Initial Environmental Examination

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IND: Vishakhapatnam Chennai Industrial Corridor Development Program (VCIC-DP)

Naidupeta Economic Zone Subproject – Common Effluent Treatment Plant at Naidupeta and Atchutapuram industrial estates

Prepared by the Government of Andhra Pradesh for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 08 March 2016)

Currency unit	–	Indian rupee (Rs)
Rs1.00	=	$0.0149
$1.00	=	INR66.9940

ABBREVIATIONS

ADB	-	Asian Development Bank
APIIC	-	Andhra Pradesh Industrial and Infrastructure Corporation Limited
BGL	-	Below Ground Level
BOD	-	Biological Oxygen Demand
BIS	-	Bureau of Indian Standard
CPCB	-	Central Pollution Control Board
DO	-	Dissolved Oxygen
DoE	-	Department of Environment
PMC	-	Project Management Consultant
EA	-	Executing Agency
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
EMoP	-	Environmental Monitoring Plan
ESO	-	Environmental and Safety Officer
GoAP	-	Government of Andhra Pradesh
GoI	-	Government of India
IEE	-	Initial Environmental Examination
IMD	-	Indian Meteorological Department
IS	-	Indian Standard
MFF	-	Multi Tranche Financial Facility
MoEF	-	Ministry of Environment and Forests
MSL	-	Mean Sea Level
MW	-	Mega Watt
NGO	-	Non - Government Organization
NOx	-	Oxides of Nitrogen
APIIC	-	Project Implementation Unit
RF	-	Reserve Forest
ROW	-	Right of Way
PMSC	-	Project Management and Supervision Consultant
SPCB	-	State Pollution Control Board
SPM	-	Suspended Particulate Matter
SO_2	-	Sulphur Dioxide
SSI	-	Small Scale Industries

NOTES

(i) In this report, "$" refers to US dollars.
(ii) “INR” and “Rs” refer to Indian rupees

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EXECUTIVE SUMMARY

1. The Vishakhapatnam-Chennai Industrial Corridor Development Program (VCICDP) is proposed to support the Government of Andhra Pradesh (GoAP) for infrastructure development, and policy and institutional reforms to stimulate economic growth and employment generation.

2. VCICDP will help boost manufacturing sector growth along the Visakhapatnam-Chennai Industrial Corridor (VCIC), which runs over 800 km from north to south covering almost the entire coastline of the state of Andhra Pradesh covering a population of 49.4 million and an area of 160,205 km^2. The VCIC is part of the East Coast Economic Corridor, which is India's first coastal economic corridor, and is poised to play a critical role in driving India's new "Act East Policy" and "Make in India" initiatives. The "Act East Policy" is a proactive initiative focused on, among others, increasing the integration of the Indian economy with the dynamic global production networks of the Association of Southeast Asian Nations.

3. VCICDP will complement the ongoing efforts of the Government of Andhra Pradesh (GoAP) to enhance manufacturing sector growth and create high quality jobs in the state of Andhra Pradesh.

4. This Initial Environmental Examination (IEE) is an environmental safeguard assessment report for the APIIC Industrial Infrastructure upgradation subprojects being proposed under the VCICDP. This IEE covers the proposed CETP installation at Naidupet Economic Zone and capacity enhancement for existing CETP at Atchutapuram Industrial estate; both Naidupet Economic Zone and Atchutapuram Industrial Estate are a part of APIIC industrial areas.

5. This IEE aims to (i) provide critical facts, significant finding, and recommended actions; (ii) present the national and local legal and institutional framework within which the environmental assessment has been carried out; (iii) provide information on existing geographic, ecological, social and temporal context including associated facilities within the subproject's area of influence; (iv) assess the subproject's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic, and physical cultural resources in the subproject's area of influence; (v) identify mitigation measures and any residual negative impacts that cannot be mitigated; (vi) describe the process undertaken during project design to engage stakeholders and the planned information disclosure measures and the process for carrying out consultation with affected people and facilitating their participation during project implementation; (vii) describe the subproject's grievance redress mechanism for resolving complaints about environmental performance; (viii) present the set of mitigation measures to be undertaken to avoid, reduce, mitigate, or compensate for adverse environmental impacts; (ix) to describe the monitoring measures and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures; and (x) identify who is responsible for carrying out the mitigation and monitoring measures.

6. Potential negative impacts were identified in relation to pre-construction and operation of the improved infrastructure, but no permanent environmental impacts were identified as being due to either the subproject design or location. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result some measures have already been included in the designs for the infrastructure. This means that the number of impacts and their significance have already been reduced by amending the design.

7. The public participation process has been conducted for both areas as a part of th public hearing and the feedback of the relevant stakeholders have been considered for the sub-project design and implementation to be undertaken during project detailed design and finalization of the IEE. The information disclosure measures and process for carrying out consultation with affected people will facilitate their participation during project implementation.

8. The subproject's Grievance Redress Mechanism will provide the citizens with a platform for redress of their grievances and describes the informal and formal channels, time frame and mechanisms for resolving complaints about environmental performance.

9. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between APIIC, PMU, PMSC and the contractors. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with.

10. The contractor will be required to submit to APIIC, for review and approval, site environmental plan (SEP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following of the EMP to ensure no significant environmental impacts; (iii) monitoring program as per SEP; and (iv) budget for SEP implementation. No works are allowed to commence prior to approval of SEP.

11. A copy of the EMP/approved SEP will be kept on site during the construction period at all times. The EMP has been made binding on all contractors operating on the site and included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

12. The subproject is unlikely to cause significant adverse impacts because: (i) most of the individual components involve straightforward construction and operation, so impacts will be mainly localized; (ii) in most cases the predicted impacts are localized and likely to be associated with the construction process at designated location and are produced because the process is involving construction, obstruction at specific construction locations, and earth movements and storage and transportation of hazardous waste during operation phase of the sub-project; and (iii) being located in the industrial area and will not cause direct impact on terrestrial biodiversity values. The potential adverse impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

13. The Environment Clearance [1] for Atchutapuram cluster is already obtained which includes a CETP of capacity 13 MLD. The Environment Clearance process for Naidupet cluster is in advanced stage. EIA report has been prepared and public hearing as per the TOR has

[1] The Environment Clearance for multi-product Andhra Pradesh SEZ at Atchutapuram and Rambilli Mandal, Vishakhapatnam district, Andhra Pradesh and CRZ clearance for laying Marine disposal pipeline by APIIC was granted on 13 February 2012

been conducted. The proposed CETP for Naidupet is for 3MLD capacity proposed as a modular unit in phases of 1 MLD capacity each.

14. Therefore as per ADB SPS, the subproject is classified as environmental Category B and does not require further Environmental Impact Assessment.

I. INTRODUCTION

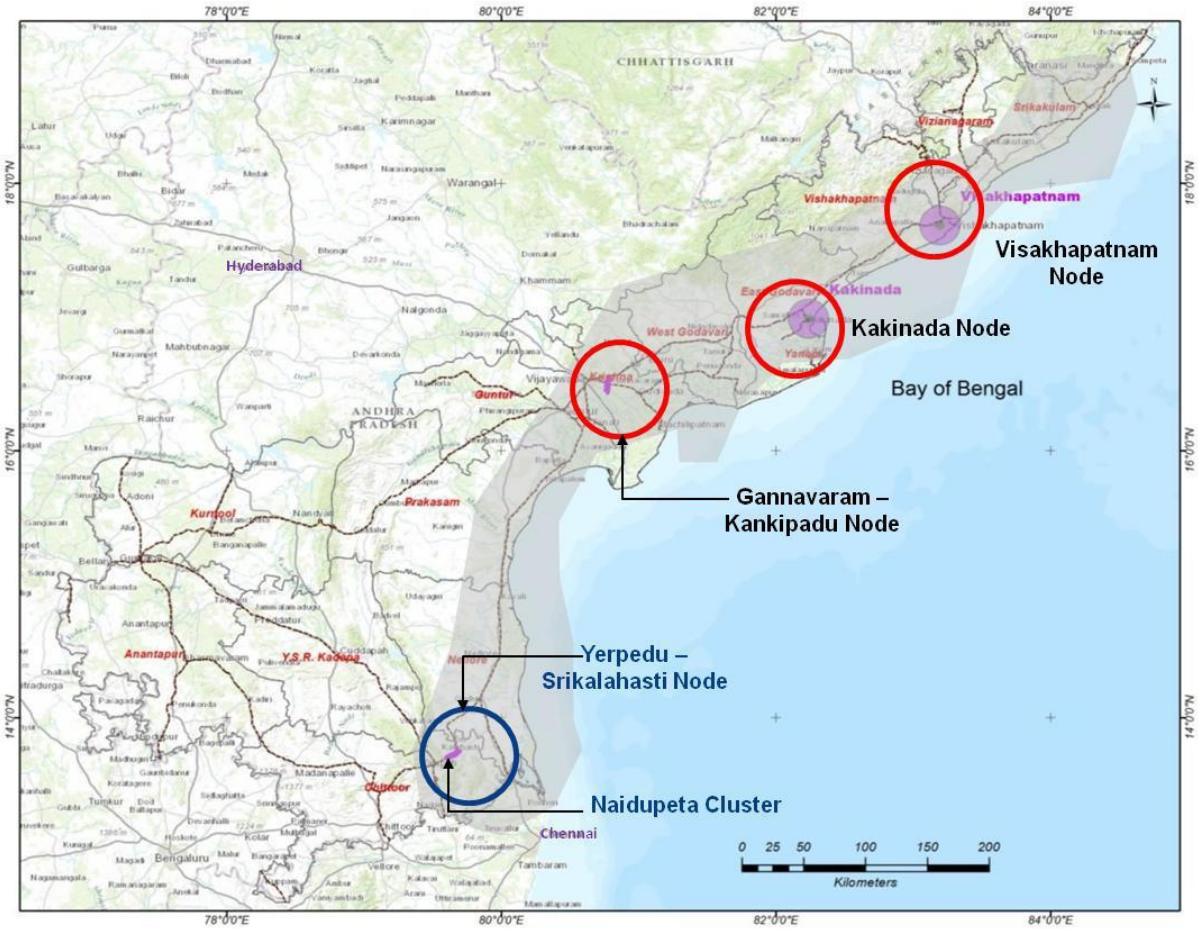
A. Background:

1. Andhra Pradesh Industrial Infrastructure Corporation Limited (APIIC) a wholly owned undertaking of Government of Andhra Pradesh (GoAP) has a mandate to develop industrial areas across the state. APIIC has developed around 300 Industrial Parks spread over an extent of 121,655 acres and in addition it has also developed sector specific industrial parks and special economic zones at strategic locations across the state.

2. The proposed project is for the construction of a 1 MLD capacity CETP at the Naidupeta cluster and augmentation of existing capacity of the Atchutapuram industrial estate CETP up to 3 MLD capacity.

3. **Naidupeta Cluster Overview**: APIIC developed the Naidupeta Cluster comprising of a Multiproduct SEZ (2,549 acres), Naidupeta Industrial Park (1,244 acres) and Attivaram Industrial park (406 acres). Naidupeta Cluster comes under the proposed Vizag – Chennai Industrial Corridor (VCIC) within the Yerpedu – Srikalahasti Node.

Figure 1: Map location of Industrial Clusters and Nodes of Vishakhapatnam Chennai Industrial Corridor



4. In view of the proposed VCIC and the envisaged developments, the demand for industrial land especially from engineering, Pharma, textile sectors is expected to increase and in order to cope up with the developments, APIIC is planning to upgrade the infrastructure in these Industrial clusters as per market needs.

5. Naidupeta cluster is located 8 km west of Naidupeta town in Nellore district of Andhra Pradesh. The cluster comprises of the following estates.

Name of the Estate	Extent (in Acres)
Multiproduct SEZ	2,549
Naidupeta Industrial Park	1,244
Attivaram Industrial Park	406

Table 1: Major Industries in the Naidupeta Cluster:

S. No	Name of the Industry	Type of Industry	Extent (in acres)	Remarks
	Multiproduct SEZ (MPSEZ)			
1	M/s Greentech Industries	Manufacture of automobiles	210	In operation
		components, automobile engines & machinery		
2	M/s Prime Electricals Pvt. Ltd.	Manufacture and export of power transformers	100	In operation
3	M/s Hemair Systems India Ltd.	Clean room technology equipment and HVAC equipment and other accessories	25	In operation
4	M/s Aurobindo Pharma Ltd.	Pharmaceuticals and Formulations	32	Under construction
	IP Naiduepta			
1	Hindustan National Glass and Industries	Manufacture of Container Glass	200	In operation
2	SKI Carbon Black (India) Pvt Limited	Manufacture of carbon black and power (byproduct)	60	In operation
3	Loyala Textiles Limited	Manufacture of Yarn and Fabric	54	In operation
4	BASF India Pvt Limited	Manufacture of Additive Mixtures	5	In operation
5	Chemsynth Laboratories	Manufacture of Bulk drugs	50	Yet to commence construction
	IP Attivaram			
1	DRA Industries	Manufacture of MS Billets and Construction Steel	100	In operation
2	Nithya Steels and Alloys	Steel Melting and Steel Rolling	20	In Operation

6. APIIC has identified the following components for further development of the Naidupeta cluster;

(i) Dedicated Water supply from Telugu Ganga Canal Project to MPSEZ, IP Naidupeta and IP Attivaram including Water Supply Distribution network including associated infrastructure for 13km in MPSEZ.

(ii) Internal Roads and storm water drains in IP Naidupeta and Attivaram around 15 kms each.

(iii) A One Stop Service centre of 15,000 sft to house APIIC, IALA, SEZ offices along with business centre, post office / banks, conference room, primary health center, food court, and office space in SEZ.

(iv) Direct Connectivity to NH5- Quick evacuation to Gateway Port (Krishnapatnam Port) Chennai and other parts of the country.

(v) Upgradation Venkatagiri – Attivaram section of Venkatagiri – Naidupeta Road

7. **Atchutapuram Cluster Overview:** APIIC has developed a multiproduct SEZ at Atchuthapuram (APSEZ), Vishakhapatnam in an area of5595.47 acres & Industrial Parks (IP) namely IP Duppituru (101.21 acres), IP Pudi (190.94 acres) and IP Krishnampalem (250.745 acres) and Expansion areas of APIIC (~3500 acres) which forms part of "Atchutapuram Cluster" falling under Vizag – Chennai Industrial Corridor (VCIC). Atchutapuram Cluster is located at around 30 km to the south of Visakhapatnam City. It is connected to Visakhapatnam via the NH 5 as well as SH 97.

Figure 2: Map location of Atchutapuram Industrial Cluster

8. Spanning about 2,265 hectares (5595.47 acres), APSEZ is strategically located in proximity to Visakhapatnam, which is an industrial belt and a port city as shown in the following location map. The site falls within Atchutapuram and Rambilli mandals of Visakhapatnam district.

9. APSEZ falls within the upcoming AP PCPIR i.e., Andhra Pradesh Petroleum, Chemical and Petrochemicals Investment Region. AP PCPIR is a specifically delineated investment region with an area of around 640 square kms planned for the establishment of manufacturing & service facilities for domestic and export led production in petroleum, chemicals & petrochemicals. Andhra Pradesh is the first state to sign a MoA for PCPIR. A Memorandum of

Agreement was signed between Dept. of Petrochemicals, Govt. of India and Govt. of Andhra Pradesh in New Delhi on 1st of October, 2009.

10. APIIC is developing the required physical infrastructure for the functioning of the APSEZ and its expansion areas through its own resources in a phased manner depending on the occupancy of the APSEZ and IPs (expansion areas). In view of the increased demand for new industrial plots in the APSEZ and its expansion areas, APIIC now proposes to upgrade the Common Effluent Treatment Plant (CETP) of 3 MLD capacity to treat wastewater from chemical and Specialty chemicals industrial units in APSEZ.

B. Purpose and objective of the study

11. The environmental assessment study was conducted from March 2015 to July 2015 as part of feasibility study under ADB financed technical assistance to meet ADB requirements. The report will be updated after the detailed design for the CETPs is completed. This version is based on pre-feasibility studies conducted, earlier EIA reports for the initial project stage, available secondary data, due diligence studies and preliminary DPR reports prepared for the CETP installation at Naidupeta and capacity enhancement at Atchutapuram industrial cluster. CETP development is one of the packages in the APIIC Infrastructure development subprojects under the Tranche 1 of VCICDP prior to initiation of civil works. It has been categorized as **Category 'B'** and hence an initial environmental examination (IEE) has been conducted.

12. The IEE report covers the general environmental profile of the study area and includes an overview of the potential environmental impacts and their magnitude on physical, ecological, economic, and social and cultural resources within the project's influence area during design, construction, and operation stages. An EMP was prepared that contains mitigation measures for significant environmental impacts during implementation of the project, environmental monitoring program, and the responsible entities for mitigation and monitoring. IEE has four basic objectives; (i) identify the environmental issues that should be taken into account due to project interventions (ii) determine the magnitude of potential environmental concerns and to ensure that environmental considerations are given adequate weight at planning/design stage (iii) identify need for further environmental studies or Environmental Impact Assessment (EIA) and, (iv) suggest enhancement measures, if any.

C. Extent of the IEE study

13. This IEE report has been prepared on the basis of pre-feasibility study and preliminary DPR, field investigations and surveys, stakeholder consultations and meetings to meet the requirements for environmental assessment process and documentation as per ADB's Safeguard Policy Statement (SPS, 2009). The extent of the IEE was decided considering all likely impacts and risks analyzed in the context of the project's area of influence encompassing: (i) the primary project site(s) and related facilities like site clearance, utility shifting etc. (ii) associated facilities project viz. management and handling, storage of hazardous waste, availability and existence of hazardous waste management facilities, disposal of debris, construction camp etc. (iii) areas and communities potentially affected by cumulative impacts, and (iv) potential impact from unplanned but predictable developments caused by the project that may occur at later stage or at a different location.

D. IEE Methodology

14. IEE commenced with an initial pre-feasibility site visit and review of the technical details provided by the APIIC and DPR consultants and preceding environmental assessment reports conducted for the project sites. This was followed by a reconnaissance site visit and discussion with the implementing agency to reconfirm the technical details of the proposed CETPs including a site visit to the existing CETP under construction at Atchutapuram cluster. This helped identify environmental attributes which may get altered due to the project and incorporate additional information to the baseline environmental scenario/environmental setting of the project to meet the ADB Safeguard requirements. Further steps followed for IEE has been concisely described in following paragraphs.

1. Primary Data Collection

15. Inventory of all environmental features viz. terrain, geologically unstable areas, waterways/water bodies, road side vegetation, sensitive receptors, common property resources, utilities, flooding/water logging, and industries was conducted for the project sites. Since the proposed project sites are within the already allocated Industrial cluster zones of APIIC, it does not impact forest area and hence no bio-diversity study was undertaken.

2. Secondary Data Collection

16. Published reports, government websites, recognized institutions and relevant government departments were consulted to gather information and maps of the project influence area. For information on ambient air quality, soil quality, background noise level, surface and groundwater quality, environmental assessment done by DPR Consultants was referred.

