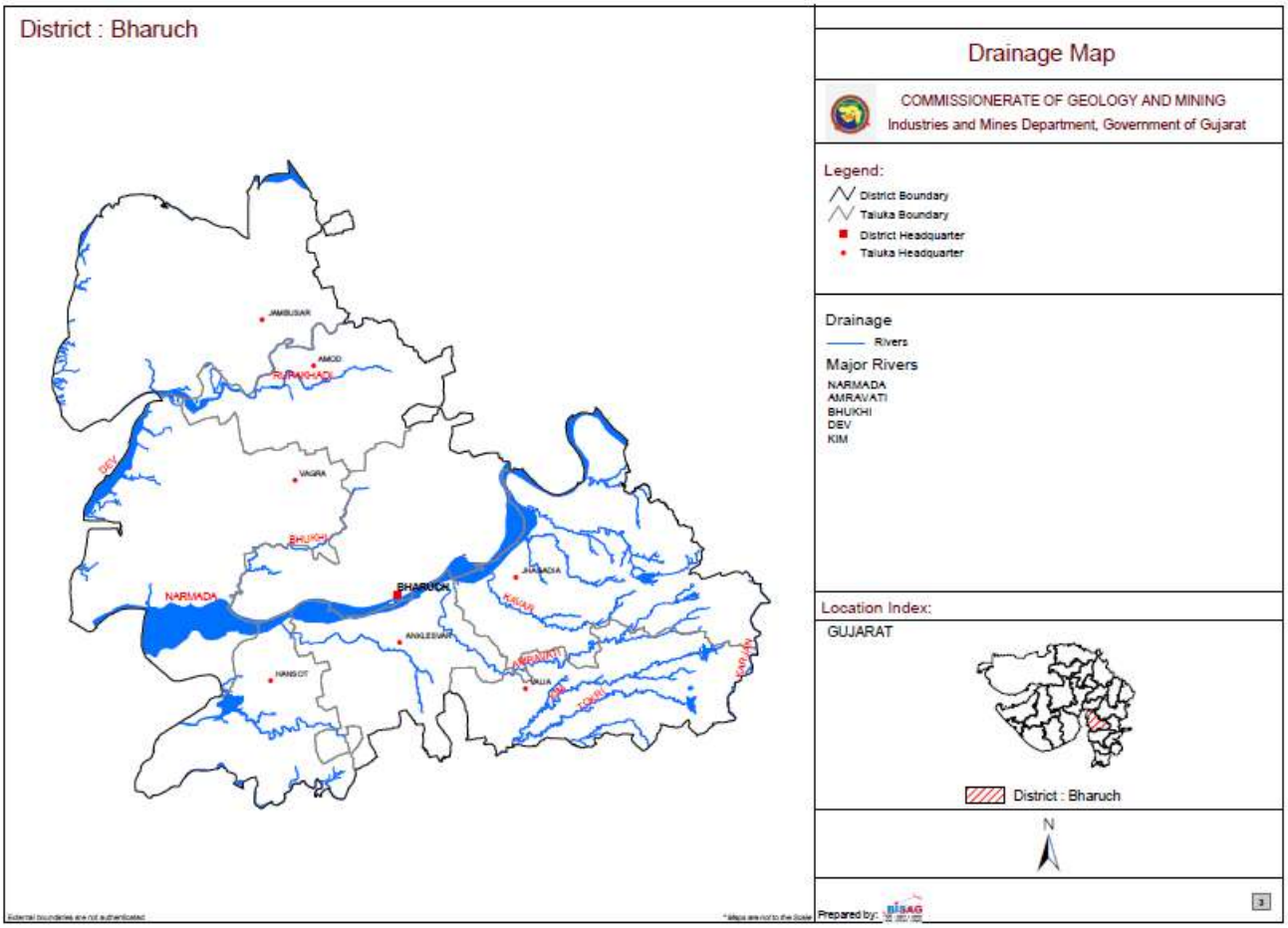


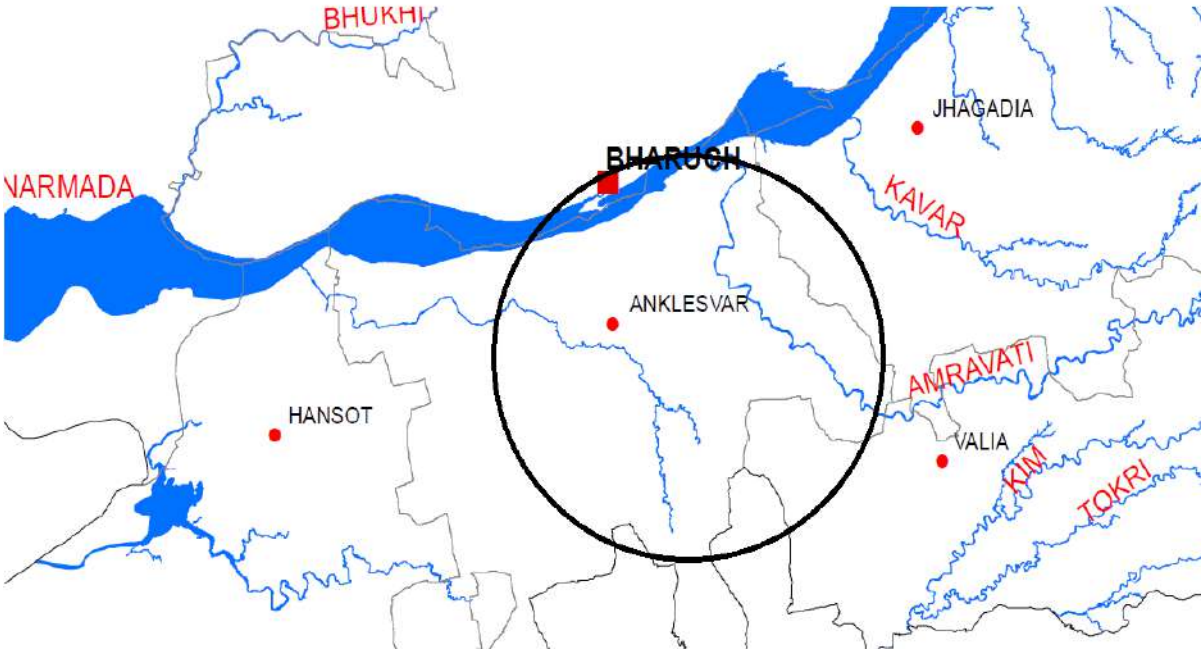
	Formation	Wells Feasible	Depth of Well (m)	Discharge (lpm)
	Soft Rock Aquifer	Dug Well Tubewell	10-25 50-100	200-300 400-60
	Soft Rock Aquifer	Dug Well Tubewell	15- 30 100-200	200-300 600-1200
	Hard Rock Aquifer	Dug Well Borewell	10-25 100-200	60-150 100-300
	Hilly Areas	Not Suitable		
	Saline Area	Not Suitable except localised fresh water pockets		
20	Pre-monsoon Decadal mean (1993-2000) Depth to Water Level (mbgl)		2000	Electrical Conductivity (µS/cm at 25° C)
×	Fluoride > Maximum Permissible Limit (1.5 mg/l)		△	Nitrate Permissible Limit (100 mg/l)
★	Over Exploited Taluka			
	Drainage		■/□	District/Taluka HQ

3.8.5. DRAINAGE PATTERN

FIGURE – 3.8

Drainage Pattern





3.9. LAND USE PATTERN

Land use, in general, reflects the human beings activities on land, whereas the word land cover indicates the vegetation, agricultural and artificial manmade structures covering the land surfaces. Identification and periodic surveillance of land uses and vegetation covers, in the vicinity of any developmental activity is one of the most important components for an environmental impact assessment, which would help determine the impact of the project development activity on the land use pattern.

3.9.1. METHOD OF DATA PREPARATION

The land use / land cover has been presented in the form of a map prepared by using IRS P6 LISS-III and procured from the National Remote Sensing Agency (NRSA), Hyderabad. The satellite data has been processed using ERDAS Imagine software supported with ground checks and ground truth verification. Area and distance calculations have been carried out using GIS software after geo-referencing the interpreted data with the help of Survey of India (SoI) topographical maps of the scale 1:50,000.

A map depicting major land use/ land cover classes comprising lands under agriculture, fallow land, open/degraded vegetation; lands falling under water bodies, scrub and lands under inhabitations is presented at Figure 3.10.

The map also marks the area within 10 km of the project site as the area of interest. Land use and Land Cover with Towns and Village Locations

FIGURE – 3.9

Process Methodology

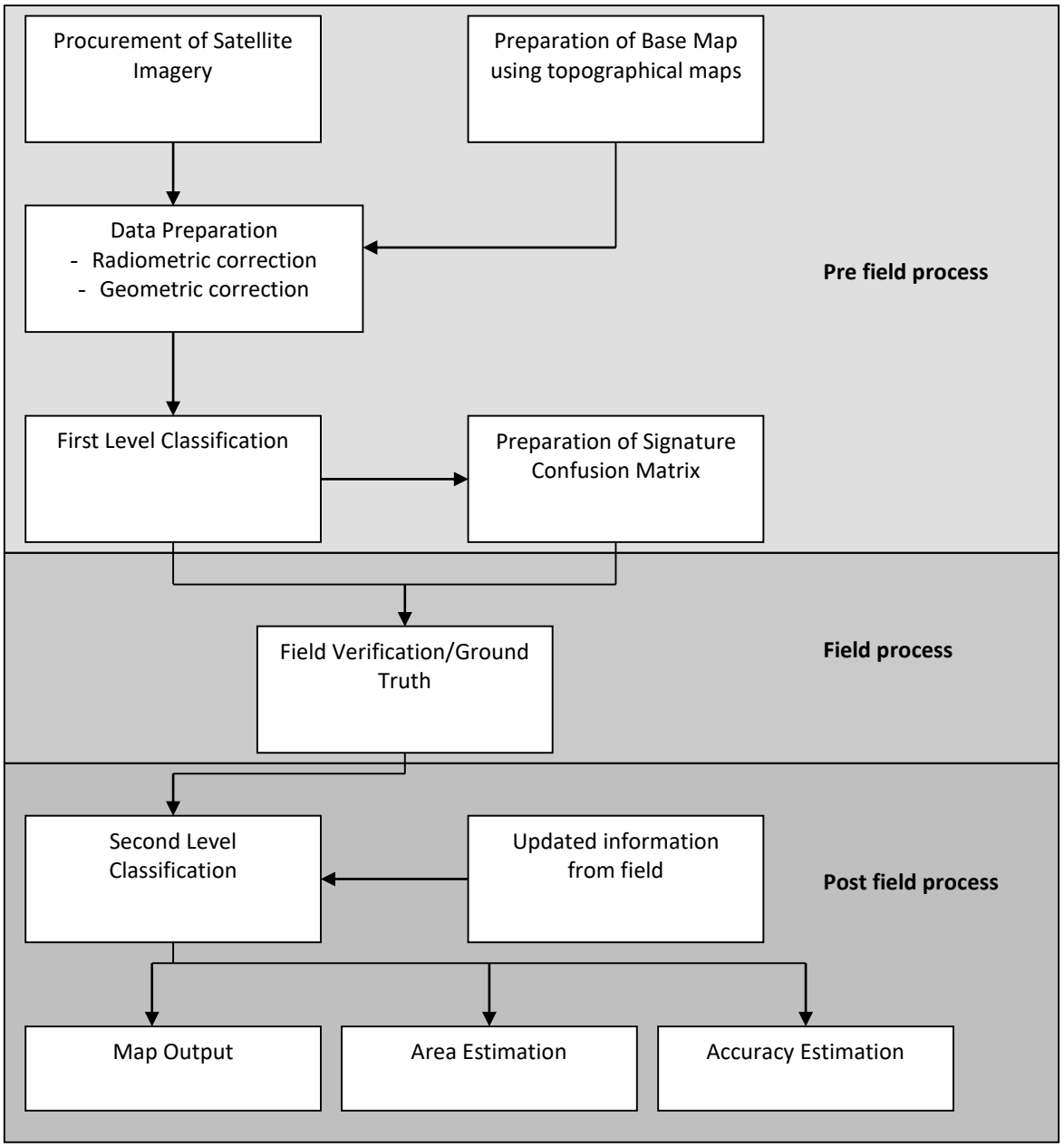


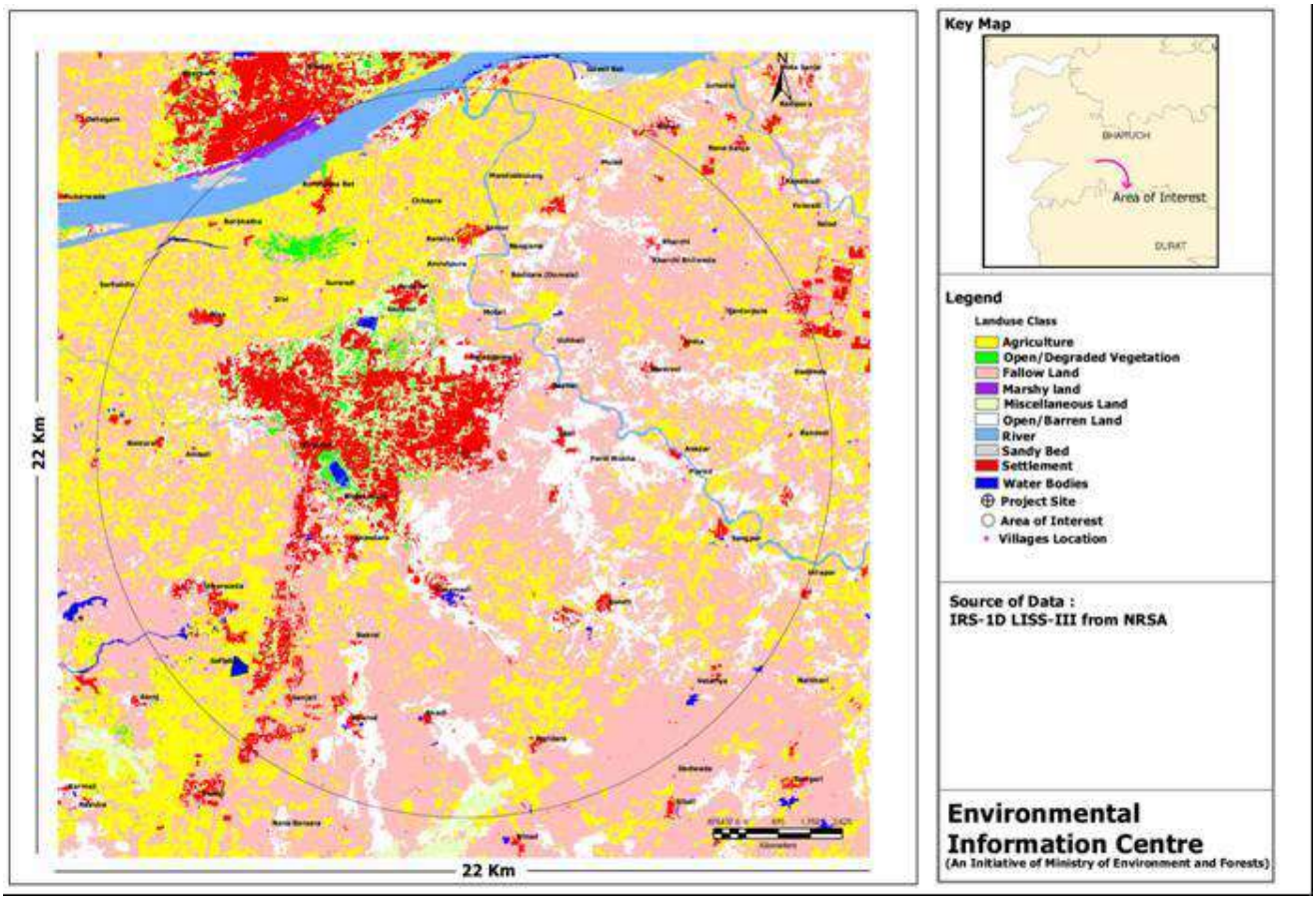
TABLE – 3.18

Areas under Different Land use

SR. NO.	LAND USE CLASSIFICATION	AREA WITHIN 10 KM OF PROJECT LOCATION	PERCENTAGE OF TOTAL AREA
1	Water Bodies	1.12	0.36
2	Open Barren Land	40.89	13.02
3	Agriculture Land	66.61	21.21
4	Fallow Land	161.75	51.50
5	Degraded Vegetation	3.29	1.05
6	River	8.03	2.56
7	Marshy Land	0.51	0.16
8	Habitation & Settlement	22.3	7.10
9	Sand & Beach	0.48	0.15
10	Miscellaneous Land	9.08	2.89
	Total	**314.06**	**100.00**

FIGURE – 3.10

Land use / Land cover



3.10. ECOLOGICAL INFORMATION

3.10.1. Introduction

Bharuch (formerly commonly known as Broach) in India, is a district in the southern part of the Gujarat peninsula on the west coast of state of Gujarat with a size and population comparable to that of Greater Boston. The Narmada River outlets into the Gulf of Khambhat through its lands located in the central and northern parts of the sub-continent of India. The geographical location of the district is 21.30° to 22.00° N Latitude and 72.45° to 73.15° E Longitude. The district has eight Talukas, Bharuch (District Headquarter), Ankleshwar, Valia, Jhagadia, Vagra, Aamos, Hansot and Jambusar. The total area of the district is 5,253 sq km, as per the census of 2001; the population is 1.3 million, with 261 persons per sq. km. The district is situated at the mouth of River Narmada. The major rivers flowing through the district are: Narmadha, Dhadhar, Kim and Kaveri.

3.10.2. Climate

The weather of Bharuch district is hot and dry-starting from mid-march till mid-June, mid-during summer season weather remains hot and dry. While from mid-June till end of September weather remains humid and can be considered pleasant. From October-November weather is bit hot. From December to February climate remains cool.

3.10.3. Rainfall

The average rainfall of the district is 800 mm.

3.10.4. Biogeography

According to Rodgers and Panwar (1988), Gujarat has parts of four biogeographic zones:

Zone 3.	The Indian Desert Province 3A – Kutch
Zone 4.	The Semi-arid Zone: Province 4B - Gujarat – Rajputana
Zone 5.	The Western Ghats: Province 5A - Malabar Coast Province 5B - Western Ghat Mountains
Zone 10.	The Coast of India: Province 10A - West Coast

The **project area** falls at **Zone 4**: The Semi-arid zone, Province 4B – Gujarat-Rajputana.

3.10.5. PHYSIOGRAPHY

The region provides a combination of most of the geo-environmental features for the development of favorable ecosystems. The alluvial sediments and reasonable water resources have provided impetus towards developing human induced ecosystems of agricultural cropping agro-forestry and horticulture. The elevation range of the region is about 20 m showing a very gentle flat gradient of 1:800 to 1:1000. The region shows more or less a flat topography with a series of sections cut by deeply incised channels of rivers flowing across the region. The riverbanks are generally marked by levee deposits, creating a ridge type banks with higher elevations than the general ground level. The flat topography is dotted by low height sandy mounds of stabilized dunes. Formation of ravine landscape is quite common on most of the riverbanks due to deep gully erosion. The rivers are prone to heavy floods and land erosion.

3.10.6. FOREST

Bharuch area is characterized by tropical dry deciduous forests. The total forest area of district is 1449.68 sq.m. That accounts for 0.73 % of the total geographical area of the district. **(Courtesy: Environmental Information Centre, New Delhi)**

3.10.7. FLORA

Some of the flora found in Bharuch area is listed below:

TABLE – 3.19

List of Flora

Sr. No.	Scientific Name	Common Name	Family
I	**Trees**		
1	Acacia aurriculifarmis	Bangali Babool	Mimoceae
2	A. leucopholia	Aniar	Mimoceae
3	A. catechu	Khair	Mimoceae
4	A. ferrungula	Pandhara Khair	Mimoceae

5	A. nilotica	Babul	Leguminoceae
6	A. lebbeck	Siris	Leguminoceae
7	A. procera	Siris	Leguminoceae
8	A. polycantha	Garad	Mimoceae
9	Adina cordifolia	Hed	Rubiaceae
10	Aegle marmelos	Bela	Rutaceae
11	Ailanthus excelsa	Maharukh	Simaroubaceae
12	Alangium salvifolium	Ankol	Alangiaceas
13	Albizia odoratissimus	Siris	Leguminoceae
14	Annogeissus latifolia	Dhavda	Combritaceae
15	Annona squamosa	Sitafal	Annonaceae
16	Azardirachta indica	Nim	Moraceae
17	Bahuania purpurea	Kachamar	Leguminosae
18	Bombax ceiba	Semal	Verbenaceae
19	Bridelia retusa	Asta (Kathmohli)	Leguminosae
20	B. squamosa	Asan	Leguminoceae
21	Buchanania lanzan	Charoli	Anacardiaceas
22	Butea monospesma	Palas	Leguminoceae
23	Callistemon lancealatus	Bottlebrush	Mytraceas
24	Casuarina equisetifoier	Sura	Casuarineae
25	Careya arborea	Kumbh	Mytraceae
26	Casearia elliptica	Manjo	Symydaceae
27	Caesearia graveoiens	Dedak manio	Samidacea
28	Cassia fistula	Sunari	Leguminoceae
29	Cestrum noctusnum	Ralkirani	Solana ceae
30	Cochiospermum religiosun	Ganeri	Cochlospermaceds
31	Cocas nicifera	Nariyal	Palmeae
32	Cordia dichotoma	Gundi	Boranginacea
33	Dalbergia paniculata	Dhobin	Leguminoceae
34	D. latifolia	Sisso	Leguminoceae
35	Murraya koenigii	Karlilimb	Rata ceae
36	Ixora parviflora	Kara	Rubiaceae
37	I. nigricans	Kukeri	Rubiaceae
38	Delonix elala	Gulmohar	Leguminoceae
39	Diosphyros melanoxylon	Tendu	Ebenaceae
40	Dolichandrone falcate	Mallar sing	Bignoniaceae
41	Elaeodendron roxburghii	Alinar	Ceiastracea
42	Eucalyptus globules	Safeda	Eucalyptaceae
43	Emblica officinalis	Aonla	Euphobiaceae
44	Erithina uliginosa	Pungara	Leguminoceae
45	Eramphis uliginosa	Almi	Rubiaceas
46	Ficus. Religiosa	Pipal	Moraceae
47	F. rumphii	Pilari	Moraceae
48	F. benghalensis	Bara	Moraceae
49	Flacourtia indica	Rankdi	Bixaceae

50	Garua pinnata	Kakad	Burseraceae
51	Griwia teliaefolia	Dhaman	Tiliaceae
52	Haidwickia bipinnata	Aniar	Caesalpiniacea
53	Holoptelia intigrifolia	Valva	Uticaceae
54	Kydia calycina	Bhindi	Malvaceae
55	Lagerstroemia lanceolata	Nano	Leguminoceae
56	L. parviflora	Sidha	Leguminoceae
57	Michellia champaca	Champa	Bignoneaceae
58	Lannea caromadalica	Modad	Anacardiaceae
59	Madhuca indica	Mahua	Sapotaceae
60	Mangifera indica	Amm	Anacardiaceae
61	Miliusa tomentosa	Gulambh	Annonacea
62	Milligntonia hortensis	Indian Coral Tree	Bignoniaceae
63	Mitragyna parvifolia	Kalam	Rubiaceae
64	Michelia Champaca	Champa	Magnoliaceae
65	Moringa oliefera	Shevga	Moringaceae
66	Musa paradisiacea	Kela	Musaceae
67	Oroxyium indicum	Tetu	Bignoniaceae
68	Phoenix sylvestris	Shindi	Palminae
69	Prosopis juliflora	Babul	Mimoceae
70	P. cinerarea	Babul	Mimoceae
71	Pithecelobium ducle	Chisbalai	Leguminoceae
72	Pongamia pinnata	Karanja	Leguminoceae
73	Pisidium guajava	Guava	Mutraceae
74	Pterocarpus marsupium	Bija	Leguminoceae
75	Punica grantalum	Anar	Pomegrannatae
76	Sapindus emerginatus	Aritha	Sapindaceae
77	Soymida febrifuga	Rohan	Meliaceae
78	Poleathia langifolia	Ashok	Apoctnaceae
79	Saraca indica	Ashok	Apoctnaceae
80	Thevetia neirifolia	Pilakanton	Apoctnaceae
81	Sterculia urens	Kodaya	Sterculiaceae
82	Syzygium cuminii	Jamun	Myrtaceae
83	Terminalia crenulata	Sadad	Leguminoceae
84	T. bellirica	Behada	Combretaceae
85	T. arjuna	Arjun	Combretaceae
86	T. caltapa	Jangli badam	Combretaceae
87	Tamarindus indica	Tentuli	Leguminoceae
88	Tecoma stans	Nellow bell	Bisgnonia ceae
89	Tectona grandis	Sag	Verbanaceae
90	Trema orientalis	Gol	Ulmaceae
91	Wrightia tinctoria	Kudo	Apocynacea
92	Zizyphus xylocarpus	Ghatbor	Rhamnaceae
93	Z. mauritiana	Bordi	Rhamnaceae
	Shrubs		

1	ARGEMONE MEXICANA	Darudi	Papaveraceae
2	CARANTHUS RESUS	Sudufuli	Apocyanaceae
3	C. CALATROPIS	Mundar	Asclepiadaceae
4	CALATOPIS GIGANTEAN	Rui	Asclepiadaceae
5	CARRISSA CARANDAS	Karvand	Apocyaninnae
6	CLERODENDRUM MULTYFOLIUM	Multaiforum	Verbenaeae
7	GYMNOSPORIA SPINOSA	Spinosa Rekii	Leguminoceae
8	LANTANA CAMERA	Ghaneri	Verbanaceae
9	OPUNTIA DILLENII	Nivdang	Cactacealea
10	EUPHORBIA NERIFOLIA	Wavding	Celastraceae
11	OCIUM GRATISSIUM	Rantulro	Labiateae
12	HELICTERIES ISORA	Atai	Sterculiaceae
13	FICUS HISPIDA	Tet umaro	Moraceae
14	DATURA FASTUASA	Dhotara	Solanaceae
15	VITEX NEGUNDO	Nirgudi	Verbaceae
16	CASSIA TORA	Tarota	Leguminoceae
17	ZIZYPHUS NUMMULARIA	Beri	Rhannaceae
18	EUPHORBIA TIRUCOLLI	Thor	Euphorbiaceae
	Bamboos		
1	DENDROCALAMUS STRICTUS	Manvel	Grammineae
2	ABRUS PRECATORIUS	Gunj	Leguminoceae
3	CAPPARIS SEPIRARIA	Lamtjar	Cappariaceae
4	COCCULUS HIRRUTUS	Asanwel	Menispermaceae
5	COMBRETUM OVALIFOLIUM	Jal	Combratae
6	CAYRATIA CARNOSA	Khatumbo	Vitaceae
	Grasses		
1	ANDROPOGON PUMILUS	Kusal	Gramineae
2	CENCHRUS SETGERUS	Dhramnu	Gramineae
3	CYNODON DACTYLON	Durva	Gramineae
4	CYMBOPOGEN MARINIL	Rosha	Gramineae
5	HETEROPOGON CONTORTUS	Gawat	Gramineae
6	SORGHUM HALEPENSE	Baru	Gramineae
7	THEMEDA TRIANDRA	Bhathdu	Gramineae
	Crops		
1	RICINUS COMMUNIS	Arand	Euphorbiaceae
2	SACCHARUM OFFICINARUM	Ganna	Gramineae
3	SORGHUM VULGAE	Jowar	Gramineae
4	ZEA MAYS	Makea	Gramineae
5	ARACHIS HYPOGAEA	Ground nut	Logumin
6	ORYZA SATIVA	Chawar	Gramineae
	Macrophytes		
1	EICHHORNIA CRASSIPES	Jalkumbhi	Pontederiace
2	IPOMEA AQUALICA	Kalmisay	Volvulaceae
3	TRAPA LATIFOLIA	Water chestnual	Volvulaceae
4	NELUMBO NUCIFERA	Lotus	Nymphaceae

5	AZOLLA PINNATA	Common duckweed	Lemnaceae

Source: Vegetation survey and data from State Forest Dept. Bharuch Gujarat

3.10.8. FAUNA

TABLE – 3.20

List of Fauna

Sr. No.	Scientific Name	Common Name	Family
1	Acridothers tristis	Common myna	Sturnidae
2	A. ginginianus	Bank myna	Sturnidae
3	Athene brama	Spotted owlet	Striginae
4	Aegithina tiphia	Common Lora	Lrenidae
5	Ardeola grayee	Pond Heron	Ardeidae
6	Amaurornis phoenicurus	Whitebrested Waterhen	Phasinidae
7	Babulcus ibis	Cattle Egret	Ardeidae
8	Centropus cinensis	Crow-phesant	Cuculidae
9	Columba livia	Blue Rock Pigeon	Columidae
10	Corvus splendens	House Crow	Carvidae
11	Coracious benghalensis	Indian Roller	Coracidae
12	Dicrurus adsimilis	Black Drongo	Dieruridae
13	Dinophum benghalense	Goldenbacked Woodpecker	Picidae
14	Eudynamys scolopacea	Koel	Cuculidae
15	Fracolinus francollinus	Black partiridge	Pharianidae
16	Halcyon rustica	Whitebrested Kingfisher	Aicenidae
17	Hirundo rustica	Common swallow	Hirundinidae
18	Lanius exubitor	Grey Shrike	Daniidae
19	Launchura malabarica	Whitethroated munia	Estrildinae
20	Megalaima rubricapilla	Smallgreen barbet	Capilonidae
21	M. malabarica	Crimsonbrestwd Barbet	Capilonidae
22	Merops orientalis	Littlegreen Bea-eater	Miropidae
23	Milvus migrans	Patih Kite	Accipitridae
24	Motacilla maderatensis	Large pied wagtail	Motacillidae
25	Nactarinia asiatica	Purplerumpled sunbird	Nectarinidae
26	Nectarinia minima	Small sunbird	Nectarinidae
27	Oriolus oriolus	Golden Oriole	Oriolidae
28	Orthotomus sutorius	Tailor Bird	Pachycephaline
29	Passer domesticus	House Sparrow	Passerinae
30	Psittacula cyanocephala	Blossamheaded parakeet	Psittacidae
31	Pycnonotus caffer	Redvented bulbul	Pycnonotidae
32	Ploceus philipinensis	Weaver bird	Plocidae
33	Sexicoloides fulicate	Indian Robin	Corvidae
34	Sopsychus saularis	Magpie Robin	Corvidae
35	Streptopelia chinensis	Spotted dove	Columbidae

36	S. senegalensis	Little brown dove	Columbidae
37	Sternus pagodramus	Brahiminy myna	Sternidae
38	Turdoides caudatus	Common Babbler	Muscicapidae
39	Upupa epops	Hoopoe	Upupidae
40	Vanellus indicus	Redwattled Lapwing	Jacanidae
41	Metopidius indicus	Brongewinged jacana	Jacanidae
42	Ardea alba	Large egrd	Ardeidae
43	A. cinerea	Grey Heron	Ardeidae
44	Falica atra	Coot	Rallidae
45	Phalacrocorax niger	Little cormorant	Phalacrocoracidae

Source: Survey of Avifauna under the study area.

3.11. SOCIO - ECONOMIC ENVIRONMENT

An assessment of socio - economic environment forms an integral part of an EIA study. Therefore, baseline information for the same was collected during the study period. The baseline socio - economic data collected for the study region, before the proposed expansion project is operational, has been identified for the four major indicators viz. demography, civic amenities, economy and social culture. The baseline status of the above indicators is compiled in forthcoming sections.

3.11.1. DEMOGRAPHY

On an average, Taluka Ankleshwar has population density of about 752 persons per sq. km. (2011 Census data), compared to the Bharuch District, which has a population density of 234 persons per sq. km. (2011 Census data). Population density within 10 km radius of the site is only 687 persons per sq. km. (2011 Census data), while population density within 5 km radius of site is 635 persons per sq. km. (2011 Census data). The population details (i.e. population distribution and population density) of the Taluka Ankleshwar, District Bharuch and the study area within 10 km radius.

TABLE – 3.21

DEMOGRAPHIC DATA

Sr. No.	Town/Village	No. of Household	Population		
			Male	Female	Total
1	Jitali	925	2150	1934	4084
2	Dadhal	617	1513	1507	3020
3	Sarangpore	3102	7727	4804	12531
4	Divi	147	339	297	636

5	Surwadi	545	1132	1040	2172
6	Gadkhol(Part)	235	536	542	1078
7	Piraman (Part)	428	990	923	1913
8	Bhadkodara	2024	5050	3570	8620
9	Kapodara	560	1374	1259	2633
10	Kosamadi	1138	2720	2585	5305
11	Uchhali	160	417	372	789
12	Motali	143	359	324	683
13	Amrutpura	153	443	419	862
14	Samor	232	578	527	1105
15	Bakrol	368	842	662	1504
16	Avadar	251	634	595	1229
17	Kararvel	290	665	621	1286
18	Pardi Mokha	97	250	279	529
19	Piprod	94	243	236	479
20	Chhapra	318	794	726	1520
21	Kansiya	541	1388	1275	2663
22	Naugama	144	371	352	723
23	Kondh	831	2231	2002	4233
24	Untia	133	327	314	641
25	Andada *(CT)	3275	7314	6192	13506
26	Diva	1248	3024	2975	5999
27	Borbhatha	295	703	692	1395
28	Boidara	405	903	884	1787
29	Amboli	223	550	527	1077
30	Umarwada	688	1680	1653	3333
31	Sangpor	530	1252	1184	2436
32	Borbhatha Bet	910	2284	2079	4363
33	Mandvabuzarg	1145	2900	2875	5775
34	Sanjali	1218	3327	1512	4839
35	Kharod	743	2413	1876	4289
36	Bhadi	406	1176	1146	2322
37	Vatariya	544	1400	1105	2505
38	Sardarpura	109	248	248	496
39	Mulad	203	495	533	1028
40	Kharchi Bhilwada	198	519	487	1006
41	Boridara (Dumala)	184	461	423	884
42	Kharchi	217	553	520	1073
43	Dadheda	175	487	450	937
44	Boridara	285	625	610	1234

TABLE – 3.22

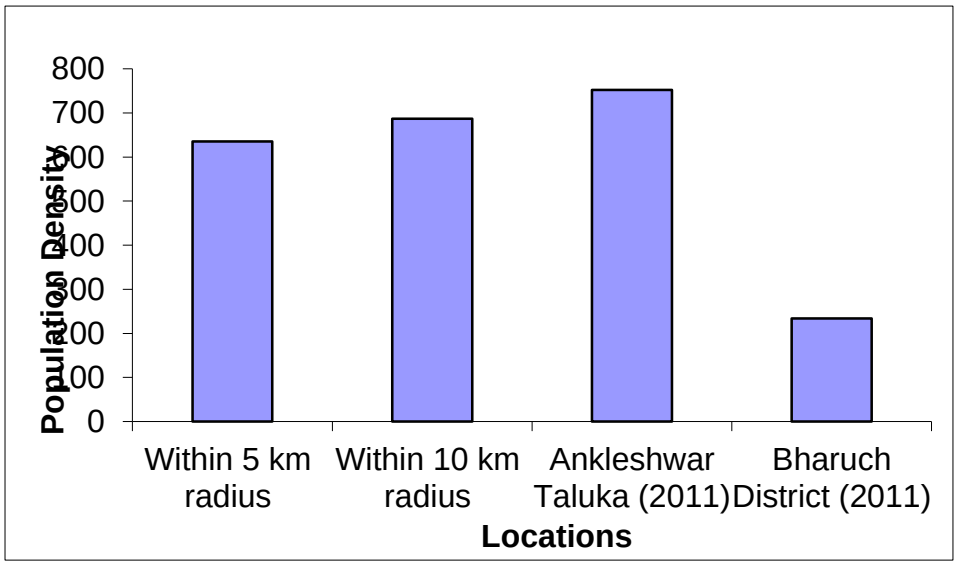
POPULATION DENSITY

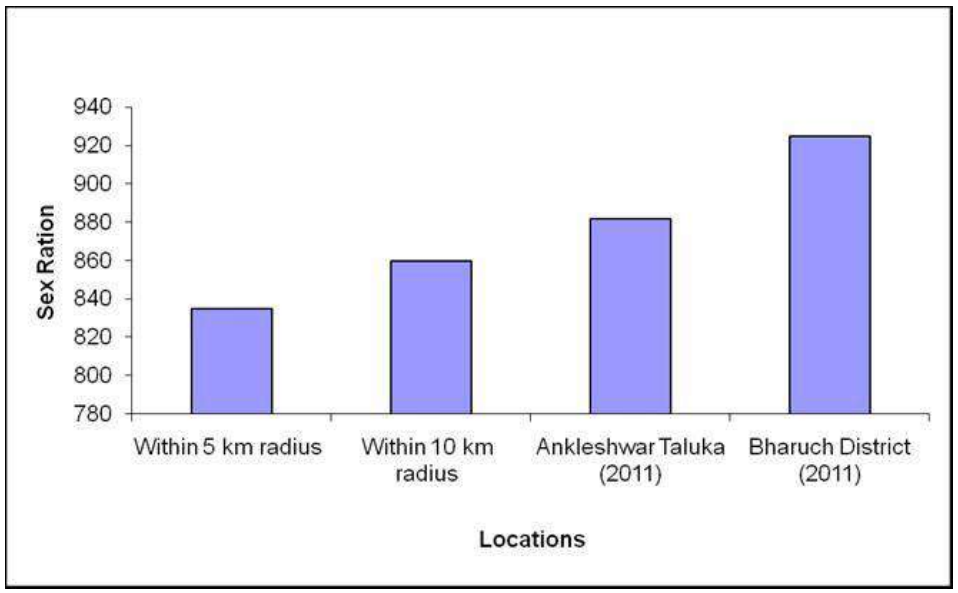
Name	Population (Persons)	Population Density (Person / sq. km.)	Sex ratio (No. of females per 1000 males)
Within 5 km Radius (2011)	40685	635	835
Within 10 km Radius (2011)	92854	687	860
Taluka Ankleshwar (2011)	315596	752	882
District Bharuch (2011)	151109	234	925

(Courtesy: Census Dept., GOI)

FIGURE – 3.11

POPULATION DENSITY





3.11.2. Literacy Rate

The literacy rate is a major factor, which influences the socio-cultural condition of a particular place. Details of literacy rate in District Bharuch, Taluka Ankleshwar and within 10 km radius and 5 km radius of project site are given in Table 3.14 while their graphical representation is shown in Figure 3.5. Literacy rate in District Bharuch, as per 2011 Census data is 76.28%, with 85.47% among male and 68.94% among female. Literacy rate in Taluka Ankleshwar as per 2011 Census data is 81.56 % with 88.28 % among males and 73.54 % among females.

Within 10 km radius of the study area, the literacy rate is observed 71.65 % having 80.25 % among males and 62.54 % among females, whereas literacy rate within 5 km radius of study area is 74.84 % having 82.50 % among males and 63.65 % among females.

TABLE – 3.23

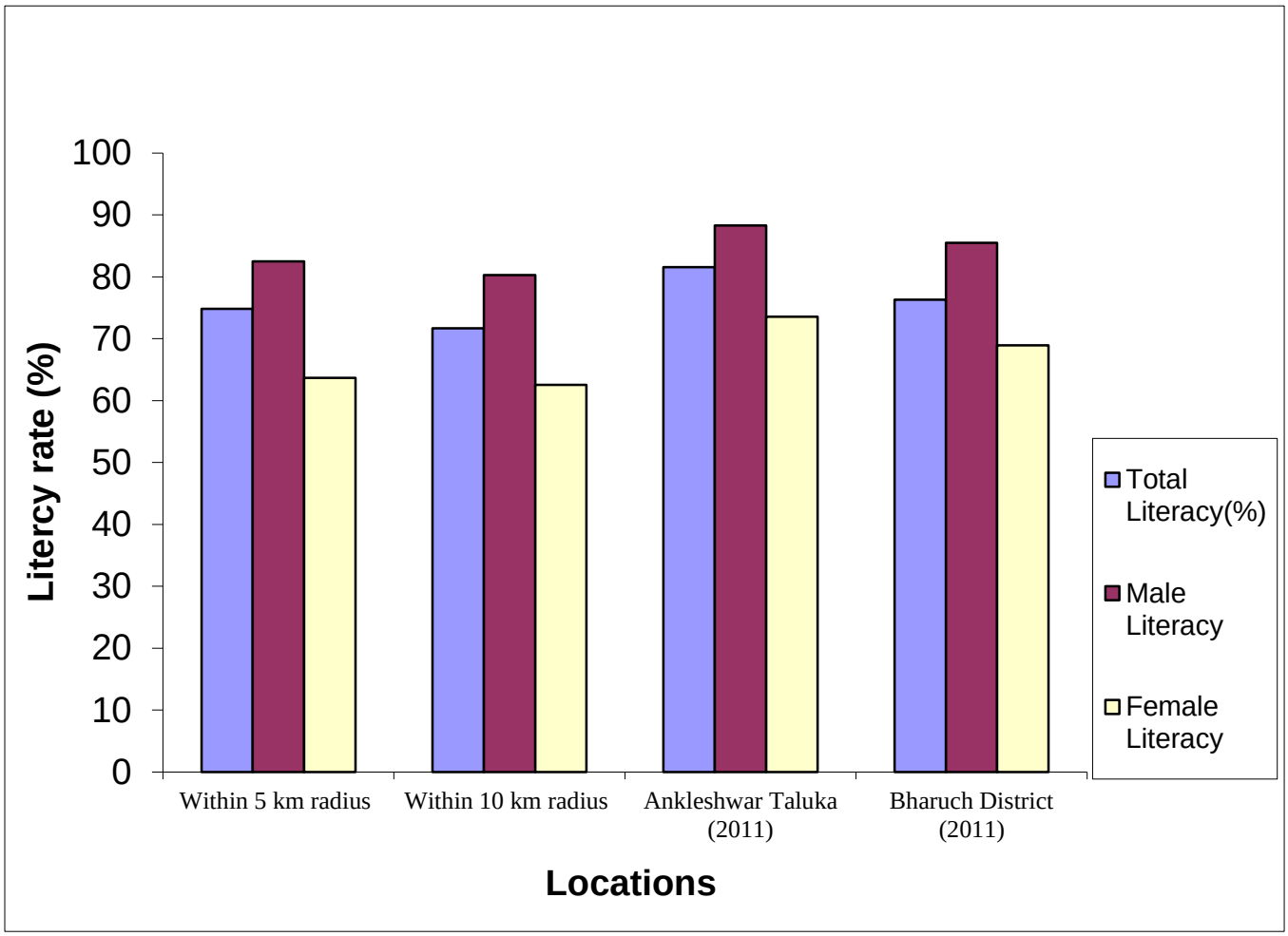
Literacy rate

NAME	MALE LITERACY (%)	FEMALE LITERACY (%)	TOTAL LITERACY (%)
Within 5 km Radius (2011)	82.50	63.65	74.84
Within 10 km Radius (2011)	80.25	62.54	71.65
Ankleshwar Taluka (2101)	88.28	73.54	81.56
Bharuch District (2011)	85.47	68.94	76.28

(Courtesy: Census Dept., GOI)

FIGURE – 3.12

LITERACY DATA



3.11.3. Occupational Structure

In economic development of the region its geographical location, natural resources, business and employment, industries and manpower play vital role. Table 3.24 provides the occupational patterns in all villages falling within the area of interest.

TABLE – 3.24

Occupational Structure

OCCUPATIONAL PATTERN IN VILLAGES FALLING UNDER AREA OF INTEREST									
Sr. No.	Name of Village	Occupational Pattern							
		Total Workers	Main Worker	Cultivator	Agriculture	Household Industries	Other Services	Marginal Workers	Non Workers
1	Jitali	1444	1402	73	524	4	801	42	2420
2	Dadhal	1033	802	64	230	10	498	231	1987
3	Sarangpore	5450	5269	59	28	117	5065	181	7081
4	Divi	359	313	32	173	0	108	46	277
5	Surwadi	916	903	70	392	0	441	13	1256
6	Gadkhol(Part)	316	292	37	23	0	232	24	762
7	Piraman (Part)	722	706	45	332	11	318	16	1191
8	Bhadkodara	3393	3273	72	168	10	3023	120	5227
9	Kapodara	1040	896	26	185	13	672	144	1593
10	Kosamadi	1872	1608	117	449	11	1031	264	3433
11	Uchhali	288	288	35	148	0	105	0	501
12	Motali	325	273	34	22	0	217	52	358
13	Amrutpura	352	125	74	1	0	50	227	510
14	Samor	420	236	46	77	0	113	184	685
15	Bakrol	855	639	76	112	0	451	216	649
16	Avadar	424	407	75	171	0	161	17	805
17	Kararvel	377	354	43	136	1	174	23	909
18	Pardi Mokha	174	173	28	87	5	53	1	355
19	Piprod	205	200	22	108	1	69	5	274
20	Chhapra	711	636	32	254	2	348	75	809
21	Kansiya	1375	843	314	372	5	152	532	1288

22	Naugama	409	234	43	137	0	54	175	314
23	Kondh	1332	1218	104	415	21	678	114	2901
24	Untia	423	307	102	97	3	105	116	218
25	Andada*(CT)	4474	4291	108	358	54	3771	183	9032
26	Diva	2462	2152	500	826	46	780	310	3537
27	Borbhatha	806	573	43	457	1	72	233	589
28	Boidara	734	655	72	283	4	296	79	1053
29	Amboli	555	408	82	137	0	189	147	522
30	Umarwada	1264	946	140	303	23	480	318	2069
31	Sangpor	1066	959	86	694	4	175	107	1370
32	Borbhatha Bet	1507	1441	270	573	11	587	66	2856
33	Mandvabuzarg	2456	1525	466	612	43	404	931	3319
34	Sanjali	2904	2754	28	159	5	2562	150	1935
35	Kharod	1455	1232	119	351	6	756	223	2834
36	Bhadi	1048	987	110	663	0	214	61	1274
37	Vatariya	1026	655	90	19	3	543	371	1479
38	Sardarpura	253	192	32	65	0	95	61	243
39	Mulad	617	425	115	245	7	58	192	411
40	Kharchi Bhilwada	338	333	45	186	1	101	5	668
41	Boridara (Dumala)	413	410	179	153	1	77	3	471
42	Kharchi	424	256	61	69	0	126	168	649
43	Dadheda	329	309	58	149	5	97	20	608
44	Boridara	652	642	124	387	0	131	10	451

3.11.4. AMENITIES

- Infrastructure resource base of the surveyed villages with reference to education, medical, water resources, post and telegraph, communication, power supply is presented in Table. There are 45 villages within study area of 10 km radius of plant site. Significant observations with respect to availability of amenities in study area are as follows.
- Education facilities in study area are quite good because all villages have primary schools, 7 villages have both primary and secondary education schools while one village caters to the need of junior college education, 4 villages provide facilities for adult literacy class, 17 villages have Other Educational Institute and one village has Training center.
- Almost all villages in the impact zone have community health center/workers, 13 villages have primary health sub center, 7 villages have registered private practitioners while 5 villages have family planning center and 2 villages have public health center. One village has child welfare center and 3 villages have dispensary with qualified Doctor.
- In the study area drinking water facility is good as tube well, tank and tap water is available almost in all the villages.
- 31 villages have post office facility and out of these villages, one village has also telegraph facility. 21 villages have phone facilities.
- All villages are well connected through a network of Pucca road as well as Kaccha approach road. Bus is the main mode of transportation and is available in 42 villages, while 5 villages are connected with railways.
- All the villages in the study area get electricity for all purposes.

TABLE – 3.25

DETAILS OF AMMENITIES AVAILABLE IN STUDY AREA

Taluka	Location code	Village	Educational	Medical	Drinking Water	Post & Telegraph	TRANSPORTATION	Approach to Village	Nearest Town	Power Supply
Ankleshwar	6	Diva	p (5), H, o	phs, d, rp (3), chw	t, w	PO, PHONE	bs	PR, KR, kr	Ankleshwar-3	ea
	7	Divi	p (3)	-(-5 kms)	w, hp	-(-5 KMS)	bs	PR, KR	Ankleshwar-3	ea
	8	Surwadi	p (2)	rp (2), chw	t, w, hp	PO	bs	PR, KR	Ankleshwar-2	ea
	9	Borbhatha	p (3)	phs, fpc	t, w	PO, PHONE	bs	PR, KR	Ankleshwar-2	ea
	11	Borbhatha bet	p (4)	-(-5 kms)	t, w, r	PO, PHONE	bs	PR, KR, nr	Bharuch-3	ea
	12	Kansiya	p (4)	-(-5 kms)	t, w	PO, PHONE	bs	pr	Bharuch-4	ea
	13	Chhapra	p (3)	chw	w, hp	po	bs	PR, KR	Ankleshwar-8	ea
	14	Mandvabuzarg	p (6), h, o	phc, d, rp (2), smp, chw (3)	t, w, hp	pto, phone	bs	pr	Ankleshwar-12	ea
	15	Samor	p (2)	phs, fpc, chw	t, w, hp	po	bs	pr	Ankleshwar-9	ea
	16	Andada	p (6), H, puc, ac (2), o	phs, rp (3)	t, w	PO, PHONE	bs	pr	Ankleshwar-3	ea
	17	Amrutpura	p (2)	-(5-10 kms)	w, hp	-(-5 KMS)	bs	pr	Ankleshwar-10	ea
	18	Motali	p (3)	-(5-10 kms)	t, w, r	PO, PHONE	bs	pr	Ankleshwar-9	ea
	19	Uchhali	p (2)	chw	w, tk, hp	-(-5 KMS)	-(-5 KMS)	PR, KR	Ankleshwar-10	ea
	20	Sarangpore	p (2)	chw	w, hp	phone	bs	PR, KR	Ankleshwar-10	ea
	21	Gadkhol	p (2), h	rp	t, w	-(-5 KMS)	bs	pr	Ankleshwar-3	ea
	22	Amboli	p (2)	-(-5 kms)	w, tw	PO, PHONE	bs	PR, KR	Ankleshwar-1	ea

	23	Boidara	p (2)	-(-5 kms)	t, w	PO, PHONE	bs	PR, KR	Ankleshwar-1	ea
	29	Umarwada	p (3), o	phs, rp	t, w, hp	PO, PHONE	bs	PR, KR	Ankleshwar-6	ea
	30	Safipura	uninhabited							
	31	Kapodara	p (2), o	phs, fpc, chw	t, w	PO, PHONE	bs	pr	Ankleshwar-7	ea
	32	Bhadkodara	p (2)	chw	t, w	PO, PHONE	-(-5 KMS)	PR, KR	Ankleshwar-7	ea
	33	Piraman	p (3), Tr, o	phs	t, w	PO, PHONE	bs	PR, KR	Ankleshwar-1	ea
	34	Jitali	p (3), h, ac (4), o	phc, rp, smp, chw	t, w, hp	PO, PHONE	bs	PR, KR	Ankleshwar-10	ea
	35	Dadhal	p (3), o	phs, fpc, chw	t, w, hp	PO, PHONE	bs, rs	PR, KR	Ankleshwar-9	ea
	36	Kararvel	p (2), ac, o	chw	t, w, tk	po	bs	PR, KR	Ankleshwar-12	ea
	37	Avadar	p (2), ac	-(-5 kms)	t, w, hp	po	bs	PR, KR	Ankleshwar-10	ea
	38	Piprod	p (2), o	chw	w, hp	po	bs	PR, KR	Ankleshwar-16	ea
	39	Pardi mokha	p (2), o	chw	t, w	-(-5 KMS)	bs	PR, KR	Ankleshwar-16	ea
	40	Sangpor	p (3)	phs, chw	t, w	po	bs	PR, KR	Ankleshwar-17	ea
	41	Kosamadi	p (6), o	phs, rp (3)	t, w, hp	PO, PHONE	bs	PR, KR	Ankleshwar-12	ea
	42	Bakrol	p (2)	chw	t, w, hp	-(-5 KMS)	bs	PR, KR	Ankleshwar-8	ea
	43	Sanjali	p (2), o	chw	t, w	PO, PHONE	bs, rs	PR, KR	Ankleshwar-10	ea
	55	Kharod	p (3), h, o (2)	chw, phc, cwc	t, w	PO, PHONE	bs	PR, KR	Ankleshwar-10	ea
	56	Bhadi	p (2), o	-(-5 kms)	t, w	po	bs	PR, KR	Ankleshwar-12	ea
Jhagadia	125	Boridara	p (2)	chw	w, tk, tw, hp	-(-5 KMS)	bs, rs	PR, KR	Ankleshwar-12	ea
	126	Mulad	p (2)	phs, chw	t, w, tk, tw, hp	po	bs	PR, KR	Bharuch-9	ea

	127	Naugama	p (2)	chw	t, w, tk, hp, r	-(-5 KMS)	bs	PR, KR	Bharuch-8	ea
	128	Kharchi Bhilwada	p	chw	t, w, tk, hp	-(-5 KMS)	bs, rs	PR, KR	Ankleshwar-10	ea
	129	Kharchi	p (2)	phs, fpc, chw	w, tk, hp	PO, PHONE	bs, rs	PR, KR	Ankleshwar-10	ea
	158	Sardarpura	p (2)	chw	t, w, tk, hp	-(-5 KMS)	bs	kr	Ankleshwar-14	ea
	159	Untia	p (2)	chw	t, w, hp	-(-5 KMS)	bs	kr	Ankleshwar-12	ea
	160	Dadheda	p (2), o	-(-5 kms)	t, w, tk, hp	po	bs	pr	Ankleshwar-11	ea
Valia	1	Kondh	p (4), h, o	phs, d, fpc, rp, chw	t, w	po	bs	PR, KR	Ankleshwar-12	ea
	2	Vatariya	p (2)	chw	w	PO, PHONE	bs	PR, KR	Ankleshwar-15	ea
Mangrol	9	Boridara	p	chw	t, w, tk	po	bs	kr	Kosamba-15	ed, eag

(Courtesy: Census Dept., GOI)

ABBREVIATIONS

1. Education

P - Primary / Elementary School
S - Matriculation or Secondary
O - Other Educational Institution
PUC - Higher Secondary/Intermediate/pre-University/junior Collage

2. Medical Facilities

RP - Registered Private Practitioner
PHS - Primary Health Sub-Centre
FPC - Family Planning Centre
PHC - Primary Health Centre
D - Dispensary
CHW - Community Health Worker/Health Worker
H - Hospital
NH - Nursing Home
MH - Maternity Home
PHC - Public Health Centre
CWC - Child Welfare Centre
O - Others

3. Drinking Water

T - Tap Water
HP - Hand Pump
TK - Tank Water
W - Well Water
R - River Water
C - Canal
N - Nallah
S - Spring
TW - Tube well Water

4. Post & Telegraph

PO - Post Office
PTO - Post & Telegraph
PH - Telephone Communication

5. Communication

BS - Bus Station
NW - Navigable Waterway

6. Approaches to Village

PR - Pucca Road / Paved Road
MR - Kuchcha Road / Mud Road
FP - Foot Path

7. Power Supply

EA - Electricity for all purposes
EAG - Electricity for Agriculture
ED - Electricity for Domestic
EO - Electricity for other purpose like Industrial, Commercial etc.

CHAPTER – 4

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1. IDENTIFICATION OF IMPACT

Various sources of pollution with respect to wastewater, the flue gas/process emission, hazardous/solid waste and noise generation along with their qualitative and quantitative analysis as well as measures taken to control them are discussed herein with details. The network method will be adopted to identify potential impact, which involves understanding of cause-condition-effect relationship between an activity and environmental parameters.

4.2. EVALUATION AND PREDICTION OF IMPACT

Evaluation is an absolute term used for assessment and prediction by means of numerical expression or value. Assessment is the process of identifying and interpreting the environmental consequences of the **significant actions**. Prediction is a way of mapping the environmental consequences of the significant actions.

Significant Action depicts direct adverse changes caused by the action and its effects on health of biota including flora, fauna and man, socio-economic conditions, landforms and resources, physical and cultural heritage properties and quality of bio-physics surrounds.

Prediction requires scientific skill drawn from many disciplines. Prediction of ecological components is often uncertain, because their response to environmental stress cannot be predicted in absolute terms. The assessor (one who does the assessment) and decision maker (one who take the decision after adequate analysis of assessment report) is expected to be aware of the degree of uncertainty. The assessor generally uses the following methods and resources for impact assessment.

- Field surveys and monitoring
- Guideline and modeling
- Literature surveys and interviews
- Qualification and experience

An impact can be defined as any change in physical, chemical and biological, cultural and or socioeconomic environment that can be attributed to activities related to

alternatives under study for meeting the project needs. Impact methodology provides an organized approach for prediction and assessing these impacts.

Scientific techniques and methodologies based on mathematical modeling are available for studying impacts of various project activities on environmental parameters.

The nature of the impacts due to said project activities are discussed here in detail. Each parameter identified in proceeding chapters, is singularly considered for the anticipated impact due to various activities listed. The impact is quantified using numerical scores 0, 1, 2, 3, 4 and 5 in increasing order of activity. In order to assess the impact accurately, each parameter is discussed in detail covering the following:

1. Project activities like to generate impact.
2. Quantification and prediction of impact

Operation of the project may have potential to affect quality of life, air, noise, water, land and flora, fauna and human by increase in air, noise and water pollution, by increase in hazardous waste generation, by pollution from spillage/surface run-off, by disturbance to flora and fauna, by loss of trees resulting from increased assess, by increase in land values threatening agriculture, etc.

During the operation phase, the following activities are considered significant.

- Air emission (Minor Negative Impact)
- Noise generation (No Impact)
- Hazardous waste generation (Minor Negative Impact)
- Water use and waste water discharge (Minor Negative Impact)
- Employment Generation (Marginal Positive Impact)
- Socio-economic Environment (Minor Positive Impact)

4.2.1. WATER ENVIRONMENT

With respect to water environment three aspects are generally considered in EIA, the raw water availability, consumption and wastewater generation that will be disposed. The first priority in water quality assessment is to maintain and restore the desirable level of water quality in general (Wholesomeness of water).

4.2.1.1. Impact during Construction Phase

The peak water requirement during construction will be met from the GIDC Water supply. Further, the wastewater generation during the construction period will be basically from construction activities and the sanitary units provided for the workers. Hence, there will not be any impact on the water environment.

4.2.1.2. Impact during Operation Phase

Water Consumption & Waste Water Generation is given in **Table 2.8 of Chapter 2.** Details of CETP are discussed in **Topic 2.4.4 of Chapter 2.** The proposed project is a Common Effluent Treatment Plant to treat the waste water from industrial area. Overall there won't be any significant adverse impact due to proposed activity on the water environment.

Ground water and soil will not get contaminated, as NAA/AWML will be providing CETP for the treatment of industrial effluent from various industrial units located in GIDC, Ankleshwar. The waste water will be treated in CETP for achieving the specified discharge norms of GPCB for discharge in FETP and after that disposed in to the Arabian Sea through pipeline.

With the above, it can be said magnitude of impact will be minor impact on surface and ground water or soil quality.

4.2.2. AIR ENVIRONMENT

4.2.2.1. Impact during Construction Phase

During construction phase, air emission will be generated due to construction activities, use of D. G. set and use of construction material. Construction activities will be limited period of time and D.G. Set will be used in case of emergency and/or power failure only and construction material will be used with proper mitigation measures. There shall be lesser vehicular movement on the road for proposed project. So there shall be minor impact during construction phase and these impact will be temporary.

Pipelines for inlet to CETP and treated effluent conveyance:

GIDC Ankleshwar has modified effluent conveyance system to final pumping station since Jan 2018.

One is IIUS main line accommodating large scale units(@57) contributing @13 MLD and second is CIP line accommodating SSI units contributing @10 MLD.

All the effluent is presently collected at FPS and then sent to FETP of NCT for further treatment.

From FPS, the effluent from CIP line accommodating SSI units contributing @10 MLD will be diverted to proposed CETP and the treated effluent from CETP will be sent to FPS only. Hence, only pipeline from FPS to CETP will be required to install for the proposed CETP. The route of this pipeline will be adjacent to existing STP.

During construction phase, air emission will be generated due to laying of this pipeline. Construction activities will be limited period of time and construction material will be used with proper mitigation measures. There shall be lesser vehicular movement on the road for proposed project. So there shall be minor impact during laying of pipelines and these impact will be temporary.

4.2.2.2. Impact during Operation Phase

With respect to operation phase impact, Air emission from proposed CETP includes both process and utility emissions. The dispersion of pollutants in the atmosphere is a function of several meteorological parameters viz. temperature, wind speed and direction, mixing depths, inversion level, etc. A number of models have been developed for the prediction of pollutant concentration at any point from an emitting source. The Industrial Source Complex – Short Term (ISCST3) dispersion model is a steady-state Gaussian plume model. It is most widely accepted for its interpretability. It gives reasonably correct values because this obeys the equation of continuity and it also takes care of diffusion, which is a random process. For the present study, this model

is used for the prediction of maximum ground level concentration (GLC).

The different air emissions at proposed CETP are PM, SO_2, NOx from D.G. Set. & Chlorine gas from chlorine scrubber. The site specific and monitored details considered for input data for the software "ISC-AERMOD View" by Lakes Environmental, Canada for prediction of impact on air environment are given in **Table-4.1.**

TABLE-4.1

DETAILS OF EMISSION

SR. No.	OPERATING PARAMETER	UNIT	SOURCE OF EMISSION	
			Flue Gas Emission	Process Gas Emission
			1	2
1	Stack Height	Meter	30	15
2	Stack Dia.	meter	0.6	0.3
3	Flue Gas Velocity	m/s	3.2	1.5
4	Flue Gas Temp.	^{O}K	418	303
	Emission Concentration		Emission Concentration	
5	PM	mg/Nm^3	150*	--
		(g/s)	0.024	--
	SO_2	mg/Nm^3	100*	--
		(g/s)	0.016	--
	NO_X	mg/Nm^3	50*	--
		(g/s)	0.001	--
	Cl_2	mg/Nm^3	--	9
		(g/s)	--	0.0002

(*Permissible Limit)

Stack attached to…

Flue Gas Emission:

1. D.G. Set (Fuel-Diesel)

Process Gas Emission:

2. Chlorine scrubber

Note: D. G. Set Capacity: 1000 KVA is kept for emergency power back up.

TABLE-4.2

SUMMERY OF ISCST3 MODEL OUTPUT FOR Cl_2

SR. NO.	LOCATIONS	X, Y CO-ORDINATES	MAXIMUM CONCENTRATION Cl_2 ($\mu g/m^3$)
1.	Project-site (A1)	(0,0)	0.00000
2.	Andada (A2)	(1808,4700)	0.00007
3.	Jitali (A3)	(6628,843)	0.00002
4.	Uchhali (A4)	(6386,3494)	0.00004
5.	Motali (A5)	(3976,3736)	0.00019
6.	Kharchi Bhilwada (A6)	(7832,5302)	0.00001
7.	Gadkol Patiya (A7)	(1085,3494)	0.00009
8.	Amboli (A8)	(-4097,382)	0.00000
9.	Umarwada (A9)	(-2892, -3856)	0.00005

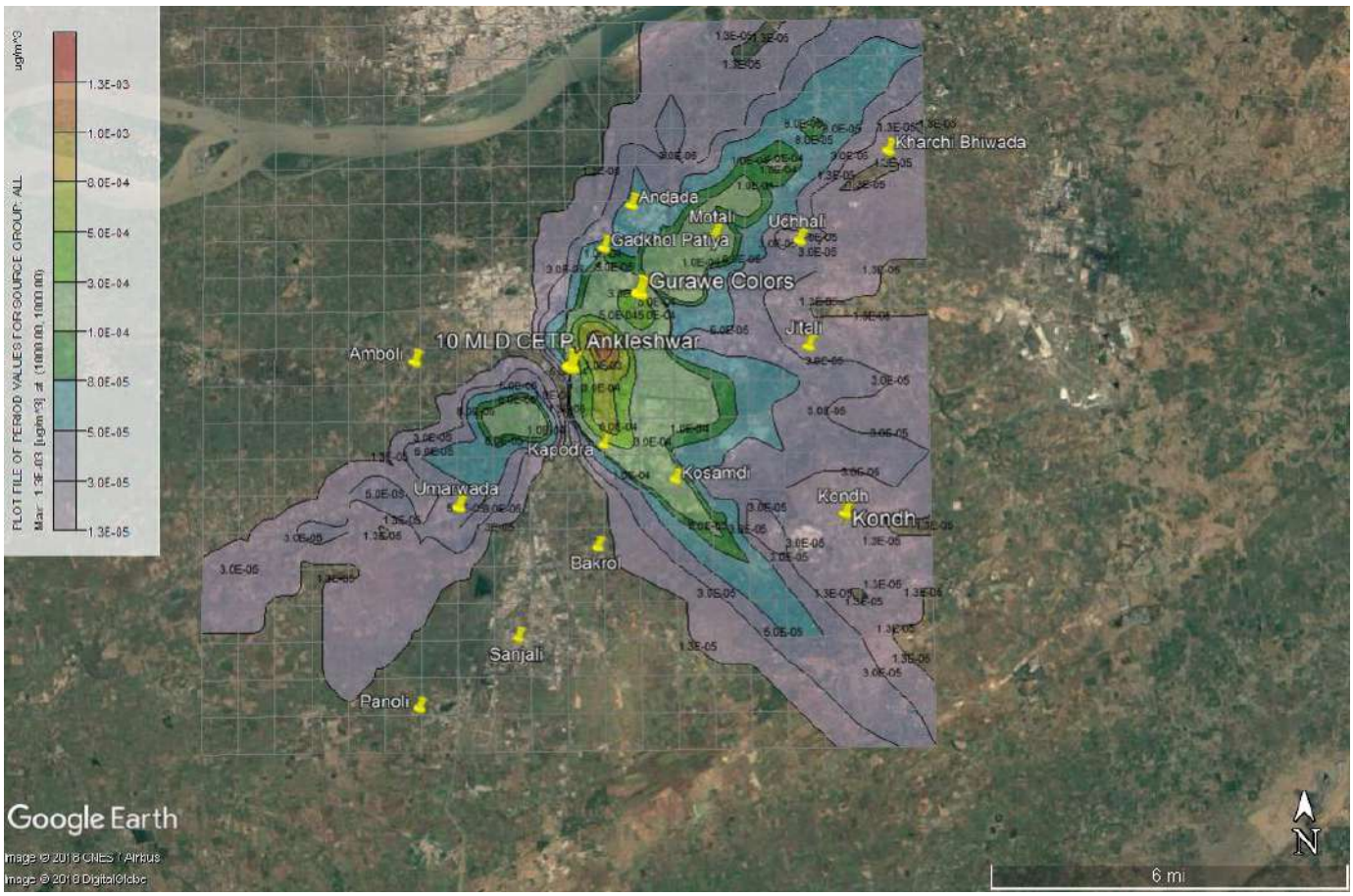
TABLE-4.3

PREDICTED AMBIENT AIR QUALITY FOR Cl_2

SR. No.	LOCATIONS	X, Y - CO-ORDINATES	MAXIMUM CONCENTRATION Cl_2 ($\mu g/m^3$)
1.	Project-site (A1)	(0,0)	BDL
2.	Andada (A2)	(1808,4700)	BDL
3.	Jitali (A3)	(6628,843)	BDL
4.	Uchhali (A4)	(6386,3494)	BDL
5.	Motali (A5)	(3976,3736)	BDL
6.	Kharchi Bhilwada (A6)	(7832,5302)	BDL
7.	Gadkol Patiya (A7)	(1085,3494)	BDL
8.	Amboli (A8)	(-4097,382)	BDL
9.	Umarwada (A9)	(-2892, -3856)	BDL

FIGURE – 4.1

ISOPLETHS FOR Cl_2



4.2.3. NOISE ENVIRONMENT

4.2.3.1. CONSTRUCTION PHASE IMPACTS:

Construction activities are likely to produce noise up to some considerable extent. During the construction phase of the project, there will be noise generation from earth moving equipment and material handling traffic. The noise generation level will be confined within the surrounding area of the project. There will be short term, localized and reversible impact on ambient noise levels during the construction activities.

4.2.3.2. OPERATION PHASE IMPACTS

Noise levels in and around the plant site will be measured. These values represent status of Noise levels. The main source of noise pollution in the plant is D.G. Set and other noise generating units. Vehicular movements during operation phase for loading/unloading and other transportation activity may also increase noise level.

4.2.4. LAND USE AND SOIL QUALITY

4.2.4.1. CONSTRUCTION PHASE IMPACT

Land is provided by NAA to AWML for the proposed CETP in the existing GIDC, Ankleshwar. Only construction activities will be carried out for the proposed CETP project and this will be minor impact on the existing land use pattern of the GIDC. However there will be no significant impact on the land use pattern and soil quality due to proposed CETP. Hence no significant topographical change is expected due to proposed project. The plant will be located in a notified industrial estate. The proposed plant site is suitably located considering availability of transportation, communication, residence and manpower. The project will not involve displacement of any population. Electricity, water, roads, all basic amenities and infrastructure are available for the proposed project.

4.2.4.2. OPERATION PHASE IMPACT

The hazardous wastes generation from proposed project like ETP Sludge from Common Effluent Treatment Plant, Used oil from lubrication of equipment, Discarded Containers and Oil & Grease from skimming. These Hazardous wastes will be stored in scientifically designed and constructed hazardous waste storage

area within the premises with leachate collection system and send for disposal to secured land fill site, registered recyclers and registered refiners. Hence, there will be marginal impact on the soil environment.

4.2.5. HOUSING

No township or housing facilities will be required for the proposed project. Residential facilities for the project will be available in nearby villages and towns for accommodating workforce. On town or neighboring villages, the impact on this account is minimal.

4.2.6. INFRASTRUCTURE AND SERVICES

Proposed CETP is identically located in Notified Area of GIDC, Ankleshwar. Water requirement is fulfilled by GIDC. The power requirement of proposed CETP will be met through DGVCL.

The transportation of raw materials, fuel and other materials will be transported by road only. As stated earlier, the site is near to State Highway and National Highway so that transportation facilities are easily available.

Due to project there are minimal impacts on services such as road transport, communication facilities, etc. However, looking at the overall volume of transportation and communication in this area, the impact is marginal.

GIDC will be contributed for development of neighboring areas in terms of residential and commercial use. The infrastructure services e.g. roads, state transport, post and telegraph, communication, education and medical facilities, housing, etc. will be improved in the surrounding areas. The project would have beneficial impact on infrastructure & services.

4.2.7. ENVIRONMENTAL HAZARDS

Raw materials are transported by road and stored in the plant premises. The company maintains systems for better performance in Quality, Environment, Occupational Health and safety. Hence, marginal impacts on this account are anticipated. The company is committed to adopt and implement all national and state legislation pertaining to workers safety, occupational health and in-plant and surrounding environment. NAA/AWML will be committed for

continuous improvement and sustainable development. Hence, NAA/AWML is able to take care of any environmental hazards within the plant premises.

4.2.8. ECOLOGY

The impact due to proposed project on the ecological parameters like natural vegetation, cropping pattern, fisheries and aquatic life, forests and species diversity is as summarized below:

4.2.8.1. NATURAL VEGETATION

The proposed CETP is located GIDC, Ankleshwar and since, there is provision for space for the proposed project and there will not be any cutting of the plantation at the site. The adequate green belt will be developed by the authority, which will lead to beneficial impact.

There shall be emission within limit as per the EMP provisions. Therefore, the adverse impact over any of the ecological components of the environment will be negligible.

4.2.8.2. CROPS

Since, the proposed project is located in GIDC, Ankleshwar; it is not likely to alter the crop production and pattern of the area, either during the construction phase or the operation phase. Further, the necessary environmental protection measures would be planned under EMP e.g. air pollution control systems designed to take care of even emergency releases of the gaseous pollutants like PM, SO_2, NOx and regular environmental surveillance, etc; so as not to have any short-term or cumulative effect on the crops and the natural vegetation of the area.

4.2.8.3. FOREST AND SPECIES DIVERSITY

The details of flora / fauna species and the wildlife habitat in the area covering 10 km radius have been collected to determine the existence of rare and / or endangered species. There is no reserved forest, national park or sanctuary within 10 km radius of the plant. There was no acquisition of forest land or parks for the plant.

