Dr. Srikant Nagulapalli, I.A.S.,
Commissioner,
Capital Region Development Authority & Capital Area (AP CRDA & CA), AMARAVATI
Vijayawada.

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Fax: +918662577357
Mobile:+917095599001
Email: ceo.crda@ap.gov.in
Website: www.crda.ap.gov.in
Address: CRDA Office, Governorpet, Vijayawada-2.

Member Secretary,
State Level Environment Impact Assessment Authority,
A3, Industrial Estate, Sanatnagar,
HYDERABAD – 500 018

Rc. No. 1389 (3)/ LSE/ APCRDA/ 2016 dt. 27 .04.2016

Dear Sir,

Sub: APCRDA & CA – Expansion and modification Interim Government Complex Buildings at Amaravati City, Guntur District, AP – Application for Amendment to Environmental Clearance – Submitted – Reg.

Ref: 1. Order No. SEIAA/AP/GNT/CON/01/2016/18, dated 09.02.2016
2. GOMS No 32, MAUD (CRDA2), dated 11.02.2016,
3. GOMS No 242, MAUD (CRDA2), dated 25.04.2016

0O0

Vide ref 2 above, APCRDA is vested with the responsibility of construction of Interim Government Complex buildings (IGC) at Amaravati City, Guntur District. Vide ref 3 above, Govt of Andhra Pradesh desired to expand the buildings with additional 2 floors.

Vide ref 1 EC has been granted to the project and through this application, amendment to EC is requested.

In this connection, we are submitting the Application for Amendment to Environmental Clearance for "Expansion of Interim Government Complex Buildings" project in Form – I, Form – IA along with plans and annexures in the prescribed format. The application is prepared in accordance with EIA Guidance Manual and MoEF guidelines for submission of application for "Building and Construction Projects".

We request the Authority to consider the application for amendment in the forthcoming SEAC meeting.

Yours faithfully,

COMMISSIONER,
APCRDA, VIJAYAWADA.

Application for Amendment to Environmental Clearance (Form1, Form1A and Concept Plan) of Expansion of INTERIM GOVERNMENT COMPLEX BUILDINGS, Amaravati City, Guntur, Andhra Pradesh

Prepared for

Andhra Pradesh Capital Region Development Authority and Capital Area, Vijayawada, Andhra Pradesh

Prepared by

TATA Consulting Engineers Limited

4th Floor, Tower A, 247 Park, LBS Marg

Vikhroli (West), Mumbai

April 2016

Declaration by TCE

I, hereby, certify that I was a part of the team in the following capacity that developed the above documents

EIA Coordinator Building and Construction Projects

Name: Ashish Deshpande

Signature and Date: 27th April 2016

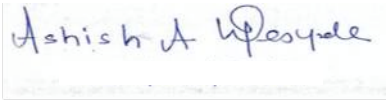
Contact information: aadeshpande@tce.co.in

Phone: 022 61148181

Declaration by the Head of the accredited consultant organization/ authorized person

I, Ashish Deshpande hereby, confirm that the above mentioned experts prepared the documents for Interim Government Complex Buildings, Amaravati City of Andhra Pradesh in Guntur District. I also confirm that the consultant organization shall be fully accountable for any mis-leading information mentioned in this statement.

Signature:



Name: Ashish Deshpande

Designation: Senior General Manager

Name of the EIA consultant organization: TATA Consulting Engineers Ltd.

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FORM 1

(I) Basic Information

<table>
<tr><th>S. No.</th><th>Item</th></tr>
<tr><td rowspan="2">1.</td><td>Name of the project/s</td></tr>
<tr><td>Expansion - Interim Government Complex Buildings - Amaravati City - Andhra Pradesh</td></tr>
<tr><td rowspan="2">2.</td><td>S. No. of the schedule</td></tr>
<tr><td>8(a)</td></tr>
<tr><td rowspan="3">3.</td><td>Proposed capacity/ area/ length/ tonnage to be handled/ command area/ lease area/ lease area/ number of wells to be drilled</td></tr>
<tr><td>Expansion of Interim government complex project which has obtained Environmental Clearance vide letter No – SEIAA/AP/GNT/CON/01/2016/18 dated 09-02-2016. The details of the proposed expansion are:
<table>
<tr><th>Description</th><th>Phase–I (IGC Complex)</th><th>Expansion</th><th>Total</th></tr>
<tr><td>Land Area (Acres)
1. Buildings</td><td>27.082</td><td>--</td><td>27.082</td></tr>
<tr><td>2. Public facilities (Acres)</td><td>18.047</td><td>-</td><td>18.047</td></tr>
<tr><td>No of buildings</td><td>6</td><td>--</td><td>6</td></tr>
<tr><td>Building configuration</td><td>G+1 (5 buildings)
G+2 (Assembly Building)</td><td>2 more floors in all 6 buildings</td><td>G+3 (5 building)
G+3 (Assembly Building)</td></tr>
<tr><td>Construction Area</td><td>58655.43 sq.mt</td><td>69989 sq.mt</td><td>1,28,644.4 sq. mt</td></tr>
</table>
</td></tr>
<tr><td>Site plan provided for 45.129 acres.</td></tr>
<tr><td rowspan="2">4.</td><td>New/ Expansion/ Modernization</td></tr>
<tr><td>Expansion</td></tr>
<tr><td rowspan="2">5.</td><td>Existing Capacity / Area etc.</td></tr>
<tr><td>Not Applicable (NA)</td></tr>
<tr><td rowspan="2">6.</td><td>Category of Project i.e. ‘A’ or ‘B’</td></tr>
<tr><td>‘B2’ (Building and Construction project)</td></tr>
<tr><td rowspan="2">7.</td><td>Does it attract the general condition? If yes please specify.</td></tr>
<tr><td>Not Applicable</td></tr>
<tr><td rowspan="2">8.</td><td>Does it attract the specific condition? If yes please specify.</td></tr>
<tr><td>Not Applicable</td></tr>
</table>

<table>
<tr><th>S. No.</th><th>Item</th></tr>
<tr><td>9.</td><td>Location (no change)</td></tr>
<tr><td></td><td>Coordinates of Interim Government Complex Buildings
<table>
<tr><th>Direction</th><th>Degrees</th><th>Minutes</th><th>Seconds</th></tr>
<tr><td rowspan="2">NW</td><td>16</td><td>30</td><td>55.630</td></tr>
<tr><td>80</td><td>30</td><td>49.769</td></tr>
<tr><td rowspan="2">NE</td><td>16</td><td>30</td><td>55.649</td></tr>
<tr><td>80</td><td>30</td><td>58.781</td></tr>
<tr><td rowspan="2">SE</td><td>16</td><td>30</td><td>42.584</td></tr>
<tr><td>80</td><td>30</td><td>58.811</td></tr>
<tr><td rowspan="2">SW</td><td>16</td><td>30</td><td>42.565</td></tr>
<tr><td>80</td><td>30</td><td>50.375</td></tr>
<tr><td rowspan="2">SW</td><td>16</td><td>30</td><td>43.117</td></tr>
<tr><td>80</td><td>30</td><td>49.799</td></tr>
<tr><td colspan="4">Coordinates including public facilities</td></tr>
<tr><td colspan="4">
<table>
<tr><th>Direction</th><th>Degrees</th><th>Minutes</th><th>Seconds</th></tr>
<tr><td rowspan="2">NW</td><td>16</td><td>30</td><td>55.63</td></tr>
<tr><td>80</td><td>30</td><td>49.769</td></tr>
<tr><td rowspan="2">NE</td><td>16</td><td>30</td><td>55.621</td></tr>
<tr><td>80</td><td>31</td><td>7.141</td></tr>
<tr><td rowspan="2">SE</td><td>16</td><td>30</td><td>42.593</td></tr>
<tr><td>80</td><td>31</td><td>2.704</td></tr>
<tr><td rowspan="2">SW</td><td>16</td><td>30</td><td>42.565</td></tr>
<tr><td>80</td><td>30</td><td>50.375</td></tr>
<tr><td rowspan="2">SW</td><td>16</td><td>30</td><td>43.117</td></tr>
<tr><td>80</td><td>30</td><td>49.799</td></tr>
</table>
</td></tr>
</table>
</td></tr>
<tr><td></td><td>Plot/Survey/Khasra No.</td></tr>
<tr><td></td><td>The interim government complex will be developed in Survey numbers: Velagapudi 196 (part), 197 (part), 198 (part), 199 (part), 200 (part), 204 (part), 205 (part), 206 (part), 207 (part), 208 (part), 209 (part), 214 (part), 216 (part)</td></tr>
<tr><td></td><td>Village</td></tr>
<tr><td></td><td>Velagapudi, Malkapuram</td></tr>
</table>

S. No.	Item
	Tehsil
	Mandal: Tulluru
	District
	Guntur
	State
	Andhra Pradesh
10.	**Nearest Railway Station / Airport along with distance in kms.**
	K C Canal Railway station near Tadepalli at 14 km in NE direction Gannavaram Airport, 35 Km in the East direction
11.	**Nearest Town, city, District Headquarters along with distance in kms.**
	Vijayawada- 16 Km Guntur- 30 km
12.	**Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (complete postal addresses with telephone nos. to be given)**
	Velagapudi Panchayat, Thulluru Mandal, Guntur District
13.	**Name of the Applicant**
	Commissioner, Andhra Pradesh Capital Region Development Authority and Capital Area (APCRDA & CA)
14.	**Registered Address**
	APCRDA & CA Lenin Center , Governor Pet , VIJAYAWADA - 520002 ANDHRA PRADESH - INDIA. Phone : 0866 - 2571271 Fax : 0866 - 2577357 e-Mail ID : srikant@apcrda.org, ceo.crda@ap.gov.in
15.	**Address for correspondence**
	Name
	Dr. Srikant Nagulapalli, IAS
	Designation (Owner / Partner / CEO)
	Commissioner Andhra Pradesh Capital Region Development Authority and Capital Area

S. No.	Item
	Address
	APCRDA & CA Lenin Center, Governor Pet, VIJAYAWADA - 520002 ANDHRA PRADESH - INDIA.
	Pin Code
	520002
	E-mail
	srikant@apcrda.org, ceo.crda@ap.gov.in
	Telephone No.
	0866 - 2571271, 7095599200
	Fax No.
	Fax : 0866 – 2577357
16.	**Details of alternative Sites examined, if any Location of these sites should be shown on a toposheet.**
	N. A.
17.	**Interlinked Projects**
	This project is being developed as a part of the Amaravati Capital City Development in Andhra Pradesh. The Capital City development Project has received Environmental Clearance vide Order No. SEIAA/AP/GTN – 151/2015, dated Oct 09, 2015. The Interim Government Complex Buildings received Environmental Clearance for construction area of 58655.43 sq.mt vide Order No: SEIAA/AP/GNT/CON/01/2016/18 dated 09-02-2016
18.	**Whether separate application of interlinked project has been submitted?**
	N.A
19.	**If yes, date of submission**
	N.A
20.	**If no, reason**
	N.A
21.	**Whether the proposal involves approval / clearance under: if yes, details of the same and their status to be given.** **(i) The Forest (Conservation) Act, 1980.**

S. No.	Item
	(ii) The Wildlife (Protection) Act, 1972 **(iii) The C.R.Z. Notification, 1991**
	No
22.	**Whether there is any Government Order / Policy relevant / relating to the site?**
	Yes GOMS No 32, MAUD (CRDA2), dated 11.02.2016, GOMS No 242, MAUD (CRDA2), dated 25.04.2016 Govt of AP
23.	**Forest Land involved (hectares)**
	Nil
24.	**Whether there is any litigation pending against the project and/or land in which the project is propose to be set up?** **(a) Name of the court** **(b) Case No.** **(c) Orders / directions of Court, if any and its relevance with the proposed project.**
	No pending cases against the current Interim government complex project.

(II) Activity

1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)

S. No.	Information / Checklist confirmation	Yes/No
1.1	**Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)**	**Yes**
	There will be permanent change in the land use. The development is aligned with the general topography of the site. The development however will alter the skyline.	
1.2	**Clearance of existing land, vegetation and buildings?**	**No**
	Expansion Project	
1.3	**Creation of new land uses?**	**Yes**

S. No.	Information / Checklist confirmation	Yes/No
	As per item 1.1 above	
1.4	**Pre-Construction investigations e.g. bore holes, soil testing?**	**Yes**
	Necessary geotechnical investigations - soil test etc. were carried out. Site found suitable for development.	
1.5	**Construction works?**	**Yes**
	Construction work for development of two more floors (G+1 to G+3) in all the 6 buildings of Interim Government Complex Building Foundations for existing buildings supporting G+7 constructions.	
1.6	**Demolition works?**	**No**
	-	
1.7	**Temporary sites used for construction or housing of construction works?**	**Yes**
	Temporary labour camps for 600 workforce are already established with following minimum features: • safe and secure accommodation • clean drinking water • hygienic sanitation facility • Good Environment, Heath and safety Practices/ compliances	
1.8	**Above ground buildings, structures, cut or fill or excavations**	**Yes**
	The project site is fairly plain land with minimum undulations. A 0.9 m rise from road level is done across the entire plot. About 27000 CuMt of additional filling material with a combination filling material - Fly ash 30%, Quarry dust 40% and Gravel 30%. Higher usage of fly ash is being encouraged. Suspend void floor approach is followed to reduce the filling requirement.	
1.9	**Underground works including mining or tunneling?**	**No**
	No mining or tunneling. However, certain underground works related to laying of ducts, service infrastructure, storage tanks will be taken up.	
1.10	**Reclamation works?**	**No**

S. No.	Information / Checklist confirmation	Yes/No
	-	
1.11	**Dredging?**	**No**
	-	
1.12	**Offshore Structures?**	**No**
	-	
1.13	**Production and manufacturing processes?**	**No**
	-	
1.14	**Facilities for storage of goods or materials?**	**Yes**
	Facilities for the construction materials storage will be provided	
1.15	**Facilities for treatment or disposal of solid waste or liquid effluents?**	**Yes**
	Solid waste treatment: About 5 TPD solid wastes will be generated in the project. The biodegradable waste (2 TPD) will be processed in OWC and the non-biodegradable waste generated (3 TPD) will be handed over to authorized local vendor. **For liquid wastes**: Total Wastewater generated from the buildings will be treated in a STP of 1000 KLD capacity. Entire treated wastewater will be recycled (300 KLD for flushing and 225 KLD for gardening and remaining for AC and cooling water). The STP is planned exclusively for the IGC, as and when the infrastructure is put in place for the Amaravati city, the outfall from the complex will be connected to the trunk sewer line.	
1.16	**Facilities for long term housing of operational workers?**	**No**
	N.A.	
1.17	**New road, rail or sea trafficking during construction or operation?**	**Yes**
	Existing Inavolu- Malkapur Link Road, which passes near the site will be used during construction phase and operation phase. A new approach road upto Mandadam about 1 km away is being developed for movement of	

S. No.	Information / Checklist confirmation	Yes/No
	construction vehicles. New connecting road to the complex from the link road and internal roads in the complex will be formed.	
1.18	**New road, rail, air, waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc.?**	**Yes**
	Same as Section 1.17	
1.19	**Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?**	**No**
	-	
1.20	**New or diverted transmission lines or pipelines?**	**Yes**
	No diversion of transmission lines. New water supply pipeline for tapping surface water source from Velagapudi is proposed.	
1.21	**Impoundment, damming, culverting, realignment or other changes to the hydrology of neither watercourses nor aquifers?**	**No**
	-	
1.22	**Stream crossings?**	**No**
	-	
1.23	**Abstraction or transfers of water from ground or surface water?**	**Yes**
	The total projected water requirement for the proposed development is 1600 KLD (during operation). 600 KLD treated sewage water will be used for flushing and landscaping. 1000 KLD fresh water requirement will be met through piped supply from Velagapudi village existing water supply source, which is 1.5 km away from site, through a 6 inch pipe.	
1.24	**Changes in water bodies or the land surface affecting drainage or run off?**	**No**
	-	
1.25	**Transport of personnel or materials for construction, operation**	**Yes**

S. No.	Information / Checklist confirmation	Yes/No
	or decommissioning?	
	Influx of approximately 600 workforce, residing at site and 600 work force commuting from near by areas is expected during the construction phase. There will be transportation of construction material throughout the construction period.	
1.26	**Long-term dismantling or decommissioning or restoration works?**	**No**
	-	
1.27	**Ongoing activity during decommissioning, which could have impact on the environment?**	**No**
	-	
1.28	**Influx of people to an area in either temporarily or permanently?**	**Yes**
	During construction phase: Approximately 600 workforce, residing at site and 600 work force commuting from near by areas will be required during the construction phase of the project. Temporary labour camps with area 12,000 sq. m. developed for the project. **During Operation Phase**: The IGC designed for 15000 employees and an average visitor and staff count of 4000. Major employment generation will happen in the operation stage of the project, this will lead to influx of people in the area - both temporary and permanent nature, which will be addressed as part of overall Amaravati Capital City Development.	
1.29	**Introduction of alien species?**	**No**
	-	
1.30	**Loss of native species or genetic diversity?**	**No**
	The land is fallow.	
1.31	**Any other actions?**	**No**
	-	

2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply).