3. Public Consultation

17. Besides consultations with the government agencies, consultations with local people/beneficiary population were held at all major habitations to collect baseline information to better understand of potential impacts and appreciate the perspectives/concerns of the stakeholders. Public hearing process has already being conducted for both the Naidupeta and Atchutapuram Industrial Estate as a part of the EIA approval process and the Information gathered from this were integrated in project design and formulating of the EMP.

4. Other Tools

18. Remote sensing and GIS based land use map of the study area has been reviewed through recent satellite imagery and verified on the ground. Information collected from both primary and secondary sources has been summarized in **Table 2**.

Table 2: Primary and Secondary Information Sources

Information	Sources
Technical Details	APIIC and DPR Consultant
Technical details of proposed CETPs	APIIC CETP consultant and site visit to existing CETP under operation at Jedhi Metla, Hyderabad
Climatic condition	Indian Meteorological Department Websites
Geology, Seismicity, Soil and Topography	State of Environment Report, Pollution Control Board, DPR and Primary Surveys
Land Use/ Land Cover	State of the Environment Report, Satellite Imagery based land use analysis
Drainage Pattern	Google Image, Detail Project Report and onsite observations
Forest/Vegetation	Forest Range Offices/State Forest Department, Andhra Pradesh
Archaeological / Cultural Heritage sites	Archaeological Survey of India
Status of fishing activity	District Fisheries offices
Air quality Noise, Soil and Water	Primary survey by DPR Consultants
Hazardous Waste Management practice and requirements	APPCB, Detailed Project Report
River geo-morphology, hydrology, drainage, flood patterns,	Detailed Project Report, Consultation and site verification
Soil profile and measures to control soil erosion	Soil Conservation Department, Govt. Of Andhra Pradesh
Groundwater Conditions	Central Groundwater Board
Socio-economic environment	Different Govt. agencies/civic bodies, official websites maintained by state govt., census of India 2011, and public Consultation during the Field survey

5. Assessment of Potential Impacts

19. Potential significant impacts were identified on the basis of: analytical review of baseline data; review of environmental conditions at site; analytical review of the underlying socio-economic conditions with the project influence area.

6. Preparation of the Environment Management Plan

20. An EMP for the project was prepared to specify the steps required to ensure that the necessary measures will be taken. The EMP includes the monitoring plan giving details of the resources budgeted and the implementation arrangements.

E. Structure of the report

21. The IEE has been structured as recommended in SPS, 2009. An introduction section has been included to have a general overview of the project. Executive Summary describing critical facts, significant findings, and recommended actions has been presented in the beginning of the report. The report has been compiled and presented as follows.

Executive Summary
Chapter 1- Introduction
Chapter 2- Policy, Legal and Administrative Framework
Chapter 3- Description of Project

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

22. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, and loans involving financial intermediaries, and private sector loans.

23. **Screening and Categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impact and are assigned to one of the following four categories:

(i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.

Category B. Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.

(ii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.

(iii) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all Projects will result in insignificant impacts.

24. **Environmental Management Plan.** An EMP which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the Project's impact and risks.

25. **Public Disclosure.** The IEE will be put in an accessible place (e.g., local government offices, libraries, community centers, etc.), and a summary translated into Bengali/Hindi for the project affected people and other stakeholders. The following safeguard documents will be put up in ADB's website so that the affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

(i) For environmental category A projects, a draft EIA report at least 120 days before Board consideration;
(ii) Final or updated EIA and/or IEE upon receipt; and
(iii) Environmental monitoring reports submitted by the Project Management Unit (PMU) during project implementation upon receipt.

B. Environmental Legislation (National and State Laws)

26. Implementation of VCICDP will be governed by environmental acts, rules, policies, and regulations of the Government of India. These regulations impose restrictions on the activities to minimize/mitigate likely impacts on the environment. Many of these are cross sector and several of them are directly related to environmental issues. The most important of these is the "Environmental Impact Assessment (EIA) Notification, 2006".

27. In addition to the EIA Notification, 2006, there are a number of other acts, rules and regulations currently in force that could apply to VCICDP. Salient features and applicability of these legislations are provided in Table 3. This presents specific requirements for the project. Annex 2 provides the environmental standards for air, surface water, groundwater, emissions, noise, vehicular exhaust and disposal to land/agricultural use of sludge and bio-solids.

28. Implementation of the subproject will be governed by the national and State of Andhra Pradesh environmental acts, rules, regulations, and standards. These regulations impose restrictions on activities to minimize/mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensure subprojects are consistent with the legal framework, whether national, state or municipal/local. Compliance is required in all stages of the subproject including design, construction, and operation and maintenance.

29. The summary of environmental regulations and mandatory requirements for the subproject is shown in Table 3.

Table 3: Applicable Environmental Regulations for Naidupeta and Atchutapuram CETPs Subproject.

No.	Legislation	Requirements for the Project	Applicability
1	National Environment Policy (NEP), 2006	Project should adhere to the NEP principle of: enhancing and conservation of environmental resources and abatement of pollution	The policy governing the environmental rules and legislations and is applicable to all the subprojects.
2	EIA Notification, 2006	Environmental clearances (EC)	Construction of CETP/STP/WTP The proposed component of the water supply, power distribution network, transmission lines and road construction are not anticipated to require Environmental Clearance.
3	Water (Prevention and Control of Pollution) Act, 1974 amended 1988 and its Rules, 1975	• Consent for establishment (CFE) and consent for operation (CFO) from APPCB • Compliance to conditions and disposal standards stipulated in the CFE and CFO	Applicable to all the subproject specifically for the construction and operation of sewage treatment plant and CETP
4	Air (Prevention and Control of Pollution) Act, 1981, amended	• CFE and CFO from APPCB as applicable	For the subproject, the following will require

No.	Legislation	Requirements for the Project	Applicability
	1987 and its Rules, 1982	• Compliance to conditions and emissions standards stipulated in the CFE and CFO.	CFE and CFO: (i) diesel generators; (ii) hot mix plants; and (iii) vehicles emitting air pollutants.
5	Environmental (Protection) Act, 1986 amended 1991 and the following rules/notifications: • Environment (Protection) Rules, 1986 including amendments • Municipal Solid Wastes (Management and Handling) Rules, 2000 • Noise Pollution (Regulation and Control) Rules, 2000 • Environmental Standards of Central Pollution Control Board (CPCB) • Notification of Eco Sensitive Zones • Wetland (Conservation and Management) Rules, 2010 • Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2009	• CETPs/STPs should be designed and operated to meet disposal standards. Inlet effluent at CETP should also meet the standards - compliance with emission and disposal standards during construction. • Solid waste and sludge generated at proposed facilities shall be disposed in accordance with the MSWM Rules. • Compliance with noise standards • Compliance to environmental standards (discharge of effluents) • Restriction of activities (including construction, tree cutting, etc.) in the notified zones. There are no eco sensitive zones in or near the subproject locations • Applies to protected wetlands (Ramsar sites, wetlands in eco sensitive areas and UNESCO heritage sites & in high altitudes, and wetlands notified by Government of India) - Prohibits/ regulates activities within and near the wetlands. None of the subproject locations has protected wetlands • Rules defines and classifies hazardous waste provides procedures for handling hazardous waste • Requires Pollution Control Board's consent for handling hazardous waste • Procedure for storage of Hazardous wastes and provides procedures for recycling, reprocessing or reuse, important and export of hazardous waste • Rules for development of	Applicable to all subprojects

No.	Legislation	Requirements for the Project	Applicability
		treatment, storage, disposal facility (TSDF) for hazardous wastes such that TSDF shall be developed following guidelines issued by CPCB	
6	Contract Labour (Regulation and Abolition) Act, 1970; • The Inter-State Migrant Workmen (Regulation of Employment and • Conditions of Service) Act, 1979	• Department of Labour, GoAP as principle employer • Contractor shall register with Labour Department, GoAP if inter-state migrant workmen are engaged • Adequate and appropriate amenities and facilities shall be provided to workers including housing, medical aid, traveling expenses from home and back, etc.,	• Applicable to all construction/civil works. • APIICs to obtain Certificate of Registration. • Contractors to obtain license from designated labour officer
7	The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996	• Cess should be paid at rate not exceeding 2% of the cost of construction as may be notified • The employer is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. • The employer has to obtain a registration certificate from the Registering Officer	Applicable to any building or other construction work and employ 10 or more workers
8	The Child Labour (Prohibition and Regulation) Act, 1986	• No child below 14 years of age will be employed or permitted to work in all the subprojects.	No child below 14 years of age will be employed or permitted to work in all the subprojects.
9	Minimum Wages Act, 1948	• All construction workers should be paid not less than the prescribed minimum wage	Applicable to all subprojects.
10	Workmen Compensation Act, 1923	• Compensation for workers in case of injury by accident	Applicable to all subprojects.
11	Equal Remuneration Act, 1979	• Equal wages for work of equal nature to male and female workers	Applicable to all subprojects.
12	AP State Environment Policy	• Follows the National Environment Policy, 2006 • Project implementation should adhere to the policy aims	Applicable to all subprojects.
13	The Motor Vehicles Act, 1988	• Standards for vehicular pollution and prevention control. The authority also checks emission standards of	Applicable to all subprojects.

No.	Legislation	Requirements for the Project	Applicability
		registered vehicles, collects road taxes, and issues licenses. • In August 1997, the Pollution under Control Certificate (PUC) program was launched in an attempt to crackdown on the vehicular emissions in the States. • All the vehicles that will be used in construction of the subprojects will have to comply with the PUC norms set down under this act.	
14	Coastal Regulation Zone (CRZ) Notification 6th January 2011 • Central Government have declared the coastal stretches of seas, bays, estuaries, creeks, rivers and back waters which are influenced by tidal action (in the landward side) up to 500m from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) & High Tide Line (HTL) as "Coastal Regulation Zone" (CRZ), as per the provisions of the CRZ Notification 6th January 2011.	The main objectives of the Coastal Regulation Zone Notification, 2011 are: • to ensure livelihood security to the fishing communities and other local communities living in the coastal areas; • to conserve and protect coastal stretches and; • to promote development in a sustainable manner based on scientific principles, taking into account the dangers of natural hazards in the coastal areas and sea level rise due to global warming.	Applicable to all subprojects.
15	Minor Mineral and concession Rules	For opening new quarries. Regulate use of minor minerals like stone, soil, river sand etc.	Applicable to all subprojects.
16	The Mining Act(1952)	The mining act has been notified for safe and sound mining activity. The construction of road subprojects will require aggregates. These will be procured through mining from riverbeds and quarries	Applicable to all subprojects.
17	Notification for use of fly ash from thermal power plants within 100km reaches of the project.	The MoEF had issued in 2009 a notification that all brick units within 100km radius of thermal power plants were required to use fly ash for making bricks as well as using it for construction activities like building or roads.	Applicable to all subprojects within 100km reaches of thermal power plants.
18	Public Liability and Insurance Act 1991	Protection from hazardous materials and accident.	Applicable to all subprojects.
19	National Environment Appellate Authority Act (NEAA) 1997	Grievances process and how they will be dealt with.	Applicable to all subprojects.
20	Explosive Act 1984 - For transporting and storing diesel, bitumen etc.	Safe transportation, storage and use of explosive material.	Applicable to all subprojects.

No.	Legislation	Requirements for the Project	Applicability
21	The Factories Act, 1948 - The Andhra Pradesh Factory Rules	The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours and rendering information-regarding accidents or dangerous occurrences to designated authorities.	Applicable to all subprojects.
22	Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996.	The Rules provide for mandatory preparation of On-Site Emergency Plans by the industry and Off-Site Plans by the district collector and the constitution of four tier crisis groups at the center, district, and local levels for the management of chemical disaster.	Applicable to all subprojects.
23	Permission for extraction of ground water for use in road construction activities from State Ground Water Board.	Extraction of groundwater.	Applicable to rehabilitation and improvement of water supply. To be obtained prior to initiation of any work involving abstraction of groundwater
24	Permission for use of water for construction purpose from irrigation department	Use of surface water for construction	Applicable to all subprojects. To be obtained prior to initiation of any work involving use of surface water for construction

C. Government of India Environmental Assessment Procedures

30. The EIA Notification, 2006, sets out the requirement for environmental assessment in India. This states that prior environmental clearance (EC) is mandatory for the development activities listed in its schedule, and must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts.

(i) Category A projects require EC from MoEF. The proponent is required to provide preliminary details of the project in the prescribed form, after which an Expert Appraisal Committee (EAC) of the MoEF prepares comprehensive terms of reference (ToR) for the environmental impact assessment (EIA) study within 60 days. On completion of the study and review of the report by the EAC, MoEF considers the recommendation of the EAC and provides the EC if appropriate.

(ii) Category B projects require EC from the State Environment Impact Assessment Authority (SEIAA). The State-level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares ToR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the EC based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated

as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

31. Common Effluent Treatment Plant (CETP) development (new or modification) will attract EIA Notification.

32. APIIC has already obtained environmental clearance for the Atchutapuram CETP and for proposed CETP at Naidupet SEZ under VCICDP, environmental clearance process is in advanced stage. TOR has been issued and Public Hearing for the project is underway.

D. International Environmental Agreements

33. India is a party to the following international convention that may apply to this project, especially in management and handling of Hazardous Wastes.

Table 4: International Agreements and Applicability to Naidupeta and Atchutapuram CETPs Subproject

No.	Agreement	Requirements for the Project
1	Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal, 1989 To protect human health and the environment against the adverse effects of hazardous wastes. This aims at (i) reduction of hazardous waste generation, promotion of environmentally sound management (ii) restriction of transboundary movements, and (iii) a regulatory system for transboundary movements.	Sludge/rejects generated from tertiary treatment process likely to have heavy metals and may fall in hazardous waste category. The sludge/rejects will be disposed within the country.
2	United Nations Framework Convention on Climate Change (UNFCCC), 1993	The UNFCC is an international environmental treaty with the main objective to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system. India signed the UNFCC on 10 June 1992 and ratified it on 1 November 1993. The project will ensure that all construction activities will not significantly increase the GHG emissions and ensure that design of all infrastructure are resilient climate change impacts

34. **Government Regulatory Body.** The Andhra Pradesh Pollution Control Board (APPCB) is the main state-level regulatory agency that is responsible environment protection and pollution control. APPCB through its Regional Offices (RO) in Atchutapuram and Naidupeta region will regulate environmental protection related activities. Regional Officer's at these locations will monitor the subprojects operation and compliance with the standards.

35. APPCB monitors the environmental parameters to check whether or not it meets the standards stipulated in its consent order. Surveillance monitoring by APPCB staff, at least once

a year, by visiting the project sites and collecting the sample and testing at APPCB laboratory, and specific monitoring in case of public complaints.

E. ADB's Safeguard Requirement

36. The Asian Development Bank has defined its Safeguard requirements under its "Safeguard Policy Statement" (SPS, 2009). Project categorization has been done using REA checklist and the project is categorized as category B. As per SPS 2009, category B projects warrants preparation of an IEE.

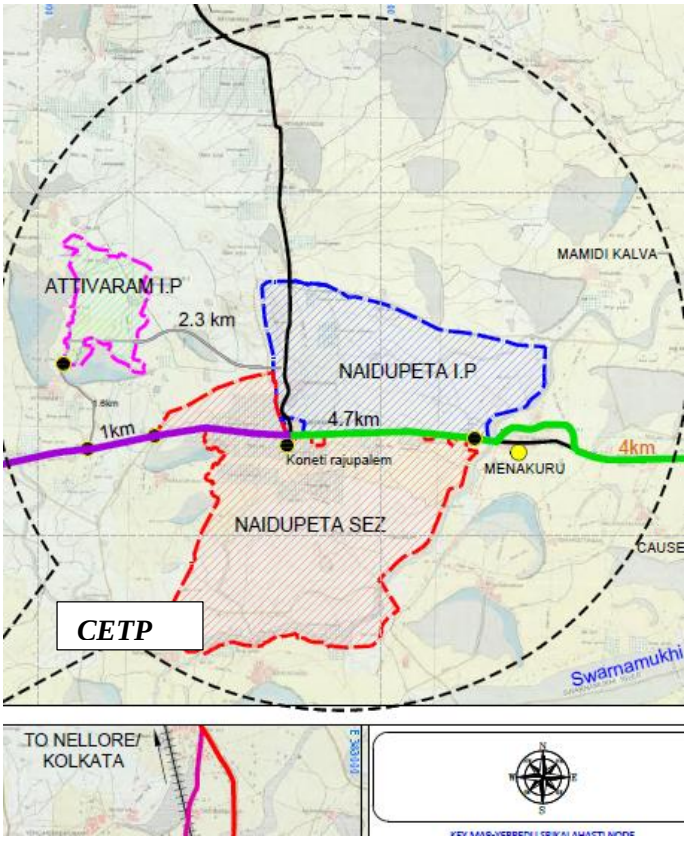
F. Grievance Redress Mechanism

37. People that are affected by the impacts of this project will have a channel to register their grievance. This report and the EMP describe a grievance redress mechanism (GRM) to document and resolve complaints from affected people. The proposed GRM was explained to the attendees of the public forum. The GRM will be accessible to diverse members of the community, including more vulnerable groups such as women and youth. Multiple points of entry and modes of access, including face-to-face meetings, written complaints, telephone conversations, or e-mail, will be available. Opportunities for confidentiality and privacy for complainants will be honored where this is seen as important.

III. DESCRIPTION OF THE PROJECT

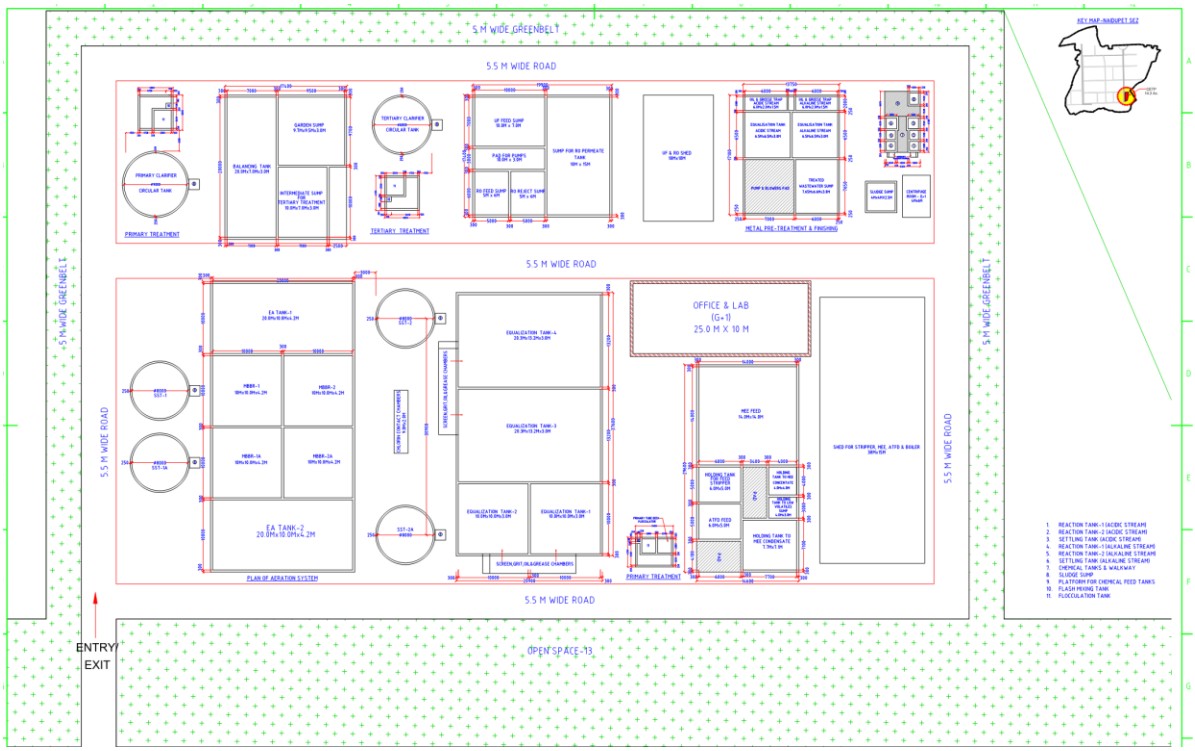
A. Location

Figure 3: Proposed location of CETP at Naidupeta Industrial Cluster



38. Naidupeta industrial cluster is a mixed industry type. Currently the industries that have been established or are under establishment are engineering (transformers, AC components, automobile parts) and pharmaceuticals (API and formulation). In the nearby Industrial Park the industries established or under establishment are textile, glass, paper and allied products, bulk drug, food, chemical, cement products, plastics, paints, engineering and carbon black.