4.2.8.4. FISHERIES AND AQUATIC LIFE

No commercial fishery activities are observed within 10 Km radius of the premises, and hence, due to proposed project activities no any adverse effect on fisheries and aquatic life could be envisaged.

4.2.8.5. AESTHETIC ENVIRONMENT

The proposed project is located at GIDC, Ankleshwar; industrial land with good landscape and proposed plantation. Any increase in fugitive emission due to construction activities and increase in the vehicular movement due to the proposed project may have minimal adverse impact on the visual quality. However, this impact can be minimized with implementation of environment management plan.

Thus, adverse impacts are minimized with various EMP measures taken by the industry on the aesthetic environment.

4.2.8.6. DEMOGRAPHY, ECONOMICS, SOCIOLOGY AND HUMAN SETTLEMENT

There are beneficial effects due to improved communication and that resulted in economic prosperity, better educational opportunities and access to better health and family welfare facilities. There will be a beneficial effect on human settlement due to employment opportunities from various industries in the area.

The standard & quality of life of local people will be improved due to the proposed CETP. This factor combined with all other mitigation measures like proper treatment and disposal of Hazardous and liquid wastes and gaseous emission will have a beneficial impact on human settlement and employment opportunities.

There will be no displacement of population in plant area. Any major activity that may lead to resettlement of the people is considered as permanent impact. Hence, there is no permanent impact on this account.

4.2.8.7. SOCIO - ECONOMIC IMPACTS

4.2.8.7.1. EMPLOYMENT OPPORTUNITIES

During construction phase, skilled and unskilled manpower will be needed. This will temporarily increase the employment opportunity. Secondary jobs

will also bound to be generated to provide day-to-day needs and services to the work force. This will also temporarily increase the demand for essential daily utilities in the local market.

The manpower requirement for the proposed project is expected to generate some permanent jobs and secondary jobs for the operation and maintenance of plant. This will increase direct / indirect employment opportunities and ancillary business development to some extent for the local population.

This proposed CETP will be expected to create a beneficial impact on the local socio-economic environment.

4.2.8.7.2. INDUSTRIES

During construction of the project, the required raw materials and skilled and unskilled laborers will be utilized maximum from the local area. The increase in industrial activity will boost the commercial and economic status of the locality, to some extent.

4.2.8.7.3. PUBLIC HEALTH

During construction period, workers will be provided with basic amenities like safe water supply, low cost sanitation facilities, first aid, required personal protective equipment, etc. Otherwise, there could be an increase in diseases related to personal hygiene.

Emission, if uncontrolled from process and utility stacks may cause discomfort, burning of eyes to the recipients in the down wind direction. This may be caused due to the failure of control equipment / process.

The company regularly examines, inspects and tests its emission from sources to make sure that the emission is below the permissible limit.

Hence, there will not be any significant change in the status of sanitation and the community health of the area, as sufficient measures will be taken and proposed under the EMP.

4.2.8.7.4. TRANSPORTATION AND COMMUNICATION

Since the project location is having proper linkage for the transport and communication, the development of this project will not cause any additional impact.

In brief, as a result of the proposed project there will be no adverse impact on sanitation, communication and community health, as sufficient measures will be proposed to be taken under the EMP. The proposed project is not expected to make any significant change in the existing status of the socio - economic environment of this region.

4.3. MATRIX REPRESENTATION

The parameters discussed are presented in the form of a matrix. The scores for various parameters and activities are presented in Table-4.4.

Environmental Impact Assessment matrix with mitigation measures are presented in Table-4.5.

The quantification of impact is done using numerical scores 0 to 5 as per the following criteria.

Score	Severity criteria
0	No impact
1	No damage
2	Slight/ Short-term effect
3	Occasional reversible effect
4	Irreversible/ Long-term effect
5	Permanent damage

TABLE-4.4

Potential Impacts & Mitigative Measures

ENVIRONMENTAL COMPONENTS	POTENTIAL IMPACTS	SOURCES OF IMPACT	MITIGATIVE MEASURE	REMARKS
Water Quality	Deterioration of water quality	Discharge of sewage and utility waste water	Domestic Wastewater will be discharged into septic tank & soak pit. Treated effluent will be disposed through 12 km pipeline into Arabian Sea.	Discharge as per G.P.C.B. Standards. No adverse impact.
Air Quality	Increase in SO_2, NO_X, PM concentrations in ambient air.	Process emissions, fugitive emissions.	Diesel shall be utilized for D.G. Set. Adequate stack height will be provided as APCM for proper dispersion of emission. FRP scrubber will be provided with chlorine tonner to control chlorine gas from process gas emission.	No adverse impacts on ambient air quality.
Socio-Economic	Overall growth & development of area, increased employment, improvement in infrastructure.	Project activities.	General area planning in advance by Development team of company.	Beneficial change.
Terrestrial Ecology	There is no loss of habitat-flora & fauna, loss of agricultural land as proposed project is located in GIDC, Ankleshwar.	Project activities.	Maintain dense Green belt, Proper management of Hazardous waste, disposal of hazardous waste at secured landfill site.	No impact.
Noise	Increased noise level	Project operation.	Noise abatement at generation point by engineering and Administration inputs & receptor Green belt.	No impact.
Infrastructure & Services	Improved communication, transport, housing, educational & medical facilities	Project.	Development has been gradual.	Beneficial impact.

Environmental Hazards	Risk to environment & neighboring population	Handling and storage of chemicals & fuels.	Onsite Emergency Plan & Disaster management plan Safe practices.	Insignificant adverse impact.
Soil Quality	No Deterioration of soil quality as proposed project is located in GIDC, Ankleshwar.	ETP waste, Discarded containers and Used oil.	ETP waste is disposed at TSDF site. Used oil is sold to the authorized registered refiners. Discarded containers are sold to registered recyclers.	Minor impact.

TABLE-4.5

Environmental Impact Assessment Matrix with Mitigation Measures (Construction Phase)

PROJECT ACTIVITIES / PARAMETERS	Excavation	Water Requirement	Civil Works	Mechanical Works	Equipment & Machine Operation	Landscaping	Filling	Surface Paving	Misc. Human	Transportation activities	Demands of Public facility	TOTAL
PHYSICO-CHEMICAL PARAMETERS:												
Surface Water Quality	0	0	0	0	0	0	0	0	0	0	0	**0**
Ground Water Quality	0	-1	0	0	0	-1	0	0	0	-1	0	**-3**
Air Quality & Noise	-1	0	-1	-1	-1	-1	0	0	0	-1	0	**-6**
Soil Quality	-1	0	0	0	0	1	0	0	0	0	0	**0**
Land use /land cover	-1	0	0	0	0	1	0	0	0	0	0	**0**
ECOLOGICAL PARAMETERS:												
Forest/ Park/ Sant.	0	0	0	0	0	0	0	0	0	0	0	**0**
Flora & Fauna	0	0	0	0	-1	2	0	0	0	0	0	**-1**
Aquatic Ecosystem	0	0	0	0	0	0	0	0	0	0	0	**0**
SOCIAL PARAMETERS:												
Aesthetics	0	0	0	0	0	1	0	0	0	0	0	**1**
Local housing	0	0	0	0	0	0	0	0	0	0	0	**0**
Services	0	0	0	0	1	0	0	0	1	1	0	**3**
Health & Safety	-1	-1	-1	-1	-1	1	0	0	0	-1	-1	**-6**
ECONOMIC PARAMETERS:												
Agriculture	0	0	0	0	0	0	0	0	0	0	0	**0**
Industries	-1	-1	-2	-1	-1	2	0	0	0	-1	0	**-5**
Employment	1	-1	1	2	1	1	0	0	1	1	0	**7**
TOTAL	**-4**	**-4**	**-3**	**-1**	**-2**	**7**	**0**	**0**	**2**	**-2**	**-1**	**-8**

TABLE-4.5

(Contd.) Environmental Impact Assessment Matrix with Mitigation Measures (Operation Phase)

PROJECT ACTIVITIES / PARAMETERS	Commissioning & Operational Activities	Water Requirement	Domestic Activities & Waste Disposal	Air emissions	Fugitive emissions	Noise	Haz. Waste generation	Material Storage & Handling	Hazard from Operations & Activities	Breakdown of Control Equipment	Transportation activities	End use of products	TOTAL
PHYSICO-CHEMICAL PARAMETERS:													
Surface Water Qt.	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Ground Water Qt.	-1	-1	-1	0	0	0	-1	0	0	-2	0	0	**-6**
Air Quality & Noise	-1	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	**-8**
Soil Quality	0	0	0	0	0	0	0	0	-1	0	0	0	**-1**
Land use / Land Cover	0	0	0	0	0	0	0	0	0	0	0	0	**0**
ECOLOGICAL PARAMETERS:													
Forest/ Park/ Sanctuary	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Flora & Fauna	0	-1	0	0	0	0	0	0	-1	0	0	0	**-2**
Aquatic Ecosystem	0	0	0	0	0	0	0	0	0	0	0	0	**0**
SOCIAL PARAMETERS:													
Local housing structure	1	0	0	0	0	0	0	0	0	0	1	0	**2**
Services	1	0	1	1	0	0	1	1	0	0	2	1	**8**
Health & Safety	-1	0	0	-1	0	-1	0	-1	-1	0	-1	0	**-6**
ECONOMIC PARAMETERS:													
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Industries	1	0	0	0	0	0	0	0	0	0	0	2	**3**
Employment	3	0	2	0	0	0	2	2	0	2	3	0	**14**
TOTAL	**3**	**-2**	**2**	**-1**	**-1**	**-2**	**2**	**1**	**-4**	**-1**	**4**	**3**	**4**

4.4. CONCLUSION

It can be concluded from the matrices that the resultant impact is beneficial in the interest of common man, the society, the state and the country as a whole. The benefits can be summarized as below:

- There should be positive impact on the socio-economic condition of the area in terms of direct and indirect employment due to the proposed project.
- Numbers of local trained persons are likely to find jobs.
- Country will save valuable foreign exchange as import of these products will reduce by corresponding amount.
- These products also have export potential. Hence, possibility of earning foreign exchange.

CHAPTER – 5
ENVIRONMENTAL MONITORING PLAN

5.1. ENVIRONMENTAL MONITORING PLAN

Environmental Monitoring is an essential tool for sustainable development & ensuring effective most implementation & monitoring of Environmental Management Plan & mitigation measures. It is also very essential for keep updating the Environmental Management System for effective conservation of environment along with ongoing project activities / operation. The Environment Monitoring Plan enables Environmental Management System with early sign of need for additional action and modification of ongoing actions for environment management, improvement & conservation. It provides exact idea for mitigation measures to be implemented as it is linked with actual distraction of environmental quality due to the project activities. Hence, monitoring of critical parameters of environmental quality is very essential in the routine activity schedule of project operation. An Environmental Monitoring Programme shall be scheduled for the following major objectives:

- To verify the result of the impact assessment study in particular with regards to new developments.
- To follow the trend of parameters which have been identified as critical.
- To check or assess the efficiency of controlling measures.
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical through the commissioning of new project.

To monitor effectiveness of Control Measures:

- Monitor daily, Assess effectiveness of the Control Measures being implemented, Explore the need to modify or add new Control Measures particularly if a violation is observed & Report weekly.
- Regular monitoring of environmental parameters will be made to find out any deterioration in environmental quality.
- Monitoring of the proposed project area will be regularly conducted. The attributes, which merit regular monitoring, are specified underneath.

5.2. POST PROJECT MONITORING

5.2.1. MONITORING POINTS/LOCATIONS & COMPONENTS

The monitoring points / location & components of significance shall be as follows:

TABLE-5.1

MONITORING POINTS/LOCATIONS & COMPONENTS

ENVIRONMENT ISSUE/COMPONENT	REMEDIAL MEASURES
Hazardous waste generation & disposal	Proper collection, Safe Handling, Storage within premises and will be disposed at approved TSDF, re-cyclers, re-processors.
Effluent treatment	Effluent treatment plant has been provided for treatment of wastewater generated from various industries and disposal of effluent in 55 km pipeline to Arabian Sea.
Emission from stack	Adequate pollution control system will be provided for control of gaseous emission.
Plantation	Plantation in and around plant.
Preparedness to handle onsite & offsite emergency	Offsite Emergency Management Plan will be prepared.
Monitoring of Environmental parameters	Regular monitoring of various environmental parameters will be carried out to check the effectiveness of the control system.

5.2.2. MONITORING PARAMETERS & FREQUENCY

The monitoring Parameters & Frequency of significance shall be as following:

TABLE-5.2

FREQUENCY OF MONITORING & PARAMETERS

Environmental Component	Parameters	Standards	Duration / Frequency
Air Environment			
AAQM at plant site	SPM, RSPM, SO_2, NOx, in Ambient Air Quality	Prescribed by CPCB	Once a week through NABL accredited laboratory.
Stack emission monitoring of emissions sources	Parameters prescribed by CPCB for stack emissions	Prescribed by CPCB	Once in a weekly / fortnightly Once in six months by NABL accredited laboratory.
Fugitive emissions monitoring within the plant side	VOC	Prescribed by CPCB	Every Day
Water Environment			
Analysis of treated effluent	Parameters prescribed by CPCB	Prescribed by CPCB	Daily by CETP Once in a Quarter by NABL accredited laboratory.

Ground water quality	-	As per drinking water quality Standards	Once in a season
Surface water quality	pH, TDS, TSS, Sulphate, Chloride, Colour, BOD_3, COD, Oil and Grease	Water use based standards of CPCB	Once in a season

Environmental Component	Parameters	Standards	Duration / Frequency
Noise Environment			
Noise	Noise level in db(A) leq	As per national noise standards	Once in quarter by Company
Soil Environment			
At plant site	Analysis of pH, Sulphate, Calcium, Magnesium, Chlorides, Cyanides, Phenolic Compounds	--	Pre and post monsoon season by Company
In surrounding area	Analysis of pH, Sulphate, Calcium, Magnesium, Chlorides, Cyanides, Phenolic Compounds	--	Pre and post monsoon season by Company

5.2.3. REGULAR MONITORING OF MEMBER INDUSTRIES

The monitoring plan for member industries is attached as **Annexure – 11**.

5.2.4. METHOD OF ENVIRONMENTAL SAMPLING & ANALYSIS

Monitoring of environmental samples shall be done as per the guidelines provide by MoEFCC / CPCB / GPCB. The method followed shall be recommended / standard method approved / recommended by MoEFCC / CPCB.

TABLE-5.3

METHOD OF ENVIRONMENTAL SAMPLING & ANALYSIS

Attributes	METHOD	
	Sampling / Preservation	**Analysis**
A. Air Environment 1. Micro-meteorological data 2. Ambient Air Quality	Mechanical / Automatic 1. Spectrum weather station 2. 2.5 Micron dust samplers & RSPM samplers having the facility to collect the gaseous samples	----- IS : 5182 & CPCB
B. Noise	Instrument : Noise level meter	-
C. Water & Waste Water 1. Ground Water 2. Surface Water	Standard methods for examination of water and wastewater analysis published by APHA 22nd edition, 2012	Standard Methods for Examination of Water and Wastewater Analysis published by APHA 22nd edition, 2012

5.3. DOCUMETATION & RECORDS

The company will maintain the following record with respect to routine monitoring.

- Standard method (IS & APHA)
- Data Sheets for necessary details
- Rough record locations & frequency
- Report preparation
- Monthly and annual progress reports.

5.4. BUDGET & PROCUREMENT SCHEDULE

On regular basis, Environment Management Cell shall inspect the necessity & availability of the materials, technologies, services & maintenance works. The Cell shall prepare appropriate budget for this purpose. Regular record review for change in financial requirement of environment management shall be done and appropriate budgetary provisions shall be made.

The budget shall include provisions for:

- Environmental Monitoring Program
- Operation & Maintenance of Environmental Technologies / Equipments
- Emergency Purchase of necessary material, equipments, tools, services, etc.
- Greenbelt development
- Social & Environmental Welfare & Awareness programs / training.

The budget shall include provisions for:

- Environmental Monitoring Program & equipment
- Operation & Maintenance of Environmental Technologies / Equipment

5.5. MONITORING PLAN FOR MEMBER INDUSTREIS

A detailed Specific monitoring plan for member industries is attached as **Annexure – 11**.

CHAPTER – 6
PROJECT BENEFITS

6.1 BACKGROUND

NAA and AWML proposed a 10 MLD CETP at GIDC, Ankleshwar for the treatment of industrial waste water of member industries from GIDC, Ankleshwar. The proposed project located Plot No. U-5 (Utility Plot), adjacent to existing 22.5 MLD STP, GIDC, Ankleshwar, Di: Bharuch, Gujarat.

6.2 ENVIRONMENT

The proposed project is a common infrastructure project for treatment of waste water of member industries of GIDC, Ankleshwar.

- At GIDC, Ankleshwar there are several small, medium and large scale industries in operation. Also so many industries are planning for expansion of their existing unit by increasing the production capacity or adding the new products. Also there are new proposed industries to establish their manufacturing facility.
- Looking to the above expansion and new industries scenario the total effluent generation form the industrial estate going to increase.
- The GIDC Ankleshwar is very old GIDC and 70% industrial units are Small Scale Industries (SSI). The plot area of SSI are small and available space is limited. So it is difficult to upgrade/modify existing ETP.
- Presently, the effluent generated from the small scale industries within the premises of GIDC Ankleshwar is either discharged directly into the FETP of NCT through underground effluent conveyance pipeline or into CETP of ETL through tankers and final pumping station. NCT treat the effluent and after achieving discharge norms, dispose the treated effluent into deep Arabian Sea through 53 km (Onshore Pipeline: 43.6 km + Offshore Pipeline: 9.4 km) effluent conveyance pipeline.
- Now, Medium and Large scale industries are having their own Effluent Treatment Plant. Such industries are treating their effluent and discharging to GIDC drainage line to FETP.
- Small scale industries (SSI) have limited facilities for effluent treatment.

- Hence, to treat the effluent from SSIs of GIDC, Ankleshwar; NAA of Ankleshwar along with AWML proposed to set up a 10 MLD CETP. Looking to the current scenario, it is proposed to set up CETP for 7.5 MLD Ind. Effluent + 2.5 MLD sewage with primary, secondary and tertiary treatment facility. The proposed CETP shall treat only the effluent from SSIs of GIDC Ankleshwar. The treated effluent from the proposed CETP shall achieve the FETP norms and discharge the treated effluent to FETP for further treatment and disposal.

6.3 The advantage of CETP is mostly sought due to following benefits:

- Saving in capital cost and operating cost of treatment plant. The common treatment is always cheaper than small scattered treatment units.
- Availability of land which is difficult to be ensured by all individual units in the event they go for individual treatment plants.
- Contribution of nutrient and diluting potential, making the complex industrial waste more amenable to degradation.
- The neutralization and equalization of heterogeneous waste makes its treatment techno economically viable.
- Professional and trained staff can be made available for operation of CETP which is not possible in case of individual plants.
- Looking to the future demand CETP will be constructed with extra capacity.
- Disposal of treated wastewater & sludge becomes more organized.
- Reduced burden of various regulatory authorities in ensuring pollution control requirement.
- As CETP will be provided after final collection sump, toxic effect of untreated & illegal dump tankers will be minimized.
- The effluent discharge will comply with the guidelines given by SPCB/CPCB and MoEF and will not be harmful to the ecology of the receiving body.
- A peripheral greenbelt/plantation, garden and lawn will be provided which will improve the aesthetics of the area.
- As the proposed site is in the GIDC area which is away from residential area, and all the required care will be taken to control the pollution levels to minimum as discussed

in the relevant sections of this report, no adverse impacts are anticipated due to construction of CETP during construction and operation phase.

- There shall be no displacement of any population as proposed project is in GIDC, Ankleshwar. Hence, there is no permanent impact or any R&R issues on this account.
- The unskilled and skilled manpower requirement during the construction and operation phases for the CETP will generate permanent jobs and secondary jobs for the operation and maintenance of plant. This will increase direct/indirect employment opportunities and ancillary business development to some extent for the local people. The employment opportunities as described above will create beneficial impact on the local socio-economic environment.
- Adequate mitigation measures will be ensured to reduce odor emissions and disease vectors from proposed site to eliminate the nuisance of ETP.
- Hence the status of sanitation and community will be maintained in good condition at the project site.

6.4 Employment Generation

The proposed project will have considerable employment. This will increase the employment opportunity. Secondary jobs will also bind to be generated to provide daily needs and services to the work force. This will also temporarily increase the demand for essential daily utilities in the local market. The manpower requirement for the proposed project will generate permanent and secondary jobs for the operation and maintenance of plant. The project will benefit the people living in the neighboring villages by giving preference to them in relation to direct employment associated with the various project activities. Construction and operation phase of the proposed project will involve a certain number of laborers. There is a possibility that local people for construction phase as well as a number of local skilled and unskilled people will be engaged in the employment which will improve the existing employment scenario of the region.

DEPLOYMENT OF QUALIFIED/SKILLED MAN POWER

Employee's	**Nos.**
Male	40
Female	10
Total	**50**

6.5 ENTERPRISE SOCIAL RESPONSIBILITY (ESR) PLANT & ACTIVITIES

- To carry out above activities in the most efficient manner, Ankleshwar Industries Association promoted Ankleshwar Industrial Development Society (AIDS), Ankleshwar Environmental Preservation Society (AEPS), Sanskardeep Trust, Enviro Technology Ltd (ETL) a common effluent treatment facility mainly for small scale industries, Bharuch Enviro Infrastructure Ltd (BEIL) a combination of common solid waste disposal facility (TSDF), common Multi Effect Evaporator (MME) and common incineration facility and Narmada Clean Tech (formerly Bharuch Eco Aqua Infrastructure Ltd) (NCT) a final effluent treatment plant for polishing cum disposal of treated effluent in to the deep sea near Kantiyajal.
- Highlights of various initiatives taken and activities carried out by Ankleshwar Industries Association through these organizations are:

Social Infrastructure:-

1. **Ankleshwar Industrial Development Society:** This society runs:

(1) Shree Gattu Vidyalaya, a school providing education to more than 2500 students from Junior KG to Higher Secondary with instructions in both English and Gujarati languages, is one of the best schools of the District

(2) Smt. Jayaben Mody Hospital, a 80-bed full-fledged hospital is providing efficient health services not only to the industrial community, but also to the rural population.

(3) D. A. Anandpura Sports & Cultural Centre is set up for providing sports, games and recreational activities to the industrial community of the area.

2. **Sanskardeep:**

Trust runs a Gujarati Medium School – Sanskardeep Vidyalaya – pre-primary to Secondary level. More than 1500 students are studying in this school, which is one of the best schools of the District, this is evident as in Board examinations, and some students regularly secure position in State topper's 'list ten.

Environmental Infrastructure

1. Ankleshwar Environmental Preservation Society:

- AEPS is running P.G. Diploma course in Environment Management for last many years. As on date more than 100 P.G. Diploma holders are in Ankleshwar and they are taking care of Environment Management System of various industries. This has helped to tackle the environmental related matters considerably.
- AEPS is organizing Environment Awareness Programs and Seminars regularly. The overwhelming response of these programs and seminars gives a clear impression of the industries that ISO 14000 is very important certification for them. In Ankleshwar GIDC, there are over 50 industries in medium/large scale category and 100 small scale industries having ISO 14000 certification. Major Goal of AEPS is to get ISO 14000 certification for the entire GIDC Estate.
- Massive tree plantation is being carried out in and around Ankleshwar GIDC. All the roads in the GIDC Estate are covered with trees. Each year almost Rs.5.0 lakhs are being spent for tree plantation & its maintenance activities. Three Green Belts have been developed within the Estate. There is increase of almost 14% green belt area compared to 1985 – 1998. This data was obtained from ISRO through their satellite images.
- Other activities like, running rain water harvesting system, increasing awareness through programs for use of solar energy, etc. are being conducted regularly.
- Being the largest cluster of chemical industries in Asia, Ankleshwar industrial estate is always vulnerable to industrial emergencies due to human errors, natural calamities and technical failures. Ankleshwar Industrial Association armed itself to take on such emergencies by setting up Disaster Prevention & Management Center (DPMC) in 1995 through AEPS. DPMC is fully capable to control emergencies like fire, explosions, gas leaks and etc. in Ankleshwar, Panoli, Jhagadia and Valia industrial estates. It is equipped with all necessary equipment for all types of emergencies and trained personnel.

  In view of the valuable services rendered by this organization, the Gujarat State Disaster Management Authority, a State Government undertaking has sanctioned a Hazmat Van worth Rs. 1.50 Crores to this organization. This will

be most advanced equipment and added service for this center in tackling all kind of emergencies in this region.

DPMC got a major boost to its morale when new building with residential quarters was inaugurated in January, 2004. Now, DPMC is all the more capable to face the future challenges.

CHAPTER – 7
ENVIRONMENTAL MANAGEMENT PLAN

7.1. BACKGROUND

The proposed 10 MLD CETP of GIDC, Ankleshwar shall adopt a comprehensive Environmental management plan (EMP), which would cover several environmental protection measures, not only for abatement of environmental pollution resulting from the project, but also for the improvement in the ambient environment. The various components of the EMP are outlined in subsequent sections.

7.2. OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN

The main objectives in formulating the environment management plan are,

- To treat all the pollutants, i.e. effluent, air emission, noise & hazardous waste etc. which contribute to the degradation of environment, with appropriate technology.
- To comply with all the regulations stipulated by central/state pollution control boards related to air emission and liquid effluents discharge as per Air & water pollution control laws.
- To handle hazardous waste as per Hazardous Waste (Management, Handling and Trans boundary Movement) Amendment Rules, 2009 of Environment Protection Act, 1986.
- To encourage, support and conduct development work for the purpose of achieving environment standards and to improve methods of environment management.
- To promote further forestation in the surrounding areas of the plant.
- To create good working conditions (devoid of air & noise pollution) for employees.
- To reduce fire and accidental hazards.
- Perspective budgeting and allocation of funds for environment management expenditure.
- Dissemination of technological solution on commercial basis to interested parties.
- Continuous development and search for innovative technologies for better environment.
- To adopt cleaner production technology.

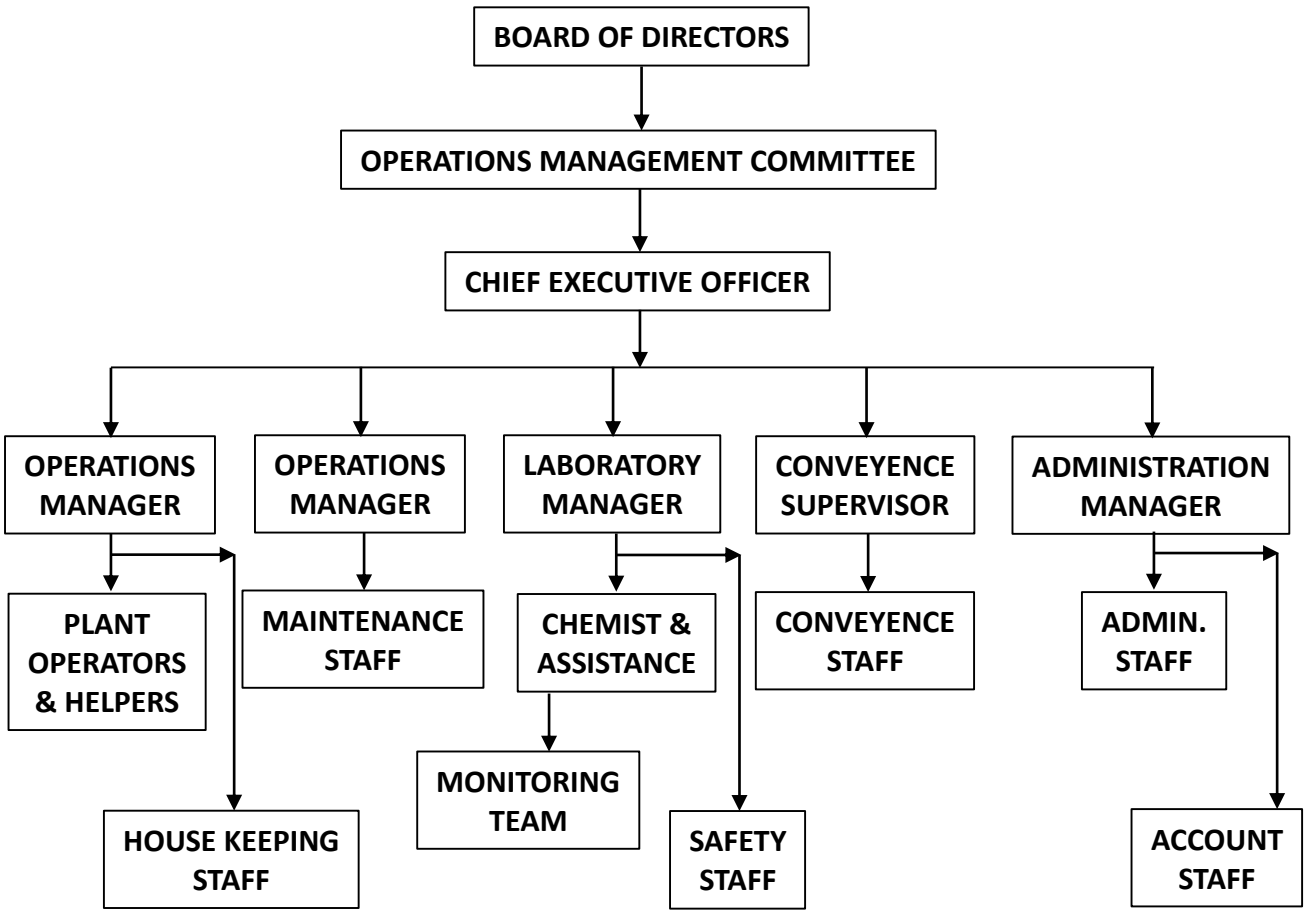
7.3. ENVIRONMENTAL MANAGEMENT CELL

Apart from having an environmental management plan, it is also necessary to have a permanent organizational set up charged with the task of ensuring effective implementation. In this effect, NAA and AWML shall assigned responsibilities to officers from various disciplines to co-ordinate the activities concerned with management and implementation of environment control measures. An organogram of Environment management is shown in Figure – 7.1. Basically, this department undertake the monitoring of environmental pollution level by measuring stack emissions, ambient air quality, water and effluent quality, Noise level, etc. either departmentally or appointing external agency whenever necessary. CETP shall have its own laboratory equipped with different equipment. The details of laboratory of CETP are attached as Annexure – 10. In addition to that CETP shall have quality control laboratory, which shall be equipped with sophisticated equipments. Equipment of quality control laboratory shall also available for analysis of environment parameters. CETP will continue the regular monitoring in future to ensure that pollution is limited below prescribed limits and to take corrective action by either providing new equipment or improving the performance of existing pollution control equipment. In case the monitored results of environment pollution are found to exceed the prescribed limits, remedial actions are taken through the concerned plant authorities. The actual operation and maintenance of pollution control equipments of each department is under respective department heads.

The Environmental, Occupational health and Safety department shall also look after for preparation of environment statement, carrying out environment audit, preparation of Water Cess Return and various consent applications and renewal under water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 as well as application for authorization and its renewal under Hazardous Waste (Management, Handling and Trans boundary Movement) Amendment Rules, 2009 under Environment Protection Act, 1986.

FIGURE – 7.1

ORGANOGRAM OF ENVIRONMENT MANAGEMENT CELL



7.3.1. MANAGEMENT AND MAINTENANCE OF CONVEYANCE SYSTEM

Following are the special provisions made in conveyance system to protect the environment from any malfunction and for smooth conductance.

- Presently, the management and maintenance of effluent conveyance system is maintained by NAA.
- Only the CIP pipeline network will be utilized for collection of effluent from various industries in CCETP.
- Proper Inspection of existing pipeline will be carried out.
- Cleaning of pipeline will be carried out as per requirement.
- The routine monitoring of entire pipeline shall be carried out.
- The entire CETP shall be operated on PLC-SCADA system.

7.4. ENVIRONMENT MANAGEMENT PLAN

7.4.1. CONSTRUCTION PHASE MANAGEMENT

Environment impact during the construction phase can be attributed to the site preparation, civil works, erection and mechanical fabrication, waste disposal, welding etc and provision of civic amenities to the construction work team. The potential for environmental impact during construction phase is temporary and environment returns back to its previous status on completions of the construction.

The construction shall be undertaken on open land and topography of the site is plain. Thus, change in land use and destruction of flora from the construction area is not involved. The Environmental Management Plan for construction phase is described below;

- During site preparation, the materials shall be stacked at safe place.
- To prevent soil erosion, temporary seeding and sedimentation basin shall be provided.
- To control the nuisance created by excavation, leveling and transportation activities shall be carried out by water sprinkling.
- Safety equipments such as ear plugs, ear muffs, helmet and safety goggles etc. will be provided.

7.4.2. OPERATIONAL PHASE MANAGEMENT

The detail study was carried out for operational phase aspect, impact and their mitigation measure. Control measures have been incorporated in the process system to minimize wastes generation and subsequent environment.

7.4.2.1. CONVEYANCE SYSTEM

The effluent from the member industries shall be transported by conveyance pipeline and pumping stations to CETP site. Within CETP, almost effluent shall convey through open channel for treatment process so there will be no any choking and also any leakage shall rectify immediately. But at some where effluent shall convey through pipeline, at there company will upgrade effluent conveyance system to prevent choking/overflow/leakage of the effluent conveyance pipeline which is as follow;

- Pipeline network will provide with adequate size with screen.
- Adequate pipeline capacity will be provided.
- To prevent leakage, flange system will be provided to joint the pipes.
- Adequate height of pipeline inlet and outlet will be provided.
- Proper Inspection will be carried out.
- Cleaning will be carried out at per requirement.
- The routine monitoring of entire pipeline shall be carried out.

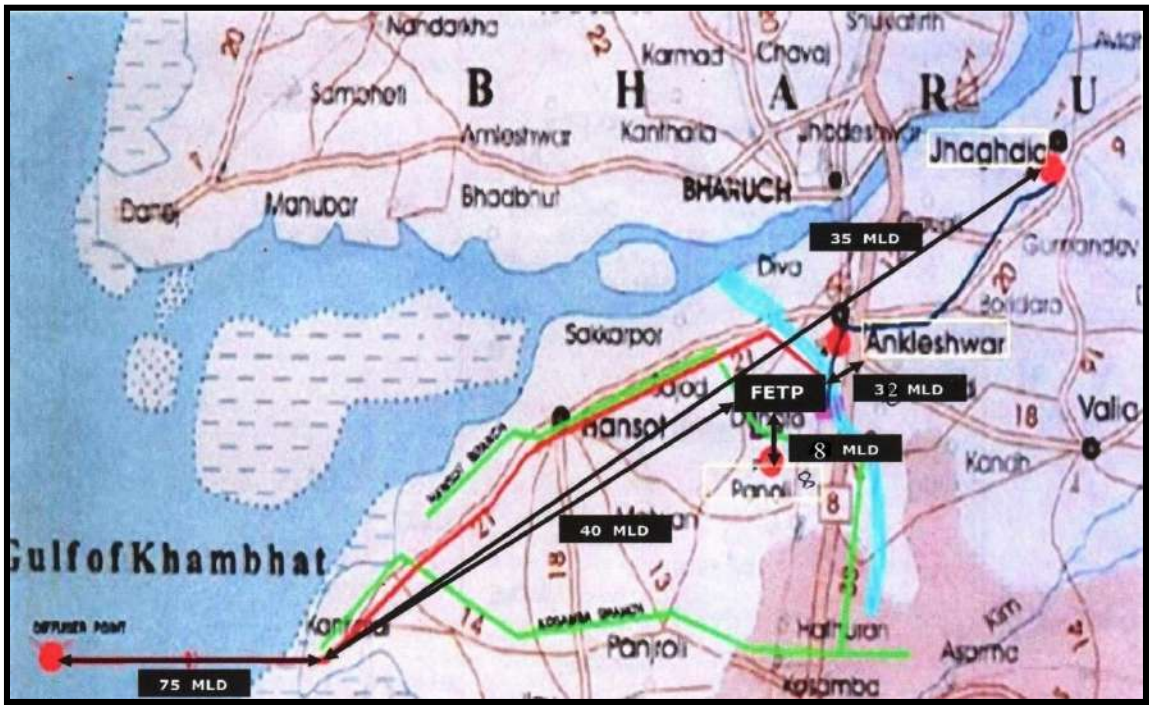
7.4.2.2. WATER ENVIRONMENT

7.4.2.2.1. AT CETP SITE

Neutral effluent from member industries to CETP shall be treated in Effluent Treatment Plant, which consists of Primary, Secondary and Tertiary treatment facility and finally sent to Final Pumping station (FPS). From the final pumping station all the collected effluent pumped to the FETP of NCTL for further treatment and final disposal into deep Arabian Sea through a 55 km pipeline. The details of pipeline for final disposal of treated effluent are shown in Figure 7.2.

FIGURE – 7.2

SCHEMATIC DIAGRAM OF TREATED EFFLUENT DISPOSAL



- Total water requirement will be fulfilled by GIDC water supply system. This will not put any stress upon the ground water bodies. However, water conservation practices and process optimization, reduction, reuse and recycle of water will minimize the impact.
- CETP has adopted the following EMP to prevent water environment;
- Water conservation measures shall be taken to optimize the fresh water requirement and record of water consumption shall be maintained.
- Record of the inlet waste water quantity and treated water/disposal quantity shall be maintained.
- Record of analysis results of untreated wastewater and treated waste water shall be maintained.
- Annual environmental audit from recognized environmental auditor shall be conducted.
- Proper housekeeping should be adopted to prevent spillages and contaminated surface runoff going to storm water drains.
- Monitoring plan shall be implemented as per schedule.

CETP also has to carry out treatability studies in pilot plant so that treatment scheme can be further improved.

7.4.2.2.2. RESPONSIBILITIES OF MEMBER INDUSTRIAL UNITS

- **The member units shall segregate their effluent into following streams and shall treat each stream according to the quality.**
  - **Low TDS low COD effluent:**

    This will be treated by individual industrial units so as to achieve CETP inlet norms.
  - **High TDS low COD effluent:**

    Individual Industries shall segregate effluent having high TDS low COD and treat that stream separately.
  - **High COD /Low TDS effluent:**

    Individual Industries shall segregate effluent having high COD Low TDS and treat that stream separately.

- Individual industrial units shall have their effluent collection and effluent treatment plants for the treatment of their effluent to achieve GPCB prescribed norms for inlet of FETP. After ETP, each industry shall also install guard pond from which the individual industry will discharge their partially treated effluent as per FETP inlet norms into effluent drainage pipeline and the discharge point shall be above the drainage chamber and the effluent shall have free fall into the chamber with a sampling point for checking the effluent norms even from outside the industrial premises. The schematic details of EFFLUENT DISCHARGE SYSTEM AT INDIVIDUAL MEBER UNIT is shown in Annexure – 11.
- The MEMBER shall comply with inlet norms of CETP at the discharge point at member premises before discharging his raw effluent in the Conveyance System.
- The MEMBER units shall pay the bill raised by the CETP within 7 DAYS time from the date of bill.
- The MEMBER units shall pay any contribution required to fulfill the economic liabilities of CETP pertaining to waste water, CETP and related activities; as per the formula, derived and approved by the Board of Directors, which may be notified from time to time.
- The MEMBER shall pay and maintain interest free refundable Security Deposit of minimum one and half month's billing or based on capital investment, whichever is higher, until its membership is terminated or it is decided by CETP to return the same to all MEMBERS.
- The MEMBER shall get the consent from the Gujarat Pollution Control Board directing the MEMBER to send its raw EFFLUENT to the chamber of Effluent conveyance pipeline of GIDC for the member near its Gate connected through pipeline up to inlet point of the CETP set up by GIDC for treatment as per their standard procedure and norms.
- MEMBER shall not discharge any effluent treated or untreated outside his premises leading to any open drain or surface drain or nallah, which shall be subject to verification and vigilance of CETP or any other

regulatory authority. The member shall maintain zero discharge; other than CETP chamber; throughout the year. They shall provide necessary provisions/facilities to take care of additional water in rainy seasons.

- In the event of CETP break down, the member will immediately close down its unit and stop discharging the effluents.
- The Member shall ensure that chemicals, solvents and other toxic chemicals giving rise to refractory COD, are not discharged in CETP, concentrated wastes having high COD and high TDS are separately treated in either incineration system or MEE or any other suitable system as per consent condition.
- The MEMBER declares that the MEMBER shall make all arrangements and installations for the measurement of flow of the EFFLUENT and shall be open to inspection by CETP.
- CETP shall reserve its right to amend/change the inlet norms of raw EFFLUENT from the MEMBER, if the MEMBER'S EFFLUENT is found to affect the performance of the CETP in achieving the treated effluent norms prescribed by GPCB or any other regulatory authority.
- The MEMBER shall make all proper and adequate arrangements for keeping accurate and classified daily log book records of production, daily water consumption and daily waste water generation and daily waste water discharge to CETP and send the compiled records to the CETP; for compilation and submission to GPCB. In case of change in product or manufacturing process/route, the MEMBER shall also inform CETP in advance and get confirmation for the acceptability of EFFLUENT for treatment in CETP.
- The MEMBER shall make adequate arrangements at its own cost as approved by and to the satisfaction of the CETP for flow measurement, collection and storage of its raw EFFLUENT in its premises and shall give access to the CETP to its storage facility for all 24/48 hours of the day as the case may be.

- The member shall stop the production and other activities generating wastes water during the planned/ accidental shut down of CETP operations; as per the instructions of CETP.
- The member industry will make the MOU regarding the maximum quantity of effluent to be sent to CETP for treatment along with quality.
- The member shall put the metering System for their daily water consumption from the GIDC/bore well and shall keep the records of their water consumption.
- Member shall not permit to any third party to join their line with member's chamber inside its premises from which effluent is ultimately discharged to Effluent Conveyance System. This includes the chamber outside his gate which is his discharge point.
- The member shall not be entitled to seek membership to any other CETP and that shall consistently and permanently send the effluent to CETP only.

Hence, the proposed project of 10 MLD CETP will have no significant adverse impact on the receiving body or water environment of study area.

7.4.2.2.3. EFFLUENT QUALTIY MONITORING PLAN

TABLE-7.1

MONITORING PLAN

WATER ENVIRONMENT			
Environmental Component	**Sampling Point**	**Parameters**	**Duration/ frequency**
Effluent Quality (at CETP)	Inlet Neutral Effluent	pH, COD, etc.	Daily
	After Primary Treatment	pH, COD, BOD_3, TDS, TSS, Chlorides, Sulphates, Ammonical Nitrogen, etc. i.e. Parameters prescribed by GPCB	Daily & Heavy Metal once in month
	After First Stage Aeration Treatment	pH, COD, BOD_3, TDS, TSS, Chlorides, Sulphates, Ammonical Nitrogen, etc. i.e. Parameters prescribed by GPCB	Daily & Heavy Metal once in month
	After Second Stage Aeration Treatment	pH, COD, BOD_3, TDS, TSS, Chlorides, Sulphates, Ammonical	Daily & Heavy Metal once in month

		Nitrogen, etc. i.e. Parameters prescribed by GPCB	
	Final Outlet (After Tertiary Treatment)	pH, COD, BOD_3, TDS, TSS, Chlorides, Sulphates, Ammonical Nitrogen, etc. i.e. Parameters prescribed by GPCB	Daily & Heavy Metal once in month

7.4.2.2.4. RAIN WATER HARVESTING

7.4.2.2.4.1. During rainy season, the rain water will be collected from roofs in underground tank having an adequate capacity and the collected water will be used for process. Proper maintenance of rainwater harvesting will be carried out. The following basic details have been worked for the rain water harvesting:

Area of administrative building, m2	450
Total area available for water harvesting, m2	450
Average rain fall, mm	495
Total rain water can be harvested per year, m3	200.48

7.4.2.3. AIR ENVIRONMENT

- Emission at 10 MLD CETP shall be in the form of the particulate matter and gases from stack attached to D.G. Sets. Moreover, regular monitoring of stacks is carried out to check the emissions. In case emission exceeds, the corrective measures are immediately taken and records of the same shall be maintained.
- Regular ambient air quality monitoring shall be carried out within premises and nearby area for PM, RSPM, SO_2 and NO_X.
- A greenbelt around the CETP shall be developed for reducing the air pollution and attenuation of noise.

7.4.2.4. NOISE ENVIRONMENT

The sound pressure level, generated by noise source, decrease with increasing distance from the source due to wave divergence. The propagation and attenuation of noise pressure wave is dependent on many parameters amongst which, the medium of travel and the ambient conditions are the most significant parameters.

As per WHO recommendations, there is no risk of damage in hearing due to the noise levels up to 75 dB(A) (L_{eq}- 8 hrs), whereas OSHA specifies the same as 90 dB(A). This sound pressure levels are used to describe the exposure to noise in workplace.

- There may be small addition to the ambient noise level, due to the increased transportation activities. This creates a slight adverse impact over the sound environment.
- Regular oiling, lubrication and maintenance of the equipments is carried out to minimize noise generation.

  However, due to the attenuation of noise level within the CETP no significant impact is expected. The CETP shall develop a green belt within the premises, which acts as a barrier to the propagation of noise from the factory premises.
- It is recommended to measure and maintain records of noise level at various places within and outside CETP premises.
- Manufacturers/ suppliers of major noise generating equipment/ machines like compressors, generators should be asked to take required measures for minimizing the noise levels generated by machines by using noise absorbing material for various enclosures or using appropriate design/ technology for fabricating/ assembling the machines.
- Audiometric tests should be conducted periodically for the employees working close to the high noise sources.

7.4.2.5. LAND ENVIRONMENT

7.4.2.5.1. HAZARDOUS WASTE DISPOSAL

Three categories of hazardous wastes are generated from CETP. Mode of disposal followed is as per HAZARDOUS AND OTHER WASTES (MANAGEMENT AND & TRANSBOUNDARY MOVEMENT) RULES, 2016. The hazardous wastes generated are ETP Sludge from Common Effluent Treatment Plant, Used oil from lubrication of equipment, Discarded Containers and Oil & Grease from skimming. These Hazardous wastes are stored in scientifically designed and constructed hazardous waste storage area within the premises. CETP sludge shall

be sent to Common TSDF of M/s. Bharuch Enviro Infrastructure Ltd. (BEIL), Ankleshwar. Used oil shall be sold to registered refiners. Discarded Containers shall be sold to GPCB approved recyclers. Oil & Grease from skimming shall be sent to Common TSDF of M/s. Bharuch Enviro Infrastructure Ltd. (BEIL), Ankleshwar.

STORAGE OF HAZARDOUS WASTE:

- Hazardous waste shall be stored at a designated Onsite-secured area that offers protection from sun, rain fall, spreading of leachate, mixing of wastes etc.
- Designated storage area with RCC flooring and cover shed shall be provided for storage of Hazardous waste.
- Hazardous waste shall not be stored for a period more than 90 days. CETP shall maintain records and make them available for inspection.
- Transportation of properly packed & labelled waste through dedicated vehicle to a captive facility/ authorized TSDF facility.
- Provision of solid/Hazardous waste collection system & storage area confirming the guidelines provided by CPCB for Solid/hazardous waste generation.
- Regular Training of employees engaged in solid waste management works.

7.4.2.6. GREEN BELT DEVELOPMENT

Tree plantation is one of the effective remedial measures to control the Air pollution and noise pollution. It also causes aesthetics and climatologically improvement of area as well as sustains and supports the biosphere. It is an established fact that trees and vegetation acts as a vast natural sink for the gaseous as well as particulate air pollutants due to enormous surface area of leaves. It also helps to attenuate the ambient noise level. Plantation around the pollution sources control the air pollution by filtering the air particulate and interacting with gaseous pollutant before it reaches to the ground. Tree plantation also acts as buffer and absorber against accidental release of pollutants.

Each plant shows different air pollution tolerance level depending upon numbers of factors. Air Pollution Tolerance Index (APTI) is calculated as under

$$APTI = A\frac{(T + P) + R}{10}$$

Where

A ⟶ Ascorbic Acid content mg/gm of dry weight

T ⟶ Total chlorophyll in mg/gm of fresh weight

P ⟶ pH of leaf extract

R ⟶ Relative water content in %

The plant having more APTI is more tolerant to air pollution and preferred for plantation.

In Green belt area about 1000 tree per acre of land as prescribed by Gujarat Pollution Control Board shall be planted.

CETP shall develop 3400 m^2 area covered as greenbelt and other forms of greenery.

The selection of tree species suitable for plantation at the CETP shall be governed by guiding factors as stated below

- The trees should be tolerant to air pollutants present in the area
- The trees should be able to grow and thrive on soil of the area, be evergreen, inhabitant, having minimum of leaf fall.
- The trees should be tall in peripheral curtain plantation and with large and spreading canopy in primary and secondary attenuation zone.
- The trees should possess extensive foliar area to provide maximum impinging surface for continued efficient adsorption and absorption of pollutants.
- The trees should be fast growing and indigenous and should maintain ecological, land and hydrological balance of the region.

- It is also recommended to plant few trees, which are sensitive to air pollution, as air pollution indicator.
- It is also recommended to carry out extensive plantation within premises.

TABLE-7.2

GREEN BELT DEVELOPMENT PLAN

SR. NO.	YEAR	NUMBERS
1	2017-2018	2000
2	2018-2019	2000
3	2019-2020	1000
4	2020-2021	1000
5	2021-2022	1000

TABLE-7.2

SPECIES AS GREENBELT

SR. NO.	TREE SPECIES
1	Neem
2	Asopalav
3	Gulmahor
4	Saru
5	Babool
6	Badam
7	Neelgiri
8	Karen
9	Bogunvelia
10	Jamun
11	Paras Pipal

7.4.2.7. ODOR MANAGEMENT PLAN

Following control measure shall be taken to avoid the odor problem;

- All the aspects shall be adopted during the designing.
- Aerobic condition shall be maintained.
- Oxidizing/ precipitate the odorous compound by using oxidizing agent as per requirement.
- Avoiding the overloading in process.
- Minimize turbulence in effluent flow.

- Avoiding the solids inventory and sludge backlog.
- Controlling the release of aerosols.
- Continuous disposal of sludge.
- Proper operating condition is maintained.
- Proper housekeeping is done.
- Green belt is developed.

7.5. SOCIO ECONOMIC ACTIVITIES

- To carry out above activities in the most efficient manner, Ankleshwar Industries Association promoted Ankleshwar Industrial Development Society (AIDS), Ankleshwar Environmental Preservation Society (AEPS), Sanskardeep Trust, Enviro Technology Ltd (ETL) a common effluent treatment facility mainly for small scale industries, Bharuch Enviro Infrastructure Ltd (BEIL) a combination of common solid waste disposal facility (TSDF), common Multi Effect Evaporator (MME) and common incineration facility and Narmada Clean Tech (formerly Bharuch Eco Aqua Infrastructure Ltd) (NCT) a final effluent treatment plant for polishing cum disposal of treated effluent in to the deep sea near Kantiyajal.
- Highlights of various initiatives taken and activities carried out by Ankleshwar Industries Association through these organizations are:

Social Infrastructure:-

1. **Ankleshwar Industrial Development Society:** This society runs:

(1) Shree Gattu Vidyalaya, a school providing education to more than 2500 students from Junior KG to Higher Secondary with instructions in both English and Gujarati languages, is one of the best schools of the District

(2) Smt. Jayaben Mody Hospital, a 80-bed full-fledged hospital is providing efficient health services not only to the industrial community, but also to the rural population.

(3) D. A. Anandpura Sports & Cultural Centre is set up for providing sports, games and recreational activities to the industrial community of the area.

2. **Sanskardeep:**

Trust runs a Gujarati Medium School – Sanskardeep Vidyalaya – pre-primary to Secondary level. More than 1500 students are studying in this school, which is one of the best schools of the District, this is evident as in Board examinations, and some students regularly secure position in State topper's 'list ten.

Environmental Infrastructure

1. **Ankleshwar Environmental Preservation Society:**

- AEPS is running P.G. Diploma course in Environment Management for last many years. As on date more than 100 P.G. Diploma holders are in Ankleshwar and they are taking care of Environment Management System of various industries. This has helped to tackle the environmental related matters considerably.
- AEPS is organizing Environment Awareness Programs and Seminars regularly. The overwhelming response of these programs and seminars gives a clear impression of the industries that ISO 14000 is very important certification for them. In Ankleshwar GIDC, there are over 50 industries in medium/large scale category and 100 small scale industries having ISO 14000 certification. Major Goal of AEPS is to get ISO 14000 certification for the entire GIDC Estate.
- Massive tree plantation is being carried out in and around Ankleshwar GIDC. All the roads in the GIDC Estate are covered with trees. Each year almost Rs.5.0 lakhs are being spent for tree plantation & its maintenance activities. Three Green Belts have been developed within the Estate. There is increase of almost 14% green belt area compared to 1985 – 1998. This data was obtained from ISRO through their satellite images.
- Other activities like, running rain water harvesting system, increasing awareness through programmes for use of solar energy, etc. are being conducted regularly.

- Being the largest cluster of chemical industries in Asia, Ankleshwar industrial estate is always vulnerable to industrial emergencies due to human errors, natural calamities and technical failures. Ankleshwar Industrial Association armed itself to take on such emergencies by setting up Disaster Prevention & Management Center (DPMC) in 1995 through AEPS. DPMC is fully capable to control emergencies like fire, explosions, gas leaks and etc…in Ankleshwar, Panoli, Jhagadia and Valia industrial estates. It is equipped with all necessary equipment for all types of emergencies and trained personnel.

  In view of the valuable services rendered by this organization, the Gujarat State Disaster Management Authority, a State Government undertaking has sanctioned a Hazmat Van worth Rs. 1.50 Crores to this organization. This will be most advanced equipment and added service for this centre in tackling all kind of emergencies in this region.

  DPMC got a major boost to its morale when new building with residential quarters was inaugurated in January, 2004. Now, DPMC is all the more capable to face the future challenges.

7.6. CAPITALS AND O&M COST FOR ENVIRONMENTAL MANGEMENT

- Total cost of the project is Rs 70.54 crores.
- O&M cost would be Rs. 14.91 crore per annum.

CHAPTER – 8
EXECUTIVE SUMMARY

8.1. Subject

- The proposed 10 MLD CETP will be located at Plot No. U-5 (Utility Plot), adjacent to existing 22.5 MLD STP, GIDC, Ankleshwar, Di. Bharuch, Gujarat.
- Total premises area is 30,000 m^2. Total cost of proposed project is Rs. 70.54 Crores.

8.2. Need and Justification of proposed expansion project.

- At GIDC, Ankleshwar there are several small, medium and large scale industries in operation. Also so many industries are planning for expansion of their existing unit by increasing the production capacity or adding the new products. Also there are new proposed industries to establish their manufacturing facility.
- Looking to the above expansion and new industries scenario the total effluent generation form the industrial estate going to increase.
- The GIDC Ankleshwar is very old GIDC and 70% industrial units are Small Scale Industries (SSI). The plot area of SSI are small and available space is limited. So it is difficult to upgrade/modify existing ETP.
- Presently, the effluent generated from the small scale industries within the premises of GIDC Ankleshwar is either discharged directly into the FETP of NCT through underground effluent conveyance pipeline or into CETP of ETL through tankers and final pumping station. NCT treat the effluent and after achieving discharge norms, dispose the treated effluent into deep Arabian Sea through 53 km (Onshore Pipeline: 43.6 km + Offshore Pipeline: 9.4 km) effluent conveyance pipeline.
- Now, Medium and Large scale industries are having their own Effluent Treatment Plant. Such industries are treating their effluent and discharging to GIDC drainage line to FETP.
- Small scale industries (SSI) have limited facilities for effluent treatment.
- Hence, to treat the effluent from SSIs of GIDC, Ankleshwar; NAA of Ankleshwar along with AWML proposed to set up a 10 MLD CETP. Looking to the current scenario, it is proposed to set up CETP for 7.5 MLD Ind. Effluent + 2.5 MLD sewage

with primary, secondary and tertiary treatment facility. The proposed CETP shall treat only the effluent from SSIs of GIDC Ankleshwar. The treated effluent from the proposed CETP shall achieve the FETP norms and discharge the treated effluent to FETP for further treatment and disposal.

- Moreover, there are several advantages of CETP are,
  - Professional and trained staff can be made available for operation of CETP, which is not possible in case of individual plants.
  - Disposal of treated wastewater & sludge becomes more organized.
  - More organized and ease of monitoring for various regulatory authorities in ensuring pollution control requirement.
  - Small and medium scale industries are not required to treat their wastewater separately.
  - The Common treatment for effluent is cheaper than individual treatment. Hence, saving in Capital and Operating cost of treatment plant for individuals.
  - Benefits to small scale industries having limited space available for treatment of effluent.

8.3. Project Details

SR. NO.	Treatment Facility	Proposed Capacity, MLD
1	Common Effluent Treatment Plant (CETP)	10

8.4. Raw Water Consumption

The total raw water requirement for proposed project of 10 MLD CETP, Ankleshwar shall be 228 KL/day (Industrial: 180 KL/day + Domestic: 30 KL/day + Gardening: 18 KL/day) which shall be met through GIDC water supply.

8.5. Treated Effluent Handling, Treatment and Management

From CETP the treated effluent shall be pumped to existing Final pumping station where the effluent from other pumping stations are mixed and finally pumped into FETP of NCT for further treatment and finally dispose the treated effluent into deep Arabian Sea through 53 km (Onshore Pipeline: 43.6 km + Offshore Pipeline: 9.4 km) effluent conveyance pipeline with diffuser approx. 10 km in Sea.

8.6. Air Pollution Source and Control/Prevention Management

8.6.1. Flue gas emission:

8.6.1.1. The flue gas emission and its control measures are mentioned in Table-8.1

TABLE- 8.1

DETAILS OF FLUE GAS EMISSION

Sr. No.	Stack attached to	Stack height, m	Type of fuel	Fuel Cons., L/Hr	Emission Parameters	Unit	Concentration	Air Pollution Control Equipment
1	D. G. Set – 1000 KVA	12.5	HSD	205	PM	mg/Nm^3	< 150	Stack with 12.5 m Height with Stack Monitoring Facility (SMF)
					SO_2	ppm	< 100	
					NOx	ppm	< 50	

8.6.2. Process gas emission:

8.6.2.1. Chlorine gas emission is likely to be generated form chlorine tonner in case of leakage only. However, to take care of this leakage, caustic scrubber along with safety hood shall be provided as Air Pollution Control equipment. Detail is given in Table - 8.2.

TABLE- 8.2

DETAILS OF PROCESS GAS EMISSION

Sr. No.	Source of Emission	Type of Emission	Scrubber	Stack Height, m	Stack Diameter, m	Outlet chlorine conc.
1	Chlorine tonner safety hood	Chlorine gas	750 dia. x 5000 mm FRP common Scrubber with alkali circulation tank, pump and blower	10	0.1	5 mg/nm^3

8.7. Solid/Hazardous Waste, Handling and Mode of Disposal

Handle and management solid/hazardous waste storage and disposal is and will be as per Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

TABLE- 8.3

SOLID & HAZARDOUS WASTE GENERATION QUANTITY AND CATEGRORY

Sr. No.	Particulars	Unit	Category	Quantity	Hazardous waste disposal/Management
1	ETP Sludge	MT/month	I - 35.3	900	Collection, Storage, Transportation & Disposal by TSDF
2	Used Oil	Lit/year	I - 5.1	100	Collection, Storage, Transportation & Disposal by selling to registered refiners.
3	Discarded Drums	kg/month	I - 33.3	200	Collection, Storage, Transportation & Disposal by GPCB/CPCB/MoEF approved recyclers.
4	Oil & Graese skimming	MT/month	I - 35.4	1.5	Collection, Storage, Transportation & Disposal by selling to registered refiners or to Common Incineration of TSDF.

8.8. Noise Level Control/Prevention Measures

Extensive oiling and lubrication and preventive maintenance are carried out to reduce noise generation at source to the permissible limit. Manufacturers/suppliers of major noise generating equipment/machines like compressors, generators should be asked to take required measures for minimizing the noise levels generated by machines by using noise absorbing material for various enclosures or using appropriate design/ technology for fabricating/ assembling the machines. However, at place where noise levels can exceed the permissible limit, Earplugs and Earmuffs are provided to those working in such area. Audiometric tests should be conducted periodically for the employees working close to the high noise sources. This system will follow after proposed expansion. Adequate plantation has done to control noise level at site.

8.9. POST PROJECT MONITORING PLAN

Environmental Component	Parameters	Standards	Duration / Frequency
Air Environment			
AAQM at plant site	SPM, RSPM, SO_2, NOx, in Ambient Air Quality	Prescribed by CPCB	Once a week through NABL accredited laboratory.
Stack emission monitoring of emissions sources	Parameters prescribed by CPCB for stack emissions	Prescribed by CPCB	Once in a weekly / fortnightly Once in six months by NABL accredited laboratory.

Fugitive emissions monitoring within the plant side	VOC	Prescribed by CPCB	Every Day
Water Environment			
Analysis of treated effluent	Parameters prescribed by CPCB	Prescribed by CPCB	Daily by Company Once in a Quarter by NABL accredited laboratory.
Ground water quality	-	As per drinking water quality Standards	Once in a season
Surface water quality	pH, TDS, TSS, Sulphate, Chloride, Colour, BOD_3, COD, Oil and Grease	Water use based standards of CPCB	Once in a season

Environmental Component	Parameters	Standards	Duration / Frequency
Noise Environment			
Noise	Noise level in db(A) leq	As per national noise standards	Once in quarter by Company
Soil Environment			
At plant site	Analysis of pH, Sulphate, Calcium, Magnesium, Chlorides, Cyanides, Phenolic Compounds	--	Pre and post monsoon season by Company
In surrounding area	Analysis of pH, Sulphate, Calcium, Magnesium, Chlorides, Cyanides, Phenolic Compounds	--	Pre and post monsoon season by Company

8.10. Green Belt

Total 30000 m^2 land area is available at site; out of this area about 3400 m^2 area shall be covered as greenbelt and other forms of greenery.

8.11. Power Requirements

The power requirement is met through 2500 KW connecting load of DGVCL (GEB) and emergency standby Diesel Generator Set (1 nos.) of 1000 KVA.

8.12. Fuel requirement

Diesel is used as fuel at rate of 205 L/hr for D.G. Set which is used in emergency only.

8.13. Storage details of Hazardous Chemicals and Control Measures.

Sr. No.	Name of the chemical	Max. qty. stored	Phase of chemical	Storage condition	Hazard involved	Measures to be taken
1	Chlorine	6 MT	liquid	Tonners	Toxic	Stored at well ventilated cool and dry place, scrubbing facility, external breathing air supply, emergency handling kit

8.14. Capital and recurring cost earmarked for environmental protection measures

- Total cost of the project is Rs 70.54 crores.
- O&M cost would be Rs. 14.91 crore per annum.

8.15. Conclusion

The Environmental Impact Assessment (EIA) study for proposed 10 MLD CETP project at Plot No. U-5 (Utility Plot), adjacent to existing 22.5 MLD STP, GIDC, Ankleshwar, Di. Bharuch, Gujarat of NAA and AWML has been carried out with respect to the Terms of Reference (TOR) granted by SEIAA, Gandhinagar dated 30/11/2017. All the impacts likely to have an effect on the environment have been identified and efficient/adequate mitigation measures have been proposed for the same.

Considering the probability of likely impacts, NAA and AWML has planned adequate mitigation measures and Environment Management Plan (EMP). Further, NAA and AWML has also planned CSR activities which will have beneficial impacts on the socio-economic environment.

Measures like energy conservation and greenbelt development are also noteworthy. Looking to the overall project scenario, employment potential and allied development plans; it has been noticed that the proposed project would significantly help in the improvement of the society and nation at large. NAA and AWML is committed to implement all the pollution control measures to protect surrounding environment. Also this project can definitely improve the regional, state and national economy. Industrial growth is an indication of socio economic development. The implementation of this project will definitely improve the physical and social infrastructure of the area.

The proposed project will lead to growth in industrialization, development of many new units as units will avail the combined treatment and disposal facilities. Thus due to proposed project, safe and environmentally sustainable mode of effluent treatment and disposal will be generated in GIDC, Ankleshwar.

The growths in industrialization will in turn generate additional employment opportunities.

CHAPTER – 9

DISCLOSURE OF CONSULTANTS ENGAGED

Aqua-Air Environmental Engineers Pvt. Ltd.

Environmental Management Consultants & Equipments Supplier

NABL Accredited Testing Laboratory

ISO 9001:2008 Certified Company

M/S. AQUA – AIR ENVIRONMENTAL ENGINEERS PVT. LTD.
403, CENTER POINT, NR. KADIWALA SCHOOL,
RING ROAD, SURAT – 395002 (GUJARAT)

TEL: +91 (261) 2460854/2461241/3987173/3048586
TELEFAX: +91 (261) 2707273/3987273
EMAIL: aquaair_surat@hotmail.com
WEBSITE: WWW.AQUA-AIR.CO.IN

COMPANY PROFILE

Aqua-Air Environmental Engineers Pvt. Ltd. is a Surat based company; one of the leading and multidiscipline Environmental Management Consulting firms of the region.

Aqua-Air Environmental Engineers Pvt. Ltd. was founded by Mr. Jayesh S. Patel & Mrs. Archana J. Patel on May 7, 2008 and Aqua-Air Environmental Engineers Pvt. Ltd. was registered under the companies Act on May 7, 2008.

Office having 3756 Sq. Ft. of area covering EC/EIA Department, R & D Centre (Environmental Laboratory), Consent (NOC/CC&A) Department, ETP/Civil Department and Account Department, Library, Conference room and Administration Department, etc. with experienced and qualified staff to render services in the field of Environmental Management of various types of industries.

Aqua-Air Environmental Engineers Pvt. Ltd. has a well-established track record in monitoring legislation and developing and implementing strategies for organizations that enable them to manage the impact of environmental issues on their business.

The company has built a reputation for delivering innovative and practical solutions to environment related business issues. These solutions help our clients to achieve successful business outcomes and make sustainable environment serving improvements within their business operations.

Aqua-Air Environmental Engineers Pvt. Ltd. started the process for ISO/IEC 17025:2005 Accrediation by NABL, New Delhi for the Competence Testing & Calibration Laboratories on June 24, 2008 and submitted the application (Version No. 10) to NABL, New Delhi for ISO/IEC 17025:2005 registration on October 7, 2008. After final assessment and Non-Conformances resolved and corrective actions taken against the Non-Conformances, Laboratory Department

M/S. AQUA – AIR ENVIRONMENTAL ENGINEERS PVT. LTD.
403, CENTER POINT, NR. KADIWALA SCHOOL,
RING ROAD, SURAT – 395002 (GUJARAT)

TEL: +91 (261) 2460854/2461241/3987173/3048586
TELEFAX: +91 (261) 2707273/3987273
EMAIL: aquaair_surat@hotmail.com
WEBSITE: WWW.AQUA-AIR.CO.IN

- Aqua-Air Environmental Engineers Pvt. Ltd. was accredited with the certification of ISO/IEC 17025:2005 on October 19, 2010.

Aqua-Air Environmental Engineers Pvt. Ltd. started the process for ISO 9001:2008 registration for Quality Management System on December 1, 2009 and submitted the application for ISO 9001:2008 registration on March 4, 2010. After final assessment, Aqua-Air Environmental Engineers Pvt. Ltd. was certified from ANAB by M/s. Intertek System Certification on May 4, 2010.

Aqua-Air Environmental Engineers Pvt. Ltd. started the process for "EIA Consultant Organization" accreditation under National Accreditation Board for Education And Training (NABET)/Quality Council of India (QCI), New Delhi on January 7, 2010 and submitted the application (Rev. 06) for "EIA Consultant Organization" accreditation under NABET, New Delhi on April 8, 2010. Office assessment was done by external NABET/QCI auditors on Feb. 3 & 4, 2011. NABET/QCI closed the application of Aqua-Air Environmental Engineers Pvt. Ltd. on March 15, 2011. Aqua-Air Environmental Engineers Pvt. Ltd. filed SCA in Hon'ble High Court of Gujarat against MoEF, QCI & NABET, New Delhi on April 13, 2012. Hon'ble High Court of Gujarat issued stay order against operation of all OMs (related to NABET/QCI Scheme) of MoEF, New Delhi for the company on Jan. 24, 2013. MoEFCC, New published Notification regarding mandatory implementation accreditation scheme of NABET/QCI on March 3, 2016. Aqua-Air Environmental Engineers P. Ltd. along with 11 EIA Consultants of Gujarat filed SCA No. 5312 of 2016 in Hon'ble High Court of Gujarat. Hon'ble High Court of Gujarat gave Stay Order on Apr. 5, 2016 against implementation of Notification dated March 3, 2016 of MoEFCC, New Delhi till further orders.

Aqua-Air Environmental Engineers Pvt. Ltd. received the Certificate of Registration of Trade Mark, Section 23 (2), Rule 62 (1) from Trade Marks Registry, Govt. of India on January 18, 2011.

M/S. AQUA – AIR ENVIRONMENTAL ENGINEERS PVT. LTD.
403, CENTER POINT, NR. KADIWALA SCHOOL,
RING ROAD, SURAT – 395002 (GUJARAT)

TEL: +91 (261) 2460854/2461241/3987173/3048586
TELEFAX: +91 (261) 2707273/3987273
EMAIL: aquaair_surat@hotmail.com
WEBSITE: WWW.AQUA-AIR.CO.IN

The company's work is spread all over Gujarat in India & Oman. Company have already prepared 183 Form-1, 161 EIA & EMP reports, 143 Risk Assessment & DMP reports, conducted 73 Public Hearings and obtained 172 Environmental Clearances so far that includes Water related Projects / Pesticide Industry Projects / Textile Industry Projects / Sugar Industry Projects / Chemical Industries / Specialty Chemical Industry Projects / Bulk Drug (API) Industry Projects / Chemical Fertilizer Industry Projects / Cement Plants / Thermal Power Plants / Mining Projects / Infrastructure Projects / Construction Projects / Distilleries / Petrochemical Industry Projects/ SEZ Projects/ CRZ Projects, etc.

Company's NABL Accredited Testing Laboratory has conducted Environmental Monitoring & Analysis with Environmental Institute and Gujarat Pollution Control Board in Industrial Estates of Ankleshwar, Panoli & Jhagadia. Company is also doing Turnkey/Consulting Projects for M/s. BASF (Detail Engineering for Effluent Treatment Plant) & M/s. Reva Proteins Ltd. (Design of Effluent Treatment Plant, supply of mechanical items, Commissioning and operation of Effluent Treatment Plant).

M/S. AQUA – AIR ENVIRONMENTAL ENGINEERS PVT. LTD.
403, CENTER POINT, NR. KADIWALA SCHOOL,
RING ROAD, SURAT – 395002 (GUJARAT)

TEL: +91 (261) 2460854/2461241/3987173/3048586
TELEFAX: +91 (261) 2707273/3987273
EMAIL: aquaair_surat@hotmail.com
WEBSITE: WWW.AQUA-AIR.CO.IN

2. ABOUT US

Aqua-Air Environmental Engineers Pvt. Ltd. has registered office in one of the top five fastest growing cities of India – Surat. We are one of the most trusted and reliable environmental and engineering consultancy service providers. With complete hold in the related domain and proficiency, we execute our work all over Gujarat region.

In addition to engineering consultancy, we also execute turnkey projects for effluent treatment plants at the client's site.

Aqua-Air Environmental Engineers Pvt. Ltd is:

- One of the leading companies in the region providing high quality services in environmental engineering to the best of client's satisfaction.
- Posses a well - developed design office with Computer Center and Laboratory -cum- R&D Center to carry out designing and analysis in the field of environmental engineering.
- Recognized as Schedule-II Environmental Auditor under the Environment Audit Scheme proposed by the Hon'ble High Court of Gujarat.
- Listed with Gujarat Pollution Control Board as Consultants and proposing to get enlisted with GPCB as Pollution Control Equipment Suppliers.
- Going to become a member of Consulting Engineers Association of India.
- Having well-developed library to render services in the field of environmental auditing, consulting, monitoring and analysis.