S. No	Information / Checklist confirmation	Yes/No
2.1	**Land especially undeveloped or agricultural (ha)**	**Yes**
	Fallow land of 27.082 Acres for the complex and about 18.047 Acres for public facilities, out side complex	
2.2	**Water (expected source & competing users) unit: KLD**	**Yes**
	Source of Water: Surface Water Quantity of water: During Construction- 840 KLD During Operation- 1600 KLD (1000 KLD fresh water & 600 KLD treated waste water)	
2.3	**Minerals (MT)**	**Yes**
	Mineral based construction material like sand, iron, stones etc will be used from the approved quarry, sand reaches and iron from the open market.	
2.4	**Construction material- stone, aggregates, and/ soil (expected source- MT)**	**Yes**
	Stone, soil, sand etc. will be sourced from the state's abundantly available sources.	
2.5	**Forest and Timber (source –MT)**	**No**
	Timber use is discouraged in the proposed plan. Furniture shall be procured from open markets.	
2.6	**Energy including electricity and fuels (source, competing users) Unit: fuel (MT), Energy(MW)**	**Yes**
	The total power requirement during construction phase is **200** KVA and will be met from **APSEB.** Total power requirement during operation phase is **11.29 MVA** and will be met from **APSEB.**	
2.7	**Any other natural resources (use appropriate standard units)**	**No**
	-	

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.

S. No.	Information / Checklist confirmation	Yes/No
3.1	**Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, Fauna, and water supplies)?**	**Yes**
	The storage of HSD, used oil and waste oil is envisaged. Safe handling practice and guidelines as mentioned in the EMP will be followed. The hazardous waste handling and management rules (2008) and amendments thereof will be complied with by disposing in existing TSDF facilities in the state.	
3.2	**Changes in occurrence of diseases or affect disease vectors (e.g. insect or waterborne diseases)?**	**No**
	-	
3.3	**Affect the welfare of people e.g. by changing living condition?**	**Yes**
	The New Capital of Andhra Pradesh is envisioned to be the pioneer Smart City of India. It aims to be World Class and at par with the standards set forth by countries such as Singapore. The new capital will be an economic powerhouse that will create a range of jobs for existing resident villagers by upgrading their skills, as well as provide high-tech and knowledge based industry jobs to be globally competitive. Housing will be at the core of its planning and will aim to provide affordable and quality homes to all its residents. It will demonstrate global quality of life standards to offer high levels of convenience to people of all ages. The proposal will capitalize on the rich heritage possessed by the region and utilize it to create a unique identity for the new capital. Sustainability and efficient management of resources will form another important pillar of this new capital. It will be supported by maintaining the clean and green character that the site currently demonstrates by mimicking these ideas in to the new capital master plan. The interim complex proposed here, will be used to shift the government operations from Hyderabad to Amaravati. This shifting of Capital and operations from within the Amaravati will tremendously boost the morale of the citizens at large. **Expansion of the IGC Complex is proposed to meet the increased demand of administrative offices.**	
3.4	**Vulnerable groups of people who could be affected by the project e.g hospital patients, children, the elderly etc.**	**No**
3.5	**Any other causes**	**-**

4. Production of solid wastes during construction or operation or decommissioning (MT / month)

S. No	Information / Checklist confirmation	Yes/No
4.1	**Spoil, overburden or mine wastes**	**No**
	-	
4.2	**Municipal waste (domestic and or commercial wastes)**	**Yes**
	Solid waste: About 5 TPD solid wastes will be generated in the project. The biodegradable waste (2 TPD) will be processed in OWC and the non-biodegradable waste generated (3 TPD) will be handed over to authorized local vendor.	
4.3	**Hazardous waste (as per Hazardous Waste Management Rules)**	**Yes**
	There will be generation of hazardous waste such as used oil/ waste oil from the DG Sets, which will be disposed as per hazardous waste management rules.	
4.4	**Other industrial process wastes**	**No**
	N.A	
4.5	**Surplus product**	**No**
	-	
4.6	**Sewage sludge or other sludge from effluent treatment**	**Yes**
	There will be generation of about 195 kg/ day of sewage sludge from the STP which will be used as manure in the green belt area.	
4.7	**Construction or demolition wastes**	**No**
	No demolition waste.	
4.8	**Redundant machinery or equipment**	**No**
	-	
4.9	**Contaminated soils or other materials**	**No**
	-	
4.10	**Agricultural wastes**	**No**
	-	
4.11	**Other solid wastes**	
	E waste generated will be channelized through authorized collection center(s) or registered dismantler(s) or recycles or will be returned to the pick up or take back services provided by the producers and will maintain records of e waste generated by them in Form 2 (prescribed by CPCB), and make these records available for scrutiny by AP State	**Yes**

S. No	Information / Checklist confirmation	Yes/No
	Pollution Control Board (APPCB)	

5. Release of pollutants or any hazardous, toxic or noxious substances to air (kg/m^3):

S. No	Information / Checklist confirmation	Yes/No
5.1	**Emissions from combustion of fossil fuels from stationary or mobile sources**	**Yes**
	There will be emission from the DG sets, which will be mitigated by providing adequate stack height as per CPCB Norms.	
5.2	**Emission from production Process**	**No**
	-	
5.3	**Emission from materials handling including storage or transport**	**Yes**
	There will be generation of fugitive emissions during the construction phase of the project. The Environmental Management Plan describes the necessary Environment management measures.	
5.4	**Emission from construction activities including plant and Equipment**	**Yes**
	There will be some emission from construction activities. However, these emissions will last for a very short period and the same will be temporary & restricted within short distances.	
5.5	**Dust or odours from handling of materials including construction materials, Sewage and waste**	**Yes**
	Dust emission will be temporary only during construction phase of the project and restricted within the short distances. Dust suppression would be carried out during this phase by water spraying etc. During construction phase, proper sanitation would be provided to the construction workers and during operation phase the STP would be provided. There would be a proper solid waste treatment and disposal facility for municipal waste. All the waste treatment facilities (STP and SWM) will adhere to the CPCB norms for emissions and odor. Odor is not envisaged from any other sources.	
5.6	**Emissions from incineration of waste**	**No**
	-	
5.7	**Emissions from burning of waste in open air (e.g. slash materials, construction debris)**	**No**
	-	
5.8	**Emissions from any other sources**	**No**

S. No	Information / Checklist confirmation	Yes/No
	-	

6. Generation of Noise and Vibration, and emissions of Light and Heat

S. No	Information / Checklist confirmation	Yes/No
6.1	**From operation of equipment e.g. engines, ventilation plant, crushers**	**Yes**
	There will be generation of noise due to the operation of concrete mixers and other associated machinery during the construction phase and will be limited to <75dB(A).	
6.2	**From industrial or similar processes**	**No**
	-	
6.3	**From construction or demolition**	**Yes**
	There will be generation of noise due to the operation of concrete mixers and other associated machinery during the construction phase and will be limited to <75dB(A).	
6.4	**From blasting or piling**	**No**
	-	
6.5	**From construction or operational traffic**	**Yes**
	There will be generation of noise due to the movement of vehicles which will be used for transportation of workers, personnel and construction material during the construction phase. Also there will be noise generation due to the operational traffic. Suitable traffic management plan will be implemented so as to mitigate the noise to acceptable limits.	
6.6	**From lighting or cooling systems**	**No**
	-	
6.7	**From any other sources**	**No**
	-	

7. Risks of contamination of land or water from release of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:

S. No	Information / Checklist confirmation	Yes/No
7.1	**From handling, storage, use or spillage of hazardous materials**	**Yes**
	There will be marginal risk arising out of handling, storage use and spillage of hazardous material such as HSD and shall be mitigated by	

	effective EMP.	
7.2	**From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)**	**Yes**
	Total Wastewater generated from the buildings will be treated in a STP of 1000 KLD capacity. Entire treated wastewater will be recycled (300 KLD for flushing and 225 KLD for gardening and remaining will be used in AC makeup).	
7.3	**By deposition of pollutants emitted to air into the land or into the water**	**Yes**
	Mitigation measures will be put in place for both air and water. Refer EMP for details.	
7.4	**From any other sources**	**No**
	-	
7.5	**Is there a risk of long term build up of pollutants in the environment from these sources?**	**No**
	-	

8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment:

S. No	Information / Checklist confirmation	Yes/No
8.1	**From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances**	**No**
	Fire safety norms as prescribed in AP Fire Service Act, 1999 will be followed, as applicable.	
8.2	**From any other causes**	**No**
	-	
8.3	**Could the project be affected by natural disaster causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?**	**Yes**
	Earthquake- As per the Geological Survey of India (GSI) map showing earthquake vulnerability, it is noted that the location / region identified for Interim Government Complex of Amaravati Capital City of Andhra Pradesh falls under Zone-III which signifies that this area falls under - low to moderate risk prone to earthquakes. The proposed development design has already taken care of this.	

9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality:

S. No	Information / Checklist confirmation	Yes/No
9.1	**Lead to development of supporting utilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.:** • **Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.)** • **Housing development; Extractive industries; Supply industries; Other**	**Yes**
	This project, Interim Govt. Complex, is designed to fast-track the overall Amaravati Capital City. The New Capital of Andhra Pradesh is envisioned to be the pioneer Smart City of India. It aims to be World Class and at par with the standards set forth by countries such as Singapore. The new capital will be an economic powerhouse that will create a range of jobs for existing resident villagers by upgrading their skills, as well as provide high-tech and knowledge based industry jobs to be globally competitive. Housing will be at the core of its planning and will aim to provide affordable and quality homes to all its residents. It will demonstrate global quality of life standards to offer high levels of convenience to people of all ages. The proposal will capitalize on the rich heritage possessed by the region and utilize it to create a unique identity for the new capital. Sustainability and efficient management of resources will form another important pillar of this new capital. It will be supported together with the clean and green vision of the overall development concepts.	
9.2	**Lead to after-use of the site, which could have an impact on the environment**	**No**
	The after use of the site is planned taking into consideration all environmental safeguards and there is no negative impact.	
9.3	**Set up precedent for later developments**	**Yes**
	The interim complex proposed here is the first phase of development for the Amaravati Capital City. This will be used to shift the government operations from Hyderabad to Amaravati. This will be followed by the Amaravati capital city development, which is conceived as a livable, environmentally sustainable and people's capital. Accordingly the location of the capital was identified between Vijayawada and Guntur cities on the bank of the river Krishna and also to go for decentralized development of the state The new capital city is the first step towards the growth story of the new state of Andhra Pradesh.	
9.4	**Have cumulative effects due to proximity to other existing or planned projects which similar effects**	**No**

S. No	Information / Checklist confirmation	Yes/No
	-	

(III) Environmental Sensitivity

S. No	Areas	Yes/No
1	**Areas protected under international conventions, national or local legislation for their ecological landscape, cultural or other related value**	**No**
	N.A	
2	**Areas which are important or sensitive for ecological reasons – Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests**	**No**
	N.A.	
3	**Areas used by protected, important or sensitive species of flora and fauna for breeding, nesting, foraging, resting, over wintering, migration**	**No**
	NA.	
4	**Inland, coastal, marine or underground waters**	**No**
	NA	
5	**State, National boundaries**	**No**
	There are no international or state boundaries	
6	**Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas**	**No**
	N.A.	
7	**Defense installations**	**No**
	None within 10 km radius	
8	**Densely populated or built-up area**	**Yes**
	Vijayawada city, 16 km North East	
9	**Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)**	**No**
	N.A	
10	**Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)**	**No**
	NA	
11	**Areas already subjected to pollution or environmental damage. (Those where existing legal environmental standards are**	**No**

S. No	Areas	Yes/No
	exceeded)	
	N.A	
12	**Areas susceptible to natural hazard which cause the project to present environmental problems (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)**	**Yes**
	As per the Geological Survey of India (GSI) map showing earthquake vulnerability, it is noted that the location / region identified for Capital City of Andhra Pradesh falls under Zone-III which signifies that this area falls under - low to moderate risk prone to earthquakes. The development design has taken into account this condition.	

"I hereby give undertaking that the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the project will be rejected and clearance given, if any to the project will be revoked at our risk and cost.

Date: 27.04.2016

Place: Vijayawada

Signature of the applicant
With Name and Full Address
(Project Proponent / Authorised Signatory)

COMMISSIONER
AP CRDA, VIJAYAWADA.

FORM-1 A

CHECK LIST OF ENVIRONMENTAL IMPACTS

1. LAND ENVIRONMENT

Will the existing land-use get significantly altered from the project that is not consistent with the surroundings? (Proposed landuse must conform to the approved Concept Plan / Development Plan of the area. Change of landuse if any and the statutory approval from the competent authority are submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

There is a change in land-use pattern due to the proposed project, which is permanent in nature

Following maps are attached as Annexure

- Google image of the project site and the study area is attached as **Annexure A1**
- Location Plan**- Annexure A2**
- Conceptual Plan including landuse plan of Amaravati City is available at http://crda.ap.gov.in/APCRDA/Userinterface/HTML/masterplansNew.htm.
- Pictures of the project site and the vicinity- **Annexure A3**

1.1. List out all the major project requirements in terms of the land area, built up area, water consumption, power requirement, connectivity, community facilities, parking needs etc.

Total Land requirement	**:**	No new land requirement, This is an expansion project and will be developed as an expansion of Interim Government Complex developed in an area of 27.082 Acres. The project will comprise of 6 Buildings and total construction area is increased to 128644.4 sq. mt from 58655.43 sq.mt. (addition of two floors to all the 6 buildings) In addition, about 18.407 Acres of adjoining site will be developed for public facilities. Site plan provided for 45.129 acres.
Buit Up Area	**:**	128644.4 sq. mt
Water Consumption	**:**	During Construction: 840 KLD During Operation: 1600 KLD
Power Requirement	**:**	During Construction: 200 KVA

		During Operation: 11.9 MVA
Connectivity	**:**	Air connectivity : Existing Gannavaram airport is at 30 minutes drive Road connectivity : good connectivity to the Vijayawada rail station via NH16
Community Facility	**:**	The development being government complex, public facilities are planned. Additional 18.047 acres will be utilized for public facilities.
Parking	**:**	**VIP parking within the complex** Parking for 4 wheelers: 200 **Visitors parking** In the public facilities area adjoining the complex Parking for 4 wheelers: 1050 Parking for 2 wheelers: 650 Cycle Parking: 500 **Area earmarked to park 30 buses.**

1.2. What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing landuse, disturbance to the local ecology).

Present land for the project site area is an open fallow land. Proposed project does not involve any activities which cause disturbance to the ecology. There will be temporary generation of fugitive dust and noise during the construction phase. Environmental Management Plan (EMP) will be implemented during the construction phase of the project to mitigate the likely impacts.

1.3. Will there be any significant land disturbance resulting in erosion, subsidence & instability? (Details of soil type, slope analysis, vulnerability to subsidence, seismicity etc may be given).

Not applicable. There will not be any significant land disturbance resulting in erosion, subsidence and instability. The proposed development will be on a generally flat land.

1.4. Will the proposal involve alteration of natural drainage systems? (Give details on a contour map showing the natural drainage near the proposed project site)

The proposal does not involve the alteration of natural drainage. No natural water body in the 500 m radius of the project boundary.

1.5. What are the quantities of earthwork involved in the construction activity- cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc?)

The earth excavated for the purpose of foundations will be reused within the project site.

1.6. Give details regarding water supply, waste handling etc during the construction period.

The water requirement during the construction phase is 840 KLD and will be met from tanker/ surface water tapping.

The Contractor shall be responsible for providing accommodation, feeding and sanitary necessities for the persons/ labour employed by him. The Contractor shall provide adequate supply of water for the use of the labourers.

The Contractor shall make necessary arrangements for providing temporary sanitary blocks for labour and treatment of sewage by providing septic tanks. He shall also provide efficient arrangement for draining away effluent/ sullage water from septic tanks to keep the camp neat and tidy.

The above conditions have been stipulated in the General Conditions of Contract in bids for construction of the Complex.

The Construction and Demolition waste generated from the project will be reused and recycled within the project site.

1.7. Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)

No

1.8. Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labour and the means of disposal)

Construction debris & waste during construction will not have potential to cause health hazard. This category of waste in general may comprise of the following materials:

Major components:

Cement concrete, Bricks, Cement plaster, Steel (from RCC, door/window frames, roofing support, railings of staircase etc.), Rubble, Stone (marble, granite, sand stone), Timber/wood.

Minor components: Conduits (iron, plastic), Pipes (GI, iron, plastic), Electrical fixtures (copper/aluminum wiring, wooden baton, Bakelite/plastic switches, wire insulation), Panels (wooden, laminated), others (glazed tiles, glass panes).

Material that is generated during the construction phase will be reused on site or salvaged for subsequent reuse to the greatest extent possible and disposal will only be considered as a last resort. Initiatives will be put in place to maximize the efficient use/reuse of materials. Excavated spoil/ topsoil will be carefully set aside and used in landscaping works in the completed development

The waste from construction camp has been estimated to be **480 kg/day**, which will be collected, transported, treated and disposed as per the Municipal Solid Waste Handling and Management Guidelines (2000) and amendments thereof.

