Initial Environmental Examination

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IND: Visakhapatnam Chennai Industrial Corridor Development Program (VCICDP):
Rajnagaram to Samarlakota Road Subproject

Prepared by the Government of Andhra Pradesh (GoAP), Government of India (GOI) 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
APRDC	-	Andhra Pradesh Road Development Corporation
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
IRC	-	Indian Road Congress
IS	-	Indian Standard
km	-	kilometer
MFF	-	Multi Tranche Financial Facility
MoEF	-	Ministry of Environment and Forests
MoRT&H	-	Ministry of Road Transport and Highways
MDR's	-	Major District Roads
MSL	-	Mean Sea Level
MW	-	Mega Watt
NSDP	-	Net State Domestic Product
NGO	-	nongovernment organization
NH	-	National Highway
NOx	-	Oxides of Nitrogen
O&M	-	operation and maintenance
PIU	-	Project Implementation Unit
PWD	-	Public Works Department
RF	-	Reserve Forest
ROW	-	Right-of-way
DSC	-	Design and Supervision Consultant
SH	-	State Highway
SPCB	-	State Pollution Control Board
SPM	-	Suspended Particulate Matter
SO_2	-	Sulphur Dioxide
SSI	-	Small Scale Industries

SPCB	-	State Pollution Control Board
TA	-	technical assistance
TDS	-	Total Dissolved Solids
TSS	-	Total Suspended Solid

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 Visakhapatnam-Chennai Industrial Corridor Development Program (VCICDP) is proposed to support the Government of Andhra Pradesh 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 kilometers (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 to enhance manufacturing sector growth and create high quality jobs in the state of Andhra Pradesh.

4. Three roads subprojects have been identified for the MFF: (i) Rajangaram–Samarlkot (also known as "ADB Road", 29 km), (ii) Anakapalli–Atutapuram (13.6) km and (iii) Nellore–Krishna Patnam (23.6 km). Andhra Pradesh Road Development Corporation (APRDC) has finalized the design standards for roads in rural and built up areas which will be applicable to VCICDP subprojects to ensure safety of road users. Tranche 1 of the MFF includes Rajangaram–Samarlkot road while Tranche 2 will include Anakapalli–Atutapuram and Nellore–Krishna Patnam roads.

5. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. This Initial Environmental Examination (IEE) addresses components of Rajangaram–Samarlkot Road Subproject which include widening of the existing 2-lane carriageway to 4-lane configuration. The subproject will also include a component for road safety considering that Andhra Pradesh is one of the top five states in India for road accident deaths.[1] The subproject will mobilize a road safety expert to prepare and identify specific components and road safety program, also to be financed under VCICDP. The components will include 4 E's (Education, Enforcement, Engineering, and Emergency) as per GOI's guidelines in selected area of the VCIC.

6. The existing road condition is good, the carriageway width is 10 m at most of the road stretch and wider at major junctions. Civil works are expected to start in 2nd Quarter of 2016 and will be completed in 6-8 months.

7. 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

[1] 28,000 deaths in road accidents in a year.

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.

8. Planning principles and design considerations were reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts due to the project design or location are not significant. However, the social impacts (access disruptions) due to construction activities are not avoidable, as residential and commercial establishments exist along the project corridor. A resettlement plan has been developed in accordance with ADB SPS and Government of India laws and regulations. No permanent negative environmental impacts were identified. Potential temporary negative impacts were identified during construction and operation of the improved infrastructure however these are 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 isolated locations and are produced because the process is invasive, involving excavation, obstruction at specific construction locations, and earth movements; and (iii) being located mainly along roads and built-up area, will not cause direct impact on terrestrial biodiversity values.

9. 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 standards. Therefore, the potential impacts that are associated with design, construction, and operation of the Rajangaram–Samarlkot Road Subproject can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

10. An environmental management plan (EMP) was developed to provide specific actions deemed necessary to assist in mitigating the environmental impacts, guide the environmentally-sound execution of the proposed project, and ensure efficient lines of communication between the implementing agency, project management unit, consultants, and contractors. The EMP also provides a proactive, feasible, and practical working tool to enable the measurement and monitoring performance on-site.

11. The contractor will be required to submit to APRDC, 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.

12. 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.

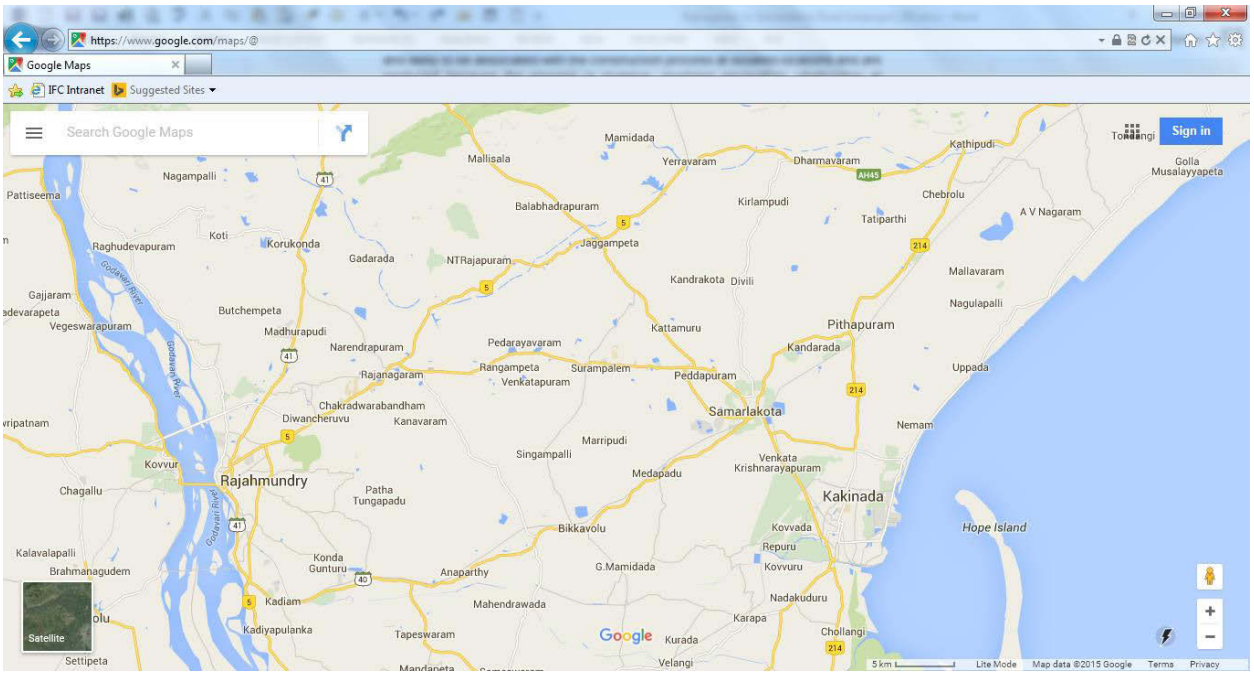
13. The public participation process included (i) identifying interested and affected parties (stakeholders); (ii) informing and providing the stakeholders with sufficient background and technical information regarding the proposed development; (iii) creating opportunities and mechanisms whereby they can participate and raise their viewpoints (issues, comments, and concerns) with regard to the proposed development; (iv) giving the stakeholders feedback on process findings and recommendations; and (v) ensuring compliance to process requirements with regards to the environmental and related legislation. This IEE includes activities to be undertaken during detailed design stage to continuously engage the stakeholders, measures for information disclosure, and processes for carrying out consultation with affected people and facilitating their participation during implementation stage.

14. The program's grievance redressal mechanism provides the citizens with a platform for redressal of their grievances and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

15. There are no impacts that are significant or complex in nature, or that need an in-depth study to assess the impact. Thus, the subproject is will not cause significant adverse impacts. In addition to the mitigation measures and specifications already considered in the package design, the potential adverse impacts that are associated with construction and O&M can be mitigated to acceptable levels with the specific mitigation measures discussed in the EMP.

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

Location Map of Subproject Road (Rajnagram – Samrlkota)



I. INTRODUCTION

A. Background

1. The Visakhapatnam-Chennai Industrial Corridor Development Program (VCICDP) is proposed to support the Government of Andhra Pradesh 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 kilometers (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.

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4. Three roads subprojects have been identified for the MFF: (i) Rajangaram–Samarlkot (also known as "ADB Road", 29.6 km), (ii) Anakapalli–Atutapuram (13.6) km and (iii) Nellore–Krishna Patnam (23.6 km). Andhra Pradesh Road Development Corporation (APRDC) has finalized the design standards for roads in rural and built up areas which will be applicable to VCICDP subprojects to ensure safety of road users. Tranche 1 of the MFF includes Rajangaram–Samarlkot road while Tranche 2 will include Anakapalli–Atutapuram and Nellore–Krishna Patnam roads.

B. Purpose of the IEE

5. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. This Initial Environmental Examination (IEE) addresses components of Rajangaram–Samarlkot Road Subproject which include widening of the existing 2-lane carriageway to 4-lane configuration. The subproject will also include a component for road safety considering that Andhra Pradesh is one of the top five states in India for road accident deaths.[1] The subproject will mobilize a road safety expert to prepare and identify specific components and road safety program, also to be financed under VCICDP. The components will include 4 E's (Education, Enforcement, Engineering, and Emergency) as per GOI's guidelines in selected area of the VCIC.

6. 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

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C. Extent of the IEE Study

7. 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. borrowing, quarrying, 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.

8. The core zone of impact is taken as 15 m on the either side of the alignment. However, the study area is considered up to 10 km on either side of road alignment for larger analysis of land use and other environmental features.

D. IEE Methodology

9. IEE commenced with an initial pre-feasibility site visit and review of the technical details provided by the APRDC and DPR team and preceding environmental assessment reports conducted for the project road. This was followed by a reconnaissance site visit and discussion with the implementing agency to reconfirm the technical details of the project road improvement work. 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

10. 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 along the project road within the area of interest/core zone. Since the proposed road is widening of an existing road and does not impact forest area outside the right of way, no bio-diversity study was undertaken. The data collection from the field was completed with the help of trained enumerators / investigators.

2. Secondary Data Collection

11. 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

12. 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. Information gathered were integrated in project design and formulating of the EMP.

4. Other Tools

13. Remote sensing and GIS based land use map of the study area has been reviewed through recent satellite imagery and verified on the ground.

14. Information collected from both primary and secondary sources has been summarized in **Table 1**.

Table 1: Primary and Secondary Information Sources

Information	Sources
Technical Details	APRDC and DPR Consultant
Inventory of road features	Ground Physical surveys
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
Roadside 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
Borrow areas, quarries and other construction material source	APRDC, Detailed Project Report and Consultation
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

15. 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

16. 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

17. 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.

(i) Executive Summary
(ii) Chapter 1- Introduction
(iii) Chapter 2- Policy, Legal and Administrative Framework
(iv) Chapter 3- Description of Project
(v) Chapter 4- Description of the Environment
(vi) Chapter 5- Anticipated Impacts and Mitigation Measures
(vii) Chapter 6- Information Disclosure, Consultation, and Participation
(viii) Chapter 7- EMP and Grievance Redress Mechanism
(ix) Chapter 8 - Conclusion and Recommendation.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. Environmental Legislation (National and State Laws)

18. 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".

19. 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 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.

20. Relevant to VCICDP, common effluent treatment plant (CETP) development (new or modification) will attract EIA Notification, 2006 and has been classified as Category B. None of the transport, power, urban/industrial water supply and sewerage infrastructure proposed under VCICDP attracts EIA Notification Schedule, and therefore EC is not required.

21. In addition to the EIA Notification, 2006, there are a number of other acts, rules and regulations currently in force that could apply to the subproject under the VCICDP. Salient features and applicability of these legislations are provided in Table 2. 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.[2]

Table 2: Applicable Government of India Environmental Legislations and Specific Requirements for Rajnagaram to Samrlkota Road 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) This states that Environmental Clearance is required for certain defined activities/projects, and this 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. Category A projects requires Environmental Clearance from the National	The proposed component of the road construction is not anticipated to require Environmental Clearance from the MoEF. According to the notification from the MoEF dated 14th September 2006 and subsequent amendments, i) New State Highways; and ii) Expansion of National / State Highways greater than 30 km involving

[2] During the design, construction, and operation of the project the PMU and PIUs will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

No.	Legislation	Requirements for the Project	Applicability
		Ministry of Environment and Forest (MoEF). Category B projects require Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA).	additional right of way greater that 20m involving land acquisition; are classified as Category B projects. Hence, project requires prior environmental clearance from State Environmental Impact Assessment Authority (SEIAA). An application seeking prior environmental clearance in all cases shall be made in the prescribed Form 1 and supplementary Form 1A, if applicable; annexed to the said notifications.
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 the road construction subproject.
4	Air (Prevention and Control of Pollution) Act 1981, amended 1987 and its Rules, 1982	• CFE and CFO from APPCB as applicable • Compliance to conditions and emissions standards stipulated in the CFE and CFO.	For the subproject, the following will require 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 • Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2009	• Solid waste and sludge generated at proposed facilities shall be disposed in accordance with the MSWM Rules. • Compliance with noise standards. In industrial areas, the noise level limit during the day time (6 am to 10 pm) is 75 decibels and during night (10 pm to 6 am) 70 decibels. Similarly, for commercial areas day time limit is 65 decibels and night limit is 55 decibels. In the case of residential areas, the limits are respectively 55 and 45 decibels and for the silence zones, 50 and 40 decibels. • 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	Applicable to the road construction subproject.

No.	Legislation	Requirements for the Project	Applicability
		locations • 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.	
6	Indian Forest Act, 1927 • Forest (Conservation) Act, 1980 amendment 1988 and the following rules/notifications • Forest (Conservation) Rules, 1981 amended 1992 and 2003 • Guidelines for diversion of forest lands for non-forest purpose	• Declaration of forest areas (reserved, protected and village forests), and regulation of activities within the forests • Restricts use of forest lands for non-forest purposes; • Prior permission for use of forest land for project proposes from Ministry of Environment and Forest (MoEF) • Approval of Ministry of Environment and Forest (MoEF) for any acquisition of forest land • Application for use of forest of land to be made to Forest Department, GoAP • Project proponent to identify non-forest land which is to be transferred to Forest Department for taking up afforestation program. • Net Present Value (NPV) of the forest land to be used, cost of afforestation, tree cutting, etc., as determined by Forest Department, is to be paid to the Forest Department.	In 1986, when Ministry of Environment & Forests enacted the Environment Protection Act, the entire linear stretches of roadside plantations along the State Highways were declared as protected forest. Although the land is under the control of the RBD[3], due to its protected status, clearance is required to cut roadside trees. Applicability of the provisions of the Forest (Conservation) Act, 1980 to the linear (road or canal side) plantations was modified by a notification from the MoEF, dated 18 February 1998. The new notification recognized that the spirit behind the Forest (Conservation) Act was conservation of natural forests, and not the strip plantations. In the case of the "notified to be protected" roadside plantations, the clearance now may be given by the concerned Regional Offices of the MoEF, irrespective of the area of plantation lost. While issuing the approval, in place of normal provision for compensatory afforestation, the Regional Offices will stipulate a

[3] RBD – Roads and Buildings Department.

No.	Legislation	Requirements for the Project	Applicability
			condition that for every tree cut at least two trees should be planted. If the concerned Regional Office does not accord the clearance within 30 days of the receipt of fully completed application, the proponent agency may proceed with the widening/expansion under intimation to the State Forest Department, and the MoEF, Government of India.
7	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. • APRDC to obtain Certificate of Registration. • Contractors to obtain license from designated labour officer
10	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
11	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 the subproject construction site.
12	Minimum Wages Act, 1948	• All construction workers should be paid not less than the prescribed minimum wage	Applicable to road construction subproject.
13	Workmen Compensation Act, 1923	• Compensation for workers in case of injury by accident	Applicable to road construction subproject.
14	Equal Remuneration Act, 1979	• Equal wages for work of equal nature to male and female	Applicable to road construction subproject.

No.	Legislation	Requirements for the Project	Applicability
		workers	
15	AP State Environment Policy	• Follows the National Environment Policy, 2006 • Project implementation should adhere to the policy aims	Applicable to road construction subproject.
16	The Motor Vehicles Act, 1988	• Standards for vehicular pollution and prevention control. The authority also checks emission standards of 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.	Applicable to road construction subproject.
17	Minor Mineral and concession Rules	For opening new quarries. Regulate use of minor minerals like stone, soil, river sand etc.	Applicable to road construction subproject.
18	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 road construction subproject.
19	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 road construction subproject. As it is 100km reaches of thermal power plants.
20	Public Liability and Insurance Act 1991	Protection from hazardous materials and accident.	Applicable to road construction subproject.
21	National Environment Appellate Authority Act (NEAA) 1997	Grievances process and how they will be dealt with.	Applicable to road construction subproject.
22	Explosive Act 1984 - For transporting and storing diesel, bitumen etc.	Safe transportation, storage and use of explosive material.	Applicable to road construction subproject.
27	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
28	Permission for use of water for construction purpose from	Use of surface water for construction	Applicable to all subprojects. To be

No.	Legislation	Requirements for the Project	Applicability
	irrigation department		obtained prior to initiation of any work involving use of surface water for construction

CFE = consent for establishment, CFP = consent for operation, CPCB = Central Pollution Control Board, MoEF = Ministry of Environment and Forest, PUC = Pollution under Control Certificate.

22. In Andhra Pradesh State, there are two national parks and 21 wildlife sanctuaries (WLS). None of these protected areas are located in the vicinity of the subproject locations.

23. Cutting of trees in non-forest land, irrespective of land ownership, also requires permission from local administration. Afforestation to the extent of two trees per each tree felled is mandatory.

B. International Environmental Agreements

24. India is a party to the following international convention that may apply to this project, especially in selection and screening of subprojects under restricted/sensitive areas.

Table 3: International Agreements and Applicability to Rajnagaram to Samrlkota Road Subproject

No.	Agreement	Requirements for the Project
1	Ramsar Convention on Wetlands of International Importance, 1971. The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. According to the Ramsar list of Wetlands of International Importance, there are 25 designated wetlands in India which are required to be protected.	There is one Ramsar Site[4] in Andhra Pradesh however it is not located within or adjacent to the road subproject.
2	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.	Solid wastes generated during the road construction may fall in hazardous waste category. This will be disposed within the country, and therefore will not attract this convention.
3	Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972)	This Convention defines and provides for the conservation of the world`s heritage by listing the natural and cultural sites whose value should be preserved. Not applicable for the road subproject.
4	Convention on Biological Diversity (1992)	This provides for a framework for

[4] Kolleru Lake.

No.	Agreement	Requirements for the Project
		biodiversity and requires signatories to develop a National Biodiversity Strategy and Action Plan. Not applicable for the road subproject.
5	Convention on the Conservation of Migratory Species of Wild Animals (Bonn 1979)	This sets the framework for agreements between countries important to the migration of 8 threatened species. Not applicable for the subproject.
6	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

C. ADB Policy

25. 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.

26. **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.

(ii) **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.

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

(iv) **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.

27. ADB Rapid Environmental Assessment (REA) Checklist for Roads (Appendix 1) has been used for the screening and categorization. Result of the screening shows the potential impacts are site-specific, short duration, not significant and few if any of them are irreversible. Thus this subproject is classified as Category B as per ADB SPS. This IEE has been prepared and covers the general environmental profile of the sub project area, an assessment of the potential environmental impacts on physical, ecological, economic, and social and cultural resources within the project's influence area during design and/or pre-construction, construction, and operation stages. An environmental management plan and an environmental monitoring plan are integral part of the IEE. The IEE followed a number of steps:

(i) Conduct field visits to collect primary or secondary data relevant to the project area to establish the baseline environmental condition;
(ii) Assess the potential impacts on environmental attributes due to the location, design, construction and operation of the subproject through field investigations and data analysis;
(iii) Explore opportunities for environmental enhancement and identify measures;
(iv) Prepare an environment management plan (EMP) outlining the measures for mitigating the impacts identified including the institutional arrangements;
(v) Identify critical environmental parameters required to be monitored subsequent to the implementation of the subproject and prepare an environmental monitoring plan;
(vi) Compare the environmental safeguard requirements of Government of India, Government of Andhra Pradesh and ADB, and identify measures to bridge the gap, if any;
(vii) Carry out consultation with affected stakeholders, local administrative bodies to identify perception of the Project, introduce project components and anticipated impacts; and
(viii) Disclose the draft IEE at ADB website and prepare project brief and/or FAQs in local language to be made publicly available at the offices of APRDC.

28. A number of field visits were done during the project preparatory phase from March – August 2015. Field visits were done to conduct ocular inspection and to assess the existing condition of the physical and biological environment of selected subproject sites, consult with local people that may be potentially affected by the subprojects, coordinate with APRDC, executing agency and local authorities, and to conduct secondary data collection. .

29. **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.

30. **Public disclosure.** ADB will post this IEE, or any update and environmental monitoring reports submitted by the Project Management Unit (PMU) during project implementation upon receipt on its website as well as disclose relevant information in accessible manner in local communities.

31. **Finalization of IEE.** PMU and PIU will update this draft IEE once detailed design of the subproject is completed and will be submitted to ADB for clearance and disclosure.

32. **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 19 Regional Offices (RO) across the state regulates environmental protection related activities. Subproject towns across the Visakhapatnam Chennai Industrial Corridor are under the jurisdiction of different Regional Officer's and they will monitor the road construction subproject operation and compliance with the standards.

33. 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.