Figure 4: CETP PROPOSED PLANT LAYOUT AT NAIDUPETA



39. Owing to its proximity to Chennai, a few garments and finished leather product (jackets, shoes) units are also anticipated. The source of raw water is from Telugu Ganga Canal and the quality of the water is expected to be good for direct use except for specific purposes like boiler feed, and industry specific needs.

40. Keeping in view the current requirements, the 3 MLD CETP is proposed to be established in 3 units of 1 MLD each. This section of the report shall deal with 1 MLD capacity CETP being proposed.

41. The 1st module of the proposed Common Effluent Treatment Plant (CETP) will cater to a capacity of 1 MLD. The CETP is proposed as a Zero Liquid Discharge (ZLD) which will enable water conservation and also prevent any discharge to the nearby water body Mamidi Kalava which is being used for irrigation purposes. A part of the treated wastewater will be used for maintaining the green belt within the Naidupeta-SEZ and the balance will be reused at the units as non-potable water for various applications.

42. The proposed CETP is designed to mainly cater to the following sector of industries which are expected to come up in the Naidupeta cluster - engineering, bulk drug & pharmaceuticals, leather and textile garments, food, chemical, paper products, cement products and textile. The engineering sector has been further split in to metal pre-treatment and finishing

(electroplating) and the manufacturing (mainly machining). The bulk drug and pharmaceuticals sector has been split in to manufacturing of API (Active Pharma Ingredients) and formulation units. It is observed[1] that the textile units will be mainly for manufacturing readymade garments and food industries for processing of sea fish. The break up in terms of volumetric contribution (for the 1st 1,000 KLD CETP) is as given below:

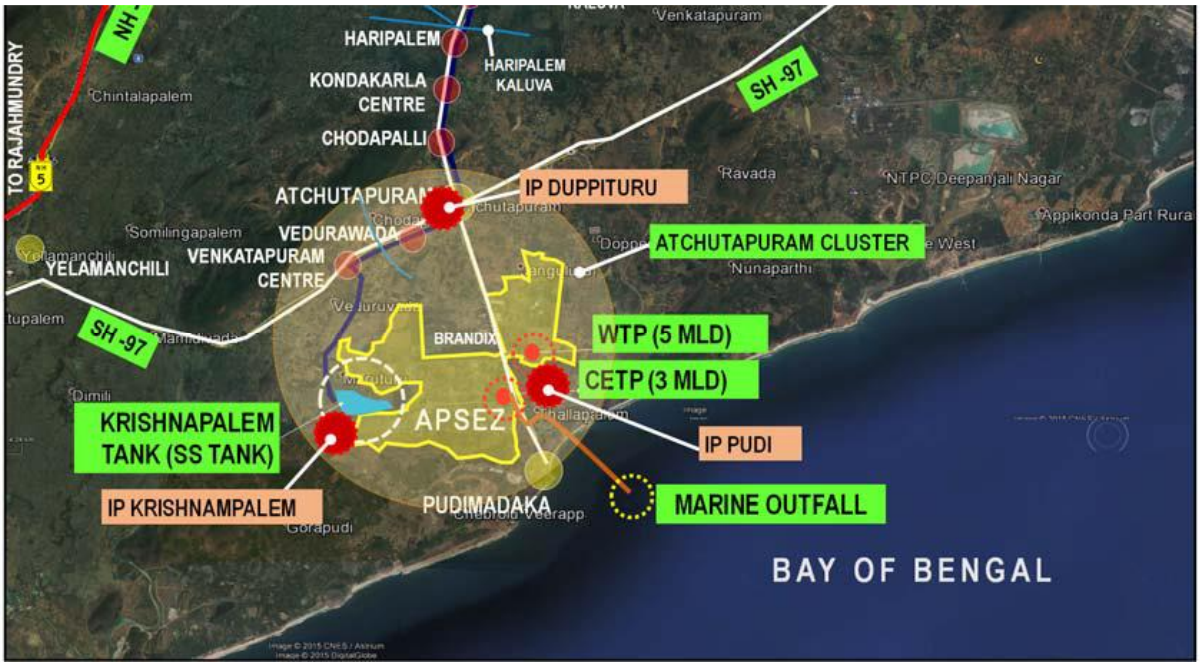
Table 5: Estimated Volumetric Contribution to CETP of Different Sectors of Industry (Naidupeta Cluster)

TYPE OF INDUSTRY	APPROXIMATE CONTRIBUTION (%)
P I Units	20
Pharmaceutical Sector (formulation units)	15
Leather and Textiles (semi-finished to finished)	25
Engineering	15
Chemical	10
Others	15

43. In addition to above a flow of 100 KLD is being considered from the metal pre- treatment and finishing operations at the various engineering units. The operations carried out at these units will predominantly be de-rusting, de-greasing, metal plating (cadmium, zinc, nickel, chrome and copper) and also stripping.

CETP at Atchutapuram:

Figure 5: Location Map of CETP at Atchutapuram Industrial Cluster

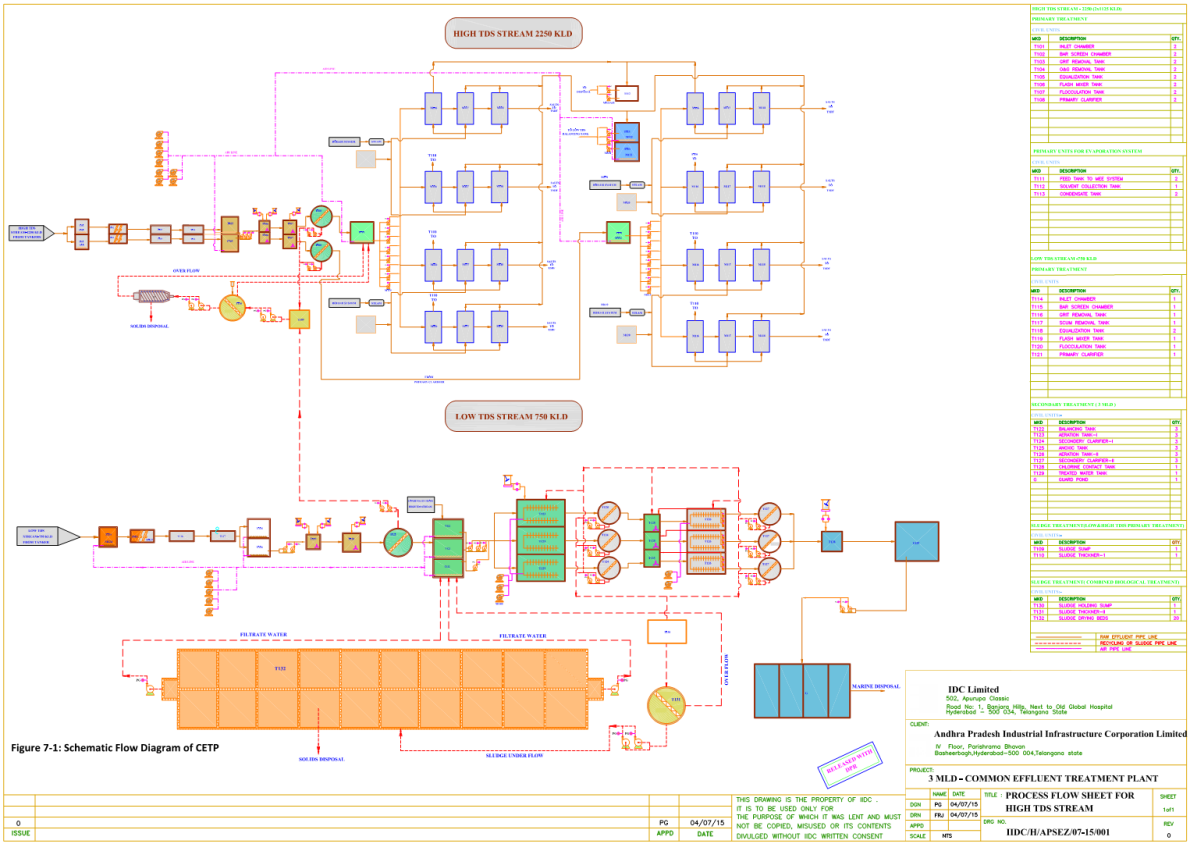


44. As per the Environmental Clearance (EC)[2] obtained for APSEZ from the Ministry of Environment & Forests (MoEF), dt: 13/02/2012; a CETP of 31 MLD capacity (for ultimate phase of development of APSEZ) along with Guard Pond (3.5 day's detention period) is proposed to

[1] Reference EIA report for Naidupeta Cluster
[2] Reference EIA report for Atchutapuram Industrial Cluster

meet the ultimate requirement of wastewater treatment. Based on the mathematical modelling studies (carried out as part of EIA[3] studies earlier while obtaining EC), a marine outfall system is proposed to discharge the treated wastewater from APSEZ at (-) 19 m CD in Bay of Bengal which is located at about 3.5 km from the shoreline. The total area earmarked for Chemical sector in APSEZ is 840 acres, of which 430 acres is already allotted to units and the balance is vacant for allotments. The quantity of effluents generated from the units (both operational and under construction) is 2.38 MLD. The estimated quantity of effluents from the vacant area (on –pro rata basis) is 2.27 MLD. Thus, the total quantity of effluents from Chemical Sector is 4.65 MLD. In order to provide effluent treatment facility to the industrial units in APSEZ, APIIC intends to develop CETPs in modules. In the initial module, APIIC has already commenced the implementation of 1.5 MLD CETP on Engineering, Procurement Construction (EPCO&M Mode) including Operation and Maintenance for five years. The proposed project will support further enhancement of the CETP capacity to 4.5 MLD based on current requirements and future demand.

Figure 6: CETP PROPOSED PLANT LAYOUT AT ATCHUTAPURAM



B. Waste Water Characteristics Expected at CETPs

45. At Naidupet industrial estate, high TDiS wastewater volume is expected to be 200 KLD and the low TDiS wastewater is expected to be 800 KL. This is apart from the 100 KL of the metal pre- treatment and finishing wastewater expected from the engineering sector. It is also proposed that the CETP would be designed to cater for the wastewater being generated at

[3] Refer EIA Study report Atchutapuram Industrial cluster

MPSEZ, IP-Naidupeta and IP-Attivaram. The definition of low TDiS and high TDiS wastewater is based on the CETP inlet standards stipulated by MoEF..

Table 6: Inlet Effluent Quality for CETP

Parameter	Concentration in mg/l
pH	5.5 – 9.0
Temperature °C	45
Oil & Grease	20
Phenolic Compounds (as C_6H_5OH)	5.0
Ammonical Nitrogen (as N)	50
Cynide (as CN)	2.0
Chromium hexavalent (as Cr+6)	2.0
Chromium (total)(as Cr)	2.0
Copper (as Cu)	3.0
Lead (as Pb)	1.0
Nickel (as Ni)	3.0
Zinc (as Zn)	15
Arsenic (as As)	0.2
Mercury (as Hg)	0.01
Cadmium (as Cd)	1.0
Selenium (as Se)	0.05
Fluoride (as F)	15
Boron (as B)	2.0
Radioactive Materials	
Alpha emitters, Hc/ml	10-7
Beta emitters, He/ml	10-8

Note: 1. These Standards apply to the small scale industries, i.e. total discharge upto 25 KL/Day. 2. For each CETP and its constituent units, the State Board will prescribe standards as per the local needs and conditions; these can be more stringent than those prescribed above. However, in case of clusters of units, the State Board with the concurrence of CPCB in writing, may prescribe suitable limits.

46. The characteristics of the wastewater that are expected from the metal pre-treatment and finishing units are considered as two parts: viz., i) alkaline and cyanide bearing effluents and ii) acidic and chrome bearing effluents. The individual units shall have to segregate the wastewater at the unit level sending it across to the CETP.

47. A waste water acceptance criterion will be developed during operation of the CETP where specific quality and characteristics of waste water for different sectors of industry will be defined along with maximum limits for different parameters beyond which the waste water will not be accepted by the CETP. The waste characterization criteria will be developed keeping in view the inlet water requirements as specified by the regulations and the capacity of CETP.

48. Presently, the industries are spread out in different areas within the cluster. There shall be in all 4 types of wastewater generated at the SEZ and the surrounding IP's. Currently, the wastewater can be conveyed to the CETP by tankers only. Each industry shall have a minimum of 2 tanks for each type of wastewater generated and the holding capacity of each tank shall be for a flow of 1 day. Depending on the wastewater characteristics, the unit shall have to provide screens, grit trap and oil and grease traps at the unit level to ensure that the CETP inlet standards are met.

49. Once a tank (for a particular type of waste stream) is filled, the CETP operator shall be informed, who shall then send his representative to check the effluent quality (finger print test) and assign the path way for onward conveyance and treatment at the CETP. The treated effluent quality will conform to the requirements as detailed out in the table below.

Table 7: Treated Effluent Quality of CETP

Parameter	**Into inland surface waters**	**On land for Irrigation**	**Into Marine Coastal areas**
	(a)	(b)	(c)
pH	5.5 - 9.0	5.5 – 9.0	5.5 – 9.0
BOD1[3days at 27°C]	30	100	100
Oil & Grease	10	10	20
Temperature	Shall not exceed 40°C in any section of the stream within 15 metres downstream from the effluent outlet	-	45°C at the point of discharge.
Suspended Solids	100	200	a) For process waste water – 100 b) For cooling water effluents 10 percent above total suspended
			matter of effluent cooling water
Dissolved Solids (inorganic)	2100	2100	-
Total residual chlorine	1.0	-	1.0
Ammonical nitrogen(as N)	50	-	50
Kjeldahl nitrogen (as N)	100	-	100
Chemical Oxygen Demand	250	-	250
Arsenic (as As)	0.2	0.2	0.2
Mercury (as Hg)	0.01	-	0.01
Lead (as Pb)	0.1	-	1.0
Cadmium (as Cd)	1.0	-	2.0
Total Chromium (asCr)	2.0	-	2.0
Copper (as Cu)	3.0	-	3.0
Zinc (as Zn)	5.0	-	15
Selenium (as Se)	0.05	-	0.05
Nickel (as Ni)	3.0	-	5.0
Boron (as B)	2.0	2.0	-

Parameter	Into inland surface waters	On land for Irrigation	Into Marine Coastal areas
Percent Sodium	-	60	-
Cynide (as CN)	0.2	0.2	0.2
Chloride (as Cl)	1000	600	-
Fluoride (as F)	2.0	-	15
Sulphate (as SO_4)	1000	1000	-
Sulphide (as S)	2.8	-	5.0
Pesticides	Absent	Absent	Absent
Phenolic compounds (as C_6H_5OH)	1.0	-	5.0

C. Project Need, Cost and Implementation Schedule::

Atchutapuram Cluster:

50. APIIC plans to develop the effluent treatment capacity in stages based on the type and size of the industrial units as they come up. A major chunk of the already allotted plots are for chemical or related industrial units. There is a pressing demand from these units for establishing CETP as it is not viable for these units to set up own treatment facilities and as production cannot start without having a functional ETP. About 430 Acres has been sold to chemical units and five out of the 38 committed chemical units in these plots are ready to commence operation. The estimated quantum of effluent from these five units is 1.499 MLD. APIIC has already awarded the work of constructing a 1.5 MLD CETP and operating it for 5 years and that would cater to the requirement of these units.

51. The remaining 33 industrial units are also on various stages of implementation. They together would be generating an effluent of 0.89 MLD. Apart from this as per the Master Plan 410 Acres of lands is also earmarked for establishing chemical units and these are expected to start in the coming 2-3 years span. The effluent generation form these units are expected to be 2.27 MLD. Thus there is an urgent need for establishing additional treatment capacity of 3.0 MLD.

Table 8: Summary of Cost of Block Items - Atchutapuram

Sl.no	Name of Work	Amount (Rs. Crores)
1	Civil units	33.39
2	Electro-mechanical units	73.05
	Sub Total (In Rs. Crores)	106.44
3	VAT @ 3.50%	3.19
4	Service Tax @ 5.60%	5.96
5	Labour Cess @ 1%	1.06
	Total Taxes	**10.22**
	Total Cost	**116.66**

Implementation Schedule:

Completion of detailed engineering design	:	15-12-2015
Issuance of tender documents	:	15-01-2016
Contract award	:	31-05-2016
Commencement of works	:	15-06-2016
Completion of contract	:	14-06-2018

Naidupeta Cluster:

52. The total industrial area in MPSEZ and IP Naidupeta is around 2,074 acres and the effluent generation when all the plots are sold and industries established is estimated to be around 8.2 MLD. Since the requirement of facility is driven by the industrial requirements, APIIC intends to create this capacity in a phased manner. Naidupeta Cluster is mixed industry type. Currently the industries that have been established are engineering (transformers, AC components, automobile parts etc.) and pharmaceuticals (Active Pharma Ingredients and formulation). In the IPs the industries established /under establishment are textile, glass, paper and allied products, bulk drug, food, chemical, cement products, plastics, paints, engineering, carbon black, etc. The wastewater discharge collected from the existing industries shows that the total effluent from the existing units (IP Naidupeta and MPSEZ) is around 445 cum/d (0.45 MLD) and from the already allotted units is around 244 cum/d (0.24 MLD). There is about 314 hectares of land soon to be allotted where industrial units are expected to come in in the next 2-3 years. Considering all there is an immediate need of an initial capacity of 1.0 MLD CETP.