2. WATER ENVIRONMENT

2.1. Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources & quantities and furnish a water balance statement.

Total gross water requirement:

PEAK WATER REQUIRED DURING CONSTRCUTION PERIOD (By Tankers/ pipe line)			
A1	**Water for permanent working Staff**		**Unit**
	Working staff during construction period	600	nos. per day
	Water for each person	135*	liters / day / person
	Water required for working staff	81000	liters / day
A2	Water for Day working Staff		
	Working staff during construction period	600	nos. per day
	Water for each person	45*	liters / day / person
	Water required for working staff	27000	liters / day
A3	Water required for Curing	83655	liters / day
A4	Water required for execution of structures	83655	liters / day
A3	Water required for Dust suppression	329600	liters / day
A4	Water requirement for landscaping	235870	liters / day
	Total Water requirement during construction of project	840780	liters / day
		840	**KLD**

WATER REQUIRED DURING OPERATION STAGE (Through Pipeline from Velagapudi)				
B1	**Requirement of Water for Permanent Staff**	**No. of Persons**	**liters/ day/ person**	**Water Requirement (liters / day)**
	Drinking Water in liters / day	15000	30	450000
	Flushing Water in liters / day	15000	15	225000
B2	**Requirement of Water for Visitors**			

	Drinking Water in liters / day	3000	5	15000
	Flushing Water in liters / day	3000	10	30000
B2	**Requirement of Water for Incidental population**			
	Drinking Water in liters / day	1000	90	90000
	Flushing Water in liters / day	1000	45	45000
B3	**Requirement of Water for Gardening**	**Area of Garden**	**liters / day / sqmt**	
		45 acres	5 KL/acre	225000
B4	**Total Requirement of Water**			
	Total Water for Drinking			600000
	Water for Flushing			300000
B5	Cooling Water Requirement for AC			480000
	Total Water required			**1600 KLD**
	Recycled water available			**600 KLD**
TOTAL FRESH WATER REQUIREMENT				**1000 KLD**

2.2. What is the capacity (dependable flow or yield) of the proposed source of water?

Existing source at Velagapudi is surface water irrigation source, tapped from Krishna River. Since irrigation is dispensed with, the source is having abundant assured supply.

2.3. What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)

Potable water is required in conformity with standards set by the Central Public Health Environmental Engineering Organization (CPHEEO). In order to meet these standards, it is proposed to treat raw water at Water Treatment Plant proposed to be located within project site area.

2.4. How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage)

The details of waste water generation and treatment is shown below:

C	WASTE AND SEWAGE WATER AND SEWAGE TREATMENT PLANT (STP)			
C1	Capacity of Sewage Treatment Plant	Drinking	600	
		Flushing	300	
	Total Consumption of Water - excluding for gardening		900	
		80% drinking and 100% flushing		
	Quantity of Waste & Sewage Water		780	KLD
	Capacity of STP		1000	KLD
C2	Recycled Water obtained after Treatment		600	KLD
	Recycled Water required	Flushing	300	
		Gardening	225	
		AC Makeup	480	
			1005	**KLD**

The treated water will be utilized for gardening and flushing and the balance will be used for AC Makeup. The entire outflow from STP after treatment will be reused and recycled and will not be discharged into any existing water course.

2.5. Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption)

No

2.6. What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of the quantities and composition of wastewater generated from the proposed activity)

The Sewage Treatment Plant shall be designed to treat 1000 KLD of raw sewage. The raw sewage quality parameters are as follows:

Raw Sewage Quality Parameters:

Daily Flow	: Max 1000 Cum. /day (Ultimate capacity).
Duration of flow to STP	: 24 hours
Temperature	: Maximum 46^0 C
pH	: 6.5 to 8.5
T.S.S (mg/l)	: 300 to 400
BOD(3) at 27^0C (mg/l)	: 500 to 600
COD (mg/l)	: 1000 to 1100
Oil & Grease	: 10 - 50 mg/lit.

Treated Sewage Quality Parameters

pH	:	7.5 to 8.0
Oil & Grease	:	< 5 mg/l
B.O.D (3) at 27^0C	:	< 10 mg/l
C.O.D	:	< 20 to 50 mg/l
Total suspended solids	:	< 5 mg/l
Bio – assay Test	:	90 % survival of Fish after 96 hrs in 100 % of intent
Other	:	As per CPCB Norms

2.7. Give details of the water requirements met from water harvesting? Furnish details of the facilities created.

Andhra Pradesh has been a forerunner in water harvesting initiative, there is a general awareness in the public about the water harvesting, the benefits of which are being reaped by the communities at various levels. Some studies have also indicated that there is a positive impact on the ground water table due to the water harvesting initiatives in the state in general.

The proposed Interim Government Complex of Amaravati City will have a well defined Rain water Harvesting Plan. The details of rainwater harvesting are as follows:

Design Basis – 50mm of rainfall / hour.

a. Rain Water Harvesting

- Capacity Each building -Terrace area 4500 sqm,
- Discharge factor – 0.8
- Total rainfall in hour = 4500x 0.8 x 0.05 = 180 Cum.
- 6 Nos. 30 cum rainwater harvesting pits, modular technology with PVC in fills.
- Total number of Rainwater having pits 6 x 6 = 36 Nos.

b. Storm Water Drainage for the Office Complex.

- Area 25 Acres
- Total Rainfall expected = 25 x4000 – 6x 4500 (terrace area)

  = 73000 x 0.5
  = 3650 Cum.

  The run off storm water 60% maximum = 2190 Cum.

- Storm water pipes with manholes provided upto proposed water body capacity 1500 Cum. The water body size 50 m x 20m shall have evaporation losses @ 1cm/day i.e. 100 KL/day.

- The water during rainy season shall be pumped to the water body in the area 1 kilometer from the plot.

- 3 Submersible Pumps of capacity 250 Ltr/sec, head 15m working in tandem with flow switches shall transfer storm water from the water body.

2.8. What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?

The project site is a flat terrain and as such the project site is small, there will be negligible change in overall surface runoff.

2.9. What are the impacts of the proposal on the ground water? (Will there be tapping of ground water; give the details of ground water table, recharging capacity, and approvals obtained from competent authority, if any)

No ground water will be used, only surface water from the River Krishna will be used.

2.10. What precautions/measures are taken to prevent the run-off from construction activities polluting land & aquifers? (Give details of quantities and the measures taken to avoid the adverse impacts)

The runoff from the construction site will be treated through one/ few of the following measures and the water can be reused within the construction site:

- Rain water harvesting structures
- Storm water filtering systems
- Vegetated filter strips, Landscaping works etc

The above measures will avoid pollution of land and aquifers..

2.11. How is the storm water from within the site managed? (State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels)

The entire site level is proposed to be increased by 0.9 mt. above road level. No flooding anticipated, as the entire terrain around is relatively flat.

2.12. Will the deployment of construction labourers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation)

600 permanent workforce and 600 day workers are required during the construction phase of the project. Temporary labour camps will be developed.

Temporary labour camps will be established suitably keeping in view the following key requirements:

- Safe and secure accommodation

- Clean drinking water
- Hygienic sanitation facility

Facilities like mobile toilets, safe drinking water, and rest area for female workers etc will be provided at the construction sites.

2.13. What on-site facilities are provided for the collection, treatment & safe disposal of sewage? (Give details of the quantities of wastewater generation, treatment capacities with technology & facilities for recycling and disposal)

Interconnected sewerage networks are laid, which will connect and transport the sewage into STP. STP of 1000 KLD capacity.

2.14. Give details of dual plumbing system if treated waste used is used for flushing of toilets or any other use.

Dual plumbing system is part of the plumbing network.

3. VEGETATION

3.1. Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with its unique features, if any)

The land is fallow and is devoid of any vegetation.

3.2. Will the construction involve extensive clearing or modification of vegetation? (Provide a detailed account of the trees & vegetation affected by the project)

No clearing or modification of vegetation during the construction phase

3.3. What are the measures proposed to be taken to minimize the likely impacts on important site features (Give details of proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale)

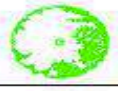
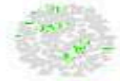
It is proposed to take up multi-tier tree planting with long rotation, native, deep rooted with large foliage tree species on the periphery fallowed by shrubs and herbs and then followed by ornamental and flowering plants duly adopting the Landscape techniques with carpet grass which will act as sinks of air pollutants.

Total 27797.18 sq. m area is developed as green area.

The species recommended are:

S. No	Name of Tree	Number of trees
1	*Jacaranda mimosifolia*	59
2	*Bauhinia blakeana*	61
3	*Couropita guianensis*	66
4	*Schefflera actinophylla*	67
5	*Anthocephalus cadamba*	90
6	*Erythrina crista galli*	45
7	*Lagerstroemia speciosa*	44
8	*Michaelia champaka*	648
9	*Xanthostemon chrysanthus*	403
	TOTAL	1483

Green cover in Public facility area

SYMBOL	NAME OF TREE	NOs	
	ERYTHRINA CRISTA GALLI	64	
	LAGERSTROEMIA SPECIOSA	28	
	BAUHINIA BLAKEANA	179	
	GOLDEN PENDA (XANTHOSTEMON CHRYSANTHUS)	62	
	MADHUCA INDICA	68	GREENERY AREAS
	KIGELIA PINNATA	68	GREENERY - 11 : 6107.73 Sq.Mts
	MIMUSOPS ELENGI	68	
	PTEROSPERMUM ACERIFOLIUM	68	TOTAL : 6107.73 Sq.Mts
	GOLDEN DURANTA	67	
	BOUGAINVILLEA	69	
	JATROPHA RED	136	

4 FAUNA

4.1. Is there likely to be any displacement of fauna- both terrestrial and aquatic or creation of barriers for their movement? Provide the details.

No

4.2. Any direct or indirect impacts on the avifauna of the area? Provide details.

No

4.3. Prescribe measures such as corridors, fish ladders etc to mitigate adverse impacts on fauna

No specific measures as indicated are needed.

5 AIR ENVIRONMENT

5.1. Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed constructions)

No emissions of gases are involved in the project.

The ground coverage of the project is less than 50%, and the extensive green cover will ensure that the proposed development will not result in any heat island effect.

5.2. What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.

The sources of gaseous pollutants within the proposed project are D.G sets and vehicular movement within the project site. The emissions of Sulphur dioxide and Oxides of Nitrogen (NOx) will be due to the operation of the D.G sets, in case of failure of the power grid. However, the designed power requirements are met from the nearby NTTPS. So, the utilization of D G sets may not be to a great extent. Apart from this, the non conventional energy will also be a part of the Power Scheme.

In order to control the emissions of particulates during the operation of the D.G sets, adequate stack height as per PCB guidelines will be provided for wider dispersion into the atmosphere. Further adequate green belt and green cover will be provided to absorb the dust and gaseous emissions due to the traffic.

The wind rose diagram of the Gannavaram Airport generated for a period of 30 years (1971-2000) shows that the calm condition varies from 10-12% in the study area as per the Windrose Atlas published by the Indian Meteorological Department. Since the project is close to coast (approximately 70 km), the atmosphere is turbulent. This ensures continuous dispersion of pollutants and built of air pollutants are not envisaged in the area.

5.3. Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures proposed for improvement including the traffic management at the entry & exit to the project site

Sufficient parking as per prevailing norms are provided, the details are as follows:

VIP parking within the complex

Parking for 4 wheelers: 200

Visitors parking

In the public facilities area adjoining the complex
Parking for 4 wheelers: 1050
Parking for 2 wheelers: 650
Cycle Parking: 500

Area earmarked to park 30 buses.

5.4. Provide details of the movement patterns with internal roads, bicycle tracks, pedestrian pathways, footpaths etc., with areas under each category.

The movement of vehicle in the layout plan and the parking areas is shown in the layout Plan attached as Concept Plan.

5.5. Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above.

There will be increase in traffic volumes due to the proposed project. However, this impact will not be felt much due to wider approach roads having adequate number of carriageways and footpaths. These roads will be adequate to handle the traffic volumes during the operation of the project.

During the operation phase of the proposed project, number of vehicles will ply on the roads and these will cause noise pollution on and along the roads. Proper

maintenance of vehicles while limiting the permissible emission levels will limit the noise levels. Also proper functioning of silencers will ensure low noise levels from the vehicles.

The site is not rocky and hence there will not be any need for blasting. Thus there is no possibility of any major ground vibrations either during construction or during the occupancy of the campus.

Avenue plantation along the road side in particular and throughout the project site with noise absorbing plant species will be done to attenuate the noise levels generated from traffic noise.

5.6. What will be the impact of DG sets & other equipment on noise levels & vibration & ambient air quality around the project site? Provide details.

The designed power requirements are met from the nearby NTTPS. So, the utilization of D G sets may not be to a great extent. Apart from this, the non conventional energy will also be a part of the Power Scheme. The DG Sets will be housed in acoustic enclosure reducing the noise transmission. Stack height will be provided as per Pollution Control Board rules.

6 AESTHETICS

6.1. Will the proposed constructions in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?

Due emphasis shall be given to ambience and cleanliness around the complex, to improve aesthetics of the area. There will not be any obstruction of a view due to the proposed construction. The proposed construction will not result any obstruction of view, scenic amenity or landscapes.

6.2. Will there be any adverse impacts from new constructions on the existing structures? What are the considerations taken into account?

No.

6.3. Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.

The site being located in tropical climatic zone, the urban form and design is carried out to suit the local climatic conditions

6.4. Are there any anthropological or archaeological sites or artifacts nearby? State if any other significant features in the vicinity of the proposed site have been considered.

The famous Undavalli cave which is notified by Archaeological Survey of India is at a distance of 11 km from the project site. However, no negative impact on the same is envisaged due to the proposed project.

7 SOCIO-ECONOMIC ASPECTS

7.1. Will the proposal result in any changes to the demographic structure of local population? Provide the details.

There will be immigration of workforce to the area due to the employment generation (direct and indirect) opportunities, economic and infrastructural opportunities. This will lead to long term change in the demography pattern of the area.

Influx and employment generation

During the construction phase this project will provide temporary employment to many unskilled and skilled laborers in the nearby villages. This project will also help in generation of indirect employment to those people who render their services for the personnel directly working in the project.

600 permanent workforce and 600 day workers will be employed during the construction phase of the project. Temporary labour camp for 600 people spread over an area of 12000 sq. m will be developed.

During the operational phase about 15000 employees will be operating from this complex. Thus direct and indirect employment generation by this project will be a positive socio-economic development in the surroundings of the project area, which will lead to enhancement of quality of life in the region.

7.2. Give details of the existing social infrastructure around the proposed project.

NA

7.3. Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safeguards proposed?

The proposed project will not cause any adverse impact on local communities, disturbance to sacred sites or other cultural values. However, the density of population near the project site will increase. The proposed project will boost the socio-economic level of the people employed directly or indirectly, related to the project.

8 BUILDING MATERIALS

8.1. May involve the use of building materials with high-embodied energy. Are the construction materials produced with energy efficient processes? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)

The following approaches will be considered in the selection of material for construction:

- Maximize the use of materials with **recycled content**: Survey the materials with recycled content and locate such local suppliers. Materials with recycled content include Aluminium, cement, composite wood, concrete, glass, gypsum, false ceiling, fly ash blocks, steel, tiles, etc.,
- Encourage the use of **salvaged building materials** and products to reduce the demand for virgin materials thereby, minimising the impacts associated with extraction and processing of virgin materials.
- Encourage use of building materials **available locally** thereby minimizing the associated environmental impacts resulting from transportation.
- Minimise use of virgin wood thereby encouraging responsible forest management and maximize use of materials which are **rapidly renewable**.

In addition to this CRDA will ensure selection of material with low embodied energy to reduce the impact on environment and ultimately increase the energy efficiency, confirming to the Energy Conservation Building Code (ECBC) guidelines.

Fly ash will be utilized as a filling material in the project. Total 59,000 cum of fly ash is estimated to be utilized in this proposed project

8.2. Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?

Adopted mitigation measures are as under:

- All the loose material either stacked or transported shall be provided with suitable covering such as tarpaulins etc.
- Water sprinkling shall be done at the location where dust generation is anticipated.
- Construction equipment will be maintained and serviced regularly such that the gaseous emissions from these equipments are maintained within the design specifications.
- Provision for insulating caps and aids at the exit of noise source on the machinery.
- The use of damping materials such as thin rubber / lead sheet for wrapping the work places like compressors, generator, etc.
- Inlet and outlet mufflers shall be provided, which are easy to design.
- Earmuffs will be provided to workers and it will be enforced to be used by the workers.
- Noise prone activities shall be restricted to the extent possible during the night time, in order to have minimum environmental impact on the workers as well as on the neighborhood.
- No worker shall be allowed to expose to more than 90 dB(A) in an 8 –hour shift and under no circumstances the noise level from any equipment shall be greater than 115 dB(A).

8.3. Are recycled materials used in roads and structures? State the extent of savings achieved?

Partial use of recycled material for sub grade in road embankment and site grading work.

8.4. Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.