III. DESCRIPTION OF THE PROJECT

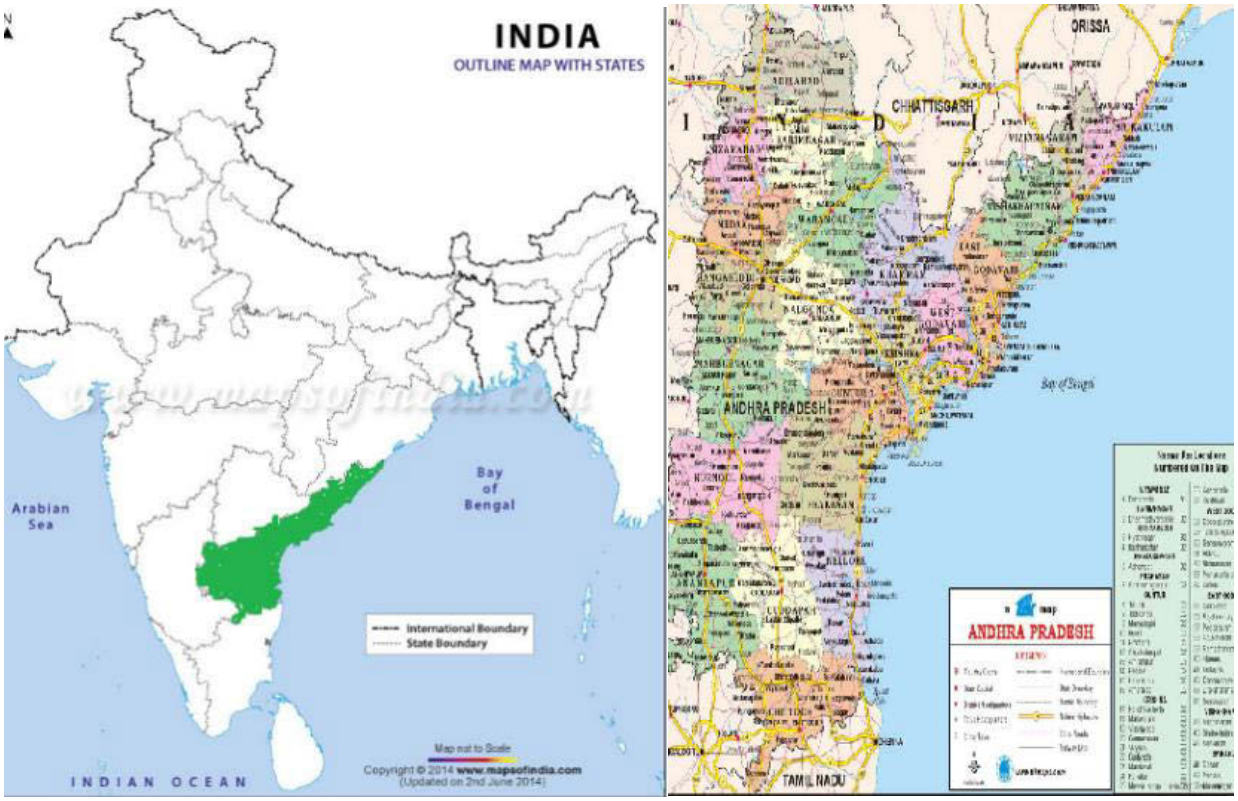
A. Location and Project Type

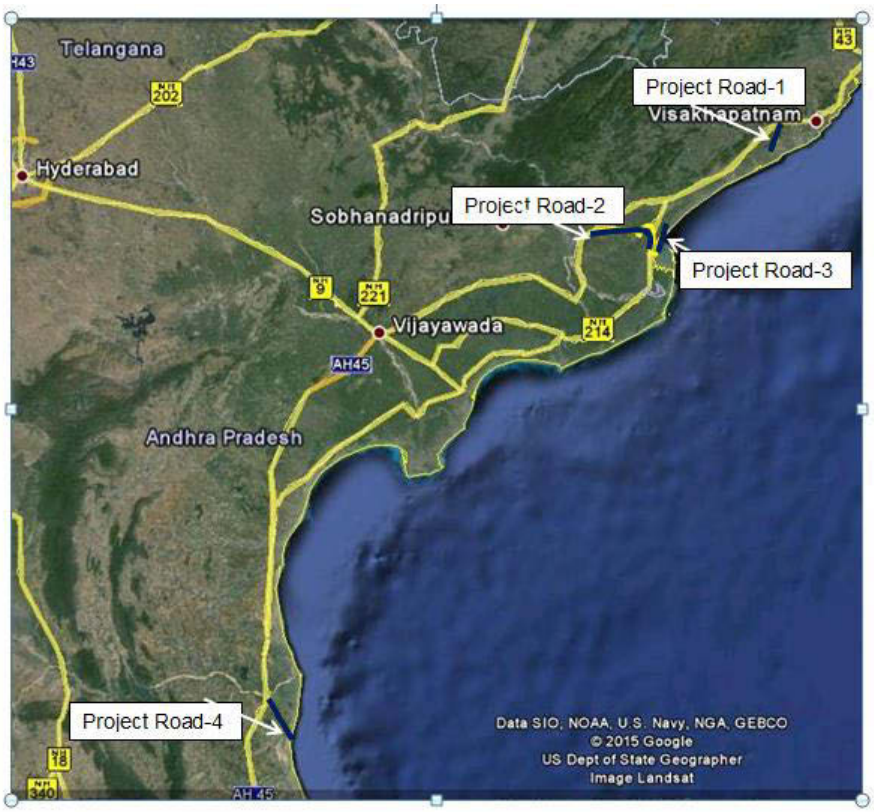
34. The State Highway component of proposed VCIC Connectivity Project has considered a length of about 131 km of state highways/MDR which include 4 road sections (Figure 1). A sample road representing typical environmental features of the region has been selected for the purpose of Initial Environmental Examination study. The scope of work for this sample road section includes *four laning of existing two lane road*

35. The existing road is known as ADB road which connects the Kakinada port and its railway station along with Industrial traffic to NH-5 at Rajanagaram. The Project road alignment traverses through the plain terrain. The road condition is good along with riding quality. The scope of work for this section is on 29.6 km road section between Samalkot and Rajanagaram. This includes widening of existing carriageway to 4 lane configuration.

36. This project will be an alternate route to Kakinada-Rajahmundry Road and SH 40 to connect Kakinada and Rajahmundry. The project will reduce the travel distance. Figure 1 provides the location map and alignment of the road as per preliminary design.

Figure 1: Location Map





B. Category of Project

37. ADB categorizes projects based on their potential environmental impacts. This project has been classified as Category B according to the ADB SPS. The Rapid Environment Assessment (REA) checklist for this subproject is appended as **Appendix 1**.

38. The project road passes mainly though plain terrain. The topography of the region is mixed type with combination of horizontal and vertical curves. The land use is mixed type with sections of agricultural land on plains and small/medium size industries in clusters. Roadside plantation is observed all along the project road. The density is approximately 137 trees/km. The improvement work will be undertaken along the existing alignment and the requirement for additional land is being ascertained to accommodate the proposed improvement work. There are no environmentally critical areas in the project road.

C. Need for Project

39. The Visakhapatnam-Chennai Industrial Corridor Connectivity Project is vital from the point of connecting various industrial corridors to the National Highways for the ease in transportation of goods and inviting various industries by providing other infrastructure facilities like water, power etc.

(i) Atchutapuram– Anakapalle: This project which connects the cluster to NH5 needs upgrading to meet the needs of existing and upcoming clusters.
(ii) ADB Road - Kakinada to Rajanagaram: This project will be an alternate route to Kakinada-Rajahmundry Road and SH 40 to connect Kakinada and Rajahmundry. The project will reduce the travel distance.
(iii) Krishnapatnam port to Nellore via Muthukur: This road will provide an alternate route for transit to Krishnapatnam port from Southern regions.
(iv) Kakinada Anchorage Port - captive port in KSEZ - Kakinada Uppada Beach Road: The node in Kakinada is close to Uppada, which is connected via Uppada beach road to Kakinada port. Hence, upgrading this road will improve connectivity between node to Kakinada port which is the VCIC gateway

40. The implementation of various project items will have the following direct benefits:

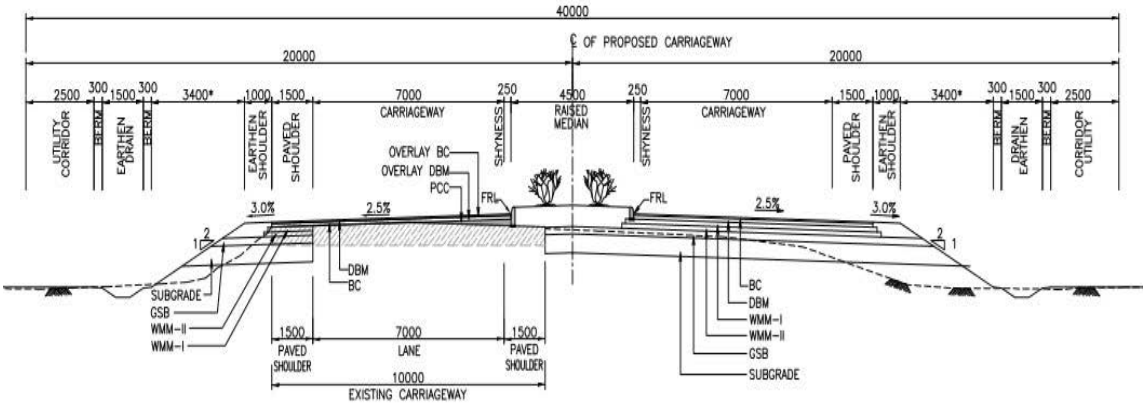
(i) Improved quality of life for the rural population in the project influence area (10 Km radial distance from the Project road): this as a result of better access to markets, health, education and other facilities; and the derived stimulus for local economic activity;
(ii) A more efficient and safe road transport system: through reduced travel times, reduced road accidents, reduced vehicle operating and maintenance costs and reduced transportation costs for goods;
(iii) Intra-state connectivity to Visakhapatnam, Kakinada, Ongole and Nellore districts and also port connectivity to Kakinada port and Krishnapatnam port.

D. Description of the Corridor

41. The existing road is known as ADB Road which connects the Kakinada port and its railway station along with Industrial traffic to National Highway – NH16 (Previously NH-5) at Rajanagaram. The Project road alignment traverses through plain terrain. The road condition is good along with riding quality. The scope of work for this section is on about 29.6 km road section between Samalkot and Rajanagaram. This includes widening of existing carriageway to 4 lane configuration.

42. The typical cross section of road is shown in figure below:

Figure 2: Cross-section of the Road



TYPE 1A : 4 - LANE FOR RURAL AREAS (OVERLAY / ECCENTRIC WIDENING)

E. Proposed Improvement Components

1. Traffic Considerations

43. The appreciation of traffic characteristics is one of most important activity to evaluate the potential of the existing road and identify the major issues to develop various components of the proposed improvement work. The existing single lane configuration has already reached capacity saturation and it is established that the existing road carriageway needs to be widened to effectively manage increased traffic and future traffic load.

2. Proposed Improvements

(i) Widening of road from the existing single to 4 lane configuration over 30.6 km road section between Samalkot and Rajanagaram.

(ii) Horizontal geometry will be based on IRC: 38-1988 “Guidelines for Design of Horizontal Curves for Highways and Design Tables (First Revision)” and vertical geometry will be based on IRC: SP 23-1993. Existing gradients in some sections are steep approaching the limiting values or even more than the exceptional values in some stretches. But due to site constraints only minor easing has been feasible.

(iii) Side drains unlined, lined and lined with cover will be designed for the project road.

(iv) Major junctions at start and end points of both ends are proposed for improvement as per geometrics laid down in IRC: SP: 41-1994 subject to road side structures/features constraints.

(v) Pavement profile will have a 210mm, 250mm, 50mm, and 40mm thicknesses for GSBC, WBM, DBM, and BC, respectively.

(vi) Lay byes/ parking areas and wayside amenities are proposed as these may be required based on present and projected traffic volume considerations. Bus bays and rest areas will be constructed at required locations.

(vii) Road safety measures are proposed as per IRC: SP: 44-1996 like road delineators, signage, metal beam crash barriers (at sharp curves and bridge approaches) and guide posts (to delineate the edge of formation).

F. Cost and Implementation Schedule

44. The project will be implementing in 36 months in one construction package. The estimated civil cost is 123.07crores.

IV. DESCRIPTION OF THE ENVIRONMENT

45. 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

46. **Topography, Geology, and Soil.** Andhra Pradesh is eighth largest state of the country has a geographical area of 1.6 lakh square kilometre (km^2), 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.

47. The proposed project road between Samalkot-Rajanagaram is situated on deltaic plain of south. The soil type in the area is mainly red-clayey soil with sandy loam to clayey loam in texture. Stratigraphically, the project area mainly comprises Archaeans, Lametas, Deccan Trap and Recent formation.

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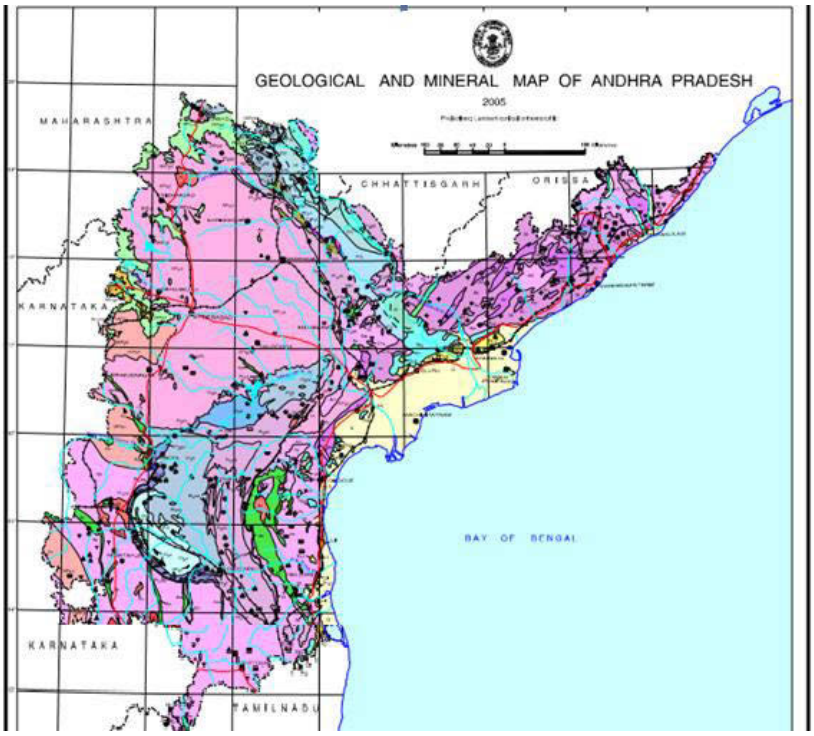
Figure 3: Geological & Mineral Map of Andhra Pradesh



48. **Climate.** 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.

49. 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.

50. 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.

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

(i)	Average Annual Rainfall	-	940 mm
(ii)	Concentration of precipitation	-	July to September
(iii)	Humidity	-	23 to 95 %
(iv)	Cloudiness	-	Heavily clouded in monsoon

(v)	Wind	-	Calm to Moderate	
(vi)	Mean Temperature	-	Summer	20-41^{0}C
			Winter	12-30^{0}C

52. **Water Resources and Water Quality.** 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/m^2 and 4.42 lpm/m/ m^2 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.

53. 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.

54. 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.

55. 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*).

56. **Surface Water**. The subproject road is not passing through a river or a canal. Water bodies found along the road alignments are limited to artificially prepared ponds used for cattle and livestock bathing and washing. However, these are outside the road ROW and and access to these ponds will not be restricted by the road widening. The surface water quality in these ponds is quite varying as these are artificially prepared ponds and the quality varies depending upon different uses such as cattle and livestock bathing and washing. The subproject is not expected to have any impact on these ponds. However, the subproject contractor will be required to map out all existing ponds and include in the detailed design drawings. In the event construction activities will impact any water body, baseline water quality will be obtained and measures as per EMP will be implemented to ensure water quality is not deteriorated due to the

civil works. Table 4 below provides primary water quality standards per Government of India rules and regulations.

Table 4: Guidelines of CPCB on Primary Water Quality[5]

Designated Best Use	Class of Water	Criteria
Drinking water source (with conventional treatment)	A	Total Coliforms MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4 mg/1 or more Biochemical Oxygen Demand (BOD) 5 days 20°C 3 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 50 or less pH between 6.5 to 8.5 Dissolved Oxygen 6 mg/l or more Biochemical Oxygen Demand (BOD) 5 days 20°C 2 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

57. **Air Quality.** Air quality in the subproject alignment is considered to be good. The air quality in and around the proposed substations is better when compared to the main city area due to the absence of industries in and around the area. Primary air quality data for all subproject sites will be gathered and monitored by the contractor during implementation. Table 5 below provides air quality data in the subproject area and standards per Government of India rules and regulations.

Table 5: Ambient Air Quality in the Project Area[6]

S.No	Parameters Location	PM 10 µg/m3	PM 2.5 µg/m3	Sox µg/m3	NOx µg/m3
NAAQS Limit		100	60	80	80
Samarlakota-Rajanagaram road					
1	Samarlakota	60	32	18	25
2	Peddapuram Junction	58	28	16	28
3	Rajjanagaram -High way Junction	62	35	20	30

58. ADB SPS requires that the subproject applies pollution prevention and control technologies and practices consistent with international good practice, as reflected in

[5] Source: Detailed Project Reports Under APRDC for Visakhapatnam-Chennai Industrial Corridor (VCIC) Connectivity Project, Package-I (Samarlakota to Rajanagaram Road)

[6] Source: **Detailed Project Reports Under APRDC for Visakhapatnam-Chennai Industrial Corridor (VCIC) Connectivity Project, Package-I (**Samarlakota **to** Rajanagaram **Road)**

internationally recognized standards such as World Bank Group's EHS Guidelines. Table 6 provides the WHO ambient air quality guidelines.

Table 6: WHO Ambient Air Quality Guidelines

Table 1.1.1: WHO Ambient Air Quality Guidelines[7,8]		
	Averaging Period	Guideline value in µg/m³
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)
Particulate Matter $PM_{2.5}$	1-year 24-hour	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline) 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)

59. **Noise Quality.** Noise pollution is not a problem in the area.. It is expected that noise is neither a major issue in the majority of subproject area nor expected to be a problem except where the project road passes through the settlements, market areas, and junctions at village areas. 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.

60. 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. The subproject road passes through community areas at a couple of points and educational institution (school) which are sensitive receptors where adequate measures will be required for noise protection. Baseline noise level in some of these locations were calculated and are as below:

Table 7: Noise Level in the Project Area[7]

S. No	Parameters Location	Leq - Day in dB (A)	Leq – Night dB (A)
Samarlakota-Rajanagaram road			
1	Samarlakota -Commercial	51.8	40.6
2	Peddapuram Junction -Industrial	66.8	51.4
3	Rajjanagaram -High way Junction	72.6	62.8

61. ADB SPS requires that the subproject applies pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as World Bank Group's EHS Guidelines. Table 8 provides the noise level guidelines.

Table 8: World Bank Group's EHS Noise Level Guidelines

Table 1.7.1- Noise Level Guidelines[54]		
	One Hour L_{Aeq} (dBA)	
Receptor	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational[55]	55	45
Industrial; commercial	70	70

B. Ecological Resources

62. **Vegetation.** 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.

63. Andhra Pradesh is endowed with rich and diverse forest resources. The forest area of the state is 94,689 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.

64. A tree inventory carried out within corridor of impact shows that about 4,251 trees (2,030 on left side and 2,221 on right side in the direction of Samalkot to Rajanagaram) of various species exist within a corridor of 15 m either side of centreline of road. The major species

[7] Source: Detailed Project Reports Under APRDC for Visakhapatnam-Chennai Industrial Corridor (VCIC) Connectivity Project, Package-I (Samarlakota to Rajanagaram Road)

envisaged are Rain tree, locally known as Netraganeru (Botanical name - Samana saman), Palm tree (Caryota urens) and few Blackberry, Mango, Banyan & Worship tree (Peepal).

Table 9: Details of Trees along the Subproject Road

Sr. No.	Chainage (Km)	No. of trees LHS	No. of trees RHS
1	25-26	2	4
2	26-27	7	6
3	27-28	9	1
4	28-29	5	9
5	29-30	5	5
6	30-31	2	2
7	31-32	8	9
8	32-33	54	56
9	33-34	49	44
10	34-35	72	87
11	35-36	103	108
12	36-37	75	113
13	37-38	68	130
14	38-39	36	192
15	39-40	57	48
16	40-41	75	89
17	41-42	75	62
18	42-43	145	151
19	43-44	111	107
20	44-45	125	112
21	45-46	117	99
22	46-47	57	122
23	47-48	66	109
24	48-49	114	105
25	49-50	102	123
26	50-51	77	49
27	51-52	63	58
28	52-53	103	38
29	53-54	93	64
30	54-55	69	51
31	55-56	86	68
	Total	2030	2221

65. **Wildlife and Protected Area Network.** The varied diversity of fauna includes tigers, panthers, hyenas, black bucks, cheetals, sambars, and sea turtles. The dense forests in mountains offers habitat to the wildlife. There are designated areas as wildlife sanctuaries and national parks. Kambalakonda Wildlife Sanctuary is situated on NH 5, surrounded by the Eastern Ghats on three sides and the Bay of Bengal on the fourth. It houses Indira Gandhi Zoological Park. The park has almost eighty species with primates, carnivores, mammals, ungulates, reptiles and birds. These includes Rhesus monkeys, Baboons, panthers, tigers, wolves, hyenas, pythons, tortoises, monitor lizards, elephant, bison, sambar deer, peacocks, ducks and macaws. Papikonda Wildlife Sanctuary is located in East Godavari, West Godavari in an area of 591 km^2 (228 square miles). Fauna found in this sanctuary are tigers, panthers, gaur,

cheetal, chowsingha, sambar, black buck, mouse deer, barking deer, sloth Bears, wild ogs, hyenas, jackals, wild boar, marsh crocodiles and a variety of birds. Coringa Wildlife Sanctuary is located in East Godavari district in an area of 235.70 km^2 (91.00 square miles). It has the rare, endangered smooth Indian otter, fishing cat and estuarine crocodile. Other fauna are jackals, marine turtles, seagulls, storks, ducks and flamingos. Krishna Wildlife Sanctuary is a wildlife sanctuary and estuary located in Krishna district of Andhra Pradesh. The sanctuary is home for reptiles like the garden lizard, the wall lizard, tortoises and snakes. Rollapadu Wildlife Sanctuary is a wildlife sanctuary located in Kurnool district of Andhra Pradesh in an area 6.14 km^2 (2.37 sq mi). It is the only habitat in the state for the rare and highly endangered great Indian bustard. The black buck, wolf, jackal, bonnet monkey, Russell viper and cobra are also found. Sri Penusula Narasimha Wildlife Sanctuary is located in Nellore District of Andhra Pradesh. It covers an area of 1030.85 km^2 is managed by the Andhra Pradesh Forest Department. Gundla Brahmeswara Wildlife Sanctuary is located in Kurnool and Prakasam Districts of Andhra Pradesh. It covers an area of 1194 km^2 is managed by the Andhra Pradesh Forest Department. Sri Lankamalleshwara Wildlife Sanctuary is located in Kadapa District of Andhra Pradesh. It covers an area of 464.42 km^2 is managed by the Andhra Pradesh Forest Department.

66. Andhra Pradesh also has a number of bird sanctuaries. Atapaka Bird Sanctuary, also known as Kolleru Wildlife Sanctuary, is a largest freshwater lake located in West Godavari district of Andhra Pradesh. The sanctuary falls under Kaikalur Forest Range. It is one of the Ramsar convention wetland sites, spread over an area of 308.55 km^2 (119.13 sq mi). Telineelapuram and Telukunchi Bird Sanctuaries are located in Srikakulam district of Andhra Pradesh. Every year, over 3,000 pelicans and painted storks visit from Siberia to these villages during September and stay until March. Pulicat Lake Bird Sanctuary is a famous 481 km^2 Protected area in Nellore District of Andhra Pradesh state. Pulicat Lake is the second largest brackish-water ecosystem in India. Central location is: 13°34′N 80°12′E. 327.33 km^2 is managed by the Andhra Pradesh Forest Department and 153.67 km^2 is managed by the Tamil Nadu Forest Department. 108 km^2 is national park area. Rainfall ranges from 800 to 2000 mm. Temperature varies from 14 °C to 33 °C. Altitude ranges from 100’ MSL to 1200’ MSL.

67. While the biodiversity of the state of Andhra Pradesh is very rich, it is not expected to get impacted due to the subproject activities as the project road does not pass through the forest area and wildlife/protected area network.

68. **Land Resources.** East Godavari district occupies an area of 10,807 square kilometres. The small enclave (30 km^2) of the Yanam district of Puducherry state lies within this district. East Godavari is famous for agriculture because of fertile lands which are adequately irrigated throughout the year. It is the most prosperous district in the state and is the one of richest district in the country. It is a potential hinterland for oil and natural gas reserves in the country as many areas are identified as richest sources for oil and Natural gas in Godavari basin. Land use pattern along the project road is also mixed type dominated by agriculture followed by small/medium scale industries.