Table 9: Summary of Cost of Block Items - Naidupeta

S.no	Name of Work	Amount (Rs. Crores)
1	Civil units	8.63
2	Electro-mechanical units	20.45
	Sub Total (In Rs. Crores)	29.08
3	VAT @ 3.50%	0.87
4	Service Tax @ 5.60%	1.63
5	Labour Cess @ 1%	0.29
	Total Taxes	**2.79**
	Total Cost	**31.87**

Implementation Schedule:

Completion of detailed engineering design	:	15-12-2015
Issuance of tender documents	:	15-01-2016
Contract award	:	31-05-2016
Commencement of works	:	15-06-2016
Completion of contract	:	14-06-2018

D. Proposed Scheme of Treatment:

53. **Alkaline and cyanide streams (max. 50 KL/day):** Wastewater bearing alkali and cyanides shall be segregated and collected in the tanks at the individual unit. Oil and grease shall be arrested at the unit itself. The wastewater shall be transported by tankers. The tankers shall be emptied in to oil and grease trap for entrapment of any oil and grease (that which would

have escaped at the unit level). Following removal of oil and grease, the wastewater is taken to a sump / equalization tank having volume of 100 cum. In the equalization tank, air shall be bubbled thru a grid. This helps in mixing and avoids settling. The wastewater from the sump is pumped at a uniform and constant rate of 5 cum/hr for onward treatment. The treatment shall be 2 stage alkaline chlorination. In the first stage chlorine shall be added under alkaline conditions (high pH) and the cyanide shall be oxidized to cyanate. The cyanate is further oxidized to carbon di-oxide and nitrogen in the second stage reaction tank. Once the cyanide complex is broken the associated heavy metals are converted in to in soluble metal hydroxides and they shall settle down. The solid – liquid separation shall take place in the settling tank. The supernatant i.e., treated wastewater is taken to the sump and mixed with secondary treated process wastewater and shall be used as water for gardening / maintaining the green belt. The sludge shall be collected in the sump and shall be pumped to the sludge sump. The sludge shall be dewatered and dried prior to safe disposal.

54. **Acidic and chrome bearing wastewaters (max. 50 KL/day):** Wastewater bearing acids and chrome shall be segregated and collected in the tanks at the individual unit. Oil and grease shall be arrested at the unit itself. The wastewater shall be transported by tankers. The tankers shall be emptied in to oil and grease trap for entrapment of any oil and grease (that which would have escaped at the unit level). Following removal of oil and grease, the wastewater is taken to a sump / equalization tank having volume of 100 cum. In the equalization tank, air shall be bubbled thru a grid. This helps in mixing and avoids settling. The wastewater from the sump is pumped at a uniform and constant rate of 5 cum/hr for onward treatment. The treatment shall be 2 in stages. The first stage shall be reduction of hexavalent chromium to trivalent form under acidic conditions and the second stage shall be elevation of pH to about 8.2 for precipitation of chromium as chromic hydroxide which is in soluble and shall settle down. The solid – liquid separation shall take place in the settling tank. The supernatant i.e., treated wastewater is taken to the sump and mixed with secondary treated process wastewater and shall be used as water for gardening / maintaining the green belt. The sludge shall be collected in the sump and shall be pumped to the sludge sump. The sludge shall be dewatered and dried prior to safe disposal.

55. The technical details including design and operational parameters for CETP are available in the DPR for CETP developed by APIIC.

56. The CETP is a Zero Liquid Discharge (ZLD) system. The residuals generated shall be

(i) Solvents at full load shall be about - 2 KL/day - this can be sold to re-claimers or incinerated at the TSDF

(ii) Salts at full load shall be about 14 tons/day with about 20% moisture content.

(iii) About 400 m^3/day of treated wastewater with TDiS of about 2000 mg/l shall be used for gardening / maintaining the green belt.

(iv) About 685 cum/day of treated wastewater with TDiS of about 100 mg/l. This water shall be reused at the industry for purposes other than potable application.

57. Considering the above, there seem no direct negative impacts owing to establishment of the CETP. There shall be an overall reduction in the water consumption as major part of the treated wastewater shall be reused. This shall drastically reduce the stress on the raw water consumption at the IP however there shall be substantial power and energy consumed in treating the wastewater and there is no alternative to that as a ZLD system is being proposed.

IV. DESCRIPTION OF THE ENVIRONMENT

58. A brief description about the existing environment, including its physical and ecological resources, economic development of the region, and issues relating to quality of life are presented in this section. Broad aspects on various environmental parameters (geology, soil, topography, climate, land use, water resources, water quality, air quality, noise quality, tourism, cultural resources etc.) which are likely to be affected (direct or indirect) by the proposed road widening project are covered. These aspects are covered in broader geographic extent to present the entire project region.

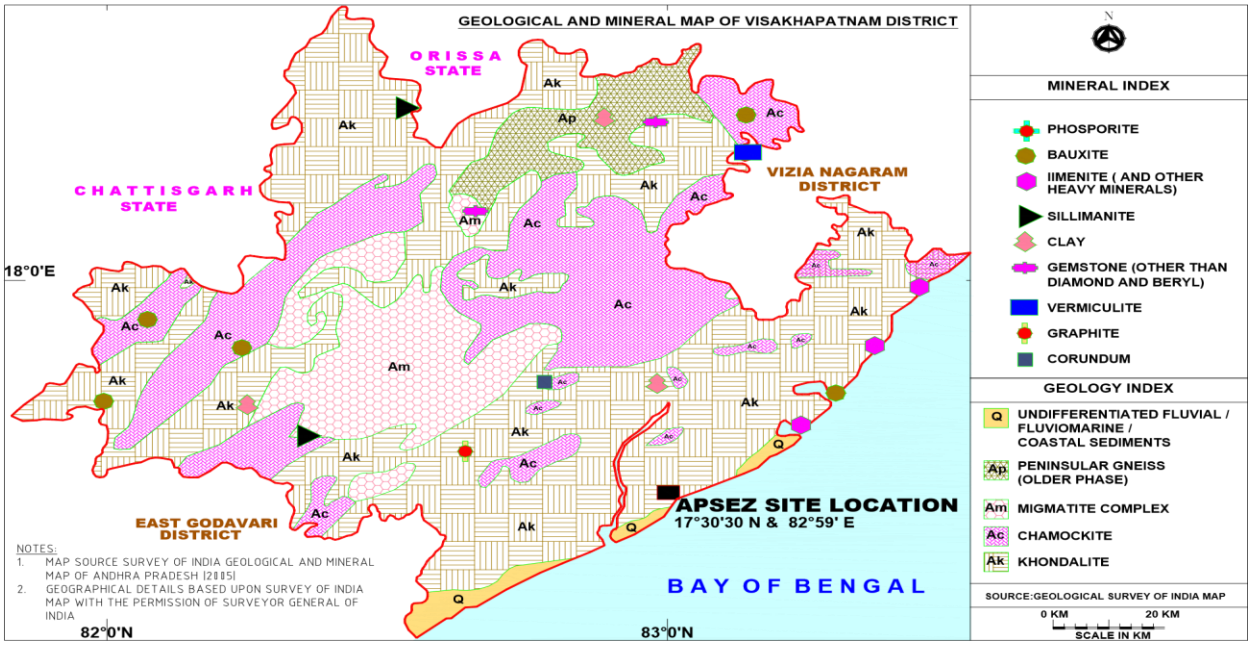
A. Physical Resources

1. Topography, Geology, and Soil

59. Andhra Pradesh is eighth largest state of the country has a geographical area of 1.6 lakh sq. Km, which constitutes 5.05% of the land area of the country. East Godavari region of Andhra Pradesh is known as “Rice bowl of State”. The project area lies between latitude $17^0$04' North & longitude $82^0$16' East and latitude $17^0$08' North & longitude 82 ^{0}90' East.

60. The baseline environmental data for terrestrial environment was collected within the study area for following attributes; Meteorology, Ambient Air Quality and Noise. EIA Study for Development of Multiproduct APSEZ also captures in detail data on water Quality, soil, ecology (flora & fauna) and land use / land cover mapping.

Figure 7: Geological Map of Andhra Pradesh – APZEZ Site location



2. Climate

61. The climate of Andhra Pradesh varies considerably, depending on the geographical region. Monsoons play a major role in determining the climate of the state. Summers last from

March to June. In the coastal plain, the summer temperatures are generally higher than the rest of the state, with temperature ranging between 20 °C and 41 °C.

62. The month from July to September is the season for tropical rains in Andhra Pradesh. The state receives heavy rainfall from the South-west Monsoon during these months. About one third of the total rainfall in Andhra Pradesh is brought by the North-east Monsoon. The month of October and November see low-pressure systems and tropical cyclones from the Bay of Bengal which along with the Northeast Monsoon, bring rains to the southern and coastal regions of the state. November, December, January, and February are the winter months in Andhra Pradesh. Since the state has a long coastal belt the winters are not very cold. The range of winter temperature is generally 12 °C to 30 °C.

63. The climate of the East Godavari district is hot subtropical with very hot summer. The average annual rainfall of the district is 1100 mm, which ranges between nil rainfall in January and 207 mm in July. July and October are the wettest months of the year. The mean seasonal rainfall distribution is 704 mm in southwest monsoon (June-September), 277 mm in northeast monsoon (October-December), 10 mm rainfall in Winter (Jan-Feb) and 109 mm in summer (March – May). The percentage distribution of rainfall, season-wise, is 64% in southwest monsoon, 25 % in northeast monsoon, 1.0 percentage in winter and 10 % in summer.

64. The salient climatic features of the state are as follow:

Average Annual Rainfall	-	940 mm	
Concentration of precipitation	-	July to September	
Humidity	-	23 to 95 %	
Cloudiness	-	Heavily clouded in monsoon	
Wind	-	Calm to Moderate	
Mean Temperature	-	Summer	20-41^{0}C
		Winter	12-30^{0}C

3. Natural Hazards

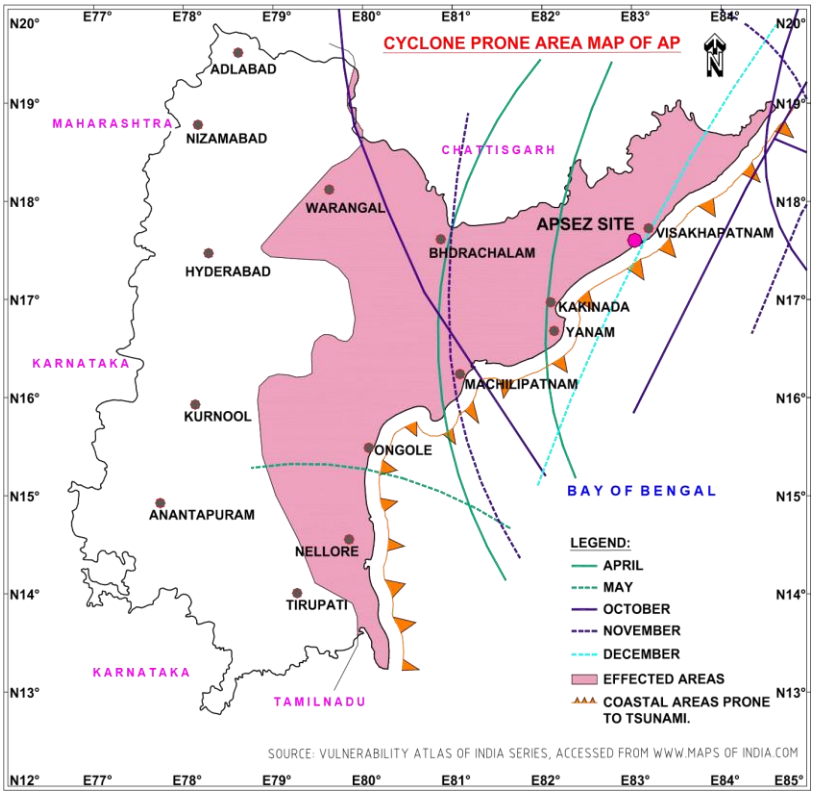
65. Andhra Pradesh coastal belt is prone to having potential natural hazards such as cyclones and depressions. Cyclones are rare in Bay of Bengal from January to March. Isolated cyclones forming in south Bay of Bengal move towards west-north-west and hit Tamil Nadu and Sri Lanka coasts. In April and May, these form in south and adjoining central Bay of Bengal and move initially towards north-west and north; and then re-curve towards north-east striking Andhra-Orissa-West Bengal-Bangladesh coasts in May.

66. Most of the monsoon (June – September) storms develop in central and north of Bay of Bengal and move towards west-north-west affecting Andhra-Orissa-West Bengal coasts.

67. Post monsoon (October – December) storms form mostly in south and central Bay of Bengal, re-curve between 15^0 and 18^0N affecting Tamil Nadu-Andhra-Orissa-West Bengal-

68. Bangladesh coasts. Cyclone prone areas of Andhra Pradesh are shown below:

Figure 8: Cyclone prone area Map of Andhra Pradesh



4. Siesmicity:

69. Both the subproject sites in Naidupeta cluster and Atchutapuram cluster fall under Seismic Zone – II and are in the low risk zone.

5. Water Resources and Water Quality

70. Ground water occurs in all most all geological formations and its potential depends upon the nature of geological formations, geographical setup, incidence of rainfall, recharge and other hydrogeological characters of the aquifer. Ground water occurs under unconfined to semi-confined conditions in the consolidated formations, while it occurs under unconfined to confined conditions in semi-consolidated & unconsolidated formations. In the consolidated formations, the depth of weathering ranges from 3.0 to 14.0 m below ground level (bgl) and fractured zones occurs within the maximum depth of 51.0 m bgl as revealed from the available bore well data. Generally, dug wells range in depth between 3.0 and 17.0 m bgl. The unit area specific capacity of dug wells are estimated to be in the range between 3.36 lpm/m/sq.m and 4.42 lpm/m/sq.m and the bore wells range in depth between 17.0 and 51.0 m bgl and the yield of bore wells in crystalline rocks generally vary from 1.0 to 2.8 lps and the yield of irrigation dug wells generally vary from 0.6 to 3.6 lps.

71. The depth to water level during pre-monsoon season (May, 2014) generally ranges between 2 and 5 m bgl. Shallow water levels less than 2 m bgl occur in the southern parts of the district i.e. in parts of Kothpalle, Kakinada mandals. Whereas, water levels more than 5 m bgl occur in central and northern parts of the district i.e. in parts of Rampachodavaram, Gangavaram, Addathegala, Rajavommangi, Korukonda, Rajahmundry and Rajanagaram

mandals. The depth to water level during post monsoon season (Nov, 2012) in the district generally less than 2 m bgl. Whereas water levels in the range of 2 to 5 m bgl occur in northern, northwestern and western parts of the district.

72. The quality of ground water is as important as quantity. The quality of ground water is good in both shallow and deeper aquifers of crystalline formations, Rajahmundry & Tirupati sandstones of the district. Shallow alluvial aquifers exhibit wide range of quality variations, due to deltaic nature of the deposits and drainage conditions. In alluvial aquifers, the deeper aquifers are invariably saline.

73. Construction of artificial recharge structures like percolation tanks and water conservation structures like sub-surface dykes are feasible in the areas where water levels are declining and over exploitation of ground water resources is taking place viz. Rajanagram, Rangampeta, Peddapuram, Gandepalli, Rajahmundry and Korukonda Mandals. Out of these 4 mandals viz. Rajanagarm, Peddapuram, Rangampeta & Gandepalli falls in the Project road stretch. None of the mandals have been notified by CGWB/SGWB. (*Source: Ground water brochure, East Godavari district, Andhra Pradesh by CGWB, Ministry of Water Resources*).

1. W/03/15/483 : Sarada River Water

TEST RESULT

Samples are analyzed "as is where basis is"

S.No	Parameter	Unit	Method	Result	IS 10500 Limits (Acceptable - permissible)
1	Color	Pt-Co	APHA 2120 C	<5.0	5-25
2	Odour	-	APHA 2150 B	Agreeable	Agreeable
3	Turbidity	NTU	APHA 2130 B	<5.0	5-10
4	pH @ 26.4°C	-	APHA 4500H+ B	8.26	6.5-8.5
5	Oil & Grease	mg/L	APHA 5520 B	<10	Not Specified
6	Electrical Conductivity	µMho/cm	APHA 2510 - B	665	Not Specified
7	Total Dissolved solids	mg/L	APHA 2540 C	399	500-2000
8	Total Solids	mg/L	APHA 2540 B	406	Not Specified
9	Alkalinity as $CaCO_3$	mg/L	APHA 2320 B	224.40	200-600
10	Hardness as $CaCO_3$	mg/L	APHA 2340 C	148.20	300-600
11	Calcium as Ca	mg/L	APHA 3500 Ca B	22.84	75-200
12	Magnesium as Mg	mg/L	APHA 3500-Mg B	22.16	30-100
13	Chlorides as Cl^-	mg/L	APHA 4500 Cl^- C	59.13	250-1000

S.No	Parameter	Unit	Method	Result	IS 10500 Limits (Acceptable - permissible)
14	Sulphates as SO_4	mg/L	APHA 4500 SO_4 D	26.75	200-400
15	Nitrate as NO_3	mg/L	APHA 4500 NO_3 B	<1.0	45-100
16	Sodium as Na	mg/L	APHA 3500 Na B	63.50	Not Specified
17	Potassium as K	mg/L	APHA 3500 K B	7.30	Not Specified
18	Fluoride as F	mg/L	APHA 4500F- D	0.52	1.0-1.5
19	Iron as Fe	mg/L	APHA 3500 Fe B	<0.3	0.3
20	Cyanide as CN^-*	mg/L	APHA 4500 CN^- C, E	<0.05	0.05
21	Phenolic Compounds as C_6H_5OH*	mg/L	APHA 5530 D (Direct Photometric Method)	<0.001	0.001-0.002
22	Lead as Pb*	mg/L	APHA 3111 B	<0.05	0.05
23	Mercury as Hg*	mg/L	APHA-3112 Hg B	<0.001	0.001
24	Manganese as Mn*	mg/L	APHA 3111 B	<0.1	0.1-0.3
25	Cadmium as Cd*	mg/L	APHA 3111 B	<0.01	0.01
26	Arsenic as As*	mg/l	APHA 3500 As B	<0.01	0.01-.0.05
27	Chromium as Cr*	mg/L	APHA 3111 B	<0.05	0.05
28	Zinc as Zn	mg/L	APHA 3111 B	<0.2	5-15
29	Copper as Cu*	mg/L	APHA 3111 B	<0.05	0.05-1.5
30	Chemical Oxygen Demand	mg/L	APHA 5220 B	8.0	Not Specified
31	Biochemical Oxygen Demand (3 Days at 27°C)	mg/L	IS : 3025 (P-44)	<4.0	Not Specified
32	Dissolved Oxygen	mg/L	APHA 2005; 4500 O C	5.8	Not Specified
33	Total Coliform*	MPN/100ml	APHA 9221B	Absent	Absent
34	Faecal Coliforms*	MPN/100ml	APHA 9221 B	Absent	Not Specified

6. Air Quality

74. The ambient air quality in the state is quite pure compared to other neighbouring states. Particulate emissions from industrial activities are major concern in the state. Dust arising from unpaved surfaces, forest fire, smoke created by burning of fire woods for producing charcoal and domestic heating, and vehicular pollution are other possible secondary sources of pollution in the state. Firewood burning is major contributor in the ambient pollution load. Industrial & vehicular pollution is mainly concentrated in the major commercial areas in the State. Lack of technology and state of the art equipment are some of the factors responsible for industrial pollution.

75. Pollution from vehicles is mainly due to use of low-grade fuel, low maintenance of vehicles, and also the poor conditions of the roads. The level of pollution in rural areas is much lower than that of the urban areas. The air quality is reported within permissible limits in these areas.