The Solid Waste Management (SWM) for the entire development would be carried out as per SWM Rules 2000.

100% waste generated in the complex will be collected by two bin system implementation. Secondary segregation will be done in a central location. The biodegradable waste collected will be treated within the complex using Organic Waste Converters. The Recyclables will be given to authorized vendors and the inerts will be stored and transported to Landfill site through authorized vendors.

Segregated E-waste will be sent for processing to authorized vendors.

9 ENERGY CONSERVATION

9.1. Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?

Total Power requirement for the project is 11.9 MVA, this will be met from APSEB. 9 D.G sets will be used as power back up, 8 X 1500 kVA (07 working and 01 standby) and 1 X 1000 kVA (For Security Lighting at Night and server room)

Basic energy conservation measures are listed below:

- Energy efficient light fixtures shall be used.
- Ballast for light fixtures shall be electronic.
- Power factor of the complete electrical system shall be maintained close to unity. This will reduce electrical power distribution losses in the installation.
- Two-way modulating valves will be installed at inlet pipe of each AHU. Return temperature sensor will sense the temperature of return air and accordingly adjust the amount of chilled water going to the coil.
- Wherever envisaged, Variable Frequency Drives (VFDs) will be provided for the AHUs. Temperature sensor located in the return air path will provide necessary inputs to the VFDs.
- Energy Recovery Ventilators/ Re-heat coils are proposed to recover energy from exhaust air, thus reducing the temperature of incoming fresh air and load on the Air-Handling Units.

9.2. What type of, and capacity of, power back-up do you plan to provide?

9 D.G sets will be used as power back up, 8X1500 kVA and 1 X 1000 kVA. The location of the DG set is shown in the Layout Plan.

9.3. What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation?

Proponent will formulate policies/ guidelines so that the characteristics of the glass which will be employed is compliant with ECBC/ better guidelines.

9.4. What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project.

The passive solar architectural features that will be considered and implemented in the project for increasing the energy efficiency of the project are:

- Solar heat gain coefficient (SHGC)
- Window glazing U-value
- Overall wall assembly U-value
- Overall roof assembly U-value

9.5. Does the layout of streets & buildings maximize the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.

Yes, rooftop and parking area is proposed to be used for exploiting Solar Energy.

It is targeted that a minimum of 1-1.2 MW of power will be generated through solar sources**, considering the security conditions required for this complex.**

9.6. Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of Walls on the East and the West and the Roof? How much energy saving has been effected?

The design will consider and select appropriate measures such as

- insulation of walls,
- insulation of roof,
- selection of glass,
- sizing of windows,
- lighting and efficient air-conditioning

9.7. Do the structures use energy-efficient space conditioning, lighting and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lighting intensity and air-conditioning load assumptions? Are you using CFC and HCFC free chillers? Provide specifications.

The designs of structures and equipments deployed will conform to the ECBC guideline.

9.8. What are the likely effects of the building activity in altering the micro-climates? Provide a self assessment on the likely impacts of the proposed construction on creation of heat island & inversion effects?

G+3 building with <50% ground coverage. Hence, impact on microclimate and heat island effect is not envisaged.

9.9. What are the thermal characteristics of the building envelope? (a) roof; (b) external walls; and (c) fenestration? Give details of the material used and the U-values or the R values of the individual components.

The thermal characteristics of the building envelope will be developed in line with ECBC guidelines.

9.10. What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans.

A fire NOC will be obtained from the competent authority which will spell out the detailed safety measures against the fire hazards. The details of the fire hydrant, location of fire extinguishers, emergency escape routes are all depicted in the detailed engineering plan.

In addition the fire management plan will consist of

- Evacuation Plan
- Regular mock Drills
- Awareness Training of people on Fire equipments
- Refuse Floors planning
- Dedicated assembly points during fire evacuation
- Fire station at prescribed distances

- Separate fire water tank for all developments

9.11. If you are using glass as wall material, provide details and specifications including emissivity and thermal characteristics.

Glass may be used, adhering to the norms of ECBC.

9.12. What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration.

All the buildings will take advantage of Natural Ventilation and Air Circulation.

9.13. To what extent the non-conventional energy technologies are utilized in the overall energy consumption? Provide details of the renewable energy technologies used.

Use of Solar Energy described in Section 9.5 of the document.

Environment Management Plan:

The Environment Management Plan is attached with this application, consisting of, inter alia, - all mitigation measures for each item wise activity to be undertaken during the construction, operation and the entire life cycle to minimize adverse environmental impacts as a result of the activities of the project; compliance requirements of various environmental regulations; steps to be taken in case of emergency such as accidents at the site including fire.

"I hereby given undertaking that the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the project will be rejected and clearance give, if any to the project will be revoked at our risk and cost.

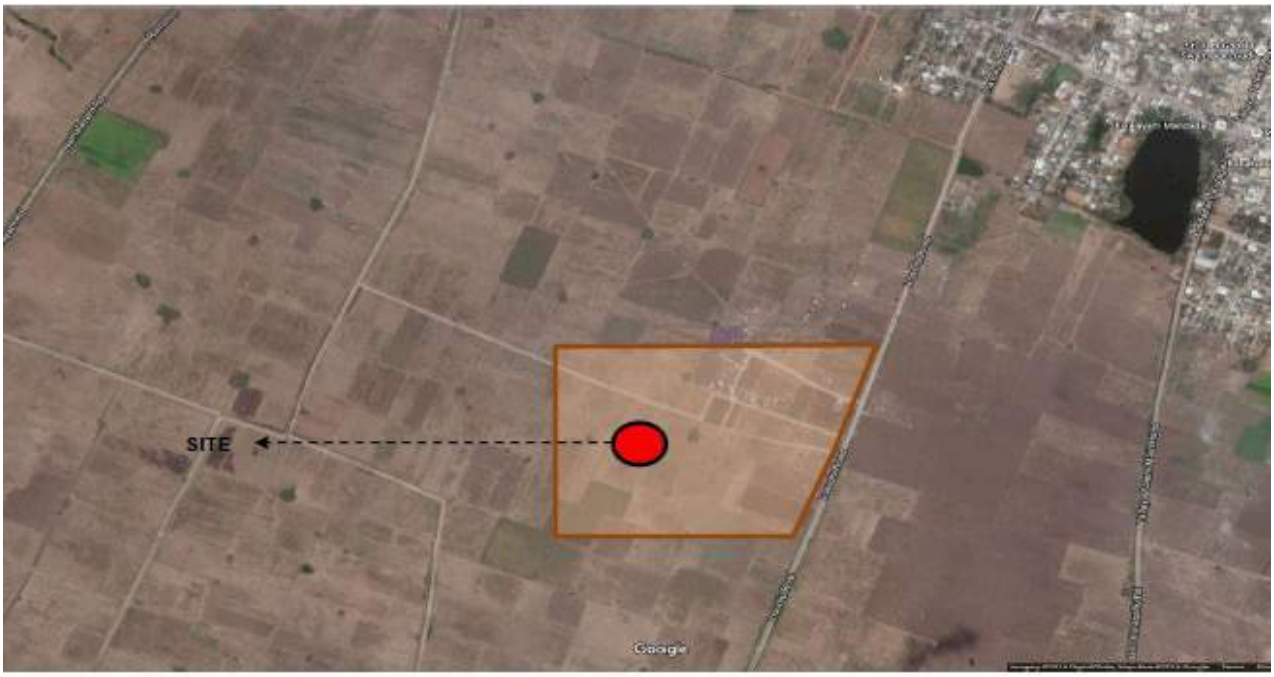
Date : 27.04.2016

Place : Vijayawada.

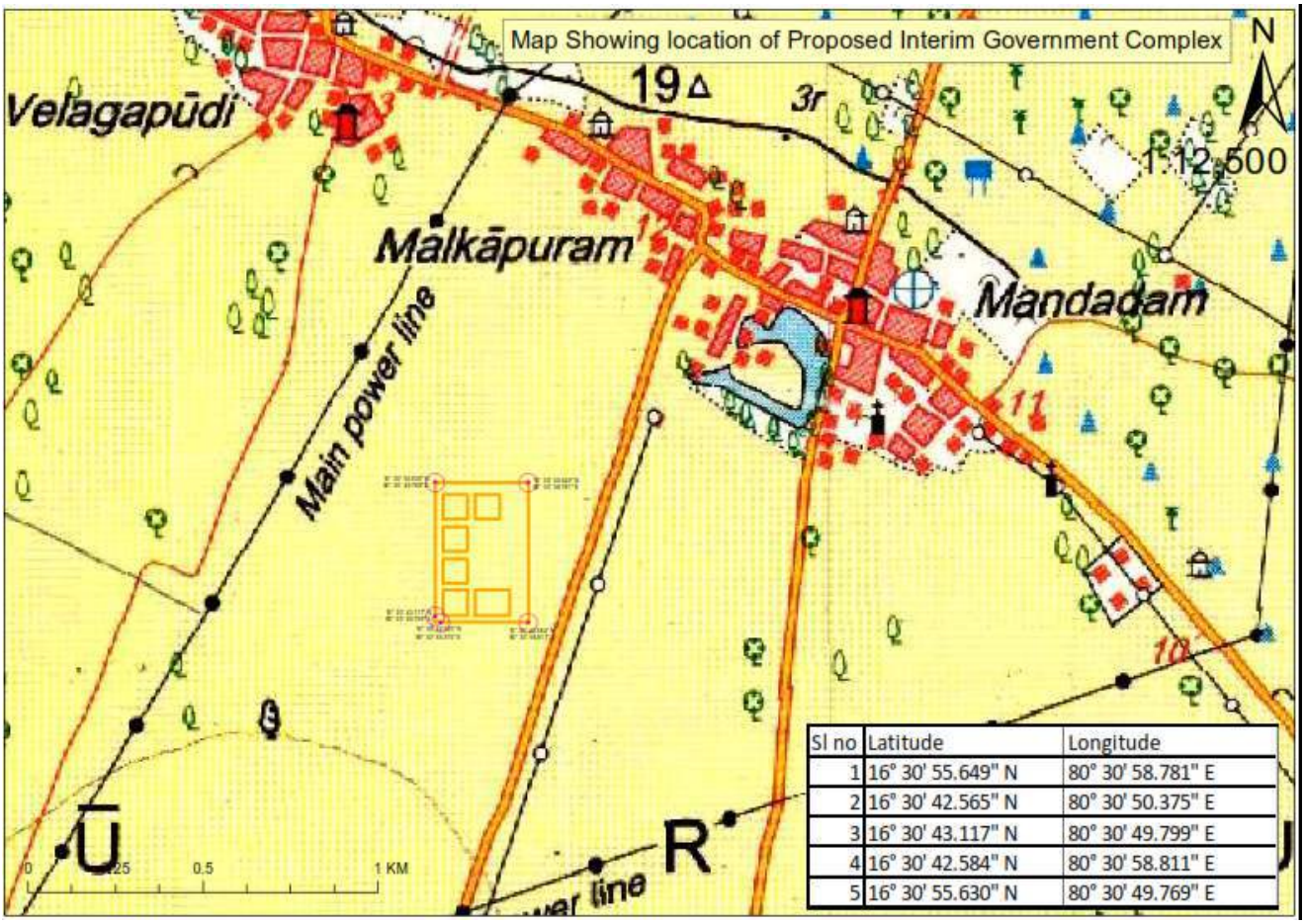
Signature of the applicant

COMMISSIONER
APCRDA, VIJAYAWADA

Annexure A1- Site marked on Google image

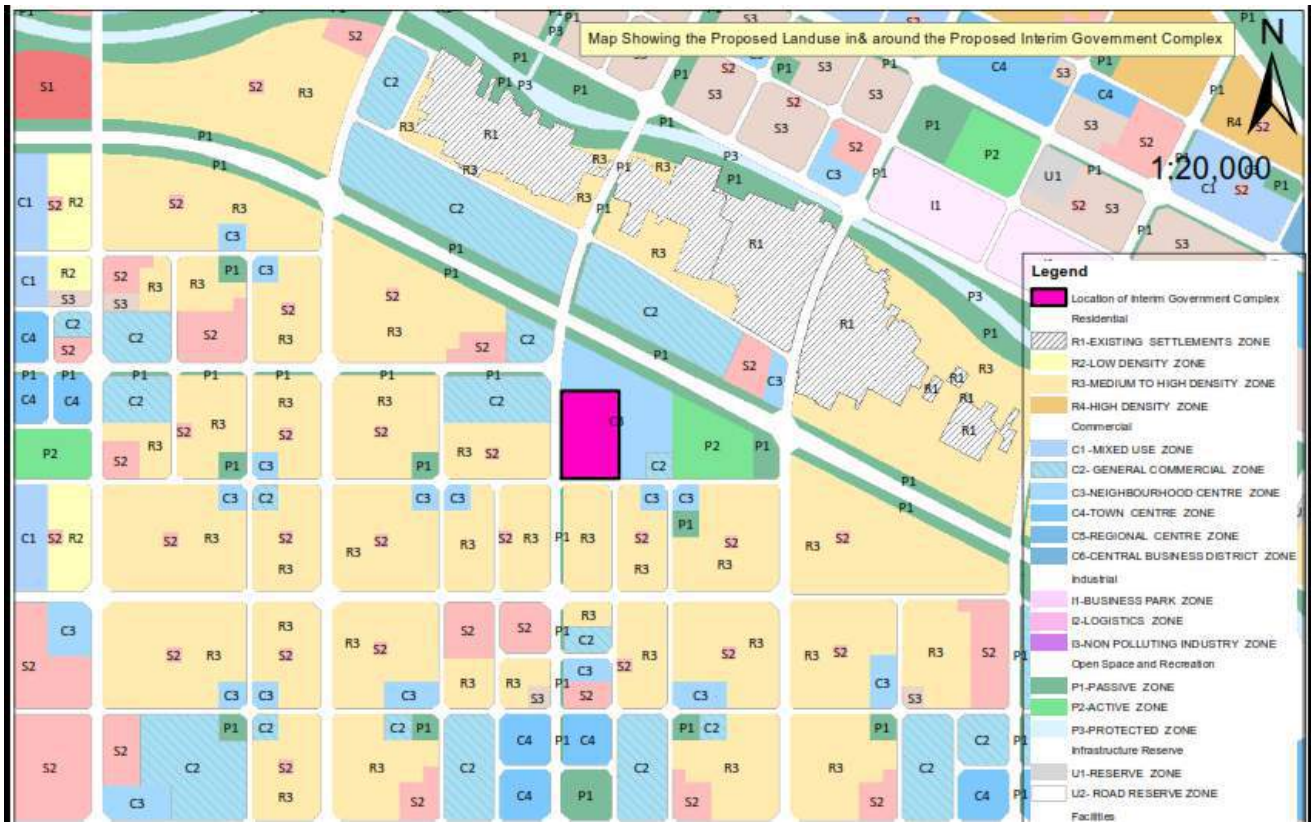


Annexure A2- Location Plan

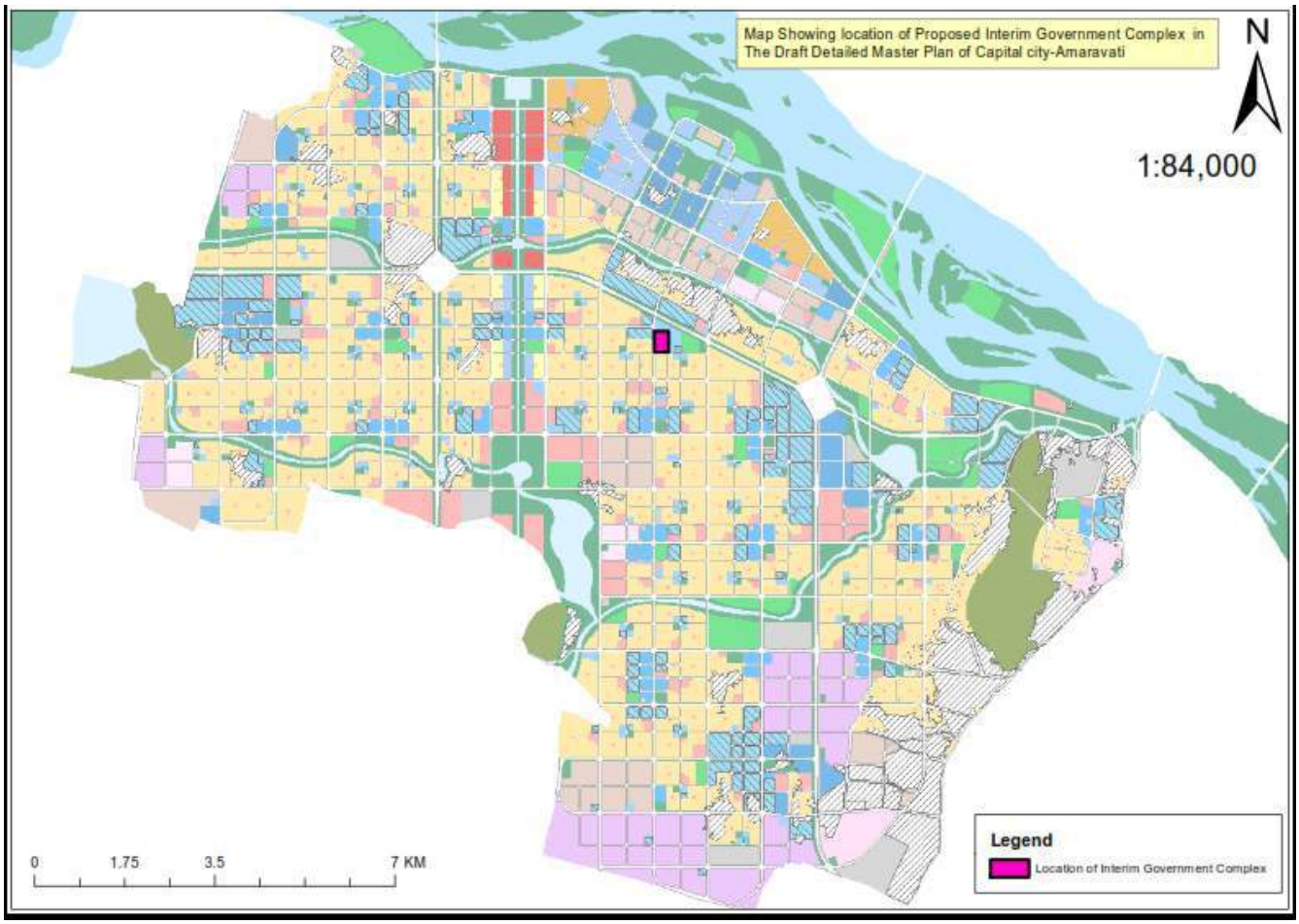


Sl no	Latitude	Longitude
1	16° 30' 55.649" N	80° 30' 58.781" E
2	16° 30' 42.565" N	80° 30' 50.375" E
3	16° 30' 43.117" N	80° 30' 49.799" E
4	16° 30' 42.584" N	80° 30' 58.811" E
5	16° 30' 55.630" N	80° 30' 49.769" E