3. ACHIEVEMENTS

1. Registered under the companies Act on May 7, 2008.
2. Gujarat Pollution Control Board Recognized Schedule – II Environmental Auditor on Dec. 24, 2008.
3. Certificate of ISO 9001:2008 received on May 4, 2010.
4. Import Export Licence received from Government of India on May 31, 2010.

M/S. AQUA – AIR ENVIRONMENTAL ENGINEERS PVT. LTD.
403, CENTER POINT, NR. KADIWALA SCHOOL,
RING ROAD, SURAT – 395002 (GUJARAT)

TEL: +91 (261) 2460854/2461241/3987173/3048586
TELEFAX: +91 (261) 2707273/3987273
EMAIL: aquaair_surat@hotmail.com
WEBSITE: WWW.AQUA-AIR.CO.IN

5. Solvency Certificate of Rs. 1,40,00,000/- received from Bank of India, Gopipura branch, Surat on Sept. 3, 2010.
6. Certificate of National Accreditation Board for Testing and Calibration Laboratories (NABL) received on Oct. 15, 2010.
7. Certificate of Registration of Trade Mark, Section 23 (2), Rule 62 (1) from Trade Marks Registry, Govt. of India on Jan. 18, 2011.
8. Certificate of Authorization as dealer in India received from Spectrum Technologies, Inc., USA on May 1, 2011.
9. Gujarat Pollution Control Board Recognized Schedule – II Environmental Auditor on May 6, 2011.

4. SERVICE PROVIDE

M/s. AQUA-AIR ENVIRONMENTAL ENGINEERS PVT. LTD. offers following specialized services in Environmental Engineering, Water Supply Engineering and Civil Engineering.

4.1 TURN KEY/BOOT/BOO PROJECTS

4.1.1 ENVIRONMENTAL ENGINEERING

- Detailed design
- Construction
- Fabrication
- Piping
- Electrification
- Supply
- Erection
- Testing and Commissioning of Effluent Treatment Plants (ETPs)
- Sewage Treatment Plants (STPs)
- Water Treatment Plants (WTPs)
- Common Effluent Treatment Plants (CETPs)
- Recycling Plants (RPs)
- Zero Discharge Plants (ZDPs)
- Incineration System Plants (ISPs)
- Hazardous waste Storage areas (HWSAs)
- Secured/ Sanitary Landfill Facilities
- Bio–Medical Waste (BMW) Treatment Facilities on a turnkey or BOOT/BOO basis.

4.1.2 CIVIL ENGINEERING

Construction of

- Water Treatment Plan
- Sewage Treatment plant
- Industrial Wastewater Treatment plant
- Elevated Service Reservoirs (ESRs)
- Underground Reservoirs (UGRs)
- Sewage Pumping Stations, etc.

M/S. AQUA – AIR ENVIRONMENTAL ENGINEERS PVT. LTD.
403, CENTER POINT, NR. KADIWALA SCHOOL,
RING ROAD, SURAT – 395002 (GUJARAT)

TEL: +91 (261) 2460854/2461241/3987173/3048586
TELEFAX: +91 (261) 2707273/3987273
EMAIL: aquaair_surat@hotmail.com
WEBSITE: WWW.AQUA-AIR.CO.IN

4.2 CONSULTING

4.2.1 ENVIRONMENTAL ENGINEERING

1. Complete study of the Pollution Problem in industries from wastes generation to disposal and providing necessary technical knowledge like–

- How including design
- Basic engineering, detailed engineering
- Water Treatment Plants (WTPs)
- Tender preparation for Effluent Treatment Plants (ETPs) for industrial wastewater
- Sewage Treatment Plants (STPs) for residential wastewater
- Common Effluent Treatment Plants (CETPs) for more than two industries
- Zero Discharge Plants (ZDPs)
- Recycling plants (RPs) for reuse of water upto maximum extent
- Incineration System Plants (ISPs) for various non-biodegradable or toxic industrial wastes on Consulting basis
- Design of Hazardous waste Storage area and Consultancy Services for Secured/ Sanitary Landfill Facilities
- Design and Consultancy Services for Bio – Medical Waste Treatment Facilities.

2. Water Supply Distribution System

- Analysis
- Design
- Tender preparation

3. Laboratory Analysis of

- Air
- Water
- Sewage
- Waste Water
- Industrial Effluent
- Industrial Sludge

4. Process Study

- Reduce the pollution at source
- Reuse / Recycle effluent

5. Pollution Control Facility

- Performance study of existing
- Suggesting scheme for the optimization of the facility

6. Environment Management

- Environmental Clearance from
  - MoEF
  - New Delhi or DoEF
  - Gandhinagar
- Environmental Impact Assessment Studies (EIAs)
  - Short term (Rapid)
  - Long term (Comprehensive)
- Environmental statements
- Environmental Auditing

7. Statutory Requirements under Factory Act

- Safety Audit
- On-site / Off-site Emergency Plan
- HAZOP study

M/S. AQUA – AIR ENVIRONMENTAL ENGINEERS PVT. LTD.
403, CENTER POINT, NR. KADIWALA SCHOOL,
RING ROAD, SURAT – 395002 (GUJARAT)

TEL: +91 (261) 2460854/2461241/3987173/3048586
TELEFAX: +91 (261) 2707273/3987273
EMAIL: aquaair_surat@hotmail.com
WEBSITE: WWW.AQUA-AIR.CO.IN

8. For Various Energy Conservation Schemes

- Energy Audit
- Design

9. Environmental Management System

- Preparing Adequacy Report
- Preparing Efficacy Report

10. Operation and Maintenance (O & M)

- Effluent Treatment Plants (ETPs)
- Water Treatment Plants (WTPs)
- Sewage Treatment Plants (STPs)

11. Air Monitoring

- Ambient Air
- Stack
- Vent

12. Design of Pollution Control Equipment

- Cyclone
- Scrubbers
- Bag Filters, fume extraction systems
- Blowers
- Aerators
- Agitators
- Flash mixers
- Reaction Vessels
- Clariflocculators
- Scrapper Mechanisms
- Incinerators
- Scrubbers, etc.

13. Pollution Control

- Effluent Survey
- Environmental review of Pollution control equipment and systems
- Feasibility Studies
- Laboratory bench scale Treatability studies
- Pilot Plant studies etc.

14. Consulting Service

- NOC
- Water Consent
- Air Consent
- Hazardous Waste Authorization Application, etc.

15. As per requirements under Factory Act-1948 and Gujarat Factory Rules

- Monitoring
- filling up Form-37
- Analysis of Work Area Environment

16. Technical Consultation & assistance to ensure and assure compete Environ-Legal compliance

- Liaison with statutory bodies in order to get the required permits
- Clearance
- Consents

M/S. AQUA – AIR ENVIRONMENTAL ENGINEERS PVT. LTD.
403, CENTER POINT, NR. KADIWALA SCHOOL,
RING ROAD, SURAT – 395002 (GUJARAT)

TEL: +91 (261) 2460854/2461241/3987173/3048586
TELEFAX: +91 (261) 2707273/3987273
EMAIL: aquaair_surat@hotmail.com
WEBSITE: WWW.AQUA-AIR.CO.IN

4.3 EQUIPMENT MFG. /TRADING

4.3.1 ENVIRONMENTAL ENGINEERING

1. Manufacture and supply of Pollution Control Equipment such as

- Incinerators With scrubbers
- Autoclaves
- Hydro-claves
- Fixed Aerators
- Floating Aerators
- Submersible Aerators (EOLO2)
- Submersible Mixers (RIO or BRIO)
- Cascade Aerators
- Clarifier mechanisms
- Agitators
- Clariflocculator
- Clariflocculator mechanism
- Flash mixes
- Oil skimmers
- Dissolved Air Flotation (DAF) units
- Cyclone
- Scrubbers
- Bag Filters
- Oil Skimmers
- Deoiler Pipes
- API separators
- Vacuum Drum filters
- Solid bowl centrifuges
- Filter presses
- Belt filters
- Reaction vessels
- Reverse Osmosis, etc.

M/S. AQUA – AIR ENVIRONMENTAL ENGINEERS PVT. LTD.
403, CENTER POINT, NR. KADIWALA SCHOOL,
RING ROAD, SURAT – 395002 (GUJARAT)

TEL: +91 (261) 2460854/2461241/3987173/3048586
TELEFAX: +91 (261) 2707273/3987273
EMAIL: aquaair_surat@hotmail.com
WEBSITE: WWW.AQUA-AIR.CO.IN

ANNEXURE – 1

NCTL permission for discharge

NARMADA CLEAN TECH

(A Subsidiary of GIDC)

D.O. No. Jan-140

Date: 25.01.2018

To,

Notified Area Authority Ankleshwar
(SPV)Ankleshwar Waste Management Limited
Plot No. 618 - 619, G.I.D.C.,
Ankleshwar – 393002

Sub: **Proposed booked quantity**

With reference to above subject we would like to inform you that acceptance for proposed booked quantity of **10 MLD** for further treatment & disposal at NCT will be on the following basis.

6.046 MLD out of total quantity 10.29 MLD (Booked quantity under 40 MLD Scheme for Ankleshwar MI)

(This quantity is as per previously issued Environmental Clearance by MoEFCC This quantity may accepted by NCT subject to lifting of direction u/section 18(1)B of Water (Prevention & Control) Pollution act 1974)

1.700 MLD ETL Member switched to Notified Area Authority Ankleshwar (SPV)Ankleshwar Waste Management Limited

1.400 MLD (Old Indokem Ltd.) Now, Sardar Patel Industrial Estate

1.800 MLD Existing NCT Member switched to Notified Area Authority Ankleshwar (SPV)Ankleshwar Waste Management Limited

10.94 MLD (Approx.) Total

If, any variation in the found in above quantity, NCT reserve the all rights. This is neither assurance nor guarantee for acceptance for proposed booking.

This Letter is exclusively issued as per the specific request of the industry for obtaining permission to apply for Environment Clearance/ TOR.

For, Narmada Clean-Tech

Alok Kumar
Chief Executive Officer

ANNEXURE – 2

Undertaking for No bore well

NOTIFIED AREA OFFICE
(GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION)

Office of the Dy. Executive Engineer (Drainage)
Plot No. 618/619, AIA Community Centre,
GIDC, Ankleshwar-393 002.
Phone : 02646-251359
Fax : 02646-251750

Our Ref. No. : N.A./ANK/DEE/DRG/394

Date : 29 MAY 2018

UNDERTAKING

I undersigned **Umesh Chauhan** Dy. Ex. Engineer of **Notified Area Authority** involved in operation of proposed project of 10 MLD CETP, Ankleshwar located at adjacent to existing STP, Nr. Valia Chowkdi, GIDC, Ankleshwar, Di. Bharuch, Gujaratdo hereby solemnly affirm & undertake that,

- Discharge of wastewater to FETP shall not exceed 10 MLD.
- No borewell shall be dug within the premises.

What is stated herein above is true to the best of my knowledge & belief.

Place: Ankleshwar

DATE: 29 MAY 2018

For **Notified Area Authority**

Umesh Chauhan
Dy. Ex. Engineer,
NA, GIDC, Ankleshwar.

ANNEXURE – 3

Action by GPCB and response

GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN
Sector-10-A, **Gandhinagar** 382 010
Phone : (079) 23222425
(079) 23232152
Fax : (079) 23232156
Website : www.gpcb.gov.in

GPCB

ANKLESHWAR INDUSTRIES ASSOCIATION
Inward No. 1229
Date: 27-3-18

Date:

Date:

Ref: Date

Sent to For

R.P.A.D.

NO: GPCB/ ANK/ CCA 1015 (27-B)/ID 27833/ 448684 Date: /03/18

22 MAR 2018

LEGAL NOTICE

To,

1. **Ms. D. THARA,** IAS CHAIRPERSON **Vice Chairperson & Managing Director,** Gujarat Industrial Development Corporation (GIDC),Udyog Bhavan, Block No.4, 2nd Floor, Sector-11, Gandhinagar – 382017(Guj.) Email: vcmd@gidcgujarat.org	2. **Dr. BHARAT JAIN** VICE CHAIRMAN **Gujarat Cleaner Production Centre,** Block No. 11-12, 3rd Floor, Udyog Bhavan, Sector – 11, Gandhinagar – 382 011, Email: info@gcpcgujarat.org.in
3. **Dr SANJIV TYAGI** IFS DIRECTOR **Gujarat Environment Management Institute** 3rd Floor, Block No. 13, Dr. Jivraj Mehta Bhavan, Old Sachivalaya, Sector – 10 B, Gandhinagar – 382010. E-mail: info@gemi-india.org	4. **SHRI D.V. PATEL** DIRECTOR **Superintending Engineer - Gujarat Industrial Development ,** Corporation (GIDC), Narmada Complex, 1st Floor, M.G Road, Panchbatti (Via), B/h Central Bank, Bharuch – 392 002 (Gujarat) Email: dvpatel2777@gmail.com
5. **DR.(PROF.) P.A. JOSHI** DIRECTOR DDIT, Dharmesh Desai University, College Road, College Road, Nadiad-387001(Guj) Email:deantechno@ddu.ac.in, pajoshi24@gmail.com	6. **DR. RANJAN SENGUPTA** DIRECTOR Chemical Engineering Department Faculty of Technology and Engineering The Maharaja Sayajirao University of Baroda Vadodara, 390001 Email: ranjan_msu@yahoo.co.in
7. **SHRI RAVI KAPOOR** DIRECTOR **Managing Director,** M/s. Heubach Colour (P) Ltd., "Land Mark Building", 2nd Floor, Gotri Road, Race Course Circle, Vadodara-390 002. Email: baroda@heubach-india.com	8. **SHRI A.A.PANJWANI** DIRECTOR **President – Jhagadia Industries Association and Director** M/s. Bharuch Enviro Infrastructure Limited, Plot No.9701-16, P.B. No. 82, GIDC Estate, Ankleshwar – 393 002, Dist. Bharuch (Gujarat). Email: panjwania@unIphose.com

Received 26/3/18

GPCB

GUJARAT POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN
Sector-10-A, **Gandhinagar** 382 010
Phone : (079) 23222425
(079) 23232152
Fax : (079) 23232156
Website : www.gpcb.gov.in

9. **SHRI MAHESHBHAI JIVANLAL PATEL** DIRECTOR **President – Ankleshwar Industries Association, Plot No.618-619,** GIDCEstate, Ankleshwar – 393002 , Dist. Bharuch,(Gujarat). Email:info@aiaindia.co.in	10. **SHRI B.S. PATEL** DIRECTOR **President – Panoli Industries Association &Proprietor** M/s. B.S. Chemicals, Plot No.2108, GIDC Estate,Panoli–394116,Dist.Bharuch,(Guj.) Email: piapanoli@yahoo.com
11. **GP. CAPT(RETD) A.G. CHITRE** DIRECTOR **Director , M/s. Heubach Colour Limited** Plot No. 9002-9010, Phase-VI, GIDC Estate, Ankleshwar – 393002. Dist. Bharuch (Gujarat). Email: agchitre@heubach-india.com	12. **SHRI B.K.CHOUDHARY** DIRECTOR **President & Executive Director- M/s. Vardhman Acrylics Ltd.** Plot No.755, GIDC Estate, Jhagadia – 393110. Email: choudharybk@vardhman.com
13. **SHRI MUKESH JOBANPUTRA** DIRECTOR **M/s. Meghmani Organics Limited,** 21/21/1, Phase-IV, GIDC Estate, Panoli-394 116, Dist. Bharuch (Gujarat) Email: mukesh.jobanputra@meghmani.com	14. **SHRI S.T. HATHILA** DIRECTOR **Asst. Industries Commissioner & General Manager,** District Industries Centre, Opp. New Collector Office, Bahumali Complex Compound, Bharuch-392 001.

Dear Sir,

Gujarat Pollution Control Board (hereinafter referred to as the Board) a statutory body constituted under Section 4 of the Water (Prevention and Control of Pollution) Act-1974 (hereinafter referred to as the Water Act-1974) and its Head Office situated at Sector : 10-A, Gandhinagar : 382010 issue this notice as under:-

1. Whereas Narmada Clean Tech (NCT) formerly known as Bharuch Eco Aqua Infrastructure Ltd. (BEAIL) is a company, subsidiary of Gujarat Industrial Development Corporation (GIDC). NCT is also jointly promoted by Member Industries of Ankleshwar, Jhagadia and Panoli Industrial Estates.

2. And Whereas, You are one of the Director of Narmada Clean Tech, Ankleshwar, District Bharuch represents Narmada Clean Tech and you are responsible for various functions of the Narmada Clean Tech as per Gujarat Industrial Development Act, 1962 and rules and regulations framed there under and also you are responsible for an implementation of the Water Act- 1974, Air Act- 1981 and Environment (Protection) Act-1986 and rules and regulation framed under the Act.

3. And whereas, the objective of NCT - FETP is to receive partially treated industrial effluent which meet with inlet norms from Ankleshwar & Panoli Industrial Estates and to polish it at Final Effluent Treatment Plant (FETP) of NCT upto marine standards and then to convey into the deep sea. Effluent is being discharged through scientifically designed diffusers at ocean outfall point, wherein instantaneous dispersion and required dilution are exist. Synergistic combination of Treatment Technology and Discharge Technology is adopted to treat pollutants and further the treatment of effluent is an important function of NCT and you are responsible for its efficient operation and maintenance as per Gujarat Industrial Development Act, 1962 and Water Act, Air Act and Environment (Protection) Act.

4. And whereas, the Board has granted Consolidated Consents & Authorizations under the provision of the Water Act 1974, Air Act

1981 and Hazardous & Other Wastes Rules 2016 vide Consent Order No. AWH - 79601 dated 12/08/2016 for operation of Final Effluent Treatment Plant (FETP) at Surti Bhagol, Umarwada Road, Nr. Gujarat gas co. ltd., Ankleshwar, Dist. Bharuch, Gujarat with specific terms and conditions which is being operated by the company called Narmada Clean Tech.

5. And whereas, the Board has noticed that the industrial effluent outlet of the FETP is not confirming to the norms stipulated by the Gujarat Pollution Control Board.

6. And whereas the board has noticed that the inlet of FETP is also not confirming to the norms stipulated by you due to member units discharging wastewater higher than the inlet norms. This shows that you failed to discipline your member units to discharge the wastewater as per inlet norms set by FETP.

7. And whereas, Central Pollution Control Board (CPCB) has issued modified directions under section 18 (i)(b) of Water Act, 1974 on date 31/03/2016 to FETP not to add any hydraulic load to the Final Effluent Treatment Plant (FETP) of Ankleshwar till not achieving the outlet norms.

8. And whereas, the Board has issued Directions under section 33(A) of the Water Act-1974 to the Narmada Clean tech, Ankleshwar

dated **27/02/2018** and **21/06/2017** to submit time bound action plan to upgrade FETP within 15 days. The said directions also enumerate to submit a clarification regarding not to follow all action plans & undertakings submitted for up-gradation of FETP.

9. And whereas, still you have not submitted any time bound action plan or status report for the up-gradation of FETP which is not acceptable to the Board.

10. Thus you have violated the Directions of the Board issued under the Water Act 1974, further you have violated the provisions of the Water Act 1974 and committed an offence punishable with imprisonment for a period up to six years and with fine under the Water Act 1974. And also you have violated the Direction of the Hon. Supreme court judgment of the writ petition- 375/2012 dated 22/03/2017.

11. You are one of the Director of Narmada Clean Tech and responsible for its efficient operation and maintenance, however it appears that inspite of policy decision taken in the meeting dated 18/01/2018 and inspite of the directions of the Board under the Water Act 1974, you have failed to carry out the directions. It further appears that it is not a case of mere negligence, but a clear case of violation of the norms and further the polluting industries

due to which directions are not being complied with though this being a serious issue.

12. Now therefore, under the above referred circumstances, you are directed to reply within fifteen days, from the receipt of this notice, as you have not complied with the directions issued by the Board and Hon. Supreme court of India. And also reply as to why you have not submitted the time bound action plan, and failing which, the Board would be constrained to initiate legal actions including initiating of prosecution and stringent the inlet norms given to member individual industrial units at Ankleshwar and Panoli.

Date: 19/03/2018.
Gandhinagar.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD

(R R Panchal)
Law Officer

To:

Mr R R Panchal, Law Officer
Gujarat Pollution Control Board
Paryavaran bhavan
Sector 10/A, Gandhinagar 382010

Sub: Your notice No.GPCB/ANK/CCA 1015 (27-B)/ID 27833/448684 dated 22.3.2018 issued to the Chairperson, Vice Chairman and the Directors of Narmada Clean Tech, Ankleshwar.

1) This is in respect of the aforesaid subject matter wherein, notice dated 22.3.2018 has been issued by you on behalf of the Gujarat Pollution Control Board ("**GPCB**" for short) to the Chairperson, Vice Chairman and other Directors of Narmada Clean Tech, Ankleshwar ("**NCT**" for short).

2) I, at the outset, deny the averments, allegations and contentions made in the notice under reply which are contrary to and inconsistent with what is stated in the present reply, as if they all are specifically and individually dealt with and traversed, save and except what is specifically admitted by me hereunder. I further state that none of the allegations and averments may be deemed as admitted, unless expressly admitted by me, merely because any of them is not specifically dealt with and replied.

3) On going through the notice under reply, it transpires that the notice is based on the following averments and allegations :

   i) It is alleged in para 5 of the notice that the industrial effluent outlet of the FETP is not confirming to the norms stipulated by the GPCB. It is further alleged in para 6 that the inlet of FETP is also not confirming to the stipulated norms which is due to the units discharging effluent having quality

4) Having regard to the contents of the notice and the averments and allegations made therein, it is stated as under:

i) As far as the contents of para 5 and 6 are concerned, it is to state that GPCB is well aware of the fact that the FETP being operated by NCT is designed to treat the effluent which is discharged by industries after the effluent is treated by the industries to confirm to their discharge norms. As far as the FETP is concerned, there are designated inlet norms which GPCB is well aware of and the discharge of effluent of the industries is required to be conformed to the said inlet norms of the FETP. From the beginning, the effluent discharge by industries has always been on the higher side and the said aspects had been brought to the notice of the GPCB time and again by way of letters / reminders and monthly reports, copies of which are available in your office. The said aspect is also relevant since the effluent carrying network i.e. the diverse pipeline network from the industries upto the point of the inlet in the FETP is that of the Notified Area Authority ("**NAA**" for short) of Ankleshwar and NCT has no control over the same except for recommending or bringing to the notice of NAA or GPCB about surreptitious discharge through those pipeline. As far as NCT is concerned, NCT carries out sampling and monitoring in the three estates of Ankleshwar, Panoli and Jhagadia for the purpose of billing as well as identifying areas of concerned regarding quality of effluent in the effluent network of the three estates and for taking actions against defaulters. The action taken along with recommendation from NCT in respect of its industries is compiled and submitted on monthly basis to the Regional and Head office of GPCB and the said data compiled during the monitoring of the

ensure that the norms laid down in the CCA issued by it to the industries is strictly complied with. Not only this, the menace of ghost connections which is used by the unscrupulous industries to discharge their untreated effluent in the underground pipeline network, which in it self, is a matter of grave concern, is required to be curbed which can be done only by NAA under regulatory control of GPCB. It may be clarified that NCT on its part has always ensured that it complies with the required norms laid down by the staturtory authority however to allege violation of norms on the part of NCT or to allege that the directions of GPCB have not been carried out is completely uncalled for and without any justification. NCT is a service provide involved in treating effluent discharge of the industries of Panoli, Ankleshwar and Jhagadia and is not a generator of effluent and therefore the problem which needs to be resolved is not at the end of NCT but of the industries which require active control and compliance by GPCB.

ii) As far as the reference in the notice to some letter dated 31.3.2016 of CPCB is concerned, no copy has been provided and therefore it would not be possible to respond to the same at this juncture.

iii) As far as the reference to directions issued under section 33 of the Water Act on 21.6.2017 and 27.2.2018 is concerned, the same has been complied with and the NCT has submitted its responses by way of letters dated 30 June 2017 and 9 March 2018, copies of which are available in your office. Further you may please note that NCT has also submitted the updated status of the action plan on March 20, 2018, copy of which is available in your office.

of willful violation of any norms on the part of the directors or the Chairperson of NCT as alleged in the notice. Alleged violation, if any, is not due to any action on part of NCT but due to the conduct on the part of the industries indulging in unchecked or surreptitious discharge of untreated effluent and / or of effluent which is not treated as per the inlet norms of FETP and which GPCB is required to look into. In such circumstances to make allegations against the Chairperson who, by virtue of her position as Vice Chairman and Managing Director of Gujarat Industrial Development Corporation, is ex-officio Chairperson of NCT and also against the other directors who are in fact nominee directors is completely uncalled for and is baseless and unjustified. As stated hereinabove, NCT has been complying with the directions issued by the GPCB as well as other statutory authorities and has submitted time bound action plan from time to time including the last updated status of the action plan on March 20, 2018. It is categorically denied that there is any non-compliance of any directions issued by GPCB or of the Hon'ble Supreme Court by NCT.

5) In view of the aforesaid, it is requested that the notice issued to the noticees be withdrawn forthwith. In case any further clarification including any documents or reports are required, the same will be provided for your satisfaction.

Yours sincerely

To:

Mr R R Panchal, Law Officer
Gujarat Pollution Control Board
Paryavaran bhavan
Sector 10/A, Gandhinagar 382010

Sub: Your notice No.GPCB/ANK/CCA 1015 (27-B)/ID 27833/448684 dated 22.3.2018 issued to the Chairperson, Vice Chairman and the Directors of Narmada Clean Tech, Ankleshwar.

1) This is in respect of the aforesaid subject matter wherein, notice dated 22.3.2018 has been issued by you on behalf of the Gujarat Pollution Control Board ("**GPCB**" for short) to the Chairperson, Vice Chairman and other Directors of Narmada Clean Tech, Ankleshwar ("**NCT**" for short).

2) I, at the outset, deny the averments, allegations and contentions made in the notice under reply which are contrary to and inconsistent with what is stated in the present reply, as if they all are specifically and individually dealt with and traversed, save and except what is specifically admitted by me hereunder. I further state that none of the allegations and averments may be deemed as admitted, unless expressly admitted by me, merely because any of them is not specifically dealt with and replied.

3) On going through the notice under reply, it transpires that the notice is based on the following averments and allegations :

   i) It is alleged in para 5 of the notice that the industrial effluent outlet of the FETP is not confirming to the norms stipulated by the GPCB. It is further alleged in para 6 that the inlet of FETP is also not confirming to the stipulated norms which is due to

4) Having regard to the contents of the notice and the averments and allegations made therein, it is stated as under:

i) As far as the contents of para 5 and 6 are concerned, it is to state that GPCB is well aware of the fact that the FETP being operated by NCT is designed to treat the effluent which is discharged by industries after the effluent is treated by the industries to confirm to their discharge norms. As far as the FETP is concerned, there are designated inlet norms which GPCB is well aware of and the discharge of effluent of the industries is required to be conformed to the said inlet norms of the FETP. From the beginning, the effluent discharge by industries has always been on the higher side and the said aspects had been brought to the notice of the GPCB time and again by way of letters / reminders and monthly reports, copies of which are available in your office. The said aspect is also relevant since the effluent carrying network i.e. the diverse pipeline network from the industries upto the point of the inlet in the FETP is that of the Notified Area Authority ("**NAA**" for short) of Ankleshwar and NCT has no control over the same except for recommending or bringing to the notice of NAA or GPCB about surreptitious discharge through those pipeline. As far as NCT is concerned, NCT carries out sampling and monitoring in the three estates of Ankleshwar, Panoli and Jhagadia for the purpose of billing as well as identifying areas of concerned regarding quality of effluent in the effluent network of the three estates and for taking actions against defaulters. The action taken along with recommendation from NCT in respect of its industries is compiled and submitted on monthly basis to the Regional and Head office of GPCB and the said data compiled during the monitoring of the effluent discharge is also submitted to the association of industries. Each

is used by the unscrupulous industries to discharge their untreated effluent in the underground pipeline network, which in it self, is a matter of grave concern, is required to be curbed which can be done only by NAA under regulatory control of GPCB. It may be clarified that NCT on its part has always ensured that it complies with the required norms laid down by the staturtory authority however to allege violation of norms on the part of NCT or to allege that the directions of GPCB have not been carried out is completely uncalled for and without any justification. NCT is a service provide involved in treating effluent discharge of the industries of Panoli, Ankleshwar and Jhagadia and is not a generator of effluent and therefore the problem which needs to be resolved is not at the end of NCT but of the industries which require active control and compliance by GPCB.

ii) As far as the reference in the notice to some letter dated 31.3.2016 of CPCB is concerned, no copy has been provided and therefore it would not be possible to respond to the same at this juncture.

iii) As far as the reference to directions issued under section 33 of the Water Act on 21.6.2017 and 27.2.2018 is concerned, the same has been complied with and the NCT has submitted its responses by way of letters dated 30 June 2017 and 9 March 2018, copies of which are available in your office. Further you may please note that NCT has also submitted the updated status of the action plan on March 20, 2018, copy of which is available in your office.

iv) In the notice, reference has been made of the Judgment dated 22.3.2017 of the Hon'ble Supreme Court which

indulging in unchecked or surreptitious discharge of untreated effluent and / or of effluent which is not treated as per the inlet norms of FETP and which GPCB is required to look into. In such circumstances to make allegations against the Chairperson who, by virtue of her position as Vice Chairman and Managing Director of Gujarat Industrial Development Corporation, is ex-officio Chairperson of NCT and also against the other directors who are in fact nominee directors is completely uncalled for and is baseless and unjustified. As stated hereinabove, NCT has been complying with the directions issued by the GPCB as well as other statutory authorities and has submitted time bound action plan from time to time including the last updated status of the action plan on March 20, 2018. It is categorically denied that there is any non-compliance of any directions issued by GPCB or of the Hon'ble Supreme Court by NCT.

5) In view of the aforesaid, it is requested that the notice issued to the noticees be withdrawn forthwith. In case any further clarification including any documents or reports are required, the same will be provided for your satisfaction.

Yours sincerely

ANNEXURE – 4

Performance of FETP

Analysis Report of FETP streams.

FLOW REPORT FOR THE MONTH OF OCT. - 2017

DATE	FLOW MLD RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Oct-17	26.93	7.00	0.00	33.93	29.60	10.00	39.60
2-Oct-17	28.10	7.00	0.00	35.10	29.30	10.00	39.30
3-Oct-17	31.63	8.00	0.00	39.63	30.90	10.10	41.00
4-Oct-17	29.58	7.00	0.00	36.58	37.80	9.92	47.72
5-Oct-17	30.80	8.00	0.00	38.80	37.90	9.83	48.20
6-Oct-17	33.30	9.00	0.00	42.30	38.00	9.60	47.60
7-Oct-17	31.40	8.00	0.00	39.40	35.20	10.76	45.96
8-Oct-17	29.50	9.00	0.00	38.50	32.70	11.31	44.01
9-Oct-17	29.30	7.00	0.00	36.30	35.00	9.70	44.70
10-Oct-17	32.50	9.00	0.00	41.50	37.30	10.90	48.20
11-Oct-17	38.30	8.50	0.00	46.80	36.90	11.73	48.63
12-Oct-17	36.90	6.00	0.00	42.90	38.10	11.05	49.15
13-Oct-17	35.70	6.00	0.00	41.70	38.10	10.20	48.30
14-Oct-17	35.30	7.00	0.00	42.30	38.90	11.30	50.20
15-Oct-17	32.70	7.00	0.00	39.70	38.70	11.41	50.11
16-Oct-17	32.20	6.00	0.00	38.20	40.20	11.20	51.40
17-Oct-17	33.60	6.00	0.00	39.60	38.20	10.90	49.10
18-Oct-17	26.50	6.00	0.00	32.50	32.20	10.95	43.15
19-Oct-17	22.90	7.00	0.00	29.90	29.30	8.60	37.90
20-Oct-17	20.00	6.00	0.00	26.00	24.80	7.10	31.90
21-Oct-17	18.70	6.00	0.00	24.70	24.30	7.30	31.60
22-Oct-17	20.30	5.00	0.00	25.30	23.10	9.90	33.00
23-Oct-17	20.30	7.00	0.00	27.30	26.60	9.40	36.00
24-Oct-17	21.80	5.00	0.00	26.80	25.00	9.50	34.50
25-Oct-17	22.80	4.00	0.00	26.80	24.00	9.65	33.65
26-Oct-17	23.60	5.00	0.00	28.60	24.10	10.27	34.37
27-Oct-17	26.00	6.00	0.00	32.00	25.80	8.50	34.30
28-Oct-17	23.40	5.00	0.00	28.40	27.30	9.40	36.70
29-Oct-17	28.10	7.00	0.00	35.10	31.30	10.35	41.65
30-Oct-17	27.80	7.00	0.00	34.80	33.40	10.50	43.90
31-Oct-17	29.10	7.00	0.00	36.10	30.50	10.40	40.90
AVG.	**28.36**	**6.73**	**0.00**	**35.08**	**32.08**	**10.06**	**42.15**
MIN.	**18.70**	**4.00**	**0.00**	**24.70**	**23.10**	**7.10**	**31.60**
MAX.	**38.30**	**9.00**	**0.00**	**46.80**	**40.20**	**11.73**	**51.40**

Analysis Report of FETP streams.

pH REPORT FOR THE MONTH OF OCT. - 2017

DATE	pH RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLE
1-Oct-17	7.70	7.38	~	7.77	7.28	7.00	7.40
2-Oct-17	8.01	7.33	~	7.98	7.17	7.20	7.45
3-Oct-17	7.30	7.01	~	7.46	7.01	6.85	7.34
4-Oct-17	6.79	7.14	~	7.10	7.17	7.09	7.46
5-Oct-17	7.43	7.16	~	7.45	7.15	7.22	7.39
6-Oct-17	7.61	7.29	~	7.58	7.20	7.20	7.57
7-Oct-17	7.68	7.32	~	7.67	7.19	7.09	7.56
8-Oct-17	7.49	7.38	~	7.59	7.24	7.44	7.48
9-Oct-17	7.91	7.50	~	7.82	7.12	7.28	7.52
10-Oct-17	7.95	7.48	~	7.84	7.12	6.71	7.02
11-Oct-17	8.33	7.60	~	8.24	7.39	7.56	7.14
12-Oct-17	8.02	7.33	~	7.72	7.08	7.37	7.39
13-Oct-17	7.54	7.22	~	7.55	7.18	7.46	7.43
14-Oct-17	7.02	7.15	~	7.24	7.23	7.53	7.50
15-Oct-17	7.67	7.16	~	7.67	7.14	7.24	7.57
16-Oct-17	8.39	7.52	~	8.18	7.46	7.57	7.83
17-Oct-17	7.39	7.09	~	7.34	7.11	7.17	7.45
18-Oct-17	7.72	7.11	~	7.56	7.13	7.24	7.46
19-Oct-17	7.81	7.39	~	7.82	7.18	7.44	7.47
20-Oct-17	7.30	7.20	~	7.46	6.98	6.58	7.39
21-Oct-17	8.04	7.58	~	8.01	7.15	7.19	7.45
22-Oct-17	8.24	7.37	~	8.20	7.09	7.01	7.50
23-Oct-17	8.13	7.42	~	8.06	7.22	6.60	7.47
24-Oct-17	7.53	7.00	~	7.55	6.91	7.12	7.64
25-Oct-17	7.96	7.19	~	7.88	7.05	6.74	7.30
26-Oct-17	8.10	7.39	~	7.97	7.08	7.16	7.30
27-Oct-17	7.23	7.11	~	7.71	7.10	6.89	7.20
28-Oct-17	7.38	6.98	~	7.32	7.00	6.97	7.24
29-Oct-17	7.32	7.13	~	7.40	7.09	6.86	7.27
30-Oct-17	7.76	7.34	~	7.83	7.14	7.24	7.36
31-Oct-17	7.96	7.20	~	7.91	6.88	7.23	7.36
AVG.	**7.70**	**7.27**	**#DIV/0!**	**7.71**	**7.14**	**7.14**	**7.42**
MIN.	**6.79**	**6.98**	**0.00**	**7.10**	**6.88**	**6.58**	**7.02**
MAX.	**8.39**	**7.60**	**0.00**	**8.24**	**7.46**	**7.57**	**7.83**

Analysis Report of FETP streams.

COD REPORT FOR THE MONTH OF OCT. - 2017

DATE	COD RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Oct-17	1609	414	~	1354	717	254	541
2-Oct-17	2112	304	~	1856	656	512	592
3-Oct-17	2183	286	~	1832	637	254	541
4-Oct-17	2473	305	~	2056	658	144	514
5-Oct-17	2215	254	~	1896	685	127	509
6-Oct-17	1888	336	~	1472	736	144	560
7-Oct-17	1824	272	~	1536	720	96	576
8-Oct-17	2368	320	~	1872	800	144	608
9-Oct-17	1816	382	~	1625	764	430	605
10-Oct-17	2560	384	~	1840	768	288	624
11-Oct-17	1848	462	~	1784	748	143	589
12-Oct-17	1616	416	~	1216	768	144	624
13-Oct-17	1571	428	~	1412	777	111	619
14-Oct-17	1702	481	~	1445	771	176	706
15-Oct-17	1808	368	~	1600	656	112	560
16-Oct-17	1872	400	~	1792	656	224	544
17-Oct-17	2007	302	~	1784	557	175	478
18-Oct-17	2432	320	~	2096	624	144	512
19-Oct-17	2470	382	~	1976	605	191	509
20-Oct-17	1944	366	~	1545	653	382	509
21-Oct-17	1864	334	~	1561	637	605	557
22-Oct-17	1744	336	~	1312	768	400	576
23-Oct-17	2080	320	~	1744	704	208	512
24-Oct-17	2364	349	~	1984	777	222	555
25-Oct-17	2072	369	~	1911	738	192	546
26-Oct-17	2016	384	~	1760	704	208	576
27-Oct-17	2736	400	~	2144	752	640	528
28-Oct-17	1768	462	~	1577	780	589	509
29-Oct-17	2023	398	~	1752	828	239	605
30-Oct-17	2507	333	~	2476	777	190	603
31-Oct-17	2473	546	~	2024	771	176	642
AVG.	**2063**	**368**	**#DIV/0!**	**1749**	**716**	**254**	**565**
MIN.	**1571**	**254**	**0**	**1216**	**557**	**96**	**478**
MAX.	**2736**	**546**	**0**	**2476**	**828**	**640**	**706**

Analysis Report of FETP streams.

BOD REPORT FOR THE MONTH OF OCT. - 2017

DATE	BOD RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Oct-17	765	12	~	540	36	10	21
2-Oct-17	780	30	~	405	51	19	36
3-Oct-17	795	174	~	555	54	97	51
4-Oct-17	600	78	~	390	63	58	42
5-Oct-17	765	18	~	585	33	94	24
6-Oct-17	600	48	~	345	36	57	30
7-Oct-17	795	36	~	600	69	16	63
8-Oct-17	615	12	~	495	51	12	42
9-Oct-17	510	48	~	450	36	7	30
10-Oct-17	750	30	~	645	60	6	45
11-Oct-17	840	48	~	645	51	6	33
12-Oct-17	555	36	~	465	54	93	36
13-Oct-17	735	24	~	600	51	93	60
14-Oct-17	660	66	~	510	78	10	57
15-Oct-17	585	96	~	390	75	12	54
16-Oct-17	585	60	~	480	72	12	66
17-Oct-17	585	12	~	345	57	3	48
18-Oct-17	780	66	~	615	54	12	48
19-Oct-17	645	36	~	600	51	42	45
20-Oct-17	720	36	~	645	51	7	45
21-Oct-17	870	36	~	615	45	15	36
22-Oct-17	735	96	~	705	30	55	30
23-Oct-17	420	48	~	285	36	63	33
24-Oct-17	660	18	~	510	30	240	36
25-Oct-17	465	66	~	330	48	111	57
26-Oct-17	825	18	~	420	48	36	27
27-Oct-17	885	30	~	630	36	6	21
28-Oct-17	810	42	~	705	45	13	42
29-Oct-17	720	18	~	435	45	36	39
30-Oct-17	975	48	~	720	48	216	39
31-Oct-17	645	54	~	570	39	198	51
AVG.	**699**	**46**	**#DIV/0!**	**524**	**49**	**53**	**42**
MIN.	**420**	**12**	**0**	**285**	**30**	**3**	**21**
MAX.	**975**	**174**	**0**	**720**	**78**	**240**	**66**

Analysis Report of FETP streams.

NH3-N REPORT FOR THE MONTH OF OCT. - 2017

DATE	NH3-N RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Oct-17	427	45	~	337	343	11	281
2-Oct-17	540	36	~	455	343	13	281
3-Oct-17	427	30	~	360	326	5	270
4-Oct-17	343	31	~	298	337	4	270
5-Oct-17	507	28	~	392	346	6	265
6-Oct-17	542	43	~	409	346	11	282
7-Oct-17	409	39	~	334	288	6	253
8-Oct-17	519	47	~	409	334	6	276
9-Oct-17	467	46	~	426	351	14	299
10-Oct-17	530	39	~	386	346	11	276
11-Oct-17	403	63	~	392	357	11	271
12-Oct-17	461	63	~	317	357	8	276
13-Oct-17	265	43	~	219	351	11	305
14-Oct-17	328	27	~	288	357	11	317
15-Oct-17	392	39	~	346	323	6	265
16-Oct-17	415	23	~	403	311	6	259
17-Oct-17	409	18	~	392	288	8	253
18-Oct-17	496	25	~	438	288	5	230
19-Oct-17	496	25	~	386	305	11	196
20-Oct-17	542	25	~	438	317	6	230
21-Oct-17	576	25	~	472	323	5	236
22-Oct-17	622	29	~	461	323	16	248
23-Oct-17	715	28	~	582	334	16	271
24-Oct-17	576	17	~	507	346	14	230
25-Oct-17	547	12	~	490	346	12	242
26-Oct-17	715	9	~	565	380	13	213
27-Oct-17	588	12	~	507	380	20	265
28-Oct-17	496	19	~	409	392	19	288
29-Oct-17	445	16	~	356	390	15	267
30-Oct-17	506	25	~	473	412	18	317
31-Oct-17	423	37	~	356	395	17	323
AVG.	**488**	**31**	**#DIV/0!**	**407**	**343**	**11**	**266**
MIN.	**265**	**9**	**0**	**219**	**288**	**4**	**196**
MAX.	**715**	**63**	**0**	**582**	**412**	**20**	**323**

Analysis Report of FETP streams.

TSS REPORT FOR THE MONTH OF OCT. - 2017

DATE	TSS RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Oct-17	211	71	~	197	80	78	58
2-Oct-17	280	63	~	224	55	160	88
3-Oct-17	271	57	~	202	67	100	70
4-Oct-17	242	77	~	243	72	129	89
5-Oct-17	194	57	~	214	83	80	57
6-Oct-17	245	71	~	225	54	109	44
7-Oct-17	190	89	~	233	82	54	66
8-Oct-17	277	80	~	229	86	110	92
9-Oct-17	352	79	~	221	60	111	94
10-Oct-17	523	88	~	213	66	57	91
11-Oct-17	310	122	~	431	93	80	96
12-Oct-17	307	95	~	209	97	49	91
13-Oct-17	172	146	~	212	58	19	74
14-Oct-17	222	74	~	173	74	111	79
15-Oct-17	253	109	~	280	58	71	53
16-Oct-17	252	57	~	355	49	66	51
17-Oct-17	257	95	~	270	61	63	64
18-Oct-17	323	94	~	298	55	104	60
19-Oct-17	186	86	~	280	65	70	63
20-Oct-17	489	68	~	317	60	89	59
21-Oct-17	179	73	~	264	59	82	82
22-Oct-17	429	52	~	231	51	136	98
23-Oct-17	330	96	~	290	57	68	61
24-Oct-17	357	54	~	248	44	80	53
25-Oct-17	203	38	~	221	74	60	85
26-Oct-17	370	96	~	339	46	57	67
27-Oct-17	334	102	~	260	44	116	77
28-Oct-17	299	80	~	246	54	113	70
29-Oct-17	208	109	~	297	75	99	64
30-Oct-17	161	68	~	374	87	99	59
31-Oct-17	337	76	~	224	58	113	87
AVG.	**283**	**81**	**#DIV/0!**	**259**	**65**	**88**	**72**
MIN.	**161**	**38**	**0**	**173**	**44**	**19**	**44**
MAX.	**523**	**146**	**0**	**431**	**97**	**160**	**98**

Analysis Report of FETP streams.

TDS REPORT FOR THE MONTH OF OCT. - 2017

DATE	TDS RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Oct-17	11110	8920	~	10540	10500	7270	9590
2-Oct-17	12190	8710	~	11490	10940	8560	9930
3-Oct-17	10960	8860	~	10260	10930	8710	9840
4-Oct-17	10310	9330	~	10160	10900	8200	9900
5-Oct-17	11910	9310	~	11010	10620	7200	9710
6-Oct-17	11190	8640	~	10060	10630	7300	10120
7-Oct-17	10050	7760	~	9360	10220	8430	9740
8-Oct-17	12310	8900	~	11590	10980	8620	10080
9-Oct-17	11060	9700	~	11110	10850	8050	9810
10-Oct-17	11940	8470	~	10720	10580	6590	9850
11-Oct-17	10990	9030	~	10470	10530	6890	9880
12-Oct-17	10610	8590	~	9250	10750	7770	10200
13-Oct-17	9260	10080	~	9500	10610	8140	9750
14-Oct-17	8910	10010	~	9060	10330	8600	9760
15-Oct-17	9350	9530	~	9380	10110	8300	9720
16-Oct-17	9250	9550	~	9620	9710	8580	9450
17-Oct-17	10070	9190	~	9900	9470	8350	9300
18-Oct-17	10600	9760	~	10350	9310	9320	9120
19-Oct-17	12300	9180	~	11190	9650	9090	9060
20-Oct-17	11380	7760	~	10350	9950	8410	9360
21-Oct-17	12080	7000	~	10810	10120	6780	9520
22-Oct-17	10450	7100	~	9360	10230	8120	7780
23-Oct-17	10860	8100	~	10170	9960	8020	9430
24-Oct-17	11700	11240	~	11440	10350	8260	9650
25-Oct-17	11440	11590	~	11480	10460	8460	9200
26-Oct-17	11330	11410	~	11040	9830	8890	9070
27-Oct-17	10800	10230	~	10370	9050	7880	8080
28-Oct-17	10110	9426	~	9830	10200	7530	9270
29-Oct-17	10750	9070	~	10450	10590	7850	9710
30-Oct-17	12190	9350	~	11300	10400	7670	10060
31-Oct-17	10540	9890	~	10340	10550	7600	9990
AVG.	**10903**	**9216**	**#DIV/0!**	**10386**	**10300**	**8046**	**9546**
MIN.	**8910**	**7000**	**0**	**9060**	**9050**	**6590**	**7780**
MAX.	**12310**	**11590**	**0**	**11590**	**10980**	**9320**	**10200**

Analysis Report of FETP streams.

FLOW REPORT FOR THE MONTH OF NOV. - 2017

DATE	FLOW MLD RESULTS						BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	JHA DIRE.	OUTLET
1-Nov-17	25.50	5.00	0.00	30.50	35.30	10.22	45.52
2-Nov-17	29.30	8.00	0.00	37.30	31.60	10.25	41.85
3-Nov-17	29.40	7.00	0.00	36.40	31.00	10.50	41.50
4-Nov-17	31.10	7.00	0.00	38.10	34.30	9.50	43.80
5-Nov-17	28.50	8.00	0.00	36.50	34.60	9.98	44.58
6-Nov-17	31.40	6.00	0.00	37.40	37.30	9.50	46.80
7-Nov-17	30.20	6.00	0.00	36.20	34.80	9.40	44.20
8-Nov-17	28.50	4.00	0.00	32.50	35.80	9.39	45.19
9-Nov-17	30.30	7.00	0.00	37.30	29.90	9.78	39.68
10-Nov-17	28.70	5.00	0.00	33.70	32.10	9.60	41.70
11-Nov-17	30.80	5.00	0.00	35.80	33.00	9.37	42.37
12-Nov-17	30.50	7.00	0.00	37.50	36.10	9.87	45.97
13-Nov-17	29.80	6.00	0.00	35.80	37.50	9.10	46.60
14-Nov-17	28.30	5.00	0.00	33.30	35.00	9.30	44.30
15-Nov-17	25.80	6.00	0.00	31.80	32.70	11.12	43.82
16-Nov-17	21.50	8.00	0.00	29.50	27.60	10.57	38.17
17-Nov-17	20.60	6.00	0.00	26.60	27.20	9.67	36.87
18-Nov-17	22.90	7.00	0.00	29.90	27.00	9.87	36.87
19-Nov-17	22.20	7.00	0.00	29.20	27.20	10.27	37.47
20-Nov-17	22.70	5.00	0.00	27.70	26.70	10.00	36.70
21-Nov-17	27.20	7.00	0.00	34.20	27.30	10.60	37.90
22-Nov-17	28.20	4.00	0.00	32.20	32.10	10.08	42.18
23-Nov-17	29.00	6.00	0.00	35.00	32.30	10.33	42.63
24-Nov-17	25.80	6.00	0.00	31.80	32.70	10.60	43.30
25-Nov-17	27.60	6.00	0.00	33.60	32.40	10.40	42.80
26-Nov-17	26.30	4.00	0.00	30.30	31.80	10.63	42.43
27-Nov-17	29.10	5.00	0.00	34.10	32.10	10.20	42.30
28-Nov-17	31.10	5.00	0.00	36.10	31.00	10.49	41.49
29-Nov-17	29.20	6.00	0.00	35.20	32.50	10.19	42.69
30-Nov-17	28.60	5.00	0.00	33.60	30.30	9.38	39.68
AVG.	**27.67**	**5.97**	**0.00**	**33.64**	**32.04**	**10.01**	**42.05**
MIN.	**20.60**	**4.00**	**0.00**	**26.60**	**26.70**	**9.10**	**36.70**
MAX.	**31.40**	**8.00**	**0.00**	**38.10**	**37.50**	**11.12**	**46.80**

Analysis Report of FETP streams.

pH REPORT FOR THE MONTH OF NOV. - 2017

DATE	pH RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Nov-17	7.69	7.23	~	7.64	7.14	7.31	7.35
2-Nov-17	7.75	7.01	~	7.65	7.30	7.20	7.36
3-Nov-17	7.31	7.30	~	7.34	7.19	7.46	7.50
4-Nov-17	7.63	7.26	~	7.65	6.98	6.91	7.34
5-Nov-17	7.75	7.22	~	7.52	7.11	7.14	7.36
6-Nov-17	7.58	7.27	~	7.58	7.10	7.07	7.19
7-Nov-17	7.83	7.35	~	7.86	7.05	7.14	7.32
8-Nov-17	7.66	7.34	~	7.48	7.07	7.25	7.22
9-Nov-17	7.73	7.47	~	7.73	7.50	7.06	7.39
10-Nov-17	7.13	7.18	~	7.29	7.05	6.62	7.23
11-Nov-17	7.56	7.17	~	7.66	7.08	6.86	7.24
12-Nov-17	7.00	7.38	~	7.64	7.00	6.89	7.21
13-Nov-17	7.78	7.16	~	7.82	7.27	7.11	7.13
14-Nov-17	7.56	7.35	~	7.74	7.36	6.86	7.15
15-Nov-17	8.39	7.07	~	8.35	7.34	7.29	7.37
16-Nov-17	8.07	7.66	~	8.08	7.54	7.07	7.26
17-Nov-17	8.10	7.10	~	7.95	7.37	6.95	7.24
18-Nov-17	7.66	7.08	~	7.49	7.22	7.17	7.40
19-Nov-17	7.50	7.14	~	7.46	7.10	7.10	7.43
20-Nov-17	7.83	7.27	~	7.64	7.24	7.09	7.30
21-Nov-17	8.20	7.31	~	8.14	7.38	6.95	7.18
22-Nov-17	8.11	7.13	~	8.07	7.43	7.23	7.30
23-Nov-17	7.94	7.37	~	7.89	7.24	7.22	7.31
24-Nov-17	7.32	7.44	~	7.50	7.16	7.20	7.26
25-Nov-17	8.02	7.27	~	7.94	7.29	7.09	7.20
26-Nov-17	7.28	7.32	~	7.36	7.34	7.08	7.39
27-Nov-17	7.36	7.41	~	7.52	7.24	7.12	7.31
28-Nov-17	7.11	7.25	~	7.36	7.23	7.00	7.27
29-Nov-17	7.11	7.10	~	7.33	7.34	7.23	7.44
30-Nov-17	7.03	6.91	~	7.13	7.30	7.13	7.44
AVG.	**7.63**	**7.25**	**#DIV/0!**	**7.66**	**7.23**	**7.09**	**7.30**
MIN.	**7.00**	**6.91**	**0.00**	**7.13**	**6.98**	**6.62**	**7.13**
MAX.	**8.39**	**7.66**	**0.00**	**8.35**	**7.54**	**7.46**	**7.50**

Analysis Report of FETP streams.

COD REPORT FOR THE MONTH OF NOV. - 2017

DATE	COD RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Nov-17	1728	704	~	1472	768	128	608
2-Nov-17	1888	720	~	1504	800	160	608
3-Nov-17	2071	653	~	1848	780	175	605
4-Nov-17	1664	560	~	1552	768	336	608
5-Nov-17	1920	544	~	1680	736	320	608
6-Nov-17	1895	594	~	1638	722	369	578
7-Nov-17	1856	608	~	1680	736	192	576
8-Nov-17	1686	514	~	1477	642	112	514
9-Nov-17	1863	514	~	1590	674	128	530
10-Nov-17	1686	449	~	1477	674	112	433
11-Nov-17	1808	400	~	1696	608	240	448
12-Nov-17	2072	497	~	1799	658	192	530
13-Nov-17	2272	544	~	2032	656	176	528
14-Nov-17	2000	512	~	1760	672	368	544
15-Nov-17	2096	608	~	1792	752	224	576
16-Nov-17	2352	799	~	2022	784	188	580
17-Nov-17	2145	790	~	1838	741	161	548
18-Nov-17	2441	771	~	2008	722	257	562
19-Nov-17	2757	677	~	2290	774	241	596
20-Nov-17	2441	530	~	2024	755	321	546
21-Nov-17	2432	416	~	2128	720	304	528
22-Nov-17	2624	464	~	2224	816	368	528
23-Nov-17	2473	594	~	2136	883	305	642
24-Nov-17	2208	528	~	1872	784	192	688
25-Nov-17	2400	592	~	2064	928	208	752
26-Nov-17	2864	544	~	2368	912	368	672
27-Nov-17	2377	562	~	2136	899	224	706
28-Nov-17	2128	656	~	1920	944	160	672
29-Nov-17	2000	512	~	1664	912	80	640
30-Nov-17	2677	541	~	2358	1003	127	780
AVG.	**2161**	**580**	**#DIV/0!**	**1868**	**774**	**225**	**591**
MIN.	**1664**	**400**	**0**	**1472**	**608**	**80**	**433**
MAX.	**2864**	**799**	**0**	**2368**	**1003**	**369**	**780**

Analysis Report of FETP streams.

BOD REPORT FOR THE MONTH OF NOV. - 2017

DATE	BOD RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Nov-17	750	66	~	465	60	48	39
2-Nov-17	870	18	~	645	69	36	45
3-Nov-17	870	156	~	705	48	6	33
4-Nov-17	615	216	~	495	42	7	42
5-Nov-17	720	234	~	465	39	30	33
6-Nov-17	645	234	~	495	45	12	36
7-Nov-17	540	156	~	465	12	60	36
8-Nov-17	750	108	~	615	27	24	12
9-Nov-17	645	156	~	540	42	97	33
10-Nov-17	720	168	~	480	33	27	33
11-Nov-17	615	96	~	465	51	12	45
12-Nov-17	615	54	~	510	36	6	30
13-Nov-17	540	78	~	390	48	9	39
14-Nov-17	840	66	~	660	48	72	36
15-Nov-17	870	78	~	735	54	27	30
16-Nov-17	915	78	~	750	45	30	42
17-Nov-17	825	96	~	675	48	105	39
18-Nov-17	585	108	~	495	48	36	39
19-Nov-17	795	180	~	615	45	4	24
20-Nov-17	945	258	~	645	48	27	42
21-Nov-17	840	156	~	645	39	60	21
22-Nov-17	1050	162	~	795	60	54	54
23-Nov-17	915	114	~	735	63	84	51
24-Nov-17	825	48	~	570	45	114	39
25-Nov-17	840	66	~	690	42	126	30
26-Nov-17	765	90	~	585	54	48	45
27-Nov-17	765	108	~	525	36	33	45
28-Nov-17	780	54	~	570	69	30	57
29-Nov-17	1005	78	~	765	81	114	63
30-Nov-17	810	126	~	525	75	36	51
AVG.	**776**	**120**	**#DIV/0!**	**591**	**48**	**46**	**39**
MIN.	**540**	**18**	**0**	**390**	**12**	**4**	**12**
MAX.	**1050**	**258**	**0**	**795**	**81**	**126**	**63**

Analysis Report of FETP streams.

NH3-N REPORT FOR THE MONTH OF NOV. - 2017

DATE	NH3-N RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Nov-17	312	33	~	267	378	13	295
2-Nov-17	373	35	~	317	395	11	295
3-Nov-17	401	35	~	323	345	7	278
4-Nov-17	373	79	~	323	351	68	295
5-Nov-17	412	44	~	345	289	11	256
6-Nov-17	468	62	~	390	295	11	245
7-Nov-17	395	44	~	345	284	6	239
8-Nov-17	479	41	~	395	284	5	189
9-Nov-17	295	66	~	267	295	5	234
10-Nov-17	323	42	~	267	284	5	239
11-Nov-17	334	28	~	328	273	5	217
12-Nov-17	445	33	~	334	261	5	228
13-Nov-17	434	31	~	401	250	7	222
14-Nov-17	406	25	~	345	261	11	211
15-Nov-17	412	16	~	334	261	8	178
16-Nov-17	490	27	~	378	295	6	211
17-Nov-17	490	26	~	423	300	5	228
18-Nov-17	540	26	~	456	306	11	211
19-Nov-17	434	30	~	373	312	10	217
20-Nov-17	445	34	~	356	312	13	222
21-Nov-17	495	16	~	448	314	14	186
22-Nov-17	477	20	~	396	302	13	232
23-Nov-17	361	17	~	302	291	11	198
24-Nov-17	308	19	~	256	326	6	203
25-Nov-17	331	20	~	279	331	5	203
26-Nov-17	413	20	~	361	320	11	215
27-Nov-17	460	29	~	407	314	9	227
28-Nov-17	337	27	~	308	273	8	203
29-Nov-17	273	27	~	244	302	5	203
30-Nov-17	320	27	~	291	326	5	232
AVG.	**401**	**33**	**#DIV/0!**	**342**	**304**	**10**	**227**
MIN.	**273**	**16**	**0**	**244**	**250**	**5**	**178**
MAX.	**540**	**79**	**0**	**456**	**395**	**68**	**295**

Analysis Report of FETP streams.

TSS REPORT FOR THE MONTH OF NOV. - 2017

DATE	TSS RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Nov-17	289	104	~	209	59	72	71
2-Nov-17	270	94	~	217	72	71	68
3-Nov-17	288	99	~	201	43	47	37
4-Nov-17	250	115	~	246	68	79	59
5-Nov-17	317	97	~	211	72	102	82
6-Nov-17	244	132	~	279	89	134	64
7-Nov-17	233	121	~	289	72	110	57
8-Nov-17	296	111	~	273	63	70	52
9-Nov-17	327	148	~	288	79	81	82
10-Nov-17	203	103	~	188	68	89	59
11-Nov-17	163	97	~	217	60	69	52
12-Nov-17	225	91	~	199	46	44	50
13-Nov-17	216	112	~	203	59	60	48
14-Nov-17	350	59	~	240	51	88	57
15-Nov-17	226	92	~	222	108	102	80
16-Nov-17	267	79	~	292	101	89	81
17-Nov-17	297	90	~	242	59	68	53
18-Nov-17	290	89	~	197	86	104	91
19-Nov-17	336	97	~	300	80	110	87
20-Nov-17	369	133	~	303	96	113	98
21-Nov-17	417	91	~	303	79	91	60
22-Nov-17	415	90	~	318	82	102	71
23-Nov-17	355	62	~	265	97	81	70
24-Nov-17	342	70	~	293	70	85	70
25-Nov-17	330	187	~	269	94	133	98
26-Nov-17	379	97	~	289	89	97	51
27-Nov-17	244	113	~	285	102	152	199
28-Nov-17	259	94	~	247	112	127	122
29-Nov-17	272	86	~	253	105	121	120
30-Nov-17	328	108	~	269	94	89	150
AVG.	**293**	**102**	**#DIV/0!**	**254**	**79**	**93**	**78**
MIN.	**163**	**59**	**0**	**188**	**43**	**44**	**37**
MAX.	**417**	**187**	**0**	**318**	**112**	**152**	**199**

Analysis Report of FETP streams.

TDS REPORT FOR THE MONTH OF NOV. - 2017

DATE	TDS RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Nov-17	9200	9390	~	9120	10610	7870	9790
2-Nov-17	9630	10540	~	9590	10330	7650	9620
3-Nov-17	10070	8530	~	9550	10190	8290	9250
4-Nov-17	9450	7950	~	9100	9950	8160	9400
5-Nov-17	10340	9210	~	10100	9670	8420	9380
6-Nov-17	9920	8050	~	9380	9530	6930	9150
7-Nov-17	10980	8390	~	10330	10350	7100	9780
8-Nov-17	10850	8560	~	10290	10300	6910	9710
9-Nov-17	10140	11250	~	10510	10710	6970	10270
10-Nov-17	10590	9540	~	10200	10540	7910	9760
11-Nov-17	10850	9630	~	10480	10460	7210	9470
12-Nov-17	12210	8290	~	10540	10290	6290	9410
13-Nov-17	12100	10010	~	10930	10380	6910	9610
14-Nov-17	10590	8550	~	10320	10390	6440	9810
15-Nov-17	9840	7840	~	9380	10120	7460	9240
16-Nov-17	12590	8190	~	11140	10440	7530	9590
17-Nov-17	11740	9320	~	11140	10540	7970	9240
18-Nov-17	12590	9550	~	11650	10650	7190	9430
19-Nov-17	13700	7540	~	11960	10650	7640	9550
20-Nov-17	11650	8260	~	10750	10380	8130	9380
21-Nov-17	11630	9130	~	11010	10360	8450	9470
22-Nov-17	12580	9780	~	11940	10860	7690	9540
23-Nov-17	11420	10640	~	11250	11200	9280	11190
24-Nov-17	11190	9560	~	10810	11400	9230	10810
25-Nov-17	11550	12620	~	11180	11150	9290	10250
26-Nov-17	12130	9770	~	11330	11370	9310	10650
27-Nov-17	10610	8280	~	10100	11180	9230	10490
28-Nov-17	10880	8540	~	10200	10940	8670	10500
29-Nov-17	10470	8100	~	10340	11000	8670	10450
30-Nov-17	10600	11470	~	10650	10840	8550	10620
AVG.	**11070**	**9216**	**#DIV/0!**	**10509**	**10559**	**7912**	**9827**
MIN.	**9200**	**7540**	**0**	**9100**	**9530**	**6290**	**9150**
MAX.	**13700**	**12620**	**0**	**11960**	**11400**	**9310**	**11190**

Analysis Report of FETP streams.

FLOW REPORT FOR THE MONTH OF DEC. - 2017

DATE	FLOW MLD RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Dec-17	29.60	6.00	0.00	35.60	30.50	8.90	39.40
2-Dec-17	29.50	5.00	0.00	34.50	34.50	10.40	44.90
3-Dec-17	30.70	7.00	0.00	37.70	39.00	9.42	48.42
4-Dec-17	27.40	5.00	0.00	32.40	36.90	9.50	46.40
5-Dec-17	21.40	5.00	0.00	26.40	33.00	10.20	43.20
6-Dec-17	34.70	6.00	0.00	40.70	29.40	9.78	39.18
7-Dec-17	30.40	4.00	0.00	34.40	36.30	9.62	45.92
8-Dec-17	29.10	4.00	0.00	33.10	33.10	10.20	43.30
9-Dec-17	29.60	4.00	0.00	33.60	31.60	9.40	41.00
10-Dec-17	27.40	4.00	0.00	31.40	31.20	9.42	40.62
11-Dec-17	28.30	4.00	0.00	32.30	29.30	9.80	39.10
12-Dec-17	30.20	4.00	0.00	34.20	29.40	9.60	39.00
13-Dec-17	26.60	3.00	0.00	29.60	30.60	10.28	40.88
14-Dec-17	27.30	3.00	0.00	30.30	30.70	9.52	40.22
15-Dec-17	25.90	4.00	0.00	29.90	29.80	8.10	37.90
16-Dec-17	25.70	4.00	0.00	29.70	28.40	9.30	37.70
17-Dec-17	29.20	4.00	0.00	33.20	28.20	9.58	37.78
18-Dec-17	27.90	5.00	0.00	32.90	31.10	9.30	40.40
19-Dec-17	26.50	4.00	0.00	30.50	30.50	9.30	39.80
20-Dec-17	27.90	4.00	0.00	31.90	30.50	5.46	35.96
21-Dec-17	26.50	5.00	0.00	31.50	30.50	0.00	30.50
22-Dec-17	26.80	3.00	0.00	29.80	29.80	4.40	34.20
23-Dec-17	28.60	4.00	0.00	32.60	27.90	2.10	30.00
24-Dec-17	28.00	4.00	0.00	32.00	28.80	9.62	38.42
25-Dec-17	28.00	4.00	0.00	32.00	29.80	5.70	35.50
26-Dec-17	25.10	6.00	0.00	31.10	31.70	0.60	32.30
27-Dec-17	22.30	4.00	0.00	26.30	31.90	0.00	31.90
28-Dec-17	14.70	6.00	0.00	20.70	17.60	6.58	24.18
29-Dec-17	22.90	5.00	0.00	27.90	27.40	10.10	37.50
30-Dec-17	24.00	5.00	0.00	29.00	29.40	10.50	39.90
31-Dec-17	22.90	5.00	0.00	27.90	27.30	9.45	36.75
AVG.	**26.94**	**4.52**	**0.00**	**31.45**	**30.52**	**7.94**	**38.46**
MIN.	**14.70**	**3.00**	**0.00**	**20.70**	**17.60**	**0.00**	**24.18**
MAX.	**34.70**	**7.00**	**0.00**	**40.70**	**39.00**	**10.50**	**48.42**

Analysis Report of FETP streams.

pH REPORT FOR THE MONTH OF DEC. - 2017

DATE	pH RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Dec-17	7.72	7.34	~	7.72	7.47	7.33	7.43
2-Dec-17	7.02	7.20	~	7.06	7.16	7.17	7.30
3-Dec-17	7.58	7.06	~	7.52	7.18	7.20	7.33
4-Dec-17	7.46	7.02	~	7.36	7.30	7.39	7.50
5-Dec-17	7.96	7.50	~	7.80	7.54	7.60	7.54
6-Dec-17	7.42	7.04	~	7.47	7.24	7.40	7.38
7-Dec-17	7.81	7.08	~	7.76	7.35	7.31	7.21
8-Dec-17	7.56	7.13	~	7.63	7.44	7.30	7.40
9-Dec-17	7.27	7.07	~	7.44	7.36	7.30	7.42
10-Dec-17	7.12	7.19	~	7.38	7.36	7.32	7.39
11-Dec-17	7.69	7.11	~	7.45	7.33	7.43	7.41
12-Dec-17	7.45	7.42	~	7.53	7.63	7.59	7.82
13-Dec-17	7.26	7.24	~	7.38	7.34	7.29	7.47
14-Dec-17	7.41	7.59	~	7.39	7.72	7.37	7.75
15-Dec-17	7.11	7.21	~	7.30	7.51	7.26	7.46
16-Dec-17	7.80	7.28	~	7.74	7.59	7.23	7.50
17-Dec-17	7.43	7.29	~	7.35	7.28	7.15	7.46
18-Dec-17	7.80	7.18	~	7.70	7.42	7.28	7.23
19-Dec-17	7.74	7.37	~	7.71	7.55	7.30	7.25
20-Dec-17	7.30	6.99	~	7.34	7.39	7.41	7.26
21-Dec-17	7.72	7.49	~	7.57	7.81	7.46	7.65
22-Dec-17	8.16	7.47	~	8.09	7.78	~	7.64
23-Dec-17	7.75	7.16	~	7.66	7.72	7.60	7.66
24-Dec-17	8.17	7.09	~	8.06	7.67	7.83	7.74
25-Dec-17	7.88	7.32	~	7.77	7.76	7.66	7.73
26-Dec-17	8.01	7.18	~	7.81	7.68	7.40	7.67
27-Dec-17	7.14	7.25	~	7.30	7.62	7.90	7.58
28-Dec-17	7.96	7.31	~	8.05	7.66	~	7.62
29-Dec-17	7.88	7.30	~	8.08	7.78	7.53	7.75
30-Dec-17	8.14	7.30	~	8.04	7.79	7.31	7.70
31-Dec-17	7.51	7.13	~	7.58	7.83	7.25	7.65
AVG.	**7.62**	**7.24**	**#DIV/0!**	**7.61**	**7.52**	**7.40**	**7.51**
MIN.	**7.02**	**6.99**	**0.00**	**7.06**	**7.16**	**7.15**	**7.21**
MAX.	**8.17**	**7.59**	**0.00**	**8.09**	**7.83**	**7.90**	**7.82**

Analysis Report of FETP streams.

COD REPORT FOR THE MONTH OF DEC. - 2017

DATE	COD RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Dec-17	2176	608	~	1904	880	464	752
2-Dec-17	2589	621	~	2191	860	223	780
3-Dec-17	2200	658	~	1943	835	144	738
4-Dec-17	2457	738	~	2152	803	128	690
5-Dec-17	2272	832	~	2032	816	144	752
6-Dec-17	2400	720	~	2160	752	208	720
7-Dec-17	2320	784	~	2128	816	448	640
8-Dec-17	2406	780	~	2310	908	191	876
9-Dec-17	2016	960	~	1840	864	272	640
10-Dec-17	2501	701	~	2294	988	286	701
11-Dec-17	2297	626	~	2072	915	176	690
12-Dec-17	2262	605	~	2055	908	223	653
13-Dec-17	2288	624	~	2032	832	480	640
14-Dec-17	2352	768	~	2224	864	320	688
15-Dec-17	2470	733	~	2231	780	175	669
16-Dec-17	2450	727	~	2228	790	553	663
17-Dec-17	2464	688	~	2304	864	256	656
18-Dec-17	2496	784	~	2320	800	176	656
19-Dec-17	2730	658	~	2377	803	337	610
20-Dec-17	2240	848	~	2048	928	496	784
21-Dec-17	2304	704	~	2192	864	400	688
22-Dec-17	2768	832	~	2416	880	~	784
23-Dec-17	2800	832	~	2432	896	160	848
24-Dec-17	2800	720	~	2736	912	192	784
25-Dec-17	2432	640	~	2176	864	384	688
26-Dec-17	2784	1008	~	2672	928	288	688
27-Dec-17	2522	963	~	2265	1044	112	851
28-Dec-17	2592	976	~	2352	1056	~	976
29-Dec-17	2795	899	~	2040	1044	867	947
30-Dec-17	2704	800	~	2432	1040	864	992
31-Dec-17	2987	819	~	2650	931	385	771
AVG.	**2480**	**763**	**#DIV/0!**	**2233**	**886**	**322**	**742**
MIN.	**2016**	**605**	**0**	**1840**	**752**	**112**	**610**
MAX.	**2987**	**1008**	**0**	**2736**	**1056**	**867**	**992**

Analysis Report of FETP streams.