Table 10: Air Quality Test Results for Atchutapuram Industrial Area[4] (May 2016)

TEST RESULT

Samples are analyzed "as is where basis is"

S. No	Parameter	Method	Units	Result	Standards
1	PM_{10}	CPCB Guidelines for the measurement of Ambient Air Pollutant, Volume –I,2012-13	$\mu g/m^3$	72.5	100
2	$PM_{2.5}$	CPCB Guidelines for the measurement of Ambient Air Pollutant, Volume –I,2012-13	$\mu g/m^3$	28.3	60
3	SO_2	CPCB Guidelines for the measurement of Ambient Air Pollutant, Volume –I,2012-13	$\mu g/m^3$	15.8	80
4	NO_2	CPCB Guidelines for the measurement of Ambient Air Pollutant, Volume –I,2012-13	$\mu g/m^3$	21.8	80
5	Ammonia *	CPCB Guidelines for the measurement of Ambient Air Pollutant, Volume –I,2012-13	$\mu g/m^3$	23.6	400

The Environmental, Health, and Safety (EHS) Guidelines as per Good International Industry Practice (GIIP) are as below:

WHO Ambient Air Quality Guidelines		
	Averaging Period	**Guideline value in mg/m^3**
Sulfur dioxide (SO_2)	24-hour 10 minute	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 500 (guideline)
Nitrogen dioxide (NO_2)	1-year 1-hour	40 (guideline) 200 (guideline)
Particulate Matter PM_{10}	1-year 24-hour	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline) 150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)

[4] Air quality monitoring report data from APIIC

Particulate Matter $PM_{2.5}$	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

7. Noise Quality

76. Noise pollution is not a problem in the state. Also in future there will not be any rise in the noise levels due to proposed activities. At busy junction small contribution to the noise levels are expected, but still the ambient noise quality is expected to be well within the permissible limits.

77. During the construction period, temporary increase in the noise levels are expected due to movement of construction machineries and construction activities associated with proposed road development. Suitable barriers in the form of noise barriers and timely scheduling of construction activities will minimize these affects to the greater extent.

Table 11: Noise Monitoring Data for Atchutapuram Industrial Area[5] (April 2016)

Locations:

1. WESTERN SECTOR OF APSEZ : NOISE/04/15/002: APIIC/NOISE/WS/15/04/2015/02

TEST RESULT

S.No	Location	Day Time 75 dB(A)	Night time 70 dB(A)
1	Western Sector Of APSEZ (Vasant Chemicals)	63.7	55.4

B. Ecological Resources

1. Vegetation

78. The forest area can also be classified based on the composition of forest and terrain of the area. Based on composition, there are three important forest formations namely Teak forest, Sal forest and Miscellaneous Forests. Bamboo bearing areas are widely distributed in the state. To obviate pressure on the natural forests, plantations have been undertaken in forest and non-forest areas to supplement the availability of fuel wood, small timber, fodder etc.

[5] Noise quality monitoring report data from APIIC

79. Andhra Pradesh is endowed with rich and diverse forest resources. The forest area of the state is 94689 sq. km constituting 0.71% of the geographical area of the state and 12.44% of the forest area of the country. Legally this area has been classified into "Reserved Forest, Protected Forest and Unclassified Forest", which constitute 65.36%, 32.84% and 1.7% of the forest area respectively. Per capita forest area in the state is 0.16 ha. as against the national average of 0.07 ha.

80. Detailed EIA[6] (Environment Impact Studies) for both the industrial clusters have been conducted. Recent air quality data, water quality data, noise monitoring data, groundwater quality data, soil properties and details on existing flora & fauna in the region is also available.

2. Economic Development

81. Andhra Pradesh has undertaken considerable industrial growth particularly in the major industrial sectors such as fertiliser, agro-products, edible oil-refineries & bio-fuel plants, Information technology, thermal power generation, etc. Presence of ports such as thee Kakinada port has provided additional advantage to Andhra Pradesh to become a gateway to the East. The agro-products like coconuts are exported by various companies, sugar refineries and various edible oil refineries & biofuel plants in Vakalapudi Industrial park exists.

82. The major occupational pattern of the people in the state includes (i) Cultivators followed by (ii) Agricultural laborers (iii) Workers in Household Industries and (iv) Other workers. The Visakhapatnam district is well connected by road, rail and air. The national Highways (NH-5 and NH-43) pass through the district. The district is served by the Chennai-Kolkata broad gauge trunk line of Indian Railways. The district is having an operational domestic airport which connects the district to Mumbai, Delhi, Chennai, Bhubaneshwar, Raipur, Kolkata and Hyderabad. Hyderabad International Airport is about 1 hr. flight from Visakhapatnam. Apart from this a new international airport is also proposed in the district.

3. Economic activities

83. **Agriculture:** Agriculture is a prevalent activity in the district. Industrial activities are more confined to Visakhapatnam and suburbs. Naidupeta industrial cluster has attracted a few pharmaceutical and engineering companies. Crops like Paddy, Jowar, Bajra, Millets (Maize & Ragi), Pulses (Horse Gram, Green Gram, Black Gram & Red Gram), Condiments & Spices (Chillies & Turmeric), Sugarcane, Fruits, Onions, Cotton, Groundnut and Sesamum are cultivated in the region.

84. **Fishing:** Visakhapatnam district share a coastline of about 132 km with about 62 fishing villages. About 13,000 fishermen families get their livelihood from marine, inland and brackish water fishing including that from Thandava and Raiwada reservoirs. There are about 35 fish landing centres in 9 coastal mandals in the district. The total inland fish production of Visakhapatnam district during 2005-2006 was 2,883 tonnes while the marine fish production was 39,332 tonnes.

85. **Industry:** Visakhapatnam has strengthened its position as a key economic center in the state in the last few years. With the proposed Petroleum, Chemical and Petrochemical Investment Region (PCPIR) between Visakhapatnam and Kakinada, several IT/ITES SEZs

[6] ANNEX A – EIA Study for Naidupeta Industrial Cluster
ANNEX B – EIA study for Atchutapuram Industrial cluster.

projects around Visakhapatnam, major oil and gas discoveries in KG basin, enormous economic and social growth of the region is envisaged with respect to per capita income levels, employment potential and export potential. The following are some of the major industries located in the district:

Hindustan Shipyard Limited
Visakha Refinery (HPCL)
Rashtriya Ispat Nigam Limited
(Visakhapatnam Steel Plant)
Coromandal Fertilisers Limited
Bharat Heavy Plates and Vessels Limited
National Aluminium Company Limited
Vizag Zinc Smelter
Rain Commodities Limited
Andhra Petrochemicals Limited
Hetero Drugs Limited, etc

4. Archaeological Monument

86. Panchadarla is the major religious place in Elamanchili Mandal which is at a distance of 2.5 km from the western boundary of APSEZ site. There are three important temples in Panchadarla namely Dharmalingeswara Temple, Visweswaraswamyvaru Temple and Radha Govinda Swamy Temple. It is a quaint pilgrim centre comprises oldest rock structure temples with water flowing in five directions in all 365 days.

5. Marine Environment:

87. Atchutapuram industrial estate is close to the sea and the Marine Environment Centre for Advanced Studies (CAS) in Marine Biology, Annamalai University, a reputed academic and research institute, has conducted studies to monitor the marine environmental attributes near proposed marine outfall. The marine environment was monitored in terms of Seawater quality, Sediment quality and Marine biology (plankton and benthos).

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND ITS MITIGATION MEASURES

88. Industrial Infrastructure improvement projects are likely to bring changes in the local environment both beneficial and adverse. Scoping process was undertaken to identify potentially significant impacts for the proposed CETP subprojects. Potential impacts in absence of additional mitigation measures were also identified. There were no potentially significant impacts requiring further assessment identified for the subproject. Detailed assessment for the subprojects have already been conducted as a part of the EIA studies for Naidupeta and Atchutapuram industrial estates.

89. This section of IEE identifies nature, extent, and magnitude of likely changes vis-a-vis project activities for all stage of project cycle i.e. preconstruction, construction, and operation. Beneficial impacts are mostly long-term and permanent whereas adverse impacts are localized and temporary in nature and are likely to occur mostly during construction stage.

A. Beneficial Impacts

90. The immediate benefits of CETP subprojects come in the form of direct employment opportunities during construction and operation of the CETPs for those engaged as wage laborers, contractors and suppliers of raw materials.

91. CETP subprojects will result in effective management of industrial waste water and hazardous waste and conservation of water through zero discharge. This will help in attracting different sectors of industries including polluting industries to the industrial estate due to

availability of adequate infrastructure to better manage the industrial waste water ensuring environmental compliance and increased employment opportunities for people. The influx of industrial sectors such as petrochemical, pharmaceutical, textiles, etc. will also help in overall economic development of the state, resulting in attracting skilled workforce and enable improvement of quality of life of people.

92. The long-term effects of these developed industrial estates on poverty reduction are, consequently, expected to be significantly positive.

93. During operation stage, economic activities supporting ancillary industries, trade, transport, etc. will increase due to increase in industrial activities is also expected to improve development of urban centers with amenities like housing, educational institutions, hospitals, etc.

B. Adverse Impacts

94. Any developmental activity in its wake will bring about some adverse impacts associated with its activities. For a multiproduct SEZ based on the possible worst case emissions and waste generation scenario, prediction of impacts helps in the preparation of a sound environmental management plan which has to be executed during the on-going activities for the proposed project to minimize the adverse impacts on the environmental quality. Management of hazardous waste and efficient management of CETP operations will be important to manage any adverse impacts due to sub-project operations.

C. Potential Impacts during Construction Phase:

1. Impact on Air Quality

95. The proposed CETPs are modular structures which will require some construction during the development phase. Air quality in the immediate vicinity is likely to be marginally affected due to movement of vehicles and heavy earth movement works that will be undertaken as part of CETP works. In most instances the primary concern during construction phase are emissions of dust and particulate matter that arise from the movement and storage of materials and other construction activities. The emissions from vehicles and construction machinery is also considered.

96. For all developments, best practicable means should be adopted to control and reduce emissions. Some examples that may be used are as follows:

(i) Use of enclosures – use of screens and sheeting to contain dust;
(ii) Use of paved / surfaced and cleaned haul routes and hard-standings;
(iii) Use of water suppression and wheel washing;
(iv) Choice of location and facilities for site storage where required (aggregates, sand, soil, cement etc.);
(v) Location of dust generating activities e.g. stone / flag cutting;
(vi) Transport route selection and location; and
(vii) No burning on site.

2. Potential Impact on Water

97. During the construction phase large quantity of water will be used for varies construction activities. To fulfill the water requirement, water is to be supplied from the nearest surface water bodies from the water reserves in the area.

Mitigation Measures:

(i) During the pre and post construction, the following measures has to be followed to maintain the quality of ground and surface water:
(ii) Preventing the run-off water beyond the SEZ premises so that it will recharge the ground water in the same area; and Storm water drainage system should be provided inside the project area.
(iii) of ground water should be minimized for construction activities and water or surface water wastage should be avoided.

3. Impact on noise levels

98. Sources of noise pollution during the construction of the CETPs is from machinery comprising of mainly bull dozers, front end loaders, standby generators, fabrication workshop and other heavy earth machinery used in construction in addition to the vehicular movement within the project boundary.

99. The industrial estates of Naidupeta and Atchutapuram are far from the main city population and as such impact of noise on the surrounding areas will be minimal.

4. Impact on the existing traffic system

100. The proposed project will involve minimal and temporary increase in traffic for transportation of the construction material.

5. Impact on Topography and land use

101. The industrial estates are located on barren land and the subproject implementation will have no or minimal impact on present topography as well as land use.

6. Impact on soil quality

102. Land disturbance from the proposed construction activities will be confined to the immediate work area. It is anticipated that major civil and mechanical works would be undertaken in setting up the CETPs. Overall the impact of this on the site environment will be temporary.

7. Impact on ecology

103. The proposed subprojects are a part of SEZ area that is barren land and there are no rare or sensitive flora and fauna species in site or in the region, it is predicted that the impacts on existing flora and fauna will be negligible. Further, development of green belt around the subproject area would enhance the situation by planting local fast growing species which are present in the surrounding areas.

(i) **Impact on Land and Private Properties:** The industrial estate land is already acquired by APIIC and CETPs will be placed in the industrial estate only. No new land acquisition is required for the CETP or for the pipeline for discharge of treated effluents.

(ii) **Impact on historical monuments / religious structures:** There are no adverse impacts expected on historical places/monuments.

D. Potential Impacts during operation phase

104. The potential significant environmental impacts associated with the project during the operation phase are discussed below.

1. Impact on Air Quality

105. The possible air emissions from CETP operations include pollutants during treatment, particularly Volatile Organic Compounds (VOC's) from holding chambers or treatment cells, emissions from diesel generator sets and boilers.

Mitigation Measures:

(i) The waste water holding tanks and treatment chambers will be provided with suitable measures to prevent leakage and emissions of VOC's.

(ii) Monitoring devices will be installed to regularly monitor and check any leakages.

(iii) Adequate PPE's will be provided to people working in the vicinity of these areas.

2. Impact on Occupational health

106. The handling of waste water, emissions during holding and treatment, discharge of pollutants, transportation and storage of raw materials are the activities that are likely to have an impact on occupational health and safety. This impact may be significant particularly for personnel exposed during longer time periods to such emissions. Regular rotation of employees conducting similar different tasks, efficient use of PPE's and better transportation and storage methods will help reduce the impact.

Mitigation Measures:

(i) The waste water holding tanks and treatment chambers will be provided with suitable measures to prevent leakage and emissions of VOC's.

(ii) Monitoring devices will be installed to regularly monitor and check any leakages.

(iii) Where, gases or fumes are likely to be present in trenches / foundations, sufficient mechanical/artificial ventilation will be provided to protect the health and safety of the workers.

(iv) Care will be taken to avoid all sources of ignition at the places of flammable material storage areas through erection / display of appropriate sign boards.

(v) Adequate PPE's will be provided to people working in the vicinity of these areas. Personal Protection Equipment such as earmuffs, protective clothing, helmets, goggles, shoes, gloves, etc. to the operation personnel involved in pile driving operations will be provided.

3. Impacts due to Hazardous waste

107. The handling of hazardous waste, during holding and treatment, discharge of pollutants, transportation and storage of raw materials are the activities that are likely to have an impact on land pollution and air and water pollution. It is important that hazardous waste management practices are adequately framed and implemented to avoid such situations. This impact may be significant from regulatory requirements and also due to impacts on people and environment due to improper hazardous waste management practices.

Mitigation Measures:

(i) The hazardous waste needs to be identified, stored and managed by implementation of required work instructions, following of material safety data sheet precautions, provision of suitable measures to prevent leakage and emissions of VOC's.
(ii) Monitoring devices will be installed to regularly monitor and check any leakages.
(iii) Adequate PPE's will be provided to people working in the vicinity of these areas.

4. Impact due to Odour

108. The odours compounds which will be emitted from CETP will impact the air quality in the surrounding area, if not properly controlled.

Mitigation Measures

(i) Provision of green buffer/plantation along the periphery of site
(ii) Suitable odour mitigation plant species will be identified during greenbelt and green areas development
(iii) Odour from area sources will be minimised by atomized spray of water
(iv) Periodical checking of treatment plants for efficient operation
(v) Sludge from treatment plants will be handled in most appropriate manner to avoid putrefied smell
(vi) Generation of data based information on the magnitude of the odorous gases/chemicals in ambient
(vii) environment around the sources by odour pollution measurement.

E. Solid Waste Management

1. Sludge from CETP

109. The solid waste from CETP comprises of boiler ash and other hazardous waste. The boiler ash can be used in brick manufacturing and sold to brick manufacturer. The hazardous waste generated from the process i.e., sludge from primary clarifier, salt from MEE, etc. would be disposed at authorized TSDF located at Jawaharlal Nehru Pharma city at Parawada (~ 20 km from Atchutapuram Cluster).

2. Sludge from WTP

110. The sludge will be dewatered in the Sludge drying beds proposed at WTP and the dried sludge will be used as manure for greenbelt development within the Atchutapuram Cluster.

111. **Impact due to emergency scenario of accidental discharge of untreated or toxic chemicals:** CETP operations will involve storage and handling of toxic chemicals such as Chlorine, ammonia, cynide, etc. Any event leading to accidental discharge of such chemicals will lead to major impacts on the people and surrounding environment. An emergency preparedness and response plan will be prepared and regularly tested through mock drills to ensure that the industrial estates are fully prepared and equipped to meet any such scenario.

Mitigation Measures:

(i) The waste water holding tanks and treatment chambers will be provided with suitable measures to prevent leakage and emissions of VOC's.
(ii) Regular stability checks and inspections of the tanks will done to ensure such events are prevented.
(iii) Monitoring devices will be installed to regularly monitor and check any leakages.
(iv) Adequate PPE's will be provided to people working in the vicinity of these areas.

3. Unanticipated Impacts during Construction and Operation

112. In the event, unanticipated impacts become apparent during project implementation, the borrower will: (i) inform and seek ADB's advice; (ii) assess the significance of such unanticipated impacts; (iii) evaluate the options available to address them; and (iv) update the IEE including EMP. ADB will help the borrower mobilize the resources required to mitigate any adverse unanticipated impacts or damage.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Public Consultation and Information Disclosure

113. Meaningful stakeholder consultation and participation is part of the project preparation and implementation strategy. A consultation and participation strategy is being designed and will be implemented with the assistance of consultants. By addressing stakeholder needs, there is greater awareness of the benefits and "ownership" of the project among stakeholders, which in turn contribute to sustainability. The consultation process during the project preparation has solicited inputs from a wide range of stakeholders, including government officials, NGOs, residents near the subproject locations and towns, marginalized/vulnerable beneficiary groups, and project-affected persons (APs).

114. Consultation, participation, and disclosure will ensure that information is provided and feedback on proposed subproject design is sought early, right from the subproject preparation phase, so that the views/preferences of stakeholders including potential beneficiaries and affected people can be adequately considered, and continue at each stage of the subproject preparation, processing, and implementation.

115. APs were consulted in the preliminary stage and subsequently to ensure: (i) incorporation of their views/concerns on compensation/resettlement assistance and environmental impacts and mitigation measures; (ii) inclusion of vulnerable groups in project benefits; (iii) identification of help required by APs during rehabilitation, if any; and (iv) avoidance of potential conflicts for smooth project implementation. It will also provide adequate opportunities for consultation and participation to all stakeholders and inclusion of the poor, vulnerable, marginalized, and APs in the project process.

116. Relevant information about any major changes to project scope will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders.

117. A variety of approaches were adopted such as stakeholder consultations regarding the scope of the environmental and social impact studies before work commences, and they were informed of the likely impacts of the project and proposed mitigation once the draft EIA/IEE and resettlement plan reports were prepared. The views of different stakeholders were recorded and documented and indicate how these have been taken into account in project development.