Annexure A3- Site Pictures


Map Showing the Proposed Landuse in& around the Proposed Interim Government Complex
N
1:20,000
Legend
Location of Interim Government Complex
Residential
R1-EXISTING SETTLEMENTS ZONE
R2-LOW DENSITY ZONE
R3-MEDIUM TO HIGH DENSITY ZONE
R4-HIGH DENSITY ZONE
Commercial
C1-MIXED USE ZONE
C2- GENERAL COMMERCIAL ZONE
C3-NEIGHBOURHOOD CENTRE ZONE
C4-TOWN CENTRE ZONE
C5-REGIONAL CENTRE ZONE
C6-CENTRAL BUSINESS DISTRICT ZONE
Industrial
I1-BUSINESS PARK ZONE
I2-LOGISTICS ZONE
I3-NON POLLUTING INDUSTRY ZONE
Open Space and Recreation
P1-PASSIVE ZONE
P2-ACTIVE ZONE
P3-PROTECTED ZONE
Infrastructure Reserve
U1-RESERVE ZONE
U2- ROAD RESERVE ZONE
Facilities


Contour Map of Proposed Interim Government Complex
N
1:12,500
0
0.25
0.5
1 KM


Map Showing location of Proposed Interim Government Complex in The Draft Detailed Master Plan of Capital city-Amaravati
N
1:84,000
0
1.75
3.5
7 KM
Legend
Location of Interim Government Complex

Concept Plan and EMP for

Expansion of

INTERIM GOVERNMENT COMPLEX BUILDINGS,

Amaravati City, Guntur, Andhra Pradesh

Prepared for

Andhra Pradesh Capital Region Development Authority and Capital Area, Vijayawada, Andhra Pradesh

Prepared by

TATA Consulting Engineers Limited

4th Floor, Tower A, 247 Park, LBS Marg

Vikhroli (West), Mumbai

April 2016

Contents

1. INTRODUCTION

1.1 PURPOSE OF THE REPORT

To obtain Amendment to environmental clearance from SEIAA, Andhra Pradesh, MoEF and CC, Government of India for the proposed expansion project of "Interim Government Complex Buildings- Amaravati City- Andhra Pradesh" conceptual report and Environmental Management Plan (EMP) are prepared. As per the EIA notification dated on 14th September, 2006 and amendments thereof, the proposed project is categorized under Project-8a Building and Construction Project (Category 'B').

The Environmental Clearance for the IGC Complex is received vide order no-SEIAA/AP/GNT/CON/01/2016/18 dated 09-02-2016.

1.2. PROJECT AND PROJECT PROPONENT

1.2.1 Project *Site*

The proposed project is an expansion of the interim government complex under development in an area of 27.082 Acres. The project comprises of 6 Buildings and total construction area is 128644.4 sq. mt.

In addition, about 18.047 Acres of adjoining site will be developed for public facilities.

Site plan provided for 45.129 acres.

Survey numbers for the complex are: Velagapudi 196 (part), 197 (part), 198 (part), 199 (part), 200 (part), 204 (part), 205 (part), 206 (part), 207 (part), 208 (part), 209 (part), 214 (part), 216 (part) at village Velagapudi, Malkapuram, Mandal Thullur, Dist- Guntur in Andhra Pradesh.

1.2.2 Project *Proponent*

The Government has enacted Andhra Pradesh Capital Region Development Authority Act 2014 (Act No. 11 of 2014) and it got assent of the Governor of Andhra Pradesh which was given on 29-12-2014 and it came into force w.e.f., from 30-12-2014. Section 3 of the Act enables the State Government to declare by Notification the "Capital Region" and "Capital City Area" for the State of Andhra Pradesh.

Section 4 of the Act enables establishment of Capital Region Development Authority for the purpose of planning, co-ordination, execution, supervision, financing, funding and for promoting and securing the planned development of the Capital Region and Capital city area for the state of Andhra Pradesh and for managing and supervising urban services in the new capital area and for the matters ancillary thereto.

The application for environmental clearance of expansion of the Interim Government Complex Building development is made by the Andhra Pradesh Capital Region Development Authority- Capital Area.

1.3 PROJECT DESCRIPTION

1.3.1 Nature of the Project

It is expansion of the Government Complex project consisting of 27.082 acres for the complex buildings and about 18.047 acres for the public facilities and consists of 128644.4 sq. mt. of construction area. The design of this project and utilities is thoroughly planned with the objectives of providing facilities to the occupants and visitors.

1.3.2 Size of Project*:*

The details of project given in Table 1.1.

Table 1.1 Details of the Project

Sr. No.	Description	Existing IGC Complex	Total after Expansion
1	Type of project	Government Complex	
2	Proponent	APCRDA, Govt. of Andhra Pradesh	
3	Location of project site	Velagapudi, Malkapuram 196 (part), 197 (part), 198 (part), 199 (part), 200 (part), 204 (part), 205 (part), 206 (part), 207 (part), 208 (part), 209 (part), 214 (part), 216 (part)	
4	Total plot area	27.082 Acres for the complex and about 18.047 acres for public facilities	
5	RG provided	23587.75 sq m	27797.18 sq. m
6	Building details	G+1 (1 building) and G+2 (5 buildings) structure	G+3 all 6 buildings
7	Total water requirement	840 KLD	1600 KLD
8	Total sewage generation	148 KLD	780 KLD
9	STP capacity	proposed – 150 KLD	1000 KLD
10	Total power requirement	5 MVA	11.9 MVA
11	Total solid waste generation	2.25 TPD	5 TPD
12	Parking provided	**Staff Parking** 4W – 350, 2W – 360, Cycle- 350 Nos. **Visitors Parking** Two areas; one around the complex in designated areas and the other parking area is in the public facility adjoining the complex.	**VIP parking within the complex** Parking for 4 wheelers: 200 **Visitors parking** In the public facilities area adjoining the complex Parking for 4 wheelers: 1050 Parking for 2 wheelers: 650 Cycle Parking: 500

		4W – 600, 2W – 600, Cycle- 200 Nos. Bus parking facility for 20-25 buses	Area earmarked to park 30 buses.
13	Total project cost	180 Crores	530 Cr
14	EMP cost	13.35 Crores – Capital Cost 1.59 Crores- Annual Maintenance Cost	22.35 Crores – Capital Cost 1.88 Crores- Annual Maintenance Cost

1.3.3 Importance of the Project and the Region:

This project, Interim Govt. Complex, is to fast-track the overall Amaravati Capital City development by shifting the government operations from Hyderabad to Amaravati.

This shifting of Capital and operations from within the Amaravati will tremendously boost the morale of the citizens at large.

The New Capital of Andhra Pradesh is envisioned to be the pioneer Smart City of India. It aims to be World Class and at par with the standards set forth by countries such as Singapore. The new capital will be an economic powerhouse that will create a range of jobs for existing resident villagers by upgrading their skills, as well as provide high-tech and knowledge based industry jobs to be globally competitive. Housing will be at the core of its planning and will aim to provide affordable and quality homes to all its residents. It will demonstrate global quality of life standards to offer high levels of convenience to people of all ages.

The proposal will capitalize on the rich heritage possessed by the region and utilize it to create a unique identity for the new capital. Sustainability and efficient management of resources will form another important pillar of this new capital.

This proposal is for the expansion of the IGC Complex.

1.4 ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP) is developed after identifying, the source of pollution due to proposed project activities and evaluating the significant impacts on each component of the environment with a view to sustainable development and maximize the benefits from the project. This report is based on reference and guidelines laid out by the Ministry of Environment and Forest & CC, Government of India and Andhra Pradesh Pollution Control Board.

2. PROJECT DESCRIPTION

2.1. LOCATION

The project site is situated in the designated **Commercial Zone** as per the Draft Master Plan as shown in the Fig-1:

Fig. 2.1: Location Plan of Proposed Site

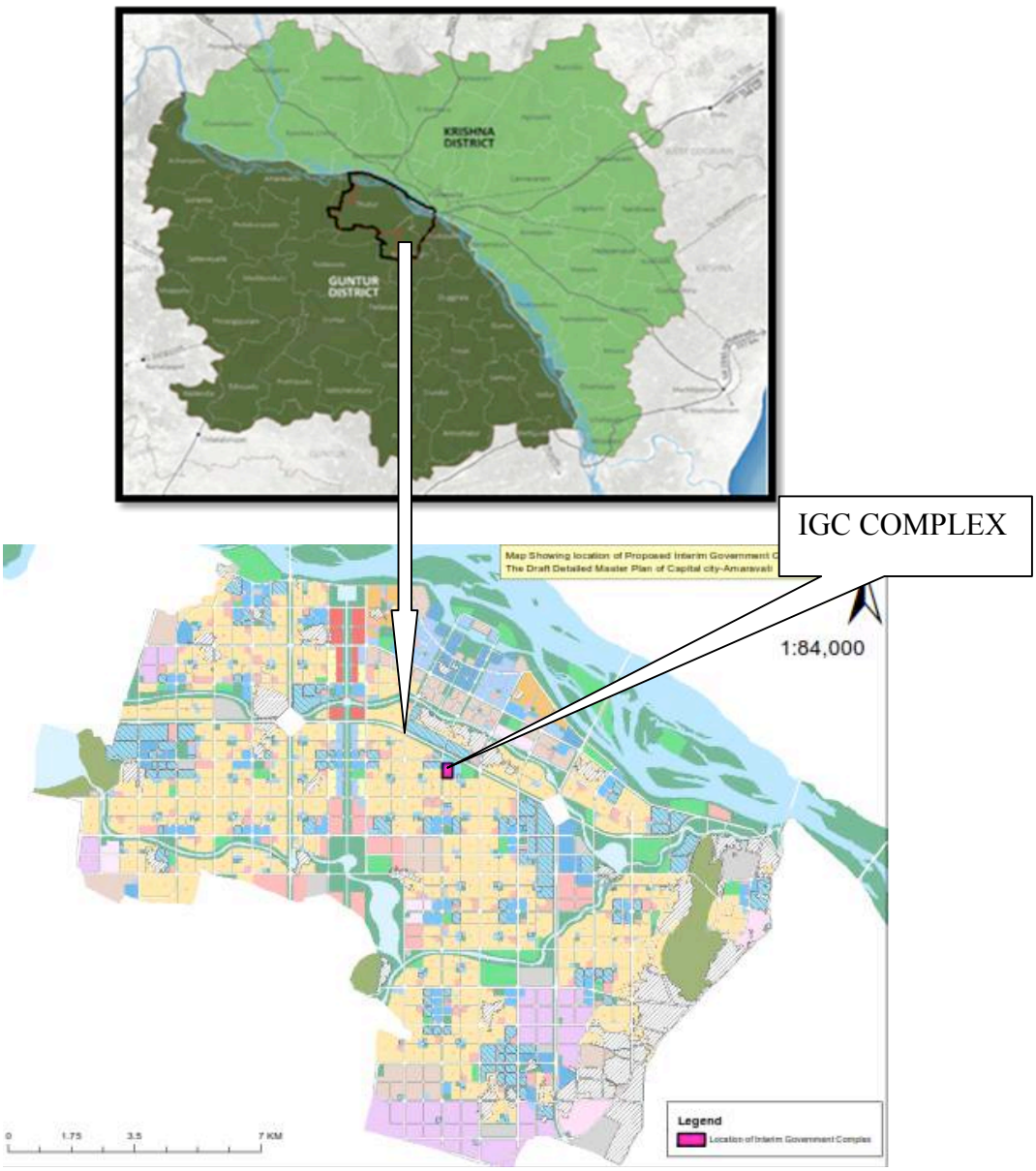


Table 2.1: Environmental Setting of the Proposed Project

<table>
<tr><th>Sr. No.</th><th>Particulars</th><th>Details</th></tr>
<tr><td>1</td><td>Site Coordinates</td><td>Coordinates of Interim Government Complex Buildings
<table>
<tr><th>Direction</th><th>Degrees</th><th>Minutes</th><th>Seconds</th></tr>
<tr><td rowspan="2">NW</td><td>16</td><td>30</td><td>55.630</td></tr>
<tr><td>80</td><td>30</td><td>49.769</td></tr>
<tr><td rowspan="2">NE</td><td>16</td><td>30</td><td>55.649</td></tr>
<tr><td>80</td><td>30</td><td>58.781</td></tr>
<tr><td rowspan="2">SE</td><td>16</td><td>30</td><td>42.584</td></tr>
<tr><td>80</td><td>30</td><td>58.811</td></tr>
<tr><td rowspan="2">SW</td><td>16</td><td>30</td><td>42.565</td></tr>
<tr><td>80</td><td>30</td><td>50.375</td></tr>
<tr><td rowspan="2">SW</td><td>16</td><td>30</td><td>43.117</td></tr>
<tr><td>80</td><td>30</td><td>49.799</td></tr>
</table>
Coordinates including public facilities
<table>
<tr><th>Direction</th><th>Degrees</th><th>Minutes</th><th>Seconds</th></tr>
<tr><td rowspan="2">NW</td><td>16</td><td>30</td><td>55.63</td></tr>
<tr><td>80</td><td>30</td><td>49.769</td></tr>
<tr><td rowspan="2">NE</td><td>16</td><td>30</td><td>55.621</td></tr>
<tr><td>80</td><td>31</td><td>7.141</td></tr>
<tr><td rowspan="2">SE</td><td>16</td><td>30</td><td>42.593</td></tr>
<tr><td>80</td><td>31</td><td>2.704</td></tr>
<tr><td rowspan="2">SW</td><td>16</td><td>30</td><td>42.565</td></tr>
<tr><td>80</td><td>30</td><td>50.375</td></tr>
<tr><td rowspan="2">SW</td><td>16</td><td>30</td><td>43.117</td></tr>
<tr><td>80</td><td>30</td><td>49.799</td></tr>
</table></td></tr>
<tr><td>2</td><td>Elevation above MSL</td><td>+ 20 to + 22 m above Mean Sea Level</td></tr>
</table>

4	Climatic Conditions	• Normal annual rainfall : 853 mm • Actual rainfall (2010-11) :1,357.6 mm • Average Annual Rainfall (1999-2011) : 889.1 mm • Mean Daily Temperature: Maximum 48.5 ^{0}C Minimum: 1 6. 8 ^{0}C • Relative Humidity : Highest-80 % & Lowest - 30 % • Evapo-transpiration :145mm – 350 mm • Wind Speed: 4.5 to 16.3 km/hr. Source: As per the report, "Guntur District Ground Water Profile" prepared by Central Ground Water Board, Ministry of Water Resources, published in September 2013.
5	Present land use at the proposed site	Fallow land
6	Nearest Highway	Guntur-Vijayawada State Highway
7	Nearest Railway Station	K C Canal Railway Station near Tadepalli at 14 km
8	Nearest Airport	Gannamvaram Airport at 35 km
9	Hills/Valleys	Tadepalli Hills within 10 km radius
10	Ecologically sensitive zones within 15 km distance	Nil within 10 km radius
11	Historical/Archaeological places	Famous Undavalli caves at 11km from project site
12	Industries/Industrial area	Nil within 10 km radius
13	Seismic Zone	Zone – III

2.2. PROJECT DESCRIPTION

The proposed project is the development of Interim Government Complex Building to accommodate 15000 secretariat and other government staff and about 4000 floating and incidental population. The complex is having 6 buildings with G+3 structures.