BOD REPORT FOR THE MONTH OF DEC. - 2017

DATE	BOD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Dec-17	765	84	~	645	57	18	51
2-Dec-17	780	132	~	510	102	18	42
3-Dec-17	930	126	~	780	129	15	54
4-Dec-17	690	138	~	585	108	102	108
5-Dec-17	930	138	~	690	96	48	87
6-Dec-17	795	162	~	630	105	10	96
7-Dec-17	900	192	~	780	90	9	75
8-Dec-17	870	186	~	660	93	18	84
9-Dec-17	735	210	~	660	90	18	66
10-Dec-17	810	192	~	720	93	183	72
11-Dec-17	975	162	~	735	105	12	93
12-Dec-17	585	300	~	570	87	72	60
13-Dec-17	975	156	~	870	87	90	78
14-Dec-17	795	120	~	540	102	9	81
15-Dec-17	870	144	~	765	87	54	69
16-Dec-17	870	168	~	675	69	105	51
17-Dec-17	900	144	~	735	72	72	54
18-Dec-17	930	132	~	795	63	18	42
19-Dec-17	825	72	~	630	63	144	60
20-Dec-17	915	60	~	705	69	42	57
21-Dec-17	1020	150	~	885	63	12	42
22-Dec-17	1050	132	~	885	72	84	66
23-Dec-17	885	192	~	165	66	156	63
24-Dec-17	900	138	~	870	69	126	54
25-Dec-17	945	204	~	765	87	~	54
26-Dec-17	1095	186	~	870	87	6	84
27-Dec-17	885	156	~	750	66	15	45
28-Dec-17	855	126	~	720	69	48	57
29-Dec-17	1155	282	~	930	108	57	66
30-Dec-17	930	252	~	765	105	15	63
31-Dec-17	1020	294	~	825	195	~	147
AVG.	**890**	**165**	**#DIV/0!**	**713**	**89**	**54**	**68**
MIN.	**585**	**60**	**0**	**165**	**57**	**6**	**42**
MAX.	**1155**	**300**	**0**	**930**	**195**	**183**	**147**

Analysis Report of FETP streams.

NH3-N REPORT FOR THE MONTH OF DEC. - 2017

DATE	NH3-N RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Dec-17	262	25	~	221	291	69	238
2-Dec-17	297	23	~	238	273	6	203
3-Dec-17	442	12	~	372	267	5	203
4-Dec-17	361	20	~	262	262	BDL	203
5-Dec-17	425	19	~	372	267	BDL	186
6-Dec-17	308	20	~	221	273	6	198
7-Dec-17	372	19	~	337	291	11	174
8-Dec-17	413	19	~	361	308	6	232
9-Dec-17	256	17	~	256	291	11	244
10-Dec-17	308	17	~	238	326	11	250
11-Dec-17	448	19	~	331	396	12	244
12-Dec-17	361	19	~	343	331	9	256
13-Dec-17	318	17	~	272	318	11	210
14-Dec-17	318	22	~	306	329	9	238
15-Dec-17	352	17	~	312	329	5	227
16-Dec-17	568	19	~	386	329	11	250
17-Dec-17	580	20	~	329	341	6	261
18-Dec-17	534	20	~	466	341	9	215
19-Dec-17	414	25	~	352	352	11	272
20-Dec-17	289	34	~	215	363	11	272
21-Dec-17	341	29	~	312	386	11	284
22-Dec-17	466	23	~	403	380	~	308
23-Dec-17	568	25	~	483	397	BDL	323
24-Dec-17	642	21	~	613	358	5	318
25-Dec-17	460	22	~	420	352	7	301
26-Dec-17	540	25	~	506	398	15	324
27-Dec-17	443	28	~	386	431	9	352
28-Dec-17	554	26	~	488	409	~	397
29-Dec-17	636	20	~	386	443	10	409
30-Dec-17	602	20	~	460	437	12	352
31-Dec-17	568	20	~	477	454	11	346
AVG.	**434**	**21**	**#DIV/0!**	**359**	**346**	**12**	**267**
MIN.	**256**	**12**	**0**	**215**	**262**	**5**	**174**
MAX.	**642**	**34**	**0**	**613**	**454**	**69**	**409**

Analysis Report of FETP streams.

TSS REPORT FOR THE MONTH OF DEC. - 2017

DATE	TSS RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Dec-17	260	106	~	214	89	109	216
2-Dec-17	303	101	~	279	106	152	249
3-Dec-17	279	85	~	232	61	98	149
4-Dec-17	417	94	~	320	99	83	124
5-Dec-17	275	103	~	271	110	110	197
6-Dec-17	217	100	~	242	109	97	162
7-Dec-17	300	120	~	235	104	82	104
8-Dec-17	307	66	~	378	62	58	268
9-Dec-17	322	207	~	308	92	98	111
10-Dec-17	240	110	~	289	70	90	77
11-Dec-17	260	123	~	273	69	127	93
12-Dec-17	211	69	~	132	69	75	51
13-Dec-17	224	96	~	223	79	111	78
14-Dec-17	472	120	~	361	71	112	70
15-Dec-17	281	102	~	277	43	75	83
16-Dec-17	282	111	~	242	72	100	86
17-Dec-17	183	111	~	287	77	112	77
18-Dec-17	167	112	~	290	77	102	62
19-Dec-17	283	82	~	296	68	112	63
20-Dec-17	217	85	~	308	76	122	100
21-Dec-17	209	42	~	303	53	113	47
22-Dec-17	490	100	~	360	89	~	105
23-Dec-17	341	104	~	284	82	73	116
24-Dec-17	207	110	~	290	100	103	113
25-Dec-17	270	127	~	317	107	186	83
26-Dec-17	203	95	~	410	114	119	117
27-Dec-17	297	102	~	366	112	65	114
28-Dec-17	440	133	~	486	110	~	164
29-Dec-17	272	93	~	231	87	143	78
30-Dec-17	402	66	~	276	70	146	132
31-Dec-17	450	132	~	489	122	162	154
AVG.	**293**	**103**	**#DIV/0!**	**299**	**85**	**108**	**118**
MIN.	**167**	**42**	**0**	**132**	**43**	**58**	**47**
MAX.	**490**	**207**	**0**	**489**	**122**	**186**	**268**

Analysis Report of FETP streams.

TDS REPORT FOR THE MONTH OF DEC. - 2017

DATE	TDS RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	DIRE.	OUTLET
1-Dec-17	10540	11260	~	10540	10910	9220	10030
2-Dec-17	10370	8120	~	9910	10420	5320	9930
3-Dec-17	11410	9610	~	10900	10630	8500	10160
4-Dec-17	11060	9800	~	10590	10520	7960	9990
5-Dec-17	11140	9740	~	10750	10230	8250	9880
6-Dec-17	9830	10340	~	9920	10330	8200	9860
7-Dec-17	9030	10640	~	9890	10370	8300	9800
8-Dec-17	9960	11810	~	10050	10300	8050	9500
9-Dec-17	9770	13300	~	10010	10180	7550	9640
10-Dec-17	10910	13100	~	11110	10470	7190	9850
11-Dec-17	11020	14300	~	11620	10890	7350	10130
12-Dec-17	10680	12630	~	10900	10650	8030	9880
13-Dec-17	10440	11080	~	10520	10360	8200	9370
14-Dec-17	10750	9240	~	10710	10920	8270	9750
15-Dec-17	11500	12150	~	11570	11360	8570	10260
16-Dec-17	11800	11310	~	11710	11220	8590	10290
17-Dec-17	12410	13040	~	12780	12740	9220	10950
18-Dec-17	12930	14700	~	12860	11920	8460	10590
19-Dec-17	11080	9880	~	11060	10540	7000	9640
20-Dec-17	11640	12460	~	11660	11920	9930	10850
21-Dec-17	11120	11760	~	11700	11510	8570	10590
22-Dec-17	12010	11680	~	11810	12160	~	11730
23-Dec-17	12140	13000	~	12090	12080	8390	11900
24-Dec-17	12390	11240	~	12550	12150	6750	11840
25-Dec-17	11170	11840	~	11190	11930	8830	11500
26-Dec-17	11730	12870	~	11970	12480	9520	11440
27-Dec-17	11430	11280	~	11650	12420	7370	12290
28-Dec-17	13030	11060	~	12700	12240	~	12130
29-Dec-17	12340	11640	~	11630	11960	9250	11760
30-Dec-17	13030	11860	~	12250	11430	8740	10660
31-Dec-17	12550	12300	~	12280	11970	9560	10940
AVG.	**11329**	**11582**	**#DIV/0!**	**11319**	**11265**	**8246**	**10553**
MIN.	**9030**	**8120**	**0**	**9890**	**10180**	**5320**	**9370**
MAX.	**13030**	**14700**	**0**	**12860**	**12740**	**9930**	**12290**

Analysis Report of FETP streams.

FLOW REPORT FOR THE MONTH OF JAN. - 2018

DATE	FLOW MLD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Jan-18	22.50	5.00	0.00	27.50	25.80	9.60	35.40
2-Jan-18	21.00	5.00	0.00	26.00	25.40	10.30	35.70
3-Jan-18	22.50	5.00	0.00	27.50	25.80	9.40	35.20
4-Jan-18	23.40	6.00	0.00	29.40	25.10	9.39	34.49
5-Jan-18	22.20	6.00	0.00	28.20	26.00	8.31	34.31
6-Jan-18	21.60	5.00	0.00	26.60	26.00	8.84	34.84
7-Jan-18	22.10	6.00	0.00	28.10	26.60	9.11	35.71
8-Jan-18	22.60	6.00	0.00	28.60	25.90	7.50	33.40
9-Jan-18	22.00	6.00	0.00	28.00	25.80	8.61	34.41
10-Jan-18	23.30	5.00	0.00	28.30	26.20	9.43	35.63
11-Jan-18	23.60	6.00	0.00	29.60	26.30	8.08	34.38
12-Jan-18	24.10	6.00	0.00	30.10	26.90	8.26	35.16
13-Jan-18	23.50	6.00	0.00	29.50	27.60	9.02	36.62
14-Jan-18	17.70	4.00	0.00	21.70	28.20	6.55	34.75
15-Jan-18	20.40	5.00	0.00	25.40	26.10	7.00	33.10
16-Jan-18	24.00	4.00	0.00	28.00	26.00	7.60	33.60
17-Jan-18	24.60	6.00	0.00	30.60	26.40	8.87	35.27
18-Jan-18	24.60	6.00	0.00	30.60	26.40	8.56	34.96
19-Jan-18	25.70	5.00	0.00	30.70	26.60	8.65	35.25
20-Jan-18	25.20	4.00	0.00	29.20	26.40	0.00	26.40
21-Jan-18	25.90	6.00	0.00	31.90	27.30	2.61	29.91
22-Jan-18	27.20	6.00	0.00	33.20	32.60	9.90	42.50
23-Jan-18	26.60	5.00	0.00	31.60	32.40	9.75	42.15
24-Jan-18	24.10	5.00	0.00	29.10	32.80	8.77	41.57
25-Jan-18	24.70	5.00	0.00	29.70	28.20	8.48	36.68
26-Jan-18	22.80	5.00	0.00	27.80	27.50	7.86	35.36
27-Jan-18	25.70	5.00	0.00	30.70	26.90	9.15	36.05
28-Jan-18	25.20	5.00	0.00	30.20	26.80	8.49	35.29
29-Jan-18	23.10	6.00	0.00	29.10	27.20	7.40	34.60
30-Jan-18	23.00	4.00	0.00	27.00	27.10	7.76	34.86
31-Jan-18	25.80	5.00	0.00	30.80	27.20	8.34	35.54
AVG.	**23.57**	**5.29**	**0.00**	**28.86**	**27.15**	**8.12**	**35.26**
MIN.	**17.70**	**4.00**	**0.00**	**21.70**	**25.10**	**0.00**	**26.40**
MAX.	**27.20**	**6.00**	**0.00**	**33.20**	**32.80**	**10.30**	**42.50**

Analysis Report of FETP streams.

pH REPORT FOR THE MONTH OF JAN. - 2018

DATE	pH RESULTS						BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	JHA DIRE.	OUTLET
1-Jan-18	8.21	7.24	~	8.13	7.75	7.36	7.55
2-Jan-18	7.65	7.40	~	7.80	7.75	7.26	7.63
3-Jan-18	7.78	7.34	~	7.85	7.69	7.45	7.68
4-Jan-18	7.75	7.34	~	7.78	7.67	7.44	7.56
5-Jan-18	7.82	7.12	~	7.88	7.75	7.50	7.71
6-Jan-18	7.01	7.09	~	7.15	7.67	7.44	7.62
7-Jan-18	7.83	7.14	~	7.81	7.74	7.38	7.68
8-Jan-18	7.55	7.20	~	7.68	7.60	7.31	7.64
9-Jan-18	7.92	7.31	~	8.00	7.74	7.45	7.84
10-Jan-18	7.73	7.18	~	7.67	7.74	7.40	7.77
11-Jan-18	7.88	7.23	~	7.98	7.73	7.44	7.73
12-Jan-18	7.60	7.31	~	7.81	7.73	7.53	7.83
13-Jan-18	7.95	7.31	~	7.75	7.67	7.30	7.64
14-Jan-18	8.08	7.33	~	8.08	7.68	7.30	7.78
15-Jan-18	7.40	7.22	~	7.55	7.70	7.43	7.77
16-Jan-18	7.88	7.35	~	7.93	7.78	7.59	7.80
17-Jan-18	7.82	7.35	~	7.90	7.75	7.15	7.95
18-Jan-18	8.02	7.50	~	8.11	8.00	7.60	7.83
19-Jan-18	7.07	7.28	~	7.68	7.75	7.52	7.78
20-Jan-18	7.78	7.48	~	7.92	7.69	7.38	7.81
21-Jan-18	7.49	7.35	~	7.70	7.59	~	7.57
22-Jan-18	7.75	7.49	~	7.63	7.76	7.88	7.81
23-Jan-18	7.89	7.37	~	7.96	7.67	7.38	7.66
24-Jan-18	8.01	7.49	~	8.17	7.82	7.46	7.83
25-Jan-18	7.92	7.44	~	7.98	7.76	7.39	7.74
26-Jan-18	8.02	7.50	~	8.11	7.65	7.02	7.65
27-Jan-18	7.96	7.56	~	7.99	7.74	7.31	7.69
28-Jan-18	8.39	7.76	~	8.24	7.94	7.32	8.00
29-Jan-18	7.87	7.70	~	8.01	7.84	7.42	7.84
30-Jan-18	8.35	7.75	~	8.36	7.90	7.44	7.87
31-Jan-18	7.75	7.59	~	7.64	7.84	7.15	7.92
AVG.	**7.81**	**7.38**	**#DIV/0!**	**7.88**	**7.74**	**7.40**	**7.75**
MIN.	**7.01**	**7.09**	**0.00**	**7.15**	**7.59**	**7.02**	**7.55**
MAX.	**8.39**	**7.76**	**0.00**	**8.36**	**8.00**	**7.88**	**8.00**

Analysis Report of FETP streams.

COD REPORT FOR THE MONTH OF JAN. - 2018

DATE	COD RESULTS						BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	JHA DIRE.	OUTLET
1-Jan-18	3280	736	~	2840	1040	400	752
2-Jan-18	2931	674	~	2530	1060	289	803
3-Jan-18	2920	880	~	2600	1024	192	896
4-Jan-18	2891	722	~	2570	1044	514	835
5-Jan-18	2880	896	~	2400	1056	752	784
6-Jan-18	2720	944	~	2640	1008	464	768
7-Jan-18	2908	844	~	2629	1003	159	733
8-Jan-18	3413	706	~	2811	1028	594	787
9-Jan-18	3320	928	~	3000	1024	720	816
10-Jan-18	3012	867	~	2530	1060	465	899
11-Jan-18	3293	803	~	2449	947	224	771
12-Jan-18	2610	690	~	2289	995	979	755
13-Jan-18	3120	560	~	2400	1008	544	784
14-Jan-18	3000	560	~	2320	1104	400	944
15-Jan-18	3360	544	~	2760	1024	208	816
16-Jan-18	2851	690	~	2811	1028	755	819
17-Jan-18	2640	576	~	2360	992	416	928
18-Jan-18	2489	626	~	2168	931	176	755
19-Jan-18	2960	800	~	2600	928	144	736
20-Jan-18	2800	768	~	2760	960	192	784
21-Jan-18	2600	544	~	2280	944	~	816
22-Jan-18	3252	497	~	3012	963	112	899
23-Jan-18	2840	512	~	2560	912	144	864
24-Jan-18	2570	481	~	1927	963	433	755
25-Jan-18	2720	576	~	2520	1040	288	800
26-Jan-18	2680	528	~	2320	1024	304	800
27-Jan-18	3200	480	~	2840	1024	656	848
28-Jan-18	2960	464	~	2440	944	512	816
29-Jan-18	2720	464	~	2400	912	192	752
30-Jan-18	2960	496	~	2320	880	336	784
31-Jan-18	2640	528	~	2400	896	560	688
AVG.	**2921**	**658**	**#DIV/0!**	**2532**	**992**	**404**	**806**
MIN.	**2489**	**464**	**0**	**1927**	**880**	**112**	**688**
MAX.	**3413**	**944**	**0**	**3012**	**1104**	**979**	**944**

Analysis Report of FETP streams.

BOD REPORT FOR THE MONTH OF JAN. - 2018

DATE	BOD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Jan-18	1080	264	~	720	198	210	156
2-Jan-18	1050	228	~	810	153	306	81
3-Jan-18	1260	240	~	930	156	96	120
4-Jan-18	1440	216	~	885	156	144	72
5-Jan-18	990	144	~	810	96	36	78
6-Jan-18	1050	204	~	825	138	24	120
7-Jan-18	1140	174	~	960	186	174	84
8-Jan-18	1170	306	~	825	180	282	90
9-Jan-18	1020	366	~	930	150	108	78
10-Jan-18	1050	270	~	855	156	18	78
11-Jan-18	1200	180	~	900	126	102	72
12-Jan-18	1080	270	~	1020	126	138	90
13-Jan-18	1200	240	~	900	138	126	102
14-Jan-18	1380	288	~	945	132	60	90
15-Jan-18	990	180	~	900	168	495	96
16-Jan-18	1320	102	~	780	156	108	108
17-Jan-18	1080	96	~	930	156	84	132
18-Jan-18	1410	132	~	1005	144	24	102
19-Jan-18	990	138	~	960	144	180	120
20-Jan-18	870	108	~	780	84	90	90
21-Jan-18	810	120	~	750	90	18	72
22-Jan-18	930	156	~	810	78	18	66
23-Jan-18	900	162	~	870	84	18	66
24-Jan-18	900	114	~	810	84	~	78
25-Jan-18	1050	66	~	930	96	18	78
26-Jan-18	870	66	~	720	90	54	72
27-Jan-18	930	48	~	780	132	84	78
28-Jan-18	1050	48	~	840	138	102	90
29-Jan-18	1020	36	~	810	102	66	84
30-Jan-18	1290	54	~	1020	114	294	96
31-Jan-18	900	42	~	720	84	48	72
AVG.	**1078**	**163**	**#DIV/0!**	**862**	**130**	**118**	**91**
MIN.	**810**	**36**	**0**	**720**	**78**	**18**	**66**
MAX.	**1440**	**366**	**0**	**1020**	**198**	**495**	**156**

Analysis Report of FETP streams.

NH3-N REPORT FOR THE MONTH OF JAN. - 2018

DATE	NH3-N RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Jan-18	682	20	~	562	454	15	289
2-Jan-18	509	22	~	441	452	11	350
3-Jan-18	571	17	~	514	469	7	333
4-Jan-18	633	22	~	554	486	14	350
5-Jan-18	452	29	~	384	486	20	339
6-Jan-18	542	36	~	497	497	11	378
7-Jan-18	452	33	~	401	492	11	361
8-Jan-18	610	31	~	509	469	10	367
9-Jan-18	576	30	~	497	492	12	384
10-Jan-18	542	28	~	526	492	11	378
11-Jan-18	537	28	~	514	480	6	361
12-Jan-18	452	28	~	328	492	14	294
13-Jan-18	548	24	~	429	509	6	361
14-Jan-18	531	24	~	486	509	6	339
15-Jan-18	435	29	~	412	486	4	390
16-Jan-18	514	24	~	514	486	11	429
17-Jan-18	469	27	~	401	492	5	418
18-Jan-18	509	20	~	401	469	5	350
19-Jan-18	370	20	~	370	440	11	370
20-Jan-18	492	23	~	428	486	8	388
21-Jan-18	695	23	~	324	469	~	405
22-Jan-18	481	23	~	446	504	15	475
23-Jan-18	492	23	~	481	446	9	440
24-Jan-18	307	25	~	220	457	6	359
25-Jan-18	440	23	~	307	457	11	324
26-Jan-18	417	25	~	411	452	6	336
27-Jan-18	504	23	~	440	452	5	359
28-Jan-18	394	20	~	370	376	8	363
29-Jan-18	405	20	~	359	411	5	347
30-Jan-18	527	11	~	428	423	5	336
31-Jan-18	365	23	~	330	423	8	318
AVG.	**498**	**24**	**#DIV/0!**	**429**	**468**	**9**	**364**
MIN.	**307**	**11**	**0**	**220**	**376**	**4**	**289**
MAX.	**695**	**36**	**0**	**562**	**509**	**20**	**475**

Analysis Report of FETP streams.

TSS REPORT FOR THE MONTH OF JAN - 2018

DATE	TSS RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Jan-18	406	128	~	382	121	142	182
2-Jan-18	365	150	~	289	122	153	135
3-Jan-18	356	103	~	315	112	149	114
4-Jan-18	326	96	~	387	124	128	160
5-Jan-18	250	60	~	204	89	124	77
6-Jan-18	320	134	~	353	90	194	122
7-Jan-18	321	117	~	459	104	83	101
8-Jan-18	323	113	~	263	121	139	166
9-Jan-18	302	113	~	409	115	128	151
10-Jan-18	209	127	~	237	102	230	96
11-Jan-18	534	109	~	245	84	143	98
12-Jan-18	342	119	~	246	141	183	132
13-Jan-18	251	82	~	334	88	235	133
14-Jan-18	326	115	~	332	104	105	88
15-Jan-18	286	112	~	145	84	110	106
16-Jan-18	300	82	~	399	127	136	133
17-Jan-18	374	78	~	342	114	150	168
18-Jan-18	355	116	~	329	120	117	145
19-Jan-18	221	134	~	286	129	119	123
20-Jan-18	330	83	~	255	88	113	84
21-Jan-18	297	77	~	263	95	~	82
22-Jan-18	387	113	~	352	117	67	125
23-Jan-18	380	131	~	312	114	127	121
24-Jan-18	443	120	~	270	116	137	155
25-Jan-18	423	97	~	283	116	84	111
26-Jan-18	262	133	~	242	111	152	105
27-Jan-18	371	117	~	353	102	141	170
28-Jan-18	379	103	~	361	122	169	142
29-Jan-18	375	75	~	362	94	91	128
30-Jan-18	479	100	~	460	92	61	169
31-Jan-18	459	128	~	412	112	94	92
AVG.	**347**	**109**	**#DIV/0!**	**319**	**109**	**133**	**126**
MIN.	**209**	**60**	**0**	**145**	**84**	**61**	**77**
MAX.	**534**	**150**	**0**	**460**	**141**	**235**	**182**

Analysis Report of FETP streams.

TDS REPORT FOR THE MONTH OF JAN. - 2018

DATE	TDS RESULTS						BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	JHA DIRE.	OUTLET
1-Jan-18	11880	10900	~	11600	11010	9020	9990
2-Jan-18	12340	13100	~	12450	11850	9650	10780
3-Jan-18	12730	10320	~	12020	11950	10900	12690
4-Jan-18	13100	8760	~	12310	12270	9760	11100
5-Jan-18	13500	9020	~	11930	12060	6990	11650
6-Jan-18	11940	9040	~	11380	11840	9430	11200
7-Jan-18	12860	11320	~	12550	12210	10140	11370
8-Jan-18	12700	10640	~	12430	12460	9850	11610
9-Jan-18	13100	10090	~	12310	12420	10060	11660
10-Jan-18	13300	11470	~	13200	12800	10600	11740
11-Jan-18	13000	11010	~	12280	12360	9970	11590
12-Jan-18	11310	9170	~	11170	11740	9760	11150
13-Jan-18	12510	10500	~	11340	12460	9860	11520
14-Jan-18	12870	9500	~	11910	12180	9960	11260
15-Jan-18	12770	10510	~	12330	12340	12270	11860
16-Jan-18	11030	9580	~	11110	11790	9080	11210
17-Jan-18	11830	9120	~	11010	12250	9830	11690
18-Jan-18	12500	10300	~	11490	12820	9030	12000
19-Jan-18	12250	11170	~	12030	12610	8490	11880
20-Jan-18	11880	8930	~	11480	12580	7270	11780
21-Jan-18	12500	9940	~	11830	12540	~	12400
22-Jan-18	13100	11620	~	12490	13100	6890	13100
23-Jan-18	11630	11400	~	11520	12180	8670	11510
24-Jan-18	11060	10980	~	10490	12380	8790	11510
25-Jan-18	12180	12070	~	12160	12680	8760	11770
26-Jan-18	12180	10950	~	12000	12570	8810	11870
27-Jan-18	13200	11080	~	12750	12630	9370	11630
28-Jan-18	12550	11040	~	12140	12340	9900	11520
29-Jan-18	12960	12520	~	12900	12770	10380	11920
30-Jan-18	13100	11230	~	12750	12470	8840	11350
31-Jan-18	11680	11610	~	11650	11970	8710	10730
AVG.	**12437**	**10609**	**#DIV/0!**	**11968**	**12311**	**9368**	**11582**
MIN.	**11030**	**8760**	**0**	**10490**	**11010**	**6890**	**9990**
MAX.	**13500**	**13100**	**0**	**13200**	**13100**	**12270**	**13100**

Analysis Report of FETP streams.

FLOW REPORT FOR THE MONTH OF FEB. - 2018

DATE	FLOW MLD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Feb-18	26.10	6.00	0.00	32.10	27.10	7.56	34.66
2-Feb-18	25.80	5.00	0.00	30.80	28.00	9.15	37.15
3-Feb-18	22.60	6.00	0.00	28.60	29.80	9.15	38.95
4-Feb-18	24.10	5.00	0.00	29.10	28.80	8.44	37.24
5-Feb-18	25.10	4.00	0.00	29.10	27.10	7.67	34.77
6-Feb-18	28.00	6.00	0.00	34.00	27.00	8.82	35.82
7-Feb-18	25.20	5.00	0.00	30.20	28.80	7.30	36.10
8-Feb-18	24.90	5.00	0.00	29.90	30.40	8.29	38.69
9-Feb-18	26.10	5.00	0.00	31.10	30.90	6.68	37.58
10-Feb-18	26.50	4.00	0.00	30.50	30.20	3.85	34.05
11-Feb-18	26.20	6.00	0.00	32.20	30.70	0.00	30.70
12-Feb-18	27.60	5.00	0.00	32.60	31.00	11.20	42.20
13-Feb-18	26.50	5.00	0.00	31.50	31.40	2.27	33.67
14-Feb-18	27.30	6.00	0.00	33.30	30.90	0.00	30.90
15-Feb-18	26.80	3.00	0.00	29.80	29.50	0.00	29.50
16-Feb-18	27.70	4.00	0.00	31.70	28.70	0.00	28.70
17-Feb-18	29.10	6.00	0.00	35.10	30.50	10.60	41.10
18-Feb-18	30.50	5.00	0.00	35.50	32.00	3.94	35.94
19-Feb-18	28.70	3.00	0.00	31.70	32.90	0.00	32.90
20-Feb-18	28.50	6.00	0.00	34.50	32.90	5.89	38.79
21-Feb-18	26.90	4.00	0.00	30.90	33.30	11.34	44.64
22-Feb-18	22.30	5.00	0.00	27.30	31.00	12.98	43.98
23-Feb-18	26.60	6.00	0.00	32.60	27.20	13.63	40.83
24-Feb-18	25.40	6.00	0.00	31.40	28.30	13.54	41.84
25-Feb-18	29.00	4.00	0.00	33.00	32.20	13.25	45.45
26-Feb-18	28.70	6.00	0.00	34.70	32.40	12.60	45.00
27-Feb-18	28.20	6.00	0.00	34.20	33.10	12.26	45.36
28-Feb-18	28.00	6.00	0.00	34.00	32.70	12.58	45.28
AVG.	**26.73**	**5.11**	**0.00**	**31.84**	**30.31**	**7.61**	**37.92**
MIN.	**22.30**	**3.00**	**0.00**	**27.30**	**27.00**	**0.00**	**28.70**
MAX.	**30.50**	**6.00**	**0.00**	**35.50**	**33.30**	**13.63**	**45.45**

Analysis Report of FETP streams.

pH REPORT FOR THE MONTH OF FEB. - 2018

DATE	pH RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Feb-18	8.11	7.74	~	8.18	7.82	7.20	7.84
2-Feb-18	7.60	7.65	~	7.90	7.89	7.35	7.82
3-Feb-18	7.88	7.70	~	8.29	7.84	7.12	7.92
4-Feb-18	7.91	7.78	~	7.88	7.83	7.22	7.92
5-Feb-18	7.86	7.72	~	7.40	7.80	7.36	7.78
6-Feb-18	7.36	7.83	~	7.73	7.83	7.41	7.86
7-Feb-18	8.09	7.82	~	8.22	7.87	7.31	7.87
8-Feb-18	7.69	7.78	~	8.15	7.85	7.44	7.86
9-Feb-18	7.84	7.68	~	8.27	7.86	7.56	7.87
10-Feb-18	7.84	7.69	~	7.94	7.80	7.48	7.89
11-Feb-18	8.38	7.68	~	8.23	7.80	7.64	7.83
12-Feb-18	8.34	7.83	~	8.26	7.88	~	7.92
13-Feb-18	7.33	7.71	~	7.40	7.80	7.47	7.83
14-Feb-18	8.08	7.76	~	8.10	7.90	7.82	7.88
15-Feb-18	7.83	7.61	~	8.37	8.87	~	7.80
16-Feb-18	7.54	7.65	~	7.85	7.92	~	7.81
17-Feb-18	8.36	7.85	~	8.39	7.88	~	8.05
18-Feb-18	7.97	7.84	~	8.33	7.89	7.66	7.97
19-Feb-18	8.11	7.80	~	8.16	7.89	7.64	7.83
20-Feb-18	8.39	7.75	~	8.39	7.78	~	7.85
21-Feb-18	7.85	7.80	~	8.15	7.80	7.67	7.84
22-Feb-18	8.16	7.78	~	8.23	7.81	7.62	7.89
23-Feb-18	8.10	7.65	~	8.09	7.84	7.56	7.93
24-Feb-18	8.11	7.70	~	8.11	7.87	7.60	7.84
25-Feb-18	8.19	7.72	~	8.24	7.89	7.46	7.94
26-Feb-18	7.90	7.80	~	7.90	7.89	7.17	7.81
27-Feb-18	7.99	7.64	~	7.94	7.85	7.11	7.91
28-Feb-18	8.10	7.70	~	8.16	7.92	7.48	7.94
AVG.	**7.96**	**7.74**	**#DIV/0!**	**8.08**	**7.89**	**7.45**	**7.88**
MIN.	**7.33**	**7.61**	**0.00**	**7.40**	**7.78**	**7.11**	**7.78**
MAX.	**8.39**	**7.85**	**0.00**	**8.39**	**8.87**	**7.82**	**8.05**

Analysis Report of FETP streams.

COD REPORT FOR THE MONTH OF FEB. - 2018

DATE	COD RESULTS						BPS
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET	JHA DIRE.	OUTLET
1-Feb-18	2480	480	~	2280	944	672	784
2-Feb-18	1960	416	~	1920	864	144	688
3-Feb-18	2530	465	~	2369	947	803	706
4-Feb-18	2440	448	~	2040	880	416	704
5-Feb-18	2505	465	~	1911	851	192	787
6-Feb-18	2200	464	~	2120	768	192	672
7-Feb-18	2377	497	~	2184	738	497	642
8-Feb-18	2432	448	~	1808	752	80	576
9-Feb-18	2168	465	~	1911	738	208	642
10-Feb-18	2048	432	~	1792	736	144	576
11-Feb-18	2432	416	~	2336	752	144	608
12-Feb-18	2496	384	~	2304	816	~	720
13-Feb-18	2441	497	~	2329	899	192	787
14-Feb-18	2361	449	~	2088	931	128	674
15-Feb-18	2586	497	~	2265	867	~	867
16-Feb-18	2720	448	~	2512	864	~	832
17-Feb-18	2265	385	~	1927	835	~	771
18-Feb-18	2368	416	~	2272	912	176	816
19-Feb-18	2682	369	~	2570	867	112	674
20-Feb-18	2272	496	~	2048	928	~	896
21-Feb-18	2313	369	~	2200	883	128	851
22-Feb-18	2112	432	~	1808	928	80	784
23-Feb-18	2425	417	~	2281	899	128	722
24-Feb-18	3104	464	~	2784	928	160	672
25-Feb-18	2680	368	~	2480	896	192	608
26-Feb-18	2320	400	~	1840	896	240	624
27-Feb-18	2272	448	~	2144	928	160	624
28-Feb-18	1872	304	~	1744	864	192	688
AVG.	**2388**	**434**	**#DIV/0!**	**2152**	**861**	**234**	**714**
MIN.	**1872**	**304**	**0**	**1744**	**736**	**80**	**576**
MAX.	**3104**	**497**	**0**	**2784**	**947**	**803**	**896**

Analysis Report of FETP streams.

BOD REPORT FOR THE MONTH OF FEB. - 2018

DATE	BOD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Feb-18	810	36	~	750	84	36	72
2-Feb-18	870	42	~	690	78	36	66
3-Feb-18	900	48	~	750	78	198	66
4-Feb-18	870	42	~	660	78	234	66
5-Feb-18	540	42	~	510	66	12	54
6-Feb-18	840	18	~	600	60	372	48
7-Feb-18	900	36	~	750	72	168	54
8-Feb-18	810	42	~	600	60	12	42
9-Feb-18	690	30	~	630	66	18	54
10-Feb-18	780	42	~	660	60	192	42
11-Feb-18	810	42	~	660	66	18	54
12-Feb-18	840	42	~	660	30	30	24
13-Feb-18	810	42	~	600	30	18	18
14-Feb-18	990	30	~	945	48	24	42
15-Feb-18	795	30	~	645	54	~	36
16-Feb-18	885	24	~	765	93	15	51
17-Feb-18	885	24	~	780	132	12	48
18-Feb-18	705	30	~	600	96	~	84
19-Feb-18	1005	12	~	780	108	~	78
20-Feb-18	750	18	~	645	90	~	42
21-Feb-18	795	12	~	645	66	12	54
22-Feb-18	945	36	~	900	102	30	60
23-Feb-18	705	12	~	600	84	~	48
24-Feb-18	705	18	~	540	78	12	60
25-Feb-18	630	12	~	480	60	12	42
26-Feb-18	855	48	~	570	84	12	72
27-Feb-18	1170	60	~	660	102	18	60
28-Feb-18	675	24	~	615	78	12	42
AVG.	**820**	**32**	**#DIV/0!**	**668**	**75**	**65**	**53**
MIN.	**540**	**12**	**0**	**480**	**30**	**12**	**18**
MAX.	**1170**	**60**	**0**	**945**	**132**	**372**	**84**

Analysis Report of FETP streams.

NH3-N REPORT FOR THE MONTH OF FEB. - 2018

DATE	NH3-N RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	Outlet	DIRE.	OUTLET
1-Feb-18	318	23	~	278	423	6	336
2-Feb-18	208	16	~	185	428	BDL	295
3-Feb-18	220	18	~	202	411	BDL	324
4-Feb-18	255	20	~	220	394	5	324
5-Feb-18	173	27	~	144	324	4	301
6-Feb-18	202	23	~	179	295	5	284
7-Feb-18	376	25	~	347	289	6	260
8-Feb-18	370	23	~	255	278	5	202
9-Feb-18	388	25	~	237	255	6	208
10-Feb-18	359	23	~	318	255	6	202
11-Feb-18	542	22	~	480	260	11	209
12-Feb-18	509	20	~	441	299	~	214
13-Feb-18	514	22	~	486	339	11	265
14-Feb-18	412	24	~	384	361	11	243
15-Feb-18	769	24	~	537	316	~	350
16-Feb-18	401	23	~	384	333	~	328
17-Feb-18	401	27	~	373	378	~	328
18-Feb-18	565	24	~	469	384	11	361
19-Feb-18	407	23	~	322	333	10	322
20-Feb-18	514	27	~	463	441	~	418
21-Feb-18	452	29	~	429	458	11	441
22-Feb-18	429	29	~	384	463	11	378
23-Feb-18	548	27	~	469	452	11	339
24-Feb-18	497	31	~	418	452	6	328
25-Feb-18	328	29	~	288	452	11	316
26-Feb-18	350	30	~	294	458	6	328
27-Feb-18	401	24	~	339	418	5	316
28-Feb-18	254	22	~	237	401	11	328
AVG.	**399**	**24**	**#DIV/0!**	**342**	**370**	**8**	**305**
MIN.	**173**	**16**	**0**	**144**	**255**	**4**	**202**
MAX.	**769**	**31**	**0**	**537**	**463**	**11**	**441**

Analysis Report of FETP streams.

TSS REPORT FOR THE MONTH OF FEB - 2018

DATE	TSS RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	Outlet	DIRE.	OUTLET
1-Feb-18	366	123	~	298	111	144	109
2-Feb-18	287	126	~	252	104	120	122
3-Feb-18	426	101	~	202	112	144	92
4-Feb-18	271	67	~	236	106	115	83
5-Feb-18	493	90	~	274	77	158	106
6-Feb-18	396	102	~	426	133	123	115
7-Feb-18	504	165	~	490	83	187	97
8-Feb-18	322	127	~	329	96	114	88
9-Feb-18	283	84	~	273	66	91	62
10-Feb-18	163	117	~	197	78	119	79
11-Feb-18	257	122	~	374	102	88	100
12-Feb-18	384	96	~	409	68	~	81
13-Feb-18	310	102	~	321	101	106	92
14-Feb-18	351	114	~	370	102	97	141
15-Feb-18	264	112	~	308	129	~	149
16-Feb-18	375	101	~	364	91	~	154
17-Feb-18	275	114	~	381	103	~	93
18-Feb-18	269	90	~	471	115	77	100
19-Feb-18	252	133	~	383	127	87	118
20-Feb-18	378	85	~	334	129	~	101
21-Feb-18	237	80	~	393	123	86	105
22-Feb-18	358	94	~	241	98	85	87
23-Feb-18	306	117	~	433	80	49	78
24-Feb-18	396	79	~	468	102	84	160
25-Feb-18	342	89	~	393	90	98	146
26-Feb-18	383	91	~	219	112	99	119
27-Feb-18	297	90	~	400	117	117	152
28-Feb-18	210	88	~	373	87	81	110
AVG.	**327**	**104**	**#DIV/0!**	**343**	**102**	**107**	**109**
MIN.	**163**	**67**	**0**	**197**	**66**	**49**	**62**
MAX.	**504**	**165**	**0**	**490**	**133**	**187**	**160**

Analysis Report of FETP streams.

TDS REPORT FOR THE MONTH OF FEB. - 2018

DATE	TDS RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	Outlet	DIRE.	OUTLET
1-Feb-18	12830	11000	~	12430	12690	8470	11440
2-Feb-18	11070	11610	~	11080	12480	9950	11680
3-Feb-18	12070	11200	~	11480	12680	10310	11910
4-Feb-18	12470	10220	~	11810	12530	9620	11510
5-Feb-18	11560	10170	~	11010	12260	9250	11270
6-Feb-18	10620	9520	~	11000	11810	9430	11420
7-Feb-18	11980	10960	~	11950	12270	9380	11780
8-Feb-18	11130	10110	~	10120	11490	9430	11000
9-Feb-18	11790	10740	~	11190	11380	7950	10870
10-Feb-18	12080	12720	~	12240	12310	8600	11690
11-Feb-18	12870	13000	~	13300	12500	9580	11900
12-Feb-18	13400	11260	~	12840	12500	~	12000
13-Feb-18	12780	9880	~	12440	12110	8110	11170
14-Feb-18	12230	11760	~	12210	12450	6900	11520
15-Feb-18	13200	11190	~	12000	11760	~	11500
16-Feb-18	12540	11870	~	12860	12780	~	10500
17-Feb-18	12350	9480	~	11480	13040	~	12650
18-Feb-18	12740	9490	~	12210	12950	8130	12800
19-Feb-18	12550	9680	~	12100	12950	8580	11630
20-Feb-18	11650	10610	~	11420	12000	~	12450
21-Feb-18	12380	9220	~	12030	12670	7850	12900
22-Feb-18	12100	11600	~	12450	12380	8350	11770
23-Feb-18	12850	13200	~	13100	12670	9320	11170
24-Feb-18	12970	12200	~	12590	12550	9800	10850
25-Feb-18	12520	10750	~	12470	12550	10440	10860
26-Feb-18	11640	10340	~	11460	12550	12560	11310
27-Feb-18	11740	13400	~	12000	12460	10400	11300
28-Feb-18	11600	11610	~	11690	12640	10230	11840
AVG.	**12204**	**11028**	**#DIV/0!**	**11963**	**12408**	**9245**	**11596**
MIN.	**10620**	**9220**	**0**	**10120**	**11380**	**6900**	**10500**
MAX.	**13400**	**13400**	**0**	**13300**	**13040**	**12560**	**12900**

Analysis Report of FETP streams.

FLOW REPORT FOR THE MONTH OF MAR. - 2018

DATE	FLOW MLD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Mar-18	27.80	6.00	0.00	33.80	32.30	10.79	43.09
2-Mar-18	21.90	8.00	0.00	29.90	32.60	8.60	41.20
3-Mar-18	20.70	4.00	0.00	24.70	28.80	9.51	38.31
4-Mar-18	25.00	7.00	0.00	32.00	25.70	10.67	36.37
5-Mar-18	29.30	7.00	0.00	36.30	26.50	9.93	36.43
6-Mar-18	27.90	5.00	0.00	32.90	31.60	9.82	41.42
7-Mar-18	26.60	5.00	0.00	31.60	31.70	8.78	40.48
8-Mar-18	27.50	5.00	0.00	32.50	31.90	11.38	43.28
9-Mar-18	24.80	5.00	0.00	29.80	31.40	9.94	41.34
10-Mar-18	26.80	5.00	0.00	31.80	29.60	10.24	39.84
11-Mar-18	28.30	5.00	0.00	33.30	28.40	10.35	38.75
12-Mar-18	27.30	5.00	0.00	32.30	28.60	9.30	37.90
13-Mar-18	27.90	5.00	0.00	32.90	28.50	9.12	37.62
14-Mar-18	23.50	4.00	0.00	27.50	28.10	9.54	37.64
15-Mar-18	24.90	6.00	0.00	30.90	29.60	9.91	39.51
16-Mar-18	26.20	4.00	0.00	30.20	28.50	11.32	39.82
17-Mar-18	24.20	6.00	0.00	30.20	28.60	10.24	38.84
18-Mar-18	26.80	4.00	0.00	30.80	27.40	9.92	37.32
19-Mar-18	25.60	6.00	0.00	31.60	26.90	9.79	36.69
20-Mar-18	22.90	5.00	0.00	27.90	27.30	8.52	35.82
21-Mar-18	27.10	4.00	0.00	31.10	27.30	9.39	36.69
22-Mar-18	25.40	5.00	0.00	30.40	27.60	8.99	36.59
23-Mar-18	27.60	4.00	0.00	31.60	28.00	9.78	37.78
24-Mar-18	27.10	5.00	0.00	32.10	29.40	8.68	38.08
25-Mar-18	26.50	6.00	0.00	32.50	30.20	9.71	39.91
26-Mar-18	25.70	4.00	0.00	29.70	30.40	8.29	38.69
27-Mar-18	26.90	5.00	0.00	31.90	31.30	8.46	39.76
28-Mar-18	24.90	4.00	0.00	28.90	31.20	7.63	38.83
29-Mar-18	28.10	5.00	0.00	33.10	28.20	11.59	39.79
30-Mar-18	25.30	5.00	0.00	30.30	28.10	9.40	37.50
31-Mar-18	26.00	6.00	0.00	32.00	29.80	9.75	39.55
AVG.	**26.02**	**5.16**	**0.00**	**31.18**	**29.21**	**9.66**	**38.87**
MIN.	**20.70**	**4.00**	**0.00**	**24.70**	**25.70**	**7.63**	**35.82**
MAX.	**29.30**	**8.00**	**0.00**	**36.30**	**32.60**	**11.59**	**43.28**

Analysis Report of FETP streams.

pH REPORT FOR THE MONTH OF MAR. - 2018

DATE	pH RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Mar-18	8.12	7.75	~	8.06	7.84	7.55	7.81
2-Mar-18	8.00	7.68	~	8.12	7.86	7.40	7.80
3-Mar-18	7.51	7.70	~	8.07	7.71	7.28	7.68
4-Mar-18	7.77	7.69	~	7.86	7.78	7.37	7.85
5-Mar-18	8.10	7.58	~	8.23	7.62	7.33	7.64
6-Mar-18	8.08	7.61	~	7.98	7.62	7.29	7.72
7-Mar-18	7.73	7.52	~	8.05	7.60	7.29	7.54
8-Mar-18	7.90	7.64	~	7.87	7.61	7.40	7.61
9-Mar-18	8.21	7.70	~	8.05	7.52	7.23	7.66
10-Mar-18	8.10	7.73	~	7.99	7.52	7.30	7.58
11-Mar-18	7.92	7.76	~	7.94	7.53	7.27	7.61
12-Mar-18	7.32	7.82	~	7.55	7.44	7.41	7.60
13-Mar-18	8.07	7.81	~	8.14	7.54	7.37	7.64
14-Mar-18	6.74	7.86	~	6.89	7.29	7.33	7.48
15-Mar-18	6.85	7.63	~	7.11	7.31	7.26	7.60
16-Mar-18	7.12	7.70	~	7.44	7.37	7.37	7.62
17-Mar-18	7.20	7.81	~	7.57	7.34	7.24	7.51
18-Mar-18	8.01	7.98	~	8.14	7.75	7.48	7.73
19-Mar-18	7.80	7.95	~	7.87	7.50	7.47	7.72
20-Mar-18	7.85	8.04	~	8.01	7.38	7.23	7.44
21-Mar-18	7.81	7.84	~	7.90	7.46	7.41	7.47
22-Mar-18	8.07	7.85	~	8.11	7.40	7.44	7.48
23-Mar-18	7.89	7.74	~	7.90	7.41	7.70	7.60
24-Mar-18	7.73	7.64	~	7.88	7.29	7.31	7.33
25-Mar-18	8.02	7.74	~	8.16	7.33	7.31	7.53
26-Mar-18	7.45	7.53	~	7.72	7.12	7.29	7.33
27-Mar-18	7.53	7.38	~	7.88	7.11	7.10	7.30
28-Mar-18	7.18	7.67	~	7.54	7.22	7.37	7.35
29-Mar-18	7.70	7.64	~	7.90	7.20	7.30	7.22
30-Mar-18	7.94	7.71	~	8.03	7.20	7.39	7.40
31-Mar-18	7.49	7.72	~	7.86	7.34	7.34	7.27
AVG.	**7.72**	**7.72**	**#DIV/0!**	**7.87**	**7.46**	**7.35**	**7.55**
MIN.	**6.74**	**7.38**	**0.00**	**6.89**	**7.11**	**7.10**	**7.22**
MAX.	**8.21**	**8.04**	**0.00**	**8.23**	**7.86**	**7.70**	**7.85**

Analysis Report of FETP streams.

COD REPORT FOR THE MONTH OF MAR. - 2018

DATE	COD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Mar-18	1984	384	~	1968	896	128	720
2-Mar-18	1808	320	~	1792	912	192	720
3-Mar-18	2354	451	~	1774	822	225	741
4-Mar-18	2064	464	~	1856	848	400	624
5-Mar-18	1847	433	~	1558	738	240	578
6-Mar-18	2240	496	~	2096	768	160	544
7-Mar-18	2024	706	~	1975	738	257	594
8-Mar-18	1840	512	~	1968	784	800	624
9-Mar-18	1693	451	~	1854	725	193	564
10-Mar-18	1440	496	~	1728	768	160	544
11-Mar-18	1856	448	~	1712	800	160	656
12-Mar-18	2048	464	~	1888	784	160	640
13-Mar-18	2120	481	~	2008	738	176	642
14-Mar-18	2152	481	~	1959	706	385	514
15-Mar-18	2008	514	~	1911	690	385	530
16-Mar-18	1696	448	~	1536	720	144	480
17-Mar-18	1863	465	~	1606	722	192	658
18-Mar-18	2000	416	~	1856	640	128	544
19-Mar-18	2499	387	~	2628	628	209	499
20-Mar-18	1848	478	~	1673	637	366	557
21-Mar-18	1686	385	~	1654	610	176	417
22-Mar-18	1590	449	~	1526	594	176	433
23-Mar-18	1296	336	~	1168	576	112	384
24-Mar-18	1408	384	~	1296	576	160	464
25-Mar-18	1440	480	~	1424	624	368	432
26-Mar-18	1792	528	~	1568	544	176	432
27-Mar-18	1808	480	~	1776	624	256	384
28-Mar-18	1450	462	~	1322	509	223	414
29-Mar-18	1606	401	~	1429	481	192	417
30-Mar-18	1536	336	~	1520	464	160	416
31-Mar-18	1760	416	~	1760	448	560	400
AVG.	**1831**	**450**	**#DIV/0!**	**1735**	**681**	**246**	**534**
MIN.	**1296**	**320**	**0**	**1168**	**448**	**112**	**384**
MAX.	**2499**	**706**	**0**	**2628**	**912**	**800**	**741**

Analysis Report of FETP streams.

BOD REPORT FOR THE MONTH OF MAR. - 2018

DATE	BOD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Mar-18	600	48	~	570	84	42	60
2-Mar-18	660	36	~	510	72	30	48
3-Mar-18	675	36	~	480	72	12	48
4-Mar-18	645	36	~	525	72	12	48
5-Mar-18	600	12	~	450	60	6	48
6-Mar-18	690	42	~	405	66	24	48
7-Mar-18	555	30	~	435	60	84	48
8-Mar-18	405	30	~	375	54	30	42
9-Mar-18	660	60	~	480	66	18	48
10-Mar-18	735	186	~	540	66	90	30
11-Mar-18	540	54	~	465	60	288	42
12-Mar-18	450	24	~	495	54	30	36
13-Mar-18	525	24	~	495	54	18	36
14-Mar-18	435	18	~	405	60	18	48
15-Mar-18	675	24	~	570	42	24	30
16-Mar-18	630	24	~	540	48	18	36
17-Mar-18	750	54	~	540	60	54	42
18-Mar-18	690	42	~	585	48	114	36
19-Mar-18	525	18	~	420	42	18	30
20-Mar-18	510	18	~	420	48	24	36
21-Mar-18	645	24	~	555	54	18	42
22-Mar-18	645	24	~	690	42	30	36
23-Mar-18	525	24	~	420	36	96	30
24-Mar-18	615	24	~	510	30	42	24
25-Mar-18	525	48	~	465	42	18	36
26-Mar-18	405	42	~	345	36	12	18
27-Mar-18	510	30	~	330	36	18	24
28-Mar-18	420	12	~	390	30	66	24
29-Mar-18	525	36	~	405	30	12	18
30-Mar-18	585	18	~	465	30	114	18
31-Mar-18	405	60	~	225	24	18	18
AVG.	**573**	**37**	**#DIV/0!**	**468**	**51**	**45**	**36**
MIN.	**405**	**12**	**0**	**225**	**24**	**6**	**18**
MAX.	**750**	**186**	**0**	**690**	**84**	**288**	**60**

Analysis Report of FETP streams.

NH3-N REPORT FOR THE MONTH OF MAR. - 2018

DATE	NH3-N RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	Outlet	DIRE.	OUTLET
1-Mar-18	305	25	~	305	411	9	317
2-Mar-18	241	23	~	335	376	11	276
3-Mar-18	505	23	~	417	364	11	276
4-Mar-18	511	24	~	364	323	14	270
5-Mar-18	376	27	~	288	311	12	270
6-Mar-18	599	30	~	308	299	8	235
7-Mar-18	446	32	~	329	270	11	217
8-Mar-18	211	28	~	241	299	19	241
9-Mar-18	258	25	~	223	299	11	223
10-Mar-18	147	30	~	105	235	11	235
11-Mar-18	188	22	~	176	270	11	235
12-Mar-18	164	22	~	141	252	8	217
13-Mar-18	217	17	~	188	235	15	205
14-Mar-18	182	28	~	176	188	15	176
15-Mar-18	164	25	~	141	182	15	176
16-Mar-18	205	23	~	105	164	11	152
17-Mar-18	108	19	~	94	152	9	117
18-Mar-18	117	19	~	105	141	11	117
19-Mar-18	147	21	~	117	152	11	105
20-Mar-18	123	23	~	94	99	12	88
21-Mar-18	123	11	~	117	99	7	76
22-Mar-18	117	23	~	111	97	11	88
23-Mar-18	108	12	~	99	88	18	70
24-Mar-18	117	18	~	111	88	11	58
25-Mar-18	141	19	~	129	82	12	70
26-Mar-18	117	22	~	99	64	9	58
27-Mar-18	126	22	~	126	71	14	71
28-Mar-18	99	20	~	88	66	12	60
29-Mar-18	110	22	~	99	66	13	60
30-Mar-18	124	17	~	104	60	12	49
31-Mar-18	121	26	~	113	49	18	55
AVG.	**210**	**23**	**#DIV/0!**	**176**	**189**	**12**	**157**
MIN.	**99**	**11**	**0**	**88**	**49**	**7**	**49**
MAX.	**599**	**32**	**0**	**417**	**411**	**19**	**317**

Analysis Report of FETP streams.

TSS REPORT FOR THE MONTH OF MAR - 2018

DATE	TSS RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	Outlet	DIRE.	OUTLET
1-Mar-18	249	154	~	461	122	103	151
2-Mar-18	116	126	~	369	76	59	175
3-Mar-18	118	102	~	276	98	66	157
4-Mar-18	139	156	~	316	90	68	72
5-Mar-18	256	187	~	390	90	80	95
6-Mar-18	125	102	~	377	65	50	74
7-Mar-18	123	94	~	302	71	80	68
8-Mar-18	212	113	~	307	65	114	70
9-Mar-18	209	83	~	360	72	68	51
10-Mar-18	226	110	~	333	68	67	57
11-Mar-18	247	109	~	244	97	62	97
12-Mar-18	240	122	~	270	61	92	59
13-Mar-18	282	173	~	283	96	78	82
14-Mar-18	172	84	~	257	83	50	80
15-Mar-18	196	128	~	252	97	57	72
16-Mar-18	182	86	~	222	102	52	69
17-Mar-18	234	80	~	229	99	121	153
18-Mar-18	254	97	~	310	67	66	87
19-Mar-18	261	159	~	357	90	77	103
20-Mar-18	167	95	~	210	103	82	121
21-Mar-18	265	102	~	299	90	89	124
22-Mar-18	288	121	~	256	106	82	101
23-Mar-18	221	90	~	208	50	42	41
24-Mar-18	214	137	~	239	55	59	63
25-Mar-18	158	61	~	216	61	72	62
26-Mar-18	161	112	~	247	59	92	77
27-Mar-18	219	103	~	332	60	84	71
28-Mar-18	360	104	~	536	86	94	73
29-Mar-18	239	102	~	353	94	83	81
30-Mar-18	208	114	~	298	55	70	122
31-Mar-18	280	117	~	343	86	92	72
AVG.	**214**	**114**	**#DIV/0!**	**305**	**81**	**76**	**90**
MIN.	**116**	**61**	**0**	**208**	**50**	**42**	**41**
MAX.	**360**	**187**	**0**	**536**	**122**	**121**	**175**

Analysis Report of FETP streams.

TDS REPORT FOR THE MONTH OF MAR. - 2018

DATE	TDS RESULTS					JHA	BPS
	ANK.	PANOLI	JHAGADIA	INLET	Outlet	DIRE.	OUTLET
1-Mar-18	11110	10720	~	10820	12320	9990	11900
2-Mar-18	9890	11160	~	11750	12290	8590	11570
3-Mar-18	12920	8910	~	10520	11740	8720	11000
4-Mar-18	13300	9830	~	11570	11870	7740	11490
5-Mar-18	9590	9800	~	10440	11370	7970	10540
6-Mar-18	12740	11110	~	11690	11550	7610	10410
7-Mar-18	11780	11160	~	11540	11220	7600	10580
8-Mar-18	9850	11760	~	10770	11310	8820	10270
9-Mar-18	10380	11950	~	10900	11210	9590	10260
10-Mar-18	9620	11310	~	10260	10970	9210	10010
11-Mar-18	10440	12160	~	10560	10960	8870	10020
12-Mar-18	10240	11250	~	10240	10910	8780	10400
13-Mar-18	10480	13100	~	10760	10880	7740	10290
14-Mar-18	10080	11300	~	10130	10550	7810	9990
15-Mar-18	9420	11720	~	9840	10410	8490	9820
16-Mar-18	11340	12820	~	11490	11140	9220	10450
17-Mar-18	10910	9910	~	10740	11020	8360	10120
18-Mar-18	10790	10940	~	10860	11550	8570	10750
19-Mar-18	11080	11520	~	11630	10910	8380	10190
20-Mar-18	10670	9610	~	10470	11130	9850	10330
21-Mar-18	11160	10280	~	11120	11310	9910	10470
22-Mar-18	10640	14100	~	11290	11180	7880	10330
23-Mar-18	10160	13900	~	10880	11070	9000	10410
24-Mar-18	10460	14200	~	10890	10940	8110	10490
25-Mar-18	10490	14700	~	11100	11090	9470	10650
26-Mar-18	10360	12770	~	11040	10910	8600	9850
27-Mar-18	10760	13900	~	11690	10860	9260	10230
28-Mar-18	10140	10120	~	9940	10660	8860	9850
29-Mar-18	9760	11630	~	9990	10740	7830	9920
30-Mar-18	9700	12280	~	10590	10850	8560	9810
31-Mar-18	10210	11710	~	10420	10230	8380	9850
AVG.	**10660**	**11665**	**#DIV/0!**	**10836**	**11134**	**8638**	**10395**
MIN.	**9420**	**8910**	**0**	**9840**	**10230**	**7600**	**9810**
MAX.	**13300**	**14700**	**0**	**11750**	**12320**	**9990**	**11900**

Analysis Report of FETP streams.

FLOW REPORT FOR THE MONTH OF APR. - 2018

DATE	FLOW MLD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Apr-18	26.20	4.00	0.00	30.20	30.60	8.52	39.12
2-Apr-18	23.10	5.00	0.00	28.10	29.40	10.00	39.40
3-Apr-18	23.50	5.00	0.00	28.50	27.10	10.39	37.49
4-Apr-18	20.50	5.00	0.00	25.50	26.80	10.93	37.73
5-Apr-18	24.00	5.00	0.00	29.00	16.40	9.77	26.17
6-Apr-18	23.80	4.00	0.00	27.80	19.90	8.90	28.80
7-Apr-18	24.30	6.00	0.00	30.30	27.50	10.09	37.59
8-Apr-18	25.80	6.00	0.00	31.80	30.20	9.41	39.61
9-Apr-18	26.30	4.00	0.00	30.30	30.90	10.47	41.37
10-Apr-18	24.20	5.00	0.00	29.20	30.70	9.67	40.37
11-Apr-18	22.80	7.00	0.00	29.80	30.70	9.63	40.33
12-Apr-18	22.80	5.00	0.00	27.80	30.70	9.15	39.85
13-Apr-18	19.90	6.00	0.00	25.90	28.40	9.47	37.87
14-Apr-18	21.80	5.00	0.00	26.80	23.50	8.76	32.26
15-Apr-18	21.30	5.00	0.00	26.30	26.40	10.32	36.72
16-Apr-18	24.50	5.00	0.00	29.50	25.70	10.40	36.10
17-Apr-18	24.80	5.00	0.00	29.80	27.40	9.63	37.03
18-Apr-18	26.40	5.00	0.00	31.40	27.50	8.97	36.47
19-Apr-18	22.80	5.00	0.00	27.80	27.20	10.72	37.92
20-Apr-18	24.90	5.00	0.00	29.90	27.60	9.16	36.76
21-Apr-18	22.80	5.00	0.00	27.80	29.80	9.44	39.24
22-Apr-18	22.00	7.00	0.00	29.00	27.90	10.41	38.31
23-Apr-18	22.70	4.00	0.00	26.70	26.20	9.16	35.36
24-Apr-18	23.60	6.00	0.00	29.60	25.90	8.46	34.36
25-Apr-18	24.80	5.00	0.00	29.80	25.60	10.28	35.88
26-Apr-18	25.50	5.00	0.00	30.50	27.90	11.32	39.22
27-Apr-18	24.80	5.00	0.00	29.80	27.90	9.44	37.34
28-Apr-18	23.20	5.00	0.00	28.20	28.20	10.89	39.09
29-Apr-18	21.70	7.00	0.00	28.70	28.50	10.88	39.38
30-Apr-18	24.60	6.00	0.00	30.60	27.00	9.25	36.25
AVG.	**23.65**	**5.23**	**0.00**	**28.88**	**27.32**	**9.80**	**37.11**
MIN.	**19.90**	**4.00**	**0.00**	**25.5**	**16.40**	**8.46**	**26.17**
MAX.	**26.40**	**7.00**	**0.00**	**31.8**	**30.90**	**11.32**	**41.37**

Analysis Report of FETP streams.

pH REPORT FOR THE MONTH OF APR. - 2018

DATE	pH RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Apr-18	7.37	7.88	~	7.37	7.13	7.70	7.40
2-Apr-18	7.54	7.71	~	8.09	8.24	7.29	7.31
3-Apr-18	6.89	7.70	~	8.03	7.19	7.32	7.20
4-Apr-18	7.83	7.71	~	7.65	7.10	7.22	7.25
5-Apr-18	8.30	7.83	~	8.25	7.19	7.50	7.47
6-Apr-18	7.73	7.73	~	8.14	7.27	7.20	7.27
7-Apr-18	7.53	7.65	~	7.90	7.04	7.35	7.37
8-Apr-18	7.73	7.80	~	7.85	7.29	7.50	7.43
9-Apr-18	7.55	7.52	~	7.93	7.29	7.47	7.07
10-Apr-18	7.54	7.56	~	7.80	7.12	7.36	7.22
11-Apr-18	7.97	7.50	~	8.12	7.05	7.02	7.15
12-Apr-18	8.00	7.68	~	8.12	7.06	7.33	7.28
13-Apr-18	7.86	7.62	~	7.99	7.15	7.16	7.00
14-Apr-18	7.60	7.41	~	8.11	7.10	7.34	7.50
15-Apr-18	7.39	7.52	~	7.45	7.04	7.42	7.21
16-Apr-18	7.60	7.33	~	7.67	6.90	7.24	7.07
17-Apr-18	7.84	7.66	~	8.07	7.20	7.38	7.29
18-Apr-18	8.25	7.65	~	8.37	7.06	7.43	7.22
19-Apr-18	7.71	7.67	~	8.01	7.08	7.50	7.06
20-Apr-18	7.40	7.69	~	6.71	7.15	7.36	7.35
21-Apr-18	8.04	7.77	~	8.14	7.60	7.31	7.36
22-Apr-18	5.41	7.75	~	7.15	7.00	7.31	7.25
23-Apr-18	6.65	7.70	~	7.23	7.18	7.47	7.45
24-Apr-18	7.97	7.70	~	8.14	7.20	7.58	7.12
25-Apr-18	7.08	7.62	~	8.01	7.23	7.35	7.14
26-Apr-18	7.73	7.70	~	8.13	7.22	7.40	7.34
27-Apr-18	7.90	7.52	~	8.38	7.27	7.19	7.13
28-Apr-18	7.39	7.74	~	7.89	7.21	7.37	7.38
29-Apr-18	7.71	7.70	~	7.81	7.22	7.42	7.41
30-Apr-18	7.94	7.38	~	7.93	6.70	7.34	6.97
AVG.	**7.58**	**7.65**	**#DIV/0!**	**7.88**	**7.18**	**7.36**	**7.26**
MIN.	**5.41**	**7.33**	**0.00**	**6.71**	**6.70**	**7.02**	**6.97**
MAX.	**8.30**	**7.88**	**0.00**	**8.38**	**8.24**	**7.70**	**7.50**

Analysis Report of FETP streams.

COD REPORT FOR THE MONTH OF APR. - 2018

DATE	COD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Apr-18	1561	450	~	1306	462	385	318
2-Apr-18	1493	497	~	1493	433	224	385
3-Apr-18	1584	544	~	1344	432	160	320
4-Apr-18	1269	433	~	1252	417	160	353
5-Apr-18	2624	480	~	1632	480	208	304
6-Apr-18	1728	432	~	1712	496	176	368
7-Apr-18	1504	400	~	1296	432	176	352
8-Apr-18	1526	433	~	1333	417	96	369
9-Apr-18	1912	605	~	1561	446	143	382
10-Apr-18	1429	674	~	1381	465	144	385
11-Apr-18	1248	608	~	1216	416	112	352
12-Apr-18	1840	544	~	1152	400	96	352
13-Apr-18	1476	555	~	1650	476	190	349
14-Apr-18	1888	512	~	1632	448	160	352
15-Apr-18	1666	571	~	1555	507	888	349
16-Apr-18	1718	530	~	1654	457	329	377
17-Apr-18	1536	416	~	1408	496	200	384
18-Apr-18	1412	444	~	1364	492	261	420
19-Apr-18	1253	444	~	984	460	555	365
20-Apr-18	1381	401	~	1076	457	481	361
21-Apr-18	1488	464	~	1376	456	208	384
22-Apr-18	2096	368	~	1632	416	272	336
23-Apr-18	1648	368	~	1520	424	168	392
24-Apr-18	1808	448	~	1392	448	176	368
25-Apr-18	1296	352	~	1216	432	184	376
26-Apr-18	1317	385	~	1108	473	216	361
27-Apr-18	1312	400	~	976	480	280	464
28-Apr-18	1204	385	~	1028	433	168	345
29-Apr-18	1216	352	~	1040	440	240	384
30-Apr-18	1440	384	~	1264	456	192	368
AVG.	**1562**	**463**	**#DIV/0!**	**1352**	**452**	**242**	**366**
MIN.	**1204**	**352**	**0**	**976**	**400**	**96**	**304**
MAX.	**2624**	**674**	**0**	**1712**	**507**	**888**	**464**

Analysis Report of FETP streams.

BOD REPORT FOR THE MONTH OF APR. - 2018

DATE	BOD RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	OUTLET		
1-Apr-18	630	72	~	495	24	18	24
2-Apr-18	510	12	~	480	24	36	18
3-Apr-18	585	48	~	570	24	186	18
4-Apr-18	510	30	~	405	24	78	18
5-Apr-18	465	30	~	420	24	6	12
6-Apr-18	390	24	~	390	18	18	18
7-Apr-18	360	36	~	255	18	12	12
8-Apr-18	855	66	~	540	24	18	18
9-Apr-18	525	12	~	495	18	12	12
10-Apr-18	405	18	~	330	24	24	18
11-Apr-18	360	12	~	255	18	12	18
12-Apr-18	480	72	~	330	24	24	18
13-Apr-18	405	132	~	345	30	30	24
14-Apr-18	405	111	~	390	12	9	9
15-Apr-18	555	105	~	330	21	9	15
16-Apr-18	435	111	~	450	15	18	12
17-Apr-18	555	54	~	435	18	15	15
18-Apr-18	540	114	~	390	18	174	15
19-Apr-18	510	63	~	375	18	102	15
20-Apr-18	435	24	~	360	18	33	9
21-Apr-18	390	93	~	375	21	78	39
22-Apr-18	315	48	~	195	18	210	52
23-Apr-18	435	30	~	210	18	174	13
24-Apr-18	435	33	~	390	19	60	18
25-Apr-18	615	33	~	570	18	84	16
26-Apr-18	525	36	~	480	18	18	16
27-Apr-18	495	27	~	345	15	12	12
28-Apr-18	360	72	~	210	13	21	10
29-Apr-18	345	27	~	225	19	36	12
30-Apr-18	405	18	~	240	18	78	16
AVG.	**475**	**52**	**#DIV/0!**	**376**	**20**	**54**	**17**
MIN.	**315**	**12**	**0**	**195**	**12**	**6**	**9**
MAX.	**855**	**132**	**0**	**570**	**30**	**210**	**52**

Analysis Report of FETP streams.

NH3-N REPORT FOR THE MONTH OF APR. - 2018

DATE	NH3-N RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	Outlet		
1-Apr-18	110	17	~	99	55	14	49
2-Apr-18	137	29	~	115	44	18	38
3-Apr-18	121	44	~	104	46	8	38
4-Apr-18	99	27	~	88	44	5	38
5-Apr-18	121	28	~	121	49	8	35
6-Apr-18	93	27	~	85	35	7	30
7-Apr-18	132	31	~	113	38	7	30
8-Apr-18	93	27	~	82	38	11	30
9-Apr-18	140	25	~	132	38	8	30
10-Apr-18	129	30	~	113	35	7	27
11-Apr-18	99	31	~	90	38	7	33
12-Apr-18	147	29	~	111	36	5	48
13-Apr-18	103	31	~	102	40	12	33
14-Apr-18	102	30	~	90	39	13	34
15-Apr-18	108	28	~	93	36	22	30
16-Apr-18	119	25	~	103	38	19	34
17-Apr-18	76	25	~	76	38	19	34
18-Apr-18	108	27	~	97	38	18	30
19-Apr-18	104	29	~	61	37	22	34
20-Apr-18	97	30	~	78	37	22	35
21-Apr-18	155	33	~	108	34	22	33
22-Apr-18	184	25	~	137	34	17	33
23-Apr-18	118	24	~	108	30	14	29
24-Apr-18	189	22	~	121	35	11	27
25-Apr-18	95	22	~	60	44	11	29
26-Apr-18	110	22	~	94	51	12	37
27-Apr-18	108	22	~	83	55	11	44
28-Apr-18	101	24	~	83	51	8	45
29-Apr-18	129	28	~	97	49	16	48
30-Apr-18	156	24	~	132	44	14	38
AVG.	**119**	**27**	**#DIV/0!**	**99**	**41**	**13**	**35**
MIN.	**76**	**17**	**0**	**60**	**30**	**5**	**27**
MAX.	**189**	**44**	**0**	**137**	**55**	**22**	**49**

Analysis Report of FETP streams.

TSS REPORT FOR THE MONTH OF APR - 2018

DATE	TSS RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	Outlet		
1-Apr-18	250	102	~	307	95	68	88
2-Apr-18	216	127	~	322	97	100	83
3-Apr-18	230	130	~	317	114	82	88
4-Apr-18	287	139	~	331	109	112	97
5-Apr-18	365	111	~	448	80	73	72
6-Apr-18	215	98	~	328	61	83	91
7-Apr-18	281	89	~	382	82	150	81
8-Apr-18	257	61	~	241	103	99	111
9-Apr-18	452	95	~	387	92	94	106
10-Apr-18	289	161	~	368	98	80	90
11-Apr-18	225	157	~	404	79	74	114
12-Apr-18	260	95	~	180	72	77	71
13-Apr-18	339	92	~	440	60	42	53
14-Apr-18	507	123	~	452	120	93	114
15-Apr-18	196	67	~	439	99	70	72
16-Apr-18	263	90	~	287	79	59	80
17-Apr-18	229	43	~	267	94	69	77
18-Apr-18	183	70	~	361	98	56	66
19-Apr-18	225	82	~	292	90	71	68
20-Apr-18	256	63	~	203	59	55	93
21-Apr-18	187	63	~	232	76	47	82
22-Apr-18	290	88	~	274	63	51	88
23-Apr-18	186	41	~	269	59	62	59
24-Apr-18	178	76	~	258	71	74	75
25-Apr-18	196	81	~	225	53	79	67
26-Apr-18	230	72	~	184	78	73	91
27-Apr-18	200	74	~	325	75	71	95
28-Apr-18	375	66	~	452	54	53	64
29-Apr-18	136	63	~	121	51	71	54
30-Apr-18	269	95	~	329	69	82	57
AVG.	**259**	**90**	**#DIV/0!**	**314**	**81**	**76**	**82**
MIN.	**136**	**41**	**0**	**121**	**51**	**42**	**53**
MAX.	**507**	**161**	**0**	**452**	**120**	**150**	**114**

Analysis Report of FETP streams.