118. The key stakeholders consulted during project preparation included:

(i) Project beneficiaries;
(ii) Andhra Pradesh Industrial Association (s)
(iii) Elected representatives, community leaders, religious leaders, and representatives of community-based organizations;
(iv) local NGOs;
(v) Andhra Pradesh Pollution Control Board
(vi) local government and relevant government agency representatives, including local authorities responsible for land acquisition, protection, and conservation of forests and environment, archaeological sites, religious sites, and other relevant government departments;
(vii) residents, shopkeepers, and business people who live and work alongside the industrial estates where facilities will be built;
(viii) Custodians, and users of socially and culturally important buildings;
(ix) VCICDP PMU and consultants; and
(x) ADB, Government of Andhra Pradesh and the Government of India

119. Detailed consultations and public hearing in the presence of District Collector were conducted as per the Environmental Clearance requirements. Details are available in the EIA reports of Atchutapuram and Naidupeta industrial estates.

Table 12: Details of Public Hearing and Stakeholder Consultation Meeting held on 28.07.2015 for Naidupet Economic Zone

Sl. No.	Name	Representative Section	Issue discussed	Date
1.	N Krishnaiah	R/O Menakur Village	Waste Water Discharge and water pollution due to industries operating in the region.	28-7-2015
2.	Sri Rajendra	R/O Menakur Village	Payment of taxes to panchayats	28-7-2015
3.	Sri L Chenchu Babu	R/O Menakur Village	Allocation of sufficient funds under CSR for environmental water pollution control. Formation of a committee for overseeing implementation.	28-7-2015
4.	Dr. R Krishnaiah	Political Party Representative, Naidupet		28-7-2015
5.	A Madhusudan Rao	R/O Menakur Village	Effective pollution control measures for preventing health risks such as asthma, etc.	28-7-2015
6.	Muppala	R/O Konetupalem	Loss of grazing land due to	28-7-2015

Sl. No.	Name	Representative Section	Issue discussed	Date
	Paradhamraju	village, ward member	industrial activity	
7.	Sri V Sunanda Reddy	NGO Representative, Nalgonda	Emphasized need for ground water harvesting and development of a green belt.	28-7-2015
8.	Sri Putta Krishna	R/O Menakur Village	Adequate compensation to be paid	28-7-2015
9.	Smt. S Navaneethamma	R/O Menakur Village	Adequate compensation to be paid	28-7-2015
10.	Sri Suresh	R/O Menakur Village	Village road widening for safety	28-7-2015
11.	Sri K Sudhakar Reddy	R/O Menakur Village	Adequate water storage, green belt development and adequate medical facilities	28-7-2015
12.	Sri Pothurasi Subramanyam	R/O Menakur Village	Occupational health and safety and adequate provision of PPE's	28-7-2015

B. Future Consultation

120. This process shall be extended during implementation. Appointed PMSC (Project Management and Supervision Consultant) agency and APIIC Environment and Social Safeguards officer shall develop public consultation and disclosure program which is likely to include (i) Public meetings with affected communities to discuss and plan work programs and allow issues to be raised and addressed once construction has started; and (ii) smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation.

C. Information Disclosure

121. The EIA reports for Atchutapuram industrial estate including the CETP component has been disclosed and environmental clearance from the ministry of environment and forests is already obtained. (Refer Appendix 1). The EIA reports for Naidupeta industrial estate including the CETP component has been prepared and draft has been disclosed for comments. Public hearing has been conducted and the Environmental Clearance from the ministry of environment and forests is awaited.

122. Information is disclosed through public consultation and making relevant documents available in public locations. The following documents will be submitted to ADB for disclosure on its website:

(i) final IEE;
(ii) a new or updated IEE and corrective action plan prepared during project implementation, if any; and
(iii) environmental monitoring reports.

123. VCICDP PMU will send written endorsement to ADB for disclosing these documents on ADB's website. VCICDP PMU will also provide relevant safeguards information in a timely manner, in an accessible place and in a form and languages understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.

D. Grievance Redress Mechanism

124. **Common Grievance Redress Mechanism.** Project grievance redress mechanism will be established to evaluate, and facilitate the resolution of APs' concerns, complaints, and grievances related to social and environmental issues of the project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

125. A common GRM will be in place for social, environmental, or any other grievances related to the project. Every grievance shall be registered and careful documentation of process with regard to each grievance undertaken, as explained below. The APIIC environmental and social safeguards officers will have the overall responsibility for timely grievance redress on environmental and social safeguards issues, including keeping and maintaining the complaint and redress records. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated.

126. Affected persons will have the flexibility of conveying grievances/suggestions by sending grievance redress/suggestion in writing, through telephone call to APIIC safeguards officer or by filling forms for complaints/suggestion by email in the VCICDP Project site to be installed under the APIIC websites. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. The APIIC's safeguard officers will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party.

127. **Grievance Redressal Committee.** Grievance Redressal Committee (GRC) will be established at two-levels, one at APIIC level and another at PMU level, to receive, evaluate and facilitate the resolution of displaced persons concerns, complaints and grievances. The GRC will provide an opportunity to the APs to have their grievances redressed prior to approaching the jurisdictional sub court. The GRC is aimed to provide a trusted way to voice and resolve concerns linked to the project, and to be an effective way to address affected person's concerns without allowing it to escalate resulting in delays in project implementation.

128. The GRC will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. The GRC is not intended to bypass the government's inbuilt redressal process, nor the provisions of the statute, but rather it is intended to address displaced persons concerns and complaints promptly, making it readily accessible to all segments of the displaced persons and is scaled to the risks and impacts of the project.

129. The APIIC level GRCs will function out of each District where the subproject is being implemented. The GRC will be Chaired by Joint Collector and comprising of the Divisional Engineer acting as its member secretary and the following members: (i) RDO/Sub Collector of the division; (ii) Project Director, DRDA; (iii) Chief Executive Officer, Zilla Parishad; (iv) District Panchayat Officer; (v) District Education Officer; (vi) District Medical and Health Officer; (vii) District Level representative of DISCOM; and (viii) Superintendent, RWS Panchayat Raj Department.

130. The Project Director, PMU will be the appellate authority who will be supported by the PMSC and Safeguard Officer of PMU, and APIIC to make final decisions on the unresolved issues.

131. **Grievance redress process.** In case of grievances that are immediate and urgent in the perception of the complainant, the contractor and PMSC on-site personnel will provide the most easily accessible or first level of contact for quick resolution of grievances. Contact phone numbers and names of the concerned APIIC safeguard officers and contractors will be posted at all construction sites at visible locations. The APIIC safeguard officers will be responsible to see through the process of redressal of each grievance.

(i) **1st Level Grievance.** The phone number of the APIIC office should be made available at the construction site signboards. The contractors engineer and APIIC safeguard officers can immediately resolve on-site in consultation with each other, and will be required to do so within 7 days of receipt of a complaint/grievance.

(ii) **2nd Level Grievance.** All grievances that cannot be redressed within 7 days at field/ward level will be reviewed by the APIIC level grievance redress committee (GRC) with support from APIIC safeguard officers and PMSC environment and resettlement specialists. APIIC level GRC will attempt to resolve them within 15 days.

(iii) **3rd Level Grievance.**The APIIC safeguards officers will refer any unresolved or major issues to the PMU/State-level GRC, who in consultation with APIIC will resolve them within 15 days.

132. Despite the project GRM, an aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

133. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB India Resident Mission (INRM). The complaint can be submitted in any of the official languages of ADB's developing member countries. The ADB Accountability Mechanism information will be included in the project-relevant information to be distributed to the affected communities, as part of the project GRM.

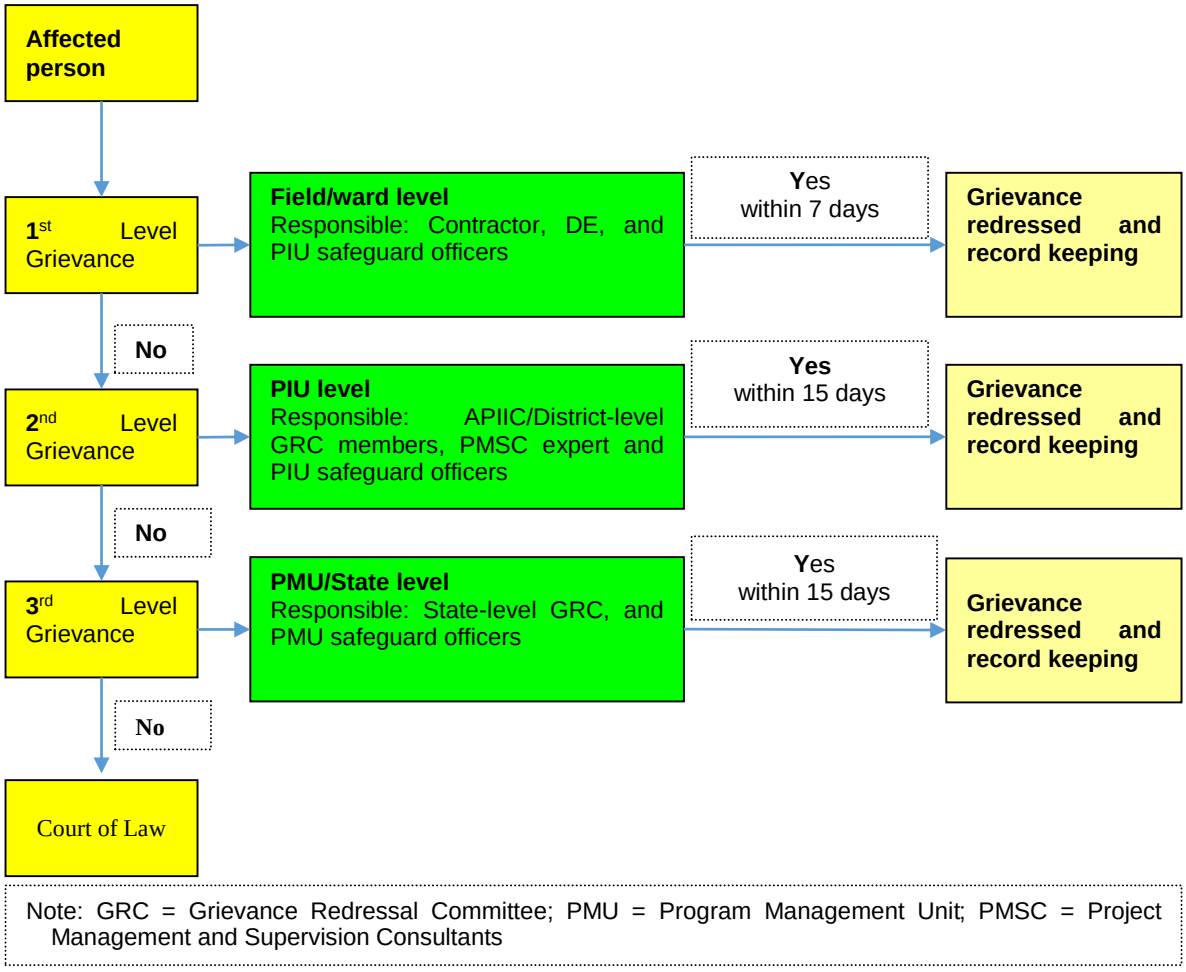
134. **Recordkeeping.** Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were effected and final outcome will be kept by PMU. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PMU office, and on the web, as well as reported in the semi-annual social and environmental monitoring reports to be submitted to ADB.

135. Periodic review and documentation of lessons learned. The PMU, and APIIC supported by the PMSC specialist will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the APIIC's ability to prevent and address grievances.

136. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by APIIC; while costs related to escalated grievances will be met by the PMU. Cost estimates for grievance redress are included in resettlement cost estimates. The grievance redress process is shown in Figure 1.

137. The GRCs will continue to function throughout the project duration.

Figure 9: APIIC Grievance Redress Mechanism



Note: GRC = Grievance Redressal Committee; PMU = Program Management Unit; PMSC = Project Management and Supervision Consultants

VII. INSTITUTIONAL ARRANGEMENTS AND RESPONSIBILITIES

138. DOI will be the executing agency. A PMU established within the Directorate of Industries, which is under the DOI is responsible for planning, implementation, monitoring and supervision, and coordination for subproject under VCICDP. APIIC will be responsible for implementing the subproject. PMU will recruit PMSC to provide support in implementation of VCICDP.

139. PMU will support APIIC in implementation, management and monitoring of the project. PMU and APIIC will be assisted by PMSC respectively. APIIC will appoint construction contractors to build infrastructure. Once the infrastructure is built and commissioned, the APIIC will operate and maintain the infrastructure. At state-level a Project Steering Committee (PSC) will be established to provide overall policy direction for the implementation of VCICDP.

A. Safeguard Implementation Arrangement

140. **Project Management Unit.** The PMU structure is as provided in the Table below. PMU will be supported by PSMC. PMU will appoint a safeguards coordinator as a part of the PMSC team to collect information and progress on environmental and social safeguards compliance.

Table 13: Tentative PMU Structure

Position	Tasks
Project Director	Overall Project Management
Project Director (Department of Industries)	Management of land-related issues
Procurement Officer	Procurement of consultants, civil works, goods, and NGOs, etc.
PMSC (Senior Engineer)	Technical officer with engineering background and preferably experience of multilateral projects
Institutional Coordination and Policy Reforms officer	Policy and Institutional support
Investment Promotion Officer	Coordination of VCICDP promotion, marketing
Monitoring and Evaluation Officer	Monitoring project results
PMSC (Environmental Safeguards Officer)	Environmental safeguards compliance
PMSC (Social Safeguards and Gender Officer)	Resettlement compliance, social, gender
Chief Accountant and Financial Management Officer	Project accounting, audit and reporting
Accountant	Accounting
Office Manager	Office management

141. Key tasks and responsibilities of the PMU environmental safeguards officer are as follows:

(i) confirm existing IEEs/EMPs are updated based on detailed designs and that new IEEs/EMPs are prepared in accordance with the EARF and subproject selection criteria related to safeguards;
(ii) confirm whether IEEs/EMPs are included in bidding documents and civil works contracts;
(iii) provide oversight on environmental management aspects of subprojects;
(iv) ensure SEMPs prepared by contractors are cleared by APIICs prior to commencement of civil works;
(v) establish a system to monitor environmental safeguards of the project including monitoring the indicators set out in the monitoring plan of the SEMPs;
(vi) facilitate and confirm overall compliance with all Government rules and regulations regarding site and environmental clearances as well as any other environmental requirements (e.g., Location Clearance Certificates, Environmental Clearance Certificates etc.), as relevant;
(vii) supervise and provide guidance to the APIIC to properly carry out the environmental monitoring and assessments as per the EARF;
(viii) review, monitor and evaluate the effectiveness with which the SEMPs are implemented, and recommend necessary corrective actions to be taken as necessary;
(ix) consolidate monthly environmental monitoring reports from APIIC and submit semi-annual monitoring reports to ADB;
(x) ensure timely disclosure of final IEEs/SEMPs in locations and in a form and language accessible to the public and local communities; and

(xi) address any grievances brought about through the Grievance Redress Mechanism (GRM) in a timely manner.

142. **APIIC:** In APIIC, the Senior Engineer will be deputed/designated as Environmental Safeguard Officer in addition to the environmental engineer.

Table 14: APIIC Environmental Safeguard Officer Tasks and Responsibilities

APIIC Environmental Safeguard Officer	Tasks and Responsibilities
Senior Engineer Cum Compliance Officer – APIIC	(i) include IEEs/EMPs in bidding documents and civil works contracts; (ii) review and approve SEMPs prepared by contractors; (iii) oversee day-to-day implementation of SEMPs by contractors including compliance with all government rules and regulations; (iv) take necessary action for obtaining rights of way; (v) oversee environmental monitoring by contractors; (vi) take corrective actions when necessary; (vii) submit monthly environmental monitoring reports to PMU; (viii) conduct continuous public outreach and awareness building related to environmental management; (ix) address grievances brought about through the GRM in a timely manner; and (x) organize an induction course for the training of contractors in environmental management to be delivered by PMSC consultants
	(i) Ensure complete payment and other resettlement assistants provided to the affected people prior to displacements (physical and economical) and starts of civil works in the affected areas; (ii) Coordinate with Safeguard Manager of PMU and ensure all social/environmental requirements if any are met.

143. **Project Management and Supervision Consultants.** The PMU and APIIC will be assisted by PMSC which will be staffed with environmental and social safeguard specialists to provide required assistance and regular progress report on safeguards implementation. The environmental specialist will have overall responsibility in implementation of environmental safeguards, including appropriate monitoring and reporting responsibilities. Key tasks and responsibilities of the PSMC environmental specialists are as follows:

(i) Update the IEEs including site- and subproject-specific EMP;
(ii) Supervise EMP implementation;
(iii) Prepare a monitoring report of final site- and subproject-specific EMPs and communicate with the stakeholders, including ADB on the progress, of the subprojects including environmental safeguards compliance; and
(iv) Prepare semi-annual environmental safeguards compliance reports.
(v) Establish a system to monitor environmental safeguards of the Project; prepare indicators for monitoring important parameters of safeguards;
(vi) Ensure all requisite approvals and no objection certificates are in place to allow implementation, and that these are renewed in a timely manner where required;
(vii) Ensure that provisions and conditions of all necessary permits, consents, NOCs, etc., are incorporated in the IEEs;
(viii) Take proactive action to anticipate the potential environmental impacts of the Project to avoid delays in implementation;
(ix) Assist APIIC in the establishment of GRC for IEE implementation;

(x) Support the APIICs and PMU in the GRM implementation to address any grievances submitted in a timely manner and establish record keeping system for complaint and redressal status of the project;
(xi) Assist APIIC and PMU in the project GRM mechanism and complaint solution;
(xii) Assist APIIC and PMU for GRM record keeping for first tier complaint and redressed actions;
(xiii) Ensure that the relevant environmental mitigation measures specified in the updated EMP will be incorporated into bidding documents and approved by the ADB prior to the issuance of the invitation for bidding;
(xiv) Closely monitor and supervise to ensure that all mitigation measures and monitoring requirements set out in the EMP are implemented and complied with throughout the project implementation, and when required, prepare or recommend necessary corrective actions to be taken and monitor its implementation;
(xv) Provide on-the-job training programs to APIIC staff involved in Project implementation for strengthening their capacity in managing and monitoring environmental safeguards; and
(xvi) Assist the APIIC safeguards officer to sensitize the turnkey contractors on ADB SPS, EARF, and GRM during detailed design and civil works implementation.

144. **Civil works contracts and contractors.** EMPs are to be included in bidding and contract documents and verified by the APIIC and PMU. The contractor will be required to designate an Environment, Health and Safety (EHS) supervisor to ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract.

145. The APIIC and PMU will ensure that bidding and contract documents include specific provisions requiring contractors to comply with: (i) all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; and (c) elimination of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites.