Table-2.2 Details of Proposed Land Use

S. No.	Name	Total Area
A	**Main Building**	(In Sqm)
(a)	Building 1	20051
(b)	Building 2	20095
(c)	Building 3,	20211
(d)	Building 4	20211
(e)	Building 5	20211
(f)	Building 6	18425
	Total of above	**119204**
B	**Utility / Other's Buildings Area:**	
(a)	HVAC Plant Room	3500
(b)	LT Panel Room	750
(c)	Garbage Collection Room	300
(d)	STP	1690
(e)	Water Tanks & Pumproom	1125
	Total of above	**7365**
C	**Security Buildings**	
(a)	Crash Bay	248
(b)	Security Room - 1	749
(c)	Security Room - 2	370
(d)	Security Posts	46.4
(e)	Security Control Room	452
(f)	Covered Parking	210
	Total of above	**2075.4**
	Grand Total (A+B+C)	**128644.4**

2.2.1 Building Details

2.2.1.1 Proposed Building Details

The proposed development comprises of total 6 buildings, Assembly Complex (G+3) and Secretariat Buildings 1, 2 3, 4 and 5 (G+3).

2.3 TOTAL COST

Total cost of project : app. 530 Crores

2.4. INFRASTRUCTURE AND UTILITIES

2.4.1 Project Layout

The Interim Government Complex Building is located on a plot which a flat terrain. The total ground coverage of the project developed is less than 50%. The layout Plan is attached as Annexure.

2.4.2 Traffic Details

The proposed site is connected to existing Inavolu- malkapur Connecting Road. Traffic management is an important aspect of the project, as large number of vehicles will be used by the employees (15000) as well as the floating population (4000) to be housed in the proposed project.

The salient features of the traffic management strategy and the level of Service (LOS) analysis for existing as well as future are as follows:

- The project site is classified as Commercial Zone categorized as C3 - Neighborhood Center Zone as per master plan.
- The connecting roads are with Right of Way (RoW) of 50mts (North - South) on west side and 25mts (East - West) on South side of the proposed site.
- The design Service volumes for the 50mt (6-lane divided 2-way carriageway) is 4800 PCUs/Hr (which is 0.7 times of the maximum capacity) at Level of Service "C" as per Indian Roads Congress (IRC)
- The design Service volumes for the 25mt (4-lane divided 2-way carriageway) is 1800 PCUs/Hr (which is 0.7 times of the maximum capacity) at Level of Service "C" as per Indian Roads Congress (IRC)

The present level of service (LOS) cannot be calculated as there is no existing road on the ground around the proposed site.

- Assuming the expected peak no. of vehicles making trips to the proposed IGC are 1000 PCUs/Hr (including Secretariat staff, MLAs, visitors, etc.,)
- The level of service of connecting roads shall remain within permissible limits such as (LoS < 0.7)

Table 2-3: Traffic Calculation

Road	Existing Volume, PCU/hr	Existing Volume/ Capacity	Additional Volume	Modified Volume	Modified Volume/ Capacity	Modified LOS & Performance
50mt (North - South) on west side(6-lane divided 2-way carriageway)	0	0	1000	1000	(1000/4800) = 0.208	LOS = B; Represents a zone of stable flow
25mt (East - West) on South side (4-lane divided 2-way carriageway)	0	0	1000	1000	(1000/1800) = 0.555 LOS = C; Represents a zone of stable flow	

200 VIP car parks will be provided within the complex. All the parking space is provided at the ground level. Designated Car Parking Area battery operated vehicle is provided in the Parking lot.

Apart from this allotted parking, a separate area (shown in layout plan) is allocated for parking area for staff and floating population. This area will have facility to park 1050 number of 4 wheelers, 650 numbers of two wheelers and 500 number of cycle.

The project gives importance to strengthen the Public transport system, there will be buses plying to the IGC Building Complex from various nearby areas for daily commuters. The proposed bus parking area can be used to park 30 buses.

2.4.3 Raw Material Requirements

Table 2.5: Raw Material Requirements

Sr. No.	Raw Material	Qty	Unit	Source	Mode of Transportation
1	Cement	16640	MT	Local Market	Trucks
2	Gravel	138000	cum	Local Market	Trucks
3	Metal	10500	cum	Local Market	Trucks
4	Sand	10376	cum	Local Market	Trucks

2.4.4 Power Supply

Total Connected load - 12000 KW

Demand load for the building- 9600 KW

DG Sets for 100% power backup

8-1500KVA

1- 1000 KVA Holiday or Night Requirement)

Stack Height- 20 m

2.4.5 Water Supply and Sewerage System

2.4.5.1 Construction phase:

Table 2.6- Water Requirement during Construction Stage

A	PEAK WATER REQUIRED DURING CONSTRCUTION PERIOD (By Tankers)		
A1	Water for permanent working Staff		Unit
	Working staff during construction period	600	nos. per day
	Water for each person	135*	liters / day / person
	Water required for working staff	81000	liters / day
A2	Water for Day working Staff		
	Working staff during construction period	600	nos. per day
	Water for each person	45*	liters / day / person
	Water required for working staff	27000	liters / day
A3	Water required for Curing	83655	liters / day
A4	Water required for execution of structures	83655	liters / day
A3	Water required for Dust suppression	329600	liters / day
A4	Water requirement for landscaping	235870	liters / day
	Total Water requirement during construction of project	840780	liters / day
		840	**KLD**

Water consumption taken as per CPHEEO Manual

2.4.5.2 Operation phase:

Table 2.7- Water Requirement during Operation Stage

WATER REQUIRED DURING OPERATION STAGE (Through Pipeline from Velagapudi)				
B1	**Requirement of Water for Permanent Staff**	**No. of Persons**	**liters/ day/ person**	**Water Requirem**

				ent (liters / day)
	Drinking Water in liters / day	15000	30	450000
	Flushing Water in liters / day	15000	15	225000
B2	**Requirement of Water for Visitors**			
	Drinking Water in liters / day	3000	5	15000
	Flushing Water in liters / day	3000	10	30000
B2	**Requirement of Water for Incidental population**			
	Drinking Water in liters / day	1000	90	90000
	Flushing Water in liters / day	1000	45	45000
B3	**Requirement of Water for Gardening**	**Area of Garden**	**liters / day / sqmt**	
		45 acres	5 KL/acre	225000
B4	**Total Requirement of Water**			
	Total Water for Drinking			600000
	Water for Flushing			300000
B5	Cooling Water Requirement for AC			480000
	Total Water required			**1600 KLD**
	Recycled water available			**600 KLD**
TOTAL FRESH WATER REQUIREMENT				**1000 KLD**

*Water consumption taken as per CPHEEO Manual

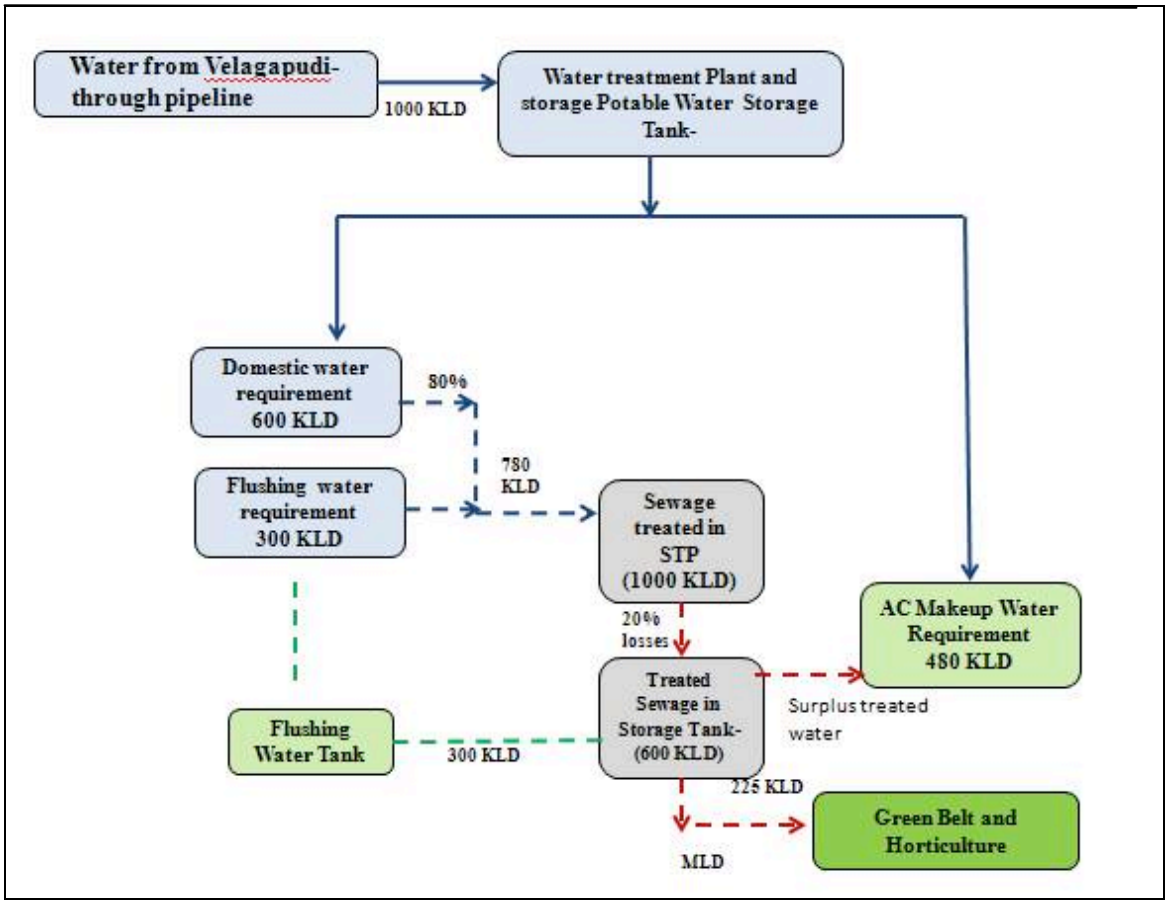


Figure: 2.4 Water Balance Diagram of Proposed Project

2.4.6 Fire Fighting System

A detailed fire protection system is being planned in the project. This system shall be implemented in line with the requirements of the Chief Fire Officer (CFO) of Fire Safety Department. A separate permission would be taken from CFO for the provisions made to the complex for the purpose of fire safety. Some of the provisions are as follows:

i. Yard hydrant on all roads at 45m intervals.

ii. 100 mm dia hydrant riser with single landing valves, 2x15 m RRL Hoses,

Hose Reel 36m, 20mm dia, Standard branch pipe – 16mm dia,

iii. Sprinkler system. Quartz bulb 68 deg C, Sprinklers with flow switches for Sprinklers above and below false ceiling. The space above the false ceiling is exceeding 800mm and accordingly Sprinklers required to be provided above false ceiling also.

iv PUMPS

Capacity 2850 lpm, 80m head,

Electric driven	2 Nos,
Diesel Engine driven	1 No.
Jockey Pump 180 lpm/80m head, Electric driven	1 No.

All Electric Pumps shall have automatic start and stop on fall of pressure. Diesel pumps shall have automatic start, manual close.

v. FIRE EXTINGUISHER (OFFICES)

Each hydrant station shall have 1 x 4.5 kg Co2 Fire extinguisher and 6 kg ABC Fire extinguisher.

2.4.7 Storm Water-Drainage and Rain Water Harvesting

Storm water drains will be constructed according to municipal regulations. Storm water from the entire plot will be collected through network of storm drains. Storm water from plot area will be collected in the rainwater harvesting pits provided for this purpose. The overflow from these pits, if any, will be then discharged in the drains.

For recharging ground water, rainwater from terrace of the buildings shall be harvested.

RUN - OFF (DISCHARGE)

Where,

$$Q = CIA$$

Q = run – off (discharge) in cubic meters per hour (m^3/hour)

C = Coefficient/Impermeability factor of the surface.

I = Intensity of rainfall (m/hr).

A = Total Drainage Area in sq.m.

Required amount of rain water will be harvested and excess will be send to drainage lines. The rainwater calculation for the project is given below:

Design Basis – **50mm of rainfall / hour**.

a. Rain Water Harvesting

i. Capacity Each building - Terrace area 4500 sqm,

Discharge factor – 0.8

Total rainfall in hour = 4500x 0.8 x 0.05 = 180 Cum.

6 Nos. 30 cum. rainwater harvesting pits, modular technology with PVC in fills.

Total number of Rainwater having pits 6 x 6 = 36 Nos.

b. **Storm Water Drainage for the Office Complex**.

Area 25 Acres

Total Rainfall expected = 25 x4000 – 6x 4500 (terrace area) = 73000 x 0.5 = 3650 Cum.
The run off storm water 60% maximum = 2190 Cum.

Storm water pipes with manholes provided upto proposed water body capacity 1500 cum. The water body size 50 m x 20m shall have evaporation losses @ 1cm/day i.e. 100 KL/day.

The water during rainy season shall be pumped to the water body in the area 1 kilometer from the plot.

3 Submersible Pumps of capacity 250 Ltr/sec, head 15m working in tandem with flow switches shall transfer storm water from the water body.

2.4.8 SOLID WASTE MANAGEMENT

The main solid waste generated from the proposed project is due to consumption of food materials, plastic, packing material and paper. The solid waste generation from the proposed project is given below:

Waste generated/head,

- Non bio-degradable – 150 gm
- Bio-degradable – 100 gm
- Horticulture – 2000 gm/Acre

Total per day –

i. Non Bio-degradable 19000x150 = 2850 Kg say 3000 kg/day

ii. Biodegradable 19000 x100 = 1900 Kg + 2 x 45 kg = 1980 kg say 2000 kg

2.4.8.1 Sewage Sludge Generation

Total Sewage generation = 780 m^3/day

= 780000 lit/day

Sewage Sludge generation = 780000 x 250 mg/lit/day

= 195000000 mg/lit/day

= 195 kg/day

Sludge generated from the STP will be used as organic manure for plantation.

2.4.9 Landscaping and Greenbelt Development

Adequate land will be available for open spaces and other non-building purposes. 27797.18 sq. m areas will be taken for green cover / lawn development in the proposed facility. Suitable plant species of local varieties will be planted with adequate spacing and density for their fast growth and survival.

3. ANTICIPATED ENVIRONMENTAL IMPACTS

3.1 INTRODUCTION

Before starting a project, it is essential to assess the present environment without the project, and the likely impact of the project on the environment, when it is completed. Therefore, an Environment Impact Assessment has to be made before starting a project. For analysis of environmental impacts, many professions and disciplines have to be involved. Like economic and engineering feasibility studies. Environmental Impact Assessment is a management tool for officials and managers who make important decisions about major development projects. The Environmental Impact Assessment should have the following objectives:

I. Predict environmental impact of projects

II. Find ways and means to reduce adverse impacts

III. Shape project to suit local environment

IV. Present the predictions and options to the decision-makers

The Conceptual plan should cover brief description of project, brief description of existing environment, likely impact of project, the mitigation and protection measures, consideration of alternatives, and summary with conclusions.

The environmental impacts of the proposed project can be categorizes in to category:

- During Construction Phase
- During Operational Phase

During the construction and operation phases of the proposed project various type of activities would be carried out due to which, many type of pollutants would be generated.

3.2 SOURCES OF POLLUTION

Pollutants generated during both the construction and operation phase are solid, liquid and gaseous in nature. Also, the generation of pollution could be continuous, periodic or accidental.

Table 3.1: Pollutant Sources and Characteristics

NO.	ACTIVITY / AREA	POLLUTANTS		
		TYPE	CHARACTERISTICS	FREQUENCY
CONSTRUCTION PHASE				
1	Excavation and construction	Air emission : SPM, CO, $RSPM_{10}$, NO_X, SO_2	Dust from construction activities and excavation. Particulates, NOx and CO from vehicle exhaust.	The emissions are expected from excavation and leveling activities.

NO.	ACTIVITY / AREA	POLLUTANTS		
		TYPE	CHARACTERISTICS	FREQUENCY
		Earth / solid waste	From construction activity and excavation.	Periodic.
		Noise	From construction activity and excavation.	Temporary
OPERATION PHASE				
1	Residential area	Sewage	Domestic wastewater : BOD, Pathogens, etc.	Continuous
		Domestic Solid Waste	Bio-degradable and non-biodegradable wastes	Continuous
2	Vehicular movement	Air emission and noise	Vehicle exhaust emissions	Continuous / periodic
		Oil spills	Minor oil leaks in parking lot	Continuous
3	Air conditioners	Solid waste	Used equipment parts and garden wastes	Continuous
		Air emission	Ozone depleting substance release	Accidental
4	Maintenance / housekeeping	Wastewater	Floor washing	Continuous

3.3 AIR EMISSIONS

Air emissions have no boundaries and can migrate from area to area depending upon the wind direction and speed. The sources of air emission can be grouped into three categories of point, area and line sources.