TDS REPORT FOR THE MONTH OF APR. - 2018

DATE	TDS RESULTS					JHA DIRE.	BPS OUTLET
	ANK.	PANOLI	JHAGADIA	INLET	Outlet		
1-Apr-18	9920	11540	~	9890	9780	8030	9560
2-Apr-18	9460	12420	~	11090	10390	9430	9820
3-Apr-18	10440	12950	~	10560	9960	8920	9590
4-Apr-18	8760	11260	~	9570	9450	8000	8900
5-Apr-18	11020	12690	~	11630	10310	10050	9790
6-Apr-18	9620	11580	~	9970	10130	9700	9680
7-Apr-18	9510	12300	~	9960	10020	10370	9870
8-Apr-18	9680	11740	~	10040	10010	9690	9610
9-Apr-18	9410	10880	~	9770	10000	8880	9690
10-Apr-18	9410	10190	~	9590	10070	8480	9860
11-Apr-18	9710	11830	~	10070	10040	8330	10070
12-Apr-18	9270	11760	~	9700	9820	8180	9760
13-Apr-18	9360	10750	~	10000	9680	8690	9560
14-Apr-18	9060	10140	~	9430	9570	8100	9200
15-Apr-18	9780	11390	~	10040	9670	7840	9300
16-Apr-18	9300	15800	~	9770	9550	7600	9900
17-Apr-18	8430	12330	~	9225	9370	8110	9100
18-Apr-18	11390	12000	~	11650	10410	7980	9440
19-Apr-18	9330	12350	~	9820	10050	7440	9530
20-Apr-18	10120	12560	~	9380	9950	7860	9570
21-Apr-18	11680	11660	~	9970	9870	8350	9530
22-Apr-18	13100	11910	~	10950	9880	8600	9300
23-Apr-18	12390	12600	~	11440	9890	8640	9140
24-Apr-18	11310	12210	~	10300	9750	8430	9160
25-Apr-18	9900	11310	~	9070	9970	8170	9460
26-Apr-18	9450	10340	~	9010	9920	9710	9530
27-Apr-18	10000	11870	~	8860	10250	8950	8900
28-Apr-18	10420	10740	~	9930	10500	9720	9850
29-Apr-18	11310	10650	~	10470	10570	8650	9910
30-Apr-18	10910	12210	~	11570	10420	9310	10000
AVG.	**10115**	**11799**	**#DIV/0!**	**10091**	**9975**	**8674**	**9553**
MIN.	**8430**	**10140**	**0**	**8860**	**9370**	**7440**	**8900**
MAX.	**13100**	**15800**	**0**	**11650**	**10570**	**10370**	**10070**

ANNEXURE – 5

Plot allotment from GIDC

GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION
(A GOVT. OF GUJARAT UNDERTAKING)
Administrative Office Building,
Plot No.624/B, GIDC, Ankleshwar, Dist. Bharuch
Phone: 02646-221351,221451,221403

No. GIDC/RM/ANK/ 53 **RPAD** Date: 05 /01 /2018

To ,
Chief Officer
Notified Area Authority
Plot No.618-619,
GIDC Ankleshwar.

Sub: Handing over possession of **Plot No. Unplanned land near STP(Excluding forest land)** at **Ankleshwar** Industrial Estate

Dear Sir,

We thank you for having returned to u 4 (Four) copies of agreement duly executed. We return herewith one copy duly executed for your record. We are also pleased to inform you that is now possible for us to hand over the possession of **Plot No. Unplanned land near STP(Excluding forest land)** area admeasuring **30,000** sq.mtrs.(Tent.) In our at **Ankleshwar** Industrial Estate. For this purpose, you are requested to contact **DEE, GIDC Ankleshwar** on any working day.

We had already sent you a sketch map of your Plot along with relevant section of the detailed development plan/drawing of the shed design. Kindly bring the same with you when you come for taking over the possession within the period of 20 days from the date of this letter. If there are any deficiencies or missing fixture in the plot, please incorporate the same in possession receipt while taking the possession from our estate officer. Any complaint not incorporated in the possession receipt will not be entertained in future.

Further you may note that in care where there are no genuine reasons no extension will be given under any circumstances. The Plot is allotted on "As it is where it is condition"

Thanking You

Yours faithfully

Regional Manager
GIDC, Ankleshwar

Copy to:

1. The Executive Engineer, GIDC, Ankleshwar
2. The Sr. Account Officer, GIDC, Ankleshwar
3. The Deputy Executive Engineer, GIDC, Ankleshwar

The Cosmos Co-Op Bank Ltd
Ravi Kiran Complex, Near GIDC Bus Stand,
Ankleshwar-393002
GUJSOSIAU RAVI 155 12007

भारत 172041 DEC 20 2017 15:13

Rs.00001[illegible]

INDIA STAMP DUTY GUJARAT

Please affix Special Adhesive stamp of Rs. 100-00 (Special Adhesive Stamp-Gujarat)

FORM OF AGREEMENT

(FOR PLOT)

(As per regulation 8 of the Land Regulation.....Ankleshwar.....Industrial Area)

AN AGREEMENT made at .....this.....
day of.....January.....of the year Two thousand.....Eighteen.....
between the GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION (A Corporation constituted under the Gujarat Industrial Development Act. 1962) and having its Head office at Udbyog Bhavan, Block No. 4, Gandhinagar (hereinafter called "the Licensor" which expression shall unless the context does not so admit reffered to as it includes its successors and assigns) of the one part and Shri.....
M/s.....Chief officer Notified Area Ank.....
residing at.....Ankleshwar.....
.....
a firm/company/society registered at.....Ankleshwar.....
and having its registered office at .....Plot No 618-619.....
.....GIDC NAO office Ankleshwar.....
(hereinafter called 'the Licensee' which expression shall unles the context does not so admit, includes his heirs, executors, administrators and assigns / its successors in Business and assigns) of the other part WHEREAS the Licensor is seized and prossessed of the land described in the schedule hereunder written (hereinafter referred to as the said land) AND WHEREAS the Licensee has applied to the Licensor to allot the said land to the Licensee for* .....C.E.T.P.....AND WHEREAS THE Licensor has agreed to grant to the Licensee for the aforesaid purpose a Licence in the first instance in respect of the said land on the terms and conditions hereinafter appearing. AND WHEREAS the parties hereto are desirous of recording the terms of Licence in writting.

State the purpose

Chief Officer
Notified Area Office
G.I.D.C., Ankleshwar

For ANKLESHWAR WASTE MANAGEMENT LTD.
MANAGING DIRECTOR
HARESH G. PATEL
DIN: 07690897

Now it is hereby agreed and declared between the parties follow :

1. On the Licensee paying amount of Rs. 52,47,000/- Fifty Two Lakes Fourty Seven Thousand/- such amount being on amount equi to 15% perecent of the price of the said land which is calculated at Rs. 2160/- (50% Concession) per sq metre and the licensor will permit the Licensee to enter upon the said and for the purpose and the terms and condition hereinafter appearing

2. in addition to the amount of Rs. 52,47,000/- mentioned above. the Licensee agrees to pay the Licensor the balance amount of Rs. 20,73,360/- Twenty Nine Lakes Seventy Three Thousand Three Hundred with interest at the rate of.....within a period of .....years commencing from.....in the following manner.

(a) A sum of Rs.....equal to.....of the price will be paid before allotment Which is paid by you.
(b) Balalance amount of Rs.....equal to.....% will be rapid within a period of 2/4/8 years from the date of allotment in 8/16/32 Quarterly Instalments, Each Quartely Instalment of Capital will be of Rs.....and the interest Instalment of Rs.....to be paid quartely on reducing reducing balance Rs.....to be paid quartely on reducing balance
(I) The first quartely Instalment will be paid on or before the 10th date of the month.....
(ii) The Second quartely Instalment will be paid on or before the 10th date of the month.....
(iii) The Third quartely Instalment will be paid on or before the 10th date of the month.....
(iv) The Forth quartely Instalment will be paid on or before the 10th date of the month.....

(C) Panel Interest @ 3% over the normal rate of interest would be charged on the amount in default The interest rate would be subject to the revision from time to time at the description of the Corporation and interest would be payable at such revised rate from such date as may be specified by the Corporation from time to time The interest liability will start from the date o agreement or after one month of the date of allotment whichever is earlier of allotment,

(d) The Licence further agrees that he / she will pay the service charges. Nonagricultural assessment and leaser rent regularly, as may be detarmined by the licensor, on failing to pay the above dues to the corporation the Licencee will pay interest on outstanding dues of SC, NAA & LR at the rate as may be specified by the corporation from time to time.

You/The Licensee / The Lessee shall not start production activity in the allotted plot/shed unless and until it has effectively and completed with the pollution control measurer required to be undertaken by you / The Licensee / The Leassee / The Leassee under any perimssion which may have bean granted by the G.P.C.B. and if you / the Licensee / The Leassee without complying with the pollution measure start or continue with their industrial activity you / the Licensor / The Leaser shall be duty bound to disconnect electricly supply and water supply of the Licensee unit even without prior notice.

Chief Officer
Notified Area Office
G.I.D.C., Ankleshwar

For ANKLESHWAR WASTE MANAGEMENT LTD.

MANAGING DIRECTOR
HARESH G. PATEL
DIN: 07690897

*strike off where not applicable

(* The Licensee further agreas that he will way pay to the Licensor such additional sum as may be determined by the Licensor. The additional sum shall be paid in lump-sum or in such instalment with interest at.....14%.....persent per annum as may be allowed by the Licensor) The Licensee futher agree that if any payment is delayed he shall pay penal interest at 3% above the normal rate of interest on the amount of penal interest default. Provided that if the payment as so delayed is not made within a period of two months from the date of which it was required to be made the Licensee shall be liable to be evicted under Gujarat Public Premises (eviction of unauthorised occupants) Act, 1972. During the currency of this agreement it shall be open to the Licensee to pay at any time to the Licensor in lump sum the amount of the price than due from him together with the amount of interest if any due thereon. Until the entire amount payable under this clause is paid by the Licensee to the Licensor. The licensee will in each year within two months from the expiry of his accounting year supply to the Licensor a copy of his profit and loss account pertaining to the accounting year and of the business run by him in the land.

Grant of License State the purpose

3. The Licensee shall have licence and authority only to enterupon the said land described in the schedule hereunder written for the purpose of building and executing work thereon for* .....C.E.T.....and for no other purpose whatsoever, acts otherwise than the Licensor will be entitled to terminate this Licensee and evict the Licensee without prejudice to the other rights which the Licensee may have.

4. Nothing in these present contained shall be construed as a demise in law of the said land so as to give to the Licensee any legal interest therein but the Licensee shall only have License to enterupon the said land for the purpose of performing this Agreement.

5. The Licensee hereby agrees to observe and perform the following stipulation that is to say

Submission of plans for approval

(a) That he will within three months of the date hereof submit to the Executives Engineer of the Licensor (hereinafter called the Executive Engineer) which expression shall include any other officer to whom the duties and fuctions of the said Executive Engineer may be assigned for his approval The specifications, plans elevations section and details of the factory building hereby agreed by the Licensee shall to be erected on the said land and the Licensee shall at his own cost and as offten as he may be called upon to do so ammend all or any such plans and elevation and if so required will produce the same before the Executive Engineer of the Licensor and will supply him such details as may be called for of the specifications shall be finally approved by the Executive Engineer and signed by him, the Licensee shall sign and leave with him three copies thereof and also three signed copies of any further conditions of stipulation which may be agreed upon between the Licensee and the Executive Engineer provided that the Executive Engineer shall within two months from the date of the receipt to the plans, specifications elevations and sections as aforesaid communicate to the Licensee his approval or any objection thereof.

facing during construction

(b) The said land shall be fenced during construction by the Licensee at his expense in avery respect of the boundary of said land shall be demarcated by the Licensee at his expense.

Chief Officer
Notified Area Office
G.I.D.C., Ankleshwar

For ANKLESHWAR WASTE MANAGEMENT LTD.

MANAGING DIRECTOR
HARESH G. PATEL
DIN: 07690897

No Work to commence till plans are approved

(c) No work shall be commence which infringes of the building condition and also other regulations so far as the same may be applicable to the said land until the said plans and elevations shall have been so approved as aforesaid and thereafter the Licensee shall not make any alteration or addition thereof unless such alterations, additions shall have been previously in like manner approved.

Time limit for commence-ment and completion of construction

(d) The Licensee shall, within a period of six months from the date hereof commence and within a period of two years from the said date at his own expense and in a substential and workman like manner and with all rules, bye-laws and regulations applicable thereof and in strict accordance with the plans, elevations details and specifications to the satisfaction of the Exclusive Engineer and in accordance with the building condition of Licensor build and completely finish fit for occupation a building to be used as industrial factory with all requisite drains and other convenience thereto as may be necessary under the Factories Act.

According to the policy of the Corporation, you shall put the plot to use within a period of 3 years from the date of ofter cum allotment failing which corporation is entitied to obtain the possession back of the plot.

In case of Plot you are required to get the building plans approved from Executives Engineer GIDC Ankleshwar within 3 months from the date of Physical Possession and inform this office with copy of approved plan In case of delay late approval fee at Rs. 0.50 / m2 / month shall be levied till the plans are approved

Similarly, you are required to start housing construction wothin 12 months from the date of physical Possession and inform this office Delay will be levied with late construction penalty at Rs. 0.50/m2/month till the construction starts.

Strike off area of Plots is less than 20,000 sq. mtrs.

*The area of the plot alloted to the Leassee being.....sq/mtres. It shall be premissible to him to utilise it within the period and in the manner aforesaid a part of the area for the contructution of the building to be used as an Industrial factory and to retain the remaining area of the plot for future expnsion of his project to the following conditions :

(I) The remaining area of the plot shall be fully utilised for the expansion of this Project within a period of ten year from the date of this agreement.

(ii) It shall be opened to the Licensor to review the progress of the utilisation at the Internal of every three years and to resume the possession of utilised portion of the plot.

(iii) white utilising a part of the plot for the construction of a building as aforesaid and retaining the remaining part of the plot for future expansion the part to be utilised for the construction of the building shall be so demarcated as to make a subdivision of the remaining part feasible in the event of the Licensor deciding to resume the possession of the untillised portion of the plot.

Licensee to pay rates, taxes etc.

(e) The Licensee will pay taxes and cesses payable in respect of the said land and any building erected thereon and will also pay the charges of water description including charges for the supply of water and his share of expence of maintance of roads and other common facilities and the claims and outgoings chargeble against owner or occupier in respect of the said land and building erected thereon.

Provided that if the Licensor demands in writing that any of such payments should be made to the Licensor for remittance shall make such parments to the Licensor within the period specified by the Licensor thereof. as regards supply of water, the Licensee shall be abide by the conditions laid down in that behalf by the Corporation from time to time.

Chief Officer
Notified Area Office
G.I.D.C., Ankleshwar

For ANKLESHWAR WASTE MANAGEMENT LTD.

MANAGING DIRECTOR
HARESH G. PATEL
DIN: 07690897

* The licensee shall consume water for his unit at following rates from year to year

year	Consumption per day (in Litres)
1st year	10 KL
2nd "	15 KL
3rd "	25 KL
Onwards.....	

strike off if not applicable

Even if he fails to consume water to the extent mentioned above he shall pay the water charges fcr the quantity equal to 70% of the above mentioned quantity irrespective of consumption if demand is more than 50,000 itrs per day, the payment for minimum charge for 70% of the above agreed quantity shall commence from the date of commencement of actual consumption of water or from the date on which the utilisation peried / from the date allotment, namely two years for plot and one year for shed is over, whichever is earlier. the water charges shall be payable at the prevailing water rate of the estate for financial year as fixed by the corporation from time to time and on failure to pay the minimum charges, the lincensee shall be liable action including termination of agreement &other steps.

Indeminity

(f) The Licensee will keep the Licensor indeminified against any and all claims for damage which may be caused to any adjoining building or other premises by such building of in consequance of the execution of the aforesaid works and also against all parments whatsover which during the progress of the work may become payable or be demanded by the local authority in respect of the said work or of anything come under the authority herein contained.

Sanitation

(g) The Licencee shall obeserve and confirm to all rules, regulations and bye - laws of the Coporation and of the local authority concerned of any other sratutory regulation in any way relating to public health, efflient treatment and disposal and sanitation in force for the time being and shall provide sufficient latrina accommodation and othe sanitary arrangement for the laboures and workmen employed during the construction of the building on the said land in order to keep the said land and its sorroundings, claen and in good condition to the entire satisfaction of the Executive Engineer, and shall not without the consent in writing of the Executive Engineer permit any labourers or workmen to reside upon the land and in event of such consent being shall comply strickly with he terms thereof Failure on the part of the Licensee to comply with the provision of nay law regarding disposal of industrial effluent shall entitle the corporation to disconnect water supply to the Licensee and to resume the possession of land The Licensee shall have to take drainage connection, when intimated by the Corporation, and shall have to pay all the necessary amounts towards capital amount recovery and shall have to pay regular drainage cess as fixed by the Corporation, from time to time While taking drainage connection, the Licensee shall have to comply with all regulation contained in the "Drainage Regulations 1990 of GIDC".

(gg) The Licensee shall comply with all laws, including Acts, Rules, Regulation or oreders passed, made or issued by the Govt. of Gujarat or by the Goverment or india from time to time, relating to the business of industry carried on by the Licensee or having a bearing on the same, (The Licensee shall in particular comply with, observe and act. according to laws, on the subject of ecology and Enviorment like the water (Prevention & Control of pollution Act. 1974) the Air Prevention & Control Pollution Act. 1981, the Water Prevention & Control of Pollution) Cess Act. 1977 and the Enviorment Protection Act. 1986 The fact of the Licensor assisting the Licensee in the matter of suppling or providing

Chief Officer
Notified Area Office
G.I.D.C., Ankleshwar

For ANKLESHWAR WASTE MANAGEMENT LTD.

MANAGING DIRECTOR
HARESH G. PATEL
DIN: 07690897

amenities, facilities like water supply, sewage, electricity etc. shall not mean that the Licensee is thereby absolved from the responsibility or liability in respect of the same Similarly in respect of any or scheme, project or work undertaken by the Licensor on behalf of for the benefit of the Licensee or of the other industries of persons jointly, the Licensee shall not thereby the deemed to have been absolved from the liability under the relevent or concerned law Not shall it make the Licensor or and if its servants or agents liable for any non compliance non-observance or breach of any such law.

(ggg) The Licensee shall be fee to obtain any service, amenity or facility like water drainage, electricity etc. directly from the concerned agency like the local body electricity Board etc. In case the Licensor makes arrangements for procuring or supplying such services, etc. for the benefit of and on behalf of the Licensee separately or jointly with others, and the Licensee avails of the same. it shall not amount to a commotment on behalf of the licensor to provided the same. not shall it be constructed as hiring of or contact for supply of such service by the Licensor to the Licensor, The Licensee shall not be held the Licensor liable in case of any delay dificiency, insufficiency of failure in supply of such amenity, facility of service nor shall the Licensee be deemed to be a consumer in respect of the same within the meaning of the provision of consumer protection Act. 1986.

Excavation

(h) The Licensee will not make any excavation upon any part of the said land or remove any stone, earth or material there form except so far as may. in the opinion of the officer authorised by the Licensor be necessary for the purpose of foundation of the building and compound walls and executing the works authorised by this Agreement.

Insurance

(I) The Licensee will keep the building to be erected on the said land excluding foundation and plinth, insured n the name of the Licensee against lose or demages by fire in a sum equivelant to the cost of the building (Excluding foundation and plinth) in some well established insurance company.

Nuisance

(j) The Licensee shall not at any time do. cause or permit any nuisance in or upon the said land and in particular shall not cause or permit the said land to be used for any industry specified by the Licensor as obnoxious. The licensee shall not interfere or cause damege to the properties belonging to the Licensee whether located outside or inside the premises such as water supply lines drainage lines, water meters, street lights and such other properties, In case he is found interfering or causing damage to the properties of the Licensor it would amount to breach of the conditions of the aggrement and he would be liable to be evicted from the premises occupied by him under the provisions of the Gujarat Public Premises (Eviction of Unauthorised Occupants) Act. 1972 or any other law of the time being in force and the Licensor shall be entitled to recover the cost of making good such damages with penalty as it may determine and such amount would be recoverable as an arrears of land revenue.

Access roads power to terminate agreement

(k) The Licensee shall at his own cost contruct and mantain an access road leading from the Estate road to the said land in strict accordance with the specifications and detailed prescribed by the Executive Engineer of the Licensor.

(6) Should the Executive Engineer of the Licensor not approve the plans, elevaqtions datails and specifications whether originally submitted or subsequently required of if the same shall not be submitted within the time hirein before stipulated. the Licensor may notice in writing to the Licensor to terminate this Agreement and its possession as a Licensor has been given by the Licensor may re-enter upon the sold land and there upon the said land shall stand resumed to the Licensor. The Licensor will be allowed to remove the building materials and machinery it any of the Licensee.

Chief Officer
Notified Area Office
G.I.D.C., Ankleshwar

For ANKLESHWAR WASTE MANAGEMENT LTD.

MANAGING DIRECTOR
HARESH G. PATEL
DIN: 07690897

(7) Power of Licensor

Until the factory building and work have been completed and certified as completed in accordance with clause 9 thereof and the price is paid full or the Lease Deed is executed in accordance with clause 9 here of the Licensor shall have thefollowing rights and powers namely:

To enter and inspection

[a] The right for the Licensor and his officers and servants at all resonable time to enter upon the said land to review the state and progress of the work and for all other reasonable purposes.

[b] POWER :

(I) Inspite of the Licensor having approved the plans, If the Licensee failed to complete the said factory building within the time aforesaid and in accordance with the stipulations herein before contained (time in this respect being the essence of the contract) or shall commit default in payment of installment with interest as agreed to be paid by the Licensee to the Licensor as provided in clause 2 hereof or shall not proceed with the works with due diligence and shall fail to obeserve any of the stipulations on his part hereincontained, the Licensor shall without prejudice to the hereincontained, the remedy available under this agreement against non payment of dues payable to the Licensor have a right to forfeit the amount already paid by the Licensee and to terminate this Agreement by giving 24 hours notice and thereupon to re-enter and resume possesion of the land and accepting thereon and thereupon this Agreement shall cease and the Licensee shall be allowed to remove materials and things after the expenses and dues of the Licensor are paid.

(ii) To continute the said land in the occupation of the Licensee on payment of such fine as may be decided by the Licensor.

(iii) To direct removal or altration of any building or structure erected of used contray to the conditions of the grant within the time prescribed in that behalf and on such removal or alterations not being carried out within the time prescribed, cause the same to be carried out and recover the cost of carring out the same from the Licensee as an arrears of land revenue.

(8) Not with standing any such dafault as aforesaid, the Licensor may in his discretion give notice to the Licensee of his interntion to enforce the Licensee's agreement herein contained or may with reference to clause 5(d) fix any extended period for the completion of the factory, building & the works, If he is satisfied that the building & the works could not be completed within the prescribed tie for the reasons beyond the control of the Licensee & thereupon the obligations hereunder of the Licensee, to complete the factory, building shall be taken to refer to such extended period.

(9) For Power Supply

[a] For obtainin power supply, the concerned allotee Licensee shall have to apply to the concerned the power supply authorities in prescribed application form He is also responsible for follow-up for timely receipt of estimate & power Corporation will not be responsible for timely receipt of the estiates of power.

[b] The Licensee allotee shall have to complete the formalities of signing agreement. payment of security deposit & complete wiring of electrical installation, as per Industrial Estate rules and submit the Test Report for the electrical wiring from the Licenced Electrical Contactor before release of connection.

[c] Hign tention consumer having power demand in execess of 500 Kva and of specific requirements shall have to make separate feeder at his cost.

Chief Officer
Notified Area Office
G.I.D.C., Ankleshwar

For ANKLESHWAR WASTE MANAGEMENT LTD.

MANAGING DIRECTOR
HARESH G. PATEL
DIN: 07690897

[d] Full cost of high tension or low tension line, bothe and the cost of feeder and sending equipments, as the case may be, is to be borne by the consumer, No reimbursement or cost sharing is admissible to high tension or low tension consumer For extension of load at the future date, full cost is to be borne by the consumer.

[e] The supply viltage and source of power shall be decided by the power Supply Authority for the consumer having power demand in excess of 2400 KVA.

[f] Licensee is liable to pay for the cost of land occupied for corridor for laying electric circuit for power supply, as per the site conditions and ppervalent policy corporation.

[g] The Licensee has to pay for the cost of augmentation of sub-station on his prorata demand basis at the rate and policy prevalent in the corporation.

[h] Licensee/Purchaser cannot seek relief of defferement of payment towards the installmant for delay/Inavailability of power.

(10) Employment

The party of the second part/ the Lease shall have to filiup atleast 85% post by local persons in their industrial unit and for managerial & supervisory cadres atleast 60% posts are to be filled up by local persons, The expression local person shall mean a person domiciled in the Gujarat State for minimum 15 years shall the considred as local person.

(11) Terms of allotment

Gujarat Industrial Development corporation allotts plots / properties, on *as is where is* basis, and no compenasation for levelling/filling or the land shall be entertained. nor any request for reduction in premium price as fixed by the corporation shall any request for reduction in premium price as fixed by the corporation shall be entertained on account of levelling filling of the land.

(12) The Corporation may or may not provide Fire Fighter Service in some of the Estates as an anenity in case of non provision of any delay or non availability of fire fighter at the time of fire, the purchaser/ Licensee / Lessee will not claim any losses/ damages due to this.

(13) Grant of Lease

It the Executive Engineer of the Licensor has certified that the factory building and works have been erected in accordance with the terms thereof and it the Licesee shall have obeserved all the stipulations and conditions here in before contained the Licensor will be granted and the Licensee will accept a lease (which shall be executed by the parties in duplicate) of the said land for a term of 99 years from the date of possesion being given to the Licensee or the date of execution of the Agreement whichever is earlier, at the yearly rent as may be fixed by the Licencor from time to time.

(14) Form of Lease

The Deed of Lease shall be prepared in duplicate in accordance with the form prescribed by the Licensor and all cost. charges and expenses of and incidental to the execuation of the Agreement and its duplicate and also the execution of the Lease Deed and its duplucate shall be borne and paid by the Licensee alone 'The Deed of Lease shall be registered at a place within the State of Gujarat Where such registration is permissible under the provision of the Indian Registration Act"

(15) Notices

All notices, consents and appovals given under this Agreement shall be in writing and shll unless otherwise provided herein signed by the Chief Executive Officer or any othe officer authorised by him and any notice to be give to the Licensee shall be considered as duly served if the same shall have been delivered / to left for post or addressed to the Licensee at the usual or last known place residence or business or the said land or if the see shall have been affixed to any building or erection temporary or otherwise upon the said land.

Chief Officer
Notified Area Office
.I.D.C., Ankleshwar

For ANKLESHWAR WASTE MANAGEMENT LTD.

MANAGING DIRECTOR
HARESH G. PATEL

(16) **Licensor may alter estate rules** — The Licensor may at any time and from time alter the layout, building conditions General Estate Regulations and other conditions relating to the other parts of the Estate of the Licensor of which the said land forms part and the Licensee shall have no right to require the enforcement thereof or any of them at any time against the Licensor or any person claiming under the Licensee.

(17) **Breach of conditions** — In the event of any breach of any condition or convenant of these presents by the Licensee, the Licensor shall be entitied to terminate this Agreement by giving 24 houres notice.

(18) **Marginal Notes** — The marginal noted do not from part of this Agreement and they shall not be refered to for construction and interpretion thereof.

(19) **Exercise of rights etc. by officers, servants of Licensor** — The rights powers, etc of the Licensor and of the Executive Engineer of the Licensor, under these presents may be exercised by any officer or servant or agent of the Licensor duly authorised by him.

(20) **Conflict between agreement and regulations** — shoud there be any conflict between the terms contained in this Agreement and the terms contained in the building conditions and general estate regulations, the former shall prevail, the Licensor had issued in repect of the said land and allotment letter NO UIDY/PRM/mu/4062 dated ____________

The terms of the said allotment letter will form part of this Agreement.

(21) The Licensee / Lessee further agree that he / she will pay the service charges. non agricultural assessment and lease rent regularly as may be determined by the Licensor/Lessor on failing to pay the above dues to the corporation. the Licencee/Lessee will pay interest on outstanding dues of Service charges. Non Agricultural Assessment and Lease Rent. at the rate as may be specified by the Corporation from time to time.

(22) The Plot no................is offered / allotted to you is reallotted cases and GEB Dues/ municipal tax for the use of this properly are payable and you shall have to clear the dues of both the GEB/Municipal Corporation. You have to plant one tree per 100 sq.mts. of the plot area before approval of the plan for the allotted plot.

(23) The Corporation has established the Gujarat Cleaner Production Centre, the Center imparts technical advice for minimizing the waste at production stage resulting economic saving with reduction of pollution load in the industry.

The Licensee / Lessee should get maximum advantage from this Centre of the Corporation / The details may be obtained from Member secretary, Gujarat Clearner Production center, GIDC. Udyog Bhavan, Gandhinagar.

Chief Officer
Notified Area Office
G.I.D.C., Ankleshwar

For ANKLESHWAR WASTE MANAGEMENT LTD.

MANAGING DIRECTOR

SCHEDULE

(Description of land)

ALL THAT Piece of land known as plot No. Unallowed land No. 576 in the Ankleshwar Industrial Area / Estate consisting of revenue Survery Nos _____ within the village limits of _____ Taluka Ankleshwar Dist Bharuch containing by admeasuremet 20,000 (Twenty) sq. mtrs of there about a bounded as followed that is to say.

On or towards the North by S.T.P. Plant
On or towards the South by G.I.D.C. Guest House
On or towards the East by OLD COLONY
On or towards the West by HARIJAN

IN WITNESS WHERE OF the Licensor has caused Shri Dhaval Vasava. an officer authorised by it, to set his hand and affix the common seal hereto and the Licensee has hereinto set his hand and seal on the day year first above written.

SIGNED, SEALED AND DELIVERED

By Shri Dhaval J. Vasava.
Officer of the GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION.

REGIONAL MANAGER G.I.D.C., ANKLESHWAR
Signature _____
(Full name in block letters)

In the presence of :
1. Signature. _____ (M.V. Rathwa)
(full name in block letter)

2. Signature. _____ (R.C. Chudasama)
(full name in block letter)

SIGNED SEAL AND DELIVERED
BY the above named Licensee
in the presence of :

_____
Signature
(Full name in block letters)

1. Signature _____
(Full name in block letter)
HIMATLAL B. SHELADIA (Himatlal Sheladia)
2. Signature PATEL MAHESH KUMAR JIVANLAL _____
(Full name in block letter)

Chief Officer
Notified Area Office
G.I.D.C., Ankleshwar

Ankleshwar Waste Management Limited Plot No. 618-619 GIDC, Ankleshwar.

For ANKLESHWAR WASTE MANAGEMENT LTD.

MANAGING DIRECTOR
HARESH G. PATEL
DIN: 07690897

GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION
[A Govt.of Gujarat Undertaking]
office of the Dy.Executive Engineer,Administrative Building,
Valia Road,GIDC,Ankleshwar–393 002
Phone:(02646) 251351,Fax:(02646) 251451

NO.GIDC/DEE/ANK/ 12
Office of the Dy.Ex.Engr
GIDC, Ankleshwar
Date. 8 /1 /2018

(1) Allotment order No : GIDC/RM/ANK/ALT 4063 DT 19/12/2017
(2) Possession Advice No : GIDC/ RM/ANK/ALT 53 DT 05/01/2018
(4) Corrigendum order No : GIDC/RM/ ANK/ALT ____ DT _____
(3) Extension letter No : GIDC/ RM/ANK/ALT ____ DT _____

POSSESSION RECEIPT

In pursuance of Allotment of Ind.Plot/Comm Plot Shed Ind Plot. **No.Unplanned land near STP** Admeasuring **30,000 sq.mt.**(tentative) situated in the Housing/ Ind Phase,**GIDC industrial estate Ankleshwar** is handed over to today i.e.on. 08/**01/2017** in good condition

THIS SAID PREMISES ARE BOUNDED AS FOLLOWS

On or towards North by	S.T.P. Plant
On or towards South by	GIDC Geust House
On or towards East by	OLD Collony
On or towards West by	Naracary

POSSESSION TAKEN OVER BY
Chief office (N/A)
Sign.
Desi.
Date. 08/01/2018

POSSESSION HANDED OVER BY
Shri. K. N. Dholu
Sign.
Desi. A. A. E.
Date. 08/01/2018

Note:- (1) Infrastructure facilities like Road, W/s, Power Available/Not available

(2) GUJARAT INDUSTRIAL DEVELOPMENT CORPORATION has allotted the land/property on "AS IS WHERE IS BASIS " hence due to this, there is no changes in rates & no any question to claim of the repairing or leveling is to be burn by the allotted.

(3) Certified that boundaries and area of the above plot are physically verified in presence of undersigned party are found correct.

COPY TO,

(1) Chief offcer
Notified Area Authority
Plot No.618-619,
GIDC Ankleshwar,

(2) The R.M. GIDC / Ankleshwar
(3) A.O.R.M. GIDC / Ankleshwar
(4) The Ex. Engineer GIDC Ankleshwar
(5) Dy. Ex. Engineer (W/S) GIDC Ankleshwar

Sign. of Party

Chief Officer
N... Office
G.I.D.C., Ankleshwar

Dy.Ex.Engineer
GIDC,Ankleshwar.

(A Govt. of Gujarat Undertaking)
Commercial plot no.320/2, Asian Paints chowkdi
GIDC Ankleshwar
Dist. Bharuch. Phone: +91-02646-221351, 221451, 221403
Fax: +91-02646-251451 Email- rmank@gidcgujarat.org

No: GIDC/RM/ANK/ 1976 Date: 24-07-2018
BY R.P.A.D.

Corrigendum order

Sub : Offer-cum-allotment of land for setting up CETP for create Pre-treatment facility at Sewage Treatment plant for industrial Effluent coming from small scale unit of Ankleshwar.

Ref : 1) Offer-cum-allotment letter No.GIDC/RM/Ank/4063 dated 19-12-2017.
2) License Agreement dated 08-01-2018.
3) Possession receipt dated 08-01-2018.

Corporation has allotted unplanned land admeasuring 30,000 sq.mtrs(tentative) for setting CETP plant at Ankleshwar Industrial estate to Chief Officer Notified Area Authority & Ankleshwar Waste Management Limited vide offer cum allotment letter referred under ref.no.1 above. The said land is unplanned and number has not been given at the time of allotment.

In view of the above, it is hereby ordered to read plot no.U-5(Utility plot) in place of unplanned land wherever it has been appeared therein i.e. offer cum allotment, license agreement and possession advise,possession receipt etc. The said corrigendum order is provisional and subject to approval of Competent Authority of GIDC and incorporation of the said number in the DD plan of Ankleshwar Industrial estate.

The other contents of the offer cum allotment letter, license agreement etc remain unchanged.

Regional Manager
GIDC Ankleshwar

To
The Chief Offficer &
Ankleshwar Waste Management Ltd
Plot No.618-619, GIDC, Ankleshwar

Copy submitted with respect to :
The Hon'ble VC & MD
GIDC Udyog Bhavan Gandhinagar....for information please.

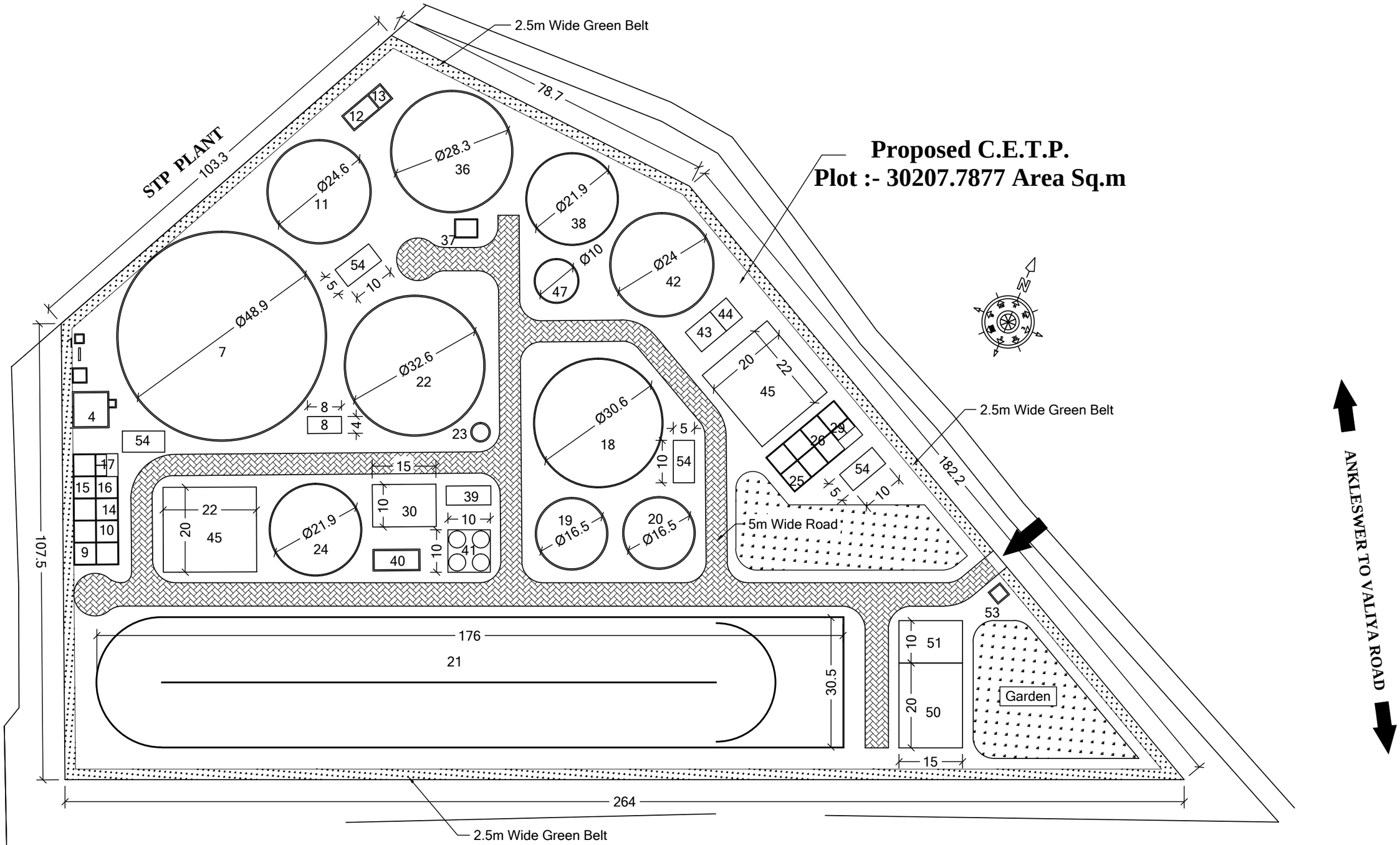
Copy fwcs to :
The Sr ATP,GIDC, Ankleshwar....the plot no.U-5 is not allotted to anyone and it is requested to incorporate the said number in the DD plan of Ankleshwar Industrial estate.

Copy to :
1)Executive Engineer GIDC Ankleshwar
2)SAO GIDC Ankleshwar

ANNEXURE – 6

Plant lay out

FILE NAME :-CEP-ANKC-001 Layout Drawing.dwg | SIZE- A3



TOTAL AREA = 30207.7877 Sq Metre
E.T.P. Area = 23364.7877 Sq Metre
Green Belt Area = 1800 Sq Metre
Garden Area = 1600 Sq Metre
Internal Road Area = 3080 Sq Metre
Adm. Bulding + Parking = 450 Sq Metre

All Dimensions Are In meter

CLIENT :- ANKLESHWAR C.E.T.P.				
TITLE :- Layout Drawing For C.E.T.P.				
DRG. NO :- CEP-ANKC-001			**REV. NO :- 0**	
DRN.BY	CHD.BY	DATE	Scale	TOTAL SHEET :- 2
Suresh		7 May 2018	N.T.S.	SHEET NO :- 1

CLEAN ENVIRO PROJECTS CONSULTANCY PVT. LTD.
9/10, 1st Floor, BDCA Shopping Center No.5,
Morarji Desai Road, VALSAD - 396 001.
Phone : (02632) 243702, 254080, Telefax : (02632) 249824.
email.- clean_2000_in@yahoo.com

Approved

DO NOT SCALE IF ANY DOUBT PLEASE ASK. CAD GENERATED DRAWING DO NOT MANUALLY UPDATE OR SCALE

DRG.NO :- | SIZE- A4

NO	Particulars	Dimension, m				Capacity m³	Qty.	MOC
		Length/Dia.	Width	Height	SWD/FB			
1	Inlet chamber	1.80	1.80	2.00	0.50	6.48	1	RCC
2	Screen channel with coarse bar & medium bar	3.00	0.45		1.00		1	RCC
3	Greet chamber	3.00	3.10	1.00	0.50	9.30	1	RCC
4	Oil & Grease chamber with FRP packing	8.00	8.00	1.85	0.50	118.40	1	RCC
5	FRP packing	4.25	4.25	1.20		21.68	1	RCC
6	Oil collection chamber	1.50	1.50	1.85	0.50	4.16	1	RCC
7	Equalization tank	48.90		4.00	0.50	7508.40	1	RCC
8	Pump room for equalization tank with roof and EOT crane	8.00	4.00	4.10	0.50	131.20	1	RCC
9	Neutralization tank with acid proof tie lining	5.00	5.00	4.00	0.50	100.00	3	RCC
10	Flash mixer	5.00	5.00	4.00	0.50	100.00	1	RCC
11	Primary clarifloculator	24.00		3.50	0.50	1582.56	1	RCC
12	Primary sludge sump	7.50	4.00	2.50	0.50	75.00	1	RCC
13	Dry sump for pump	4.00	3.50	3.60	0.50	50.40	1	RCC
14	Lime slurry preparation tank	5.00	5.00	1.25	0.50	31.25	2	RCC
15	Lime slurry feed tank	5.00	5.00	1.25	0.50	31.25	1	RCC
16	Ferrous sulphate/PAC preparation tank	5.00	5.00	1.25	0.50	31.25	2	RCC
17	Polyelectrolyte preparation tank	2.50	2.50	1.00	0.50	6.25	2	RCC
18	Bio tower with media	30.00		7.20	0.50	5086.80	1	RCC
19	Bio tower feed sump	16.50		4.00	0.50	854.87	1	RCC
20	Bio tower circulation sump	16.50		4.00	0.50	854.87	1	RCC
21	Advanced Oxidation Ditch	176.00	30.00	6.00	0.50	31680.00	1	RCC
22	Secondary Clarifier	32.60		3.50	0.50	2919.93	1	RCC
23	RAS sludge sump	4.00		4.85	0.50	60.92	1	RCC
24	Secondary treated effluent sump	21.30		3.50	0.50	1246.51	1	RCC
25	Lime slurry preparation tank	5.00	5.00	1.25	0.50	31.25	2	RCC
26	Lime slurry feed tank	5.00	5.00	1.25	0.50	31.25	1	RCC
27	Ferrous sulphate/PAC preparation tank	5.00	5.00	1.25	0.50	31.25	1	RCC
28	Polyelectrolyte preparation tank	2.50	2.50	1.00	0.50	6.25	1	RCC
29	SBS reagent tank	5.00	5.00	1.00	0.50	25.00	1	RCC
30	Chlorine shed	15.00	10.00			0.00	1	RCC
31	Static mixer for lime-hypo mixing with baffles	10.00	1.00	0.75	0.50	7.50	1	RCC
32	Hypo reaction tank	5.00	5.00	4.00	0.50	100.00	2	RCC
33	Static mixer for SBS-lime mixing with baffles	10.00	1.00	0.75	0.50	7.50	1	RCC
34	SBS reaction tank	5.00	5.00	4.00	0.50	100.00	2	RCC
35	Static mixer for lime-Ferrous mixing with baffles	10.00	1.00	0.75	0.50	7.50	1	RCC
36	Tertiary clarifloculator	28.30		3.50	0.50	2200.45	1	RCC
37	Tertiary sludge sump	5.00	4.00	3.50	0.50	70.00	1	RCC
38	Tertiary treated effluent collection sump	21.30		3.50	0.50	1246.51	1	RCC
39	Tertiary Dual media filter	4.50	10.50			47.25	2	
40	Filter back wash tank	7.00		3.00	0.50	115.40	2	RCC
41	Activated Carbon Filter	4.00		2.50		31.40	4	
42	Sludge Thickner	24.00		4.50	0.50	2034.72	1	RCC
43	Thickened sludge sump with pump house	7.60	6.00	4.50		205.20	1	RCC
44	Pump house	6.00	5.00	4.50		135.00	1	RCC
45	Filter press house	20.00	22.00				1	RCC
46	Membrane Filter press	1.50	1.50				2	
47	Dirty water leachate collection sump	10.00		1.50		117.75	1	RCC
48	Urea preparation tank					2.00	1	HDPE
49	Phosphoric acid preparation tank					2.00	1	HDPE
50	Administrative Building	15	20				1	
51	Parking							
52		12	3.5				1	
53	Watchman Cabin	3	3				1	
54	MCC Panel	10	5				4	
55								
56								
57								
58								
59								
60								

All Dimensions Are In meter

CLIENT :- ANKLESHWAR C.E.T.P.

TITLE :- Layout Drawing For C.E.T.P.

DRG. NO :- CEP-ANKC-001			REV. NO :- 0	
DRN.BY	CHD.BY	DATE	Scale	TOTAL SHEET :- 2
Suresh		7 May 2018	N.T.S.	SHEET NO :- 2

CLEAN ENVIRO PROJECTS CONSULTANCY PVT. LTD.
9/10, 1st Floor, BDCA Shopping Center No.5,
Morarji Desai Road, VALSAD - 396 001.
Phone : (02632) 243702, 254080, Telefax : (02632) 249824.
email.- clean_2000_in@yahoo.com

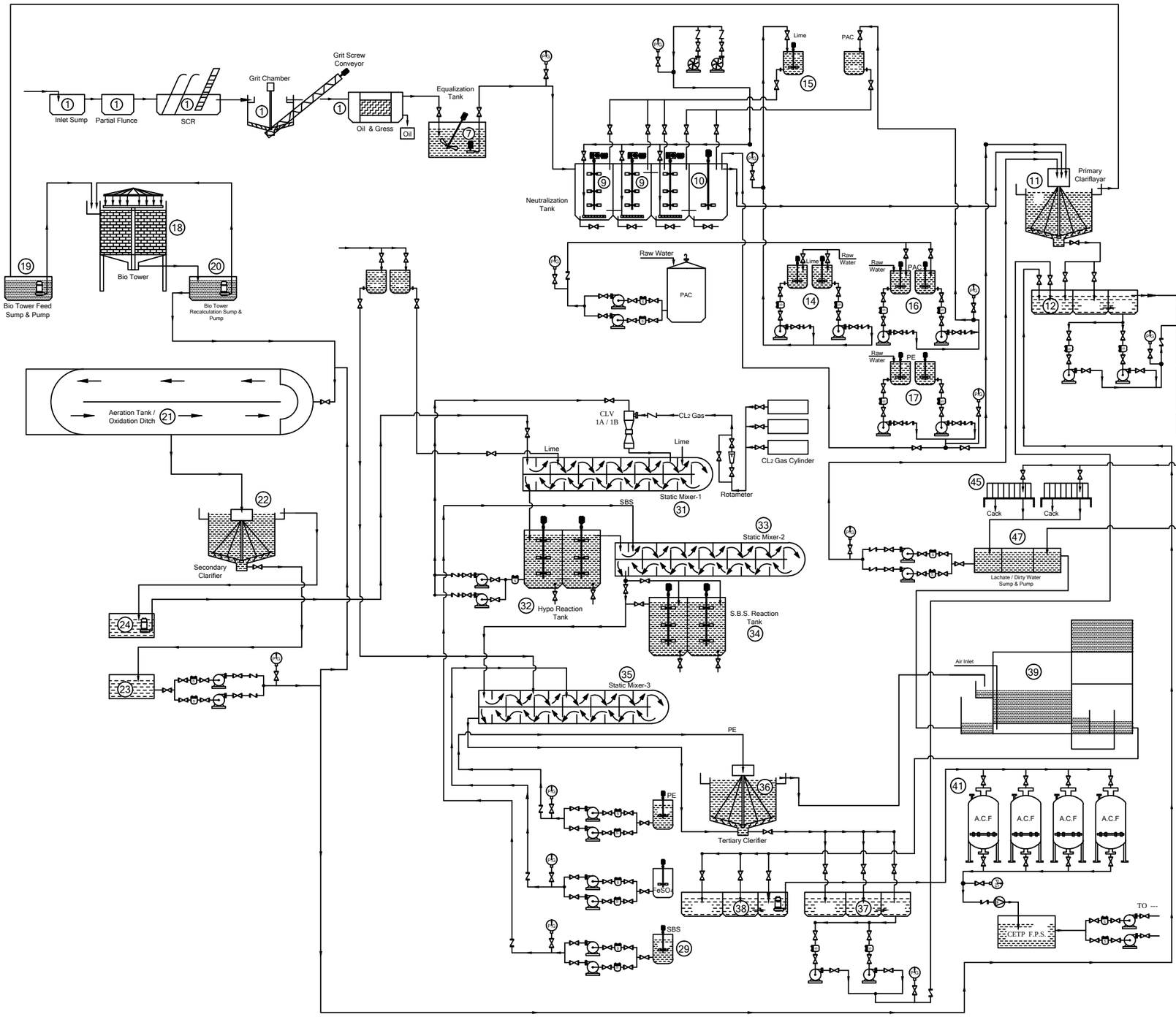
Approved

DO NOT SCALE IF ANY DOUBT PLEASE ASK. CAD GENERATED DRAWING DO NOT MANUALLY UPDATE OR SCALE

ANNEXURE – 7

Schematic flow diagram

FILE NAME :-CEP-ANKC-002 Flow Diagram.dwg | SIZE- A3



CLIENT :- ANKLESHWAR C.E.T.P.				
TITLE :- Flow Diagram				
DRG. NO :- CEP-ANKC-002			**REV. NO :- 0**	
DRN.BY	CHD.BY	DATE	Scale	TOTAL SHEET :- 2
Suresh		7 May 2018	N.T.S.	SHEET NO :- 1

CLEAN ENVIRO PROJECTS CONSULTANCY PVT. LTD.
9/10, 1st Floor, BDCA Shopping Center No.5,
Morarji Desai Road, VALSAD - 396 001.
Phone : (02632) 243702, 254080, Telefax : (02632) 249824.
email.- clean_2000_in@yahoo.com

Approved

DO NOT SCALE IF ANY DOUBT PLEASE ASK. CAD GENERATED DRAWING DO NOT MANUALLY UPDATE OR SCALE

ANNEXURE – 8

Treatability study report

Treatability Study

1.0 Introduction:

The Notified Area Authority, GIDC, Ankleshwar has proposed to set up a 10 MLD Common Effluent Treatment Plant (CETP) at GIDC, Ankleshwar, Di. Bharuch for Small Scale Industries located within GIDC, Ankleshwar. Looking to the pace of development, there is a need of Common Effluent Treatment Plant (CETP) of capacity 10 MLD. The treated effluent from the proposed 10 MLD CETP shall be sent to Narmada Clean Tech (NCT) for further treatment and final disposal into Arabian Sea through a 44 km long onshore & 10 km long offshore pipe line through scientifically designed diffuser. The proposed plant is to be designed to meet the inlet norms for FETP of NCT.

To establish the CETP, design and capacity of CETP must be required to finalize. And for the same purpose, a treatability study of effluent from various industries which is going to be treated in CETP is required to be carried out. Clean Enviro Projects Consultancy Pvt. Ltd. as a Master consultant has conducted a survey of member industries of Ankleshwar GIDC estate and carried out the Treatability study of above said effluent.

GIDC Ankleshwar consists of many types of industries as mentioned in below Table -1.

Table – 1: Nature of Industries

Sr. No.	Type of Industry	No.
1	Chemical	294
2	Dyes & Intermediates	169
3	Textiles	17
4	Pulp & Paper	4
5	Pesticides (Technical & Formulation)	46
6	Pharmaceuticals (Technical & Formulation)	85
7	Others	199
	Total	**814**

HEAD OFFICE
9/10, 1ST floor, B.D.C.A. Shopping Center No. 5, Stadium Road, VALSAD – 396 001, Gujarat, India.
Phone: (02632)243702, 254080. Telefax: (02632)249824
E-mail: clean2000in@gmail.com , clean_2000_in@yahoo.com
BRANCH OFFICE
C-5/14, 2nd floor, Vikas Chamber, Behind G.I.D.C. Office, G.I.D.C., Vapi – 396 195, Di. Valsad
Telefax: (0260) 2432883/2428335/6531788

2.0 Water consumption and effluent generation data.

Table – 2: Water consumption & effluent generation, KL/day

Sr. No.	Particular	Qty., KL/day		Remarks
		Water consumption	Effluent generation	
I	Domestic	30.0	24.0	Septic tank and CETP
II	**Industrial**			
a	Process + washing	180.0	40.0	Consumed for chemical preparation and washing and shall be treated in CETP only.
II	**Total Industrial**	**180.0**	**40.0**	
III	**Gardening**	**18.0**	**0.0**	
	Total (I+II+III)	**228.0**	**64.0**	

3.0 Sampling and preparation of sample for treatability study:

- To carry out the Treatability study of effluent, samples from various different types of industries, pumping stations are collected and made composite samples.
- This composite sample is then analyzed at laboratory and various treatments has been given to the samples to carry out the treatability of the effluent to achieve prescribed norms for inlet to FETP of NCTL.

4.0 Characteristics of Untreated Effluent:

- A complete analysis of composite sample has been carried out and the analysis results of various parameters are as shown in below Table: 3.

Table – 3: Analysis results of composite untreated sample

No.	Effluent parameters	Unit	Untreated effluent
1	pH	pH units	7.80
2	Color	Pt.Co. scale	380.00
3	Oil and grease	mg/L	15.80
4	Total dissolved solids	mg/L	19500.00
5	Suspended solids	mg/L	540.00
6	Ammonical Nitrogen (NH3-N)	mg/L	512.00
7	COD	mg/L	10800.00
8	BOD	mg/L	5126.00
9	Cr+	mg/L	2.20
10	Cr+6	mg/L	0.18
11	Cu	mg/L	3.42
12	Ni	mg/L	1.80

5.0 TREATMENT FOR COMPOSITE SAMPLE:

5.1 Physico Chemical (Primary Treatment):

- As indicated by characteristics of the untreated effluent in Table - 1, the effluent needs treatment for the removal of color, s/s, oil & grease, COD, BOD, Ammonical Nitrogen, Sulphates, Chlorides, Phosphate, metals etc.
- It was decided to give normal physico chemical treatment to the effluent followed by the secondary biological treatment under aerobic condition.
- For treatability study, 1 L of the raw effluent sample was treated with 1200 mg/lit lime, passed air for one hour at 9.5 pH for reduction in ammoniacal nitrogen, then added 50 mg/lit PAC, 500 mg/lit ferrous sulfate and 1.5 mg/lit PE, so as to obtain good settlable floccs. The clear effluent was obtained after sedimentation for about 15 minutes and the clear effluent was tested for the effectiveness of the treatment scheme.
- The results of the experiments were recorded in the below Table – 4.

Table – 4: Results after Primary treatment

No	Effluent Parameter	Unit	Combined sample	After primary treatment	Reagent
1	pH	pH units	7.80	7.60	lime
2	Color	Pt.Co. scale	380.00	210.00	
3	Oil and grease	mg/L	15.80	7.20	
4	Total dissolved solids	mg/L	19500.00	18790.00	
5	Suspended solids	mg/L	540.00	80.50	Alum, Ferrous sulfate, PE
6	Ammonical Nitrogen (NH3-N)	mg/L	512.00	342.00	
7	COD	mg/L	10800.00	5940.00	45% reduction
8	BOD	mg/L	5126.00	1860.00	
9	Cr+	mg/L	2.20	0.70	
10	Cr+6	mg/L	0.18	0.08	
11	Cu	mg/L	3.42	0.70	
12	Ni	mg/L	1.80	0.60	

- Results: Reasonably good reduction of 45 % in COD value is obtained. Other parameters also showed good reduction.
- The clear effluent sample was further treated by biological treatment under aerobic conditions after proper acclimatization and stabilization of active biomass.

- After sedimentation, the sludge was collected, filtered and dried. The results of the experiments were recorded in the below Table – 5.

Table – 5: Sludge generation

No	Dry sludge, mg/L	Dry sludge, kg/KL	Sludge slurry, m^3/KL	Sludge after filtration, kg/KL	Sludge after drying, kg/KL
1	2290	2.29	45.8	7.63	5.73

5.2 Biological Treatment under Aerobic Conditions:

- **Next 25 % sewage was added to the effluent for improving treatability and to control TDS to reasonable level.**
- Fresh biomass was prepared using cow dung slurry in the laboratory scale experiment. The biomass was acclimatized over a period of 96 hours by slowly increasing the concentration of the effluent as per the details given in the following Table - 5.
- The dissolved oxygen was maintained by operating aquarium aerator. Nutrient level was also maintained carefully at desired level.

Table – 5: Preparation of bio mass

No.	Time in hours	% effluent	MLSS	DO	Remarks
1	0	20	1900	2.1	
2	24	40	2600	2.2	
3	48	60	3400	2.0	
4	72	75	3800	1.8	
5	96	95	4200	1.9	

- Next the effluent was treated with active biomass under aerobic condition and the results were recorded in Table - 6.

- **Addition of 25 % sewage to the effluent:**

No	Effluent Parameter	Unit	After primary treatment	Sewage analysis	Combined mixed sample
1	pH	pH units	7.60	6.80	7.20
2	Color	Pt.Co. scale	210.00	240.00	230.00
3	Oil and grease	mg/L	7.20	6.80	7.20
4	Total dissolved solids	mg/L	18790.00	457.20	14168.00
5	Suspended solids	mg/L	80.50	210.40	112.00
6	Ammonical Nitrogen (NH3-N)	mg/L	342.00	24.00	262.00
7	COD	mg/L	5940.00	470.60	4572.00
8	BOD	mg/L	1860.00	211.50	1447.87

Table – 6: Analysis results after biological treatment

No.	Time in hours	Unit	COD	MLSS	DO	BOD	NH3-N	Remarks
1	0	mg/L	4572.00	4200.00	1.80	1447.87	262.00	1 mg/lit enzyme added
2	24	mg/L	3801.40	3800.00	2.00			1 mg/lit enzyme added
3	48	mg/L	1012.00	4200.00	2.10			1 mg/lit enzyme added, bacteria taken out washed and again continued
4	72	mg/L	740.00	3000.00	2.58			1 mg/lit enzyme added
5	96	mg/L	525.60	2100.00	3.00	120.20	65.00	

- Enzyme was added to the effluent whenever the biological process became sluggish.
- The aeration experiment was stopped as MLSS started decreasing and no further reduction in COD value could be achieved.
- The analysis results after Secondary biological treatment are as shown in Table – 7.

Table – 7: Analysis results after biological treatment

No	Effluent Parameter	Unit	After Secondary treatment
1	pH	pH units	7.24
2	Color	Pt.Co. scale	210.00
3	Oil and grease	mg/L	6.90
4	Total dissolved solids	mg/L	14196.20
5	Suspended solids	mg/L	75.60
6	Ammonical Nitrogen (NH3-N)	mg/L	65.00
7	COD	mg/L	525.60
8	BOD	mg/L	120.20

5.3 Tertiary Polishing Treatment:

- Looking to the analysis results of Secondary biological treatment, it is decided to give polishing tertiary treatment for the removal of any residual color, COD, Ammonical Nitrogen and other pollutants by chlorination followed by SMBS dosing, Neutralization, clarifloculation and clarification.
- Effluent sample was given treatment with sodium hypochlorite for 1 hour to achieve 2 -3 mgl residual chlorine. (chlorotex reagent)
- This excess chlorine was treated with sodium bisulfite solution till excess chloride disappeared as per chlorotex reagent.
- The effluent was further neutralized with lime, treated with PAC and flocculated with 1 mg/lit PE.
- And after clarification the treated effluent is passed through sand and finally through a column fitted with granular activated carbon. The results were recorded in the following Table - 8.

Table – 8: Analysis results after Tertiary polishing treatment

No.	Effluent Parameter	Unit	After Secondary treatment	After Chlorination and Neutralization	After first Carbon & sand filter
1	pH	pH units	7.80	7.80	7.90
2	Color	Pt.Co. scale	210.00	92.00	80.00
3	Oil and grease	mg/L	6.90	5.40	4.10
4	Total dissolved solids	mg/L	14196.20	14508.10	14515.20
5	Suspended solids	mg/L	75.60	71.54	48.42
6	Ammonical Nitrogen (NH3-N)	mg/L	65.00	36.42	35.64
7	COD	mg/L	525.60	396.80	354.10
8	BOD	mg/L	120.20	78.20	62.30

Conclusions:

1. The effluent becomes biodegradable, sometimes sluggish, enhanced with addition of enzyme, only after very careful acclimatization and stabilization of active biomass.
2. Polishing treatment reduces all the pollutants to a desirable level.

6.0 Disposal norms for treated effluent:

- The GPCB prescribed CETP disposal norms for the treated effluent are shown in below Table – 9.

Table – 9: CETP disposal norms for the treated effluent

No.	Effluent Parameter	Unit	Expected result	CETP norms
1	pH	pH units	7.9	6.5 to 8.5
2	Color	Pt.Co. scale	80	< 100
3	Oil and grease	mg/L	4.10	< 10
4	Total dissolved solids	mg/L	14000-15000	
5	Suspended solids	mg/L	70-80	< 100
6	Ammonical Nitrogen (NH3-N)	mg/L	35-45	< 75
7	COD	mg/L	400-500	< 500
8	BOD	mg/L	70-80	< 100

7.0 Characteristics of untreated and treated effluent:

- The characteristics of untreated and treated effluent are shown in below Table – 10.

Table – 10: Characteristics of untreated and treated effluent

No	Parameter	Unit	Before Treatment	After Treatment	CETP disposal norms
1	pH	pH units	7.80	7.9	6.5 to 8.5
2	Color	Pt.Co. scale	380.00	80-90	< 100
3	Oil and grease	mg/L	15.80	4 to 5	< 10
4	Total dissolved solids	mg/L	19500.00	14000-15000	
5	Suspended solids	mg/L	540.00	70-80	< 100
6	Ammonical Nitrogen (NH3-N)	mg/L	512.00	35-45	< 75
7	COD	mg/L	10800.00	400-500	< 500
8	BOD	mg/L	5126.00	70-80	< 100
9	Cr+	mg/L	2.20	0.7	< 1
10	Cr+6	mg/L	0.18	0.08	< 0.1
11	Cu	mg/L	3.42	0.7	< 1
12	Ni	mg/L	1.80	0.6	< 1

8.0 Disposal of treated effluent:

- The treated effluent meeting the FETP of NCTL norms can be safely drained into GIDC effluent drainage pipeline to NCT for further treatment and final disposal in Arabian Sea through a 44 km long onshore & 10 km long offshore pipe line through scientifically designed diffuser.

Note: Extensive trials were taken on two stage 10 lit aeration assembly to establish the treatment parameters.

Note:

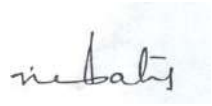
1. Sample for treatability was a composite sample of three different samples. The samples were provided by AWML.
2. Nature of sample: Heterogeneous/cocktail.
3. Sample was collected for lab study as well as pilot study.

4. Presently, this is a continuous process and final treatability report will be prepared based our detailed study, individual/Estate survey/Pilot plant and actual requirement for the project.
5. It can be concluded that the effluent is treatable with proposed above scheme. However, other advanced technology may explore for final treatment scheme considering below factors.
   - Easy operation and feasibility.
   - Cost benefit.

Date: 08.05.2018

Place: VAPI

FOR Clean Enviro Projects Consultancy Pvt Ltd.



N. C. Patel.

(Sc II Environmental auditor)

HEAD OFFICE
9/10, 1ST floor, B.D.C.A. Shopping Center No. 5, Stadium Road, VALSAD – 396 001, Gujarat, India.
Phone: (02632)243702, 254080. Telefax: (02632)249824
E-mail: clean2000in@gmail.com , clean_2000_in@yahoo.com
BRANCH OFFICE
C-5/14, 2nd floor, Vikas Chamber, Behind G.I.D.C. Office, G.I.D.C., Vapi – 396 195, Di. Valsad
Telefax: (0260) 2432883/2428335/6531788

ANNEXURE – 9

NIO reports

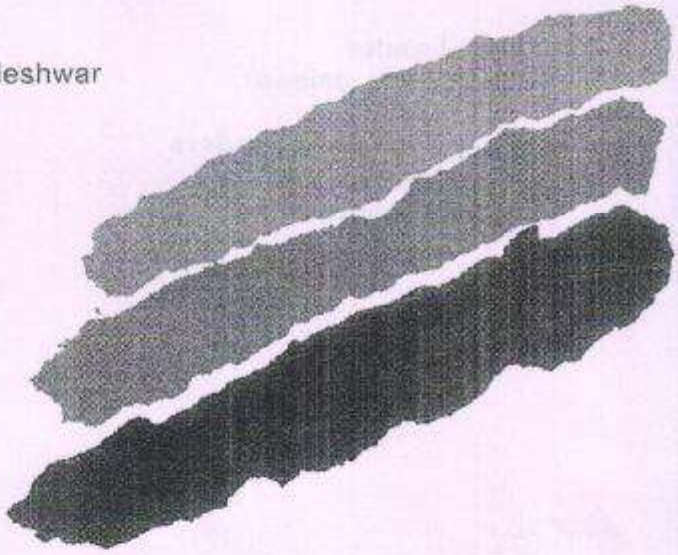
DISTRIBUTION RESTRICTED

ISO-9001
acredited

NIO/SP-28/2008

Monitoring of Coastal Waters off Kantiyajal

SPONSORED BY
Bharuch Eco-Aqua Infrastructure Ltd., Ankleshwar



AUGUST 2008

राष्ट्रीय समुद्र विज्ञान संस्थान
NATIONAL INSTITUTE OF OCEANOGRAPHY
Regional Centre : 4 Bungalows, Mumbai - 400 053
HQ : Dona Paula, Goa - 403 004

CONTENTS

EXECUTIVE SUMMARY

Bharuch Eco Aqua Infrastructure Limited (BEAIL), a company promoted by Gujarat Industries Development Cooperation (GIDC) member industry of Ankleshwar, Panoli and Jhagadia Industrial Estates collect effluents from all industries and treat combined effluents ($4x10^4 m^3/d$) in its Common Effluent Treatment Plant (CETP) as per norms set by the Gujarat Pollution Control Board (GPCB). The treated effluent is being discharged in the coastal waters off Kantiyajal through a submarine pipeline with a multi-port diffuser.

BEAIL contacted the National Institute of Oceanography (NIO) to undertake monitoring of the coastal water off Kantiyajal. Accordingly NIO conducted studies with respect to water quality, sediment quality and biological characteristics, comprising subtidal and intertidal regions of the project site during November 2007 to assess the impacts on marine ecology off Kantiyajal with the objectives viz. a) to evolve prevailing water quality, sediment quality and biological characteristics of marine area off Kantiyajal. b) to assess the impact of treated effluent on marine ecology. c) to suggest mitigation measures for minimizing the impacts, if any.

Project description

The BEAIL situated at Ankleshwar in Bharuch district is 10 km away from Bharuch railway station and collects effluent from 989 industries.

The industries, which send there effluents to BEAIL comprises the industries of dyes and dye intermediates, insecticides and pesticides, paper and paper packing, pharmaceutical, plastic rubber and leather and textile etc.

Quantity of wastewater generated from different units of the Ankleshwar zone is estimated to be 22,000 $m^3 d^{-1}$.

Wastewater generated from medium and large-scale industrial units are treated to the standard of GPCB and discharged through a chamber in a tunnel wastewater drainage system. The outlet chamber for individual

industries is common and designed by GIDC. A common effluent treatment plant is operated by Enviro Technology Limited (ETL). About 190 small-scale industries give their raw effluent to ETL for treatment. ETL is collecting effluent from member industries and treating it in CETP having a capacity to treat 1,000 m^3d^{-1} of raw effluent. The treated effluent from CETP is pumped in common CETP of BEAIL. Wastewater from three adjacent industrial estates viz. Ankleshwar, Panoli and Jhagadia joins CETP of BEAIL.

CETP of BEAIL has a polishing facility for removal of suspended solids, BOD and maintenance of pH of wastewater. An aerated lagoon with nutrient closing facility, settling tank with sludge return mechanism and a small wastewater holding tank fitted with pH sensor are provided under polishing treatment facility. The CETP has a capacity to treat the wastewater to the maximum of 60,000 m^3d^{-1} (60 MLD). Thus the wastewater is treated at CETP of BEAIL and pumped through pipeline into the nearshore coastal waters off Kantiyajal.

Prevailing marine environment

Prevailing marine environment of Kantiyajal is discussed based on the observations made during the present study.

The minimum dilutions obtained at release location and at 100 m distance from the coast, are in the range of 189-232 and 1934-2431 times, respectively. The over all minimum dilutions during the experiment were 189 at release location and 1934 at 100 m distance almost coinciding with the low water of the day. The effluent released at station 4, was getting diluted under strong current regime.

The result of water temperature indicated minor variation between the surface and the bottom layers, suggesting vertically well-mixed condition.

The nearshore waters off Kantiyajal sustain high suspended solids (SS). The range of concentration of SS from 91 to 2510 mg/l in the region indicated wide variations of suspended solids in the water. The results of SS of present study compares well with the findings of 1993 and 1994 of this area and suggests the values expected from the coastal water off Kantiyajal.

The variations in salinity were minor. Low salinity near the coast suggests freshwater inflow into the area, which may be due to the Narmada river opening in this region. The range in concentration of salinity (24.0 - 25.7 ppt) was well in line with that recorded during the earlier studies.

The DO of Kantiyajal varied from 1.5 to 5.2 ml/l during the study period. Temporal changes in the nearshore waters were markedly high. The occurrence of such a low DO as 1.5 ml/l, indicates some stress conditions on the ecology. The BOD off Kantiyajal varied from <0.2 to 2.7 mg/l during the study period. The average concentration of DO and BOD were well within the range of average values recorded earlier from this area and suggested that the ecological condition is similar to the baseline values of this region.

The nutrients in terms of NO_3^--N, NO_2^--N and NH_4^+-N vary in the range of 20.2-39.7 µmol/l, 0.3-1.0 µmol/l and 0.5-8.8 µmol/l respectively. The overall average value of NO_3^--N and NO_2^--N compares well to that of earlier records. However, the average values of NH_4^+-N indicated slightly higher values than that of earlier studies.

The concentrations of dissolved phosphate (1.7-3.4 µmol/l, av. 2.7 µmol/l) were those generally expected for the near shore coastal region off Kantiyajal.

The results indicated that the concentration of petroleum hydrocarbons (PHc) around Kantiyajal was low (av. 4.3 µg/l). The average concentration of phenols in water was low (av. 27.8 µg/l), which indicates baseline conditions and that environment is free from contamination of PHc and Phenols. The

average concentration of PHc and phenol recorded during present study is well within the range of baseline values and indicates the level of natural variability.

The sediment quality as evident in the present study is in agreement of the earlier studies and suggests no contamination in the intertidal sediment of the region.

The concentration of heavy metals around Kantiyajal is in normal range and suggests no contamination of the subtidal sediment in the study area. The results of C_{org} and phosphorous do not show any anthropogenic contamination in the region. The concentration of PHc are low and do not show any enrichment in the region.

The concentration of phytoplankton pigments in terms of chlorophyll *a* and phaeophytin, which ranged between 0.1-1.9 mg/m^3, (av 0.8 mg/m^3) and 0.1-3.6 mg/m^3, (av. 1.2 mg/m^3), respectively suggest a wide variation in pigments. The concentration of pigments was generally higher during the ebb than the flood tides. The values of chlorophyll *a* were generally higher at surface than that of bottom water whereas phaeophytin were recorded to be slightly higher at bottom as compared to surface water. Low concentrations of pigment suggest a poor primary production in the region, which is similar to that of earlier records.