Table 15: Institutional Roles & Responsibility: Environmental Safeguards

Phase	PMU / APIIC	PMSC	ADB
Appraisal stage of all Subprojects under the investment program	PMU / APIICs to review the REA checklists and draft EIA/IEE. PMU / APIICs to submit draft EIA/IEE to ADB for review and approval. PMU / APIICs to disclose on its website the approved EIA/IEE. PMU / APIICs to ensure disclosure of information throughout the duration of the subproject.	PMSC to conduct REA for each subproject using checklists and to prepare EIA/IEE	ADB to review the REA checklists and reconfirm the categorization. ADB will review and approve EIA reports (Category A) and IEE reports (Category B) subprojects. ADB to disclose on its website the submitted EIA/IEE report.
Detailed Design Phase of all Subprojects under the investment program	PMU / APIICs with the assistance of PMSC to incorporate the EMP, environmental mitigation and monitoring measures into contract documents. PMU / APIICs to obtain all applicable consents/permits/clearances PMU to submit to ADB final IEE for approval and disclosure at ADB website.	PMSC to revise the IEE and EMP in accordance with detailed design changes if warranted. PMSC to ensure incorporation of EMP in bid documents and contracts. PMSC to prepare inventory of utilities to be affected by the subproject.	ADB will review and approve updated EIA reports (Category A) and IEE reports (Category B) subprojects. ADB to disclose on its website updated EIA/IEE report.
Pre-construction Phase of all Subprojects under the investment program	PMU / APIICs to conduct public consultation and disclosure during IEE process and comments will be reflected in the IEE report. PMU / APIIC to monitor the disclosure and public consultation. APIIC and PMSC to approve contractor‘s proposed locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes. PMU to submit to ADB in prescribed format semi-annual Environment Monitoring Report 6 months after Loan effective date.	PMSC to ensure statutory clearances and permits from government agencies/other entities are obtained prior to start of civil works. PMSC to ensure disclosure of information prior to start of civil works and throughout the duration of the construction period. PMSC to approve contractor‘s site-specific environmental plan (such as traffic management plan, waste management plan, locations for camp sites, storage areas, lay down areas, and other sites/plans specified in the EMP). PMSC to conduct baseline environmental conditions and inventory of affected trees	

Phase	PMU / APIIC	PMSC	ADB
Construction Phase of all Subprojects under the investment program	PMU / APIICs will review 6-monthly monitoring and EMP implementation report including the status of Project compliance with statutory clearances and with relevant loan covenants and submit the 6-monthly report to ADB and seek permission to disclose the same in the investment program web site.	PMSC to monitor the implementation of mitigation measures by Contractor. PMSC to prepare monthly progress reports including a section on implementation of the mitigation measures (application of EMP and monitoring plan) PMSC (as per EMP) will conduct environmental quality monitoring during construction stage (ambient air and noise, and water quality). PMSC to prepare the six-monthly monitoring report on environment by focusing on the progress in implementation of the EMP and issues encountered and measures adopted, follow-up actions required, if any.	ADB to review the 6 monthly report, provide necessary advice if needed to the PMU and approve the same. ADB to disclose on its website environmental monitoring reports.
Pre-operation Phase (Commissioning and Defect Liability Period)	PMU / APIICs to review monitoring report of PMSC on post-construction activities by the contractors as specified in the EMP PMU / APIIC to review applicable consents requirements	PMSC to apply for the CTOs prior to commissioning. PMSC to monitor and approve post-construction activities by the contractors as specified in the EMP.	
Operation Phase of all Subprojects under the investment program	APIICs to conduct monitoring, as specified in the environmental monitoring plan. APPCB to monitor the compliance of the standards regarding drinking water quality, ground water, ambient air, effluent quality from treatment plant, noise, as applicable.		

Notes: APPCB = Andhra Pradesh State Pollution Control Board, PMSC = Project Management Consultants, CTE = Consent to Establish, CTO = Consent to Operate, PMSC = Design and Supervision Consultant, EIA = Environmental Impact Assessment, EMP = Environmental Management Plan, IEE = Initial Environmental Examination, PMU = Project Management Unit; APIIC = Project Implementation Unit; REA = Rapid Environmental Assessment

VIII. INSTITUTIONAL CAPACITY AND DEVELOPMENT

146. The PMSC environmental safeguards specialist will be responsible for training PMU and APIIC on environmental awareness and management in accordance with both ADB and government requirements. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project, along with the frequency of sessions, is presented in Table 12.

Table 16: Training Program for Environmental Management

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation workshop	Module 1 – Orientation - ADB Safeguard Policy Statement - Government of India Environmental Laws and Regulations	1/2 day (at Hyderabad) (50 persons)	PMU, and APIIC's officials involved in project implementation
Description	**Contents**	**Schedule**	**Participants**
	Module 2 – Environmental Assessment Process - ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements - Review of environmental assessment report to comply with ADB requirements - Incorporation of EMP into the project design and contracts	1/2 day (at Hyderabad) (50 persons)	PMU, and APIIC's officials involved in project implementation.
Construction stage			
Orientation program/ workshop for contractors and supervisory staff	- Roles and responsibilities of officials/contractors/consultants towards protection of environment - Environmental issues during construction - Implementation of EMP - Monitoring of EMP implementation - Reporting requirements	1 day (at Subproject locations) (15 persons)	PMU APIICs Contractors

Description	Contents	Schedule	Participants
Experiences and best practices sharing	- Experiences on EMP implementation – issues and challenges - Best practices followed	1 day on a regular period to be determined by PMU, APIICs, and PMSC (at Hyderabad / Visakhapatnam) (50 persons)	PMU APIICs Contractors

ADB = Asian Development Bank; EMP = Environmental Management Plan; APIIC = Project Implementation Unit; PMU = Project Management Unit; PMSC = Design and Supervision Consultant; APRDC=Andhra Pradesh Road Development Corporation; APIIC= Andhra Pradesh Industrial & Infrastructure Corporation; AP Transco=Andhra Pradesh Transmission Corporation; GVMC=Greater Vishakhapatnam Municipal Corporation

IX. ENVIRONMENTAL MANAGEMENT PLAN, MONTORING PLAN AND GRIEVANCE REDRESSAL MECHANISM

A. Environment Management Plan

147. Environmental Management Plan (EMP) is intended to set out clearly and unambiguously the likely negative impacts of construction and/or operation of the project, the action that is required to avoid or mitigate each impact and the responsibility for taking each action. Responsibility is made legally binding when actions are subsequently specified in contracts. The EMP (**Appendix 6)** also ensures that the positive impacts are conserved and enhanced. It addition, it provides measures for institutional strengthening and effectiveness assessment through defined monitoring plan, reporting and corrective & preventive action planning. More specifically the objectives of the EMP are:

(i) To ensure compliance with Asian Development Bank's applicable safeguard policies, and regulatory requirements of Andhra Pradesh and the Government of India;
(ii) To formulate avoidance, mitigation and compensation measures for anticipated adverse environmental impacts during construction and maintenance and ensure that environmentally sound, sustainable and good practices are adopted;
(iii) To stipulate monitoring and institutional requirements for ensuring safeguard compliance; and
(iv) The CETPs should be environmentally sustainable.

B. Environment Monitoring Program

148. The monitoring and evaluation are critical activities in implementation of the Project. Monitoring involves periodic checking to ascertain whether activities are going according to plan or not. It provides the necessary feedback for project management to ensure project objectives are met and on schedule. The reporting system is based on accountability to ensure that the environmental mitigation measures are implemented. Environmental monitoring program has the underlying objective to ensure that the intended environmental mitigations are realized and these results in desired benefits to the target population causing minimal deterioration to the environmental parameters. Such program targets proper implementation of the EMP. The broad objectives are:

(i) To evaluate the performance of mitigation measures proposed in the EMP.
(ii) To evaluate the adequacy of environmental assessment.
(iii) To suggest ongoing improvements in management plan based on the monitoring and to devise fresh monitoring on the basis of the improved EMP.

(iv) To enhance environmental quality through proper implementation of suggested mitigation measures.
(v) To meet the requirements of the existing environmental regulatory framework and community obligations.

C. Performance Indicators

149. The significant physical, biological and social components affecting the environment at critical locations serve as wider/overall Performance Indicators. However, the following specific environmental parameters can be quantitatively measured and compared over a period of time and are, therefore, selected as specific Performance Indicators (PIs) for monitoring because of their regulatory importance and the availability of standardized procedures and relevant expertise. A comprehensive monitoring plan for all performance indicators has been prepared for all stages appended as **Appendix 7.** This includes parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits, cost and responsibility for implementation and supervision. Performance indicators requiring quantitative measurements are:

(i) Air Quality with respect to PM2.5, PM10, CO, NOx and SO2 at selected location.
(ii) Water Quality with reference to DO, BOD, Oil and grease, COD, Suspended Solids and Turbidity, Alkalinity rivers/streams and water bodies at selected points.
(iii) Noise levels at sensitive receptors (nearby community religious places).
(iv) Occupational Health and Safety data for employees and contractors working in the CETPs

150. **Ambient Air Quality (AAQ) Monitoring:** Ambient air quality parameters recommended for monitoring road development projects are PM2.5, PM10, Carbon Monoxide (CO), Oxides of Nitrogen (NOx) and Sulphur Dioxide (SO2). These are to be monitored, right from the commencement of construction activity at selected locations of plants and machinery, crushers on sites, excavation works etc. Data should be generated once in a season excluding monsoon in accordance with the National Ambient Air Quality Standards as per CPCB recent notification of 2009 **(Appendix 1).**

151. Water Quality Monitoring: The physical and chemical parameters recommended for analysis of water quality relevant to industrial development projects are pH, total solids, total dissolved solids, total suspended solids, oil and grease, COD, Chloride, Lead, Zinc and Cadmium. The location, duration and the pollution parameters to be monitored and the responsible institutional arrangements are given in the Environmental Monitoring Plan. The monitoring of the water quality is to be carried out at locations identified along the project road during construction and operation phase. The Indian Standard Specifications – IS10500: 1991 is given in **Appendix 2**. Surface water quality will be monitored as per fresh water classification of CPCB **(Appendix 2).**

152. **Noise Level Monitoring:** The measurements for monitoring noise levels would be carried out at sensitive receptors and construction sites around the industrial estates. The Ambient Noise Standards formulated by Central Pollution Control Board (CPCB) in 1989 or the standards by State Pollution Control Board if such standards are stringent than those of the CPCB are to be complied. The CPCB standards are given in **Appendix 3**. Sound pressure levels would be monitored on 24 hr. basis. Noise should be recorded at “A” weighted frequency using a “slow time response mode” of the measuring instrument.

153. **Occupational Health and Safety Data:** Regular health check records and safety data for employees and workers working in the CETPs operations will be monitored.

D. Environment Management Budget

154. An environmental management budget of INR 20,00,000 Lakhs has been estimated for implementation of the environmental management plan. This budget DOES NOT INCLUDE cost of environmental monitoring and associated trainings which will be a part of contractor's budget. A detail of environmental management budget is given in **Table in Appendix.**

E. Generic Guidelines for Implementing EMP

155. A set of generic guidelines have been formulated to avoid potential impacts due to construction and its allied activities. These guidelines have been attached as Appendices with following headings.

X. CONCLUSION AND RECOMMENDATION

156. The proposed subproject CETPs at Naidupeta and Atchutapuram has been categorized as Category 'B'. This is based on the fact that a comprehensive EIA study for both the CETPs as a part of the industrial estate development has already been done and regular monitoring of EIA EMP's and EIA EMoP will be done as per statutory requirements by the Government agencies. The same will also be monitored by ADB as a part of the overall monitoring requirement. Hence a separate EIA study was not required and an IEE has been prepared linked with the existing EIA studies for the Naidupeta industrial estate and Atchutapuram industrial estate.

157. CETPs are located in the industrial estates and they are not located in any environmentally sensitive areas. It does not cover any reserve forest area and no diversion of forest land is required. Land acquisition has already been conducted by APIIC and no additional land is required for the development of this subproject.

158. The significant environmental impacts attributable to the CETPs pertain more to their operations phase relating to meeting statutory requirements for effluent handling and treatment, effluent discharge, hazardous waste management and final disposal to TSDF facilities. Occupational Health and Safety of employees and workers and emergency preparedness for any accidental leak or failure are other significant impacts that need to be managed and controlled. These impacts are easily managed by adopting adequate and efficient operational practices, implementing and monitoring required guidelines, having adequate PPE's in place and effective implementation of Environmental Management Plan (EMP).

159. The initial environmental examination of the CETP subproject ascertains that the subproject studies and EIA's have been done and EMP's and EMoP's have been developed. The Executing Agency and APIIC shall ensure that EIA's EMP and EMoP along with this IEE's EMP and EMop are included in Bill of Quantity (BOQ) and forms part of bid document and civil works contract. The same shall be revised if necessary during project implementation or if there is any change in the project design and with approval of ADB.

Appendix 1: National Ambient Air Quality Standards

Pollutant	Time weighted average	Sensitive area	Industrial area	Residential, rural & other areas	Method of measurement
Sulphur Dioxide (SO2)	Annual* 24 hours**	15 µg/m³ 30 µg/m³	80 µg/m³ 120 µg/m³	60 µg/m³ 80 µg/m³	Improved West and Gaeke Method Ultraviolet Fluorescence
Oxides of Nitrogen as NOx	Annual* 24 hours**	15 µg/m³ 30 µg/m³	80 µg/m³ 120 µg/m³	60 µg/m³ 80 µg/m³	Jacab & Hochheiser Modified (Na-Arsenite) method Gas phase Chemiluminescence
Suspended Particulate Matter (SPM)	Annual* 24 hours**	70 µg/m³ 100 µg/m³	360 µg/m³ 500 µg/m³	140 µg/m³ 200 µg/m³	High Volume Sampler (Average flow rate not less than 1.1 m³/minute)
Restorable Particulate Matter (RPM) size less than 10 µm	Annual* 24 hours**	50 µg/m³ 75 µg/m³	120 µg/m³ 150 µg/m³	60 µg/m³ 100 µg/m³	Respirable Particulate Matter Sampler
Pollutant	Time weighted average	Sensitive area	Industrial area	Residential, rural & other areas	Method of measurement
Lead (Pb)	Annual* 24 hours**	0.5 µg/m³ 0.75 µg/m³	1.0µg/m³ 1.5 µg/m³	0.75 µg/m³ 1.0 µg/m³	AAS Method after sampling using EPM 2000 or equivalent filter paper
Carbon Monoxide (CO)	8 hours** 1 hour	1.0 mg/m³ 2.0 mg/m³	5.0 mg/m³ 10 mg/m³	2.0 mg/m³ 4.0 mg/m³	Non - dispersive infrared Spectroscopy

Appendix 2: Guidelines of CPCB on Primary Water Quality

Designated Best Use	Class of Water	Criteria
Drinking water source (with conventional treatment)	A	Total Coliforms MPN/100ml shall be 50 or less pH between 6.5 to 8.5 Dissolved Oxygen 6 mg/1 or more Biochemical Oxygen Demand (BOD) 5 days 20°C 2 mg/1 or less
Outdoor bathing (organised)	B	Total Coliforms MPN/100ml shall be 500 or less pH between 6.5 to 8.5 Dissolved Oxygen 5 mg/1 or more Biochemical Oxygen Demand (BOD) 5 days 20°C 3 mg/1 or less
Drinking Water Source (without conventional treatment)	C	Total Coliforms MPN/100 ml shall be 5000 or less pH between 6.5 to 8.5 Dissolved Oxygen 4 mg/l or more Biochemical Oxygen Demand (BOD) 5 days 20°C 3 mg/l or less
Propagation of Wildlife	D	pH between 6.5 to 8.5 for Fisheries Dissolved Oxygen 4 mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste	E	pH between 6.0 to 8.5 Electrical Conductivity at 25°C Max 2250µ mhos/cm Sodium absorption ratio Max. 26 Boron, Max. 2 mg/l

Appendix 3: National Ambient Noise Standards

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

Day time is from 6 am to 9 pm whereas night time is from 9 pm to 6 am
** Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicles horns, loud speakers and bursting of cracking are banned in these zones

Appendix 4: DRINKING WATER QUALITY STANDARDS (AS PER IS: 10500-1991)

Sl. No.	Parameter and Unit	Desirable Limit	Permissible Limit in Absence of Alternate Source
1.	Colour (Hazen units)	5	25
2.	Odour	Unobjectionable	-
3.	Taste	Agreeable	-
4.	Turbidity (NTU)	5	10
5.	pH	5-8.5	No relaxation
6.	Total Coliforms (MPN/100 mL)	nil	-
7.	Pathogenic Organisms or Virus	nil	-
8.	TDS (mg/L)	500	2000
9.	Mineral Oil (mg/L)	0.01	0.03
10.	Free Residual Chlorine (mg/L)	0.2	-
11.	Cyanide (mg/L as CN)	0.05	No relaxation
12.	Phenol (mg/L C_6H_5OH)	0.001	0.002
13.	Total Hardness (mg/L as $CaCO_3$)	300	600
14.	Total Alkalinity (mg/L as $CaCO_3$)	200	600
15.	Chloride (mg/L as Cl)	250	1000
16.	Sulphate (mg/L as SO_4)	200	400
17.	Nitrate (mg/L as NO_3)	45	100
18.	Fluoride (mg/L as F)	1	1.5
19.	Calcium (mg/L as Ca)	75	200
20.	Magnesium (mg/L as Mg)	30	100
21.	Copper (mg/L as Cu)	0.05	1.5
22.	Iron (mg/L as Fe)	0.3	1
23.	Manganese (mg/L as Mn)	0.1	0.3
24.	Zinc (mg/L as Zn)	5	15
25.	Boron (mg/L as B)	1	5
26.	Aluminium (mg/L as AL)	0.03	0.2
27.	Arsenic (mg/L as As)	0.05	No relaxation
28.	Mercury (mg/L as Hg)	0.001	No relaxation
29.	Lead (mg/L as Pb)	0.05	No relaxation
30.	Cadmium (mg/L as Cd)	0.01	No relaxation
31.	Chromium (VI) (mg/L as Cr)	0.05	No relaxation
32.	Selenium (mg/L as Se)	0.01	No relaxation
33.	Anionic Detergents (mg/L MBAS)	0.2	1
34.	PAH (mg/L)	nil	-
35.	Pesticides (µg/L)	Absent	0.001
36.	Alpha Emitters (10^{-6}µc/mL)	nil	0.0001
37.	Beta Emitters (10^{-6}µc/mL)	nil	0.001

Appendix 5: Environment Management Budget

Table 1: Environment Management

Sl. No.	Item Description	Quantity	UNIT	Rate (Rs.)	Amount (Rs.)	Responsibility
A	**Environmental Monitoring**					
A.1	Ambient air quality monitoring					Monitoring Amount Part of BOQ
A.2	Ambient noise level monitoring					
A.3	Water quality monitoring of surface water					Contractor / APIIC to monitor compliance
A.4	Water quality monitoring of drinking water					APIIC
C	**Occupational Health and Safety (Health Tests)**				15,00,000	
D	**Environmental Training**				500,000	APIIC
D.1	Training at site as per **Appendix E of EMP.**					
	Grand Total = INR 20,00, 000					