Table 10: Chainage wise Land use pattern along project road

Chainage		Existing Land use	Remark
From	To		
25	26	Settlements/ small scale industries/Agriculture fields	Rural area
26	27	Agriculture fields	
27	28	APIIC Industrial Park/Agricultural fields/Orchard	Industrial area
28	29	Orchard/vacant fields	Rural area
29	30	Orchard/Vacant plots	

Chainage		Existing Land use	Remark
From	To		
30	31	Agriculture fields	
31	32	Small scale industries/ agriculture fields	
32	33	HP Petrol pump RHS, IOCL petrol bunk LHS	
33	34	Peddapuram junction, Agricultural fields	
34	35	Rice mill RHS, Agricultural fields	
35	36	Agriculture fields	
36	37	Poultry farms, cultivable lands	
37	38	Vacant plots/agriculture fields	
38	39	Ramesampeta settlement and agriculture fields	
39	40	Agricultural fields along with vacant land	
40	41	Poultryfarm/ agriculture fields	
41	42	Godown RHS and agricultural fields LHS	
42	43	St. Mary's College of Pharmaceutical & Research LHS/agriculture fields	
43	44	Agricultural fields	
44	45	Aditya Engineering college bus stop/agriculture fields	
45	46	Agricultural fields	
46	47	Pragati Engineering college LHS/agriculture fields	
47	48	Settlement/Pond LHS and vacant lands	
48	49	Small scale industries RHS/Agriculture fields	
49	50	AFAL Brick Unit LHS/Settlement/Agriculture fields	
50	51	Big irrigation pond RHS/Agriculture fields	
51	52	Visakha Dairy LHS, Big irrigation pond RHS, Rangampeta settlements	
52	53	Sakshi paper Industry, SRKT warehouse RHS	
53	54	Agricultural fields	
54	55	Agriculture fields/settlements/Few roadside shops	
55	56	Government School RHS, roadside shops, Junction with NH-5	

69. **Agriculture and Forestry.** East Godavari district is situated in Krishna-Godavari Agro Climatic Zone, it is one of the agriculturally potential district of Andhra Pradesh, contributing 10% of total food production of state. The major crop grown is paddy which is cultivated in both Rabi & Kharif season. The other crops are maize grown in both Kharif & Rabi season followed by sugarcane, jowar, pulses and oil seeds.

70. The forests in Kakinada division shows considerable variation starting from the rich and well stocked forests in the agency area to various types of deciduous forests occurring on hills, hill ranges and all over the upland areas and denuded forests in the plains, which tend towards thorny scrub type. The East Godavari district bears with consistent variety of soils and climate. Approximately 56 % of the total growing stock of Kakinada division extending over an area of 180,497.245 ha is mixed forest.

Figure 4: Forest Map of Andhra Pradesh

71. **Fisheries.** The East Godavari district has potential for marine fisheries due to harbour at Kakinada. There are 153 primary fisherman Co-operative society with 51 ice-plants, 6 freezing plants and 6 cold-storage facilities.

C. Economic Development

72. The major industries of the East Godavari district are fertiliser, agro-products, edible oil-refineries & bio-fuel plants, Information technology. The Kakinada is known as 'Fertiliser city' of Andhra Pradesh with Nagarjuna fertiliser & Godavari fertiliser as two major groups. The agro-products like coconuts are exported by various companies, sugar refineries and various edible oil refineries & biofuel plants in Vakalapudi Industrial park exists. Further, it is considered as Tier-II city as far as Information technology is concerned due to educated work-force.

73. **Tourism.** Kakinada is noted for its temples, beaches, mangrove forests and the Godavari delta. Attractions include Sri Srungara Vallaba Temple, Annavaram Satyanarayana Swamy Temple, Pithapurm Sri Dattatreya temple, famous Shakti Peeth Purukitha Devi. This Shakti peetha forms an integral part of Shiva temple, the Kukkuteshwara Swami

temple, Draksharama Shiva Temple, Samalkot Shiva Temple, Sri Bhimeswaraswamy Vari Temple, Sri Chalukya Kumararama Temple, one of the five a National Heritage site which is 10 kilometres away in Samalkota, Shri Bhavanarayana Swamy Temple (Sun God), Coringa Wildlife Sanctuary, part of the Godavari delta, hope island, a sandspit formed by the Godavari, Konaseema, scenic Godavari delta islands. Uppada beach is considered as Kakinada beach which is having one of the longest coastlines in Indian beaches.

74. **Transportation.** Roadways : Kakinada is connected by road to the rest of the state and India. NH-214 from Kathipudi to Ongole (both on NH-5) passes through the city, and state highways connect it to Rajahmundry and other towns in the district.
Railways: Kakinada Port is a terminal station. The city has two main stations namely, Kakinada Town and Kakinada Port. The city is connected to the Howrah-Chennai main line at Samalkot.
Seaways: Kakinada Port is located on the shore of Bay of Bengal. It is one of the intermediate ports in the state.

75. **Mineral Resources.** The Krishna Godavari Basin is considered the largest natural-gas basin in India. Significant discoveries of oil and natural gas were made by Oil and Natural Gas Corporation (ONGC), Gujarat State Petroleum Corporation and Reliance, which has been extracting gas from its KG D6 block off the Kakinada coast. Reliance has an onshore terminal in Gadimoga, about 25 kilometres from Kakinada, to process and distribute gas to other parts of the country.

76. **Energy and Electric Power Potential.** There are several power plants in and around Kakinada. Spectrum Power Generation has a 208-MW plant, and was one of the first Independent Power Producers in the country. The company is planning to expand the capacity to 1350 MW in phases. Tenders for a 350-MW expansion have been requested. A 220-MW power station (being expanded to 2400 MW) owned by Reliance Energy and a 464-MW combined-cycle power plant by GVK Group are in operation at Samalkota (Kakinada Rural). These plants supply electricity to the state's transmission utility, AP Transco, under a power purchase agreement.

D. Social and Cultural Resources

77. Kakinada Beach Festival (**Sagara Sambaralu)** is a music festival held in Kakinada. It was declared as an annual festival by the government of Andhra Pradesh. It is a three-day event where many artists perform. East Godavari is noted for its traditional Andhra cuisine, pickles made from mangoes, vegetables (e.g.cauliflower), chicken, shrimp, mutton and fish. Kakinada is known for *Kakinada Kaaja*, a sweet made from maida flour and dipped in a sugar syrup.

78. There is only one ASI protected monument known as Kumar Bheemeshwara Swami temple, approx. 1.5 Km from the project road. Further, there are few religious structures i.e. temples located within corridor of project. Table 11 shows the locations of religious properties along the project road.

79. Various physical features along the project road are described in Table 11 below.

Table 11: Physical Features along the Subproject road

Location / Chainage (Km)	Features
25-26	Samalkot small scale industries after RoB portion
26-27	Small scale industries LHS, Agriculture fields RHS
27-28	APIIC Industrial Park LHS, Agricultural fields RHS
28-29	RAK ceramics LHS, cluster of roadside trees
29-30	Samalkot power station LHS, Vacant plots RHS
30-31	Cluster of trees on both sides
31-32	A.P Transco Jn. Cluster of trees
32-33	HP Petrol pump RHS, IOCL petrol bunk LHS
33-34	Peddapuram junction, Agricultural fields
34-35	Rice mill RHS, Agricultural fields
35-36	Cluster of trees on both sides
36-37	Poultry farms LHS, cultivable lands RHS
37-38	Coconut grooves felled & converted to new pond LHS
38-39	Ramesampeta settlement and roadside shops
39-40	Agricultural fields with vacant land
40-41	Poultryfarm LHS & vacant plots RHS
41-42	Godown RHS and agricultural fields LHS
42-43	St. Mary's College of Pharmaceutical & Research LHS
43-44	Agricultural fields both sides
44-45	Aditya Engineering college bus stop RHS
45-46	Agricultural fields
46-47	Pragati Engineering college LHS
47-48	Pond LHS and vacant land, Ganesha temple LHS
48-49	Small scale industries RHS
49-50	AFAL Brick Unit LHS
50-51	Big irrigation pond RHS, Goddess Durga temple LHS
51-52	Visakha Dairy LHS, Big irrigation pond RHS, Rangampeta settlements
52-53	Sakshi paper Industry, SRKT warehouse RHS, Goddess Laxmi temple LHS
53-54	Cluster of trees both sides, Agricultural fields, Lord Rama temple LHS
54-55	Few roadside shops, Rajanagaram bypass road
55-56	Government School RHS, roadside shops, Junction with NH-5, Panchmukhanjaneya Swami temple RHS

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND ITS MITIGATION MEASURES

80. Road improvement projects are likely to bring several changes in the local environment both beneficial and adverse. Scoping process was undertaken to identify potentially significant impacts for the proposed subproject road. Potential impacts in absence of additional mitigation measures were also identified. There were no potentially significant impacts requiring further assessment identified for the subproject.

81. 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

82. The immediate benefits of road construction and improvement will come in the form of direct employment opportunities during construction for the roadside communities specially those engaged as wage laborers and petty contractors and suppliers of raw materials.

83. Improvement of the Rajanagaram - Samarlkota section to four-lane configuration will result in connectivity to the National Highway, Smooth flow of traffic to benefit different stakeholders (e.g. Educational Institutional buses - where more than 200 buses travel each day up& down from Rajahmundry and kakainda towns), reduction in travel time and lower vehicle operating cost i.e. per kilometre vehicle operating cost from the general improvement work and an absolute saving in cost due to reduction in fuel consumption for the existing traffic. Improved access and reduced travel times and costs will be major stimuli to economic growth, particularly in semi-urban and rural areas. The better access of agricultural goods to market will be particularly important and a major contributor to poverty reduction.

84. Increased labour mobility will also occur. There is also the likelihood of the relocation of homes and businesses to new road-side locations.

85. The long-term effects of these roads on poverty reduction are, consequently, expected to be significantly positive.

86. During operation stage, road-side economic activities supporting transport like gasoline stations, automotive repair shops, lodging, and restaurants will increase due to increased number of vehicles. Increase in agro-industrial activities is also expected to take advantage of improved access to urban centers where there are higher demands and better prices for agricultural products.

B. Negative Impacts

87. Road maintenance, repair and new construction will continue to cause large demands for construction materials. Some of the major impacts arising from the road improvement projects like borrowing and quarrying will be minimal since as all aggregates will be procured from existing licensed quarries. No alteration in surface water hydrology is expected.

88. Loss of trees due to cutting along formation width (15.0 m) of the road will be there. Measures for checking soil erosion, run-off from road and the re-channelization of existing drainage will be undertaken.

89. Road safety will be an important aspect to manage as the flow of traffic and speed of traffic both will increase after the subproject implementation. Mitigation measures in terms of Road Safety assessment and actions will be planned and implemented.

90. All other impacts are temporary and localized in nature limited to construction period. The following subsections describes anticipated impacts and its mitigation measures on all aspects of physical, ecological and socio-cultural environment during construction and operation stage of the projects.

C. Pre-construction Impacts

91. Subproject road is not located in any eco-sensitive areas. There is no major bottleneck along the subproject road requiring realignment/bypasses. Proposed widening will follow the existing alignment. As a result, minimal acquisition of any agricultural land is required. Impact on private and community structure is also reduced. Road and alignment design has considered all major preconstruction impacts and taken avoidance measures at an early stage of planning to have minimal impact due to relocation.

(i) **Alignment**: Final alignment has been determined to avoid / minimize land acquisition, impact on structures, impact on water bodies, archaeological/cultural sites, interference with water sources, shifting of existing utilities etc.

(ii) **Water bodies:** construction of culverts and bridges during lean flow period. If technically not feasible toe walls/retaining walls will be installed. Aggregate will be procured from existing licensed quarries.

(iii) **Tree Cutting:** restrict tree cutting to formation width. To the extent possible, road has been aligned on other side of dense vegetation/mature trees.

(iv) **Construction material Sourcing:** Borrow areas have been identified at non-agricultural land. Quarrying is not proposed as material will be sourced from licensed quarries.

(v) **Dust and air pollution:** No new borrow areas/quarry sites to be opened for the project. Aggregates will be sourced from existing licensed quarries. Waste disposal sites and asphalt mixing sites have been sited away from habited areas.

(vi) **Noise and Vibration:** Time regulation for construction near sensitive receptors and residential areas. No crusher operation near these locations.

(vii) **Soil Erosion, Cut and fill:** The design attempted to equalize cut and fill. Adequate erosion control measures included in design.

(viii) **Construction Camp and Waste Disposal:** No such facility is sited near any water bodies, forest area, and settlements.

(ix) **Natural Hazards:** The project area is not located in a high seismic zone or high risk zone from natural hazards perspective.

92. The detailed engineering design shall identify areas prone to erosion and include land stabilization as part of the design. The detail engineering studies and construction activities will strictly enforce the environmental conditions put as part of the Environmental clearance and Consent conditions from the SPCB. The improvement of road will be done by adopting Environmental Friendly Road Construction (EFRC) methods.

D. Construction Stage Impacts

93. **Climate and Air Quality.** The potential sources of air emission during the construction phase of the project are: (i) earth works during site preparation; (ii) operation of equipment, machines and vehicles; (iii) transport of construction materials; and (v) combustion of hydrocarbons particularly from the hot mix plants and process of heating bitumen. Most of the emissions will be in the form of coarse particulate matter which will settle down in close vicinity of construction site.

Table 12: Impact on Air Quality during Construction Stage

	Impact	Source
1	Generation of Dust (SPM)	• Transportation and tipping of cut material - while the former will occur over the entire stretch between the cutting location and disposal site, the latter is more location specific and more intense;

	Impact	Source
		• Transportation of raw materials from quarries and borrow sites; • Stone crushing, handling and storage of aggregates in asphalt plants; • Site levelling, clearing of trees, materials loading/unloading at construction site, construction of bridges; • Concrete batching plants; • Hot mix plants – due to the mixing of aggregates with bitumen; and • Construction of structures and allied activities
2	Generation of polluting gases including SO2, NOx and HC	• Hot mix plants; • Large construction equipment, trucks and asphalt producing and paving equipment; • The movement of heavy machinery, oil tankers etc. on steep slopes will cause much higher emissions of gases; • Toxic gases released through the heating process during bitumen production; and • Inadequate vehicle maintenance and the use of adulterated fuel in vehicles.

94. The stone aggregate will be sourced from licensed quarries. No new quarries shall be open for the project. The pollution related aspects to these quarries are independently complied by the quarry owners. The aggregate will be transported in the tarpaulin covered trucks.

Mitigation Measures

(i) Vehicles delivering loose and fine materials shall be covered.
(ii) Loading and unloading of construction materials in covered area or provisions of water fogging around these locations.
(iii) Storage areas should be located downwind of the habitation area. (iv) Water shall be sprayed on earthworks periodically
(iv) Regular maintenance of machinery and equipment. Vehicular pollution check shall be made mandatory.
(v) Hot mix plants should be located at least 1.5 km from the nearest habitation, school, hospital, archaeological site, forest, rivers, streams and lakes, 500 m from ponds, and national highway, 250 m from state highway, unless otherwise required by statutory requirements after securing a No-Objection Certificate (NOC) from the SPCB. Hot mix plant shall be fitted with stack of adequate height as may be prescribed by APPCB to ensure enough dispersion of exit gases.
(vi) Bitumen emulsion and bitumen heaters should be used to extent feasible.
(vii) Only crushers licensed by APPCB shall be used.
(viii) LPG should be used as fuel source in construction camps instead of wood.
(ix) Regular water sprinkling of unpaved haulage roads2.
(x) Mask and other PPE shall be provided to the construction workers
(xi) Diesel Generating (DG) sets shall be fitted with adequate height as per regulations (Height of stack = height of the building + 0.2 √ KVA. Low sulphur diesel shall be used in DG sets as well as machineries.
(xii) Contractor should submit a dust suppression and control program to the APRDC prior to construction.

95. **Noise and Vibration.** Noise level may increase temporarily in the close vicinity of construction activities, maintenance workshops, and earthwork site. These construction

activities are expected to produce noise levels in the range of 80 – 95 dB(A) (at a distance of about 5 m from the source).

Table 13: Typical noise levels of principal construction equipment

(Noise Level in db (A) at 50 Feet)

Construction Equipments		**Construction Equipments**	
Bulldozer	80	Crane	75-77
Front end loader	72-84	Welding generator	71-82
Jack hammer	81-98	Concrete mixer	74-88
Crane with ball	75-87	Concrete pump	81-84
		Concrete vibrator	76
Excavation and Earth Moving		Air compressor	74-87
Bulldozer	80	Pneumatic tools	81-98
Backhoe	72-93	Bulldozer	80
Front end loader	72-84	Cement and dump trucks	83-94
Dump truck	83-94	Front end loader	72-84
Jack hammer	81-98	Dump truck	83-94
Scraper	80-93	Paver	86-88
Grading and Compaction		Landscaping and clean-up	
Grader	80-93	Bulldozer	80
Roller	73-75	Backhoe	72-93
		Truck	83-94
Paving		Front and end loader	72-84
Paver	86-88	Dump truck	83-94
Truck	83-94	Paver	86-88
Tamper	74-77	Dump truck	83-94

Source: U.S. Environmental Protection Agency, noise from Construction Equipment and Operations. Building Equipment and Home Appliance. NJID. 300.1 (December 31, 1971)

96. Although this level of noise is higher the permissible limit for ambient noise level for residential/commercial levels but will occur only intermittently and temporary. This noise level will attenuate fast with increase in distance from noise source. Although there are a number of noise sensitive locations **(Appendix 6)** especially households, shops and village schools close to the alignment, installation of solid noise barrier is not recommended.

Mitigation Measures

97. Water suppression of fugitive dust can reduce emissions.

(i) The Contractor shall adequately compensate in a timely manner for any damage to property/services and life caused by activities.

(ii) All equipment shall be timely serviced and properly maintained to minimize its operational noise. Noise level will be one of the considerations in equipment selection which will favour lower sound power levels. Construction equipment and machinery shall be fitted with silencers and maintained properly.

(iii) Stationary noise making equipment shall be placed along un-inhabited stretches.

(iv) Timing of noisy construction activities shall be regulated near sensitive receptors. Maximum construction activities shall be undertaken during night time and weekends when there are minimal activities by the sensitive receptor, concurrent noisy operations may be separated to reduce the total noise generated, and if possible re-route traffic during construction to avoid the accumulation of noise beyond standards.

(v) If the above mentioned schemes prove to be inadequate, the provision of temporary noise barrier shall be made near identified sensitive locations or near the noise source during construction.
(vi) Protection devices (ear plugs or ear muffs) shall be provided to the workers operating in the vicinity of high noise generating machines.
(vii) Noise measurements should be carried out to ensure the effectiveness of mitigation measures.
(viii) Develop a mechanism to record and respond to complaints on noise

98. Impact on Land and Soil - Topography and Aesthetics: Activities like clearing of vegetation, waste/debris disposal, and establishment of labor camps may change the topography and appearance of the landscape.

Mitigation Measures

(i) Cut materials should be used to widen the road or disposed in an environmentally acceptable manner.
(ii) Cut slopes should be re-vegetated immediately after widening activities
(iii) Borrow areas, if required should be rehabilitated and brought back as far as possible to their previous appearance. Some borrows shall be converted into ponds to compensate loss of water bodies. This will also enhance the local aesthetics
(iv) Cut off material should be used to widen the road or disposed of at proper disposal sites
(v) Provision and allocation of proper waste disposal bins and sites are required. Supply of cooking gas should be provided by the contractor to eliminate the use of fire wood.

99. **Loss of Productive Soil and Change in Land use:** Road widening and improvement is limited to available ROW and encroachment on agricultural land is expected to be minimal. Following set of mitigation measures will be implemented with regards to conversion of agricultural lands:

Mitigation Measures

(i) The top soil from the productive land shall be preserved and reused for plantation purposes. It shall also be used as top cover of embankment slope for growing vegetation to protect soil erosion.
(ii) Ensured that the land taken on lease for access road, borrow areas, construction camp is restored back to its original land use.

100. **Soil Erosion/Silt Runoff:** Soil erosion may take place near cutting areas, at steep and un-compacted embankment slope, and wherever vegetation is cleared. Accumulated eroded soil will result to siltation, embankment damage, and drainage problem. Loss of soil due to run off from earth stock-piles may also lead to siltation.

Mitigation Measures

(i) Bank protection measures shall be taken at erosion prone areas.
(ii) Provision of side drain to guide the water to natural outfalls.
(iii) Retaining walls with parapets and breast walls have been included in the design to check erosion.
(iv) When soil is spread on slopes for permanent disposal, it shall be buttressed at the toe by retaining walls.

(v) Side slopes of the embankment shall not be steeper than 2H: 1V. Turfing of embankment slopes shall be done along the stretch.

(vi) IRC: 56 -1974 recommended practice for treatment of embankment slopes for erosion control shall be taken into consideration.

101. **Borrow Areas and Quarries:** Need for opening borrows areas and quarries are not anticipated. However, if requirement emerged, it may cause some adverse impacts if left un-rehabilitated. It may pose risk to people, particularly children and animals of accidentally falling into it as well as become potential breeding ground for mosquitoes and vector born disease. Illegal quarrying may lead to unstable soil condition; destroy the landscape of the terrain, air and noise pollution. Opening of new quarries is not envisaged due to the proposed subproject. Quarry material will be sourced from existing licensed quarries[8]. The dredging and use of dredged material, if involved, may have its impact in terms of localized sedimentation level increase and dispersion of pollutants present in the dredged material in the river water.

Mitigation Measures

(i) Borrow areas if required, shall not be located near forest areas. The edges of borrow sites shall be no closer than 3 meters from any fence line or boundary. Adequate clearance shall be provided for the construction of catch drains. Borrow sites shall have adequate drainage outlets unless the relevant landowner has agreed that the borrow area is to create a permanent tank or dam. Cut batter slopes shall not be steeper than 3 to 1 and shall be left by the Contractor in a tidy and safe condition to the satisfaction of the Engineer. Written clearance from the land owner/village head shall be obtained before leaving a site.

(ii) Obtain statutory approval from competent authority as detailed in chapter II (recent policy initiatives on mining of minor mineral)

(iii) Borrow pits shall be selected from barren land/wasteland to the extent possible. Borrow areas should not be located on cultivable lands except in the situations where land owners desires to level the land. The top soil shall be preserved and depth shall be restricted to the desired level.

(iv) Borrow areas should be excavated as per the intended end use by the owner. The Indian Road Congress (IRC):10-1961 guideline should be used for selection of borrow pits and amount that can be borrowed.

(v) The dredged material from the river bank shall be tested for presence of heavy metals and other pollutants before its reuse.

(vi) The depths in borrow pits to be regulated so that the sides shall not be steeper than 25%, to the extent possible, borrow areas shall be sited away from habited areas. Borrow areas shall be levelled with salvaged material or other filling materials which do not pose contamination of soil. (vii) Monitoring of rehabilitation plan of borrow areas.

102. **Compaction and Contamination of Soil**: Compaction of haulage roads and construction camp area due to movement of construction vehicles, machineries and equipment, and due to sitting of construction camps and workshops. Soil may get contaminated due to inappropriate disposal of liquid waste (lubricating oil and fuel spills, waste oil and lubricant and vehicle/equipment washing effluent) and solid waste (fuel filters, oily rags) likely to be generated from repair and maintenance of transport vehicles, construction equipment and machinery.

[8] List of existing Borrow areas close to subproject location is provided in Appendix 4

103. Soil may also get contaminated due to inappropriate disposal of domestic solid waste and sewage from construction camps. Sub soil contamination may also be attributed to: scarified bitumen wastes, operation of the emulsion sprayer and laying of hot mix, storage and stock yards of bitumen and emulsion, excess production of hot mix and rejected materials

Mitigation Measures

(i) Fuel and lubricants shall be stored at the predefined storage location. The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils.
(ii) Unavoidable waste shall be stored at the designated place prior to disposal. To avoid soil contamination at the wash-down and re-fuelling areas, “oil interceptors” shall be provided. Oil and grease spill and oil soaked materials are to be collected and stored in labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed) and sold off to APPCB/ MoEF authorized refiners.
(iii) Movement of construction vehicles, machinery and equipment shall be restricted to the designated haulage route.
(iv) Approach roads shall be designed along the barren and hard soil area to reduce the compaction induced impact on soil.
(v) The productive land shall be reclaimed after construction activity.
(vi) Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp.
(vii) Domestic solid waste at construction camp shall be segregated into biodegradable and non-biodegradable waste. Non-biodegradable and non-saleable waste shall be disposed of to an authorized land fill site. If land fill site not available then burial of the waste in a secured manner shall be ensured.

104. **Surface Water Resources - Siltation and Deterioration in Surface Water Quality:** The temporary pollution of water bodies from spillage of chemicals and oil at construction sites and waste from construction camps may occur. Accidental oil and chemicals spills can contaminate the ponds close to alignment.