The phytoplankton population in term of cell counts varied in the range of $5.6x10^3 - 35.2x10^3$ /l, (av. $14.4x10^3$ /l) during November 2007 and is in agreement with earlier records.

The poor generic diversity of phytoplankton may be associated with high suspended solids prevailing in the region. The major phytoplankton genera recorded were viz *Navicula, Thalassiosira, Cyclotella, Nitzschia, Pleurosigma, Surirella, Gyrosigma, Chaetoceros, Amphora, Biddulphia* and *Thalassiothrix* in the region. However, the generic diversity of phytoplankton recorded in the region shows a moderate enhancement when compared to the past data.

The overall distribution of zooplankton standing stock indicated a variation in biomass (0.7-11.2 ml/100 m^3, av. 4.0 ml/100m^3), population count (2.2-80.8 x 10^3/100 m^3, av. 23.1 x 10^3 /100 m^3) and total group (11-18, av. 14) during November 2007 and suggested poor standing stock in the nearshore waters off Kantiyajal. As high as 22 groups (Table 5.3.5) recorded during present study, indicated the region to be highly diverse in terms of zooplankton groups. The major zooplankton groups viz. copepods, chaetognaths, decapod larvae, foraminiferans and mysids were recorded in the region. The overall results of zooplankton standing stock compared well with that of earlier studies.

The overall results of intertidal macrobenthic faunal biomass (0- 1.8 g/m^2 wet wt, av. 0.2 g/m^2 wet wt), population density (0-625 /m^2, av. 75/ m^2) and total groups (0-2, av.1) during the period of study indicated small variation in intertidal macrobenthic standing stock. The overall results suggest a poor intertidal macrobenthic standing stock in the study region in the comparison of earlier studies.

The results of subtidal macrobenthic standing stock suggest the poor biomass (0-0.93g/m^2 wet wt; av. 0.09g/m^2 wet wt), population density (0 - 150/m^2, av. 22/m^2) and faunal group (0-2, av. 1) in the nearshore waters off Kantiyajal during study period. Polychaetes are the most dominant group recorded at all stations often recorded in this nearshore coastal water. The overall results of macrobenthic standing stock compared well with the findings of the earlier studies.

High tidal amplitude and high turbidity coupled with strong tidal currents make trawling or gill netting for fish, difficult and risky in the coastal waters off Kantiyajal. Evidently no active commercial fishing exists in the region.

The status of fisheries was assessed based on the experimental trawling conducted around the effluent discharge point (Stn 3, 5 and 6) in the coastal waters off Kantiyajal.

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

1 INTRODUCTION

1.1 Background

Bharuch Eco Aqua Infrastructure Limited (BEAIL), a company promoted by Gujarat Industries Development Cooperation (GIDC), member industry of Ankleshwar, Panoli and Jhagadia Industrial Estates collect effluents from all industries and treat combined effluent ($4x10^4 m^3 d^{-1}$) in its Common Effluent Treatment Plant (CETP) as per norms set by the Gujarat Pollution Control Board (GPCB) for discharging into coastal marine waters. The treated effluent is being discharged in the coastal waters of Kantiyajal through a 9.7 km long submarine pipeline with a multi-port diffuser.

As a requirement for marine environment management, BEAIL contacted the National Institute of Oceanography (NIO) to undertake monitoring of the coastal waters off Kantiyajal. Accordingly, NIO conducted studies with respect to water quality, sediment quality and biological characteristics, comprising subtidal and intertidal regions of the project site during November 2007 to evaluate the impacts, if any, on marine ecology due to release of effluent from BEAIL.

1.2 Objectives

a) To evolve prevailing water quality, sediment quality and biological characteristics of marine area off Kantiyajal.

b) To assess the impact of treated effluent on marine ecology.

c) To suggest mitigation measures for minimizing the impacts, if any.

1.3 Scope of studies

For monitoring the nearshore region off Kantiyajal, 10 stations adequately spaced around the diffuser in an area of around 200 km^2 was considered as the project area to meet the above objectives. The following ecological aspects would be studied:

1.3.1 Water quality

Water quality at selected subtidal stations would be assessed based on temperature, Suspended Solids (SS), pH, salinity, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), reactive phosphate (PO_4^{3-} - P), total phosphorous (P_{total}), nitrate (NO_3^- - N), ammonia (NH_4^+ - N), total nitrogen (N_{total}), Petroleum Hydrocarbons (PHc) and phenols.

Surface and bottom samples would be collected and analysed for depths exceeding 5 m while only surface samples would be studied for shallow regions less than 5 m depth. Selected stations would be sampled over a tidal cycle to evolve tidal variability of water quality.

1.3.2 Sediment quality

Surficial sediment from subtidal and intertidal areas would be analysed for texture, organic carbon (C_{org}), phosphorous, selected metals (aluminium, chromium, manganese, iron, cobalt, nickel, copper, zinc and mercury) and PHc.

1.3.3 Biological characteristics

The status of flora and fauna in the project area would be established based on phytoplankton pigments, population and generic diversity; zooplankton biomass, population and group diversity; macrobenthic biomass, population and group diversity and status of fishery and mangrove vegetation.

Based on field studies and available information, the status of the prevailing marine ecology would be evolved to evaluate the impact of effluent of BEAIL on the coastal waters off Kantiyajal.

1.4 Approach strategy

Some adverse impacts on marine ecology due to an industrial development in the coastal area are generally inevitable. However, in

planned projects, these impacts are identified in advance in order to take suitable mitigative measures at the plan and design stages of activity. Hence, identification of impacts on marine ecology requires detailed and reliable information on water quality, sediment quality and flora and fauna of the project area against which perturbation due to activities can be compared.

The studies conducted by National Institute of Oceanography (NIO) during January 1995, March 1997, April 2003 and January 2004 in the coastal waters off Kantiyajal, will be considered as the baseline data to assess the impact, if any, on the ecology. Hence, field investigations conducted during November 2007 for the present monitoring have been aimed at obtaining required data and information from more or less same locations sampled during earlier studies.

2 PROJECT DOMAIN

2 PROJECT DOMAIN

This section is largely based on the informations provided by BEAIL, which is as follows:

2.1 Project site

The project site at Ankleshwar industrial estate is situated in Bharuch district, which is 10 km away from Bharuch railway station. BEAIL collects effluents from the following industries.

2.1.1 Types of Industries

There are total 989 industries units dealing with dyes and dye intermediates, insecticides and pesticides, paper and paper packing, pharmaceutical, plastic rubber and leather and textile etc.

2.1.2 Wastewater quantity

Wastewaters generated from various industries of Ankleshwar industrial estate are conveyed through the open drainage and/or underground pipeline system in a suitably located sump and is pumped through a pipeline into nearshore waters off Kantiyajal. Quantity of wastewater discharged from different units of the Ankleshwar zone is estimated to be 22,000 m^3d^{-1}.

2.1.3 Wastewater Treatment and Mode of disposal

Wastewater generated from medium and large-scale industrial units are treated to the standard of GPCB and discharged through a chamber in a tunnel wastewater drainage system. The outlet chamber for individual industries is common and designed by GIDC. A common effluent treatment plant is operated by Enviro Technology Limited (ETL). About 190 small-scale industries give their raw effluent to ETL for treatment. ETL is collecting effluent from member industries and treating it in CETP having a capacity to treat 1000 m^3d^{-1} of raw effluent. The treated effluent from CETP is pumped in common CETP of BEAIL.

Thus wastewater from three adjacent industrial estates viz. Ankleshwar, Panoli and Jhagadia is collected in CETP of BEAIL.

CETP of BEAIL has a polishing facility for removal of suspended solids, BOD and maintenance of pH of wastewater. An aerated lagoon with nutrient closing facility, settling tank with sludge return mechanism and a small wastewater holding tank fitted with pH sensor are provided under polishing treatment facility. This facility would take care of fluctuations in flow and characteristics of effluents from three industrial estates. The CETP has a capacity to treat the wastewater to the maximum of 60,000 m^3d^{-1} (60 MLD). The wastewater is treated at primary, secondary and tertiary levels and pumped through pipeline into the nearshore waters off Kantiyajal. BEAIL receives wastewater mainly from the following three industrial estates:

2.1.4 Ankleshwar industrial estate

Ankleshwar industrial estate has a significant role to play in development of Gujarat State. It is an organized industrial estate of the country, spread over vast area where more than 1,400 units exist.

About 12 to 15% of country's production of pharmaceuticals, bulk drugs, dyes and dye intermediates are made in Ankleshwar. It is also the leading estate in agro chemicals and technical pesticides (19% of country's pesticide and insecticides). There are more than 150 texturing production in the country. Industries receive uninterrupted supply of around 100-megawatt power and 40,000 m^3d^{-1} of water.

2.1.5 Jhagadia industrial estate

Jhagadia industrial estate is situated in Jhagadia Taluka of Bharuch district. The number of proposed industrial units in this estate is nearly 1500 out of which about 100 units have started production.

2.1.6 Panoli industrial estate

GIDC has also developed an industrial estate at Panoli in Bharuch district of Gujarat. Presently around 300 industries are functioning, which include some major groups such as chemical (including textiles), pesticides, pharmaceutical and engineering. Wastewater discharge from chemical industries has been accounted and is 50% of total wastewater from this estate.

3 SUMMARY OF EARLIER STUDIES

3 SUMMARY OF EARLIER STUDIES

The informations in this section are based on the database of NIO for the years 1995, 1997, 2003 and 2004, which can be considered as the baseline for comparing the results of the present study. The results of earlier studies are discussed below:

3.1 Physical processes

3.1.1 General

The spreading of pollutants released in the sea is governed by advection, caused by large scale water movements affecting a local change in concentration of pollutant and diffusion caused by comparatively small scale random and irregular movements without causing any net transport of water. The important flow properties governing the rate of dilution of a wastewater cloud in the coastal water are the tides, currents, circulation and stratification.

3.1.2 Bathymetry

The deep waters of 40 - 50 m below CD occur off Tapi mouth and Piram Island. The inner Gulf, however, is shallow and vast areas off Mahi, Dhadhar and Sabarmati rivers are exposed during ebb tide. The bathymetry of the Gulf is constantly changing due to highly dynamic behaviour, the shoal movements and heavy siltation associated with high turbidity. The channel on the west side, the Malcolm Channel is seen to have a maximum depth of 22 m below CD, whereas the eastern channel has number of shallow regions. At a few locations, the deeper waters of 22 m below CD are noticed. Changes in the configuration of Mal Bank are noticed in the recent remote sensing imageries. The bathymetry of the Kantiyajal coast has extensive intertidal areas comprising mainly sand and mud. Shallow channels run across these mud banks making this area susceptible to topographic changes.

3.1.3 Tides

Short-term measurements undertaken during several surveys indicate a close resemblance with the tides at Bhavnagar and Luhara. The tides are mixed semidiurnal type with a slack period of about 30 min at high water and 25 min at low water. A comparison between the predicted tide at Luhara

leads by about 30 min with the range factor of 0.89 during the high water and 0.82 during the low water.

From the observed tide levels at Luhara, the following tidal parameters (with respect to Chart Datum) were calculated.

Highest high water spring	9.8 m
Mean high water spring	8.3 m
Highest high water neap	6.5 m
Mean high water neap	3.1 m
Lowest low water neap	1.9 m
Lowest low water spring	1.1 m

Analysis of the available data indicates that the tide range of 6 to 8 m occurs during 4% of the time and tide range of lower than 6 m occurs about 38% of the time.

Short term tidal observations in the vicinity of Kantiyajal indicated a lead of 25 to 30 min with respect to tide at IPCL jetty at Jageshwar. Though the ebb and flood durations are comparable, the tidal range at Kantiyajal is lower by 20 – 40 cm during neap and spring respectively. The tide at Kantiyajal is presented in Figure 1.

3.1.4 Currents and circulation

The currents are bimodal with prominent northerly movement during flood and southerly movement during ebb. Maximum current speeds vary from 1.4 m/s during spring to 0.8 m/s during neap. The currents attain maximum speeds about 1-2 h after flood and 3-4 h after ebb. The current speeds decrease considerably from surface to bottom and attain maximum values of 0.8 -1.0 m/s at the bottom. During flood, the direction of the current varies between 0 and 15° and during ebb between 180 and 210°. The current speed increases from shallow to deeper waters. Maximum speeds vary from 1 - 1.7 m/s at 10 m depth contour to 1.4 - 2.3 m/s at 20 m depth contour.

The currents measured near the proposed marine outfall location are presented in Figure 2. The current speeds are resolved into u and v-

components. Positive u-component denotes flooding while negative u-component indicates ebbing. Similarly, positive v-component signifies the movement of water towards the coast, while negative counterpart indicates offshore movement. The v-component varies between -0.4 to 0.38 m/s.

A negative net alongshore component of current (0.13 m/s) indicates a net flow in the southerly direction. This movement is expected since the Gulf receives considerable amount of freshwater brought-in by a number of rivers draining along the eastern shore, which ultimately promotes the net southward transport. The v-component indicated a net offshore direction. Thus the effluents released in this locality would be carried to south - south west in each tidal cycle.

The data collected through drogue studies are presented in Figures 3 - 7. The circulation pattern off Kantiyajal shows elongated ellipse with major axis parallel to the shore varying from 7 to 25 km. The minor axis, which is perpendicular to the shore, varies between 0.5 and 7 km. Average drogue speed is as high as 0.8 m/s. The high excursion length in this region signifies the high mixing capacity of the region. Since the proposed marine outfall location is sufficiently away from the coast (>10 km from the nearest shore) the chances of effluent reaching the shore are remote.

3.2 Water quality

The results of earlier studies are presented in Table 3.2.1 and discussed below:

3.2.1 Temperature

The variation in the average values of temperature recorded during earlier studies in the surrounding region of Kantiyajal for different years indicates a small variation (22.5-27.5 °C) in temperature. The significant variation in temperature may be associated with different seasons.

3.2.2 pH

The average pH variations in the surrounding region of Kantiyajal during different years also shows a small variation of 8.0 - 8.1 in the surrounding region of Kantiyajal.

3.2.3 Suspended Solids

The average concentration of SS during different years reveals significantly high values of SS (3720 mg/l) during 1995 and 16495 mg/l during 1997 whereas the same is declined to 827 mg/l and 1201 mg/l during 2003 and 2004 respectively.

3.2.4 Salinity

The average values of salinity recorded during earlier studies show significantly high variation (0.3 – 30.9‰) and indicates the fresh water influx into the region.

3.2.5 DO and BOD

The overall average values of DO and BOD of earlier studies suggest healthy condition of water quality for the marine organisms. The variation in the average values of BOD is between 0.5 and 2.5 mg/l and suggests the values to be normal of near shore system.

3.2.6 Nitrogen and Phosphorous compounds

The findings on dissolved phosphorous and nitrogen compounds during earlier studies indicates a small variation in average values of NO_3^--N (24.2-32.5 µmol/l) and PO_4^{3-}-P (2.1-3.0 µmol/l) and suggests a slight increased level in the nutrient concentration which may be due to influx of Narmada water carrying high nutrients through anthropogenic releases into it.

3.2.7 Phenols and PHc

The result of earlier studies indicates that the concentrations of PHc and Phenols are those expected from the nearshore marine environment. This indicates that the study region is free from any contamination of PHc and Phenol through anthropogenic sources.

3.3 Sediment quality

The average values of sediment qualities for different years are presented in Table 3.2.2 and 3.2.3, which are discussed as follows:

3.3.1 Texture

The texture of coral area surrounding region of Kantiyajal is in general sandy as per the information available with the database of NIO.

3.3.2 Heavy metals

Intertidal

The average values of metal recorded in the sediment of the surrounding region of Kantiyajal during 1997, as evident in Table 3.2.2, indicates that the concentrations of metals are similar to that recorded in the sediment of subtidal region. However, the average values are those expected from the sediment of any nearshore coastal water.

Subtidal

The sediment quality recorded during 1997 in the surrounding region off Kantiyajal is presented in Table 3.2.3 and indicates low concentrations of metals except Mn and suggests the sediment free from any contamination.

3.3.3 Organic carbon and phosphorous

The average concentration of intertidal sediments of earlier study as evident in Table 3.2.2 indicates the normal values of C_{org} and phosphorous compounds.

C_{org} and phosphorous in marine sediments of the subtidal region of Kantiyajal observed during 1997 are evident in Table 3.2.3 indicating the absence of anthropogenic contamination in the region.

3.3.4 Petroleum hydrocarbon

The average concentrations of PHc in the intertidal as well as subtidal sediments are presented in Tables 3.2.2 and 3.2.3, which indicate low values suggesting the reason to be free from any contamination.

The variation, of zooplankton standing stock in terms of biomass, population and total groups, is marginal as evident in Table 3.3.3, which is expected from this region.

3.4.3 Macrobenthos

a) Intertidal

The intertidal macrofaunal biomass was as low as 4.5 g/m^2 and as high as 64.5 g/m^2 during the period of earlier studies as evident in Table 3.3.4. The total groups suggest poor group diversity during the period of earlier studies. The overall average of earlier records in the surrounding region of near shore coastal waters off Kantiyajal is presented in Table 3.3.4, which indicates slightly reduction in macrobenthic biomass, population and total groups during 2004 as compared to 1995 whereas the average values of macrobenthic biomass are almost similar to that of 1997 and 2003.

b) Subtidal

The subtidal macrobenthic standing stock in terms of biomass (<0.1-0.01 g/m^2), population (4.0x10^2–21.0 x10^2/m^2) and total group (1-3) recorded during earlier studies suggests very low standing stock in the coastal water off Kantiyajal and surrounding region, as evident in Table 3.3.5. The overall average values indicate a marked poor standing stock of subtidal macrobenthos. Polychaetes were the dominant group in the surrounding region of coastal waters off Kantiyajal.

3.4.4 Fishery

The records of fisheries as evident in Table 3.3.6, is based on experimental trawling conducted during earlier studies.

The fish catch rate was poor with a variation of 0.5 – 4.2 Kg/h, av 3.0 Kg/h. The poor species diversity was also discernable in Table 3.3.6.

4 STUDIES CONDUCTED

4 STUDIES CONDUCTED

4.1 Period of study

The field investigations were undertaken during November 2007 as per the planned scheme described below:

Whenever, we consider assessment of marine pollution implication, we must be aware of the fact that there may be many changes in the ecology such as water quality, sediment quality and biological characteristics of the water body. To assess these impacts, on the marine ecology, the earlier data of January 1995, March 1997, April 2003 and January 2004 can be compared with the results of present study.

4.2 Sampling location

The present study was conducted at 9 subtidal stations and 4 intertidal transects. Station 4 was close to effluent disposal point. Station 1, 3, 5 and 6 were at the distance of 2 km surrounding the effluent disposal point. Station 2 was towards the shore whereas station 7, 8 and 9 along the 10 m contour. Station 3, 4 and 9 were sampled temporally to assess tidal variability in the ecology and other stations were spot monitored. The coordinates for all subtidal stations are as follows:

Station	Latitude	Longitude
1	21°26'23. 00" N	72°33'36. 50" E
2	21°28'43. 30" N	72°38'04. 50" E
3	21°27'42. 00" N	72°34'04. 30" E
4	21°28'08. 10" N	72°33'39. 40" E
5	21°28'10. 40" N	72°31'32. 80" E
6	21°29'44. 20" N	72°33'31. 30" E
7	21°32'29. 70" N	72°32'59. 30" E
8	21°34'37. 30" N	72°32'50. 60" E
9	21°36'28. 20" N	72°32'13. 70" E

Intertidal sampling was conducted at 4 transects (T 1 – T 4) to assess the status of intertidal macrobenthic fauna and sediment quality and the position of transects are as follows:

Transect	Level	Latitude	Longitude
T 1	Upper	21°40'13. 5"N	72°34'36.8" E
	Middle	21°40' 8. 1" N	72°34'39.4" E
	Lower	21°40' 5. 8" N	72°34'41.5" E
T 2	Upper	21°40'47. 4"N	72°36'06.0" E
	Middle	21°40'48. 9"N	72°36' 6. 4" E
	Lower	21°40'45. 5"N	72°36' 8. 3"E
T 3	Upper	21°34'07. 2"N	72°35'21. 1"E
	Middle	21°33'44. 6"N	72°34'49. 7"E
	Lower	21°33'4. 5"N	72°34'30. 0"E
T 4	Upper	21°36'48. 4"N	72°33' 2. 2"E
	Middle	21°36'44. 9"N	7232' 53. 2"E
	Lower	21°36'38. 1"N	72°32'41. 0"E

4.3 Sample collection

Samples were collected during November 2007 from different locations cited as above.

4.4 Sampling methodology

A Niskin sampler (5 l) with a mechanism for closing at a desired depth was used for collecting sub-surface water samples. Sampling at the surface was done using a clean polyethylene bucket. Glass bottle sampler (2.5 l) was used for obtaining samples at 1 m below water surface, for the estimation of PHc.

Oblique hauls for zooplankton were made using a Heron Tranter net (Mesh size 0.33 mm, mouth area 0.25 m^2) attached with a calibrated TSK flow

vi) Total phosphorous:

Phosphorous compounds in the sample were oxidized to phosphate with alkaline potassium persulphate at high temperature and pressure. The resulting phosphate was analyzed as described under (v).

vii) Nitrite:

Nitrite in the sample was allowed to react with sulphanilamide in acid solution. The resulting diazo compound was reacted with N-1-Naphthyl-ethylenediamine dihydrochloride to form a highly coloured azo-dye. The light absorbance was measured at 543 nm.

viii) Nitrate:

Nitrate was determined as nitrite as above after its reduction by passing the sample through a column packed with amalgamated cadmium.

ix) Ammonia:

Ammonium compounds (NH_3 + NH_4^+) in water were reacted with phenol in presence of hypochlorite to give a blue colour of indophenol. The absorbance was measured at 630 nm.

x) Total nitrogen:

Nitrogen compounds in the sample were oxidized to nitrate by autoclaving with alkaline persulphate. The solution was neutralized and nitrate was estimated as described under (viii).

xi) PHc:

Water sample (2.5 l) was extracted with hexane and the organic layer was separated, dried over anhydrous sodium sulphate and reduced to 10 ml at 30° C under low pressure. Fluorescence of the extract was measured at 360 nm (excitation at 310 nm) with Saudi Arabian crude residue as a standard. The residue was obtained by evaporating lighter fractions of the crude oil at 100°C.

xii) Phenols:

Phenols in water (500 ml) were converted to an orange coloured antipyrine complex by adding 4-aminoantipyrine. The complex was extracted in chloroform (25 ml) and the absorbance was measured at 460 nm using phenol as a standard.

4.5.3 Sediment quality

Surficial sediment for the determination of texture, heavy metals, C_{org}, phosphorous and PHc was collected at all water quality stations as well selected locations on intertidal transects.

a) Sampling procedure:

Subtidal sediment was obtained by a van Veen grab of 0.04 m^2 area. The samples after retrieval were transferred to polyethylene bags and preserved for further analyses. Intertidal sediment was sampled using a hand shovel.

b) Methods of analyses

i) Texture:

The sediment was dried at 60° C and analysed for particle size following the procedure of Holme and McIntyre.

ii) Metals:

Sediment was brought into solution by treatment with conc HF-$HClO_4$-HNO_3-HCl and the metals were estimated on a Perkin Elmer (Analyst 300/600) Atomic Absorption Spectrophotometer (AAS) by flame/graphite furnace. Mercury was estimated by flameless AAS technique after digesting the sediment with aquaregia.

iii) C_{org}:

Percentage of C_{org} in the dry sediment was determined by oxidising organic matter in the sample by chromic acid and estimating excess chromic

acid by titrating against ferrous ammonium sulphate with ferroin as an indicator.

iv) Phosphorous:

Digested sample for metals was used for estimating phosphorous in the sediment. The method used was similar to that described under Section 4.5.2 (vi).

v) PHc:

Sediment after refluxing with KOH-methanol mixture was extracted with hexane. After removal of excess hexane, the residue was subjected to clean-up procedure by silica gel column chromatography. The hydrocarbon content was then estimated by measuring the fluorescence as described under Section 4.5.3 (v).

4.5.4 Flora and fauna

i) Phytoplankton

Phytoplankton pigments: A known volume of water (500 ml) was filtered through a 0.45 µm Millipore membrane filter paper and the pigments retained on the filter paper were extracted in 90% acetone. For the estimation of chlorophyll and phaeophytin the extinction of the acetone extract was measured at 665 and 750 nm before and after treatment with dilute acid (0.1N HCl).

Phytoplankton population: Samples for the cell count were preserved in Lugol's solution with 2% formaldehyde. Enumeration and identification of phytoplankton were done under a compound microscope using a Sedgewick-Rafter slide.

ii) Zooplankton

Volume (biomass) was obtained by displacement method. A portion (25-50%) of the sample was analysed under a microscope for faunal composition and population count.

iii) Benthos

The sediment was sieved through a 0.5 mm mesh sieve and animals retained were preserved in 5% buffered formaldehyde. Total population was estimated as number of animals in 1 m^2 area and biomass on wet weight basis.

5 PREVAILING MARINE ENVIRONMENT

5 PREVAILING MARINE ENVIRONMENT

Dilution

7-2 — 17 2

The minimum dilutions obtained at release location and at 100 m distance during the 6h sampling varied in the range of 189-232 and 1934-2431 times respectively. The over all minimum dilutions during the experiment were 189 at release location and 1934 at 100 m distance which almost coincided with the low water of the day. This shows the effluent is getting diluted under strong current regime in this area. It may be noted that the diffuser array was designed for a quantity of 60 MLD effluents and the present discharge is 40 MLD only. Also it may be noted that the effluent already existed in the pipeline can slightly reduce the concentration at the diffuser end and also the water entering the sump after the dye injection stopped can decrease the concentrations entering the pipeline. Hence, the dilutions obtained are a bit more than predicted initially. The overall assessment is that the diffuser system is working properly to the designed objective.

The marine environmental quality was assessed based on water quality, sediment quality and biological characteristics of nearshore water of Kantiyajal.

5.1 Water quality

The results of present study on water quality of Kantiyajal are presented in Tables 5.1.1-5.1.5 and those of temporal variations are shown in Figures 5.1.1-5.1.2 and discussed below:

5.1.1 Temperature

Temperature of water is an important parameter and influences chemical processes in water such as dissolution – precipitation, adsorption, desorption, emulsification, flocculation, oxidation etc. For instance dissolution of gases such as ammonia and oxygen decreases with increase in temperature while some solids may precipitate out due to decrease in solubility at lower temperature. Some contaminants like PHc may be absorbed at high temperature and concentration of some materials may

enhance due to increase in solubility at lower temperature. As a result of absorption of solar radiation, the water temperature of a well-mixed water body varies in accordance with air temperature while that of a water body having a restricted mixing, a thermal gradient may occur. Due to the natural changes in climatic conditions, the temperature of water fluctuates daily as well as seasonally.

As expected for shallow waters, the water temperature around Kantiyajal varied in accordance with air temperature. The variations in temperature between the surface and the bottom (Figure 5.1.1 to 5.1.2) were minor suggesting vertically well-mixed water column. The average water temperature of the study area during November 2007 is given in the table below.

Station	Level	Temperature (°C)
1	S	28.5
	B	28.0
2	S	26.5
	B	26.5
3	S	27.5
	B	27.4
4	S	26.7
	B	26.8
5	S	28.5
	B	28.0
6	S	27.5
	B	28.0
7	S	28.0
	B	27.5
8	S	27.0
	B	27.0
9	S	26.3
	B	26.2

A minor variation in temperature as evident in above table suggested the calm weather condition in the region.

5.1.2 pH

pH is the measure of hydrogen ion activity in water. It is known as the master variable in water since many properties, processes and reactions are

pH dependent. The pH of seawater is largely controlled by the CO_3^{2-}/ HCO_3^-/ CO_2 system. When the primary productivity is high, CO_2 is consumed during photosynthesis, which shifts the equilibrium that favors higher pH. The average pH variations in the study area are as follows:

Station	Level	pH
1	S	8.0
	B	8.0
2	S	8.0
	B	8.1
3	S	8.0
	B	8.0
4	S	8.0
	B	8.1
5	S	8.0
	B	8.0
6	S	8.0
	B	8.0
7	S	8.0
	B	8.1
8	S	7.9
	B	8.1
9	S	8.1
	B	8.1

As evident from the above table, the pH variations in the study area were negligible. Temporal variations were also negligible as evident from the Figures 5.1.1 to 5.1.2.

5.1.3 Suspended Solids

SS is the description term used for suspended / settleable particulate matter in the water column. SS of natural origin mostly contains clay, silt and sand derived from bottom and shore sediment. For nearshore, coastal areas and estuaries, clay and vegetation matter form an important component of SS. Since the major contribution to SS comes from the disturbance of bed and shore sediment, tidal current is the vital influencing factor for SS concentration and typically lead to high values in the bottom waters. Anthropogenic discharges add a variety of SS depending upon the source.

The nearshore waters off Kantiyajal sustained high suspended solids as evident from the average values shown in the table below:

Station	Level	SS (mg/l)
1	S	225
	B	1122
2	S	550
	B	568
3	S	319
	B	1644
4	S	218
	B	1245
5	S	91
	B	783
6	S	111
	B	625
7	S	335
	B	661
8	S	156
	B	310
9	S	731
	B	2510

The average concentration of SS from 91 to 2510 mg/l in the region showed wide variations of suspended solids in the water. SS was expected to be largely inorganic in nature and which was resulted from the dispersion of fine-grained sediment from the bed as well as the banks by tidal currents. Hence the bottom water sustained markedly high SS as compared to that at the surface.

5.1.4 Salinity

Salinity is an indicator of freshwater intrusion in nearshore waters as well as excursion of salinity in inland water bodies such as estuaries, creeks and bays. Normally seawater salinity is 35.5 ppt but may vary depending on evaporation, precipitation and freshwater addition. Salinity largely influences several processes such as dissolution, dispersion, dilution etc. in seawater due to high dissolved salt content and high density.

The salinity of Kantiyajal varied from 24.0 to 25.7 ppt during study period. The average salinity at different stations around Kantiyajal is as follows:

Station	Level	Salinity (‰)
1	S	25.1
	B	25.0
2	S	25.0
	B	25.1
3	S	25.7
	B	25.7
4	S	24.6
	B	24.8
5	S	25.2
	B	25.7
6	S	25.0
	B	25.1
7	S	25.4
	B	25.5
8	S	25.4
	B	25.4
9	S	24.0
	B	24.5

Temporal variations in salinity were minor (Figs. 5.1.1 to 5.1.2). Low salinity near the coast suggested freshwater inflow in the region, which could be due to Narmada River, draining in this region.

5.1.5 DO and BOD

DO content is a vital water quality parameter influencing the aquatic biota. DO is an important constituent and is significant in the protection of aesthetic qualities of water as well as maintenance of aquatic life. Although there is considerable dispute on the minimum level of DO required for a healthy tropical marine environment, it is considered that the DO level should not fall below 3 ml/l for prolonged periods in creeks, estuaries and coastal waters for the health of the ecosystem. Hence, it is of considerable interest in water quality investigations as its concentration in water is an indicator of prevailing water quality and ability of a water body to support a well-balanced aquatic life. The sources of DO in seawater are photosynthesis and dissolution from the atmosphere at air-water interface. However, DO is consumed during microbial oxidation of organic substances which is measured in terms of BOD.

The DO off Kantiyajal varied between 1.5 and 5.2 ml/l during the study period (Table 5.1.1 to 5.1.5). Temporal changes in the nearshore waters were markedly high. The occurrence of such a low DO as 1.5 ml/l indicated some stress conditions on the ecology. The average DO values around Kantiyajal are as follows:

Station	Level	DO (ml/l)	BOD (mg/l)
1	S	2.3	1.9
	B	2.9	<0.2
2	S	2.9	1.9
	B	2.5	<0.2
3	S	4.6	2.7
	B	4.7	1.9
4	S	4.6	2.6
	B	4.7	2.5
5	S	1.6	<0.2
	B	1.9	<0.2
6	S	1.5	1.0
	B	2.7	0.6
7	S	2.7	<0.2
	B	1.9	<0.2
8	S	2.4	<0.2
	B	2.2	<0.2
9	S	4.9	2.1
	B	5.2	1.8

All natural waters contain some oxidisable matter in low concentration, leading to BOD, which can be 2 to 5 mg/l. The BOD off Kantiyajal varied from <0.2 to 2.7 mg/l during the study period (Table 5.1.1 to 5.1.5).

5.1.6 Nitrogen and Phosphorous compounds

Dissolved phosphorous and nitrogen compounds play a major role in primary productivity of a water body, which in turn influences the fishery since they are vital nutrients for the growth of phytoplankton. Phosphorous is present as orthophosphate, while nitrogen is mainly present as nitrate with low concentration of nitrite and ammonia. Nitrite is thermodynamically unstable and ammonia is biochemically oxidized to nitrate via nitrite, apart from being directly assimilated by algae. Hence, concentration of nitrite and ammonia are often very low in natural waters. The concentrations of nitrogen

and phosphorous compounds in the surface and bottom of coastal waters off Kantiyajal are shown in the table below:

Station	Level	NO_3^--N (µmol/l)	NO_2^--N (µmol/l)	NH_4^+-N (µmol/l)	PO_4^{3-}-P (µmol/l)
1	S	21.4	0.5	4.7	2.5
	B	21.9	0.5	1.2	3.2
2	S	39.7	0.8	2.7	2.5
	B	39.4	0.8	6.6	3.1
3	S	36.2	0.8	2.1	2.7
	B	36.4	1.0	2.0	3.4
4	S	37.3	0.5	2.4	2.4
	B	37.7	0.5	0.5	3.1
5	S	20.2	0.5	ND	1.7
	B	22.2	0.4	1.0	3.1
6	S	22.4	0.5	ND	1.8
	B	24.0	0.4	1.2	3.0
7	S	25.2	0.5	4.7	1.9
	B	27.5	0.4	6.8	2.9
8	S	27.4	0.3	8.8	1.9
	B	22.3	0.4	7.2	2.9
9	S	37.4	0.6	4.9	2.8
	B	35.3	0.8	4.0	3.2

The trend of distribution of nitrogenous nutrients in terms of NO_3^--N, NO_2^--N and NH_4^+-N suggested the variation of 20.2-39.7 µmol/l, 0.3-1.0 µmol/l and 0.5-8.8 µmol/l, respectively as evident in above table. These concentrations were those expected from the creek system.

The concentrations of dissolved phosphate (1.7-3.4 µmol/l, av. 2.7 µmol/l) were similar to other surrounding region and those generally expected for the nearshore region of Kantiyajal.

5.1.7 Phenols and PHc

Natural water contains trace levels of PHc and phenols. However, their occurrence in high concentration is often due to external perturbations. The levels of phenols and PHc off Kantiyajal are summarized in table below:

Station	PHc (µg/l)	Phenol (µg/l)
1	4.3	15.1
2	2.8	17.9
3	4.3	6.7
4	5.2	54.6
5	2.9	44.2
6	4.4	31.9
7	5.7	13.7
8	2.2	32.8
9	6.6	33.3

These results indicated that the concentration of PHc around Kantiyajal was low. The average concentration of phenols in water was also low, which indicated baseline conditions and that the environment free from contamination of PHc and Phenols.

5.2 Sediment quality

5.2.1 Texture

The sediment texture around Kantiyajal was sandy (av. 80.2%) with fine silt (av. 2.5%) as evident in Table 5.2.2.

5.2.2 Heavy metals

Determination of trace pollutants such as heavy metals and organic compounds in water often revealed wide fluctuation as their concentration was depending on the location, time of sampling, nature of pollutants and chemical characteristics of water. Moreover, several trace pollutants get rapidly fixed to SS and thus removed from the water column.

The pollutants adsorbed on the SS were ultimately transferred to the bed sediment, on settling, evidently the concentrations of pollutants in sediment increased over a period of time in regions receiving their fluxes.

The sediment quality in the surrounding region of Kantiyajal was studied in terms of subtidal sediment quality and intertidal sediment quality, which are discussed below:

a) Intertidal

The sediment quality as evident in Table 5.2.1 of present study was in agreement with the earlier studies and suggested no contamination in the region.

Metals	Concentration
Al (%)	4.6
Cr (µg/g)	180
Mn (µg/g)	1631
Fe (%)	8.8
Co (µg/g)	46
Ni (µg/g)	77
Cu (µg/g)	98
Zn (µg/g)	141
Hg (µg/g)	ND

The average values of metals suggesting the intertidal area free from any contamination are evident in the above table.

b) Subtidal

The concentration of heavy metals around Kantiyajal is presented in Table 5.2.2. The average metal content of sediment is as follows:

Metals	Concentration
Al (%)	4.7
Cr (µg/g)	150
Mn (µg/g)	1418
Fe (%)	5.9
Co (µg/g)	38
Ni (µg/g)	67
Cu (µg/g)	96
Zn (µg/g)	88
Hg (µg/g)	ND

The above table indicated that the nearshore sediment of Kantiyajal was free from any contamination of the metals except a slight increase in the concentration of Mn, which could be due to Narmada river draining into the region.

5.2.3 Organic carbon and phosphorous

C_{org} and phosphorous in marine sediments largely results from decaying organic matter as well as through anthropogenic releases. Phosphorous also occurs in some mineral phases. Hence sediment of areas receiving organic matter invariably has high concentrations of these constituents.

The average concentration of intertidal sediments of present study is compared with earlier results and presented below:

Parameter	Average values
	2007
Corg (%)	0.8
P (µg/g)	266

The above table suggests natural level of organic carbon and phosphorous.

Their average concentrations in the subtidal sediments around Kantiyajal were as follows:

Parameter	Average values
	2007
Corg (%)	0.6
P (µg/g)	324

The above values were indicative of absence of anthropogenic contamination in the region.

5.2.4 Petroleum hydrocarbon

Naturally occurring low PHc content is associated with vegetation decay, erosion etc. PHc entering through the spillage of water partly evaporates and the leftover residue eventually sinks to the bottom due to increase in density or its incorporation with particulate matter. Thus bed sediment serves as a sink to PHc and its high level may indicate gross sediment contamination in the region.

The concentration of PHc in the intertidal sediment was as follows:

Parameter	Average values
	2007
PHc (µg/g)	0.2

This intertidal sediment also sustained very low concentration of PHc, which was comparable to earlier records and suggested no contamination in the region.

Average PHc concentration in subtidal sediment around Kantiyajal varied as follows:

Parameter	Average values
	2007
PHc (µg/g)	0.7

The concentration of PHc was low and did not show any contamination in the region.

5.3 Biological Characteristics

Evaluation of biological sensitivity of potential coastal activities is an integral part of environmental monitoring, since the ultimate consequences of perturbations in the environment, affect marine life. In the marine environment

Significantly low average concentrations of pigments as evident in above table suggested a poor primary production in the region.

b) Phytoplankton population: The phytoplankton population in terms of cell count varied within the range of $5.6x10^3$ – $35.2x10^3$ /l, (av. $14.4x10^3$ /l) during November 2007 (Table 5.3.2).

The poor generic diversity of phytoplankton as evident in Tables 5.3.2 - 5.3.3 could be associated with high-suspended solids prevailing in the region. The major phytoplankton genera viz. *Navicula, Thalassiosira, Cyclotella, Nitzschia, Pleurosigma, Surirella, Gyrosigma, Chaetoceros, Amphora, Biddulphia and Thalassiothrix* were recorded in the region. The average values of cell counts and total genera of nearshore coastal waters off Kantiyajal are presented below:

Location	Phytoplankton		
	Cell Count (no x 10^3/l)	Total genera (no)	Major genera
1	14	10	*Thalassiosira, Thalassionema, Thalassiothrix, Navicula*
2	9.2	7	*Peridinium, Thalassiothrix, Thalassionema, Amphiprora*
3	8.9	8	*Peridinium, Thalassiothrix, Cyclotella, Thalassiosira*
4	18.4	11	*Thalassiosira, Thalassionema, Thalassiothrix, Peridinium*
5	10.8	8	*Peridinium, Rhizosolenia, Thalassiosira, Ditylum*
6	13.6	11	*Thalassionema, Thalassiothrix, Nitzschia, Thalassiosira*
7	13.6	11	*Fragilaria, Guinardia, Coscinodiscus, Thalassionema*
8	13.6	8	*Fragilaria, Guinardia, Thalassiothrix, Cyclotella*
9	27.8	6	*Thalassiothrix, Fragilaria, Thalassiosira, Coscinodiscus*

The above table suggested poor phytoplankton production in the nearshore waters off Kantiyajal, which could be attributed to high suspended solids prevailing in the region. However, the generic diversity of phytoplankton recorded in the region was slightly higher.

5.3.2 Zooplankton

The overall distribution of zooplankton standing stock (Table 5.3.4) indicated a variation in biomass (0.7-11.2 ml/100 m^3, av. 4.0 ml/100m^3), population (2.2-80.8 x 10^3/100 m^3, av. 23.1 x 10^3 /100 m^3) and total groups (11-18, av. 14) during November 2007 and suggested poor zooplankton standing stock in the region. As high as 22 groups (Table 5.3.5) recorded during present study, indicated the region to be highly diverse in terms of zooplankton groups. The major zooplankton groups were copepods, chaetognaths, decapods larvae, foraminiferans and mysids were recorded in the region. The average values of zooplankton standing stock recorded during present study are presented in the table shown below:

Location	Zooplankton			
	Biomass (ml/100m^3)	Population (nox10^3/100m^3)	Total Group (no)	Major group
1	4.4	9.8	16	Copepods, chaetognaths, polychaetes, lamellibranchs
2	6.9	44.2	14	Copepods, chaetognaths, lamellibranchs, mysids
3	4.2	15.0	14	Copepods, chaetognaths, polychaetes, lamellibranchs
4	1.7	12.9	15	Copepods, chaetognaths, decapod larvae, fish larvae
5	7.0	16.6	15	Copepods, chaetognaths, foraminiferans, decapod larvae
6	1.9	16.9	12	Copepods, chaetognaths, fish larvae, decapod larvae
7	1.7	22.0	14	Copepods, chaetognaths, decapod larvae, mysids
8	2.0	18.2	14	Copepods, chaetognaths, polychaetes, lamellibranchs
9	4.3	35.1	15	Copepods, chaetognaths, lamellibranchs, decapod larvae

The average values of zooplankton standing stock at different locations in the nearshore waters off Kantiyajal suggested slightly low zooplankton standing stock in the study region in the comparison of other neighboring areas.

5.3.3 Macrobenthos

a) Intertidal

The overall results of intertidal macrobenthic faunal biomass (0 - 1.8 g/m^2, wet wt, av. 0.2 g/m^2, wet wt), population (0-625 /m^2, av. 75/ m^2) and

total groups (0-2, av.1) during the period of study revealed small variation in intertidal macrobenthic standing stock as evident in Tables 5.3.6-5.3.7. Polychaetes were the major group at transects T 1 – T 3 whereas in transect T 4 decapod larvae were the major group (Table 5.3.6). The overall average of intertidal macrobenthic standing stock is presented in the table shown below:

Transect	Biomass (g/m^2,wet wt)	Population (no/m^2)	Faunal group (no)	Major group
T 1	0.3	88	1	Polychaete
T 2	0.3	179	1	Polychaete
T 3	<0.1	12	1	Polychaete
T 4	0.2	21	1	Decapod larvae

The above table suggests a poor intertidal macrobenthic standing stock in the study region.

b) Subtidal

The results of subtidal macrobenthic standing stock are presented in Table 5.3.8, which suggest overall poor biomass (0-0.93 g/m^2 wet wt; av. 0.09 g/m^2 wet wt), population (0 -150/m^2, av. 22/m^2) and faunal group (0-2, av. 1) in the nearshore waters off Kantiyajal during the study period. Polychaetes were the dominant group (Table 5.3.9), in the study area. The average values for different area is as follows:

Station	Biomass (g/m^2,wet wt)	Population (no/m^2)	Faunal group (no)	Major group
1	0	0	0	Nil
2	0.5	106	1	Polychaete
3	<0.1	13	1	Polychaete
4	<0.1	26	1	Polychaete
5	<0.1	19	1	Decapod larvae
6	0	0	0	Nil
7	<0.1	19	1	Isopods
8	<0.1	6	1	Polychaete
9	0.1	6	1	Polychaete

As evident in above table, the average values suggested a poor subtidal macrobenthic standing stock in the nearshore waters off Kantiyajal.

5.3.4 Fishery

High tidal amplitude and high turbidity coupled with strong tidal currents make trawling or gill netting for fish, difficult and risky in the coastal waters off Kantiyajal. Evidently no active commercial fishing exists in the region excepting limited shore–based fishing by common bag-nets or other traditional gears. Enquiries with the local fishermen and the department of state fisheries, Kantiyajal, also confirmed that the trawlers generally do not operate in the nearshore waters. No fishing activity and gill net operation recorded in nearshore waters off Kantiyajal. The status of fisheries is assessed based on the experimental trawling conducted around the effluent discharge point (Stn 3, 5 and 6) in the coastal waters off Kantiyajal.

The results of trawl catch recorded during present study (Table 5.3.10) are presented as below:

Station	Catch (Kg/h)	No. Of Species	Major species
3	2.6	F-9 P-3 O-3	Fishes: *Harpadon nehereus, Arius sona* *Prawns: Parapenaeopsis stylifera*
5	2.0	F-10 P-2 O-4	Fishes: *Harpadon nehereus, Eleutheroma tetradactylum* *Prawns: Parapenaeopsis stylifera*
6	2.7	F-11 P- 4 O-6	Fishes: *Harpadon nehereus, Eleutheroma tetradactylum* Prawns: *Parapenaeopsis stylifera*

The catch rates of experimental trawling varied between 2.0 – 2.7 kg/h, av. 2.4 kg/h and suggested a low fish catch in the region. However, species diversity in terms of number of species was moderate as evident in above table. The trawling results indicated a total of 13 species of fishes, 4 species of prawns and 7 species of other groups as evident in above table. *Harpadon nehereus* and *Arius sona* were the major species recorded in the coastal waters off Kantiyajal. *Parapenaeopsis stylifera* was the major species of prawn and suggested the common fishes similar to other coast.

The overall results confirmed low fishery potential in terms of catch per unit effort as well as diversity in the Gulf.

5.3.5 Mangroves

Mangroves are salt tolerant forest ecosystem of tropical and subtropical intertidal regions of the world. Where the conditions are sheltered and suitable, the mangroves may form extensive and productive forests, which are the reservoirs of a large number of species of plants and animals. The role of mangrove forests in stabilizing the shoreline of the coastal zone by preventing soil erosion and arresting encroachment on land by sea is well recognized thereby minimizing water logging and formation of saline banks.

The shoreline of Kantiyajal in the corridor of 500 m of the pipeline was without mangroves whereas immediately after that dense mangrove vegetation was seen along the shore.

6 ENVIRONMENTAL IMPACT ASSESSMENT

6 IMPACT ASSESSMENT ON MARINE ENVIRONMENT

The impact of effluent on the ecology of Kantiyajal is assessed based on the comparison made of present study with baseline data detailed in Section 3 and discussed below:

6.1 Dilution

As evident in Section 5.0, the minimum dilutions obtained at release location and at 100 m distance, varied in the range of 189-232 and 1934-2431 times respectively. The overall minimum dilutions during the experiment were 189 at release location and 1934 at 100 m distance that almost coincided with the low water of the day. Thus, the effluent released at station 4, is getting diluted under strong current regime in this area and does not reveal any impact on the marine ecology of the region.

6.2 Water quality

The results of present study are compared with the baseline data available with NIO data base which are discussed below:

6.2.1 Temperature

The comparison of average temperature of present study with the earlier results in the surrounding region of Kantiyajal is presented below:

Year	Temperature (°C)
January 1995	22.8
March 1997	22.1
April 2003	27.5
January 2004	22.5
November 2007	27.3

It is evident in above table that the overall average value of temperature recorded during present study was in the agreement of the values of April 2003 whereas the values recorded in January 1995, March 1997 and January 2004 reveal low temperature indicating winter season.

6.2.2 pH

The average pH of present study was compared with the earlier records, which are as follows:

Year	pH
January 1995	8.0
March 1997	8.0
April 2003	8.0
January 2004	8.1
November 2007	8.0

The results of pH observed during present study were well comparable to the findings of the earlier studies, which was discernible in above table.

6.2.3 Suspended Solids

The average concentration of SS in the surrounding region of Kantiyajal was compared with the earlier records:

Year	SS (mg/l)
January 1995	3720
March 1997	16495
April 2003	827
January 2004	1201
November 2007	678

The above table suggested a marked reduction in SS during present study in the comparison of 1995 and 1997. However the level of SS of present study was well comparable to the findings of 1993 and 1994 and suggested the values expected from the coastal waters off Kantiyajal.

6.2.4 Salinity

The overall average of salinity observed during present study is compared with the results of earlier studies and presented below:

Year	Salinity (‰)
January 1995	28.2
March 1997	0.3
April 2003	30.9
January 2004	26.8
November 2007	25.1

The above table indicates that the average value is well in the range of salinity recorded during earlier studies.

6.2.5 DO and BOD

The overall average values of DO and BOD were compared with the results of earlier studies and discussed below:

Year	DO (ml/l)	BOD (mg/l)
January 1995	7.7	1.8
March 1997	5.0	0.5
April 2003	3.5	1.6
January 2004	5.1	2.5
November 2007	3.1	1.1

The average concentration of DO and BOD were slightly lower during 2007 in the comparison of earlier records. However, these average values of DO and BOD suggested the ecological condition is similar to the baseline of this region.

6.2.6 Nitrogen and Phosphorous compounds

The findings on dissolved phosphorous and nitrogen compounds were compared with the values of earlier studies and discussed below:

Year	NO_3^--N (µmol/l)	NO_2^--N (µmol/l)	NH_4^+-N (µmol/l)	PO_4^{3-}-P (µmol/l)
January 1995	24.2	0.2	0.7	2.1
March 1997	29.5	0.6	1.3	1.3
April 2003	29.3	0.5	0.6	2.4
January 2004	32.5	0.5	0.6	3.0
November 2007	29.7	0.6	3.8	2.7

The above table indicates that the overall average value of NO_3^--N, NO_2^--N and PO_4^{3-}-P compares well to that of earlier records. However the average values of NH_4^+-N indicated slightly higher level than that of earlier results. The overall high concentration of NO_3^--N in nearshore waters off Kantiyajal could be attributed to the anthropogenic releases in the downstream of Narmada River.

6.2.7 Phenols and PHc

The average concentration of phenols in water was low, which indicated baseline conditions and that environment was free from contamination of PHc and phenols.

Year	PHc (µg/l)	Phenol (µg/l)
January 1995	11.5	2.5
March 1997	2.3	18.0
April 2003	0.5	38.1
January 2004	3.9	50.3
November 2007	4.3	27.8

The average concentration of PHc and phenol recorded during present study was well in the range of baseline and indicated the level of natural variability.

6.3 Sediment quality

6.3.1 Texture

The sediment texture around Kantiyajal was sandy with the fine silt, which was similar to the results of earlier studies.

6.3.2 Heavy metals

a) Intertidal

Parameter	Average values			
Metals	March 1997	April 2003	January 2004	November 2007
Al (%)		6.4	6.2	4.6
Cr (µg/g)	126	85	116	180
Mn (µg/g)	1075	1148	1104	1631
Fe (%)	5.0	7.2	6.8	8.8
Co (µg/g)	48	31	32	46

Parameter Metals	Average values			
	March 1997	April 2003	January 2004	November 2007
Ni (µg/g)	46	55	61	77
Cu (µg/g)	74	107	96	98
Zn (µg/g)	107	141	127	141
Hg (µg/g)	0.04	0.14	-	ND

The sediment quality as evident in above table of present study was in agreement of the earlier studies and suggested no contamination in the region.

b) Subtidal

The sediment quality in the surrounding region off Kantiyajal recorded during the period of earlier studies is discussed below:

Parameter Metals	Average values			
	March 1997	April 2003	January 2004	November 2007
Al (%)		2.7	4.1	4.7
Cr (µg/g)	107	47	104	150
Mn (µg/g)	1133	923	1039	1418
Fe (%)	4.0	3.2	6.4	5.9
Co (µg/g)	39	18	28	38
Ni (µg/g)	46	29	57	67
Cu (µg/g)	46	39	75	96
Zn (µg/g)	100	77	95	88
Hg (µg/g)	0.07	ND	0.3	ND

6.3.3 Organic carbon and phosphorous

The average concentrations of C_{org} and phosphorous in the subtidal sediments around Kantiyajal are as follows:

Parameter	Average values			
	March 1997	April 2003	January 2004	Novembe r 2007
Corg (%)	0.1	ND	0.3	0.6
P (µg/g)	463	380	384	324

The above values indicate the absence of anthropogenic contamination in the region.

The average concentration of intertidal sediments of present study was compared with earlier results and presented below:

Parameter	Average values			
	March 1997	April 2003	January 2004	November 2007
Corg (%)	0.5	0.4	0.5	0.8
P (µg/g)	331	504	480	266

The comparison of results between present study and earlier records confirmed that the sediment of intertidal region was free from organic matter contamination.

6.3.4 Petroleum hydrocarbon

Average PHc concentration, in subtidal sediment around Kantiyajal varied as follows:

Parameter	Average values			
	March 1997	April 2003	January 2004	November 2007
PHc (µg/g)	0.2	0.1	0.3	0.7

The concentration of PHc was low and did not show any enrichment in the region.

The concentration of PHc in the intertidal sediment is as follows:

Parameter	Average values			
	March 1997	April 2003	January 2004	November 2007
PHc (µg/g)	0.2	0.1	0.3	0.2

This intertidal sediment also sustained very low concentration of PHc, which was comparable to earlier records and suggested no contamination in the region.

6.4 Biological Characteristics

The results of biological characteristics in terms of phytoplankton, zooplankton, macrobenthos and fishery recorded during present study were compared with the earlier records of the surrounding region of the coastal waters off Kantiyajal.

6.4.1 Phytoplankton

a) Phytoplankton pigments:

The overall average value of chlorophyll *a* and phaeophytin were compared with the earlier records and shown below:

Parameter	Jan(95) (Av)	Mar (97) (Av)	Apr (03) (Av)	Jan (04) (Av)	Nov (07)	
					(Av)	Stn 4
Chlorophylla (mg/m^3)	1.0	0.7	0.2	0.3	0.8	1.5
Phaeophytin (mg/m^3)	0.6	0.7	0.4	0.7	1.0	0.6
Ratio chl.*a* / phaeo	1.7	1.0	0.5	0.4	0.8	2.5

It is evident in above table that the overall average values of chlorophyll *a* and phaeophytin recorded during present study were well comparable to the earlier records. It was also discernible that the average values of chlorophyll *a* and phaeophytin recorded at station 4 were in the agreement of baseline and did not suggest any significant impact of effluent on phytoplankton of Kantiyajal.

b) Phytoplankton population:

The average values of cell counts and total genera of nearshore waters off Kantiyajal are presented below:

Parameter	Jan 1995 (Av)	Mar (97) (Av)	Apr (03) (Av)	Jan 04 (Av)	Nov (07)	
					(Av)	Stn 4
Cell count (no x 10^3/l)	18.7	18.6	4.4	1.0	14.4	18.4
Total Genera (no)	2	2	9	3	9	11
Major Genera	*Skeletonema, Fragilaria*	*Nitzschia, Navicula*	*Nitzschia, Thalassiosira Navicula, Coscinodiscus*	*Nitzschia, Coscinodiscus Synedra, Navicula*	*Thalassiosira, Fragillaria, Thalassionema Thalassiothrix*	*Thalassiosira, Thalassionema, Thalassiothrix, Peridinium*

It is evident from the above table that the overall average values of phytoplankton crop in terms of phytopopulation, total genera and major genera were comparable to the past records. The average value of phytoplankton population recorded near effluent discharge point, at station 4, was similar to that of baseline and suggested no influence of effluent on phytoplankton in this region. However, markedly enhanced generic diversity in the present study suggested the environment conducive for phytoplankton production.

6.4.2 Zooplankton

The overall average values of present study were compared with the earlier findings and summarized in the table shown below:

Parameter	Jan 95 (Av)	Mar (97) (Av)	Apr (03) (Av)	Jan (04) (Av)	Nov (07)	
					(Av)	Stn 4
Biomass (ml/100m^3)	1.0	5.3	4.9	1.1	3.8	1.7
Population (no.x 10^3/100m^3)	1.2	14.9	9.5	11.4	21.2	12.9
Total Group (no)	10	9	13	11	14	15
Major group	Decapod larvae, Siphonophores, Copepods	Copepods, Decapod larvae Chaetognaths	Copepods, Lamellibranchs Decapods	Copepods, Lamellibranchs Decapods	Copepods, Chaetognaths, Decapod larvae	Copepods, Chaetognaths, Decapod larvae,

The above table indicated that the overall average values of zooplankton standing stock in terms of biomass, population and total group observed during present study compared well with that of earlier results and suggested that there is no impact of effluent on the distribution of zooplankton

standing stock in the region. No influence of effluent was clear by recording the similar zooplankton standing stock near the vicinity of effluent discharge point at Stn 4.

6.4.3 Macrobenthos

a) Intertidal

The overall average values of intertidal macrobenthic standing stock of the present study were compared with the values of earlier studies and discussed below:

Parameter	Jan (95) (Av)	Mar (97) (Av)	Apr (03) (Av)	Jan (04) (Av)	Nov (07) (Av)
Biomass (g/m^2,wet wt)	64.5	4.5	5.5	4.9	0.3
Population (no/m^2)	1220	921	1242	1097	75
Total Group (no)	5	4	4	3	1
Major group	Polychaete, Crab larvae	Polychaete, Brachyurans	Polychaete, Brachyurans	Polychaete, Brachyurans	Polychaete

As evident in above table, a marked decline was observed in intertidal macrobenthic standing stock in terms of biomass, population and total group during present study in the comparison to the earlier records, which could be due to spatial variation. Earlier intertidal samplings were conducted in the neighbouring area at Luhara and Lakhigam whereas the present sampling was at the intertidal region of Kantiyajal sustaining the sandy soil.

b) Subtidal

The average macrobenthic standing stock of the present study was compared with the past results and presented below:

Parameter	Jan (95) (Av)	Mar (97) (Av)	Apr (03) (Av)	Jan (04) (Av)	Nov (07)	
					(Av)	Stn 4
Biomass (g/m^2,wet wt)	-	-	<0.1	0.01	0.2	<0.1
Population (no/m^2)	-	21	4	14	28	26
Total Group (no)	-	1	1	1	1	1
Major group	Polychaete	Polychaete	Polychaete	Polychaete	Polychaete	Polychaete

The overall average values of subtidal macrobenthic standing stock of resent study was well comparable to the values of earlier results recorded in e surrounding region, as evident in above table. Group diversity was also ore or less similar to that of earlier findings. The major group viz. polychaete mained similar during the present study. The macrobenthic standing stock corded at station 4 was also in the agreement of earlier findings and ggested no influence on the stock.

ishery

The present result on fishery was compared with the earlier records nd presented below:

Year	Catch rate (kg/h)	Total species (no)	Major species
1995	3.4	F-6 P-3	*Harpadon nehereus*, *Arius* sp. *Parapenaeopsis* sp.
1997	0.5	F-2 P-2	*Johnius macropterus* *Parapenaeopsis* sp.
2003	4.2	F-8 P-3	*Harpadon nehereus* *Cynoglossus arel, Parapenaeopsis sculptilis*
2004	4.2	F-7 P-2	*Harpadon nehereus,* *Thryssa hamiltonii, Exopalaemon styliferus*
2007	2.4	F-10 P-3	*Harpadon nehereus* *Parapenaeopsis stylifera*

The above table indicated that the average trawl catch rate observed ring present study was well in the range of earlier records. The major ecies such as *Harpadon nehereus* remained common for the past 10 years the study region. This suggested that the release of effluent in the arshore waters off Kantiyajal did not have any significant impact on the hery.

ngroves

The shoreline of Kantiyajal in the corridor of 500 m of the pipeline was thout mangroves whereas immediately after that, dense mangrove getation was seen along the shore. However, the impact of effluent,

released in the nearshore waters off Kantiyajal, on the mangrove vegetation was not seen.

7 MANAGEMENT OF MARINE ENVIRONMENT

7 MANAGEMENT OF MARINE ENVIRONMENT

Basic framework for efficient management of the marine environment should address the following major issues:

(a) Marine environmental quality criteria.

(b) Pollution control.

(c) Periodic monitoring.

7.1 Marine environmental quality criteria

This report provides available information on the status of the Dahanu creek. The data presented in this report may be considered as a baseline of Dahanu creek for future monitoring for the release of the FGD effluent in the creek.

7.2 Pollution control

It should be ensured through regular monitoring that the quality of the effluent meets GPCB norms before release to the coastal waters off Kantiyajal. Similarly, the coastal water at the site of release should be monitored periodically for water quality, sediment quality and biological characteristics. All records must be maintained and should be available for inspection of the designated agency.

7.3 Periodic monitoring

A comprehensive marine quality-monitoring programme should be implemented in a planned manner as given below:

7.3.1 Sampling locations

Water quality, sediment quality and biological characteristics at same stations in the coastal waters off Kantiyajal as in present study should be periodically evaluated. Out of these, a few locations should be monitored over a tidal cycle with hourly measurements, for water quality.

Representative intertidal sites on either side of the effluent release location towards the shoreline should be selected and designated as experimental sites for monitoring the health of intertidal flora and fauna.

7.3.2 Parameters to be monitored

Water quality

Water samples obtained from surface and bottom, when the depth exceeds 5 m, should be analysed for temperature, pH, salinity, DO, BOD (or total organic carbon), nitrate, nitrite, ammonia, dissolved phosphate, PHc and phenols.

Sediment quality

Sediment from subtidal and intertidal regions should be analysed for grain size, C_{org}, phosphorous, chromium, nickel, copper, zinc, cadmium, lead, mercury and PHc.

Flora and fauna

Biological characteristics should be assessed based on primary productivity, phytopigments, phytoplankton populations and their generic diversity; zooplankton biomass, population and group diversity, macrobenthic biomass, population and group diversity of subtidal as well as intertidal, mangroves and fish quality.

7.3.3 Frequency of monitoring

The programme of monitoring may be scheduled as follows:

Periodic monitoring at every year should be undertaken.

The results from each monitoring should be compared with the baseline to identify changes for enabling corrective measures, if warranted.

8 MITIGATION MEASURES

8 MITIGATION MEASURES

The treatment of effluent of BEAIL should be carried out carefully to meet the norms of GPCB.

It is strongly suggested to conduct the periodic monitoring at every year to understand the changes occurring in the marine ecology, due to release of effluents in the coastal waters off Kantiyajal. In case of the impact of pollutants are observed, the treatment of effluent must be improved to meet the GPCB criteria strictly.

9 SUMMARY AND CONCLUSION

9 SUMMARY AND CONCLUSION

The overall results suggest that the status of water quality, sediment quality and biological characteristics off Kantiyajal recorded during present study were more or less similar to that of base line data and suggests no impact of the effluent on the ecology. The release of such effluent in the nearshore waters off Kantiyajal doesn't show any fish mortality in the region, which may be due to sufficient dilution of this effluent.

Management of marine environment is suggested by conducting monitoring every year. If the impacts of effluents are noticed on the ecology of Kantiyajal, the treatments of effluent are suggested to be improved to meet the standard of GPCB. The individual industries supplying the effluents to the CETP of BEAIL are required to treat their effluents at the source as per the GPCB criteria.

TABLES

Table 3.2.1: Water quality (average) in surrounding region off Kantiyajal during 1995-2004

Parameters	January 1995	March 1997	April 2003	January 2004
WT (°C)	22.8	22.1	27.5	22.5
pH	8.0	8.0	8.0	8.1
SS (mg/l)	3720	16495	827	1201
Sal (S%)	28.2	0.3	30.9	26.8
DO (mg/l)	7.7	5.0	3.5	5.1
BOD (mg/l)	1.8	0.5	1.6	2.5
PO_4^--P (µmol/l)	2.1	1.3	2.4	3.0
NO_3^--N (µmol/l)	24.2	29.5	29.3	32.5
NO_2^--N (µmol/l)	0.2	0.6	0.5	0.5
NH_4^+-N (µmol/l)	0.7	1.3	0.6	0.6
Phenol(µg/l)	2.1	18	38.1	50.3
PHc (µg/l)	11.5	2.3	0.5	3.9

Table 3.2.2: Intertidal sediment quality in surrounding region off Kantiyajal during 1997-2004

Elements	March 1997	April 2003	January 2004
Al (%)	-	6.4	6.2
Cr (µg/g)	126	85	116
Mn (µg/g)	1075	1148	1104
Fe (%)	5.0	7.2	6.8
Co (µg/g)	48	31	32
Ni (µg/g)	46	55	61
Cu (µg/g)	74	107	96
Zn (µg/g)	107	141	127
Hg (µg/g)	0.04	0.14	-
C_{org} (%)	0.5	0.4	0.5
P (µg/g)	331	504	480
PHc (µg/g)	0.2	0.1	0.3

Table 3.2.3: Subtidal sediment quality (average) in surrounding region off Kantiyajal during 1997-2004

Elements	March 1997	April 2003	January 2004
Al (%)	-	2.7	4.1
Cr (µg/g)	107	47	104
Mn (µg/g)	1133	923	1039
Fe (%)	4.0	3.2	6.4
Co (µg/g)	39	18	28
Ni (µg/g)	46	29	57
Cu (µg/g)	46	39	75
Zn (µg/g)	100	77	95
Hg (µg/g)	0.07	ND	0.3
Corg (%)	0.1	ND	0.3
P (µg/g)	463	380	384
PHc (µg/g)	0.2	0.1	0.3

Table 3.3.1: Phytoplankton pigments (average) in surrounding region off Kantiyajal during 1995-2004

Parameter	January 1995	March 1997	April 2003	January 2004
Chlorophyll *a* (mg/m^3)	1.0	0.7	0.2	0.3
Phaeophytin (mg/m^3)	0.6	0.7	0.4	0.7
Ratio chl *a* / phaeo	1.7	1.0	0.5	0.4

Table 3.3.2: Phytoplankton population (average) in surrounding region off Kantiyajal during 1995-2004

Parameter	January 1995	March 1997	April 2003	January 2004
Cell count (no x 10^3/l)	18.7	18.6	4.4	1.0
Total Genera (no)	2	2	9	3
Major Genera	*Skeletonema, Fragilaria*	*Nitzschia, Navicula*	*Nitzschia, Thalassiosira, Navicula,* Coscinodiscus	*Nitzschia,* Coscinodiscus, *Synedra, Navicula*

Table 3.3.3: Zooplankton standing stock (average) in surrounding region off Kantiyajal during 1995-2004

Parameter	January 1995	March 1997	April 2003	January 2004
Biomass (ml/100m^3)	1.0	5.3	4.9	1.1
Population (no.x10^3/100m^3)	1.2	14.9	9.5	11.4
Total Group (no)	10	9	13	11
Major group	Decapod larvae, siphonophores, copepods	Copepods, decapod larvae chaetognaths	Copepods, lamellibranchs, decapods	Copepods, lamellibranchs, decapods

Table 3.3.4: Intertidal macrobenthic standing stock (average) in surrounding region off Kantiyajal during 1995-2004

Parameter	January 1995	March 1997	April 2003	January 2004
Biomass (g/m^2,wet wt)	64.5	4.5	5.5	4.9
Population (no/m^2)	1220	921	1242	1097
Total Group (no)	5	4	4	3
Major group	Polychaete, crab larvae	Polychaete, brachyurans	Polychaete, brachyurans	Polychaete, brachyurans

Table 3.3.5: Subtidal macrobenthic standing stock (average) in surrounding region off Kantiyajal during 1995-2004

Parameter	January 1995	March 1997	April 2003	January 2004
Biomass (g/m^2, wet wt)	-	-	<0.1	0.01
Population (no/m^2)	-	21	4	14
Total Group (no)	-	1	1	1
Major group	Polychaete	Polychaete	Polychaete	Polychaete

Table 3.3.6: Catch rate of experimental trawling (average) in surrounding region off Kantiyajal during 1995-2004

Year	Catch rate (kg/h)	Total species	Major species
1995	3.4	F-6	*Harpadon nehereus*, *Arius* sp.
		P-3	*Parapenaeopsis* sp.
1997	0.5	F-2	*Johnius macropterus*
		P-2	*Parapenaeopsis* sp.
2003	4.2	F-8	*Harpadon nehereus*, *Cynoglossus arel*
		P-3	*Parapenaeopsis sculptilis*
2004	4.2	F-7	*Harpadon nehereus*, *Thryssa hamiltonii*
		P-2	*Exopalaemon styliferus*

Table 5.1.1: Water quality off Kantiyajal during November 2007

Parameter		Station 1			Station 2		
	Level	Min	Max	Average	Min	Max	Average
Temperature (°C)	S	28.5	28.5	28.5	26.5	26.5	26.5
	B	28.0	28.0	28.0	26.5	26.5	26.5
		(29.0)	(29.0)	(29.0)	(26.5)	(26.5)	(26.5)
pH	S	8.0	8.0	8.0	8.0	8.0	8.0
	B	8.0	8.0	8.0	8.1	8.1	8.1
SS (mg/l)	S	-	-	225*	-	-	550*
	B	-	-	1122*	*	*	568*
Salinity (ppt)	S	25.0	25.2	25.1	25.0	25.0	25.0
	B	25.0	25.0	25.0	325.0	25.2	25.1
DO (ml/l)	S	1.7	2.9	2.3	1.9	3.9	2.9
	B	2.6	3.2	2.9	2.3	2.6	2.5
BOD (mg/l)	S	-	-	1.9*	-	-	1.9*
	B	-	-	<0.2*	-	-	<0.2*
PO_4^{3-}-P (µmol/l)	S	2.1	2.8	2.5	2.5	2.5	2.5
	B	3.2	3.2	3.2	3.0	3.1	3.1
P_{TOTAL} (µmol/l)	S	-	-	1.5*	-	-	1.0*
	B	-	-	2.1	-	-	2.2*
NO_3^- N (µmol/l)	S	20.1	22.8	21.4	37.2	42.3	39.7
	B	20.3	23.5	21.9	32.3	40.6	39.4
NO_2^- N (µmol/l)	S	0.5	0.5	0.5	0.7	0.8	0.8
	B	0.4	0.5	0.5	0.7	0.8	0.8
NH_4^- N (µmol/l)	S	3.7	5.8	4.7	2.5	2.8	2.7
	B	1.1	1.3	1.2	4.5	8.7	6.6
N_{TOTAL} (µmol/l)	S	-	-	38.3*	-	-	49.0*
	B	-	-	46.7*	-	-	39.6*
PHc(µg/l)	1m	-	-	4.3*	-	-	2.8*
Phenols (µg/l)	S	-	-	15.1*	-	-	17.9*

Air temperature (°C)given in parenthesis.
*= Single value

Table 5.1.2: Water quality off Kantiyajal during November 2007

Parameter		Station 3			Station 4		
	Level	Min	Max	Average	Min	Max	Average
Temperature (°C)	S	27.3	27.6	27.5	24.5	28.5	26.7
	B	27.2	27.5	27.4	25.0	28.0	26.8
		(26.5)	(29.8)	(28.3)	(26.0)	(29.5)	(27.8)
pH	S	7.9	8.0	8.0	7.9	8.0	8.0
	B	7.9	8.0	8.0	8.0	8.1	8.1
SS (mg/l)	S	-	-	319*	92	343	218
	B	-	-	1644*	574	1916	1245
Salinity (ppt)	S	25.4	26.1	25.7	24.3	24.8	24.6
	B	25.4	26.2	25.7	24.1	25.4	24.8
DO (ml/l)	S	4.4	4.8	4.6	4.0	4.9	4.6
	B	4.6	4.8	4.7	4.1	5.2	4.7
BOD (mg/l)	S	-	-	2.7*	2.5	2.6	2.6
	B	-	-	1.9*	2.1	2.8	2.5
PO_4^{3-}-P (µmol/l)	S	2.3	2.9	2.7	1.9	2.8	2.4
	B	3.1	3.6	3.4	2.7	3.4	3.1
P_{total} (µmol/l)	S	1.2	2.1	1.7	1.7	1.8	1.8
	B	2.2	2.2	2.2	-	-	-
NO_3^- N (µmol/l)	S	31.3	40.7	36.2	33.4	41.0	37.3
	B	34.1	38.4	36.4	34.2	40.9	37.9
NO_2^- N (µmol/l)	S	0.7	0.9	0.8	0.3	0.6	0.5
	B	0.9	1.1	1.0	0.4	0.5	0.5
NH_4^- N (µmol/l)	S	ND	5.3	2.1	0.2	2.6	2.4
	B	0.6	3.5	2.0	0.2	0.8	0.5
N_{total} (µmol/l)	S	42.6	43.3	43.0	33.9	39.9	36.9
	B	34.4	37.6	36.0	-	-	-
PHc(µg/l)	1m	2.5	6.1	4.3	3.0	7.3	5.2
Phenols (µg/l)	S	ND	13.4	6.7	51.8	57.4	54.6

Air temperature (°C)given in parenthesis.