Appendix 6: Environmental Management Plan

Table 1: ENVIRONMENTAL MANAGEMENT PLAN

S. No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
PRE-CONSTRUCTION PHASE					
1	EIA Approval	Undertake all necessary requirements to obtain EIA approval for Naidupeta CETP	• Necessary planning and coordination with concerned authorities • Prior notice to and consultation with concerned authority, public to be affected so as to ensure that work does not get affected.	APIIC	APPCB / MoEF
2	Contractor Preparatory Works		The Contractor will complete the following activities no later than 30 days upon issuance of Notice to Proceed 1.) Submit appointment letter and resume of the Contractor's Environmental Officer (EO) to SC/APIIC 2.) EO will engage CSC-Environment Specialist and to a meeting to discuss in detail the EMP, seek clarification and recommend corresponding revisions if necessary 3.) EO will request CSC-ES copy of monthly monitoring formats and establish deadlines for submission. 4.) EO will submit for CSC-ES approval an action plan to secure all permits and approvals needed to be secured during construction stage which include but not limited to: i) Agreement with TSDF for transport, storage and disposal of hazardous waste (e.g. sludge, toxic untreated wastewater), ii) temporary storage location, iii) water use, and iv)	Contractor	APIIC

S. No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
			emission and fitness compliance of all vehicles to be used for hazardous waste transfer to CETPs.		
CONSTRUCTION PHASE					
1	Air Pollution	Construction plants, equipment and vehicles	Refer **Appendix 13** and **Appendix 14**	Contractor	APIIC
		Dust during earth works	• Maintaining adequate moisture at surface of any earthwork layer completed or non-completed unless and until base course is applied, to avoid dust emission. • Stockpiling spoil at designated areas and at least 5 m away from traffic lane.	Contractor	APIIC
		Storage of construction materials	• Sprinkling of water as necessary.	Contractor	APIIC
2	Water Pollution	Construction of CETPs foundation, storage tanks, Earthwork and marginal spillage of construction materials causing temporary turbidity and suspended solids	Storage of construction material and excavated soil above high flood level	Contractor	APIIC
		Construction vehicles	• Strictly avoiding cleaning / washing of construction vehicle in any water body	Contractor	APIIC
		Soil erosion from construction site	• Proper planning of site clearing and grubbing so as not to keep the cleared site before working for long duration. • Providing temporary side drains, catch water bank or drains, sedimentation basin, as necessary to avoid or minimize erosion and prevent sedimentation to receiving water bodies	Contractor	APIIC
3	Ground water	Wastewater logging	• All wastewater will be diverted to a	Contractor	APIIC

S. No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
	Pollution		ditch that will be managed for the period of construction and after construction such ditches will be filled and restored to original condition.		
		Human wastes and wastewater	• Providing septic tanks for treating sewage from toilets before discharging through soak pits • Decanting and or controlled disposal of oil and grease as collected at collection tanks of maintenance yard and chemical storage areas	Contractor	APIIC
4	Noise Pollution and Vibration	Vehicles and Construction machinery	• **Protection devices** (ear plugs or ear muffs) will be provided to the workers operating in the vicinity of high noise generating machines. • Construction equipment and machinery should be fitted with silencers and maintained properly. • Source-control through proper maintenance of all equipment. • Use of properly designed engine enclosures and intake silencers. • Noise measurements should be carried out along the road to ensure the effectiveness of mitigation measures. • Vehicles and equipment used should confirm to the prescribed noise pollution norms.	Contractor	APIIC
5	Land Pollution	Spillage from plant and equipment at construction camp	• Providing impervious platform and oil and grease trap for collection of spillage from construction equipment vehicle	Contractor	APIIC

S. No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
			maintenance platform • Collection oil and lubes drips in container during repairing construction equipment vehicles • Providing impervious platform and collection tank for spillage of liquid fuel and lubes at storage area		
		Domestic solid waste and liquid waste generated at camp	• Collecting kitchen waste at separate bins and disposing of in a pit at designated area/s • Collecting plastics in separate bins and disposing in deep trench at designated area/s covering with soil • Collecting cottons, clothes etc. at separate bins and burning in a pit (with sand bed)	Contractor	APIIC
09	Occupational health and safety of workers	Construction camp	• Water supply, sanitation, drainage and medical health facilities at campsite • Providing and using PPEs • Using working reverse horn for all construction equipment and vehicles	Contractor	APIIC
10	Accidents and safety	Construction sites	• Providing adequate light at construction zone if working during night time is permitted by the Engineer • Conducting induction and periodic training for all workers and supervisors	Contractor	APIIC

Appendix 7: Environmental Monitoring Program

Table 1: ENVIRONMENTAL MONITORING PLAN

			MONITORING					RESPONSIBILITY	
Component	**Project Stage**	**Parameters**	**Measurement Method**	**Standards**	**Location**	**Frequency**	**Duration**	**Implementation**	**Supervision**
Air	Construction Stage	PM 2.5 PM 10 SO2 NO_x CO	Methods of Measurement as prescribed in National Ambient Air Quality Standard **(Appendix 7)**	National Ambient Quality Standards **(Appendix 7)**	Next to construction area	Once a quarter	once	Contractor through approved monitoring agency	APIIC
	Operation Stage	Same as above	Same as above	Same as above	2 locations next to CETP holding tanks and outside boundary	As per Statutory requirements and Environmental Clearance conditions. (as stated in EIA's of Atchtapuram and Naidupeta industrial estates)	As per Statutory requirements and Environmental Clearance conditions. (as stated in EIA's of Atchtapuram and Naidupeta industrial estates)	APIIC through approved monitoring agency	APIIC
Water Quality	Construction stage (surface water)	pH, temperature, turbidity, DO, BOD, COD, TDS, TSS, Oil	Grab sample collected from source and analyzed as per IS : 2488 (Part 1-5) methods for	Water quality standards by CPCB **(Appendix 8)**	1 locations	Once in a Quarter for 3 years	-	Contractor through approved monitoring agency	APIIC

Component	Project Stage	Parameters	MONITORING				Duration	RESPONSIBILITY	
			Measurement Method	Standards	Location	Frequency		Implementation	Supervision
		& Grease	sampling and testing of Industrial effluents						
	Construction stage (ground water)	All parameters of drinking water		IS: 10500, 1991 (**Appendix 10**)	1 location	half yearly for 3 years	-	Contractor through approved monitoring agency	APIIC
	Operation Stage (surface water)	pH, temperature, turbidity, DO, BOD, COD, TDS, TSS, Oil & Grease and Pb	Grab sample collected from source and analyzed as per IS : 2488 (Part 1-5) methods for sampling and testing of Industrial effluents	Water quality standards by CPCB	As per Statutory requirements and Environmental Clearance conditions. (as stated in EIA's of Atchtapuram and Naidupeta industrial estates)	As per Statutory requirements and Environmental Clearance conditions. (as stated in EIA's of Atchtapuram and Naidupeta industrial estates)	-	APIIC through approved monitoring agency	APIIC
Noise levels	Construction stage	Noise levels on dB (A) scale	Equivalent noise levels using an integrated noise level meter kept at a distance of 10-15 m from edge of pavement	Noise standards by CPCB **(Appendix 9)**	Once a quarter			Contractor through approved monitoring agency	APIIC

Component	Project Stage		MONITORING					RESPONSIBILITY	
		Parameters	Measurement Method	Standards	Location	Frequency	Duration	Implementation	Supervision
	Operation Stage	Noise levels on dB (A) scale	Equivalent noise levels using an integrated noise level meter kept at a distance of 10-15 m from edge of pavement	Noise standards by CPCB (**Appendix 9**)	Once a quarter			APIIC through approved monitoring agency	APIIC
Hazardous Waste (Sludge)	Operation stage	AS defined by waste characteristics	As defined by waste characteristics	As per Environmental Clearance requirements	As per Environmental Clearance requirements (Hazardous Waste & Management Rules, 2008) and subsequent amendments	As per Environmental Clearance requirements	As per Environmental Clearance requirements	Contractor	APIIC
Occupational Health & Safety	Operation stage	AS defined by waste characteristics and worker profile	As defined by waste characteristics and worker profile	As per Environmental Clearance requirements	As per Environmental Clearance requirements	As per Environmental Clearance requirements	As per Environmental Clearance requirements	Contractor	APIIC

Appendix 8: REA CHECKLIST

Rapid Environmental Assessment (REA) Checklist

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: VCICDP-APIIC CETP subprojects

Sector Division: South Asia Urban Development Division

Screening Questions	Yes	No	Remarks
B. Project Siting Is the project area…			
• Densely populated?		✓	The industrial estates are far from the urban city and hence population is less.
• Heavy with development activities?	✓		As and when more industries will come up, the activity in the area will increase
Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site		✓	There are no environmentally sensitive areas located within the vicinity or 10 km radius of the 2 economic zones. Activities will be confined within the already built-up/developed and demarcated areas of the economic zones.
• Protected Area		✓	
• Wetland		✓	
• Mangrove		✓	
• Estuarine		✓	
• Buffer zone of protected area		✓	
• Special area for protecting biodiversity		✓	
• Bay		✓	
A. Potential Environmental Impacts Will the Project cause…			
• impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	Not anticipated.
• interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?		✓	Not anticipated.
• dislocation or involuntary resettlement of people?		✓	Not anticipated.

Screening Questions	Yes	No	Remarks
• disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	Not anticipated.
• impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?	**Y**		For industrial effluent from CETPs. Not anticipated for Naidupeta CETP as it is designed as Zero Discharge Liquid (ZLD). For Atchutapuram CETP, it has been designed to meet international effluent standards. O&M manual to be developed as part of the project will include measures in cases where there are any accidental or emergency requirements to discharge incomplete treated effluent. The EMP ensures measures are included to mitigate the impacts.
• overflows and flooding of neighboring properties with raw sewage?		✓	Not anticipated.
• environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		✓	Not anticipated. Drainage systems of the economic zones are designed to be separate from industrial effluents. The EMP ensures measures are included to mitigate the impacts.
• noise and vibration due to blasting and other civil works?		✓	Not anticipated.
• risks and vulnerabilities related to occupational health and safety due to physical, chemical,and biological hazards during project construction and operation?		✓	Not anticipated. Workers may get exposed to dust and noise during construction activities. However the exposure levels are likely to be short and insignificant. Workers will be provided requisite PPEs to minimise such exposure and associated harmful occupational health effects. Traffic Safety measures will be adopted during operation phase.
• discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		✓	Not anticipated. Drainage systems of the economic zones are designed to be separate from industrial effluents. The EMP ensures measures are included to mitigate the impacts.
• inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		✓	Not anticipated.
• road blocking and temporary flooding due to land excavation during the rainy season?		✓	Not anticipated.
• noise and dust from construction activities?	✓		Ambient noise level is expected to increase in the range of 80-90 dB(Aa) due to various construction activities, maintenance workshops, and earthmoving equipment. However there are no sensitive receptors in the economic zones. Nevertheless, stationary noise-making sources equipment like diesel

Screening Questions	Yes	No	Remarks
			generator sets and compressors will be installed with acoustic enclosures. Workers will be required to wear PPEs and exposure to noise will be limited as per EHS Guidelines.
• traffic disturbances due to construction material transport and wastes?		✓	Not anticipated. Construction works are within the economic zones. Transportation routes will be through existing roads built for use of the economic zones.
• temporary silt runoff due to construction?		✓	Not anticipated.
• hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		✓	Not anticipated.
• deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		✓	Not anticipated.
• contamination of surface and ground waters due to sludge disposal on land?		✓	Not anticipated. CETP designs include sludge management. The EMP ensures measures are included to mitigate the impacts.
• health and safety hazards to workers from toxic gases and hazardous materials which maybe contained in confined areas, sewage flow and exposure to pathogens in untreated sewage and un-stabilized sludge?	✓		Not significant. Adequate PPE's will be provided to workers on site. Regular monitoring and testing of air, water and sludge quality will be conducted as also mentioned in the monitoring schedule. The EMP ensures measures are included to mitigate the impacts.
• large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		✓	Not anticipated.
• social conflicts between construction workers from other areas and community workers?		✓	Not Anticipated. Local workers will be employed for regular operations.
• risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	Adequate measures for transportation, storage and disposal will be implemented. Regular monitoring of the same will be conducted.
• community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		✓	Not anticipated.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title:
Sector :
Subsector:
Division/Department:

Screening Questions		Score	Remarks [8]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	1	Atchutapuram industrial estate is in Vishakhapatnam which is prone to cyclones.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	1	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include

[8] If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High):__MEDIUM_____

Other Comments:_____

Prepared by: _____

Appendix 9: Records of Public Consultation

The following table is the suggested format for recording the minutes of the public consultations conducted for the project.

Date and Venue of Public Consultation	Number of attendees	Issues /concerns raised during the public consultation	Response of the EA/IA on how to address the issues and concerns

Attachments:

Attendance sheets

Photo documentation

Appendix 10: SAMPLE ANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

This template must be included as an appendix in the IEE that will be prepared for EACH sub- project. It can be adapted to the specific subproject as necessary.

I. Introduction

- Overall project description and objectives
- Description of subprojects
- Environmental category of the subprojects
- Details of site personnel and/or consultants responsible for environmental monitoring
- Overall project and subproject progress and status

No.	Subproject Name	Status of Subproject				List of Works	Progress of Works
		Design	Preconstruction	Construction	Operational Phase		
		□	□	□	□		
		□	□	□	□		
		□	□	□	□		

Compliance status with national/state/local statutory environmental requirements

No.	Subproject Name	Statutory Environmental Requirements	Status of Compliance	Action Required

Compliance status with environmental loan covenants

No. (List Schedule and Paragraph Number of Loan Agreement)	Covenant	Status of Compliance	Action Required

II. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

a. Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including environmental site inspection reports.

b. There should be reporting on the following items which can be incorporated in the checklist of routine environmental site inspection reports, followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection need to note and record the following:

- what are the dust suppression techniques followed for site, and if any dust was noted to escape the site boundaries;
- if muddy water was escaping site boundaries, or muddy tracks were seen on adjacent roads;
- adequacy of type of erosion and sediment control measures installed on-site, condition of erosion and sediment control measures, including if these were intact following heavy rain;
- are there designated areas for concrete works and refueling;
- are there spill kits on site, and if there are site procedure for handling emergencies;
- is there any chemical stored on site and what is the storage condition;
- are there any dewatering activities, if yes, where is the water being discharged;
- how are the stockpiles being managed;
- how are solid and liquid waste being handled on-site;

- review of the complaint management system; and
- checking if there are any activities being undertaken outside of working hours, and how that is being managed.

Summary Monitoring Table

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum, those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-construction Phase						
Construction Phase						
Operational Phase						

Overall Compliance with EMP

No.	Subproject Name	EMP Part of Contract Documents (Y/N)	EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

III. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

Brief description on the approach and methodology used for environmental monitoring of each subproject

IV. MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (AMBIENT AIR, WATER QUALITY, AND NOISE LEVELS)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM_{10} µg/m^3	SO_2 µg/m^3	NO_2 µg/m^3

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM_{10} µg/m^3	SO_2 µg/m^3	NO_2 µg/m^3

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/l	TSS mg/l	TN mg/l	TP mg/l

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/l	TSS mg/l	TN mg/l	TP mg/l

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/l	TSS mg/l	TN mg/l	TP mg/l

Noise Quality Results

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Government Standard)	
			Daytime	Nighttime

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Monitoring Results)	
			Daytime	Nighttime

V. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

Summary of follow up time-bound actions to be taken within a set timeframe.

APPENDIXES

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- Other

Appendix 11: SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name

Contract Number

NAME: _____ DATE: _____

TITLE: _____ DMA: _____ LOCATION: _____ GROUP: _____

WEATHER CONDITION:

_____

INITIAL SITE CONDITION:
_____

CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory _____ Incident _____ Resolved _____ Unresolved _____

INCIDENT:

Nature of incident:

_____

Intervention steps:

_____

_____

Incident issues:

Resolution

Project activity stage	Survey	
	Design	
	Implementation	
	Pre-commissioning	
	Guarantee period	

Inspection

Emissions	Waste minimization
Air quality	Reuse and recycling
Noise pollution	Dust and litter control
Hazardous substances	Trees and vegetation

Site restored to original condition Yes [ ] No [ ]

Signature

_____

Sign off

_____

_____

Name **Name**

Position **Position**

Appendix 12: CONSTRUCTION SITE CHECKLIST FOR EMP MONITORING

Project Name: RUSDP **Name of the Contractor:** **Yes (√) No (x)**

Monitoring Details: _____

EHS supervisor appointed by contractor and available on site

Construction site management plan (spoils, safety, material, schedule, equipment etc.,) prepared

Traffic management plan prepared

Dust is under control

Excavated soil properly placed within minimum space

Construction area is confined; no traffic/pedestrian entry observed

Surplus soil/debris/waste is disposed without delay

Construction material (sand/gravel/aggregate) brought to site as & when required only

Tarpaulins used to cover sand & other loose material when transported by vehicles

After unloading , wheels & undercarriage of vehicles cleaned prior to leaving the site

No AC pipes disturbed/removed during excavation

No chance finds encountered during excavation

Work is planned in consultation with traffic police

Work is not being conducted during heavy traffic

Work at a stretch is completed within a day (excavation, pipe laying & backfilling)

Pipe trenches are not kept open unduly

Road is not completely closed; work is conducted on edge; at least one line is kept open

Road is closed; alternative route provided & public is informed, information board provided

Pedestrian access to houses is not blocked due to pipe laying

Spaces left in between trenches for access

Wooden planks/metal sheets provided across trench for pedestrian

No public/unauthorized entry observed in work site

Children safety measures (barricades, security) in place at work sites in residential areas

Prior public information provided about the work, schedule and disturbances

Caution/warning board provided on site

Guards with red flag provided during work at busy roads

Workers using appropriate PPE (boots, masks, gloves, helmets, ear muffs etc)

Working conditions at CETP are assessed by EHS expert and ensure that there is no risk

Workers conducting or near heavy noise work is provided with ear muffs

Contractor is following standard & safe construction practices

Deep excavation is conducted with land slip/protection measures

First aid facilities are available on site and workers informed

Drinking water provided at the site

Toilet facility provided at the site

Separate toilet facility is provided for women workers

Workers camps are maintained cleanly

Adequate toilet & bath facilities provided

Contractor employed local workers as far as possible

Workers camp set up with the permission of PIU

Adequate housing provided

Sufficient water provided for drinking/washing/bath

No noisy work is conducted in the nights

Local people informed of noisy work o blasting activity conducted Pneumatic drills or other equipment creating vibration is not used near old/risky buildings 9

Appendix 13: SAMPLE GRIEVANCE REGISTRATION FORM

(To be available in Telegu and English)

The _____Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

<table>
<tr><td>Date</td><td>Place of registration</td><td colspan="4">Project Town

Project:</td></tr>
<tr><td colspan="6">Contact information/personal details</td></tr>
<tr><td>Name</td><td></td><td>Gender</td><td>* Male
* Female</td><td>Age</td><td></td></tr>
<tr><td>Home address</td><td colspan="5"></td></tr>
<tr><td>Place</td><td colspan="5"></td></tr>
<tr><td>Phone no.</td><td colspan="5"></td></tr>
<tr><td>E-mail</td><td colspan="5"></td></tr>
<tr><td colspan="6">Complaint/suggestion/comment/question Please provide the details (who, what, where, and how) of your grievance below:</td></tr>
</table>

If included as attachment/note/letter, please tick here:
How do you want us to reach you for feedback or update on your comment/grievance?

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)
Mode of communication: Note/letter E-mail Verbal/telephonic
Reviewed by: (Names/positions of officials reviewing grievance)

Action taken:	
Whether action taken disclosed:	Yes No
Means of disclosure:	