Mitigation Measure

(i) Construction works near waterways/water bodies shall not be undertaken during the monsoon season
(ii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
(iii) No construction camp within 500m of any water body
(iv) Locate all parking, repair, and fuel and hazardous material storage area away from any water body. Vehicle parking and maintenance areas shall have waterproof floors from which drainage is collected and treated to legal standards.
(v) Refuel vehicles only in dedicated areas with waterproof floors from which drainage flows to an oil/water separator before discharge
(vi) Collect all waste oil, store in sealed damage-proof containers and dispose it to recyclers.
(vii) All equipment operators, drivers, and warehouse personnel will be trained in immediate response for spill containment and eventual cleanup.
(viii) temporary retention ponds, interception drains, and silt traps are installed to prevent silt laden water from entering adjacent water bodies/waterways;
(ix) The slopes of embankments leading to water bodies should be modified and re-channelized to prevent entry of contaminants.

105. **Alteration of Surface Water Hydrology/Drainage:** Diversion of rivers and major streams construction is not envisaged**.** Reconstruction/new construction of culverts will be done during lean flow period. Diversion of some nallahs may be required for a very short period and their courses will be maintained as soon as construction is completed.

106. **Groundwater:** Water for construction purpose will be sourced mainly through river sources. Suitable arrangement for drinking water in the campsite will be managed by contractor without affecting availability to local community. The area is not classified as critical semi-critical or overexploited by CGWB. However, uncontrolled abstraction can deteriorate the situation. Contamination of groundwater is not envisaged since construction camps, if any will have septic tanks or mobile toilets depending on the number of workers in the camp**.**

Mitigation Measures

(i) Requisite permission shall be obtained for abstraction of groundwater.
(ii) The contractor shall make arrangements for water required for construction in such a way that the water availability and supply to nearby communities remain unaffected.

107. **Impact due to Construction Debris/Waste.** Debris can be generated by dismantling of pavement. Quarry dust and unused iron bars or damaged support structures constitute significant wastes. Mitigation for solid waste from construction camp has been given in construction camp section.

Mitigation measures

(i) The existing bitumen surface can be utilized for paving of cross roads, access roads, and paving works in construction sites and camps, temporary traffic diversions, haulage routes etc.
(ii) All excavated materials from roadway, shoulders, verges, drains, cross drainage and the like will be the property of the APRDC and will be used for backfilling embankments, filling pits, and landscaping.
(iii) Unusable debris material should be suitably disposed at pre-designated disposal locations, with approval of the concerned authority. The bituminous wastes shall be disposed in secure landfill sites only in environmentally accepted manner.
(iv) Unusable and surplus materials, as determined by the Project Engineer, will be removed and disposed off-site.

108. Following consideration shall be made during selection of dumping sites.

(i) 1.5 km from habitation and forest areas and 500 m from ponds.
(ii) Dumping sites do not contaminate any water sources, rivers etc, and
(iii) Public consent from the village council has to be obtained before finalizing the location.
(iv) Form works will be re-used to the extent possible, more than 20 times as dictated by good practice. All stripped formworks will be examined for any damage and rectified in the workshop for re-use.

109. **Ecological Resources - Terrestrial:** There are no national parks, wildlife sanctuaries or any other similar eco-sensitive areas in the subproject location. No wildlife movement was reported/observed. Subproject road is a part of an existing state highway and passes through local villages and commercial areas over its length of 30 km. No diversion of forest land is required. The land next to the ROW stretches is owned by private individuals and about 4000 trees are likely to be affected.

110. **Impacts due to Construction Camp and Immigration of Workers:** Poor siting and improper management of construction camp may lead to several adverse impacts on environment viz: (i) loss of vegetation due to use of wood as fuel for cooking; (ii) deterioration in nearby surface water quality; (iii) compaction and contamination of soil due to uncontrolled disposal of solid waste; and (iv) poor sanitation may result to transmission of communicable diseases among the workers and the host communities to include sexually transmitted disease, diseases from improper handling and supply of foodstuffs, poor water supply, insect-borne diseases, and alcoholic and drug.

Mitigation measures

(i) No productive land will be utilized for construction camp. All sites must be graded, ditched, and rendered free from depressions to avoid water stagnation. Accommodation and ancillary facilities including recreational facility for workers shall be erected and maintained to standards and scales approved by the resident engineer. All camps should maintain minimum distance of 500 m from habitation and water bodies.

(ii) All construction camps shall be provided sanitary toilet with provision of septic tanks attached with soak pits. Storm water drains shall be provided for the flow of used water outside the camp. Drains and ditches shall be treated with bleaching powder on a regular basis. Garbage bins must be provided in the camp and regularly emptied and disposed of in a hygienic manner. LPG cylinders shall be provided as fuel source for cooking to avoid any tree cutting.

(iii) At every workplace, the Contactor will ensure that a readily available first-aid unit. Workplaces away from regular hospitals shall have indoor health units. Suitable transport shall be provided to approach the nearest hospital. At every workplace an ambulance containing the prescribed equipment and nursing staff shall be provided.

(iv) The Contractor will ensure the good health and hygiene of all workers to prevent sickness and epidemics. These include the HIV/AIDS prevention program to reduce the risk and transfer of HIV virus. Activities under the program include monthly information, education, and communication campaigns to workers, drivers, delivery crew, and communities on the risk.

(v) The Contractor will provide adequate and safe water supply for the use of the workers. The Contractor will ensure that all precautions to protect the workers from insect and pest to reduce the risk to health. This includes the use of insecticides which should comply with local regulations. No alcoholic liquor or prohibited drugs will be imported to, sell, give, and barter to the workers of host community.

(vi) Migrant workers may be the potential carriers of various diseases. Local community may get exposed to the diseases carried by migrant workers. Regular health check-up and immunization camps shall also be organized for the workers and nearby population.

111. **Safety of Construction Workers and Accident Risk to Local Community:** The following safety aspects: (i) safety of construction workers, (ii) safety of road users including pedestrians and cyclists, (iii) safety to cattle, (iv) safety of local community, (iv) unsafe/ hazardous traffic conditions due to construction vehicle movement need to be considered during design and construction stage, and (v) conduct of safety audit. Impact and mitigations due to blasting operation as already been detailed in Noise and Vibration section.

112. Requirement of underpasses for cattle is not envisaged as movement of the cattle will be alongside the road for accessing any water pond or grazing area, which is the present practice.

Water ponds are available for livestock drinking along both sides of the road and the subproject will not impact any restriction on the movement of local community and livestock.

113. Pedestrian crossings, shelter area and level crossings will be incorporated along the road and finalized during the detailed design. This will be based on the result of the traffic study that is being conducted for estimating the traffic flows and estimated traffic volumes over time once the subproject is completed.

Mitigation measures

(i) During the construction phase, contractors shall be required to adopt and maintain safe working practices. Internationally accepted and widely used safety procedures should be followed during (i) road works (ii) handling of large construction equipment and machineries, (iii) handling of chemicals and hazardous materials and inflammable substances (iii) welding (iv) electrical works etc.

(ii) Contractor shall arrange all PPEs for workers, first aid and firefighting equipment at construction sites. An emergency plan shall be prepared duly approved by engineer in charge to respond to any instance of safety hazard.

(iii) To avoid disruption of the existing traffic due to construction activities, comprehensive traffic management plan shall be drawn up by the concessionaire. Traffic in construction zones shall be managed as per the provisions of IRC SP 55.

(iv) After construction is completed in a particular zone, it shall be opened for normal operation. All diversions/access roads should be closed before start of normal operation.

(v) Use of retro-reflectorized traffic signs, and cantilever/gantry type overhead signs, thermoplastic road marking paints, delineators, traffic cones, empty bitumen drums, barricades, and flagmen will be used to ensure traffic management and safety. Conduct of regular safety audit on safety measures adopted during construction. The audit will cover manpower and their safety, machinery, temporary works, equipment and vehicles, materials storage and handling, construction procedures, environment, site safety guidelines, and miscellaneous services.

114. **Obstruction and Disruption of Traffic:** Disruption of access to infrastructure or social resource due to construction activity will cause nuisance and to a certain extent additional cost to the public in terms of longer travel period due to diversion or heavier traffic. It will also pose risk of accident to motorist at night if these blockages and disruption are not clearly demarcated.

Mitigation Measures

(i) The contractor will submit a Traffic Plan to the Project Engineer at least two weeks before the construction starts that will result to obstruction. This Plan will recommend for approval, the safe and convenient temporary diversion of traffic during construction, design of barricades, delineators, signs, markings, lights, and flagmen, among others.

(ii) For widening of existing carriageway and part of it will be used for passage of traffic, paved shoulder will be provided on one side of the existing road by the contractor with the following minimum requirements:

(iii) At least one 3.5 m lane to remain to traffic at all times

(iv) The surface used by the through traffic will be firm bituminous compacted surface free of defect

(v) The maximum continuous length over which construction under traffic may take place is limited to 750 meters.
(vi) Construction activity will be restricted to only one side of the existing road.
(vii) On stretches where it is not possible to pass the traffic on the part width of existing carriageway, temporary paved diversions will be constructed. These paved diversions will comply with standards on junctions and temporary cross drainage.
(viii) Transportation of quarry material to the construction sites through heavy vehicles shall be done through existing major roads to the extent possible. This will restrict wear and tear to the village/minor roads. Small vehicles/un-motorized vehicle can also be used for its further transportation to the construction sites from temporary storage areas.

115. **Transport and Storage of Materials:** The construction material primarily will consist of aggregate, sand, cement, bitumen, lubricating oil and fuel for vehicle and construction equipment. These will be primarily stored temporarily at construction camps. The oils, fuels, and chemicals will be stored on concreted platform with spills collection pits. The cement will be stored under cover. All these temporary storage areas will be located at least 150m away from the habitat.

116. **Impact on Land and Private Properties:** The assessment made in resettlement plan shall be referred for exact loss of private properties and measures to compensate such losses. Besides monetary compensation for any loss of private trees, compensatory afforestation and extensive plantation are incorporated in the EMP. Income restoration measures/livelihood options for vulnerable group/resource poor sections and other affected persons as recommended by social development/resettlement expert shall be implemented.

117. **Impact on Common Property Resources:** There are various types of community structures/ facilities/utilities along the proposed alignment. Geometric adjustments have been made to minimize the loss to any such facilities. Alternate access has to be provided to these structures during construction stage. All community structures likely to be dismantled shall be suitably relocated. For exact extent of impact on these structures and mode of compensation, resettlement/land acquisition plan shall be referred.

118. **Impact on historical monuments / religious structures:** There are no adverse impacts expected on historical places/monuments. However, there are few religious structures/idols which are coming within ROW and adjacent to existing carriageway. Care must be taken to relocate these structures. Also earthworks, associated with the actual road construction/improvement works, or deriving from secondary sites such as quarries or borrow pits, may reveal sites or artefacts of cultural/archaeological significance. In the event of such discovery, the concern authorities (Archaeological Survey of India) should be informed and the requirement to take such action should be incorporated in contract documents.

E. Operation Stage Impacts

119. **Road Maintenance:** Lack of proper maintenance may deteriorate the road condition over the years resulting into numerous problems such as rise in accidents, disruption of transportation services, tree survival. APRDC must allocate adequate resources and logistics to ensure that the road is being maintained and intended benefits are generated thereof.

120. **Soil Erosion and its Cumulative Impacts:** The consequences of soil erosions are far wider than repair and maintenance of the road. Along the project road, the inflow of water into ponds during rains causes erosion of the embankment besides seepage of water into embankments and subgrade resulting in softening of the subgrade. This may also increase siltation in water bodies. Project design includes provisions of retaining walls/retaining walls for the protection. Regular checks shall be made to ensure its effectiveness.

121. **Air Pollution:** Likely rise in traffic after road improvement may cause air and noise pollution in the vicinity of the project. Vehicular emission will be the principle source of pollution during operation stage. The project road is located in thickly vegetated and open agricultural land which will provide adequate dispersion dynamics of gaseous pollutants. Vegetation acts as sink to air pollutants. Further, the improved road condition will facilitate free flow of traffic thereby reducing the emission level significantly.

122. **Noise Pollution**: Noise level is likely to increase due to increased traffic. Effective traffic management and good riding conditions shall be maintained to reduce the noise level throughout the stretch and speed limitation and honking restrictions may be enforced near sensitive locations. The effectiveness of noise mitigation should be monitored and if need be, solid noise barrier shall be placed.

123. **Water Pollution:** Accidental oil spillage, washing of vehicles, used engine oils can contaminate the nearby water bodies. Expansion joints and drainage spouts may be choked due to silt and vegetation growth. In order to prevent water pollution; communities should not allow drivers washing their vehicles near the streams and ponds. Regular removal/cleaning of deposited silt shall be done from drainage channels and outlet points before the monsoon season. Rejuvenation of the drainage system by removing encroachments/ congestions will be regularly conducted.

124. **Ribbon Development/Encroachment of ROW:** Increase in economic activities results in ribbon development along highways. This may cause congestion to road users and increase in accident. APRDC shall explore options like avenue plantation and/or fencing and initiating regulatory provisions to stop encroachment of ROW.

125. **Indirect, Induced and Cumulative Impacts:** The proposed road works will be the main generator of indirect and induced impacts; the controlled landfill works to a lesser extent. The volume of vehicle movements that will be generated and the likely closure/blocking of some roads/lanes during construction will cause traffic build-up and choke points. There will be slower mobility, longer travel time; slower delivery of goods, people and services than usual during this time. A greater number of people will be exposed to safety hazards from traffic and constricted road space. Coupled with disruption of economic activities and social services from interrupted power supply due to relocation of power poles and/or accidental damages, production outputs will suffer some slowdown. Severe dust falling on vegetation would have some effect on the fields. Apart from the applicable mitigation measures for direct impacts during construction, the coordination with the relevant community and village authorities, social service institutions and business associations should enable further mitigation of indirect and induced the impacts.

126. As such, the proposed road works will not generate cumulative impacts of high magnitude and significance in terms of dust, noise, water resources contamination, soil contamination, impact on aquatic habitats, traffic, blocking of accesses, health and safety hazards and disruption to social services and economic activities. The grievance redress

mechanism will be disclosed (through public meetings, display at strategic places and media) to the communities affected by the cumulative impacts.

F. Climate Change Impacts and Risks

127. The proposed road widening will have both beneficial as well as adverse impact on carbon emissions. While the subproject will result in higher traffic and increased road capacity and increased users leading to increase in emissions, at the same time road widening will result in less traffic congestion and increased speeds thus limiting CO2 emissions.

128. The subproject road widening is for only 29.6 km section and the CO2 emissions are expected to be below the 100,000 tons per year threshold[9] set in the ADB SPS 2009. Hence it is not necessary to implement options to reduce or offset CO2 emissions under the subproject.

129. Calculation for GHG emissions for the proposed subproject will be done during detailed design using estimation tools such as 'The Transport Emissions Evaluation Model for Projects' (TEEMP) developed by Clean Air Asia which is utilized to assess the CO2 gross emissions with and without the project improvements.

130. **Unanticipated Impacts during Construction and Operation:** In the event, unanticipated impacts become apparent during project implementation, APRDC through PMU 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. ANALYSES OF ALTERNATIVES

131. As per ADB SPS 2009 alternatives to the project's location, design, technology, and components and their potential environmental and social impacts need to be analyzed.

132. **Without the subproject.** In the absence of the proposed subproject, the road will continue to have frequent traffic congestions, reduced flow of traffic (commercial as well as domestic), regular maintenance costs on existing roads and inadequate access to ports and other key towns and commercial centers in the state.

133. **With the subproject.** This project road widening and upgrading will improve connectivity between node to Kakinada port which is the VCIC gateway. The implementation of various project items will have the following direct benefits:

(i) Improved quality of life for the rural population in the project influence area (10 Km radial distance from the subproject road): this as a result of better access to markets, health, education and other facilities; and the derived stimulus for local economic activity; and
(ii) A more efficient and safe road transport system through reduced travel times, reduced road accidents, reduced vehicle operating and maintenance costs and reduced transportation costs for goods.

[9] Page 38, Appendix I, footnote 10 of SPS 2009

134. **Location and design alternatives.** In general, the horizontal alignment of the project road follows that of the centerline of the existing road. The project road is a part of VCIC corridor known as ADB road located in East Godavari district of Andhra Pradesh. The topography of the region is plain terrain. The land use is mixed with habitations at few settlements, Industrial and agriculture in rural area. Most of the project road is covered by roadside vegetation. However, density is fair i.e.139 trees/Km. It is found that about 4251 trees exist within a corridor of 15m along the project road.

135. The improvement work includes widening of the existing carriageway to 4 lane configuration. The benefits of the widened road will be improved road safety, lower vehicle operating costs and decreased journey times. The initial proposed road was re-aligned with sections of road to be widened on both sides to minimize the impact on people, structure and places of worship.

136. In a number of locations, the road design has taken into account the location of the trees along the road edge. At some locations along the project road, vegetation including trees, obscure visibility. Where the design team consider this to be unsafe, trees will have to be removed. Where visibility is not an issue, trees may still have to be removed to accommodate road widening. However, as many trees as possible are being retained by a measured design.

137. **Technological alternatives.** There is no practical alternative to the proposed widening of the existing road to improve existing conditions. A cement concrete paved road structure would provide a construction alternative but the issues surrounding this construction would be similar, if not greater, than the proposed asphalt concrete road widening.

138. Therefore it is concluded that in order to get maximum economic and social benefit from the existing highway road, widening and upgradation needs to be completed. This will not only have regional and national benefits but will impact positively on the local residents living along the project road. Without the project, it is anticipated that the benefits of the existing road and increased activity will not be fully realized.

VII. CONSULTATION, INFORMATION DISCLOSURE, AND GRIEVANCE REDRESS MECHANISM

A. Public Consultation and Information Disclosure

139. Meaningful stakeholder consultation and participation is part of the project preparation and implementation strategy. A consultation and participation strategy will be designed and 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).

140. 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.

141. APs will be consulted at various stages in the project cycle 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.

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

143. A variety of approaches can be adopted. At minimum, stakeholders will be consulted regarding the scope of the environmental and social impact studies before work commences, and they will be informed of the likely impacts of the project and proposed mitigation once the draft IEE reports are prepared. The report will record the views of stakeholders and indicate how these have been taken into account in project development (Appendix-5. Consultations will be held with a special focus on vulnerable groups.

144. The key stakeholders to be consulted during project preparation, EMP implementation, and project implementation include:

(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 roads which would be widened, where pipes will be laid and near sites 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

145. Key issues were identified in initial consultations during reconnaissance site visit with local people and government departments and framework for comprehensive consultations was designed. Detailed consultations based on road alignment and project improvement components were held in October, 2015. This IEE includes the key findings of the consultations conducted by the APRDC in 2015.

146. Consultation with the stakeholders, beneficiaries, and community leaders were carried out using standard structured questionnaires to obtain background information and details of general environmental issues. The official consultations with the stakeholders were carried out at respective offices in state capital and project district headquarters.

B. Consultation with Government Departments

147. Detailed discussions with APRDC officials; relevant government departments including forest and wildlife, fisheries, pollution control board, economics and statistics, and tribal welfare were consulted. The list of government officials contacted, along with purpose/objective has been summarized in Table 14.

Table 14: List of Officials Consulted During Field Visit

Sl. No.	Name of Official Consulted	Department	Issue discussed	Date
1.	Mr. D.Ravindra Babu	Environmental Engineer, APPCB Regional Office, Kakinada	Environmental quality in the East Godavari district. Capacity of pollution control board in environmental management and monitoring, requirements of APPCB for proposed road project.	6-7-2015
2.	Mr. T. Prasad Rao	Assistant Environmental Engineer, APPCB Regional Office, Kakinada	Present scenario of environmental quality in the region and specifically the proposed Project road.	6-7-2015
3.	Mr. Venkat Rao	District Town & Country Planning Department, Kakinada	Future planning of developments in East Godavari district. Specific development scenario near KakinadaRajanagaram Project road.	8-7-2015
4.	Mr. P. Srinivasa Rao	Conservator Assistant, Archaeological Survey of India, Kakinada	Status of Archeaological monuments/structures in the vicinity of the Project road.	7-7-2015
5.	Mr. M. V. Prasad Rao	Forest Range Officer, Kakinada	Status of forest resources in Kakinada range, Wildlife in East Godavari district, Impact of proposed Project road on forest & wildlife.	8-7-2015
6.	Madam Sribala	Forest Officer, Peddapuram Forest Nursery, Kakinada Range	Species of road-side tree on Samalkot-Rajanagaram road, and their uses.	9-7-2015

C. Consultations with Local people/Beneficiaries

148. The informal consultation generally started with explaining the sub project, followed by potential impacts. Issues discussed are:

(i) Awareness and extent of the project and development components;
(ii) Benefits of the project for the economic and social upliftment of community;
(iii) Labour availability in the project area or requirement of outside labour involvement;
(iv) Local disturbances due to project construction work;
(v) Necessity of tree felling etc. at project sites;

(vi) Impact on water bodies, water logging and drainage problem if any;
(vii) Drinking water problem;
(viii) Health issues
(ix) Flora and fauna of the project area
(x) Socio-economic standing of the local people and
(xi) Willingness to contribute/co-operate

149. Summary of consultations held during different stages with affected persons, local communities, panchayat members, shop owners is given in Table15.

Table 15: Summary of Consultation Held with Government Departments.

Sl. No.	Department	Topic Discussed
1	Archaeological Survey of India	Gathered information about any archaeological sites within 10 km Response: no such sites
2	APRDC	Discussed about various clearances required prior to construction Information about proposed locations for camps, debris disposal and construction material availability and sourcing was obtained.
3	Forest Department	Information collected about legal status of the forest and forest types, presence of any endangered floral species and wildlife movement. There is no endangered/threatened floral species along the project road. No wildlife movement along the project road.
5	APPCB	Enquired about availability of environmental quality data of the project areas, List of Industries within 10 km radius. And restrictions/ permission about establishment of new crusher/ hot mix plant/ wet mix plant and list of existing ones.
6	Central Ground Water Board	Availability of Ground Water Quality assessment data of project road region.
7	India Meteorological Department	Availability of Meteorological Data of project road region.
8	GSI	Availability of Geological information.

D. Outcome of Public Consultations

150. Project receives wide acceptance from local people with some apprehensions/concerns. They perceived that the project road improvement will definitely bring out positive socio-economic changes. They also made some demands and suggestions for maximum benefits to the local community and other road users. Results of the public consultations has been summarized in Table 16.

Table 16: Outcome of Public Consultations

Perceived Benefits	Concern/ Apprehension	Demands and Suggestions
Reduction in travel time and fuel due to improved road better access to educational, medical facilities markets, Improvement in road safety; More employment opportunities due to increased economic activity and better connectivity. Farmers will get better prices for their local produces especially vegetables and spices Appreciation in land cost.	Physical and economic displacement Compensation for private and community property impacts. Loss of trees Re-location of temples Air and Noise pollution during construction	Adequate compensation at market value for loss of land and other assets No water sources and water harvesting structures shall be disturbed Employment and petty contracts to local people in construction activities Lines/concrete covered drains Project authorities should improve the availability of water as an enhancement measure.