- A point source is a single source of emission with an identified location, such as an industry.
- An area source is when the sources of emission are widely distributed point sources having relatively comparable significance.
- A line source is when the sources of emissions from a number of fixed or moving facilities have relatively comparable significance, such as roads.

3.3.1 Predicted Air Emissions from the Site

For the purpose of analyzing the movement and dispersion of air emissions, the following potential emissions from the construction/ operational activities at the proposed site have been considered.

3.3.1.1 Construction Phase:

During the construction phase, SPM and PM10 is expected to be the main pollutant associated with on-site roads (paved and unpaved), stockpiles and material handling. In

this case, pollution emission sources are distributed throughout the project site and shall fall under the category of area source. The land acquired is fairly flat, so extensive formation work is not expected during this phase. Surplus excavated material shall be disposed to the approved municipal dumping site.

Due to the confined nature of heavy construction activity during this limited period, tailpipe emissions from construction equipment are assumed to be essentially negligible. In the absence of information regarding the quantity and type of construction equipment to be deployed at any particular time, emission factors for construction activities were used for emissions estimates. Overall SPM emissions were estimated using the emission factor of 1.2 tons SPM/ month of activity/ acre as per AP-42 Section 13.2.3.3 (U.S. EPA, 1995). This emission factor is most useful for developing estimates of overall emissions from construction throughout a geographical area and most applicable to construction operations with medium activity level, moderate silt contents, and semiarid climate (U.S. EPA, 1995). The derivation of the factor assumes that construction activity occurs 30 days per month, for 24 hours making the above estimate somewhat conservatively high for total suspended particulate (U.S. EPA, 1995).

At the time of construction, by adopting control measures, dust generation can be brought down by 85-95%. Thus, the dust emission factor given above has been reduced by 90% to arrive at the expected emissions from the site due to construction activity.

3.3.1.2 Operation Phase:

During the operation phase, major air pollution source will be due to the vehicular emissions within the project site and DG sets.

9 number of DG sets will be provided to ensure 100% power backup. The stack height of the DG is calculated as 18 m to ensure sufficient dispersion of pollutants.

3.4 NOISE EMISSION

The assessment of the impacts of noise on the surrounding community depends upon:

- Characteristics of noise source (instantaneous, intermittent, or continuous in nature, with the latter contributing the least to noise pollution).
- Time of day from which noise occurs
- Location of noise source with respect to noise sensitive receptor.

A higher level of urban sounds has come to be known as “noise pollution”. Elevated sound levels impact our physical health, stress levels, and quality of life in much the same way that other, more obvious forms of pollution affect us.

Research shows it is more effective to use a multi-faceted approach to noise reduction rather than a single tool. Well planned efforts may reduce noise levels by as much as 50%. In planning the Interim Government Complex the following tips are followed for noise reduction.

- Maximising personal distance from the sound source for dissipating loud sounds over extended distances.

- Using vegetation to break sound lines.
- Utilising and economising all spaces.

Noise reduction is achieved by either deflection or absorption of the noise or a combination of the two. Most hardscape barriers work by deflecting sound. Since there is no space constraint, vegetation approach alone is used in and around the proposed Interim Government Complex to reduce noise pollution. The most visually appealing way to block noise is with a dense growth of plants. An advantage to using plants as noise blockers is that they absorb sounds best in the high frequencies that people find most annoying.

Planting Noise Blockers

Plant materials help attenuate sound and "calm" the noise. Some types of plants are better at performing noise reduction function than others. Effective trees and shrubs have thick, dense evergreen foliage, and branches that extend to the ground are only utilised in planting.

Procedures for noise screening:

- Planting the noise buffer close to the noise source ie., roads
- Planting noise reducing plants as a hedge, spacing them so that there won't be gaps between the plants when they reach maturity. This will provide an uninterrupted buffer of foliage.
- Installing dense layers of plants to provide optimum noise protection. Beginning with a row of evergreen shrubs nearest the noise, and planting a row of taller shrubs or small trees behind them. Finishing with a row of showy trees that face the interim government complex.
- Choosing trees and shrubs of evergreens with dense branches that reach all the way to the ground.
- Tree planting should be staged in two staggered rows to provide visual screening of the sound source.

Plant materials recommended for noise screening & reduction:

- Overstorey Trees: Madhuca indica, Kigelia pinnata and Polyalthia longifolia.
- Understorey Trees: Mimusops elengi, Pterospermum acerifolium, and Heterocarpus incisa
- Shrubs: Golden duranta, Bouganvillea and Jatropha red.

3.4.1 Construction Phase:

Sources of noise emissions are expected from various construction equipments. General noise levels generated from the operation of equipment and machinery is provided in the following table. (Source: www.gvrd.bc.ca)

Table 3.2: Noise Levels Generated From Construction Equipments

S. No	Name of Source	Noise Levels From Source (dBA)	
		At a Distance of 50 ft. (16 m)	At a Distance of 1 m
1.	Air Compressor	87	111
2.	Back Hoe / Loader	81	105
3.	Concrete Mixer Truck	85	109
4.	Concrete Pumper	70	94
5.	Concrete Vibrators	77	101
6.	Cranes – Mobile	81	105
7.	Dump Truck	83	107
8.	Hammering	86	110
9.	Jack hammer	88	112
10.	Pile Driver	100	124
11.	Radial Arm Saw	80	104

The MoEF&CC has not yet prescribed noise emission specifications for construction equipment. However, the limited information available is provided in the given table. (Source: CPCB–Domestic appliances and construction equipments at the manufacturing stage to be achieved by the year, 1993).

Table 3.3: Noise Limits for Appliances and Equipments during Construction Phase

Sr. No.	Equipment	Noise Limit, dB(A)
1.	Air Conditioner – Window	68
2.	Air Cooler	60
3.	Diesel Generator	85 – 90
4.	Compactors (rollers), concrete mixers, cranes, vibrators, etc.	75

The resultant noise emission level, as calculated from the information provided is 100 dB (A). Considering all pertinent equipment to be in operation as a worst-case scenario, this resultant noise level was subsequently used to predict noise exposure patterns.

3.4.2 Operation Phase:

During the operation phase of the project, major sources of noise pollution are expected to be from DG sets, vehicular traffic, air conditioning systems and by use of any other machinery.

- The D.G. Sets will be only used in case of emergency. Proper acoustic enclosures will be provided for avoiding any noise problem.
- The expected noise level from proposed project would be much less than the statutory requirement i.e., less than 75 dB (A) during day time and 70 dB (A) during night time.

Vehicular parking is being provided in open, where noise levels are expected to increase substantially during the morning and evening hours. Honking of vehicles would be a major form of pollution.

3.5 WASTEWATER GENERATION

3.5.1 Construction Phase:

The project will employ 600 permanent workforce and 600 day workers for the early execution of the construction activity. A temporary labour camp to house 600 workforce will be established for the project. An area is allocated for temporary labour camp at about 500m distance from the project site.

Wastewater generated during construction is about 80 KLD. 3 temporary toilet blocks will be constructed to provide hygienic sanitation facilities to the entire workforce. Also the waste water generated will be treated in septic tanks & soak pits. The site manager shall ensure that in no circumstances, open defecation in and around the site by labor or their children is carried out.

3.5.2 Operational Phase:

Water will be consumed in various processes like drinking, flushing, floor washing and gardening. After this consumption about 780 KLD wastewater will be generated in significant amount. The waste water will be treated in sewage treatment plant (capacity-1000 KLD) upto tertiary level.

3.6 SOLID WASTE GENERATION

Waste quantification from manual on Municipal Solid Waste Management by Central Public Health and Environmental Engineering Organization (CPHEEO)] and characterization exercise is being carried out to estimate the quantum and type of waste that would be generated by different activities due to proposed project during construction and operation phase.

Table 3.4: Quantification of Solid Wastes

S. No.	Waste	Generation factors
1.	Domestic Waste	0.2 kg / capita / day
2.	Street Sweepings	0.05 – 0.20 kg / capita / day
3.	Garden & Open space	15 kg / acre / day

Table 3.5: Expected Waste Characteristics and Frequency

S. No.	Activity/ Area	Waste Generated		
		Type	Characteristics	Frequency
Construction Phase				
1	Excavation and construction	Construction wastes	Earth, stones, concrete, bricks, lumber, etc.	Larger quantities will be generated in phase.

2	Labour camps	Domestic wastes	Mainly bio-degradable wastes including food wastes	Temporary – during construction phase.
Operation Phase				
2.	Residential Area	Domestic wastes	Biodegradable wastes food waste) and non-biodegradable wastes (paper, plastic, wood, metal containers, etc.)	Daily
		Street Sweepings	Dirt and dust, catch basin dirt, leaves etc.	Daily

3.6.1 Construction Phase:

During the construction phase, a considerable quantum of waste generated at the project site would be inert waste, which largely comprises of clay, sand, gravel, untreated wood, concrete, asphalt, pipes, conduits, light steel material, stone, bricks, plastic, paper, metal and glass. Technology Information, Forecasting, and Assessment Council (TIFAC) estimated waste generation during construction and demolition operations is 40 - 60 kg/m^2 and 300 - 500 kg/m^2 respectively. The table below gives an estimate of the average composition of waste that shall be generated from the onsite construction activities. (Source: TIFAC Report "Utilization of Waste from Construction Industry", 2001)

Table 3.6: Waste Composition – Construction Phase

Sr. No.	Constituents	Percentage Composition
1	Soil, Sand and Gravel	34.99
2	Brick and Masonry	29.95
3	Concrete	24.98
4	Metal	4.97
5	Bitumen	2.04
6	Wood	2.04
7	Others	1.03
	TOTAL	**100.00**

The expected solid waste generation from the construction is about 6432 Tones during the entire construction period. The total filling requirement for the project will be met by combination of fly ash, quarry dust and gravel considering the soil condition. The estimated amount of filling material required for this is about 27,000 cum. This is after taking into account the soil that will be reused from excavation for foundations and the suspended void floor approach.

Material that is generated during the construction phase will be reused on site or salvaged for subsequent reuse to the greatest extent possible and disposal will only be considered as a last resort. Initiatives will be put in place to maximize the efficient use/reuse of materials. Excavated spoil/ topsoil will be carefully set aside and used as landscaping material in the completed development. Innovative initiatives to avoid the need for disposal shall be investigated.

The waste from construction camp has been estimated to be 480 **kg/day**, which will be collected, transported, treated and disposed as per the Municipal Solid Waste Handling And Management Guidelines (2000) and amendments thereof.

3.6.2 Operation Phase:

Waste quantification has been carried out based on the activities proposed in the project master plan. About 90% of waste from the site during operation phase would be from domestic sources.

Waste from open spaces and garden comprise of horticultural waste that will be generated by periodical lawn mowing and trimming of trees. Horticulture waste is assumed based on the experience in other projects with similar setting. Assumed waste generation factor for horticulture waste is 2 Kg /Acre/ Day.

Total solid waste generated during the operation stage is 5 TPD.

3.7 IMPACTS

The primary function of an environmental impact assessment study is to predict and quantify the magnitude of impacts, evaluate and assess the importance of the identified changes, present information and monitor actual changes. Environmental impacts could be positive or negative, direct or indirect, local or regional and also reversible or irreversible.

3.7.1 Identification of Impacts

Figures given below describe the different areas, which may be affected due to any developmental project.

Table 3.8: Identification of Impacts during Construction and Operation Phase

Sr. No.	Media	Aspect	Potential Impact
Construction Phase			
1	Air	Dust emissions from excavation, material handling and other construction activities.	Minor negative impact inside the project premises. No negative impact outside the site.
2	Noise	Noise generated from construction activities, operation of construction equipment and traffic.	Minor negative impact near noise generation sources inside premises. No significant impact on ambient noise levels at sensitive receptors.
3	Water	Surface runoff from project site, Oil/ fuel and waste spills, Improper	No significant negative impact.

Sr. No.	Media	Aspect	Potential Impact
		debris disposal, Discharge of sewage from labour camp.	
4	Land use and aesthetics	Land development	Minor positive impact
5	Topography and geology	Site development	No significant impacts
6	Soil	Construction activity leading to topsoil removal and erosion.	Minor negative impact
7	Ecology, flora and fauna	Habitat disturbance during construction activity.	Minor negative impact
8	Traffic pattern	Haul Truck movement and possibility of traffic congestion.	Minor negative impact
9	Socio-economy	Increased job opportunity for locals. Economy related to real estate development, material supply, etc. expected to boom.	Overall positive impact.
Operation Phase			
1	Air	Vehicular traffic.	Minor negative impact.
2	Noise	Noise from AC, D.G sets, vehicle movement.	Minor negative impact inside premises. No significant impact at sensitive receptors.
3	Water	Sewage Discharge of sewage to Sewer line/recycled after treatment as per APPCB norms.	No significant adverse impact.
4	Soil	Storage and disposal of solid waste, Discharge of sewage, Fuel and material spills, Pesticides use	No negative impact
5	Ecology, flora and fauna	Land use change, discharge of wastewater to surface water bodies.	No negative impact

Sr. No.	Media	Aspect	Potential Impact
6	Socio-economy	Increased job opportunity for locals for working in project general household services. Project will involve road upgrading, beautification of the surrounding, etc.	Overall positive impact.

3.7.2 Air Environment

3.7.2.1 Construction Phase:

As discussed earlier, during the construction phase, SPM and PM10 is expected to be the main pollutant, which is associated with general construction activity including excavation, leveling and material handling. As the pollution emission sources in this case shall be distributed all over the project site, they shall fall under the category of area source. With the emission factor and the phased manner in which construction activity is to be carried out, it is likely that increase in SPM and PM10 levels due to construction would mainly be confined to the project site.

Thus, it is inferred that **minor negative** impact within a few 100 meters from the source within the site would occur on ambient air quality under the worst conditions, which are mitigated by implementing Environmental Management Plan. However, **no significant impacts** are expected on the overall ambient air quality due to construction activities, at the sensitive receptors outside the project premises.

3.7.2.2 Operation Phase:

In the operation phase of the project, as mentioned, the significant pollution source would be vehicle emissions. As mentioned earlier, approximately 800 - 1000 vehicles would be added to the existing traffic by the project, during peak hours.

3.7.3 Ambient Noise

The noise sources for the project and the noise generation at source have been discussed earlier. The impact of this noise generated at source has been predicted by the use of equations and assumptions and are as discussed below.

For an approximate estimation of dispersion of noise in the surrounding from the source point, a standard mathematical model for sound wave propagation is used. The equation for sound wave propagation used is as follows:

$$\text{Noise (Receptor)} = \text{Noise (Source)} - 20 \text{ Log distance of Receptor / Distance of Source}$$

3.7.3.1 Construction Phase:

The effect on noise levels due to the construction activity in worst-case scenario would not extend beyond 250 m. Therefore, there would be **no significant impact** of the noise from construction activity at receptors outside the project site.

The above noise levels are without any mitigative measures. With the mitigative measures, the noise levels will be further restricted within very short distance from the

site. These measures would include both preventative measures like use of Personal Protection Equipments (in the form of ear plugs/ muffs) compulsory for workers to be stationed in high noise areas and also design of barriers in the form of green belts to effectively reduce propagation of sound waves to vulnerable receptors outside the site.

Thus, noise from construction would have **minor negative impact** on overall acoustics of the project site. However by implementing appropriate mitigation measures these effects are expected to become insignificant.

3.7.3.2 Operation Phase:

As mentioned earlier, the project shall use D. G. sets (8X1500 kVA and 1X500 kVA) in construction phase and operation phase. So, the sources of noise pollution are D. G. sets and vehicular movement and honking. By implementing appropriate mitigation measures these effects are expected to become insignificant.

Thus, **minor negative impact** would occur on the nearby road infrastructure. These negative impacts can be further reduced by implementing a traffic maintenance and road infrastructure maintenance schedule. Thus, with mitigative measures impacts on transport links would become **insignificant**.

3.7.4 Water Resource

This section describes the potential impacts on the water resource during the construction and operation phase of the project.

3.7.4.1 Construction Phase:

No ground water extraction will be done for the project construction. Total 840 KLD water will be required during the construction stage, the water supply during construction phase will be met by Tankers by the Contractors.

Construction activities for the proposed development can have minor impact on hydrology and ground water quality of the area if the construction waste leaches into ground. Potential sources of impacts on the hydrology and ground water quality during the construction phase are as follows:

1. Soil runoff from the site leading to off-site contamination (particularly during rainy season).
2. Improper disposal of construction debris leading to off-site contamination of water resources.
3. Spillage of oil and grease from the vehicles and wastewater generated on site activities such as vehicles washing, workshop etc.

Precautions and preventive measure should be taken at the site during construction to avoid any ground and surface water contamination. Following mitigation measures will be implemented:

1. Not allowing water to leave the construction site, the special geology of the site allows percolation of water to a very large extent without contaminating ground water.
2. Disposal of construction debris in approved areas.

3. Construction of storm water diversion channels to divert storm runoff from flowing over the construction areas.
4. Installing oil and grease traps in construction workshop and vehicle parking areas.