*= Single value

Table 5.1.3: Water Quality off Kantiyajal during November 2007

Parameter		Station 5			Station 6		
	Level	Min	Max	Average	Min	Max	Average
Temperature (°C)	S	28.5	28.5	28.5	27.5	27.5	27.5
	B	28.0	28.0	28.0	28.0	28.0	28.0
		(27.5)	(27.5)	(27.5)	(30.0)	(30.0)	(30.0)
pH	S	8.0	8.0	8.0	8.0	8.0	8.0
	B	8.0	8.0	8.0	8.0	8.0	8.0
SS (mg/l)	S	-	-	91*	-	-	111*
	B	-	-	783*	-	-	625*
Salinity (ppt)	S	25.2	25.2	25.2	25.0	25.0	25.0
	B	25.7	25.7	25.7	25.0	25.2	25.1
DO (ml/l)	S	1.5	1.7	1.6	1.1	1.9	1.5
	B	1.7	2.1	1.9	2.1	3.3	2.7
BOD (mg/l)	S	-	-	<0.2*	-	-	1.0*
	B	-	-	<0.2*	-	-	0.6*
PO_4^{3-}-P (µmol/l)	S	1.5	1.9	1.7	1.1	2.5	1.8
	B	3.0	3.1	3.1	3.0	3.0	3.0
P_{total} (µmol/l)	S	-	-	2.2*	-	-	-
	B	-	-	2.1*	-	-	1.5*
NO_3^- N (µmol/l)	S	20.1	20.2	20.2	21.8	23.1	22.4
	B	21.1	22.3	22.2	23.9	24.3	24.0
NO_2^- N (µmol/l)	S	0.5	0.5	0.5	0.4	0.6	0.5
	B	0.4	0.4	0.4	0.4	0.4	0.4
NH_4^+ N (µmol/l)	S	ND	ND	ND	ND	ND	ND
	B	0.8	1.2	1.0	1.1	1.2	1.2
N_{total} (µmol/l)	S	-	-	35.5*	-	-	-
	B	-	-	63.8*	-	-	56.9*
PHc(µg/l)	1m	-	-	2.9*	-	-	4.4*
Phenols (µg/l)	S	-	-	44.3*	-	-	31.9*

Air temperature (°C)given in parenthesis.

*= Single value

Table 5.1.4: Water quality off Kantiyajal during November 2007

Parameter		Station 7			Station 8		
	Level	Min	Max	Average	Min	Max	Average
Temperature (°C)	S	28.0	28.0	28.0	27.0	27.0	27.0
	B	27.5	27.5	27.5	27.0	27.0	27.0
		(29.0)	(29.0)	(29.0)	(25.0)	(25.0)	(25.0)
pH	S	8.0	8.0	8.0	7.9	7.9	7.9
	B	8.1	8.1	8.1	8.1	8.1	8.1
SS (mg/l)	S	-	-	335*	-	-	156*
	B	-	-	661*	-	-	310*
Salinity (ppt)	S	25.3	25.5	25.4	25.3	25.4	25.4
	B	25.5	25.5	25.5	25.3	25.4	25.4
DO (ml/l)	S	2.7	2.7	2.7	2.4	2.4	2.4
	B	1.7	2.0	1.9	2.2	2.2	2.2
BOD (mg/l)	S	-	-	<0.2	-	-	<0.2
	B	-	-	<0.2	-	-	<0.2
PO_4^{3-}-P (µmol/l)	S	1.9	1.9	1.9	1.8	1.9	1.9
	B	2.8	2.9	2.9	2.8	3.0	2.9
P_{total} (µmol/l)	S	-	-	-	-	-	-
	B	-	-	2.0*	-	-	-
NO_3^- N (µmol/l)	S	23.3	27.1	25.2	23.9	31.0	27.4
	B	27.0	28.1	27.5	21.8	22.8	22.3
NO_2^- N (µmol/l)	S	0.5	0.5	0.5	0.3	0.3	0.3
	B	0.4	0.4	0.4	0.3	0.4	0.4
NH_4^+ N (µmol/l)	S	3.7	5.8	4.7	7.5	10.1	8.8
	B	6.7	6.8	6.8	7.0	7.3	7.2
N_{total} (µmol/l)	S	-	-	-	-	-	-
	B	-	-	36.9*	-	-	-
PHc(µg/l)	1m	-	-	5.7*	-	-	2.2*
Phenols (µg/l)	S	-	-	13.7*	-	-	32.8*

Air temperature (°C)given in parenthesis.

*= Single value

Table 5.1.5: Water quality off Kantiyajal during November 2007.

Parameter		Station 9		
	Level	Min	Max	Average
Temperature (°C)	S	25.5	27.3	26.3
	B	25.0	27.3	26.2
		(23.1)	(29.9)	(26.7)
pH	S	8.0	8.1	8.1
	B	8.0	8.1	8.1
SS (mg/l)	S	617	845	731
	B	2160	2860	2510
Salinity (ppt)	S	22.0	25.9	24.0
	B	23.4	25.7	24.5
DO (ml/l)	S	4.6	5.1	4.9
	B	4.9	5.3	5.2
BOD (mg/l)	S	1.4	2.9	2.1
	B	1.4	2.2	1.8
PO_4^{3-}-P (µmol/l)	S	2.1	3.3	2.8
	B	2.9	3.7	3.2
P_{total} (µmol/l)	S	ND	2.4	1.2
	B	2.0	2.4	2.2
NO_3^- N (µmol/l)	S	31.0	43.3	37.4
	B	30.8	39.5	35.3
NO_2^- N (µmol/l)	S	0.5	0.8	0.6
	B	0.5	1.0	0.8
NH_4^- N (µmol/l)	S	0.7	9.0	4.9
	B	1.4	6.5	4.0
N_{total} (µmol/l)	S	1.8	44.6	23.2
	B	44.6	45.8	45.2
PHc(µg/l)	1m	4.6	8.7	6.6
Phenols (µg/l)	S	31.9	34.7	33.3

Air temperature (°C)given in parenthesis.

*= Single value

Table 5.2.1: Intertidal sediment quality around Kantiyajal during November 2007

Transect	Texture			Elements											
	Sand (%)	Silt (%)	Clay (%)	Al (%)	Cr (µg/g)	Mn (µg/g)	Fe (%)	Co (µg/g)	Ni (µg/g)	Cu (µg/g)	Zn (µg/g)	Hg (µg/g)	C (%)	P (µg/g)	PHc (µg/g)
TR1	91.8	5.2	3.0	3.8	234	2407	13.8	62	103	104	230	ND	0.9	70	0.1
TR 2	56.0	41.0	3.0	6.4	120	702	5.9	36	64	82	82	0.01	0.6	483	0.4
TR 3	88.4	8.8	2.8	4.2	128	1210	4.4	30	48	57	71	ND	1.2	392	0.1
TR 4	93. 6	4.4	2.0	3.9	237	2205	11.2	56	96	149	181	ND	0.7	120	0.1

Table 5.2.2: Sediment quality around Kantiyajal during November 2007

Station	Texture			Elements											
	Sand (%)	Silt (%)	Clay (%)	Al (%)	Cr (µg/g)	Mn (µg/g)	Fe (%)	Co (µg/g)	Ni (µg/g)	Cu (µg/g)	Zn (µg/g)	Hg (µg/g)	C (%)	P (µg/g)	PHc (µg/g)
1	88.2	9.6	2.2	4.7	202	1654	7.9	49	82	117	124	ND	0.1	110	1.2
2	55.4	41.6	3.0	6.9	138	1145	6.7	45	79	103	91	0.01	0.3	258	1.1
3	93.2	4.6	2.2	4.2	209	1746	8.2	48	80	111	135	ND	0.1	139	0. 5
4	78.0	18.6	3.4	5.4	109	1183	4.5	32	56	169	60	0.01	0.4	498	0. 5
5	84.6	12.0	3.4	4.7	132	1339	4.8	34	60	70	73	ND	1.2	530	0.9
6	81.8	15.2	3.0	4.4	165	1672	7.8	46	81	107	116	ND	1.1	61	0. 5
7	81.8	14.8	3.4	4.3	133	1500	4.8	33	58	70	70	ND	1.0	571	0.9
8	89.2	7.4	3.4	4.0	182	1666	6.3	39	70	81	91	0.01	0.4	349	0.8
9	69.2	26.6	4.2	3.8	81	857	2.3	19	34	35	29	ND	0.6	402	0.4

Table 5.3.1: Range and average (parenthesis) of phytopigment at different stations in the coastal waters off Kantiyajal during November 2007

Station	Date	Chlorophyll *a* (mg/m^3)		Phaeophytin (mg/m^3)		Ratio of Chl *a* to Phaeo	
		S	B	S	B	S	B
1	17.11.07	0.9 – 1.1 (1.0)	1.5 – 1.7 (1.6)	0.5 – 0.6 (0.6)	2.0 – 2.1 (2.1)	1.4 – 2.0 (1.7)	0.8 – 0.8 (0.8)
2	21.11.07	0.7 – 1.0 (0.9)	0.1 – 0.9 (0.5)	2.0 – 2.4 (2.2)	0.6 – 2.3 (1.5)	0.3 – 0.5 (0.4)	0.2 – 0.4 (0.3)
3	20.11.07	0.4– 1.3 (0.8)	0.5 - 0.8 (0.6)	0.1 – 1.2 (0.8)	1.1 – 2.0 (1.4)	0.5– 7.8 (2.5)	0.3– 0.7 (0.5)
4	16.11.07	1.0 – 1.9 (1.5)	0.9 – 1.7 (1.4)	0.1 – 0.7 (0.3)	0.3– 1.4 (0.9)	2.8 – 31.8 (10.9)	1.0 – 4.8 (1.6)
5	17.11.07	0.5– 1.0 (0.8)	0.1 – 0.7 (0.4)	0.2 – 0.3 (0.3)	2.1 – 2.2 (2.2)	2.9 – 3.2 (3.0)	0.1 – 0.3 (0.2)
6	17.11.07	0.7– 0.7 (0.7)	0.6– 0.7 (0.7)	0.3 – 0.3 (0.3)	3.1 – 3.6 (3.4)	2.3 – 2.4 (2.4)	0.2 – 0.2 (0.2)
7	19.11.07	0.5 – 0.6 (0.6)	0.4 – 0.5 (0.5)	0.2 – 0.2 (0.2)	0.5 – 0.7 (0.6)	2.3 – 2.8 (2.6)	0.7– 0.7 (0.7)
8	19.11.07	0.5 – 0.6 (0.6)	0.2 – 0.6 (0.4)	0.3 – 0.8 (0.6)	1.0 – 1.1 (1.1)	0.5 – 2.0 (1.3)	0.1 – 0.6 (0.4)
9	23.11.07	0.4 – 1.1 (0.8)	0.4 – 1.1 (0.8)	0.6 – 1.7 (1.1)	1.2 – 2.5 (1.6)	0.3 – 0.9 (0.7)	0.3 – 0.8 (0.5)

Table 5.3.2: Range and average of phytoplankton population at different stations in the coastal waters off Kantiyajal during November 2007

Station	Date	Cell count (no x 10^3/l)		Total genera (no)		Major genera	
		S	B	S	B	S	B
1	17.11.07	13.6*	14.4*	10*	9*	*Thalassionema* *Thalassiosira* *Ditylium* *Thalassiothrix*	*Thalassiosira* *Thalassiothrix* *Prorocentrum* *Navicula*
2	21.11.07	9.6*	8.8*	7*	6*	*Peridinium* *Thalassiothrix* *Thalassiosira* *Amphiprora*	*Thalassiothrix* *Peridinium* *Thalassiosira* *Amphiprora*
3	20.11.07	7.2 –11.2 (9.3)	8.0 – 8.8 (8.4)	6 – 9 (8)	6 – 7 (7)	*Peridinium* *Cyclotella* *Nitzschia* *Thalassiothrix*	*Peridinium* *Thalassiothrix* *Thalassiosira* *Cyclotella*
4	16.11.07	18.4 – 22.4 (20.4)	13.6 – 19.2 (16.4)	11 – 12 (12)	8 – 12 (10)	*Thalassiosira* *Peridinium* *Thalassionema* *Thalassiothrix*	*Thalassiosira* *Thalassionema* *Thalassiothrix* *Peridinium*
5	17.11.07	16.0*	5.6*	11*	5*	*Peridinium* *Rhizosolenia* *Thalassiosira* *Ditylium*	*Peridinium* *Rhizosolenia* *Thalassiosira* *Bacteriastrum*

* = Single value

Table 5.3.2 (contd..2)

Station	Date	Cell count (no x 10^3/l)		Total genera (no)		Major genera	
		S	B	S	B	S	B
6	17.11.07	17.6*	9.6*	12*	9*	*Thalassionema* *Thalassiothrix* *Nitzschia* *Navicula*	*Thalassionema* *Thalassiosira* *Navicula* *Thalassiothrix*
7	19.11.07	16.8*	10.4*	11*	10*	*Fragilaria* *Guinardia* *Bacteriastrum* *Coscinodiscus*	*Thalassionema* *Guinardia* *Coscinodiscus* *Cyclotella*
8	19.11.07	15.2*	12.0*	8*	8*	*Fragilaria* *Guinardia* *Cyclotella* *Thalassiothrix*	*Thalassiothrix* *Thalassionema* *Fragilaria* *Cyclotella*
9	23.11.07	22.4 – 28.8 (25.6)	22.4 – 35.2 (28.8)	5 – 5 (5)	5 – 8 (7)	*Thalassiothrix* *Fragilaria* *Peridinium* *Thalassiosira*	*Fragilaria* *Thalassiothrix* *Thalassiosira* *Coscinodiscus*

Table 5.3.3: Percentage composition of phytoplankton population at different stations in the coastal waters off Kantiyajal during November 2007

Algal Genera	Station								
	1	2	3	4	5	6	7	8	9
Amphiprora	-	8.7	-	-	-	-	-	-	-
Bacteriastrum	-	-	3.6	-	7.4	5.9	5.9	-	-
Biddulphia	2.9	-	-	3.3	-	2.9	2.9	-	-
Campyloneis	2.9	-	-	-	-	-	-	-	-
Ceratium	-	-	-	-	3.7	-	-	-	-
Cerataulina	-	-	-	-	3.7	-	-	-	-
Chaetoceros	-	-	-	7.6	-	-	-	-	-
Coscinodiscus	5.7	-	7.1	6.5	7.4	5.9	8.8	5.9	7.9
Cyclotella	8.6	4.3	12.5	5.4	3.7	2.9	2.9	15.0	5.3
Diploneis	-	4.3	-	-	-	-	-	-	-
Ditylium	5.7	-	1.8	1.1	7.4	2.9	-	-	-
Fragilaria	-	-	-	-	-	-	23.6	21.0	34.3
Guinardia	-	-	-	-	3.7	-	14.7	12.0	2.6
Gyrosigma	-	-	1.8	1.1	-	-	-	-	-
Melosira	-	-	1.8	3.3	-	-	-	-	-
Navicula	11.4	-	1.8	3.3	=	11.8	5.9	2.9	-
Nitzschia	2.9	4.3	8.9	-	-	11.8	-	-	-
Peridinium	5.7	35.1	23.2	8.7	37.1	5.9	2.9	2.9	10.5
Prorocentrum	8.6	-	-	1.1	-	-	-	-	-
Rhizosolenia	-	4.3	3.6	3.3	11.1	8.8	-	-	2.6
Streptotheca	-	-	1.8	1.1	-	-	2.9	-	-
Surirella	-	4.3	1.8	2.2	-	-	5.9	-	2.6
Thalassionema	14.3	-	3.6	15.2	3.7	14.6	11.8	12.0	-
Thalassiosira	17.1	13.0	9.5	25.9	11.1	11.8	5.9	5.9	10.5
Thalassiothrix	14.3	21.7	19.0	10.9	-	11.8	5.9	21.0	23.7
Striatella	-	-	-	-	-	-	-	2.9	-
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 5.3.4: Range and average (parenthesis) of zooplankton at different in the coastal waters off Kantiyajal during November 2007

Station (Date)	Biomass (ml/100 m^3)	Population (no $x10^3$/100m^3)	Total groups (no)	Major groups (%)
1 (17.11.07)	1.7 – 7.1 (4.4)	6.9 – 12.7 (9.8)	14 – 18 (16)	Copepods (85.8) chaetognaths (11.9), polychaetes (0.5), lamellibranchs (0.4), medusae (0.5), decapod larvae (0.2) fish larvae (0.2), foraminiferans (0.2), gastropods (0.2), mysids (0.1), siphonophores (0.1) others (0.1)
2 (21.11.07)	6.0 – 7.7 (6.9)	34.7 – 53.8 (44.2)	13 – 15 (14)	Copepods (84.1) chaetognaths (8.0), lamellibranchs (5.9), mysids (0.6), gastropods (0.5), polychaetes (0.5), decapod larvae (0.1) fish larvae (0.1), medusae (0.5), amphipods (0.1), others (0.1)
3 (20.11.07)	1.8 – 8.1 (4.2)	5.8 – 21.0 (15.0)	11 – 16 (14)	Copepods (83.8) chaetognaths (6.9), polychaetes (4.4), lamellibranchs (1.7), decapods (1.2), medusae (0.7), mysids (0.7), gastropods (0.5), amphipods (0.2), ctenophora (0.1), isopods (0.1), others (0.2)
4 (16.11.07)	0.7– 3.9 (1.7)	2.2 – 37.9 (12.9)	12 – 17 (15)	Copepods (89.4) chaetognaths (8.3), decapod larvae (0.5) fish larvae (0.4), gastropods (0.4), lamellibranchs (0.3),

Table 5.3.4 (contd....2)

Station (Date)	Biomass (ml/100 m^3)	Population (no $x10^3/100m^3$)	Total groups (no)	Major groups (%)
5 (17.11.07)	2.7 – 11.2 (7.0)	7.2 – 26.0 (16.6)	15 – 15 (15)	Copepods (78.8), chaetognaths (14.3), foraminiferans (4.3), decapod larvae (1.4) fish larvae (0.5), polychaetes (0.1), siphonophores (0.1) lamellibranchs (0.1), medusae (0.1), others (0.1)
6 (17.11.07)	1.5 – 2.2 (1.9)	11.3 – 22.6 (16.9)	11 – 13 (12)	Copepods (77.2) chaetognaths (21.3), fish larvae (0.8) decapod larvae (0.3), medusae (0.2), siphonophores (0.1), others (0.1)
7 (19.11.07)	1.4 – 1.9 (1.7)	13.4 – 30.5 (22.0)	13 – 14 (14)	Copepods (91.0) chaetognaths (8.1), decapod larvae (0.4) mysids (0.1), lamellibranchs (0.1), medisae (0.1) fish larvae (0.1) others (0.1)
8 (19.11.07)	1.5 – 2.4 (2.0)	14.7 – 21.6 (18.2)	12 – 15 (14)	Copepods (92.0) chaetognaths (5.6), polychaetes (1.0), lamellibranchs (0.3), medusae (0.2), gastropods (0.2), fish larvae (0.2), decapod larvae (0.2), mysids (0.1), foraminiferans (0.1), others (0.1)

Table 5.3.4 (contd....3)

Station (Date)	Biomass (ml/100 m^3)	Population (nox10^5/100m^3)	Total groups (no)	Major groups (%)
9 (23.11.07)	2.8 – 6.5 (4.3)	12.9 – 80.8 (35.1)	12 – 16 (15)	Copepods (91.1), chaetognaths (6.1), lamellibranchs (0.6), decapod larvae (0.4), polycheates (0.4), gastropods (0.4), medusae (0.3), ctenophora (0.2), fish larvae (0.1), siphonophores (0.1), mysids (0.1), isopods (0.1), others (0.1)

Table 5.3.5: Abundance of zooplankton in the coastal waters off Kantiyajal during November 2007

Faunal group	Station								
	1	2	3	4	5	6	7	8	9
Foraminiferans	+	+	+	+	+	-	+	+	+
Siphonophores	+	+	+	+	+	+	+	+	+
Medusae	+	+	+	+	+	+	+	+	+
Ctenophores	+	+	+	+	+	-	+	+	+
Chaetognaths	+	+	+	+	+	+	+	+	+
Polychaetes	+	+	+	+	+	+	+	+	+
Cladocerans	+	-	-	-	-	-	-	-	-
Ostracods	+	+	+	+	+	+	-	-	+
Copepods	+	+	+	+	+	+	+	+	+
Amphipods	+	+	+	+	+	+	+	+	+
Mysids	+	+	+	+	+	+	+	+	+
Lucifer sp.	+	-	-	-	-	-	-	-	+
Decapod larvae	+	+	+	+	+	+	+	+	+
Stomatopods	-	-	-	+	+	+	-	-	+
Gastropods	+	+	+	+	+	+	+	+	+
Lamellibranchs	+	+	+	+	+	+	+	+	+
Appendicularians	-	-	+	+	-	-	-	-	-
Fish eggs	+	-	-	+	-	-	+	+	+
Fish larvae	+	+	+	+	+	+	+	+	+
Isopods	+	+	+	+	+	+	+	+	+
Acetes sp.	+	+	+	+	+	+	+	+	+
Marine insects	-	-	-	+	-	-	-	-	+

Table 5.3.6: Range and average (parenthesis) of intertidal macrobenthic fauna at different water levels at Kantiyajal during November 2007

Transect	Biomass (g/m^2 : wet wt.)	Population (no/ m^2)	Faunal group (no)	Major group
Transect – I				
HW	0.01 – 1.78 (0.88)	25 – 525 (219)	1 – 2 (1)	Polychaetes
MW	0 – 0.1 (0.04)	0 – 125 (44)	0 – 1 (1)	Polychaetes
LW	Nil	Nil	Nil	-
Transect - II				
HW	0.01 – 1.28 (0.56)	25 – 625 (312)	1 – 2 (1)	Polychaetes
MW	0.3 – 0.58 (0.47)	175 – 275 (225)	1	Polychaetes
LW	Nil	Nil	Nil	-
Transect - III				
HW	0 – 0.08 (0.04)	0 – 50 (24)	0 – 2 (1)	Pelecypods, polychaetes, amphipods brachyurans
MW	0 – 0.02 (0.01)	0 – 25 (6)	0 – 1 (1)	Amphipods
LW	0 – 0.03 (0.01)	0 – 25 (6)	0 – 1 (1)	Polychaetes isopods

Table 5.3.6 (contd.2)

Transect	Biomass (g/m^2, wet wt)	Population (no/ m^2)	Faunal group (no)	Major group
Transect – IV				
HW	<0.1 – 0.93 (0.45)	25 – 50 (37)	1 – 2 (2)	Decapod larvae
MW	0 – 0.1 (0.04)	0 – 50 (25)	0 – 1 (1)	Decapod larvae polychaetes mysids
LW	Nil	Nil	Nil	-

Table 5.3.7: Intertidal macrobenthos composition (%) in coastal waters off Kantiyajal during November 2007

Faunal Groups	Transect - I			Transect - II			Transect - III			Transect - IV			Average
	HW	MW	LW	HW	MW	LW	HW	MW	LW	HW	MW	LW	
Phylum Mollusca													
Gastropods										16.2			0.7
Pelecypods			N			N	25.0					N	0.7
Phylum Annelida													
Polychaetes	94.1	100.0	I	98.1	100.0	I	25.0		50.0		24.0	I	88.4
Phylum Arthropoda													
Mysids			L	1.9		L				16.2	24.0	L	2.0
Isopods									50.0				0.7
Amphipods							25.0	100.0					1.3
Brachyurans	5.9						25.0						2.1
Decapod larvae										35.1	52.0		2.9
Penaeids										16.2			0.7
Phylum Chordata													
Fish larvae										16.2			0.7

Table 5.3.8: Range and average (parenthesis) of subtidal macrobenthic fauna at different water levels at Kantiyajal during November 2007

Station	Biomass (g/m^2, wet wt)	Population (no/ m^2)	Faunal group (no)	Major group
1	Nil	Nil	Nil	Nil
2	0.18 – 0.93 (0.54)	50 – 150 (106)	1 – 2 (1)	Polychaetes
3	0 – 0.2 (0.06)	0 – 25 (13)	0 – 1 (1)	Polychaetes
4	0 – 0.03 (0.01)	0 – 50 (26)	0 – 2 (1)	Polychaetes insects
5	0 – 0.06 (0.02)	0 – 50 (19)	0 – 2 (1)	Decapod larvae polychaetes
6	Nil	Nil	Nil	Nil
7	0 – 0.05 (0.02)	0 – 50 (19)	0 – 1 (1)	Isopods
8	0 – 0.01 (<0.01)	0 – 25 (6)	0 – 1 (1)	Polychaetes
9	0 – 0.55 (0.14)	0 – 25 (6)	0 – 1 (1)	Polychaetes
Over all Average	0 – 0.93 (0.09)	0 – 150 (22)	0 – 2 (1)	Polychaetes

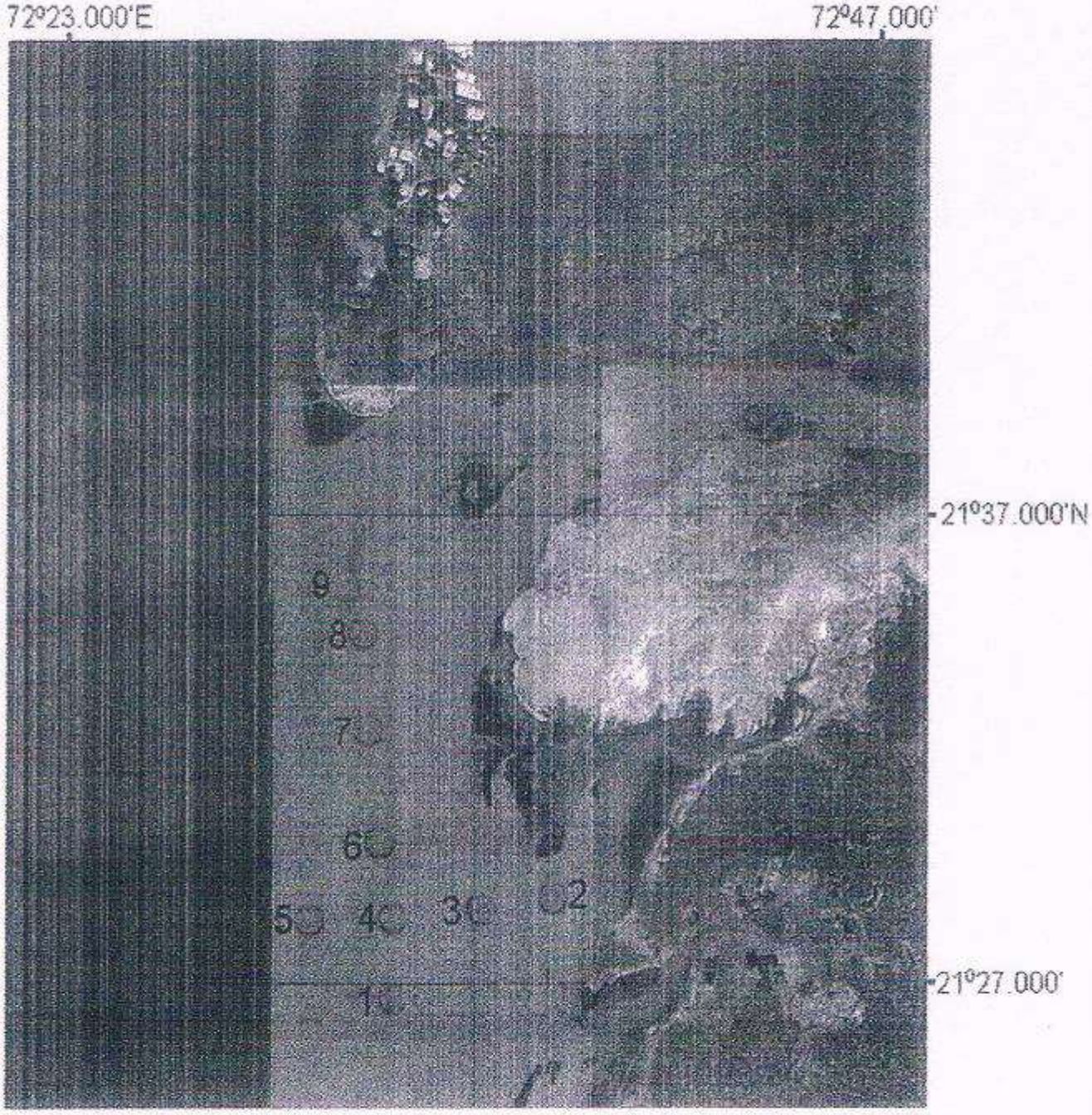
Table 5.3.9: Subtidal macrobenthos composition (%) in the coastal waters off Kantiyajal during November 2007

Faunal Groups	Stations									Average
	1	2	3	4	5	6	7	8	9	
Phylum Annelida										
Polychaetes		94.3	100.0	50.0	31.6			100.0	100.0	73.9
Phylum Arthropoda	Nil					Nil				
Mysids		5.7								3.1
Isopods							100.0			9.7
Decapod larvae					68.4					6.7
Insect				50.0						6.7

Table 5.3.10: Fish catch off Kantiyajal during November 2007

Station (Date)	Time (h)	Catch (Kg/h)	No. Of Species	Major species
3 (18.11.07)	12:30	2.6	F-9	Fishes: *Harpadon nehereus, Arius sona, Synaptura commersoniana, Otolithoides biauritus, Otolithoides sp., Johnius glaucus, Trypochen vaginar, Johnieops macrorhynus, Eleutheronema tetradactylum.*
			P-3	Prawns: *Parapenaeopsis stylifera, Exopalaemon styiifera, Acetes indicus*
			O-3	Others: *Matuta lunaris*, Matuta plaipes, *Octopus.*
5 (18.11.07)	11:00	2.0	F-10	Fishes: *Harpadon nehereus, Arius sona, Arius sp., Synaptura commersoniana, Otolithoides biauritus, Otolithoides sp., Eleutheronema tetradactylum, Johnius glaucus, Trypochen vaginar, Johnieops macrorhynus.*
			P-2	*Prawns: Parapenaeopsis stylifera, Exopalaemon stylifera.*
			O-4	Others: *Matuta lunaris, Squilla, Matuta plaipes, Octopus.*
6 (24.11.07)	12:15	2.7	F-10	Fishes: *Harpadon nehereus, Eleutheronema tetradactylum, Synaptura commersoniana, Otolithoides sp, Johnius glaucus, Arius sona, Arius sp., Trypochen vaginar, Otolithoides biauritus, Johnieops macrorhynus.*
			P-4	Prawns: *Parapenaeopsis stylifera, Exopalaemon stylifera, Acetes indicus, Metapenaeus dobsoni.*
			O-4	Others: *Matuta lunaris, Squilla, Matuta plaipes.*

FIGURES



1.1.1 : Sampling location in near shore waters off Kantiyajal

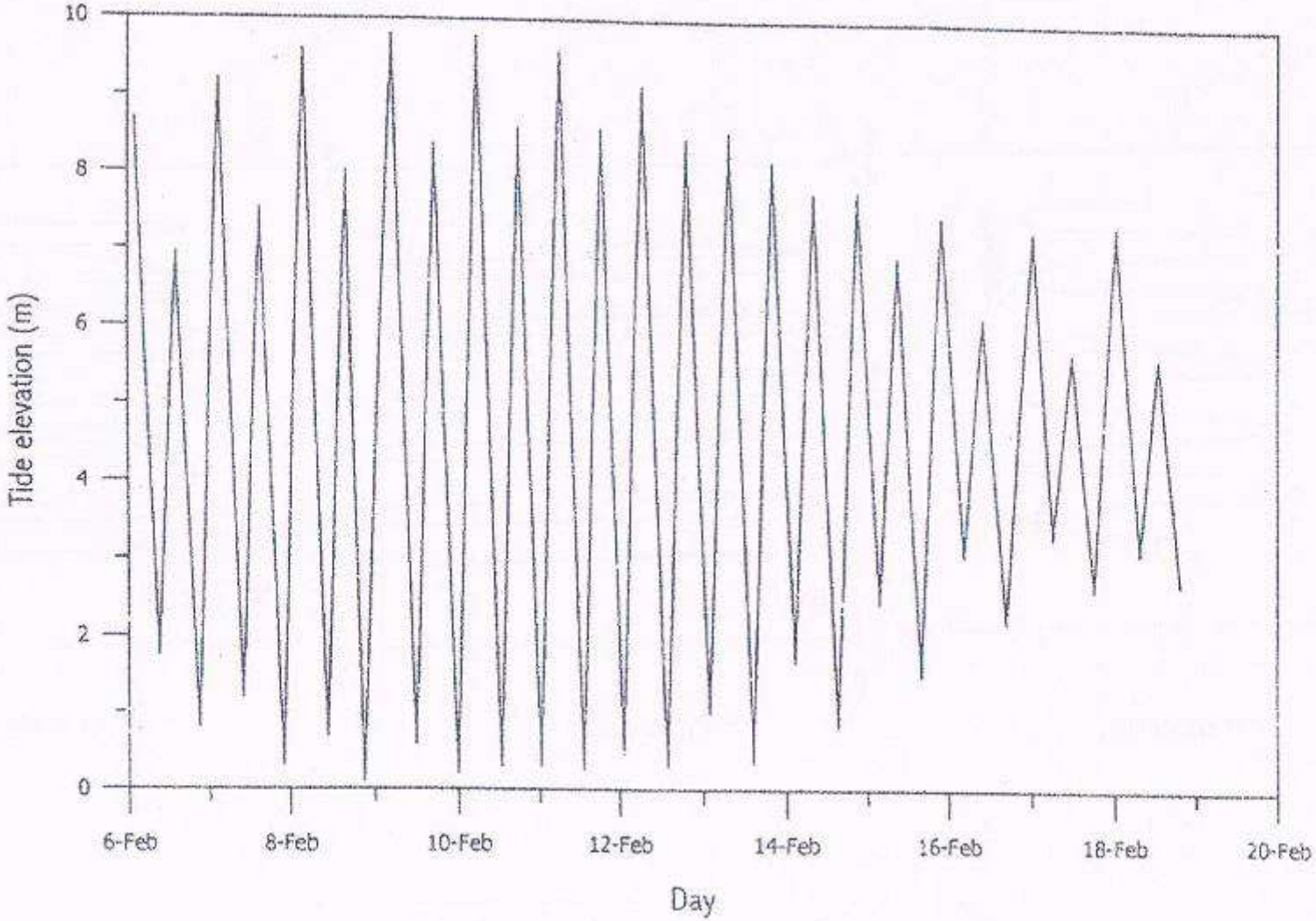


Figure 3.1.1: Tide at Kantiyajal during 6-19 February, 2001

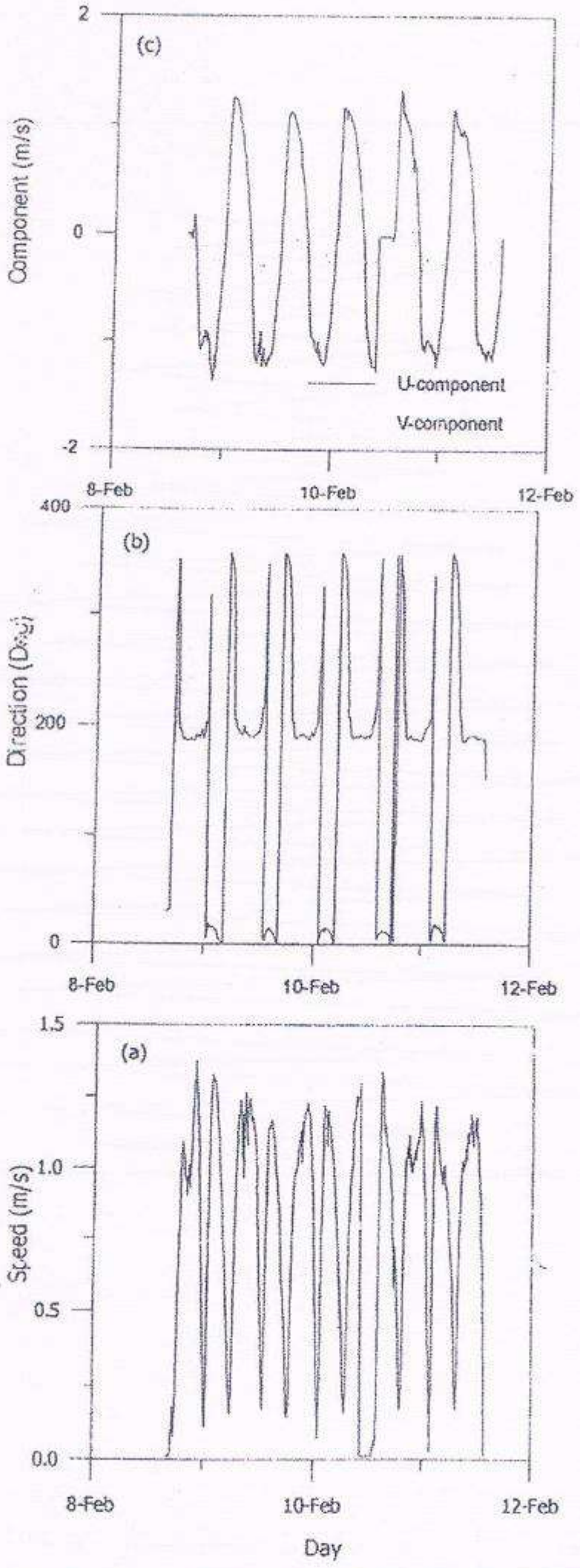


Figure 3.1.2: Current speed (a), direction (b) and components (c) at station 1 during

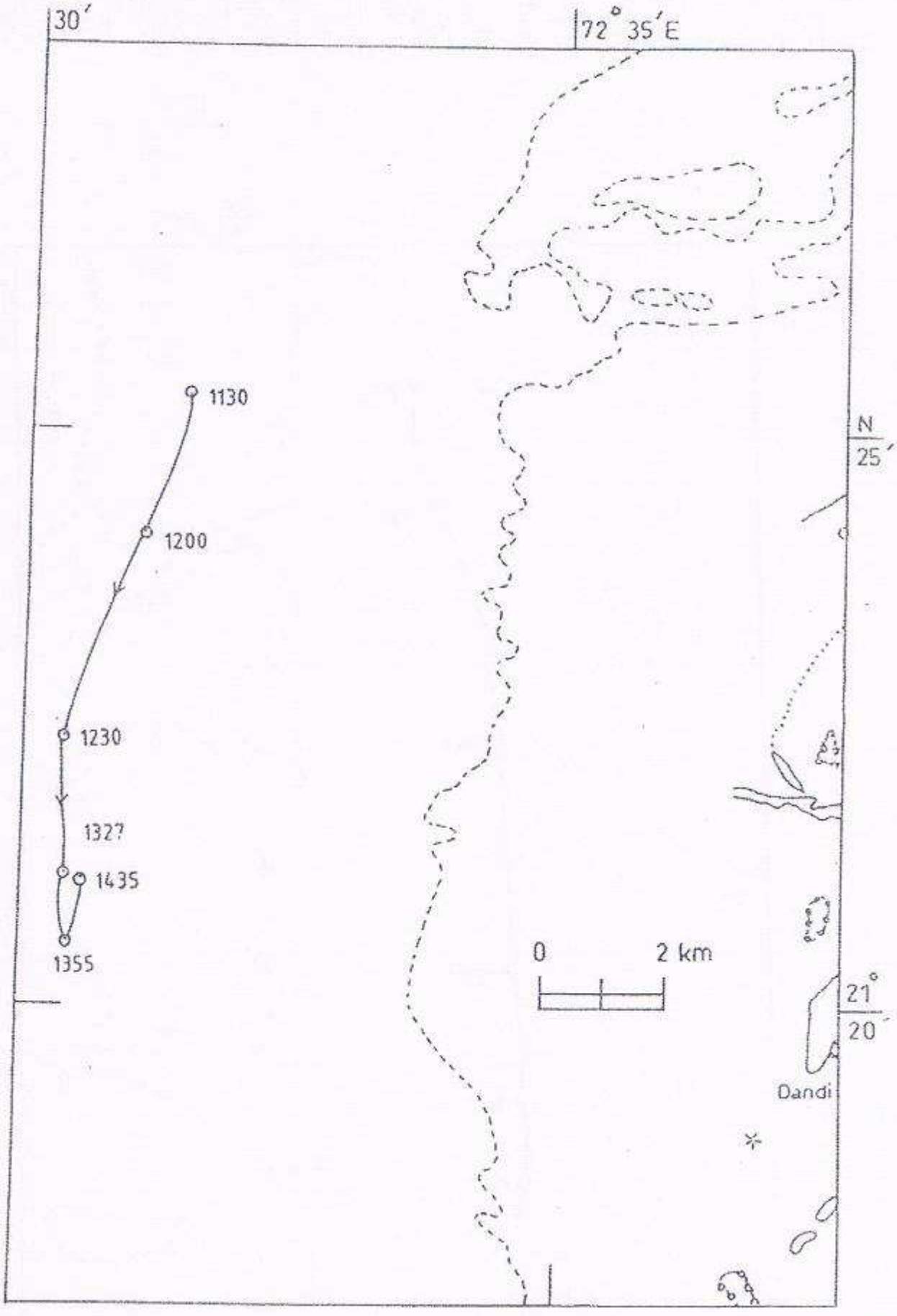


Figure 3.1.3: Drogue trajectory on 12 February 2001 (Narmada mouth)

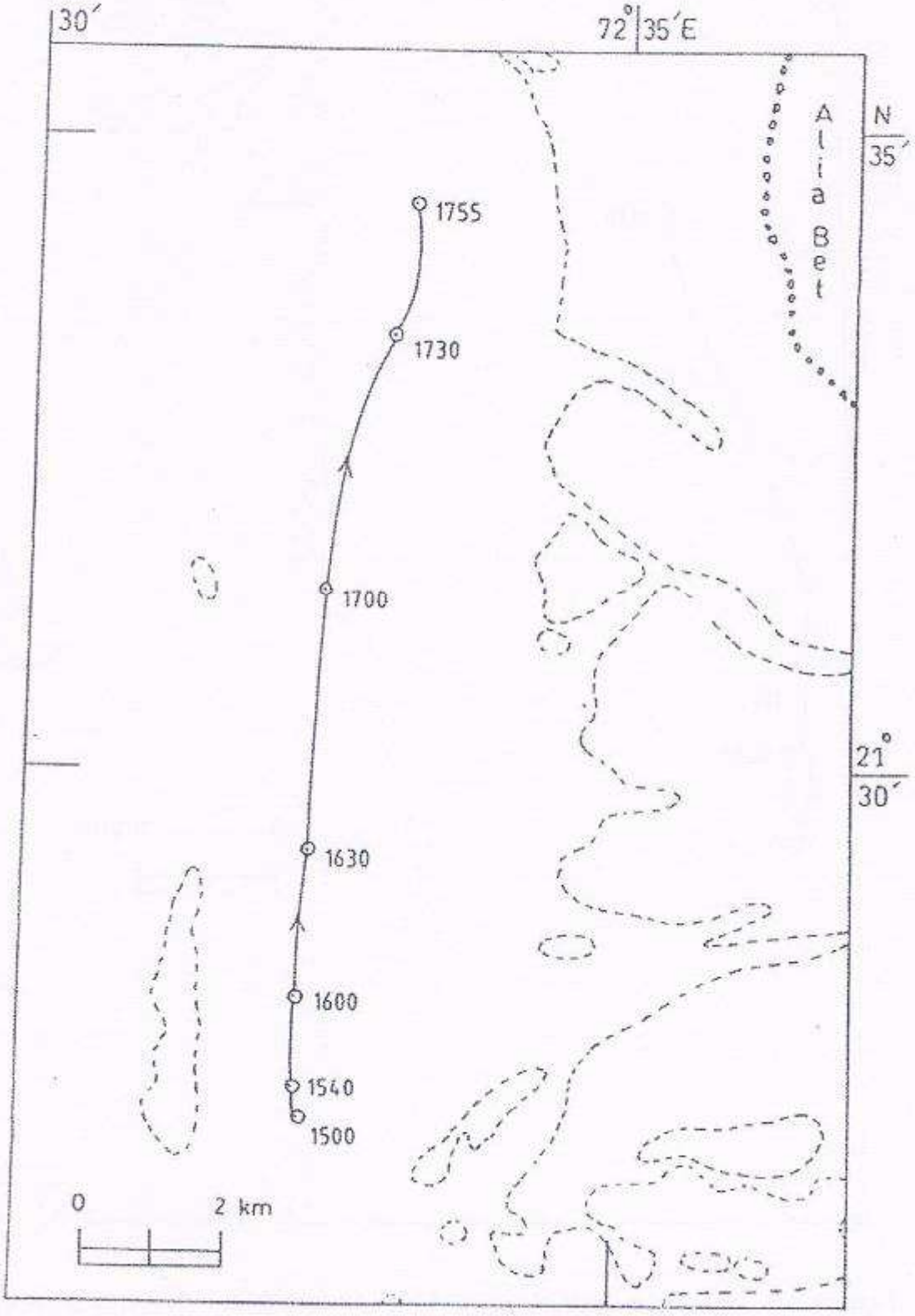


Figure 3.1.4: Drogue trajectory on 13 February 2001 (Narmada mouth)

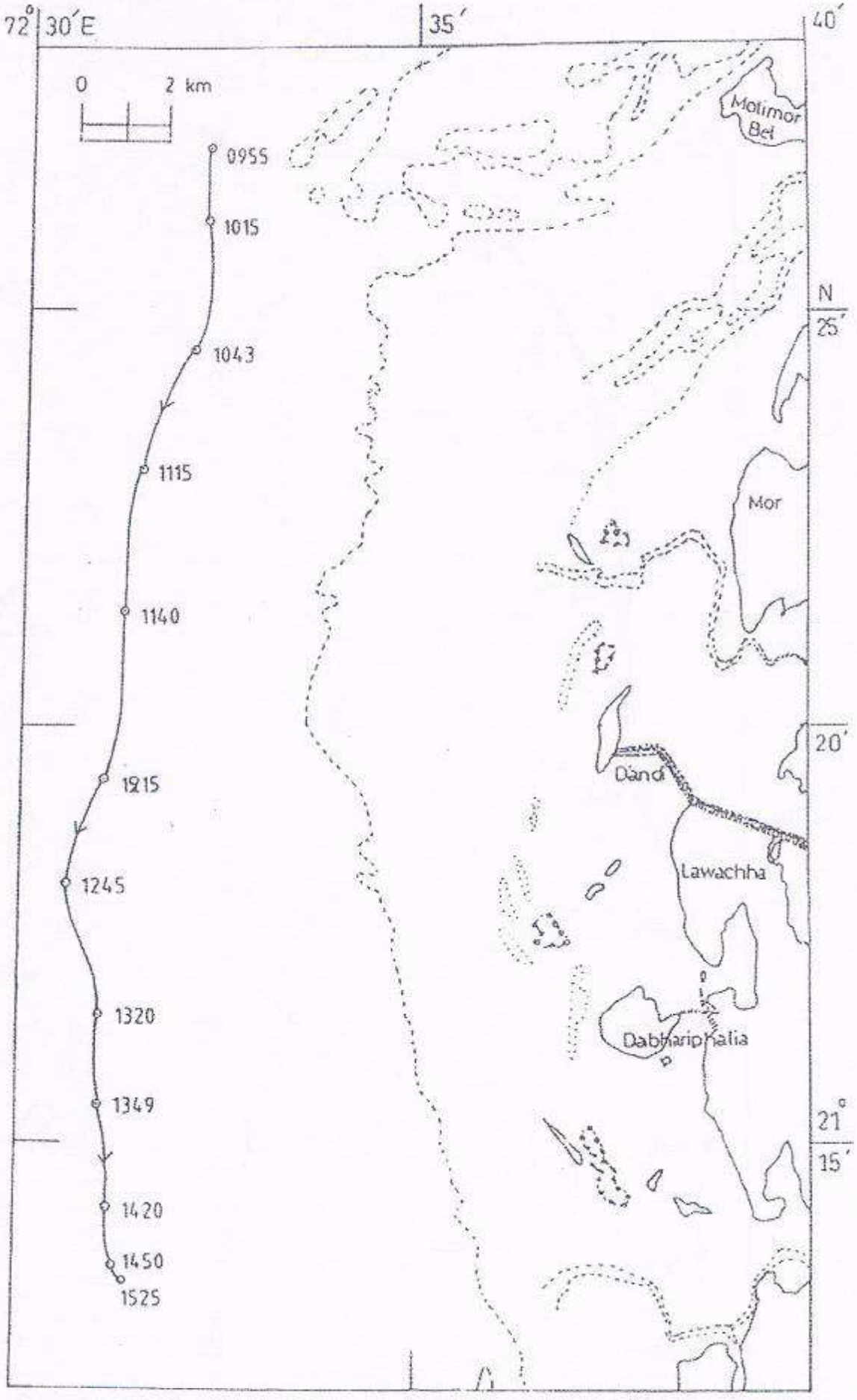


Figure 3.1.5: Drogue trajectory on 14 February 2001 (Narmada mouth)

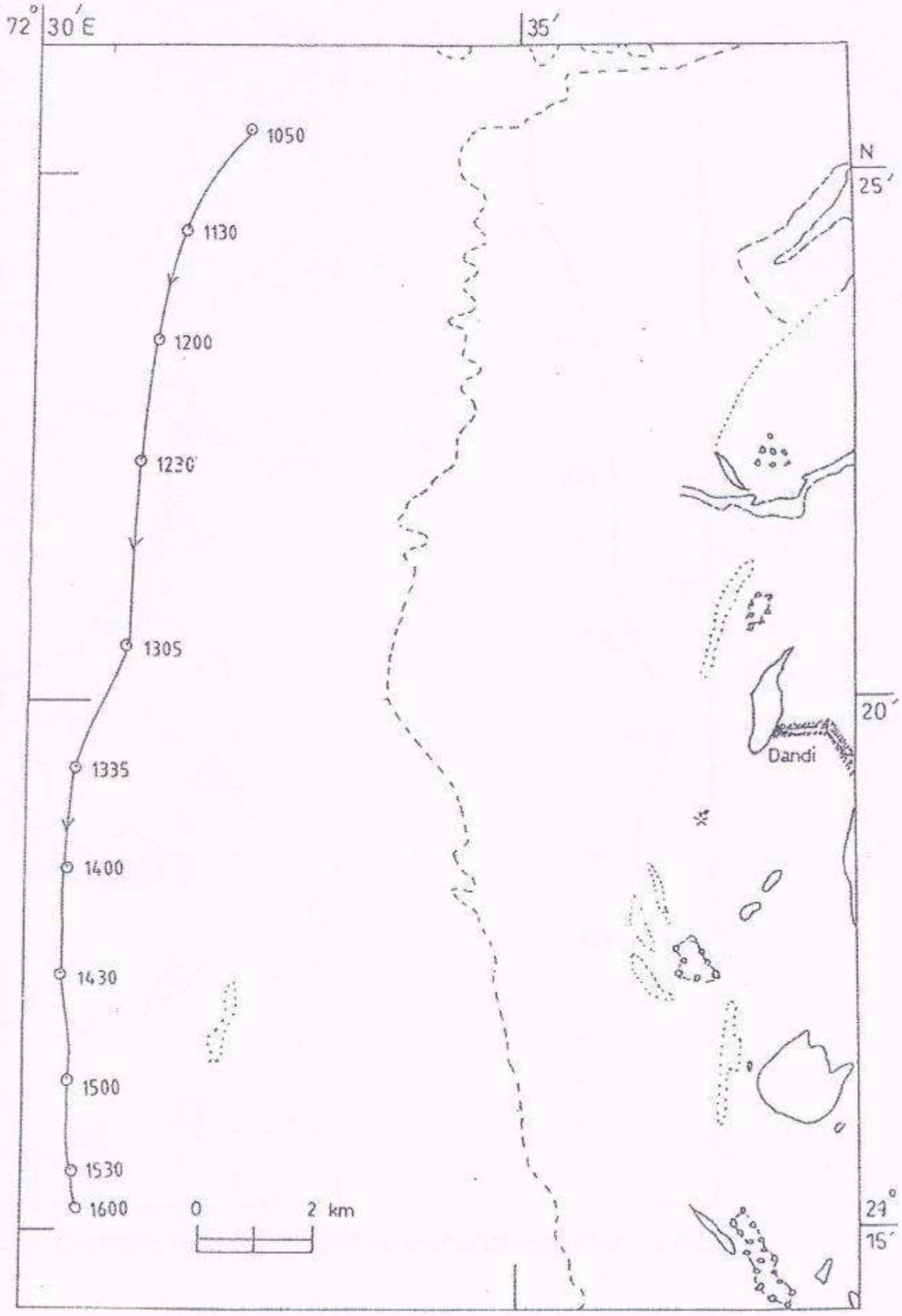


Figure 3.1.6: Drogue trajectory on 15 February 2001 (Narmada mouth)

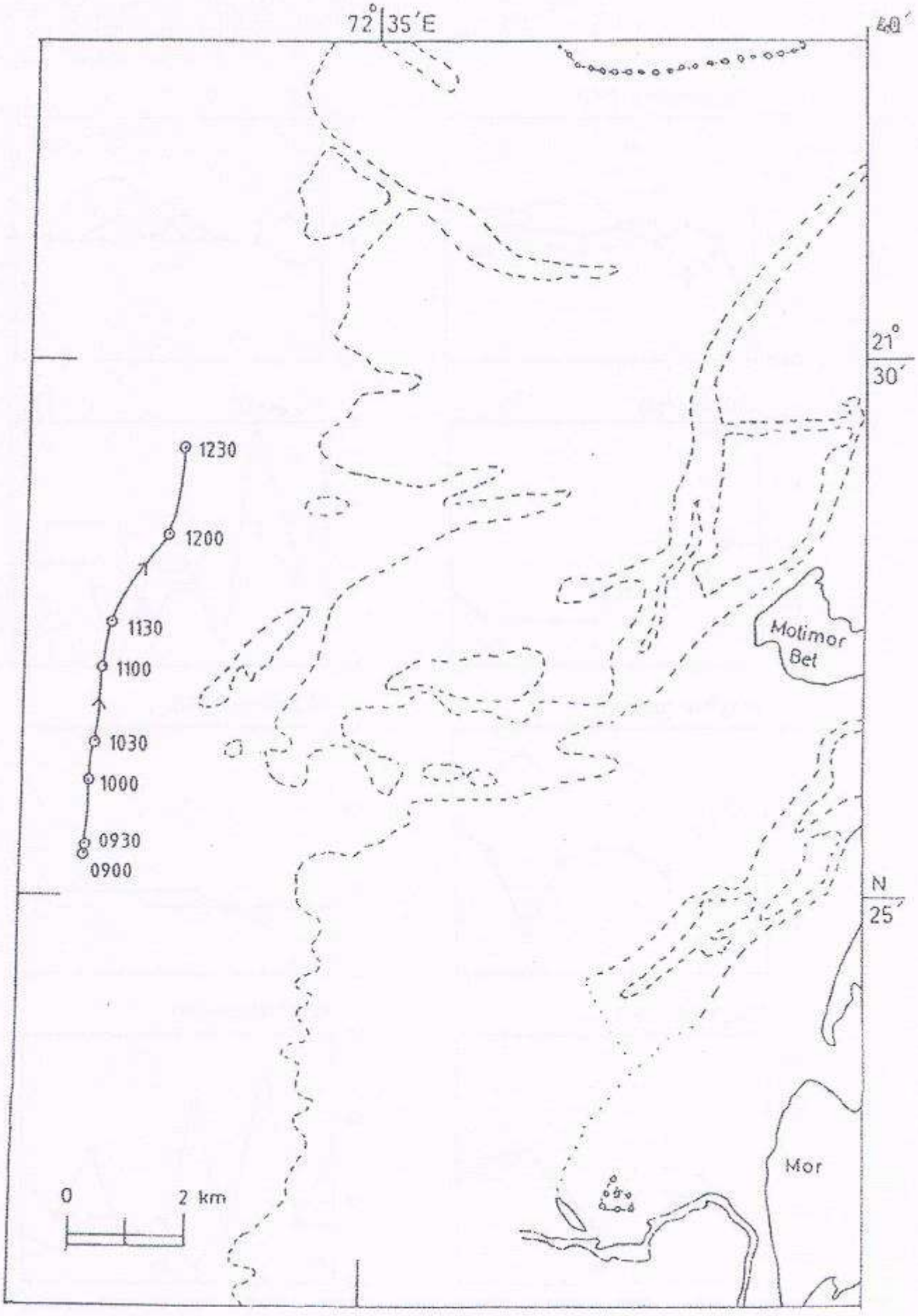


Figure 3.1.7: Drogue trajectory on 18 February 2001 (Narmada mouth)

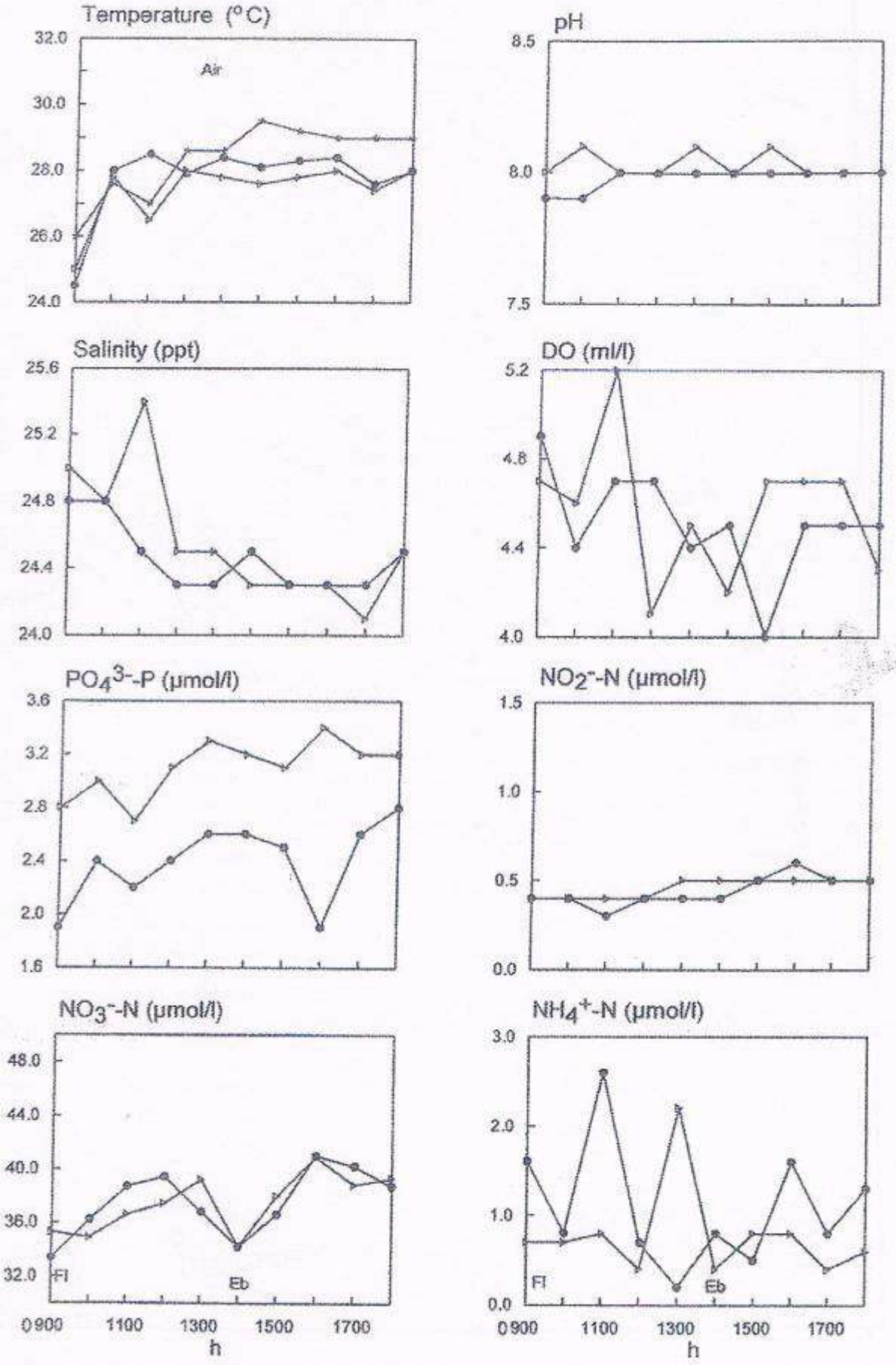


Figure 5.1.1: Temporal variation (•-•-•→S → ▶ -▶ -▶ → B) in water quality at station 4 on 16 November 2007.

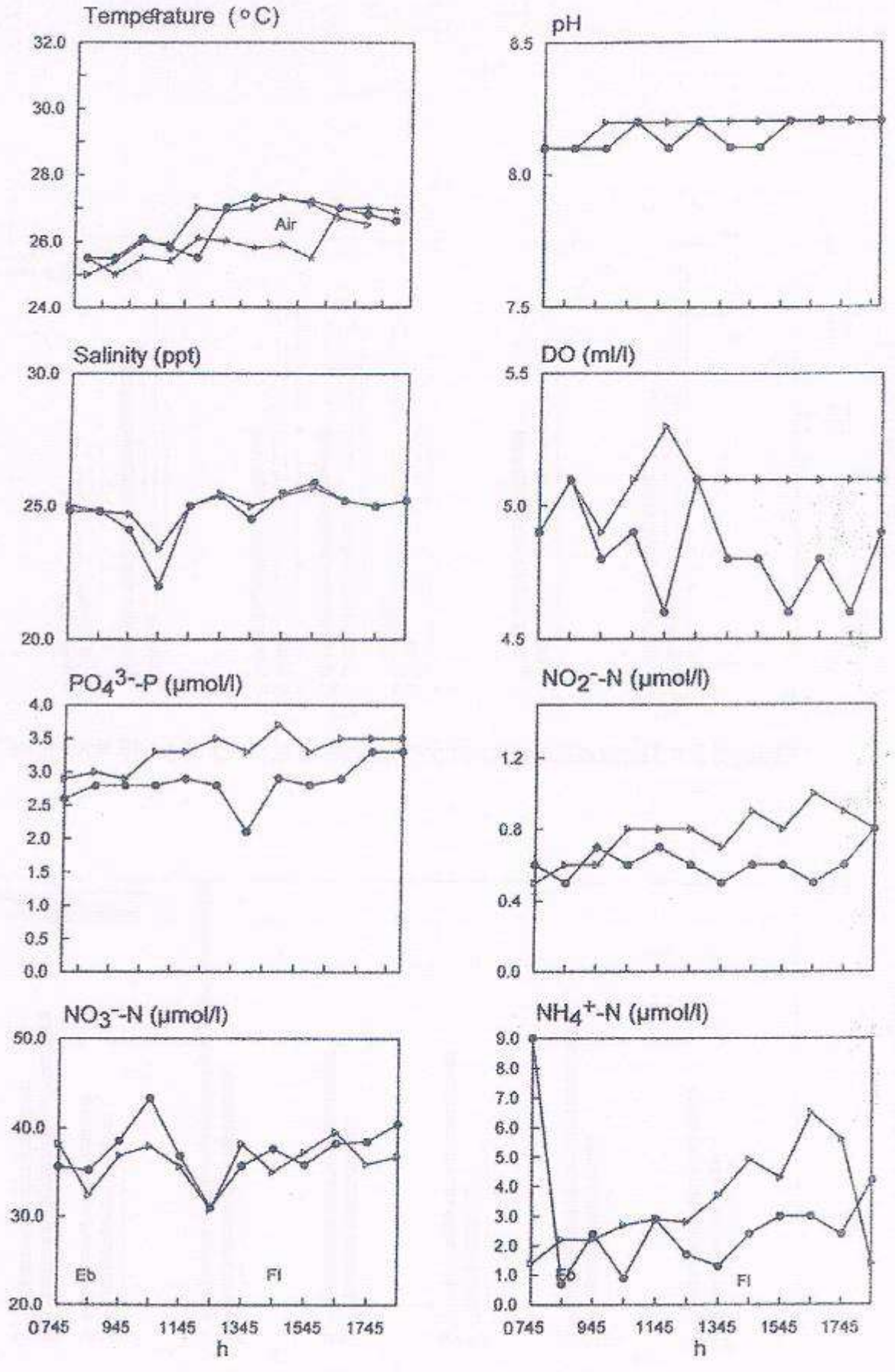


Figure 5.1.2: Temporal variation (•-•-•→S → ▶ ▶ ▶ → B) in water quality at station 9 on 23 November 2007.

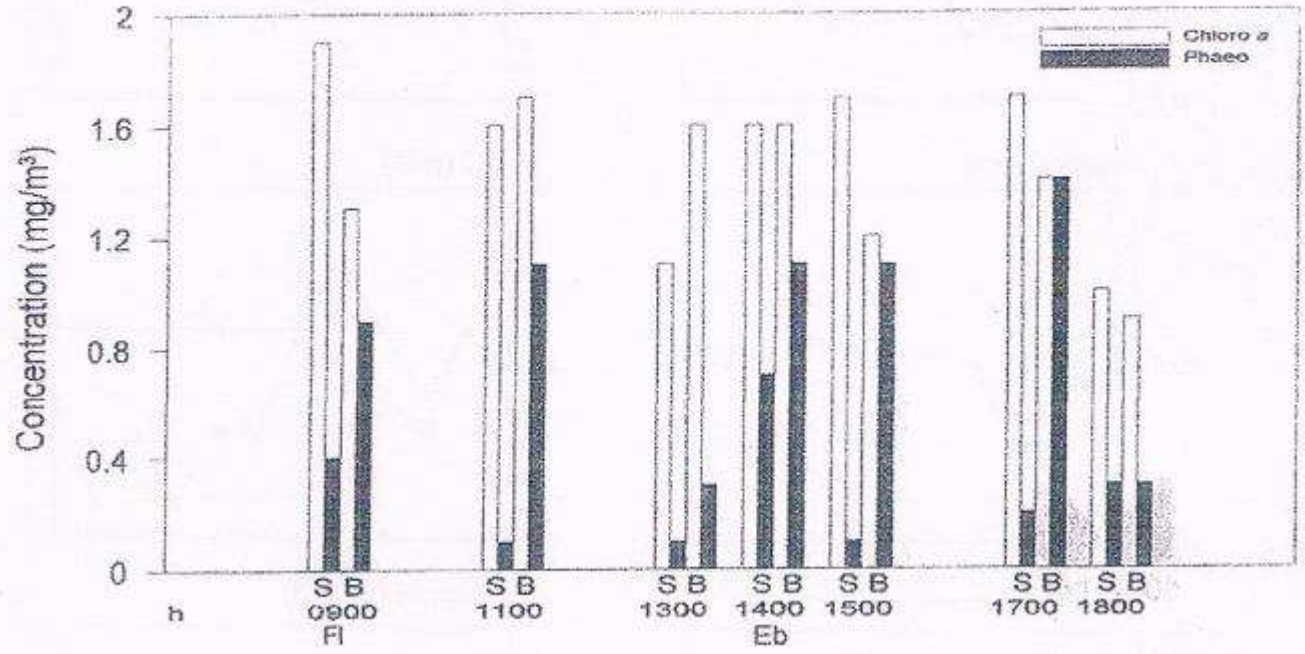


Figure 5.3.1: Temporal variation of phytopigments at station 4 on 16 November 2007

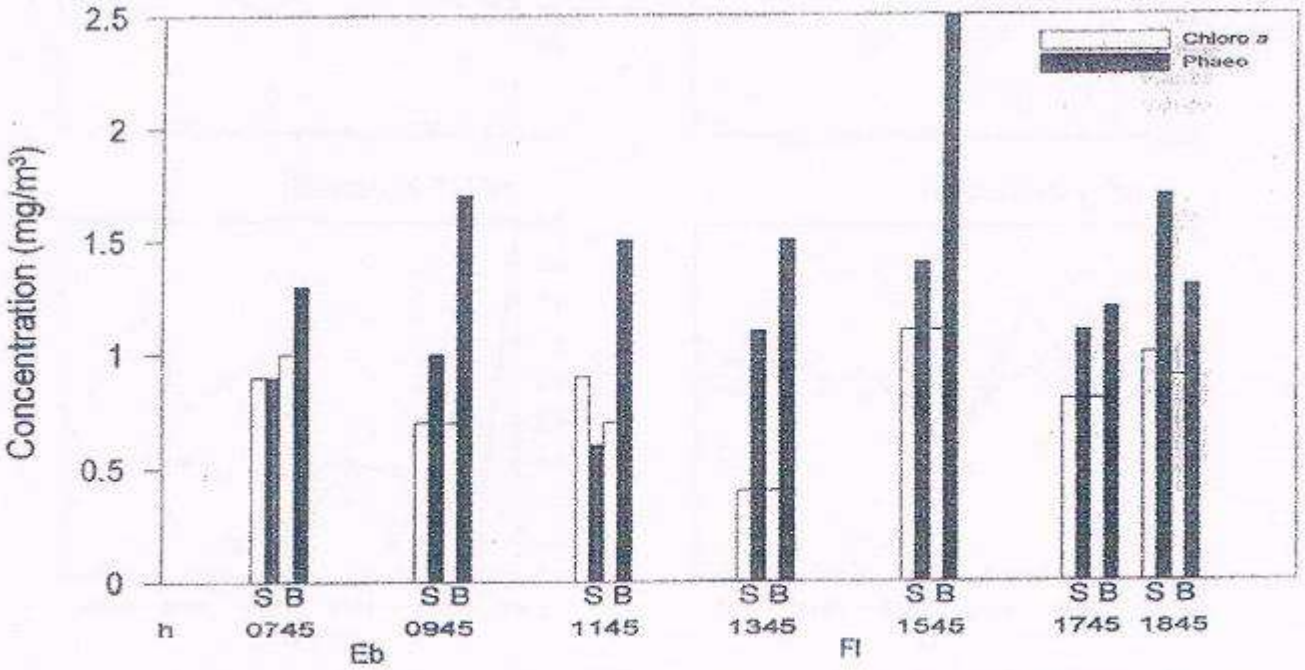


Figure 5.3.2: Temporal variation of phytopigments at station 9 on 23 November 2007

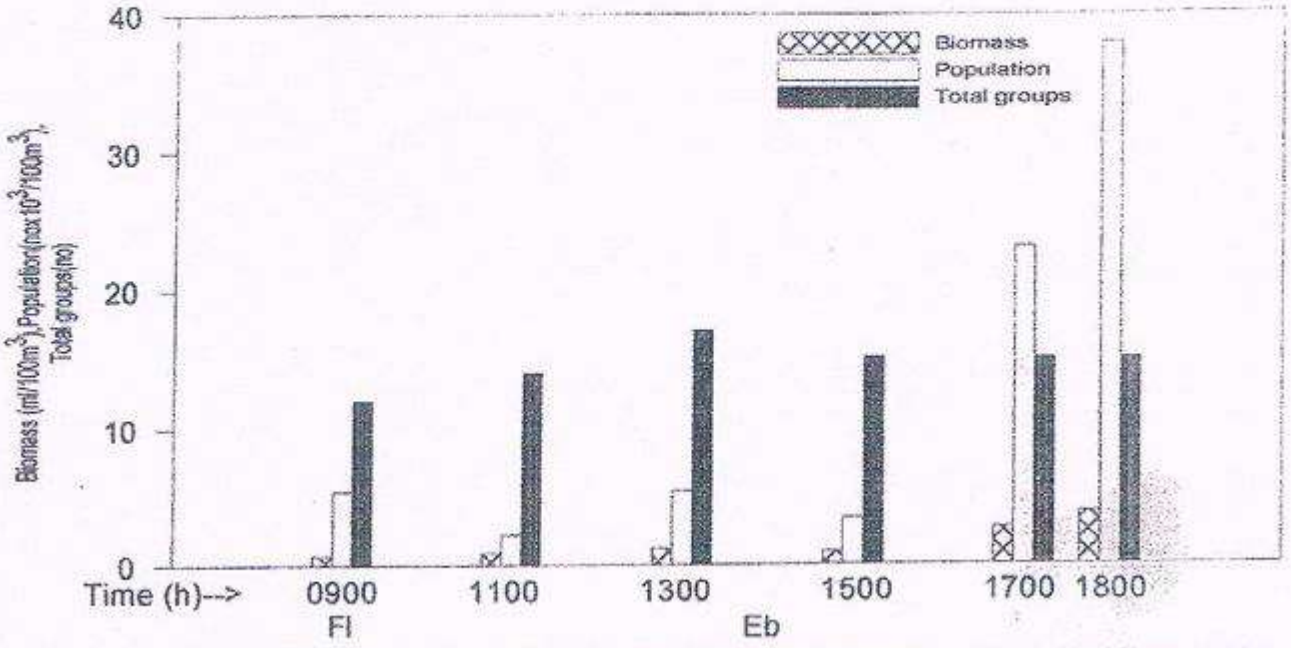


Figure 5.3.3: Temporal variation in zooplankton at station 4 on 16 November 2007

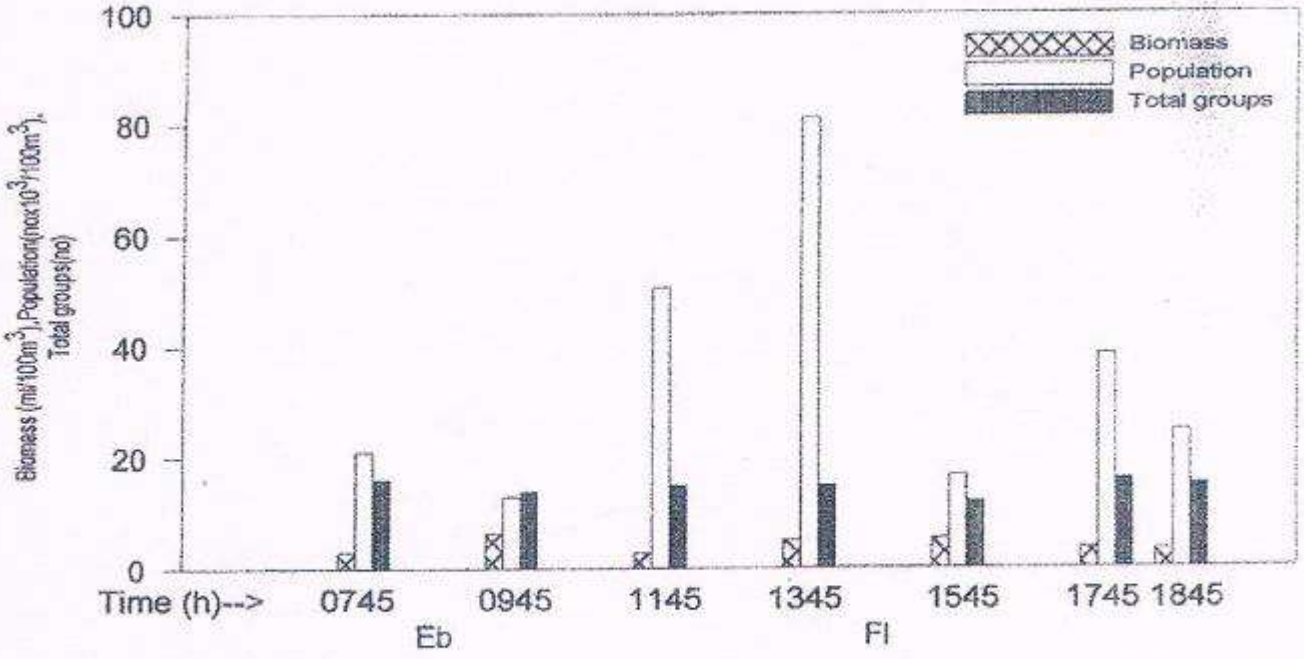


Figure 5.3.4: Temporal variation in zooplankton at station 9 on 23 November 2007

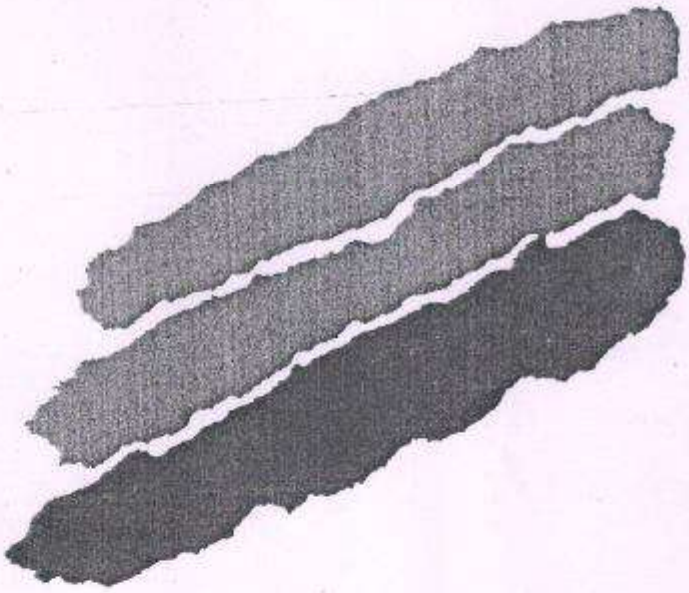
Annexure - VII

NIO/SP- 28/2017
SSP3057

DISTRIBUTION RESTRICTED

Evaluation of Diffuser Performance and Model Study for Release of Revised Quality of Treated Effluent Generated by FETP of Narmada Clean Tech (NCT) Ankleshwar.