Table 17: List of Affecting CPRs in the Samalkota to Rajanagarm Road

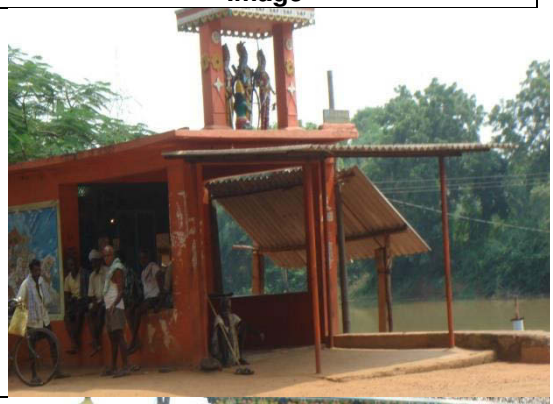
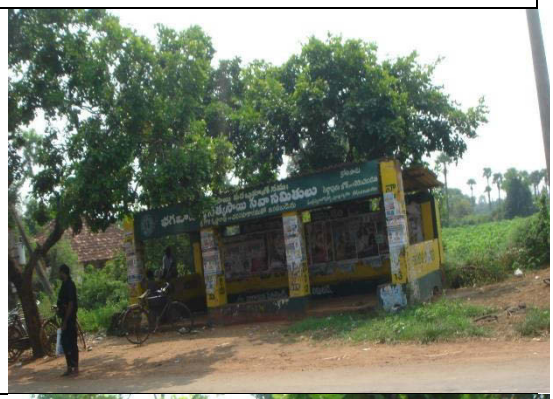
Asset No	Chainage Location	Direction Right or Left	Distance Form The Center Line in Mts	Describe What is Getting Affected
1	0.860	L	18	Sharadhamba Temple
2	6.380	R	11	Vinayaka Temple
3	7.570	L	8	Durga Matha Temple
4	14.520	L	10	NTR Statue
5	14.520	R	12	Ganapathi Temple
6	14.550	L		YSR Statue
7	14.840	L	9.5	Hanuman Temple
8	14.850	R	8.5	Muthyalamma Temple
9	16.710	R	15.5	Ambedkar Statue
10	17.280	L	19	Government Primary School & Water Tank
10	17.290	L	18	Government Primary School & Water Tank
11	17.370	L	10	Bus Stand at Kotapadu
12	20.230	R	13.5	Compound of M.P.D.O.Office at Kotapadu
13	20.330	L	12.5	Police Station at Rangampeta
14	20.350	R	12	Ground
15	21.380	L	6	Vinayaka Temple
16	21.660	R	12.4	Venkateswara Temple
17	23.100	L	6.4	Sri Durgamma Temple
18	25.480	L	12	Sri Laxmi Vigneswar Temple
19	26.230	L	9	Saibaba Temple
20	26.300	R	10.5	Durga Devi Temple
21	26.500	L	11.2	Veda Matha Temple
22	26.510	L	9.8	Hanuman Temple
23	26.590	L	12	Ramalayam Temple

Asset No	Chainage Location	Direction Right or Left	Distance Form The Center Line in Mts	Describe What is Getting Affected
24	27.850	L	12.5	Dumping Yard
25	27.900	R	11	Hanuman Temple
26	27.920	L	16	Government Primary School
27	27.960	L	10	Vinayaka Temple
28	28.320	R	9.5	Hanuman Temple
29	29.180	L	7.8	Katcha Structure
30	29.170	L	18.5	Ramalayam Temple Compound Wall
31	30.750	R	15.7	Zilla Parishad Government School & Compound Wall

151. Most of the temples in the list are small places of worship developed by people overtime and will be shifted to other locations within the area in consultation with the local community and administration. There is no major Temple that will be impacted due to the subproject.

Table 18: Details of affecting CPRs in Samarlakota to Rajanagaram Road

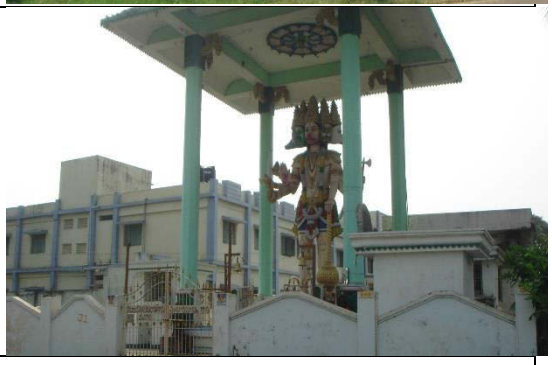
S.No	CPR Description	Image
1	**Vinayaka Temple**: It is a type of Religious CPR in Samarlakota village located on right side at chainage of 6.38 km at a distance of 11m.	
2	**Durga Matha Temple**: It is a type of Religious CPR in Valuthimmapuram village located on left side at chainage of 7.57 km at a distance of 8m.	
3	**NTR Statue**: It is a type of statue CPR in Ramaswamipeta village located on left side at chainage of 14.52 km at a distance of 10m.	
4	**Ganapathi Temple**: It is a type of Religious CPR in Ramaswamipeta village located on right side at chainage of 14.52 km at a distance of 12m.	
5	**YSR Statue**: It is a type of statue CPR in Ramaswamipeta village located on left side at chainage of 14.55 km.	

S.No	CPR Description	Image
6	**Hanuman Temple**: It is a type of Religious CPR in Ramaswamipeta village located on left side at chainage of 14.84 km at a distance of 9.5m.	
7	**Muthyalamma Temple**: It is a type of Religious CPR in Ramaswamipeta village located on right side at chainage of 14.85 km at a distance of 8.5m.	
8	**Ambedkar Statue**: It is a type of statue CPR in Kotapadu village located on right side at chainage of 16.71 km at a distance of 15.5m.	
9	**Bus Stand at Kotapadu**: It is a type of bus shelter CPR in Kotapadu village located on left side at chainage of 6.38 km at a distance of 10m.	
10	**Compound of M.P.D.O.Office at Kotapadu**: It is a type of Govt office in Rangampeta village located on right side at chainage of 20.23 km at a distance of 13.5m.	

S.No	CPR Description	Image
11	**Police Station at Rangampeta**: It is a type of Police Station CPR in Rangampeta village located on left side at chainage of 20.33 km at a distance of 12.5m.	
12	**Burial ground**: It is a type of Burial ground in Rangampeta village located on right side at chainage of 20.35 km at a distance of 12m.	
13	**Vinayaka Temple**: It is a type of Religious CPR in Rangampeta village located on left side at chainage of 21.38 km at a distance of 6m.	
14	**Venkateswara Temple**: It is a type of Religious CPR in Rangampeta village located on right side at chainage of 21.66 km at a distance of 12m.	

S.No	CPR Description	Image
15	**Sri Durgamma Temple**: It is a type of Religious CPR in Rangampeta village located on left side at chainage of 23.1 km at a distance of 9m.	
16	**Sri Laxmi Vigneswar Temple**: It is a type of Religious CPR in Vodiseleru village located on left side at chainage of 25.48 km at a distance of 10.5m.	
17	**Saibaba Temple**: It is a type of Religious CPR in Vodiseleru village located on left side at chainage of 26.23 km at a distance of 11.2m.	
18	**Durga Devi Temple**: It is a type of Religious CPR in Vodiseleru village located on right side at chainage of 26.3 km at a distance of 9.8m.	

S.No	CPR Description	Image
19	**Veda Matha Temple**: It is a type of Religious CPR in Vodiseleru village located on left side at chainage of 26.5 km at a distance of 12m.	
20	**Hanuman Temple**: It is a type of Religious CPR in Vodiseleru village located on left side at chainage of 26.51 km at a distance of 12.5m.	
21	**Ramalayam**: It is a type of Religious CPR in Vodiseleru village located on left side at chainage of 26.59 km at a distance of 11m.	
22	**Dumping yard**: It is a type of Dumpyard CPR in Ramaswamipeta village located on left side at chainage of 27.85 km at a distance of 16m.	

S.No	CPR Description	Image
23	**Hanuman Temple**: It is a type of Religious CPR in Ramaswamipeta village located on right side at chainage of 27.9 km at a distance of 10m.	
24	**Government Primary School**: It is a type of Religious CPR in Ramaswamipeta village located on left side at chainage 27.92 km at distance of 9.5m.	
25	**Vinayaka Temple**: It is a type of Religious CPR in Ramaswamipeta village located on left side at chainage of 27.96 km at a distance of 7.8m.	
26	**Hanuman Temple**: It is a type of Religious CPR in Govindharajapuram village located on right side at chainage of 28.32 km at a distance of 15.7m.	
27	**Katcha Structure**: It is a type of Religious CPR in Venkannapeta village located on left side at chainage of 29.18 km at a distance of 12m.	

S.No	CPR Description	Image
28	**Zilla Parishad Government School & Compound Wall**: It is a type of Govt office CPR in Venkannapeta village located on right side at chainage of 30.75 km at a distance of 9m.	

E. Future Consultation

152. This process shall be extended during implementation. Appointed PMSC and implementing NGO for RP 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.

F. Information Disclosure

153. 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.

154. 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.

G. Grievance Redress Mechanism

155. **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.

156. 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 APRDC 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.

157. Affected persons will have the flexibility of conveying grievances/suggestions by sending grievance redress/suggestion in writing, through telephone call to Divisional Engineer (DE), APRDC safeguard manager, or by filling forms for complaints/suggestion by email in the VCICD Project site to be installed under the APRDC 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 APRDC 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.

158. **Grievance Redressal Committee.** Grievance Redressal Committee (GRC) will be established at two-levels, one at APRDC 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.

159. 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.

160. The APRDC 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.

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

162. **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 Divisional Engineer, APRDC safeguard officers and contractors will be posted at all construction sites at visible locations. The APRDC safeguard officers will be responsible to see through the process of redressal of each grievance.

(i) **1st Level Grievance.** The phone number of the APRDC office should be made available at the construction site signboards. The contractors, DE and APRDC 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 APRDC level grievance redress committee (GRC) with support from APRDC safeguard officers and PMSC environment and resettlement specialists. APRDC level GRC will attempt to resolve them within 15 days.

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

163. 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.

164. 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.

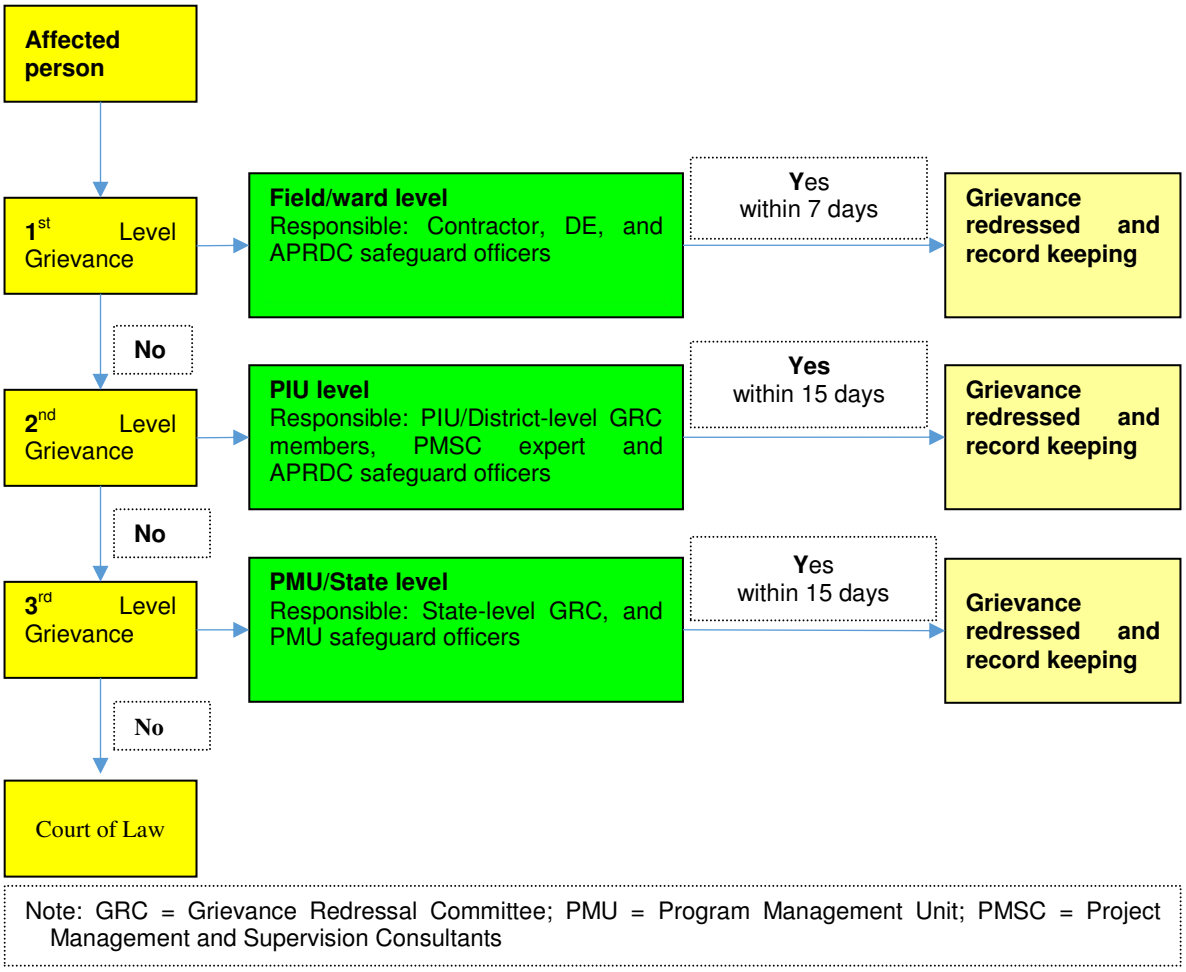
165. **Recordkeeping.** Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were effected and final outcome will be kept by PMU. The number of grievances recorded and resolved 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.

166. Periodic review and documentation of lessons learned. The PMU, and APRDCs, 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 APRDC's ability to prevent and address grievances.

167. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the respective APRDCs; 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 5.

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

Figure 5: VCICDP Grievance Redress Mechanism

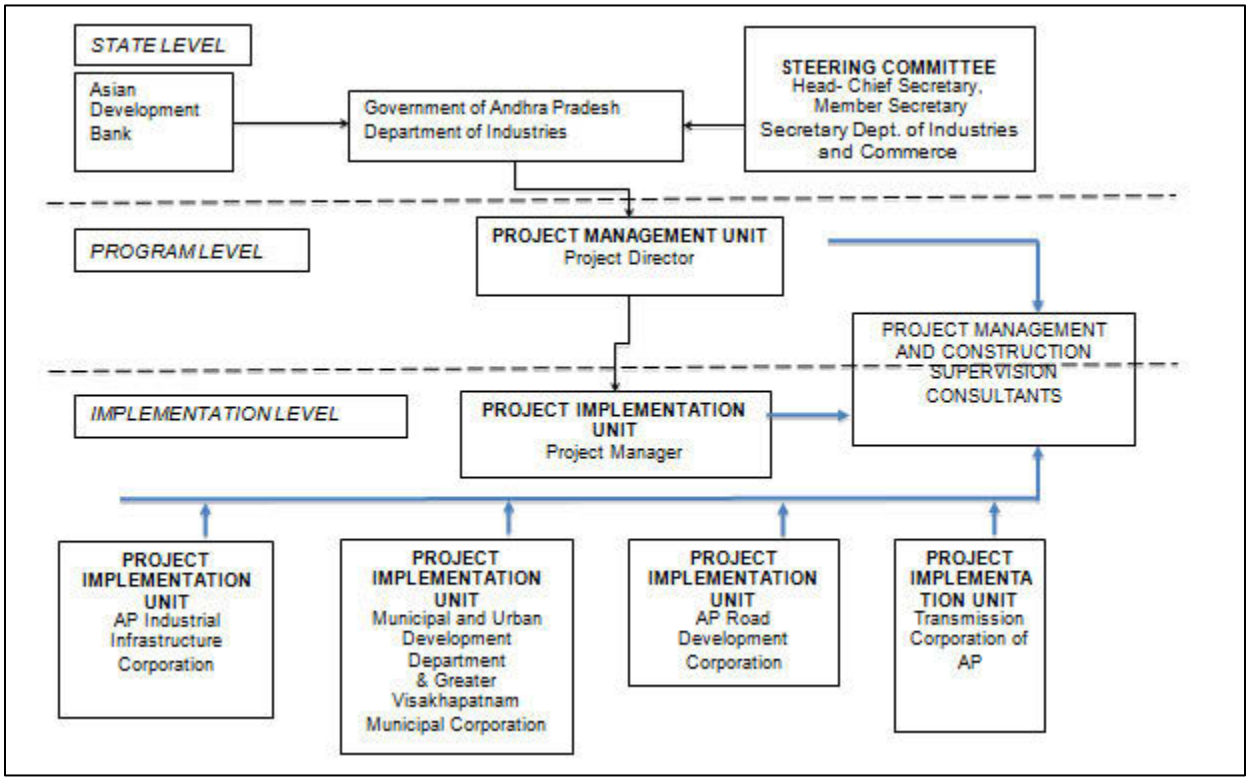


VIII. INSTITUTIONAL ARRANGEMENTS AND RESPONSIBILITIES

169. DOI will be the executing agency. A PMU will be established within the Directorate of Industries, which is under the DOI, for planning, implementation, monitoring and supervision, and coordination with APRDC. APRDC will be responsible for implementing the IEE/EMP requirements. PMU will recruit PMSC to provide support in implementation of VCICDP.

170. PMU will support APRDC in implementation, management and monitoring of the project. PMU and APRDC will be assisted by PMSC respectively. APRDCs will appoint construction contractors to build infrastructure. Once the infrastructure is built and commissioned, the APRDC 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.

Figure 6: VCICDP Subproject Implementation Arrangements



H. Safeguard Implementation Arrangement

171. **Project Management Unit.** The PMU structure is as provided in the Table 19 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 19: 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

Position	Tasks
Office Manager	Office management

172. 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 APRDCs 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 APRDCs 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 APRDCs 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.

173. **Project Implementation Units.** In APRDC Head Office, the safeguards specialists of APRDC currently working on a World Bank Project will coordinate all environmental and social aspects of the projects.

Table 20: APRDC Environmental Safeguard Officer Tasks and Responsibilities

APRDC Environmental Safeguard Officer	Tasks and Responsibilities
Environmental Safeguards - APRDC	(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

APRDC Environmental Safeguard Officer	Tasks and Responsibilities
	environmental management to be delivered by PMSC consultants

174. **Project Management and Supervision Consultants.** The PMU and APRDCs 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 specialist are as follows:

(i) Update the IEEs including site- and subproject-specific EMPs for the subproject;
(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;
(iv) Prepare semi-annual environmental safeguards compliance reports; and
(v) Support the implementing agencies in preparing periodic financing requests and necessary environmental safeguard reports for subsequent tranches.
(vi) Establish a system to monitor environmental safeguards of the Project; prepare indicators for monitoring important parameters of safeguards;
(vii) 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;
(viii) Ensure that provisions and conditions of all necessary permits, consents, NOCs, etc., are incorporated in the IEEs;
(ix) Take proactive action to anticipate the potential environmental impacts of the Project to avoid delays in implementation;
(x) Assist APRDCs in the establishment of GRC for IEE implementation;
(xi) Support the APRDCs 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;
(xii) Assist the APRDCs and PMU in the project GRM mechanism and complaint solution;
(xiii) Assist the APRDCs and PMU for GRM record keeping for first tier complaint and redressed actions;
(xiv) 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;
(xv) 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;
(xvi) Provide on-the-job training programs to APRDC staff involved in Project implementation for strengthening their capacity in managing and monitoring environmental safeguards; and
(xvii) Assist the APRDCs' safeguards officer to sensitize the turnkey contractors on ADB SPS, EARF, and GRM during detailed design and civil works implementation.

175. **Civil works contracts and contractors.** EMPs are to be included in bidding and contract documents and verified by the APRDCs 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.

176. The PMU and APRDCs 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 21: Institutional Roles & Responsibility: Environmental Safeguards

Phase	PMU / APRDCs	PMSC	ADB
Appraisal stage of all Subprojects under the investment program	PMU / APRDCs to review the REA checklists and draft EIA/IEE. PMU / APRDCs to submit draft EIA/IEE to ADB for review and approval. PMU / APRDCs to disclose on its website the approved EIA/IEE. PMU / APRDCs 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 / APRDCs with the assistance of PMSC to incorporate the EMP, environmental mitigation and monitoring measures into contract documents. PMU / APRDCs 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 / APRDCs to conduct public consultation and disclosure during IEE process and comments will be reflected in the IEE report. PMU / APRDC to monitor the disclosure and public consultation. APRDC 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.	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	

Phase	PMU / APRDCs	PMSC	ADB
	PMU to submit to ADB in prescribed format semi-annual Environment Monitoring Report 6 months after Loan effective date.	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	
Construction Phase of all Subprojects under the investment program	PMU / APRDCs 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 / APRDCs to review monitoring report of PMSC on post-construction activities by the contractors as specified in the EMP PMU / APRDC 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	APRDCs 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		

Phase	PMU / APRDCs	PMSC	ADB
	air, effluent quality from treatment plant, noise, as applicable.		

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

IX. Institutional Capacity and Development

177. The PMSC environmental safeguards specialist will be responsible for training PMU and APRDCs 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 22.

Table 22: 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 APRDCs 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 APRDCs officials involved in project implementation.
Construction stage			

Description	Contents	Schedule	Participants
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 APRDCs Contractors
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, APRDCs, and PMSC (at Hyderabad / Visakhapatnam) (50 persons)	PMU APRDCs Contractors

ADB = Asian Development Bank; EMP = Environmental Management Plan; APRDC = 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 Visakhapatnam Municipal Corporation

X. ENVIRONMENTAL MANAGEMENT PLAN

A. Environment Management Plan

178. 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 11)** 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 project road should be environmentally sustainable.

B. Environment Monitoring Program

179. 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

180. 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 12.** 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 (schools, hospitals, community/religious places).
(iv) Survival rates of trees planted as compensatory plantation to compensate for removal of roadside trees.

181. **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 7).**

182. **Water Quality Monitoring:** The physical and chemical parameters recommended for analysis of water quality relevant to road 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 10**. Surface water quality will be monitored as per fresh water classification of CPCB **(Appendix 8).**

183. **Noise Level Monitoring:** The measurements for monitoring noise levels would be carried out at sensitive receptors and construction sites along the project roads. 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 9**. Sound pressure levels would be monitored on twenty-four hour basis. Noise should be recorded at "A" weighted frequency using a "slow time response mode" of the measuring instrument.

184. **Success of Re-vegetation:** compensatory plantation will be taken up in lieu of tree cutting@1:2 basis. These compensatory plantations will have to be monitored by the implementing agency with the help of the Forest Department. Such monitoring will be conducted through random samples. Such sampling should cover at least 5% of the area planted up. 75% survival rate shall be ensured.

D. Generic Guidelines for Implementing EMP

185. A set of generic guidelines have been formulated to avoid potential impacts due to construction and its allied activities. Quarry and Borrow area Management has been excluded since no new borrow areas or quarries are likely to be opened and quarrying is not involved. Quarry materials will be obtained from licensed quarries. Earth material obtained from excavation will be used for road construction. These guidelines have been attached as Appendices with following headings.

(i) Appendix 13- Management of Construction Plants, equipment and vehicles
(ii) Appendix 14- Campsite Management
(iii) Appendix 15- Management of Construction Waste and Debris Disposal
(iv) Appendix 16- Borrow Area Management

XI. MONITORING AND REPORTING

186. DOI will monitor and measure the progress of EMP implementation. The monitoring activities will correspond with the project's risks and impacts. In addition to recording information on the work and deviation of work components from original scope, PMU, APRDC, and PMSC will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome.

187. APRDC / PMSC will submit monthly monitoring and implementation reports to PMU, who will take follow-up actions, if necessary. DOI will submit semi-annual monitoring reports to ADB. The suggested monitoring report format is in Appendix 5. A construction site checklist is attached at Appendix 6, which is to be filled by the PMSC/APRDC supervising staff, and attached to monthly reports. Subproject budgets will reflect the costs of monitoring and reporting requirements. For projects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis. Monitoring reports will be posted in a location accessible to the public.

188. Compliance with loan covenants will be screened by the Department of Industries, Government of Andhra Pradesh.

189. ADB will review project performance against the DOI, GoAP, commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system.

Table 24: Environment Management Budget

Sl. No.	Item Description	Quantity	UNIT	Rate (Rs.)	Amount (Rs.)	Responsibility
A	**Tree Plantation**					
A.1	Compensatory Plantation@1:2 basis for 8502	8502	No.	2000	1,70,04,000	No. Trees to be planted including maintenance for 5 Years Contractor to assign the VSS Committee for carrying out the additional 2plantation
B	**Environmental Monitoring**					
B.1	Ambient air quality monitoring					Contractor / APRDC to monitor compliance
B.2	Ambient noise level monitoring					
B.3	Water quality monitoring of surface water					
B.4	Water quality monitoring of drinking water					
D	**Enhancement of cultural properties as per directed by the engineer including the following items**					
E	**Environmental Training**					
E.1	Training at site as per **Appendix E of EMP.**			500000	500000	APRDC
	Grand Total = INR 1,75,04,000					

XII. CONCLUSION AND RECOMMENDATION

190. The proposed subproject Rajnagaram to Samrlkota road section improvement has been categorized as Category 'B' based on environmental screening and assessment of likely impacts. Initial environmental examination ascertains that it is unlikely to cause any significant environmental impacts. Few impacts were identified attributable to the proposed subproject, most of which are localized and temporary in nature and easy to mitigate.

191. Subproject road is not located in any environmentally sensitive areas. It does not pass through any reserve forest area and no diversion of forest land is required. Widening and improvement will mostly be accommodated within available land. Land acquisition is required only for curve important and locations where protection works are proposed.

192. The significant environmental impacts attributable to the upgrading of the road sections pertains to tree cutting, temporary deterioration of environmental attributes/ambient during construction phase from land clearing, camp operations and community and occupational health and safety. These impacts are easily mitigated by adopting good construction practices and effective implementation of Environmental Management Plan (EMP). During operation stage, the main impacts are increase in mobile emissions, noise level, accident risk to motorist, pedestrian and animals. Road safety measures are proposed as per IRC: SP: 44-1996 like road delineators, signage, metal beam crash barriers and guide posts etc. Toe walls and stone pitching has been proposed on embankment slopes where ponds are abutting to avoid seepage into sub grade and erosion of road embankment.

193. In general, the subproject received immense support from local people. The local people appreciated that improved connectivity will bear out several socio-economic positive benefits resulting to improved quality of life

194. The initial environmental examination of the subproject ascertains that the project is unlikely to cause any significant environmental impacts. No additional studies or need of undertaking detailed EIA is envisaged at this stage. The Executing Agency and APRDC shall ensure that 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: 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 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- Rajnagaram to Samarlkota Road Subproject

Sector Division: South Asia Urban and Water Division

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site	✓		No cultural heritage site is located within the road ROW or vicinity.
▪ Protected Area		✓	There are 2 protected areas in the State of Andhra Pradesh however one of them is in the vicinity or within 10 km radius of the subproject.
▪ Wetland		✓	None of them is in the vicinity or within 10 km radius of the subproject.
▪ Mangrove		✓	
▪ Estuarine		✓	
▪ Buffer zone of protected area		✓	
▪ Special area for protecting biodiversity		✓	
B. Potential Environmental Impacts Will the Project cause…			
▪ encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?	✓		Not anticipated. The subproject is widening of existing road from two to four lanes. The activities are not of large scale and confined to available ROW. No encroachment of historical places. However, some temples exist along the subproject road may get impacted. Opening of new quarries is not proposed. Quarry material will be sourced from existing quarries. Mitigation measures for quarry management are outlined in the IEE in case need

Screening Questions	Yes	No	Remarks
			for a new quarry arises in future.
▪ encroachment on precious ecology (e.g. sensitive or protected areas)?		✓	Not anticipated. No national parks, wildlife sanctuaries or similar eco-sensitive areas along the subproject road. As per the forest department, no loss of any rare/threatened/endangered species of flora is envisaged.
▪ alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		✓	Not anticipated. There are a few drains (locally known *nallas*) being crossed by the subproject road. However most of them are seasonal and the activities are not of large scale and confined to available ROW.
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		✓	Not anticipated. Workers camp will be small as most of the workers employed will be local. Contractor will be required to manage excavated soils and provide adequate sanitary facilities for the workers. The EMP ensures measures are included to mitigate the impacts.
▪ increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	✓		Anticipated during construction period. However, site-specific, low in magnitude and short in duration. The EMP ensures measures are included to mitigate the impacts.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation 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 minimize such exposure and associated harmful occupational health effects. Traffic Safety measures will be adopted during operation phase.
▪ noise and vibration due to blasting and other civil works?	✓		Not anticipated. Blasting will not be required as the Project is widening of existing road. Ambient noise level is expected to increase in the range of 80-90 db(a) due to various construction activities, maintenance workshops, and earthmoving equipment. Although this level of noise exceeds national standards, their occurrence will be intermittent and co-terminus

Screening Questions	Yes	No	Remarks
			with the project construction. All stationary noise making sources equipment like dg set, compressors will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Noise barriers have been proposed at sensitive locations very close to the alignment.
▪ dislocation or involuntary resettlement of people?		✓	Not anticipated. Since widening will be mostly accommodated within available ROW, this impact is expected to be low. Exact number of affected persons are mentioned in the subproject Resettlement Plan (RP)
▪ dislocation and compulsory resettlement of people living in right-of-way?	✓		Minimal. Details available in the subproject RP.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	Not anticipated.
▪ other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		✓	Not anticipated. Deterioration in ambient air quality will be localized and temporarily during construction activity. The project area is largely located in open areas. Plantation along the highway and improved road conditions will improve the air quality of the area.
▪ hazardous driving conditions where construction interferes with pre-existing roads?	✓		Anticipated. Suitable traffic management plan will be designed and implemented by the contractor to prevent any hazardous driving condition in above situations.
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?		✓	Not anticipated. No such condition is anticipated as mostly local workforce will be employed and construction camps will be smaller, if any. Proper provisions for sanitation, health care and solid waste disposal facilities will be available in the contract documents to avoid such possibility. Workers will be made aware about communicable diseases. The EMP ensures measures are included to mitigage the impacts.
▪ creation of temporary breeding habitats for diseases such as those transmitted by		✓	Not anticipated. No new borrow areas are likely to be opened.

Screening Questions	Yes	No	Remarks
mosquitoes and rodents?			
▪ accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?	✓		Adequate safety measures will be adopted to avoid such conditions.
▪ increased noise and air pollution resulting from traffic volume?	✓		Increase in noise and air pollution is expected during construction phase. Adequate mitigation measures will be adopted to minimize them. During operation phase, the main source of noise and air will be traffic. Improved road conditions, extensive plantation will help reduce the noise and air impact. Moreover, the alignment mostly passes through open land which will provide adequate dispersion of gaseous emission. if measures suggested for noise sensitive receptors prove inadequate, solid noise barrier will be placed.
▪ increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		✓	Not anticipated. This is expected from accidental spillage. The EMP ensures measures are included to mitigate the impacts.
▪ social conflicts if workers from other regions or countries are hired?		✓	Not anticipated. Most of the workers will be from local areas and hence such conflict is not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Not anticipated. Most of the workers will be from local areas and large population influx during construction and operation is not anticipated.
▪ 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?		✓	Not applicable. Construction will not involve use of explosives and chemicals
▪ community safety risks due to both accidental and natural causes, 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.	✓		Work areas will be clearly demarcated with signage and safety barriers and access will be controlled. Only workers and project concerned members will be allowed to visit the operational sites.

Based on the above assessment the project is categorized as 'B' as per SPS, 2009
Project will require Environmental Clearance from the SEAC under the preview of EIA Notification 2006 and its subsequent amendments.

A Checklist for Preliminary Climate Risk Screening

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

Screening Questions		Score	Remarks[1]
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?		
	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)?		
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)?		
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?		
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?		

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

[1] 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):_____

Other Comments:_____
_____
_____

Prepared by: _____

Appendix 2: Trees along the Sub Project Length (Chain-wise Description)

TREES ALONG THE SUBPROJECT LENGTH (CHAINAGE WISE NUMBER)

Sr. No.	Chainage (Km)	No. of trees LHS	No. of trees RHS
1	25-26	2	4
2	26-27	7	6
3	27-28	9	1
4	28-29	5	9
5	29-30	5	5
6	30-31	2	2
7	31-32	8	9
8	32-33	54	56
9	33-34	49	44
10	34-35	72	87
11	35-36	103	108
12	36-37	75	113
13	37-38	68	130
14	38-39	36	192
15	39-40	57	48
16	40-41	75	89
17	41-42	75	62
18	42-43	145	151
19	43-44	111	107
20	44-45	125	112
21	45-46	117	99
22	46-47	57	122
23	47-48	66	109
24	48-49	114	105
25	49-50	102	123
26	50-51	77	49
27	51-52	63	58
28	52-53	103	38
29	53-54	93	64
30	54-55	69	51
31	55-56	86	68
	Total	2030	2221

Appendix 3: Land use pattern (Chain wise description)

LAND USE PATTERN (CHAINAGE WISE)

Chainage		Existing Land use	Remarks
From	To		
25	26	Settlements/ small scale industries/Agriculture fields	Rural area
26	27	Agriculture fields	
27	28	APIIC Industrial Park/Agricultural fields/Orchard	Industrial area
28	29	Orchard/vacant fields	Rural area
29	30	Orchard/Vacant plots	
30	31	Agriculture fields	
31	32	Small scale industries/ agriculture fields	
32	33	HP Petrol pump RHS, IOCL petrol bunk LHS	
33	34	Peddapuram junction, Agricultural fields	
34	35	Rice mill RHS, Agricultural fields	
35	36	Agriculture fields	
36	37	Poultry farms, cultivable lands	
37	38	Vacant plots/agriculture fields	
38	39	Ramesampeta settlement and agriculture fields	
39	40	Agricultural fields along with vacant land	
40	41	Poultryfarm/ agriculture fields	
41	42	Godown RHS and agricultural fields LHS	
42	43	St. Mary's College of Pharmaceutical & Research LHS/agriculture fields	
43	44	Agricultural fields	
44	45	Aditya Engineering college bus stop/agriculture fields	
45	46	Agricultural fields	
46	47	Pragati Engineering college LHS/agriculture fields	
47	48	Settlement/Pond LHS and vacant lands	
48	49	Small scale industries RHS/Agriculture fields	
49	50	AFAL Brick Unit LHS/Settlement/Agriculture fields	

Chainage		Existing Land use	Remarks
From	To		
50	51	Big irrigation pond RHS/Agriculture fields	
51	52	Visakha Dairy LHS, Big irrigation pond RHS, Rangampeta settlements	
52	53	Sakshi paper Industry, SRKT warehouse RHS	
53	54	Agricultural fields	
54	55	Agriculture fields/settlements/Few roadside shops	
55	56	Government School RHS, roadside shops, Junction with NH-5	

Appendix 4: Details of Existing Borrow Areas

Details of Borrow Areas

B. A. No.	Chinage (km)	Lead (km)	Side (LHS/RHS)	Ownership Details	Available Quantity
B.A-1	27+000	1.5	RHS	Mr.Baburao & Co., Peddapuram (V), Samarlakota (M), Ph: 09441780456	20 Acr
B.A-2	33+700	0.2	RHS	Mr. Ramraj, Peddapuram (V), Samarlakota (M) Ph:09989555688	25 Acr
B.A-3	34+800	0.2	LHS	Govt. Land., Chowdapalle Village	Adequate
B.A-4	38+500	0.4	LHS	Govt. Land., Surempalem Village	Adequate
B.A-5	39+900	0.4 & 0.7	LHS	Govt. Land., On Anuru Kotturu Rd. Ramesampeta Village	Adequate
B.A-6	5+000	0.2	RHS	Pvt. Land., Vadisaleru Village.	-
B.A-7	54+950	0.4	RHS	Govt. Land, South Thirupathi Rajampuram	15 Acr

Appendix 5: Environmental Survey along Sub Project Length

ENVIRONMENTAL SURVEY
Practical View of the Community about Environmental Scenario

Km: From - Samalkota To - Rajanagaram Team No- 2

Q.1 What do you think about the quality of water from ponds, wells, rivers or canal in your area?
Good
Satisfactory - **Satisfactory**
Polluted

Q.2 if the quality of water is polluted /poor then in your opinion what are its reasons?
Ingress of industrial effluent in the source
Sewage leakage/discharge in the source
Animal water holes **- Yes**
Rain water storage **- Yes**
Others, please specify

Q.3 Is the noise level in your area disturbing / irritating?
Yes
No **- No**

Q.4 If the Noise level is disturbing / irritating then in your opinion, it is due to
Vicinity of industry
Vehicular Traffic
Construction work - **Yes**
Work shop / scooter repair shop -
Aviation zone
Others, please specify

Q.5 How, in your opinion, the noise level can be brought to satisfactory level in your area?
Using the Machinery equipment, which causes less noise as well as the Good condition certificate from the authorities concerned.

- Is the quality of air, which you breathe, is healthy and clean?
  Yes **Yes**
  No

- If not, then what are the reasons?
  Due to vehicular pollution
  Due to Industrial pollution
  Due to poor sanitation **Not Applicable**
  Due to tanneries in the vicinity
  Due to domestic smoke
  Others, please specify

  Are there any places of Archaeological / historical importance in your vicinity? If yes, please give details. : **Furnished in the Report**

Is there any previous history of natural disaster viz. Floods, Drought, earthquake etc. in your area? If so, give details with year of occurrence and damage.

Location: Year:

Flood Yes / No
Drought Yes / No
Earthquake Yes / No

Are any rare species of Birds, Animals etc. visiting your area during winter? If so, please give details and locations

Name of the Species Location

Do you have any market place etc. in your areas and it is likely to be affected by proposed expansion of road? If yes, then which site do you suggest for relocation of the markets. **Yet to be decide**

Do you have any suggestion to improve the Environment w.r.t. Air, Water and Noise in your area?

Follow & implement the pre-cautions mentioned in the report during the work execution

Particular	**Name**	**Sign/Date**
Recorder	D.Swamulu	26.09.2015
Scrutinizer	A.Madhav Reddy	28.09.2015

Appendix 6: Public Consultation for Rajanagram – Samarlakota Road

SAMARLAKOTA –RAJANAGARAM ROAD PUBLIC CONSULTATION AT RANGAMPETA

Venue: Sri Shuba Kala Vedhika at Rangampeta
Date: 10-10-2015
Time:
11.00 AM

Participants:

From the Government Department (GoA.P.) : Mr.John Sudhakar, Executive Engineer, A.P. Road Development Corporation (APRDC),Rajahmundry Division.

From the DPR Consultants : Er.A.Madhava Reddy, Environmental Specialist , Mr .P. Devaraju, Social and R&R Specialist, Mr. Praveen Technical Expert. **Public Participated : Potential Project Affected Persons**

The Village heads, Public Representatives,The Residential House Owners,Land owners, Retried Government Employs, Shop Owner's, Housewife's, Widows,Village Youth groups,Agriculture Labours, Business Men's, Private Employs, Government Employs ,Vulnerable People and etc.

The Participants List is in closed with Name of the Person, Nature of Affecting Designation with Mobile numbers with Signature.

The Villagers Participated from the Affected Villages at Rangampeta Venue are: Peddapuram, Samarlakota, Valuthimmapuram, Surampalem, Remeshampeta, Kotapadu, Ragampeta and Vadiseleru. Near about 150 Persons attended The Public Consultation and Participated.

The Public Consultation convened by the Rangampeta Vice-President P.V. Nageshwarrao, as the Chair Person of the Meeting.

The APRDC Executive Engineer,Sri .K.John Sudhakar Presided as the Chief Guest of the Meeting .The Social and Environmental Experts and Technical Team from Roughton and Satra Consultants participated.

The Village Representatives G.Shymulu, V. Giribabu, V.Veerabadrarao, P.Ramchandrarao, S.Surya Chakravathi, CH.Sathya Narayana, K.Chinna Venkatarao, K.Hari Ramakrishna and Others Participated.

The Public Consultation started at 11:00 AM with the WEL-COMING Speech .The Executive Engineer narrated the importance of VCIC project corridor to the participants and requested every participants to express their views, opinion, suggestions, and objections regarding the proposed road either social or environmental issues.

The Social Environmental and Technical Team of Roughton and Satra consultants, explained clearly about the project social ,environmental issues and nature of affecting of settlements, common property resources(CPRs) ,water bodies, trees, and etc,. The Technical Expert informed about the technical specification of proposed road such as existing RoW and proposed

RoW, Curves improvements and importance of usage of existing ADB Road and the proposed RoW at village sections in order to reduce the affecting settlement and L A to the participants. The Chair Person requested the participants to respond one by one based on the nature of affecting. The participants positively responded and started questioning, expressing their views, suggestions, alternative practices etc.

The entire program was exclusively video graphed with audio recording, right from the starting of the programme to the disbursing of participants. In this records the participants voice captured and documented in the form of compact disk(CD)s ,the local media also covered the programmed in major Telugu newspapers.

Issues Discussed in the Public Consultations are:

1. Brief introduction of the project, importance ,implementation and funding agency.
2. Loss of structure like Residential, Commercial, Residential &Commercial, PRs and others.
3. Loss of Agriculture Lands.
4. Compensation of for the affecting structures and lands.
5. Affecting of CPRs.
6. Resettlements and Rehabilitation sites.
7. Road safety and health (HIV/AIDS).
8. Water bodies affecting.
9. Gender issues.
10. Vulnerable persons,
11. Other issues

Suggestions:

Based on the discursions the information and suggestions from public are:

1. The participants requested and appeal to lay the purposed road within 35 meters as the RoW. It is because during the formation of existing ADB road , period 1993-1994 most of the people lost their livelihood , structures disturbed and agriculture land acquired without paying compensation to the villagers .All the farmers , voluntarily surrendered their agriculture lands ,settlements to the government for laying of the existing road. It shows that the people of this villages have faced troubles in all respects and this time they do not want to face any more troubles.
2. The compensation should be given on far with the market value to the residential lands, where the present market value all along the road settlements is around Rs.45,000 / to Rs.50,000/ per square yard.
3. For the families those who are supposed to be Re-locate should be compensated with house sites, and house constructions, and other benefits.
4. Every displaced Re-location person should get the equal compensation whether Title-Holder or Non-Title holder/Encroacher, irrespective of position.
5. The present agriculture land market values fluctuates from Rs.1 Crore to Rs.1.5 Crores per acre land, whereas the government rate is Rs.18 Lakhs per acre. So in this situation the compensation should be on far with the market value.
6. The CPRs to be taken care by the authority concerned without violating any specifications.
7. The health centers can be establish at junctions, where settlements are more and there is need to provide the health facilities.

8. The affecting water bodies such as irrigation tanks, ponds, canals, local streams if any are affecting should be taken care by the concerned authorities to restore the affecting structure respectively.

For more information we can refer the attached CDs. The original public consultation minutes, attendance sheet, photographs are being enclosed with this report.

PUBLIC CONSULTATION AT RAMASWAMIPETA

Venue: Ram swami Temple
Date: 10-10-2015
Time: 04.00 PM

Participants:
From the Government Department (Govt. of. A.P.) : Mr.John Sudhakar, Executive Engineer, A.P. Road Development Corporation (APRDC), Rajahmundry Division.

From the DPR Consultants : Er.A.Madhava Reddy, Environmental Specialist , Mr .P. Devaraju, Social and R&R , Specialist, Mr. Praveen Technical Expert. **Public Participated: Potential Project Affected Persons**

The Village heads, Public Representatives, The Residential House Owners ,Land owners, Retried Government Employs, Shop Owner's, Housewife's, Widows, Village Youth groups, Agriculture Labours, Business Men's, Private Employs, Government Employs ,Vulnerable People and etc.

The participants list is en closed with name of the person,nature of affecting designation with mobile numbers with signature.

The villagers participated from the affected villages at Ramaswami temple Venue are Peddapuram, Samarlakota, Valuthimmapuram, Surampalem, Remeshampeta, Kotapadu, Ragampeta and Vadiseleru. Near about 150 Persons attended The Public Consultation and Participated.

The Public Consultation convinened by the Ramaswamipeta President .Subramanyaswar , as the Chair Person of the Meeting.

The APRDC Executive Engineer,Sri .K .John Sudhakar President as the Chief Guest of the meeting .The Social Environmental and experts technical team from Roughton and Satra participated.

The village representatives Dasari Apanna, G. SubbaRao, V.Apparao B.Badrinarayana, K.Ramu, P.Subramanya Swmi, D.Apparao, Ramakrishnna .P.Ramayamma, Ms.Victoria rani,Nilapala Pakeer, P.Raju,Ms.Lavanya ,Ms.Suguna and others participated.

The Public Consultation started at 04:00 PM with the WEL-COMING Speech .The Executive Engineer narrated the importance of VCIC project corridor to the participants and requested every participants to express their views, opinion, suggestions, and objections regarding the proposed road either social or environmental issues.

The Social Environmental and Technical Team of Roughton and Satra consultants, explained clearly about the project social ,environmental issues and nature of affecting of settlements, common property resources(CPRs) ,water bodies, trees, and etc,. The Technical Expert informed about the technical specification of proposed road such as existing RoW and proposed RoW, Curves improvements and importance of usage of existing ADB road and the proposed RoW at village sections in order to reduce the affecting settlement and L A to the participants. The Chair Person requested the participants to respond one by one based on the nature of affecting. The participants positively responded and started questioning, expressing their views, suggestions, alternative practices etc.

The entire program was exclusively video graphed with audio recorded right from the starting of the programme to the disbursing of participants. In this records the participants voice captured and documented in the form of compact disk(CD)s ,the local media also covered the programmed in major Telugu newspapers.