PREPARED FOR
Narmada Clean Tech (NCT)



December, 2017

सीएसआईआर - राष्ट्रीय समुद्र विज्ञान संस्थान
CSIR - NATIONAL INSTITUTE OF OCEANOGRAPHY
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद)
(COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH)
क्षेत्रीय केंद्र : चार बंगला, अंधेरी (प.) मुंबई - 400 053.
Regional Centre : 4 Bungalows, Andheri (W), Mumbai - 400 053.
(फोन) Tel.: 022-26359605-08 • (फॅक्स) Fax: 022-26364627
(ई-मेल) e-mail: rcm@nio.org
HQ: दोना पावला,गोवा भारत / Dona Paula, Goa - 403 004.

EXECUTIVE SUMMARY

1. Introduction

Narmada Clean Tech (NCT) has been discharging its treated effluents to the tune of 75 MLD collected from Gujarat Industrial Development Corporation (GIDC) industrial estates, Ankhleshwar, Panoli and Jhagadia. While awarding clearance, the Ministry of Environmental Forestry & Climate Change (MoEF&CC) has laid a condition that the concentration of Chemical Oxygen Demand (COD) in the treated effluent should not exceed 250 mg/l. According to the new MoEF&CC guidelines (2016), the COD limit may be enhanced to 500 mg/l provided the dilutions of 150 times are achieved at discharge location and 1500 times at 100 m distance from release site. The NCT requested the CSIR-National Institute of Oceanography (NIO) to conduct model study and to find out the dilutions in the region for release of 75 MLD treated industrial wastewater with COD concentration of 500 mg/l. Also, the company would like to evaluate the existing diffuser performance by conducting tracer experiment.

The objectives of the project are (a)to study the near-field dilutions at the release site, (b)to study the far-field dilutions by applying 2D model and (c)to evaluate the performance of the present diffuser by conducting tracer experiment at present release site.

2. Project Domain

The project site is situated on the left bank of the Narmada river in Bharuch district. There are total 989 industrial units, dealing with various chemicals, dyes, paper, leather and textiles present in the complex. M/s NCT collects effluent to the tune of 75 MLD from Ankleshwar, Panoli and Jhagadia industrial units. Final Effluent Treatment Plant (FETP) of NCT has a polishing facility for removal of suspended solids, Biochemical Oxygen Demand (BOD) and maintenance of pH of wastewater. An aerated lagoon with nutrient closing facility, settling tank with sludge return mechanism and a small wastewater holding tank fitted with pH sensor are provided under polishing treatment facility. The wastewater is treated at primary and secondary and pumped through pipeline into the near-shore waters off Kantiyajal.

3. Prevailing Marine Environment

The funnel-shaped 129 km long Gulf, which occupies an area of 3120 km^2, is shallow with depths varying between 5 m at the head and 35 m in the channels cutting through the shoals in the mouth region. The Gulf is bisected into two prominent channels by Mal Bank. Further north of Mal Bank, the Gulf merges into the shallow and wide estuaries of Mahi Sagar and Sabarmati Rivers through the Khambhat Channel.

Apart from Sabarmati and Mahi Sagar, the other rivers joining along the eastern shore of the Gulf include Dhadhar, Narmada and Tapi all of which have wide and shallow estuaries. The western bank of the Gulf is devoid of major rivers.

The average temperature in Bharuch is 27.9 °C. The hottest months are April and May when the average maximum temperature is around 40 °C. The average annual rainfall is 873 mm. Winter starts in the area by November and continues up to February. The average temperature during winter is around 23 °C.

The Gulf region and associated estuaries are swept significantly by strong tides with spring and neap tidal ranges of 8.7 and 4.6 m respectively at Dahej. The maximum currents during neap and spring are respectively 1.4 and 3.5 m/s respectively. In general, the ebb currents are stronger than the flood currents.

The average pH varies in a narrow range of 7.9 to 8.0 although seasonal changes are normally noticed. The suspended solids vary widely from 17 to 397.71 mg/l and are of natural origin resulting from the dispersion of fine grained bottom sediment in the water column by strong tidal currents. Average Dissolved Oxygen (DO) level is fairly high (3.1–5.4 ml/l) and variable though under-saturation is common. The average BOD is low (<0.2 to 8.5 mg/l) as expected for healthy natural waters. The levels of NO_3^--N and PO_4^{3-}-P are quite high (ND-39.2 and 4-34.6 µmol/l respectively) which is a characteristic of the South Gujarat region. The NO_2^--N and NH_4^+-N levels are normally low indicating good oxidizing conditions in the Gulf. The

concentration of PHc (ND-41.8 µg/l) and phenols (ND-65 µg/l) are also low as expected for clean coastal waters.

Texture of sediment of the subtidal and intertidal regions vary marginally from sandy to silty sand. The levels of chromium, cobalt, nickel, copper, zinc, mercury, C_{org}, P and PHc in intertidal and subtidal sediments though variable do not suggest any gross anthropogenic accumulation.

The average level of chlorophyll *a* (0.9 mg/m^3) is low though, the mean concentration of phaeophytin (1.0 mg/m^3) indicates that the growth and mortality of the phytoplankton are well balanced. Phytoplankton cell count averages at 19 x 10^{3}no./l with low generic diversity (av. 2). Standing stock of zooplankton in terms of biomass and population is 3.2 ml/100m^3 (av.) and 9.3 x 10^{3}no./100 m^3 (av.) respectively. The faunal diversity varies considerably and the average number of groups amounts to 9. The region supports very poor subtidal macrobenthic standing stock in terms of population (av. 49 no./m^2) and biomass (av. 0.09 g/m^2). The population (av. 964 no./m^2) of intertidal macrobenthos indicates relatively high standing stock in the intertidal area with moderate group diversity (av. 5).

4. Numerical Modeling

At present M/s NCT has been discharging their combined treated effluents to the tune of 75 MLD generated by Ankleshwar, Jhagadia and Panoli industrial estates into offshore location at Kantiajal with BOD concentration of <100 mg/l and COD of 250 mg/l. In 2002, on the basis of detailed study of physical processes on tide, currents, circulation, NIO suggested a site for disposal of effluent totaling about 75 MLD at location 21° 28' 10.2" N; 72° 33' 45" E where depth of 11 m below Chart Datum (CD) is available for release of treated effluents having marine standards.

In this study, modeling has been carried out to estimate the near-field and far-field dilutions. Buoyant jet model was applied for calculations of initial dilutions in which mixing is considered while plume reaches the surface during release at the bottom due to jet flow and buoyancy. A 2D numerical model was used to simulate the far-field dilutions associated with advection and diffusion.

The inputs for the Buoyant jet model were: effluent quantity = 75MLD; effluent density= 1005 kg/m^3; seawater density = 1020 kg/m^3; Maximum depth at release location = 21 m; Average current velocity = 0.4 m/s.

The model was run for different jet configurations. The results show that for the release of 75MLD of treated effluent, dilution of 130-200 times is possible at release site for 10 port diffuser. An average dilution of 165 times can be achieved in the region. Since the dilution attained would be higher than the dilutions (150 times) stipulated in the MoEF&CC guidelines, the present site is suitable for release of the treated effluent of 75 MLD with 10 port diffuser.

Far-field dilutions were calculated using a 2D numerical model. The model simultaneously simulates the tides, currents and concentration. The inputs for the model were: bathymetry and tide at boundaries, concentration of contaminants and flow rate. The flow of 75MLD was introduced at the release site with COD concentration of 500 mg/l. The hydrodynamically calibrated model was used for the simulations. The results show that the dilutions ranged from 1315 to 1785 times which indicate that the effluent attains near ambient conditions at a periphery of 100 m distance.

5. Efficiency of effluent diffuser system

Tracer experiment was conducted on 18th March 2017 at Kantiajal to find the efficiency of the effluent diffuser system. The results show that the dilutions varied from 500 to 1550 times. Even though dilutions are in the range, in some cases, high concentrations were found at longer distance. Low concentrations were found close to the outfall which may raise a question about the existence of outfall at this location. Hence, it is advised to examine the diffuser by employing a diving team. Also, it is recommended to carry out the survey of sub-bottom profiling and side-scan sonar along the pipeline route with 50 m either side of the pipeline.

6. Recommendations

Hence, from the above results of far-field and near-field dilutions, it is recommended that treated effluent of 75 MLD can be discharged at the same location with 10 port diffuser having the COD standards stipulated by MoEF&CC in 2016 guidelines. to increase another 2 ports to the present diffuser after detailed study of geotechnical investigations along the pipeline route up to diffuser. From the tracer experiment conducted at the release site, it is recommended to carry out the survey of sub-bottom profile and side-scan sonar along the pipeline route with 50 m either side of the pipeline to determine the exact location of the diffuser.

ANNEXURE – 10

Details of laboratory

DETAILS OF LABORATORY

- GIDC proposed to establish an analytical laboratory for 10 MLD CETP at Ankleshwar.
- NABL accreditation shall also be obtained for proposed laboratory.
- Well experienced staff shall be deployed for laboratory.
- The laboratory shall also have a specific role for the regular monitoring of member industries.
- Laboratory shall have following equipment/instruments.

SR. NO.	NAME OF MACHINE / EQPT. / TOOL	QTY.
1	pH / ORP Meter	2
2	Conductivity Meter	2
3	Thermometer	6
4	D.O. meter	2
5	Digital Weighing Balance (5 Digit)	2
6	Muffle Furnace	2
7	Digital Thermometer & Hygrometer	2
8	COD Digester	3
9	Water Bath	2
10	Oven	2
11	BOD Incubator	2
12	GAS CHROMATOGRAPH	1
13	KARL FISHER TITRATION APPARATUS	1
14	AAS	1
15	FLAME PHOTOMETER	1
16	UV Spectrophotometer	1
17	AIR COMPRESSOR	1
18	MAGNETIC STIRRER	2
19	HOT PLATE	4
20	HEATING MENTAL	6
21	TOC meter	1
22	OIL FREE VACUUM PUMP	2
23	Glassware(Burette, Pipette, Conical Flask, Volumetric Flask, Round Bottom Flask, Beaker, Ammonia Assembly, Phenol Assembly, BOD Bottle, Reagent	1
23	Bioassay test jar system	1
24	Lab furniture including hot chamber, fume chamber, other relevant furniture as per annexure for NABL accreditation	1
25	Extra Items as deemed fit to Qualify for NABL Accreditation	1
26	Water still	1
27	CENTRIFUGE	1
28	AUTOCLAVE	1
29	Refrigerator	1
30	Distilled Water Plant	1
31	Kjehldal Digester unit	1

32	Atomic Absorption Spectrophotometer	1
33	Incubator (1 No) for bacteriological tests	1
34	Analytical Balance	1
35	Vacuum pump single (with suction flask/Litre capacity)	1
1.0 PART E2		
1	Guch crucibles disc dia. 40mm porosity G-3, Borosil R.	2
2	**Vacuum flask** i.e. filtration flask cap. 500 ml. with side tabular Borsil R.	2
3	Evaporating dishes.	50
4	**Desiccators** large with cover size 250mm Borosil R.	1
5	Buchner Funnel cap. 80 ml. disc dia. 40 mm porosity G-3.	2
6	**Measuring cylinder** graduated Borosil R.	
	10000 ml capacity	2
	500 ml capacity	4
	100 ml capacity	6
7	**Burette** with straight bore stop cock Borosil R.	
	100 ml capacity	2
	50 ml capacity	2
8	**Conical flask** Borosil R.	
	1000 ml capacity	2
	500 ml capacity	10
	100 ml capacity	15
	50 ml capacity	8
9	**Volumetric flask**	
	1000 ml capacity	4
	500 ml capacity	8
	100 ml capacity	8
	50 ml capacity	4
10	**Reflux flask** i.e. COD flask cap. 250 ml with B-24 joint BorosilR.	12
11	**Volumetric pipettes** i.e. Bulb pipette borosil R.	
	50 ml capacity	2
	20 ml capacity	2
	10 ml capacity	2
	5 ml capacity	2
	2 ml capacity	2
12	Ammonia distillation assembly	5
13	Phenol distillation assembly	5
14	COD assembly	25
15	EXTRA GLASSWARE ITEMS AS DEEMED FIT	LS

Note:

ARAIL (NABL Approved laboratory is already in place which shall be transferred under the management of AWML/AIA in future. Hence, the available laboratory facilities shall be utilized AS THIRD PARTY MONITORING SYSTEM.

However, CETP shall also set its own laboratory within premises.

ANNEXURE – 11

Monitoring plan

MONITORING PLAN FOR MEMBER UNITS OF CETP

- NAA/AWML proposed 10 MLD CETP for treatment of effluent from SSIs of GIDC Ankleshwar.
- An MOU will be signed between NAA/AWML and the member of GIDC Ankleshwar for the treatment of effluent of members in the proposed CETP.
- The draft of MOU is attached as **Annexure – 14**.
- The compliance of MOU and CETP conditions has to be monitored regularly. NAA/AWML will form a monitoring team of CETP for regular monitoring.

TEAM:

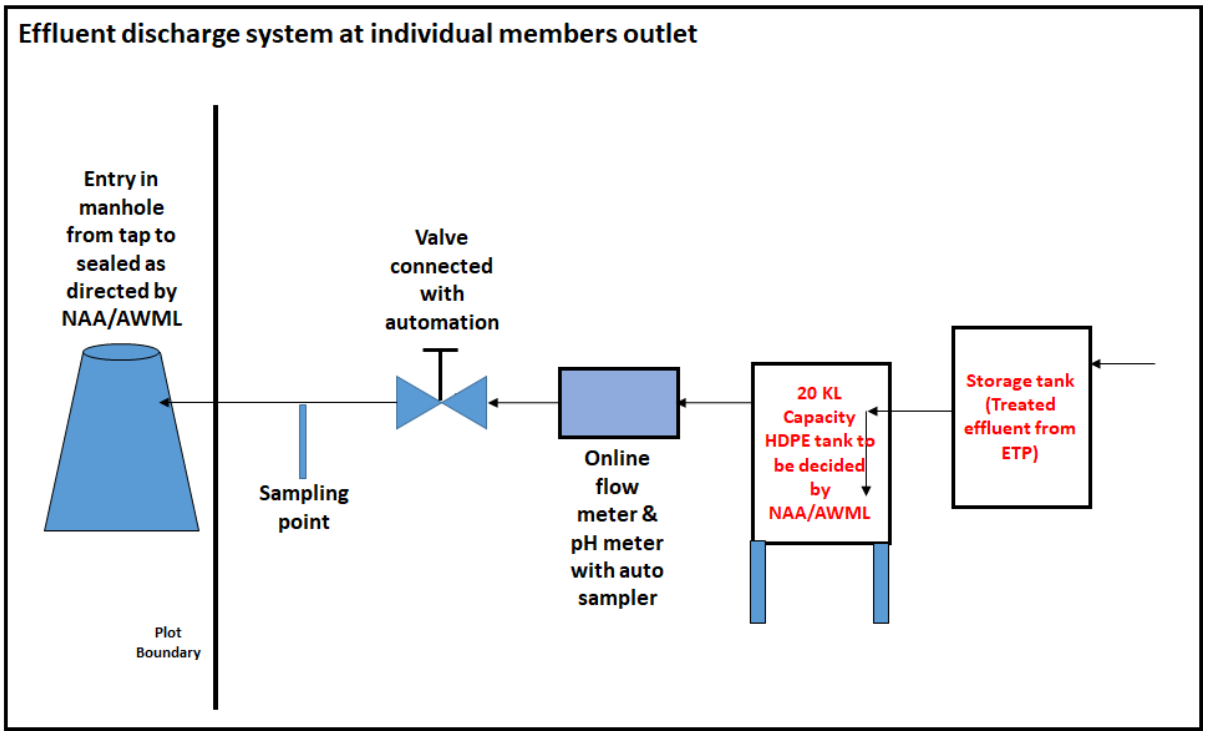
- The monitoring team consists of Sr. chemist, Jr. Chemist, Helper and driver.

MONITORING PLAN:

- Monitoring of each industries and pumping stations shall be carried out during the month.
- Each industry will be monitored minimum twice a month.
- All the pumping stations will be monitored daily.
- Samples of treated effluent discharged from each industry will be collected and analysed in the CETP laboratory.
- The flow meter reading will be noted during each visit and daily record will be collected from each industry at the time of sampling.
- Any non-compliance of industry shall be noted and informed to member unit for the same.
- Major non-compliance of industry will be noted seriously and the member unit will be asked for the same and will be visited if required.
- For the first non-compliance, the technical committee will have discussion with the member industry and to visit if required for improving the EMS of the defaulting unit.
- Also such unit shall be monitored at least twice a week including night monitoring.
- If the non-compliance found second time, the discharge connection shall be disconnected for a period of seven days till the unit make necessary amendment for compliance.
- If the non-compliance found third time, the discharge connection shall be disconnected for a period of one month till the unit make necessary amendment for compliance. The governing authority like GPCB, GIDC shall be informed to take necessary action against defaulter industry.
- All the members have to comply the conditions in MOU as well as Consent from GPCB.
- All the members have to provide an effluent discharge system at their discharge point. The schematic diagram of the effluent discharge system is shown in Figure – A.

FIGURE - A

EFFLEUNT DISCHARGE SYSTEM AT INDIVIDUAL MEMBER UNIT



Quantity Monitoring:

- All the Pumping stations shall be equipped with SCADA-PLC system for controlling quantity of the effluent discharged by member units.
- All the member units are given the discharge schedule for their registered effluent quantity to CETP. The quantity of effluent discharged by member units to sump room is governed by SCADA-PLC system.
- No member unit can discharge the effluent to CETP more than their booking quantity, as either the discharge time or registered quantity is over, the valve provided in SCADA PLC will be automatically closed.

Quality Monitoring:

- All the pumping stations shall be equipped with Auto samplers for controlling quality of the effluent discharged by member units.
- 2 Litres of composite effluent sample shall be collected in the bottle of specific member, which is equipped in the Auto sampler. The collected composite sample is irrespective of that member units' discharge time and volume.

- Every day, member of monitoring team of CETP, empty the collected sample into the sample bottles and make 3 parts of the same. Then all 3 sample bottles shall be sealed at a time. Then immediately one bottle shall be given to the specific member unit, one bottle to CETP laboratory for analysis and 3rd one is preserved for joint testing (if member unit wants to test after getting the result from our CETP lab). In laboratory, barcode shall be generated for each bottle and then analysis shall be performed. Result of the same shall be sent to the member unit through software based SMS system. If any member unit have query on the provided result then they have to intimate to the CETP within 48 hours of SMS. After 48 hours bill is generated through software based system.
- If the analysis of sample collected from member industry not confirm the prescribed norms of discharge into CETP, the final discharge valve won't be operated to discharge the effluent from effluent discharge system at their discharge point. The member industry have to retreat the effluent to achieve the prescribed norms of discharge into CETP and then only will be allowed to discharge their effluent in to drainage to CETP.

DETAILS OF ONLINE MONITORING SYSTEM TO BE INSTALLED AT PROPOESED CETP

- **Specification Details of the REAL Time Monitoring system:**

  The unit includes servers and combinations of Hardware and software for following parameters:

  1. Shimadzu TOC analyser
  2. Online TSS analyser
  3. Online pH meter
  4. Magnetic Flow meter

- **Hardware Features:**

  Total channels: 12 Nos Input: RS 485 2 Nos. Memory: 2 GB. For Data Recovery. Output 2 – Ethernet Connection: With Mail Server Connectivity. Power: 230 V AC Housing: ABS IP protected Protocol Support: TCPIP/232/ Modbus 232 or 485/422/Ethernet Modbus / Profibus/ Can open.

- **Software Features:**

  - Server/Client Connectivity.

- Flexible System can add as many monitoring nodes. Like Temp. TOC/PH Flow and stack gases.
- Alarm messaging
- Measured value recording and archiving.
- Different Report generation
- On line /off line trending (graph) facility with Auto dial mailing facility
- Remote hooter announcing facility for abnormality.(Hi Low Set point)
- Data logging facility with different type of sheets (shift wise report Etc.)

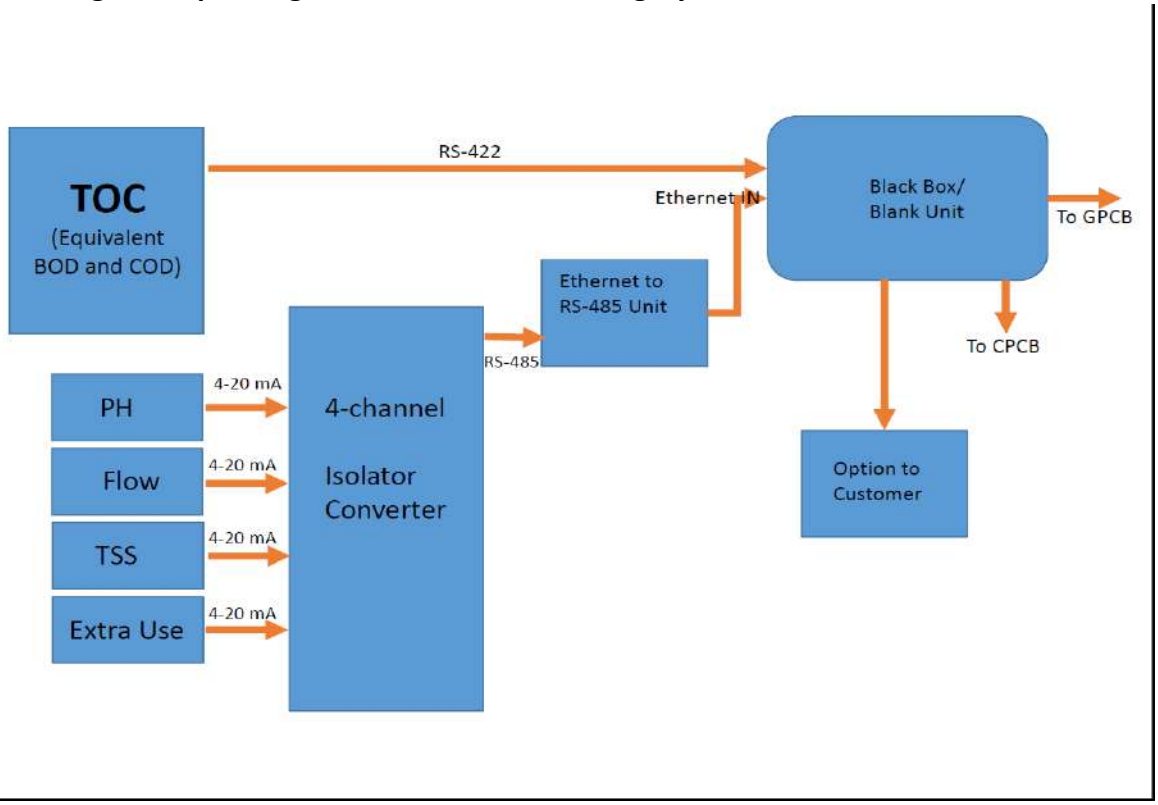
❖ **Software to see real data from Black Box to PC Features:**

1. Trend Graph.
2. Data logger.
3. Historical Chart.
4. Data connecting to your LCD screen

❖ **Technical Details for Data Transmission (Effluent Parameters)**

- Through the real time data transmission unit, the data of TOC and equivalent COD & equivalent BOD can be transmitted from TOC to GPCB/CPCB server.
- Similarly the data of TN (Total Nitrogen) and AN (Ammonical Nitrogen) can also be transmitted to GPCB/CPCB server.
- Also through real time data transmission unit you can transmit data of TSS, Flow, pH etc. to GPCB/CPCB server.
- We'll also providing facility of local software through the same you could see all data which transfer to GPCB/CPCB at your PC.

❖ **Diagram explaining the Real Time monitoring system**



Note: Provision of multiple facilities for internet connectivity like Wireless, broadband, leased line, dongle etc…. as per latest guidelines of CPCB, shall be provided.

❖ **Details of online monitoring instruments to be installed at CETP**

No	Name of the instrument	Parameter monitored	Installation at	Remarks
1	Ultrasonic Level Transmitters on Parshall Flume for Inlet to CETP	Flow Rate inlet to CETP	Inlet Parshall Flume	Connected to PLC SCADA
2	Online Magnetic flow meter	Flow rate to CETP	Equalized Effluent Transfer Pump, Outlet to CETP	Connected to PLC SCADA
3	Online TOC meter	TOC, NH3-N	Inlet/ outlet to CETP	Connected to PLC SCADA
4	Online pH meter	pH	Inlet to CETP/ outlet to CETP	Connected to PLC SCADA
5	pH control meters	pH	Inlet / outlet to neutralization tanks	Connected to PLC SCADA
6	DO meters	DO	Oxidation Ditch	Connected to PLC SCADA
7	pH + ORP Analyser	ORP	Anoxic Zone of Oxidation Ditch, inlet outlet of hypo treatment unit	Connected to PLC SCADA
8	MLSS analyser	MLSS	Oxidation Ditch	Connected to PLC SCADA
9	TSS analyser	TSS	Return Activated Sludge Sump	Connected to PLC SCADA
10	Auto Sampler	All parameters	Inlet / outlet of CETP	-
11	Residual chlorine analyser	Residual chlorine	Outlet of hypo treatment unit.	Connected to PLC SCADA

ANNEXURE – 12

Consultant stay order against NABET Accreditation

ANNEXURE – 13

CERTIFIED COPY OF HON'BLE HIGH COURT OF GUJARAT'S STAY ORDER AGAINST IMPLEMENTATION OF NOTIFICATION DATED MARCH 3, 2016 OF MoEFCC, NEW DELHI

PAGES : 4 CHARGE :25

U/2292/2016 Read By :
Prepared By : MS. BITTAN RAJPUT
Applied on : 05/04/2016 Examined By :
Prepared on : 05/04/2016
Notified on : 7/4/16
Delivered on 7/4/16

Dy.S.O. Section Officer
Decree Department Decree Department

IN THE HIGH COURT OF GUJARAT AT AHMEDABAD
ORDER PASSED BY THE COURT IN THE CASE OF

1 JAYESHKUMAR SOMABHAI PATEL
AQUA-AIR ENVIRONMENTAL ENGINEERING P. LTD.
403, CENTRE POINT, NR.KADIWALA SCHOOL,
RING ROAD, SURAT - 395002

2 CHANDRASHEKHAR BHANUPRASAD UPASANI
JYOTI OM CHEMICAL RESEARCH CENTRE PVT. LTD.
60, DAKSHINAMURTI RESIDENCY, OPP.SUN PHARMA
RESEARCH CENTRE,
ATLADRA, VADODARA - 3990012

3 MALAV PRAFULBHAI DALWADI
T R ASSOCIATES
C/605 A, GANESH MERIDIAN, OPP.KARGIL PETROL PUMP
S.G.HIGHWAY, AHMEDABAD- 380060

4 SNEHAL BHARATBHAI SATYAPATHI
VASUDEV ASSOCIATES
G-203, AKASH-3, NEAR SAHAJANAND COMPLEX,
132 FT RING ROAD, NARANPURA, AHMEDABAD - 380013

5 PRADEEP PRABHAKAR JOSHI
GREEN CIRCLE INC., GREEN EMPIRE (ANUPUSHPAM),
ABOVE AXIS BANK, NEAR YASH COMPLEX,
GOTRI ROAD, VADODARA- 390023

6 GAURANG VINODBHAI PARMAR
ECO-CARE SOLUTIONS, 306-307, 3RD FLOOR, DWARKESH COMPLEX,
SUN PHARMA ROAD, ATLADRA, VADODARA - 390020

7 DARSHAN JITENDRABHAI PAREKH
AKSHAR CONSULTANTS, 704 & 813, SAKAR-5,
NEAR MITHALHALI RAILWAY CROSSING,
OFF ASHRAM ROAD, AHMEDABAD - 380009

8 SURESH TULSHIBHAI MORADIA
EARTHCARE ENVIRO SOLUTIONS PVT. LTD.
B-1/106, 304 & 308, PUSHPRAJ APRTMENT, NR.CNG PETROL PUMP
KHATODARA, SURAT - 395002

9 SUDHIR NARAISINGH VERMA
RAAS ENVIROCARE, 93/94, MATRI MANDIR SCOIETY,
ISKON ROAD, OFF GOTRI ROAD, VADODARA

10 SEEMA CHANDRAKANT ABHALE
PRAKRUTI ENVIRONMENTAL ENGINEERS,
1, UTKANTH SOCIETY, B/H ALKAPURI CLUB,
ALKAPURI, VADODARA - 390007

11 DILIP CHANDUBHAI THAKKAR
SUNRISE ENVIROMENTAL CONSULTANT,
TF-4, THIRD FLOOR, KRISHNA ARCADE,
NEAR BSNL OFFICE, NARODA, AHMEDABAD - 382330

12 BALU TRIBHOVAN PATEL
NATURE ENVIRO CARE, SURVEY NO.274/4,
OPP. GUJARAT HIGH COURT BUILDING, B/H SATYAMEV COMPLEX,
NEAR CAR BOX, S.G.HIGHWAY, AHMEDABAD- 380060

Petitioner(s)

VERSUS

1 UNION OF INDIA
THROUGH SECRETARY, MINISTRY OF ENVIRONMENT, FOREST
&
CLIMATE CHANGE, INDIARA PRAYAVARAN BHAVAN,
JOR BAGH ROAD, NEW DELHI -110003

Respondent(s)

Being SPECIAL CIVIL APPLICATION No. 5312 of 2016

Appearance on Record:
MR NILESH P SHAH as ADVOCATE for the Petitioner(s) No. 1 - 12
ANSHUL N SHAH as ADVOCATE for the Petitioner(s) No. 1 - 12

COURT'S ORDER :

CORAM :
HONOURABLE THE CHIEF JUSTICE MR. R SUBHASH REDDY
HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI
Date of Decision: 05/04/2016
(COPY OF ORDER ATTACHED HEREWITH)

IN THE HIGH COURT OF GUJARAT AT AHMEDABAD

SPECIAL CIVIL APPLICATION NO. 5312 of 2016

JAYESHKUMAR SOMABHAI PATEL & 11....Petitioner(s)
Versus
UNION OF INDIA....Respondent(s)

Appearance:
MR ANSHUL N SHAH, ADVOCATE for the Petitioner(s) No. 1 - 12
MR NILESH P SHAH, ADVOCATE for the Petitioner(s) No. 1 - 12

CORAM: HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY
and
HONOURABLE MR.JUSTICE VIPUL M. PANCHOLI

Date : 05/04/2016

ORAL ORDER
(PER : HONOURABLE THE CHIEF JUSTICE MR. R.SUBHASH REDDY)

Notice returnable on 13.06.2016. Implementation of the impugned Notification dated 03.03.2016 shall stand deferred till further orders.

(R. SUBHASH REDDY, CJ)

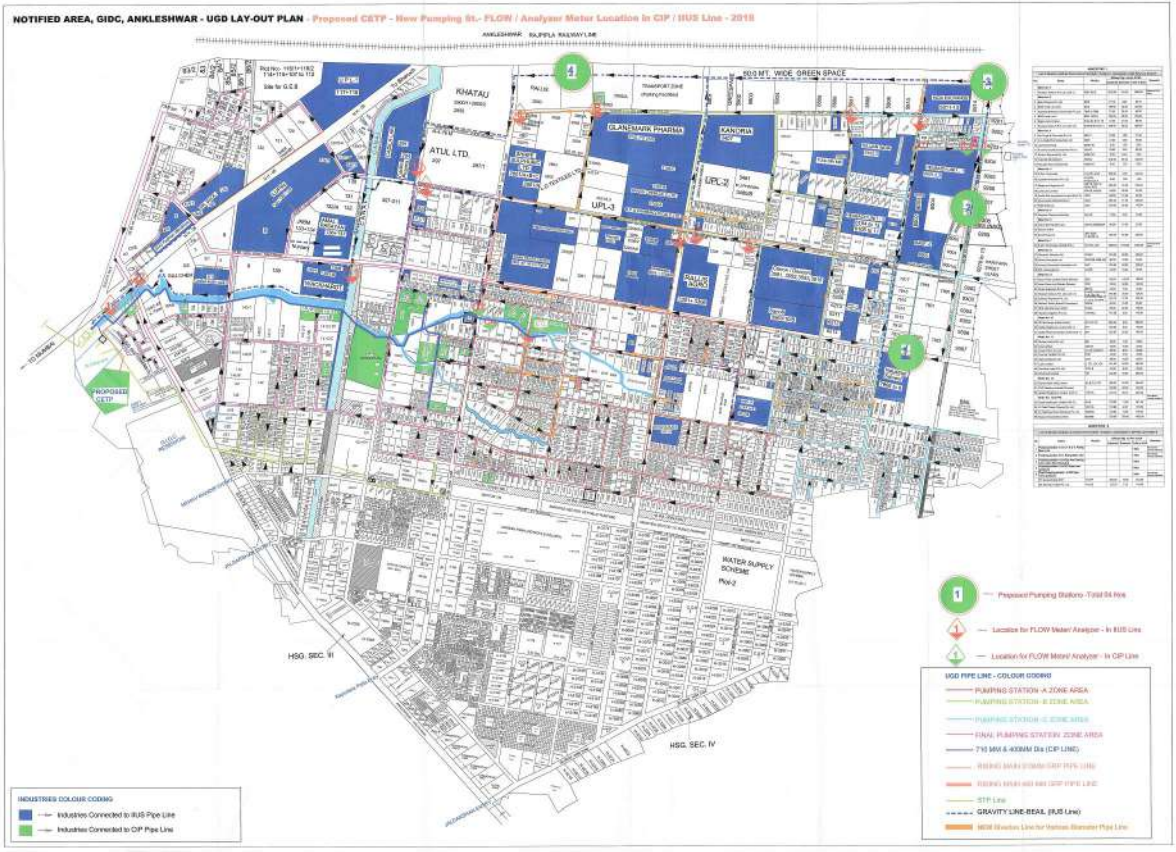
(VIPUL M. PANCHOLI, J.)

satish

TRUE COPY
DEPUTY / ASSISTANT REGISTRAR
THIS 7/4/16 DAY OF 07/04/2016
Page 1 of 1

ANNEXURE – 13

Map of upgraded Effluent conveyance pipeline


NOTIFIED AREA, GIDC, ANKLESHWAR - UGD LAY-OUT PLAN - Proposed CETP - New Pumping St.- FLOW / Analyser Meter Location in CIP / IIUS Line - 2018
ANKLESHWAR RAJPIPLA RAILWAY LINE
60.0 MT. WIDE GREEN SPACE
KHATAU
ATUL LTD.
GLAXOSMITH PHARMA
GLENMARK PHARMA
KANORIA
UPL-2
UPL-3
PROPOSED CETP
WATER SUPPLY SCHEME Pool-2
HSG. SEC. III
HSG. SEC. IV
Proposed Pumping Stations -Total 04 Nos
Location for FLOW Meter/ Analyzer - In IIUS Line
Location for FLOW Meter/ Analyzer - In CIP Line
UGD PIPE LINE - COLOUR CODING
PUMPING STATION -A ZONE AREA
PUMPING STATION -B ZONE AREA
PUMPING STATION -C ZONE AREA
FINAL PUMPING STATION ZONE AREA
710 MM & 400MM Dia (CIP LINE)
STP Line
GRAVITY LINE-BEAL (IIUS Line)
INDUSTRIES COLOUR CODING
Industries Connected to IIUS Pipe Line
Industries Connected to CIP Pipe Line

ANNEXURE – 14

Copy of MoU

USER AGREEMENT DOCUMENT FOR MEMBERS OF CETP

CONVEYANCE, COMMON TREATMENT, REUSE/RECYCLE AND DISCHARGE OF EFFLUENT

This AGREEMENT is made on this _____ between Ankleshwar Waste Management Ltd. (hereinafter referred to as 'AWML') (a Special Purpose Vehicle- SPV promoted by M/s Ankleshwar Industries Association) a company incorporated and registered under the Companies Act, 1956, having its registered office at **Plot No. : 618-619, AIA Community centre, GIDC, Ankleshwar – 393 002** *Dist. Bharuch, Gujarat, hereinafter referred to as "The Party of the First Part" which expression shall where the context so requires or admits of, be deemed to include its successors or assigns of on FIRST PART _____ Partnership firm/proprietorship firm/ Private Limited Company/ Public Limited Company/Co-Operative Society/Association Company of person registered under the _____ and having its registered office at _____ (Hereinafter referred to as "MEMBER" or Party of the Second Part which expression shall where the context so requires or admits of, be deemed to include its successors or assigns of the SECOND PART.*

WHEREAS:-

The Party of the First Part a Special Purpose Vehicle has established Common Effluent Treatment Plant for Acceptance and treatment of raw effluent water received from the Members of AWML. The said AWML has been formed in terms of Memorandum of Understanding executed between Gujarat Industrial Development Corporation (GIDC) and AIA on _____ and subsequent ADDENDUMS _____ for executing project of Common Effluent treatment Plant with Underground Drainage System in Ankleshwar GIDC. Accordingly, AIA and GIDC devolved all the rights, obligations and powers in favor of AWML to discharge all the obligations of GIDC in MOU's executed between GIDC and AIA referred hereinabove. This was further substantiated by Tripartite MOU between AWML, AIA and GIDC executed on _____. Therefore GIDC having necessary permissions from GPCB has authorized AWML to use this approval for its operations in compliance of GPCB norms for treatment, and discharge EFFLUENT after treatment as per GPCB norms and discharge values

AND THEREFORE, the party of the Second Part is:

a member of AIA & has participated and contributed in promotion and formation of AWML for the purpose of setting up of Common Effluent Treatment Plant for the requirements of the member units of AIA.

The Member is having a factory at Ankleshwar G.I.D.C., Industrial Estate at _____ _____ For the purpose of manufacturing _____

The manufacturing activity of the Member is governed by the provisions of the Environment Act and accordingly the Member is required to maintain the standards of the effluents discharged by it in the Common Drainage of Gujarat Industrial Development Corporation (hereinafter referred to as "GIDC") as per the standards prescribed by the Gujarat Pollution Control Board (hereinafter referred to as "GPCB") from time to time as well as those mentioned in the Consent Letter issued by GPCB to the Member.

The manufacturing unit Generates polluted waste water from the unit which requires specific treatment before discharging it into the underground drainage line connected with CETP of AWML but do not have the treatment facilities and desires to send its untreated / partly treated effluent to AWML (hereinafter referred to as "EFFLUENT") for treatment, final discharge.

To meet with the standards so prescribed, it is necessary to treat the effluent and the member has no such Effluent Treatment Plant, which can treat the effluent to meet with the standards.

The Company is incorporated for the purpose of establishing the Common Effluent Treatment Plant (CETP) and to treat the effluents received from various Members of Ankleshwar GIDC Industrial Estate for the control of pollution and violation of the standards.

The Party of the First Part has agreed to receive the EFFLUENT at its CETP sent by the MEMBER on the terms and conditions stated hereunder, which have been mutually agreed to between the AWML and the Member unit.

THIS AGREEMENT WITNESS AS FOLLOWS:

DEFINITIONS AND INTERPRETATIONS

1. *'TIME' shall be stated in 'Hours' and shall mean Indian Standard Time.*
2. *'DAY' means period of twenty four (24) consecutive hours beginning and ending at 00 hours.*
3. *'WEEK' means a period of seven (7) consecutive days beginning from a day.*
4. *'FORTNIGHT' means a period of fifteen (15) consecutive days beginning from a day. Considering different number of days of each calendar month of a year, it is clarified that 'FIRST FORTNIGHT' would commence from the first day to the fifteenth day of the month and 'SECOND FORTNIGHT' from sixteenth day to the last day of the month.*
5. *'MONTH' means a period beginning at 00.00 hours on the first day of the calendar month and ending at 00.00 hrs on the first day of the succeeding calendar month.*
6. *"FINANCIAL YEAR" means a period of three hundred and sixty five (365) consecutive days or three hundred and sixty six (366) consecutive days when such period includes a twenty ninth (29^{th}) day of February beginning at 00.00 hours from a day. It starts from 1st day of April month of the year and ending on 31^{st} day of March month of next year.*
7. *AIA means Ankleshwar Industries Association.*
8. *AWML means Ankleshwar Waste Management Limited.*
9. *GIDC means Gujarat Industrial Development Corporation*
10. *The headings of or title to the Clauses in this AGREEMENT shall not be deemed to be a part thereof or be taken into consideration in the interpretation of construction thereof of the AGREEMENT.*
11. *Words imparting the singular only also include the plural and vice versa where the contexts so require.*
12. *The present agreement is entered into between AWML and its members for collection, conveyance, treatment, and final discharge of treated effluent generated by its Members.*
13. *GPCB means Gujarat Pollution Control Board.*

14. ***Inlet norms mean the maximum permissible limits of waste water quality parameters specified by AWML to Its members for the effluent discharged by members at the outlet of the doorstep of the member into conveyance system.***
15. ***Outlet norms means the maximum permissible limits of treated waste water parameters specified by GPCB to AWML for the discharge.***
16. ***CC & A means Consolidated consents and authorization granted by GPCB to AWML under Water Act, Air Act and Hazardous Wastes (Management & Handling) amended rules'2008.***
17. ***EFFLUENT PIPELINE means underground drainage line or effluent conveyance system through which effluent is conveyed from doorsteps of member unit up to CETP.***
18. ***MEMBER means the industrial unit registered as member of AIA as well as AWML.***
19. ***CETP means Common Effluent Treatment Plant designed, developed, by GIDC, operated and maintained by AWML.***
20. ***CUT OFF VALVE means the disconnection of flow of effluent by operating cut off valve to the point of authorized chamber at the doorstep of member unit***

A. COMMENCEMENT OF AGREEMENT

This Agreement comes into force from the date member unit pays all money to AWML, submit all the documents along with application including No dues certificate of AIA, AWML, GIDC. AWML issues NO OBJECTION to GIDC to give connection in Effluent Conveyance line and on application or receipt of CC & A by AWML.

B. ADDITIONAL QUANTITY DURING PERIOD OF AGREEMENT

1. If the member desires to send its additional quantity of raw effluent in addition to committed under this present agreement it shall give 3 months advance notice to AWML of its desire of increase in effluent quantity, AWML shall, subject to availability of capacity, consider the request and may in its absolute discretion, offer terms for the Fresh agreement. Both the parties here to shall after reaching an agreement on the offered terms, execute a fresh agreement at least three months before accepting the additional effluent quantity.
2. Both the parties here to agree that the present agreement shall automatically come to an end in any of the following circumstances:

On expiry of CCA granted to the member & the same having not been renewed by the member of the same having been not granted by **GPCB.**

On expiry of CCA issued to AWML, Promoted by AIA and if the same is cancelled, refused, or not granted by GPCB.

3. Both the parties here to further agree, in case of present agreement coming to end owing to any of the aforesaid eventualities, it will be the sole responsibility of the member to handle, treat & dispose off its raw / treated effluent.

C. MEMBERSHIP AND OTHER CHARGES:

1. The AWML shall provide Membership Certificate of CETP to the MEMBER on receipt of Security Deposit/ capital contribution or any other amount as may be decided by the Board from time to time towards Share Capital Contribution and NO DUE CERTIFICATE issued by AIA/ AWML GIDC that Member has paid ail other contributions. The membership Certificate shall specify the committed quantity of raw Effluent water for treatment.
2. The Membership Application Form submitted by the member on 01st _____ of _____ declaring various information forms part of this agreement.
3. After having become the member, if the membership is terminated, because of any reason stated in this agreement, then in that event, the membership can be restored on the payment of required fees which shall be non- refundable.
4. The member undertakes to pay a minimum guarantee charge equivalent to **65%** of charges payable of declared effluent load per month. This is subject to change which may be notified from time to time.

   In case the member wants to take closure of the unit, the member shall inform ONE WEEK in advance to AWML in writing mentioning the period of closure. If the closure is for more than 30 days, Member shall pay minimum guarantee charge as stated above.
5. EXCESS/ PENALTY CHARGE: If member do not comply with the inlet norms OR release effluent in excess of contracted quantity, he undertakes to pay extra/additional charges as may be decided by AWML from time to time. AWML has right to refuse to accept such effluent including additional quantity if inlet norms are not met with or plant capacity is not sufficient to accept additional quantity.

D. OBLIGATION OF THF AWML

1. The AWML is obliged to accept effluent; complying with the inlet norms and specified quantity; from the MEMBER through underground pipeline to CETP, treat the effluent at CETP, **recycle/reuse to the extent possible** and finally discharge treated EFFLUENT as per the outlet norms, prescribed by GPCB to the approved effluent discharge point.
2. AWML is obliged to ensure proper collection, storage and disposal of solid hazardous wastes generated from CETP; as per the regulatory requirements and conditions of CC&A granted by GPCB.
3. AWML shall be responsible for all the activities starting from the effluent collection chamber situated at the entrance of premises of every member, its conveyance, receipt, treatment, reuses / recycles to the extent possible and final discharge of treated effluent as per GPCB norms.
4. AWML shall maintain daily records of waste water flow at inlet and outlet of CETP, consumption of Energy and chemicals, solid wastes generated and all other relevant information.
5. AWML shall ensure adequate power back up facility for ensuring smooth functioning of CETP during power failure.

E. OBLIGATIONS OF THE MEMBER

1. The MEMBER has to establish an EFFLUENT DISCHARGE SYSTEM as proposed by AWML, for the discharge of its effluent into CETP drainage line.
2. The Final discharge of effluent through final discharge valve shall be as per policy of CETP only.
3. The MEMBER who has installed Auto sampler on effluent discharge point should arrange for minimum 24 hours of holding capacity for storage of its effluent to meet with the emergency situation or during maintenance of CETP Plant or pipeline or for any other unforeseen situation as per its declared load of EFFLUENT.
4. The MEMBER who has not installed Auto sampler on effluent discharge point should arrange for minimum 48 hours of holding capacity for storage of its effluent, with a lock arrangement on discharge valve to enable testing of the effluent by CETP authorities before discharge of effluent into GIDC pipeline and also to meet with the emergency situation or during maintenance of CETP Plant or pipeline or for any other unforeseen situation as per Its declared load of EFFLUENT

5. The MEMBER shall also agree to comply with inlet norms of AWML at the discharge point at member premises before discharging his raw EFFLUENT in the Conveyance System.
6. The MEMBER is obliged to maintain discharge limits like heavy metals and other toxicants as may be intimated by the AWML from time to time.
7. The MEMBER is obliged to pay the bill raised by the AWML within 7 DAYS time from the date of bill.
8. The MEMBER is obliged to pay any contribution required to fulfil the economic liabilities of AWML pertaining to waste water, CETP and related activities; as per the formula, derived and approved by the Board of Directors, which may be notified from time to time.
9. Of the party of the Second Part disconnect, dismantle or reduce or sell off any plant machineries in existence resulting into reduction / stoppage of effluent as declared by the party while entering into this agreement, than in such situation the party of the Second Part shall do so after obtaining prior written approval of AWML and payment of transfer fees prevailing at the time of giving approval. Thereafter it is entitled to sell the proportionate shares in reference to declared effluent load to any other member of AWML who wants to buy the shares or has to comply with the condition of shareholding with reference to installing new plant and machineries in its unit. However party of Second Part will not be entitled to ask for any refund of its initial or subsequent contributions of whatsoever nature made by it to the party of the First Part. Both the Parties to the contract (i.e. transferor & transferee) are required to clear all the dues before the transfer of shares is executed
10. The MEMBER is obliged to pay and maintain interest free refundable Security Deposit of minimum one and half month's billing or based on capital investment as mentioned in annexure 1, whichever is higher, until its membership is terminated or it is decided by AWML to return the same to all MEMBERS.
11. Subject to review from time to time as per the prevailing monthly charges per m3 of effluent/ water consumption, and member shall be liable to make good the deficit in the required deposit amount.
12. The MEMBER shall get the consent from the Gujarat Pollution Control Board directing the MEMBER to send its raw EFFLUENT to the chamber of Effluent conveyance

pipeline of GIDC for the member near its Gate connected through pipeline up to inlet point of the CETP set up by AWML/ GIDC for treatment as per their standard procedure and norms.

13. MEMBER shall not discharge any effluent treated or untreated outside his premises leading to any open drain or surface drain or nallah, which shall be subject to verification and vigilance of AWML or any other regulatory authority. The member shall maintain zero discharge; other than CETP chamber; throughout the year. They shall provide necessary provisions/facilities to take care of additional water in rainy seasons.
14. In the event of CETP break down, the member will immediately close down its unit and stop discharging the effluents.
15. The Member shall ensure that chemicals, solvents and other toxic chemicals giving rise to refractory COD, are not discharged in CETP. The member have to segregate the concentrated wastes having high COD and high TDS and have to treat individually in either incineration system or MEE or any other suitable system as per consent condition.
16. The MEMBER declares that the MEMBER shall make all arrangements and installations for the measurement of flow of the EFFLUENT and shall be open to inspection by AWML or competent authorized agency appointed by AWML.
17. AWML shall reserve its right to amend/change the inlet norms of raw EFFLUENT from the MEMBER, if the MEMBER'S EFFLUENT is found to affect the performance of the CETP in achieving the treated effluent norms prescribed by GPCB or any other regulatory authority.
18. The MEMBER shall make all proper and adequate arrangements for keeping accurate and classified daily log book records of production, daily water consumption and daily waste water generation and daily waste water discharge to CETP and send the compiled records to the AWML; for compilation and submission to GPCB. In case of change in product or manufacturing process/route, the MEMBER shall also inform AWML in advance and get confirmation for the acceptability of EFFLUENT for treatment in AWML. AWML shall submit above information/data to GPCB or any other regulatory authority up on their request.

19. The AWML or its Authorized Representative(s) shall have right of entry at all hours for the purpose of monitoring the Effluent Collection Facilities, quality and quantity of effluent, to inspect plant and machineries and manufacturing facilities inside the MEMBER'S premises.
20. The MEMBER shall make adequate arrangements at its own cost as approved by and to the satisfaction of the AWML for flow measurement, collection and storage of its raw EFFLUENT in its premises and shall give access to the AWML to its storage facility for all 24/48 hours of the day as the case may be.
21. The member shall stop the production and other activities generating wastes water during the planned/ accidental shut down of CETP operations; as per the instructions of AWML.
22. The member shall put the metering System for their daily water consumption from the GIDC/ borewell and shall keep the records of their water consumption.
23. Member shall not permit to any third party to join their line with member's chamber inside its premises from which effluent is ultimately discharged to Effluent Conveyance System. This includes the chamber outside his gate which is his discharge point.
24. The member shall not be entitled to seek membership to any other CETP and that shall consistently and permanently send the effluent to CETP of AWML only.

F. CONVEYANCE

The MEMBER shall at its own cost discharge its EFFLUENT in Conveyance System maintained by AWML/ GIDC complying with the inlet norms of CETP.

The MEMBER for avoiding pollution from the discharge of its EFFLUENT has examined possibilities of having its EFFLUENT treated at its site and it has found that it is not going to be economically viable. The MEMBER states that this is the reason, which prompted him to enter into AGREEMENT with the AWML by which it undertakes to send its EFFLUENT to be treated and processed by the AWML.

G. Quantity and Quality of Effluent

1. The quality and quantity of EFFLUENT shall not exceed to that declared in Application Form without written consent from AWML.
2. The MEMBER shall have to bear all the costs for the calibration of the flow meter as per the instructions of AWML. If the MEMBER on its own decides to carry out

calibration of flow meter, he has to inform the same to AWML in advance and calibration of flow meter shall be carried out in presence of AWML authorized person. The calibration of flow meter shall be carried out only by competent agency authorized by AWML.

3. The AWML may disconnect the effluent drainage connection after giving prior notice to the MEMBER, if the effluent is found not in consonance with the conditions mentioned in this AGREEMENT.
4. The decision of the AWML in disconnecting the EFFLUENT drainage connection of the MEMBER for noncompliance with various clauses shall be final and it will not be called in question and the MEMBER shall have to pay the AWML the extra cost which shall be charged by the AWML for the expenditure incurred in analysing, and extra treatment charges and related other expenditures.
5. Any non-compliance of industry shall be noted and informed to member unit for the same.
6. Major non-compliance of industry will be noted seriously and the member unit will be asked for the same and will be visited if required.
7. For the first non-compliance, the technical committee will have discussion with the member industry and to visit if required for improving the EMS of the defaulting unit.
8. Also such unit shall be monitored at least twice a week including night monitoring.
9. If the non-compliance found second time, the discharge connection shall be disconnected for a period of seven days till the unit make necessary amendment for compliance.
10. If the non-compliance found third time, the discharge connection shall be disconnected for a period of one month till the unit make necessary amendment for compliance. The governing authority like GPCB, GIDC shall be informed to take necessary action against defaulter industry.
11. All the members have to comply the conditions in MOU as well as Consent from GPCB.
12. The member shall be liable to pay cost of any damage directly or indirectly caused to Effluent conveyance system and Common Effluent Treatment Plant of AWML as a result of change in quality of effluent discharged by member in conveyance system.
13. The MEMBER shall be bound to accept the said disconnection and reconnection shall be given only after the AWML is satisfied that the member has made adequate arrangement for the pre-treatment of effluent to the acceptable inlet norms, and if it fails to do so, its membership will be suspended. The MEMBER shall have to pay to

AWML charges for the disconnection and reconnection as decided by the Board of Directors.

H. Billing and Payment of Treatment Charges:

1. The MEMBER shall pay to the AWML the charges as mentioned in Schedule of Charges plus applicable taxes as may be notified/made effective from time to time for treating its industrial EFFLUENT. The AWML shall raise monthly bill for treatment to the MEMBER. The MEMBER shall make payment of the bill within 7 days from the date of the bill.
2. The applicability of service tax for the services in the form of treatment of effluents is not clearly defined in the relevant Act and Rules and therefore shall not be recovered in the bill. However, if it is established by the department at a later date that service tax is attracted on such charges, the member undertakes to pay the same from the date the department raises its demand along with penalties and interest for the period covered by the department in Demand Notice.
3. The member shall be liable to pay any taxes or levies or cess if imposed by any authority from the date it is made effective.
4. In case there is any dispute regarding billing, the MEMBER shall not withhold payment. After making full payment of such Invoices, the MEMBER shall lodge the claims to the AWML giving full particulars within a period of TEN (10) DAYS from the date of making the payment, and such claims if found correct, the AWML shall give adjustment for the same in the next bill.
5. The MEMBER shall pay interest on all delayed payments @18/%. Delayed payment means any payment not received within the stipulated due date of any invoice raised against the MEMBER by the PIL. The PIL reserves right to disconnect and stop treatment of effluent on account of non-payment, till payment is received against the said invoice.
6. In case of dishonour of cheque, the member has to pay the amount by way of Pay Order or Demand Draft and shall have to pay the charges for dishonour of cheque and allied costs as may be fixed by AWML from time to time.
7. The MEMBER shall be bound by the analysis of the AWML for levy of treatment charges and shall not call it in question for any reason whatsoever. In case of dispute,

joint testing may be carried out at AWML or any Approved accredited laboratory at the MEMBER'S cost.

8. The MEMBER shall be bound to pay Extra Treatment Charges and cost of damage as may be fixed for the quality and quantity of effluent treated by PIL, which does not meet the inlet norms of CETP.
9. The AWML shall impose penalty and / or disconnect the effluent drainage connection / after giving 3 days prior notice to the MEMBER, if it is found that the MEMBER has carried out tampering with flow meter/ TOC / pH meter and / or declared false effluent/ water consumption data.
10. Charges are subject to revision from time to time due to escalation in operations and Maintenance cost or for any other reasons not within the control of AWML during currency period of this agreement as may be decided by the board.
11. AWML shall impose additional charges to the member in any forms in case the change in legal requirements/ directions etc. result in any treatments/ discharge/ collection/ conveyance/ operation & maintenance requirements and therefore the cost of treatment.
12. AWML shall inform member in advance for any planned shutdown of conveyance or treatment infrastructure and may direct the member to close down/slow down its production and related activities generating waste water. The member has to follow the directions without questioning the same, what so ever.
13. In case of any accidental/unplanned breakdown of treatment and/or conveyance facilities; member is obliged to stop its activities; strictly in line with AWML's directives.

I. DEFAULT

1. If the MEMBER defaults in the discharge of any of the obligation under the present agreement, and in the event of default by the MEMBER in payment of treatment recovery/service charges due from the MEMBER, the AWML shall
    i. Refuse to accept EFFLUENT from the MEMBER for treatment and disconnect.
    ii. Notify to Gujarat Pollution Control Board AND/OR appropriate authorities the name of the MEMBER committed such default and that it's EFFLUENT

would not be taken for treatment by the AWML on account of such defaults.

iii. Inform the MEMBER that its EFFLUENT would be deemed to cause pollution and the MEMBER shall be liable as polluter under the Environmental Act/laws/Regulations and

iv. Notify to GPCB to take such action as may be deemed necessary under Environmental Act/laws/Regulations against such MEMBER.

2. The MEMBER declares that the MEMBER alone shall be liable for any action initiated against the MEMBER by the Gujarat Pollution Control Board or any other regulatory authority under the Water (Prevention and Control of Pollution) Act, 1974 or any other applicable Environmental laws.
3. AWML reserves the right to accept or refuse membership, in the event of member committing any breach / violation of the condition of the present agreement or any provision of law /Act/ Rules for the timing being in force, AWML reserves its right to suspend / cancel the membership for such period as it deem fit without giving any reason or prior notice.
4. Where an offence under the Environment Protection Act or under the rules framed there under, has been committed by the member or is attributed to any negligence on the part of the member which shall include its Directors, partner, proprietor, manager, secretary, officer, partner, etc. and if such member is guilty to the offence or is liable to be prosecuted against and punished accordingly, no suit, prosecution or legal proceeding (s) shall lie against AWML for the offence committed by its member and member shall be solely responsible to bear the cost of damage including compensating towards any damage to AWML.
5. It is also agreed by the MEMBER that the AWML is not and shall not be liable in any manner whatsoever, due to any negligence and for any reason or otherwise of the MEMBER, the untreated EFFLUENT is discharged by the MEMBER at a place other than that authorized by GPCB.

J. TRANSFER OF RIGHTS

1. The AWML may at any time transfer or assign its rights and obligation under the AGREEMENT to any other company or business concern. Upon such transfer or

assignment, only the transferee or assignee shall be liable for the obligations herein contained.

2. The MEMBER may, subject to approval of the AWML obtained in advance in writing, transfer and assign its rights and obligations under this AGREEMENT to any other Firm or company. Upon such transfer and / or assignment, only the transferee and / or assignee shall be liable for the obligations herein contained. The MEMBER shall produce satisfactorily evidence and documents as required by the AWML at the time of transfer of rights. No part transfer of rights shall be approved.
3. Provided further that the MEMBER shall first make payments of all bills issued by the AWML for the EFFLUENT treatment in full including interest, if any, thereon for delayed payments before applying for the approval of transfer and / or assignment as aforesaid to the AWML. The member shall pay the transfer fees along with application of Transfer of effluent quantity/ water consumption rights to other member as may be decided by Board from time to time. In the event of the failure on the part of the MEMBER to comply with the provisions of this agreement, the PIL reserves its rights to discontinue accepting EFFLUENT either to the MEMBER or to its transferee and / or assignee and without prejudice to any other rights, which the AWML may be having under the terms of the **AGREEMENT or otherwise.**
4. The incoming member OR existing shall have to pay the transfer and other charges as may be fixed by AWML from time to time.

K. PENALTIES

1. The MEMBER undertakes to pay penalties as may be notified by the AWML for noncompliance of Clauses of this AGREEMENT as decided by the Board from time to time.

L. FORFEITURE

1. In case of failure of the MEMBER to pay charges as notified by the AWML and as specified in various Clauses of this AGREEMENT, the AWML shall be at the liberty to adjust the amount from deposit of the MEMBER and AWML have right to use spare capacity to other prospective MEMBER.

M. SUSPENSION OF MEMBERSHIP

1. The MEMBER shall be suspended for noncompliance with the Clauses of this AGREEMENT at the sole discretion of the AWML without assigning any reason

whatsoever. The PIL shall not receive any EFFLUENT from the MEMBER during the period of suspension.

2. The AWML shall inform the GPCB about the suspension of any MEMBER. The suspension shall be revoked only at the sole discretion of the AWML after it is satisfied that its conditions have been met.

N. FORCE MAJEURE

1. In case of any force majeure, AWML shall not be saddled with any liability contingent otherwise but in that case, and it shall be the sole liability of the MEMBER.
2. Statuesque neither party.
3. Both the parties hereto agree that due to change in any laws related to pollution or due to any directive of any court or Authority, if AWML is to incur any additional financial burden consequent upon any alteration and/ or modification on the site or because of any other reason, then, in that case the MEMBER shall be liable to contribute for the same proportion to its disposal of raw effluent quantity in AWML's chamber provided at the gate of the member.
4. The term FORCE MAJEURE in this AGREEMENT means act of God, war, revolt, riot, fire, tempest, flood, earthquake, lightening, direct or indirect consequences of war (declared / undeclared), sabotage, hostilities, national emergencies, civil disturbances, commotion, embargo or any law of promulgation, regulation or ordinance whether Central or State or Municipal, breakage, bursting or freezing of pipeline, break down in plant. Upon occurrence of such cause and on its termination, the parties rendered unable as aforesaid shall notify other party within TWENTY FOUR (24) HOURS of the beginning and the ending, giving full particulars and satisfactory evidence thereof. Any action of labor employed by the MEMBER shall not be considered as FORCE MAJEURE.

O. PREVIOUS CORRESPONDENCE

All discussions and meetings held and correspondence exchanged between the Pit and the MEMBER in respect of the AGREEMENT and any decisions arrived at therein, in the past and before the coming into force of the AGREEMENT and no reference of such discussions or meetings or past correspondence shall be entertained by either the AWML or the MEMBER for interpreting the AGREEMENT or otherwise.

P. LAWS GOVERNING THE AGREEMENT

The present AGREEMENT shall be subject to Indian laws and rules and regulations, notifications etc. issued under such laws.

Q. AMENDMENTS

Any amendments to any of the clause of the AGREEMENT shall be proposed and sent in writing to the other party by the party proposing such amendment and if both the AWML and the MEMBER agree to such amendment, then same shall be incorporated in the AGREEMENT

R. INDEMNITIES

1. The MEMBER shall be deemed to be in exclusive possession and control of the said EFFLUENT and fully liable and responsible for its arrangements, appurtenances and properties before the effluent leave the premises of the MEMBER through drainage connection into Effluent Drainage Line, of AWML.
2. Accordingly the MEMBER agrees to fully protect, indemnify and hold the AWML or its employees, agents & successors and assigns harmless against any and all claims, demands, actions, suits, proceedings and judgments and any and all liabilities, costs, expenses, damages or losses arising out of or resulting from or incidental to or in connection therewith, which may be made out against the AWML, whether by the MEMBER, its employees, agents or successors and assigns or by third parties on account of damages or injury to property or person or loss of life resulting from or arising out of the installation, presence, maintenance or operation of the intake arrangements, appurtenances and properties of the MEMBER.

S. ARBITRATION

In case of any disputes or difference of opinion arising out of the present agreement the matter shall be referred to an Arbitrator mutually agreed upon by the member and AWML whose decision on the issue shall be final and binding on both the parties

T. TERMINATION OF AGREEMENT

1. The AWML has the unrestricted right to terminate this AGREEMENT and deduct it's all pending claims from the amount of contribution paid by the MEMBER.
2. This AGREEMENT can be terminated by either party, by giving a written notice of at least 120 days to the other. If the MEMBER requests cancellation, the provision relating to minimum charges shall be applicable, also during the notice period.

U. JURISDICTION

1. The PIL and the MEMBER mutually agree that only the local civil court shall have jurisdiction for all the disputes/ differences arising out of this agreement.
2. The addresses of parties hereto unless changed by written notification to be given at least 15 days in advance by registered letter prior to proposed date of change, IN WITNESS WHEREOF the parties hereto acting through their properly constituted representatives have set their hands to cause this AGREEMENT signed and executed in their respective names and on their behalf.

For and Behalf of AWML

Name

Designation Address

For and behalf of MEMBER

Name

Designation Address

ANNEXURE – 15

POLICY OF CETP

POLICY OF CETP FOR CONVEYENCE, ACCEPTANCE, TREATMENT & DISPOSAL OF EFFLUENT FROM MEMBER INDUSTRIES

1. Member must have CC&A from GPCB to discharge their effluent in CETP conveyance pipeline.
2. All the prescribed norms in CC&A for discharge of effluent from member industry to CETP must be achieved by member.
3. Member must obtain CETP membership for the discharge of effluent into CETP by signing the agreement with CETP management and must follow the CETP policy.
4. Each Member industry will be monitored minimum twice a month. If required, frequency shall be increased.
5. Samples of treated effluent discharged from each industry will be collected and analysed in the CETP laboratory.
6. The flow meter reading will be noted during each visit and daily record will be collected from each industry at the time of sampling.
7. Any non-compliance of industry shall be noted and informed to member unit for the same.
8. Major non-compliance of industry will be noted seriously and the member unit will be asked for the same and will be visited if required.
9. For the first non-compliance, the technical committee will have discussion with the member industry and to visit if required for improving the EMS of the defaulting unit.
10. Also such unit shall be monitored at least twice a week including night monitoring.
11. If the non-compliance found second time, the discharge connection shall be disconnected for a period of seven days till the unit make necessary amendment for compliance.
12. If the non-compliance found third time, the discharge connection shall be disconnected for a period of one month till the unit make necessary amendment for compliance. The governing authority like GPCB, GIDC shall be informed to take necessary action against defaulter industry.
13. The MEMBER has to establish an EFFLUENT DISCHARGE SYSTEM as proposed by AWML, for the discharge of its effluent into CETP drainage line.
14. The Final discharge of effluent through final discharge valve shall be as under.
    a. For Industry having discharge less than 25 KLD, the final discharge valve shall be operated manually.
    b. For Industry having discharge more than 25 KLD, the final discharge valve shall be operated automatically which shall be connected with automization system of CETP.
15. All the commercial and financial terms mentioned in agreement with CETP must be followed by member industry.