Issues Discussed in the Public Consultations are:

1. Brief introduction of the project, importance, implementation and funding agency.
2. Loss of structures like Residential, Commercial, Residential & Commercial, CPRs and others.
3. Loss of Agriculture Lands.
4. Compensation for the affecting structures and lands.
5. Affecting of CPRs.
6. Resettlements and Rehabilitation sites.
7. Road safety and health (HIV/AIDS).
8. Water bodies affecting.
9. Gender issues.
10. Vulnerable persons,
11. Other issues

Suggestions:

1. The participants express that the present village site has been donated by the one of the land lord by name Ramaswami. The villagers are economically, educationally very poor.
2. In This village nearly 30 families are affecting and expecting fair compensation to be provided to these families.
3. For Re-located persons, the house site should be provided near to the village only with house construction cost.
4. Under the single roof 2 to 3 families are sating at present, as does not have economical, conditions to purchase or live separately. These cases to be considered at the time of compensation considering major sons, or daughter in-laws living together should get separate compensation.
5. During construction the commercial families losing their business, these to be compensated with better employment or livelihood generation.
6. As the road divides the village two parts it is difficult to cross the school children's, .Hence the underpass may be constructed to restrict or safe guard the anticipated accidents.
7. The CPRs such as school building, 3 Temples, 1 Damping yard and 1Grave yard are affecting these should be properly taken care with high compensations, specifications.
8. Special compensation expecting for vulnerable under this project

SAMARLAKOTA – RAJANAGARAM ROAD PUBLIC CONSULTATIONS REPORT At RANGANPETA VILLAGE Date: 10-10-2015 At 11.00 AM

The Chairperson of Rangampeta Village Mr.Sri.P.V.Nageshwar rao inaugurated the meeting

The Executive Engineer Mr.Sri.K.John Sudhakar Narrated the Importance of VCIC Project

The Environment Specialist Mr.Sri.A.Madhava Reddy Explained Social&Environmental issues of VCIC Project

The Technical Specialist A.Praveen Explained Technical issues of the Road

Participation of the Residential Effected Person of Rangampet village Express his Opinion

Vulnerable person & Agriculture Labour Expressing her issues and requesting for proper resettlement

The Participation of Project affected Persons and Others in the Public Consultation

SAMARLAKOTA – RAJANAGARAM PUBLIC CONSULTATIONS AT RAMASWAMIPETA
Date: 10-10-2015 At 4.00 PM

The Executive Engineer Mr.Sri.K.John Sudhakar Narrated the Importance of VCIC Project

The Participation of Project affected Persons and others in the Public Consultation

The Environment Specialist Mr.Sri.A.Madhava Reddy Explained Social & Environmental issues of VCIC Project

Participation of the Residential Effected Person of Ramaswamipeta village Express his Opinion

Participation of The Tenant Effected Person of Ramaswamipeta village Express his Opinion

Participation of Residential Effected widow women of Ramaswamipeta village Express her Opinion

The Participation of Project affected Persons and his blind son Express his problems

Participation of the Residential Effected widow women and her blind child of Ramaswamipeta village Express her views

The Vulnerable person (Blind) participated and requesting for better compensation

Participation of the Village vice-president Ramaswamipeta Express village problems

SAMARLAKOTA – RAJANAGARAM CPRs COMING UNDER ROAD (Sample Photos)

CPRs Sharadhamba Temple At Samarlakota Village Chainage 0+860

CPRs Durga Matha Temple At Valuthimmapuram Village Chainage 7+570

CPRs Ganapathi Temple At Rameshampeta Village Chainage 14+520

CPRs Hanuman Temple At Rameshampeta Village Chainage 14+840

CPRs Bus-Stand At Kotapadu Village Chainage 17+370

CPRs MPPS At Kotapadu Village Chainage 17+280

CPRs Sai Baba Temple At Vadiseleru Village Chainage 26+230

CPRs Durga Devi Temple At Vadiseleru Village Chainage 26+510

CPRs Vedhamatha Temple & Haman Temple At Vadiseleru VillageChainage 26+500

CPRs Damping Yard At Ramaswmypeta Village Chainage 27+850

Appendix 7: Environmental Management Plan

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 8: Environmental Monitoring Plan

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 9: National Ambient Air Quality Standards

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 10: National Drinking Water Standards

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 11: Criteria for Fresh Water Classification

ENVIRONMENTAL MANAGEMENT PLAN

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
PRE-CONSTRUCTION PHASE					
1	Tree cutting	Cutting of about 4000 number of trees during site clearance	• Restricting tree cutting within construction limit • Avoiding tree cutting at ancillary sites • Providing and maintaining compensatory plantation of two times of cutting • All trees to be cleared will numbered clearly marked with paint	Forest Dept. / APRDC	APRDC
2	Removal of utilities	Work site clearance	• Necessary planning and coordination with concerned authority and local body • Prior notice to and consultation with concerned authority, local body and public to be affected so as to ensure that work does not get affected and impact on public is minimum • All above ground utilities that will be shifted will clearly marked with paint to guide workers	Concerned utility agencies / APRDC	SC/ APRDC
3	Contractor Preparatory Works (Upon issuance of Notice to Proceed)		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/APRDC 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) operation of crushers and hot mix plants, ii) transport and storage of hazardous materials (e.g. fuel, lubricants, explosives), iii) waste disposal sites, iv) temporary storage location, iv) water use, and v) emission compliance of all vehicles. Arrangements to link with government health programs on hygiene, sanitation, and prevention of communicable diseases will also be included in the action	Contractor	APRDC

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
			plan. 5) EO will submit for approval of CSC-ES the construction camp layout before its establishment.		
4	Religious places	Work site	• Suitable mitigation measures are incorporated in resettlement plan.	APRDC	SC / APRDC
CONSTRUCTION PHASE					
1	Air Pollution	Construction plants, equipment and vehicles	Refer **Appendix 13** and **Appendix 14**	Contractor	SC/APRDC
		Temporary diversion	• Maintaining diversion and detour for road traffic in good shape and traffic regulated. • Regular sprinkling of water, as necessary.	Contractor	SC/APRDC
		Dust during earth works or from spoil dumps	• 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. • Refer **Appendix 15**	Contractor	SC/APRDC
		Borrow pits	Refer Appendix 4	Contractor	SC/APRDC
		Storage of construction materials	• Sprinkling of water as necessary.	Contractor	SC/APRDC
2	Water Pollution	Construction of Bridges or Culverts - Earthwork and marginal spillage of construction materials causing temporary turbidity and suspended solids	• Constructing and maintaining diversion channel, sedimentation basin, dykes, etc. as may be required to temporarily channelise water flow of streams / river • Storage of construction material and excavated soil above high flood level	Contractor	SC/APRDC

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
		Construction vehicles	• Strictly avoiding cleaning / washing of construction vehicle in any water body	Contractor	SC/APRDC
		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	SC/APRDC
		Seepage from Construction Debris	• Refer **Appendix 15**		
		Construction camp and workers' camp	• Refer **Appendix 14**	Contractor	SC/APRDC
3	Ground water Pollution	Wastewater logging	• All wastewater will be diverted to a ditch that will be managed for the period of construction and after construction such ditches will be filled and restored to original condition.	Contractor	SC/APRDC
		Borrow pit excavation	• Excavation of borrow pit should not touch the aquifer	Contractor	SC/APRDC
		Human wastes and wastewater at construction camp	• Providing septic tanks for treating sewage from toilets before discharging through soak pits • Locating soak pits at least 50m from any ground water sources • Decanting and or controlled disposal of oil and grease as collected at collection tanks of maintenance yard and chemical storage areas Refer Appendix **14**	Contractor	SC/APRDC
4	Noise Pollution and Vibration	Vehicles and Construction machinery	• **Site Controls:** Stationary equipment will be placed along uninhabited stretches as per distance requirements computed above as far as practicable to minimize objectionable noise impacts. • **Scheduling of Project Activities:** Operations will be scheduled to coincide with period when people would least likely to be affected. Construction activities will be avoided between 9 P.M. and 6 A.M. near residential areas. • **Protection devices** (ear plugs or ear muffs) will be	Contractor	SC/APRDC

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
			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. • Blasting operations will be carried as per **Appendix 16**. • Movements of heavy construction vehicles and equipment near public properties will be restricted. • Comply with siting criteria for stone crushers, Hot Mix Plant/s (HMP) and concrete batching plant/s (CBP), and installations and maintenance of pollution control devices as mentioned in **Appendix 13**		
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 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 • Providing bulk bituminous storage tank instead of drums for storage of bitumen and bitumen emulsion • Providing impervious base at bitumen and emulsion storage area and regular clearing of any bitumen spillage for controlled disposal • Reusing bitumen spillage • Disposing non-usable bitumen spills in a deep trench providing clay lining at the bottom and filled with soil at the top (for at least	Contractor	SC/APRDC

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
			0.5 m) • Refer **Appendix 13** and **14**		
		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	SC/APRDC
		Borrow pits	• • Controlled operation and redevelopment of borrow pits to avoid water logging and land contamination	Contractor	SC/APRDC
6	Loss of topsoil	All construction sites	• The topsoil from all areas of cutting and all areas to be permanently covered shall be stripped to a specified depth of 150 mm and stored in stockpiles. At least 10% of the temporarily acquired area shall be earmarked for storing topsoil. • The stockpile shall be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile be restricted to 2m. To retain soil and to allow percolation of water, the edges of the pile shall be protected by silt fencing. • Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles shall be covered with gunny bags or tarpaulin. • It shall be ensured by the contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles. Such stockpiled topsoil will be returned to cover the disturbed area and cut slopes. Residual topsoil will be distributed on adjoining/proximate barren/rocky areas as identified by the SC in a layer of thickness of 75mm – 150mm. Top soil shall also be utilized for redevelopment of borrow areas, landscaping along slopes, medians and incidental spaces.	Contractor	SC/APRDC
7	Compaction of soil	All construction sites	• Construction vehicle, machinery and equipment shall move or be stationed in the designated area (RoW or CoI, as applicable) only. While operating on temporarily acquired land	Contractor	SC/APRDC

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
			for traffic detours, storage, material handling or any other construction related or incidental activities, topsoil from agricultural land will be preserved as mentioned above.		
8	Ecology	Site clearance	• Restricting tree cutting within corridor of impact	Contractor	SC/APRDC
		Ancillary sites	• Minimizing tree cutting and vegetation clearance during site selection • Preservation of trees within ancillary sites and avoiding impact on forest resources by providing buffer area from boundary of PF, RF, national park and wildlife sanctuary of 1km for locating construction plants, construction camp and 500 m for borrow areas • Preservation of trees of ecological, socio-cultural importance • Providing cooking at camp for discouraging and prohibiting use of fire-wood i.e. cutting of trees by the workers.	Contractor	SC/APRDC
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 • Providing earth link circuit breaker (ELCB) for all electrical connections • Maintaining first aid at construction sites • Maintaining emergency response system • Refer **Appendix 14**	Contractor	SC/APRDC
10	Accidents and safety	Construction sites	• Providing and maintaining traffic management comprising diversion; warning, guiding and regulatory signage; channelisers and delineators; lighting, flagmen; dust control system etc. as specified in the contract. • 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	SC/APRDC
		Construction camp	• Conducting periodic mock drilling on critical accident prone activities	Contractor	SC/APRDC

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
			• Conducting periodic training for all personnel working at plant site		
OPERATION PHASE					
1	Air Pollution	Vehicular gaseous emission	• Periodicals monitoring of air pollutants and if values exceed the standard limits, suitable mitigation measures to be taken.	APRDC	SPCB and Traffic Police
2	Noise Pollution	Vehicular	• Periodical monitoring of noise level will be carried out. If values exceed the standard limits, suitable measures will be taken. • Providing and maintaining signage on noise regulation at silence zones	APRDC	SPCB
3	Road Safety	Traffic and Vehicles	Maintenance of standard Highway Safety Signage and Traffic Management.	APRDC	APRDC and Traffic Police
		Lighting	Maintenance of road / flyover lighting.	APRDC	APRDC/Traffic police
4	Tree plantation	-	Roadside tree plantation two times of cutting.	Forest Dept. / APRDC	APRDC
5	Contamination of Soil and Water Resources from Spills due to traffic & Accidents	Vehicular Traffic	• Contingency plans to be in place for cleaning up of spills of oil, fuel and toxic chemicals. • Spill of oil, fuel and automobile servicing units without adequate preventive systems in place to be discouraged.	APRDC	APRDC
6	Maintenance of drainage system	-	• The drains will be periodically cleared to maintain storm water flow. • Road drains will be cleared of debris before onset of every monsoon.	APRDC	APRDC

Appendix 12: CPCB Noise Level Standard

ENVIRONMENTAL MONITORING PLAN

Component	Project Stage	MONITORING						RESPONSIBILITY	
		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)**	Hot mix plant /Batching plant (1 location) and 1 location where construction is ongoing	Once in a Quarter and as may be instructed by SC (for 3 years) other than monsoon	Continuous 24 hourly twice a week for	Contractor through approved monitoring agency	SC, APRDC
	Operation Stage	Same as above	Same as above	Same as above	2 locations throughout the stretch during operation	Once in a year other than monsoon season	Continuous 24 hourly twice a week	APRDC through approved monitoring agency	APRDC
Water Quality	Construction stage (surface water)	pH, temperature, turbidity, DO, BOD, COD, TDS, TSS, Oil & Grease	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 **(Appendix 8)**	2 locations trough out the corridor will be monitored till end of construction period	Once in a Quarter for 3 years	-	Contractor through approved monitoring agency	SC, APRDC

Component	Project Stage	MONITORING						RESPONSIBILITY	
		Parameters	**Measurement Method**	**Standards**	**Location**	**Frequency**	**Duration**	**Implementatio**	**nSupervision**
	Construction stage (ground water)	All parameters of drinking water		IS: 10500, 1991 (**Appendix 10**)	1 location at each camp site Camp site	half yearly for 3 years	-	Contractor through approved monitoring agency	SC, APRDC
	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	2 location trough out the corridor will be monitored till end of construction period	half yearly for one year	-	APRDC through approved monitoring agency	APRDC
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)**	As directed by the Engineer (At maximum 2 locations)	Once in a Quarter for 3 years	Readings to be taken at 15 seconds interval for 15 minutes every hour and then Leq should be estimated.	Contractor through approved monitoring agency	SC, APRDC

Component	Project Stage	MONITORING						RESPONSIBILITY	
		Parameters	**Measurement Method**	**Standards**	**Location**	**Frequency**	**Duration**	**Implementatio**	**nSupervision**
	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**)	2 location throughout the stretch during operation	Half-yearly for one year	Continuous 24 hours/ or for 1 full working day	APRDC through approved monitoring agency	APRDC
Tree plantation	Operation stage	Rate of Survival	Physical verification	Ensuring at least 75% survival	Area of plantation along the road will be specified by APRDC	For three years	-	Forest Dept.	APRDC

Appendix 13: Management of Construction Plants, equipment and vehicles

MANAGEMENT OF CONSTRUCTION PLANTS, EQUIPMENT AND VEHICLES PLANT MANAGEMENT

Purpose

- To ensure that statutory / regulatory requirements are complied with
- To ensure that safeguard measures are taken to avoid / mitigate / minimize environmental impacts

Site selection criteria

Following criteria are to be met wherever possible for crusher and HMP:

- 1.5 km away from settlement, school, hospital on downwind directions
- 1.5 km from any archaeological site
- 1.5 km from ecologically sensitive areas i.e. forest, national park, sanctuary etc.
- 1.5 km from rivers, streams and lakes
- 500 m from ponds
- 250 m from State and National Highway boundary
- away from agricultural land
- preference to barren land

Concrete batching plant should be located at least 200 m from the settlement, preferably on leeward side, whenever possible.

The format for submission of details to the Engineer during finalisation of plant site is given as follows (**Site identification for Plants)**.

Statutory Requirements

- Obtaining Consent-for-Establishment (CFE) under Air and Water Acts from the State Pollution Control Board (SPCB) before start of installation
- Obtaining Consent-for-Operation (CFO) under Air and Water Acts from the State Pollution Control Board (SPCB) before start of commissioning and trial run
- Complying with the terms and conditions laid down in the CFE and CFO, which generally include providing metallic road inside plant campus for movement of vehicles, plantation, periodic (monthly) pollution monitoring i.e. ambient air, noise and stack emission
- The suspended particulate matter contribution value at a distance of 40 m from a controlled isolated as well as from a unit located in a cluster should be less than 600 $\mu g/m^3$ or as shall be prescribed by SPCB.
- Obtain certificates from manufacturer for Type Approval and Conformity of Production for Diesel Generator (DG) set/s.
- For DG sets of capacity up to 1000 kVA, the noise level at 1 m from the enclosure surface shall not exceed 75 dB (A).

Pollution control measures

- Dust control measures in stone crusher plant i.e. water sprinkling at primary crusher and secondary crusher, conveyor & return belts, covered conveyor system, chute at outfall of aggregates, cyclone separator, wind braking wall etc.
- For HMP, ensure adequate stack height as stipulated in CFE, install emission control devices such as bag house filters, cyclone separators, water scrubbers etc., as attached with the plant by the manufacturer or stipulated in CFE.

- Prefer bulk bitumen storage with mechanized handling facilities that storage in drums with manual operation at HMP to prevent / minimize bitumen spillage and thereby contaminating soil and ground water.
- Impervious platform for storage of bituminous and other liquid hazardous chemical
- Bag house filter / multi-cone cyclone for emission control. For bag house, cartridge filters reported to be more efficient than fabric filters
- Pollution control measures for Diesel Generator (DG) set i.e. stack height, acoustic enclosure etc.
- Greenbelt along the periphery of plant site.

SITE IDENTIFICATION FOR PLANTS

Construction Stage Report: One Time Date:

Installed Capacity: Location of Plant (Ch. & offset):

Sl. No.	Item / Requirement	Details as per Actual
1	Predominant wind direction	
2	Size and area of the proposed plant site (m xm & Sq.m)	
3	Present land use (barren or fallow land having no prominent vegetation should be preferred)	
4	No dwelling units within 1.5km from the plant boundary in downwind direction	
5	Distance of nearest boundary of State Highways and National Highways (should be at least 250 m from the plant boundary)	
6	Sensitive areas such as religious places, schools/educational institutions, reserved / protected forest, sanctuary etc. within 1.5 km (should be nil)	
7	River/Stream/Lake within 1.5 km and ponds within 500 m	
8	No other trees of girth>0.3m present and will be affected (no tree should be affected)	
9	Width of Haul road (m)	
10	Total Length of Haul Road (km)	
11	Length of non-metal Haul Road (km) (should be as minimum as possible)	

Documents to be attached:

Site plan showing wind direction, haul road and other environmental features.

Certified that the furnished information is correct and all relevant information as required is attached.

Contractor:

Appendix 14: Camp Site Management

CAMP SITE MANAGEMENT

A. Purpose

1. Campsite of a contractor represents the single potentially most polluting location during implementation of any road project. Air pollution may be caused by emissions from Crushers, Hot-Mix, and Concrete Batching Plants. Water pollution may be caused by discharge of sediment, oil & grease, and organics laden run-off from these plants and their ancillary facilities as well as workshops, residential quarters for the labor. Land may be polluted due to indiscriminate disposal of domestic waste or (accidental) release of hazardous solids from storage areas.

2. While the installation and operation of Crushers and Hot-Mix Plants are regulated by the respective Pollution Control Boards, the other sources described above usually do not appear to be causes of significant concern. Items to be considered for labor camps are mentioned briefly in Clause 105.2 (as part of 105: Scope of Work) of the Ministry of Road Transport and Highways (MoRTH) publication: Specifications for Road and Bridge Works. Some specific requirements for labor accommodation and facilities are to be met by the Contractor in line with Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. Currently, there is no one-point guidance regarding the environmental management aspects of the Contractor's campsite. This guideline on Campsites is designed to fill this gap.

B. Scope

3. This guideline covers the Contractors' camp sites – whether used by in-house crew or by any sub-contractors' crew. It covers siting, operation, maintenance, repair and dismantling procedures for facilities for labor employed on project (and ancillary) activities as well as equipment and vehicles. ***It does not include siting, operation, maintenance, repair and dismantling of major plants – Hot-mix Plant, Concrete Batching Plant, Crusher or Wet Mix Macadam Plant.***

C. Siting, Establishing, Operation and Closure of Construction Camp

1. Potential Environmental Impacts

4. Construction camps require large areas for siting facilities like major plants, storage areas for material, residential accommodation for construction labor and supervisors, and offices. Removal of topsoil and vegetation from the land to be utilized for camps is the first direct impact of any such establishment. In addition, local drainage may be impaired if proper drainage is not effected by grading. Other impacts may include damage to ecologically important flora and fauna, if campsites are located close to such areas. Water pollution because of discharge of sediment, fuel and chemicals is also a possibility. Pollution of land due to indiscriminate disposal of construction wastes including scarified pavement, concrete and even substantial quantities of domestic wastes from residential areas can also be potentially disastrous, especially if the site is reverted to its original use after the project (mostly agriculture).

D. Mitigation Measures

1. Siting of Construction Camps

5. The following guidelines will assist the Contractor to avoid any environmental issues while siting construction camps:

i Maintain a distance of at least 1.5 km from boundaries of designated Reserved Forests, Sanctuary or National Park area for locating any temporary or permanent camps.

ii Maintain 1.5 km from river, stream and lake and 500m from ponds

iii Maintain 250 m from the boundary of state and national highways

iv Locate facilities in areas not affected by flooding and clear of any natural or storm water courses.

v Locate campsites in the (most prevalent) downwind direction of nearest village(s). The boundary of the campsite should be at least 1.5 km from the nearest habitation so that the incoming labor does not stress the existing local civic facilities.

vi The ground should have gentle slope to allow free drainage of the site.

vii Recorded consultations should be held with residents of the nearest settlement and/or their representatives to understand and incorporate where possible, what they would like to see within their locality.

2. Establishment, Operation, and Closure of Camps

i The facilities within the camp site should be laid out so that the separation distances suggested in other guidelines are maintained. A notional lay-out of the facilities except the major plants is included in this guideline.

ii Topsoil from the area of the plant shall be stored separately for the duration of the operation of the camp and protected from being washed away, unless agreed otherwise in writing with the owner. If stored, it will be returned on to its original location at the time of closure of the site.

iii The Contractor shall prepare, make widely available (especially to staff responsible for water and material management), and implement a Storm water Management Plan (SWMP) for (all) the site(s) following approval of the same by the Engineer. .

iv The Contractor shall prepare an Emergency and Spill Response Plan as per the requirements of Appendix 1 to Clause 501 of Specifications for Road and Bridge Works to cover the spillage of bitumen and/or chemicals like retarders, curing compounds, etc.

v The Contractor shall prepare a Waste Management Plan describing the types and quantities that are likely to be generated from within the camp site, with the period and duration during the construction schedule; methods to be adopted to minimize these; methods of removal, treatment and (on-site or off-site) disposal for each type; as well as location of final disposal site, if any.

vi The Contractor shall provide safe ingress and egress for vehicles from the site and public roads and shall not impact existing through traffic.

vii Water tankers with sprayers must be available at the camp site at all times to prevent dust generation.

viii In case of stockpiles of stored material rising higher than wind-breaking perimeter fencing provided, sprinklers shall be available to prevent dusting from the piles during windy days.

ix On completion of works, the Contractor shall restore the site to the condition it was in before the establishment of the campsite, unless agreed otherwise in writing with the owner(s) of the site(s). If such a written agreement has been

made, the Contractor shall hand over the site to the owner(s) in accordance with such an agreement.

E. Equipment and Vehicle-related issues

1. Potential Environmental Impacts

6. The maintenance and repair of equipment and vehicles in Contractor's camp are activities that can have significant adverse impacts if not carried out properly. The concern mainly arises from discharge of wash water contaminated with oil and grease, whether from washing of vehicles or degreasing of equipment and vehicle parts. Vehicle washing, especially dirt from tires, also gives rise to sediment-laden run-off. No such discharges should be directly allowed into surface water bodies since they can be harmful to aquatic species.

2. Mitigation Measures

a. Vehicles

i All vehicles used by the Contractor must have copies of currently valid Pollution Under Control Certificates displayed as per the requirement of the Motor Vehicles Department for the duration of the Contract.

ii All vehicles and equipment will be fitted with silencers and/or mufflers which will be serviced regularly to maintain them in good working condition and conforming to the standard of 75dB (A) at 1m from surface of enclosure.

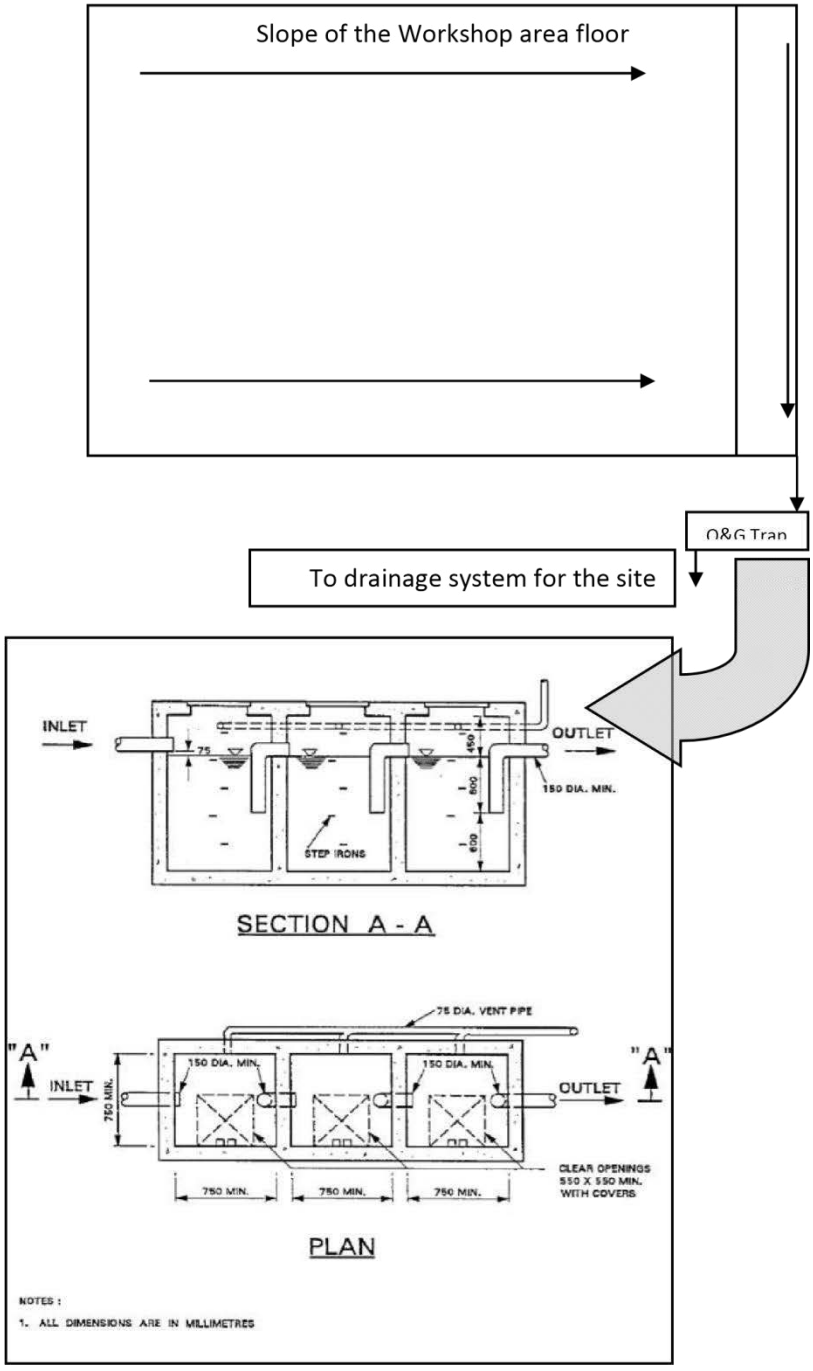
b. Workshop and Maintenance areas

i These areas must have impervious flooring to prevent seepage of any leaked oil & grease into the ground. The area should be covered with a roof to prevent the entry of rainwater.

ii The flooring shall be sloped to from both directions to one corner where an oiland-grease trap with sufficient capacity should be installed. All discharges from the workshop area must pass through the trap to remove the floating oil and grease before entering the drainage system of the site. The trap should be designed to provide a hydraulic residence time of about 20 minutes for the peak hourly discharge anticipated from the area **(as per following figure).**

iii Alternatively, degreasing can also be carried out using mechanical spray type degreaser, with complete recycle using an enclosure with nozzles and two sieves, coarse above and fine below, may be used as shown in the adjacent photograph. This arrangement will require some initial investment and running cost for the pump, but the payback period, in terms of the use of diesel, under Indian conditions, has been reported to be less than 1 year.

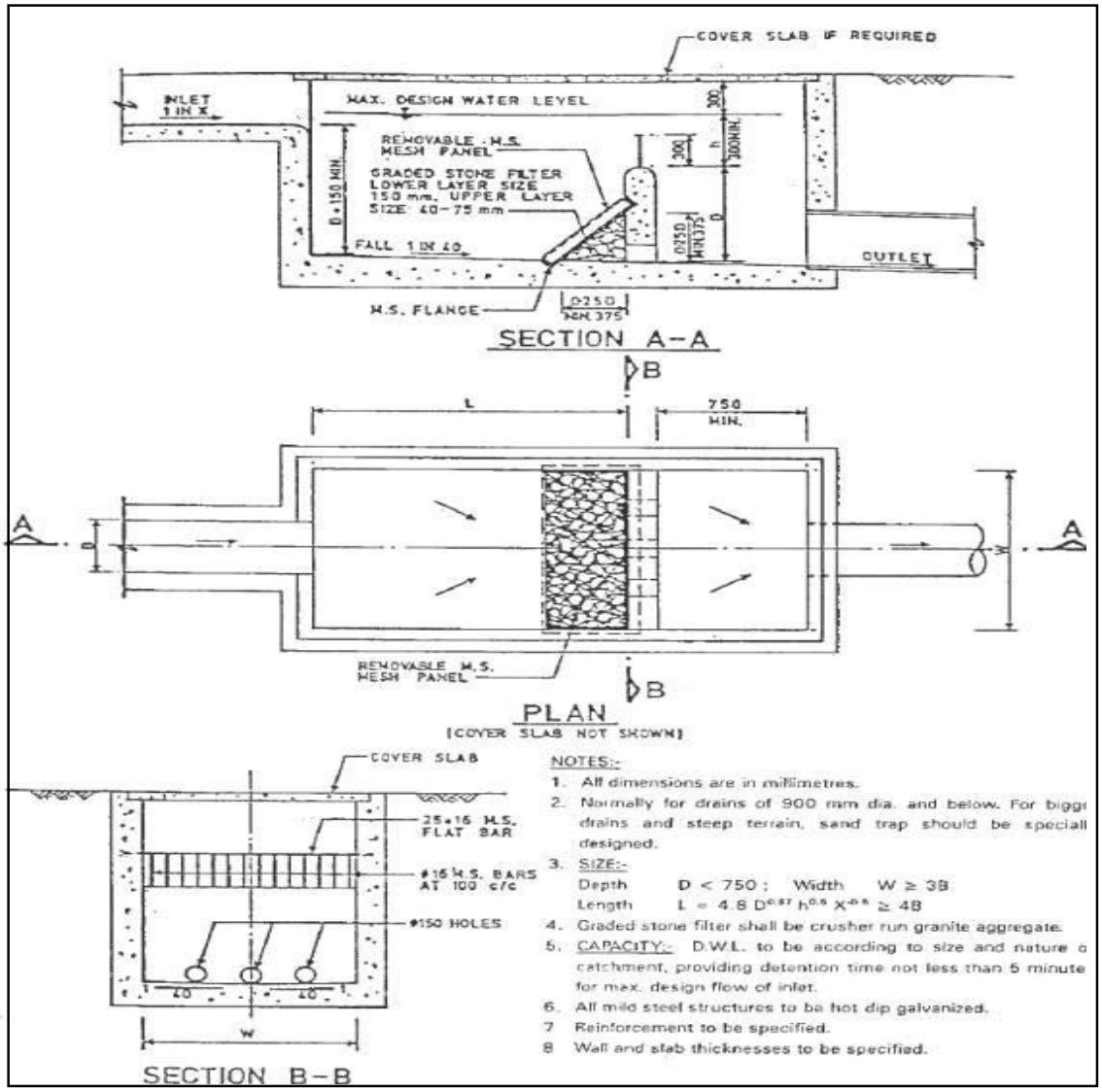
Figure 1: Workshop Area Pollution Control



7. All the waste oil collected, from skimming of the oil trap as well as from the drip pans, or the mechanical degreaser shall be stored in accordance with the Environment Protection (Storage and Disposal of Hazardous Wastes) Rules, 1989. For this purpose, metallic drums should be used. These should be stored separately in sheds, preferably bunded. The advantage of this arrangement is that it allows for accurate accounting in case the waste material is sold to oil waste recyclers or other users like brick-kiln owners who can burn such inferior fuel.

8. A separate vehicle washing ramp shall be constructed adjacent to the workshop for washing vehicles, including truck mounted concrete mixers, if any, after each day's construction is over, or as required. This ramp should have an impervious bottom and it should be sloped so that it drains into a separate chamber to remove the sediment from the wash water before discharge. The chamber should allow for a hydraulic residence time of about 10 minutes for discharge associated with the washing of each truck. **Following figure shows an outline sketch for a sedimentation chamber.**

Figure 2: Sedimentation Chamber for vehicle washing ramp discharge



Facilities for Labour

c. Potential Environmental Impacts

9. The sudden arrival and relatively longer duration of stay of construction crew can cause substantial strain on the existing infrastructure facilities like water supply, sanitation and medical care, especially in rural areas. Pollution from domestic wastes can affect local sources of water

supply and may harm the crew themselves as well as local residents. Improper sanitation and inadequate health care also potential bottlenecks that the Contractor can eliminate with relatively little effort.

d. Mitigation Measures

10. It should be emphasized that the Indian Law requires that the Contractor provide several facilities to for the workers as per Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. Some of the provisions described herein are more stringent to act as benchmark for improved environmental performance of road projects:

i The contractor shall provide free-of-charge temporary accommodation to all the labour employed for the project. The accommodation includes separate cooking place, bathing, washing and lavatory facilities. At least, one toilet will be provided for every 35 people and one urinal will be provided for every 20 persons. More toilets and/or urinals may have to be provided if the Engineer decides that these numbers are insufficient. In case female labourers are employed, separate toilet and urinals will be provided in locations clearly marked “Ladies Toilets” in a language understood by most labourers.

ii The contractor shall ensure the supply of wholesome water for all the labour, including those employed by any other agency working for the contractor. These locations will be marked “Drinking Water” in the language most commonly understood among the labour. In hot season, the contractor shall make efforts to ensure supply of cool water. No water point shall be located within 15 m of any washing place, urinal, or latrine.

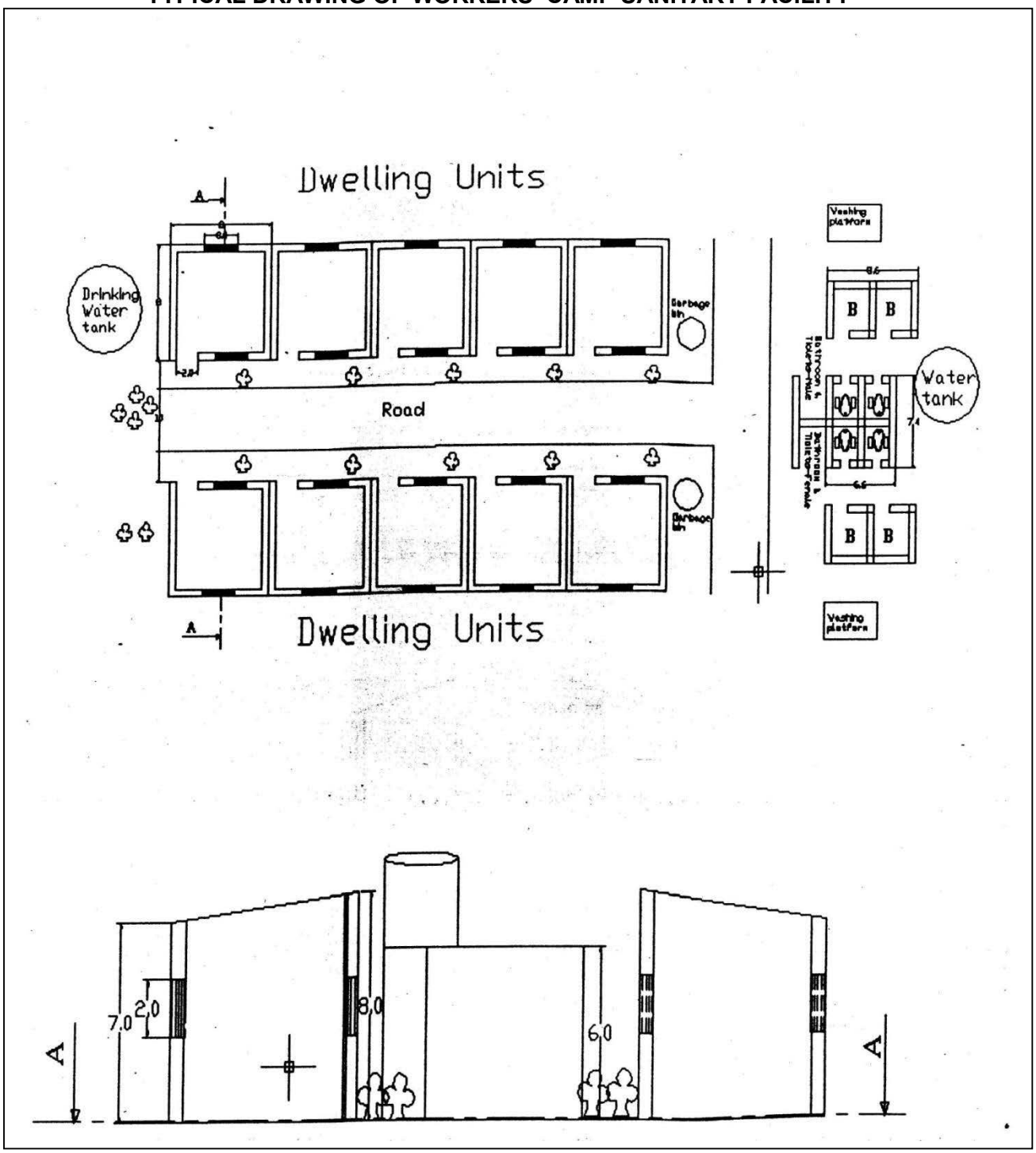
iii The contractor shall ensure that adequate cooking fuel, preferably kerosene or LPG, is available on-site. The contractor will ensure that wood/ coal are not used as fuel on the site. Workers need to be made aware of this restriction. In cases where more than 250 labours are employed, canteen facility should be provided by the Contractor.

iv A crèche must be provided in each campsite where more than 50 female labourers are employed, whether directly or indirectly, for the project or its ancillary activities.

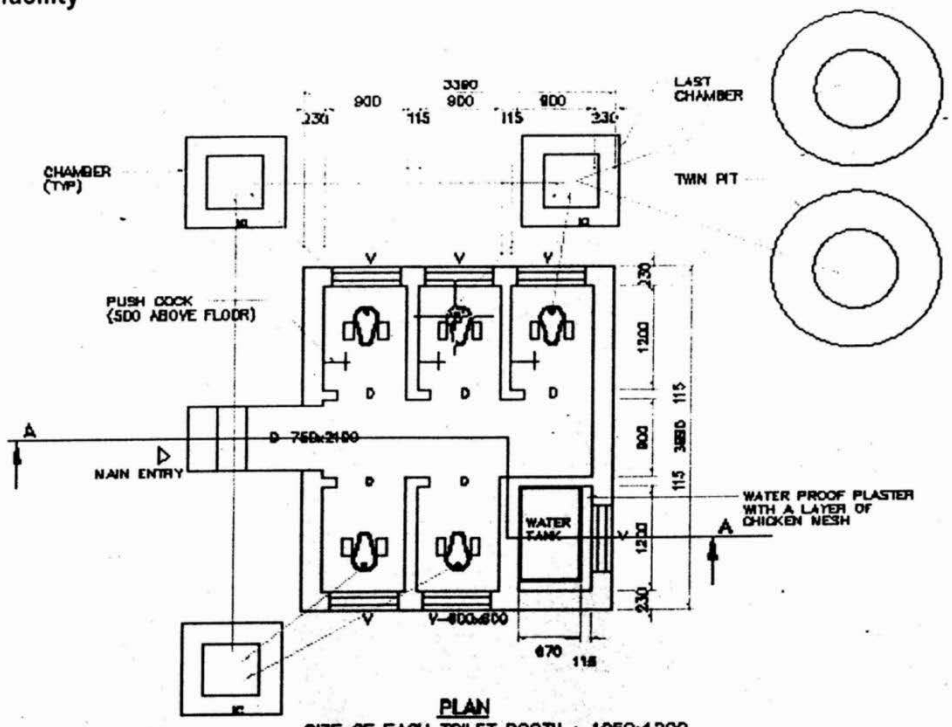
v Contractor must provide adequate facilities for first-aid treatment at the campsite. A doctor / ambulance should be available on call for the duration of project implementation.

vi The contractor shall obtain the approval of the Engineer for these facilities within 30 days of mobilization.

TYPICAL DRAWING OF WORKERS' CAMP SANITARY FACILITY

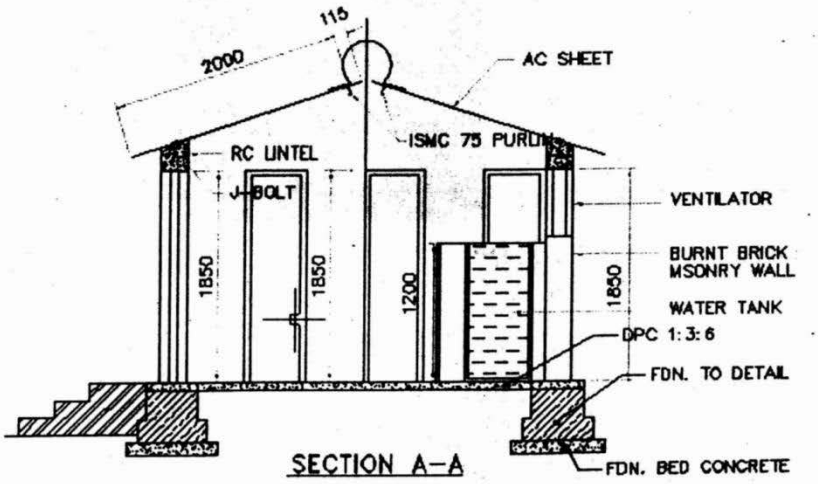


Sanitary facility



PLAN

SIZE OF EACH TOILET BOOTH : 1050x1200
(TYPICAL WITH 8 WC ENCLOSURE FOR SCHOOLS, SHOPPING AREAS)

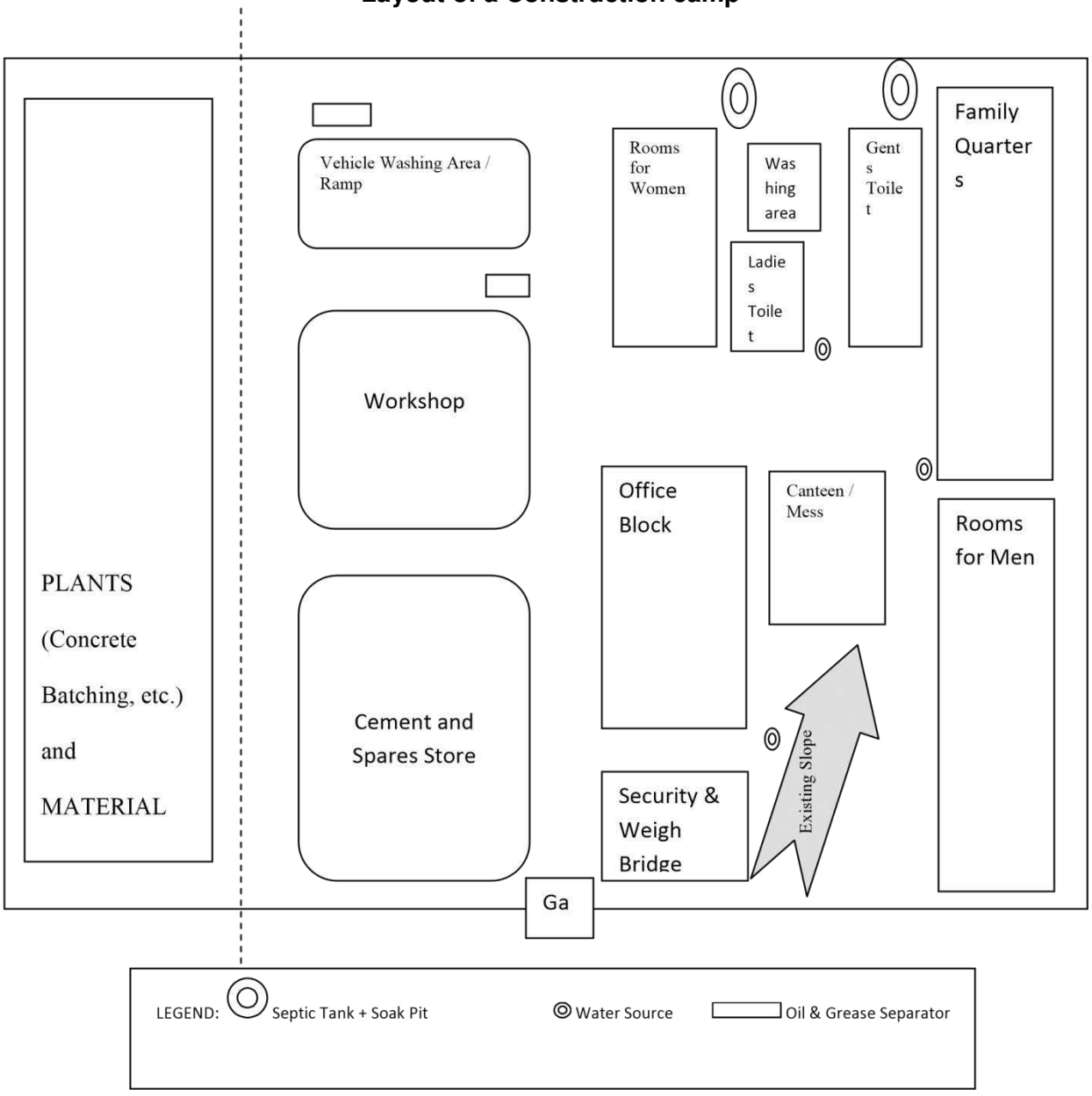


SECTION A–A

NOTES:

1. INSPECTION CHAMBER (IC) 600x600x600 DEEP WITH AIRTIGHT MH COVER
2. SEPTIC TANK & SOAK PIT AS PER SITE CONDITIONS

Layout of a Construction camp



Appendix 15: Management of Construction Waste and Debris Disposal

MANAGEMENT OF CONSTRUCTION WASTE DEBRIS DISPOSAL

A. Purpose

- To maximize re-use of material generated during construction and
- To avoid environmental hazards due to improper disposal of construction waste material.

B. Procedure

1. The following procedures should be followed for upkeep of storage and disposal sites;
   - i Contractor shall maintain register for keeping records on kilometer-wise quantities of material generated during grubbing, stripping, excavation and scarifying;
   - ii Contractor shall re-use construction material to the extent possible based on engineering properties. Possible re-use areas are fill sections, embankment slope, village approach roads etc. Debris without bitumen could be used for backfilling of quarry / borrow areas as recommended by the Engineer. At locations identified for dumping of residual bituminous wastes, the dumping shall be carried out over a 60mm thick layer of rammed clay so as to eliminate the possibility of the leaching of the wastes into the ground water. The contractor shall ensure that the filled area is covered with a layer of preserved topsoil layer of preserved topsoil.
   - iii Contractor shall estimate the chainage-wise quantities of various waste material to be disposed of;
   - iv Contractor shall restrict waste disposal strictly at approved site/s only;
   - v Contractor shall prepare a plan including detailed lay out plan and cross-section for disposal of debris and bitumen waste and get approval of the same by the Engineer;
   - vi Bentonite slurry or similar debris generated from pile driving or other construction activities shall be disposed such that it does not flow into the surface water bodies or form mud puddles in the area;
   - vii Contractor and Engineer shall ensure that disposal areas are properly treated as per agreed plan;
   - viii Contractor and Engineer's representatives shall undertake joint weekly inspection to ensure compliance of various environmental requirements.
   - ix Engineer's representatives shall issue non-compliance if disposal site is not managed as per agreed plan;
   - x All arrangement for transportation during construction including provision, maintenance, dismantling and clearing debris, where necessary will be considered incidental to the work and should be planned and implemented by the contractor as approved and directed by the SC.

C. Site Inspection

2. Weekly joint site inspection shall be undertaken for all the storage areas. The details of attributes, which are to be inspected, are given as follows. The Contractor shall ensure compliance of the requirements.

Details to be inspected for Monitoring Construction Material Reuse & Disposal

Attributes	Requirements
Construction material generation and re-use	Segregating debris and bitumen during generation; Segregating re-usable portion of debris and bitumen and storing preferably near areas of re-use; and Temporary storage of waste material at sites as directed by the Engineer.
Waste disposal	Disposal of waste material at approved disposal site within a week of generation; Disposal site should be properly demarcated; Proper levelling / grading at disposal site/s; Recommended / agreed safeguard measures to avoid ground water contamination by leachate from disposal of scarified material are to be implemented; Recommended / agreed safeguard measures to avoid soil erosion are to be implemented; Recommended / agreed plan for surface treatment of waste disposal site/s are to be implement.