3.7.4.2 Operation Phase:

The entire fresh water requirement of 1000 KLD will be met by a dedicated pipeline from source in Velegapudi by pipelines. No ground water extraction is planned for the project. Hence, no significant adverse impacts on surface and ground water quality are expected during the operation phase as no major pollutants would be released. Wastewater will be first treated using the sewage treatment plant provided. The water will be recycled to the maximum extent, by using for the gardening & flushing purposes.

Hence, **no negative** impacts are expected due to the construction and operation phase of the project.

3.7.5 Land Environment

The project will create a sustainable infrastructure together with landscaped and green spaces. Land will be used for various purposes like permanent structures, roads and other infrastructures, green areas, open spaces etc.

This is expected to enhance the land use pattern of the area without compromising on the socioeconomic status of the local people. The change in aesthetics and visual appeal of the region will also be positive, wherein the development will give way to planned, environment friendly and sustainable urban facilities.

Currently there is no tree on the project site, approximately 1483 plant species are planned to be planted in the complex area and about 777 plants will be planted in the public facility area.

Thus, a **Major Positive Impact** is expected on the land use pattern and aesthetics of the area**.** The proposed activity during the construction phase would involve excavation work and leveling of proposed site. Since the proposed site is a plain land, the topography as well as geology is not anticipated to change due to proposed project. No additional stresses will be imposed by the project on these parameters and hence **no significant impacts** are expected.

3.7.5.1 Soil

This section describes the potential impacts on the soil during the construction and operation phase of the project.

Construction Phase:

Impact on soil owing to the project construction activity includes soil erosion, compaction, physical and chemical desegregations and pollution of soil. Erosion of soil may occur on account of vegetation and large-scale excavation activity for construction. Site selected for the project has no vegetation on the plot; hence impact owing to removal of vegetation would be negligible, however construction and associated activities would expedite erosion if not managed properly. Site pictures are shown in Fig 3-1.

Other factors contributing to soil erosion is increased runoff and decrease in permeability of the soil. Use of heavy machinery and storage of material compact the soil. Compaction

of soil of as well as mixing of construction material with soil would also lead to reduced infiltration of water, decrease in permeability and increased runoff. Both physical and chemical desegregations of soil would occur during the construction phase. Physical desegregations would occur due to excavation of different layers of soil and subsequent mixing of different layers and would lead to disruption of soil structure. Chemical desegregations and pollution of soil would be on account of spillage of oil from vehicles used for transportation of construction material and from the building material used for construction purposes.

Several environmental management measures will be implemented to minimize the soil erosion and other impacts such as removal and use of topsoil from construction activity for future plantation, construction of silt traps etc.

Fig 3-1: Site Pictures

Operation Phase:

During the operation phase, 27797.18 sq. m area will be developed as landscape. This will be planted with native species of about 1483 trees in IGC and 777 trees in public facilities area. No significant impact is expected on the soil on and around the site, due to the following management measures:

- All solid wastes from the complex will be properly collected, stored and recycled.
- Wastewater will be reuse at maximum extent the treatment.
- Storm water will be used to recharge the tanks used for rain-water harvesting on site.

- The entire site area will be well paved and thus there will be no leaching of any substances in case of spills.

Hence, **no negative impact** on soil quality in the study area is expected due to the project activities.

3.7.6 Waste Disposal

This section describes the potential impacts due to the waste disposal during the construction and operation phase of the project.

3.7.6.1 Construction Phase:

During the construction phase, solid waste generated will include biomass from land clearing activities, waste from the labour camp, construction and hazardous waste. Impact from construction waste may arise owing to the shortage of dumping sites, increase in transportation and disposal cost and environmental deterioration. Potential pollution problems during construction activities include dumping of construction debris into or near watercourses or surface water drains. Proposed mitigation plan suggest maximum reuse of construction waste on site or removal of waste from the site and proper disposal, which would reduce the impact significantly.

The waste from labour camps would be mainly household domestic waste that would be disposed as per solid waste management rules. After completion of the project, the labour camp shall be removed from the site. All the scrap and debris shall be disposed off to the designated own dumpsite.

3.7.6.2 Operation Phase:

During this phase, environmental impact from solid waste (**about 5 TPD**) disposal can typically include contamination of soil, ground water, surface water and air quality. Solid waste, if disposed improperly can cause the following impact on the environment.

- Ground water contamination by leachates generated by dumping.
- Surface water contamination by the run off from the dumping site.
- Bad odor, Pests, rodents and wind blown litter in and around the dumping site.
- Generation of inflammable gases (e.g. Methane)
- Fires within the waste dump.
- Bird menace above dumping site.
- Erosion and stability problem relating to slope of the dumping site.
- Epidemic through stray animals.
- Increased concentration of acidity in the surrounding soil.
- Release of green house gases.

Impacts may also result from improper sitting, inadequate design and poor operation. However, for the proposed project, impacts from waste disposal would not be significant, since waste would be disposed as per the Solid Waste (Management and Handling) rules, 2000.

3.7.7 Biological Environment

The green development will be done in about 27797.18 sq mt. In this plantation the trees would be flower bearing trees, Soil improving and air pollution abatement trees. No eco-sensitive receivers or rare/endangered species of fauna were observed in study area.

The project site was devoid of any vegetation or any other feature. Thus, the impacts on Flora and Fauna will not be an issue of concern at site. The project is not contributing any negative impacts to the surroundings. Hence, the overall impacts on ecology of the area would be **negligible.**

3.7.8 Socio-Economic Environment

This section discusses the project activities and the extent of the potential impacts anticipated from these. Based on the nature and type of impacts, the assessment has been divided into three category i.e. positive, negative and negligible impacts. For example, the positive impacts include job opportunities for men and women, better utilization of land, preservation of environment, infrastructural development, etc. Long term impacts are also taken into account i.e. relocation, demography, aesthetics, accessing utilities, impact on archeological sites, etc. Negative impacts include adverse impacts on health, air pollution including noise, road safety, odours, etc.

3.7.9 Positive Impacts

Job opportunity: Total 600 permanent workforce and about 600 day workers during construction and 15000 permanent staff during operation is estimated for the project. The benefit relate to the direct employment associated with the construction of the facility. Jobs would be given to the unskilled, semi skilled as well as skilled labour category, for which locals would be given preference and thereby the overall development of the region is envisaged.

Wider economic growth: This project will increase the economic activities around the area, creating avenues for direct/ indirect employment in the post project period. There would be a wider economic impact in terms of generating opportunities for other business like hotels, restaurants, commercial areas, marketing, repair and maintenance tasks etc.

Infrastructural development: The project would enhance the infrastructure in the vicinity.

Aesthetics Environment: The architectural character of the new building, the vistas and landscaped areas created would improve the aesthetics of the area.

3.7.10 Negative Impacts

Transport: Additional traffic in the area is anticipated during the construction as well as operation stage. However, as per the draft Master Plan the project site will be catered by 30m and 50m wide road networks. The traffic analysis shows that even with peak load, the traffic volume will be under control.

Transient Labour population: Laborers from the surrounding areas might come and work at the site. Though majority of population would be recruited locally, limited labour with specific skills will be recruited from outside the region. Therefore, no significant pressure on local infrastructure is envisaged. Labour camps are expected to come during

construction. All Environmental Health & Safety (EHS) practices will be followed according to Labour Commissions Notification.

3.7.11 Negligible Impacts

Resettlement and rehabilitation issues: Since there is no existing settlement on the proposed project area, there is no issue of resettlement or rehabilitation.

Demography: During construction phase as well as operation phase, certain number of work force from outside cannot be avoided. Otherwise the project will not alter the existing demographic profile and the existing population density.

Impact on accessing utilities: Utilities include the supply of water, electricity and sewage facilities. Presently, the proposed site is barren with no facilities. It is anticipated that project will have own infrastructure facilities and would also provide access to local population at least during crisis.

Impact on Historical, Archeological and Architectural Sites: There are no historical or archeological monuments of significance within the immediate impact radius of 5 to 7 km from the site. The famous Undavalli caves is at a distance of 11km from the project site. Hence, no negative impact in this regard is anticipated.

3.8 CONCLUSION

Overall, the project will have **major positive impacts** on the region in sense of environment as well as social. **Negative effects** are not expected if there is dedicated environmental planning and if at the same time the interests of the population and the areas directly adjacent to the project site are considered.

4. ENVIRONMENTAL MANAGEMENT PLAN

4.1 INTRODUCTION

The Environmental Management Plan (EMP) is a site specific plan developed to ensure that the project is implemented in an environmentally sustainable manner where all stakeholders including the project proponents, contractors and subcontractors, including consultants, understand the potential environmental risks arising from the proposed project and take appropriate actions to properly manage that risk. Adequate environmental management measures need to be incorporated during the entire planning, construction and operation stages of the project to minimize any adverse environmental impact and assure sustainable development of the area.

The EMP is proactive in nature and should be upgraded if new facilities or modification of existing facilities, with environmental concerns, come up at a later stage.

EMP includes four major elements:

Commitment & Policy: Project will strive to provide and implement the Environmental Management Plan that incorporates all issues related to air, land and water.

Planning: This includes identification of environmental impacts, legal requirements and setting environmental objectives.

Implementation: This comprises of resources available to the developers, accountability of contractors, training of operational staff associated with environmental control facilities and documentation of measures to be taken.

Measurement & Evaluation: This includes monitoring, corrective actions, and record keeping.

The EMP will be planned for construction and operating stages of the project and includes the following elements:

- Air pollution control and management
- Water pollution control and management
- Noise control and management
- Storm water management
- Solid waste management
- Plantation, landscaping and land management
- Management of Social Issues
- Energy conservation

A summary of project activities, expected environmental impacts and proposed environmental management measures for controlling the likely impacts are presented at the end of this chapter.

4.2 AIR POLLUTION CONTROL AND MANAGEMENT

4.2.1 Construction Phase:

Air emissions from construction sites can pose health risks to workers and sensitive receptors surrounding the site, if not managed properly. It is the responsibility of the contractor to provide appropriate safety training, information equipment, signage, security and emergency response plans on the site.

To mitigate the impact of SPM (dust), the following measures are recommended for implementation.

4.2.1.1 Dust Control Plan

The most cost-effective dust suppressant is water, because a source of water tends to be readily available on a construction site. Water can be applied using water trucks, handheld sprays and automatic sprinkler systems. The total area on which vehicle movement is anticipated during construction phase is 32960 sq. m. Considering 10 l water per sq. m. for dust suppression, 329 KLD water will be utilized for dust suppression

Furthermore, incoming loads could be covered to avoid loss of material in transport, especially if material is transported off-site.

Table 4.1: Dust Control Plan

Fugitive Dust Source Category	Dust Control Actions
Earth-moving	(1a) For any earth moving, which is more than 30 m from all property lines, watering must be done as necessary to prevent visible dust generation from exceeding 100 m in length in any direction.
Disturbed surface areas (except completed grading areas)	(2a) Apply dust suppression in sufficient quantity and frequency to maintain a stabilised surface. (2b) Areas, which cannot be stabilised as evidenced by wind driven dust water at least twice per day to at least 80% of the unstabilised area.
Disturbed surface areas (completed grading areas)	(2c) Apply water to at least 80% of all inactive accessible disturbed surface areas on a daily basis when there is evidence of wind driven fugitive dust.
Inactive disturbed surface areas	(3a) Apply dust suppressants in sufficient quantity and frequency to maintain a stabilised surface; or (3b) Utilise any combination of control actions 2c, or 3a such that, in total, they apply to all inactive disturbed surface areas.
Unpaved roads	(4a) Water all roads used for any vehicular traffic at least twice per day of active operations; or (4b) Water all roads used for any vehicular traffic once daily and restrict vehicle speed to 15 kmph.
Open storage piles	(5a) Apply water to at least 80% of the surface

Fugitive Dust Source Category	Dust Control Actions
	areas of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust; or (5b) Install a three-sided enclosure with walls with no more than 50% porosity that extends, at a minimum, to the top of the pile.
Track-out control	(6a) Downwash of trucks (especially tyres) prior to departure from site.

4.2.1.2 Procedural Changes to Construction Activities

Table 4.2: Procedural Changes to Construction Activities

Description of the activity	Change effected
Electrically operated machinery	Using electrically operated construction machinery is the best way to avoid external pollution produced by diesel engines. This procedural change reduces problems related to emission, idling and maintenance.
Emission Control and Maintenance	The diesel generators used on site, in case of power failure, are maintained properly.
Reduction of On-site Construction Time	Rapid on-site construction shall reduce the duration of traffic interference and therefore, reduce emissions from traffic delay. Off-site fabrication of structural components, if possible, will also enhance the quality of work, as the production takes place in controlled settings and external factors such as weather and traffic do not interfere.

4.2.2 Operation Phase:

To mitigate the impact of pollutants from diesel generator sets and vehicular traffic during operational phase, the following measures are recommended for implementation:

(a) Air pollution control measures for DG sets.
   i. Use of good quality fuel with low sulphur content.
   ii. Periodic maintenance of DG sets as per defined schedule of manufacturer.
   iii. Stack height-18m.

(b) Vehicle emission controls and alternatives;
   i. **Flow of Vehicle**: Sudden acceleration or de-acceleration of vehicles produces more pollution than a vehicle maintaining a constant speed. Smoother flow of traffic within the parking area of the Interim Government Complex Building would ensure lesser pollution from the vehicles.
   ii. **Entry and Exit of Vehicles**: Two entry and exit with dedicated pedestrian entry as well as pathway for smooth vehicle movement.
   iii. **Idling**: The parking area should carry signs warning the vehicle driver against idling within the parking lot.

iv. **Traffic Management Team**: A team of trained staff should be appointed for monitoring traffic movement inside the parking space and at entrance and exit points of the premises.

Greenbelt Development

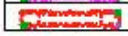
Increasing vegetation in the form of greenbelt is one of the preferred methods to mitigate air pollution. Plants generate oxygen, serve as a sink for pollutants, reduce the flow of dust and reduce noise pollution. The following table indicates various species to be used to reduce air pollution.

Table 4.3: Plant Species for Air Pollution Abatement

In IGC area

S. No	Name of Tree	Number of trees
1	*Jacaranda mimosifolia*	59
2	*Bauhinia blakeana*	61
3	*Couropita guianensis*	66
4	*Schefflera actinophylla*	67
5	*Anthocephalus cadamba*	90
6	*Erythrina crista galli*	45
7	*Lagerstroemia speciosa*	44
8	*Michaelia champaka*	648
9	*Xanthostemon chrysanthus*	403
TOTAL		1483

In public facility area total trees of approximately 777 as per below details

SYMBOL	NAME OF TREE	NOs	
	ERYTHRINA CRISTA GALLI	64	
	LAGERSTROEMIA SPECIOSA	28	
	BAUHINIA BLAKEANA	179	
	GOLDEN PENDA (XANTHOSTEMON CHRYSANTHUS)	62	
	MADHUCA INDICA	68	GREENERY AREAS
	KIGELIA PINNATA	68	GREENERY - 11 6107.73 Sq.Mts
	MIMUSOPS ELENGI	68	
	PTEROSPERMUM ACERIFOLIUM	68	TOTAL : 6107.73 Sq.Mts
	GOLDEN DURANTA	67	
	BOUGAINVILLEA	69	
	JATROPHA RED	136	

4.3 NOISE CONTROL AND MANAGEMENT

4.3.1 Construction Phase:

The construction stage causes an increase in ambient noise levels within a radius of 200 m, which would occur due to traffic movement and construction equipment. The particular location of the building ensures that there are no receptors within 500 m radius of the project boundary, for the noise pollution produced by the construction activity. Thus, the noise generated would mainly affect the workers on project site.

Hearing Protection: Earplugs shall be provided to those working very close to the noise generating machinery.

Noise Reduction: Strict Safety, Health and Environment (SHE) codes for construction shall be implemented. Any noise generating activity shall be avoided as far as possible.

4.3.2 Operational Phase

Possible mitigation measure for further reduction of noise could include:

- An acoustic enclosure for the DG sets will be provided as required in the Power Generator MoEF notification.
- Strict adherence to maintenance schedule of generators, as specified by vendors.
- Staff to use earplugs inside DG room.
- Anti honking sign boards will be placed in the parking areas and on entry and exit points.

4.4 WASTEWATER TREATMENT AND MANAGEMENT

4.4.1 Construction Phase:

To prevent degradation and maintain the quality of the water source, adequate control measures have been proposed to check the surface run-off, as well as uncontrolled flow of water into any water body. Following management measures are suggested to protect the water quality during the construction phase.

- Avoid excavation during monsoon.
- All contaminants including oil and fuel storage shall be provided on impervious flooring.
- Any wash off from the oil/grease handling area or workshop shall be drained through impervious drains. Oil and grease traps are constructed and water is allowed to leave the site only after passing through them.
- No discharge of wastewater to soil and ground water body.
- On-site collection and settling of storm water, prohibition of equipment wash downs and prevention of soil loss and toxic releases from the construction site are necessary to minimize water pollution.
- All stacking and loading areas should be provided with proper drains equipped with baffles to prevent run off from the site to enter any water body.

80 KLD of domestic waste water/ sewage will be generated during the construction phase. This will be treated using septic tanks and soak pits. The arrangement of temporary labour camps, the toilet blocks and septic tanks is shown in Fig-4-1.

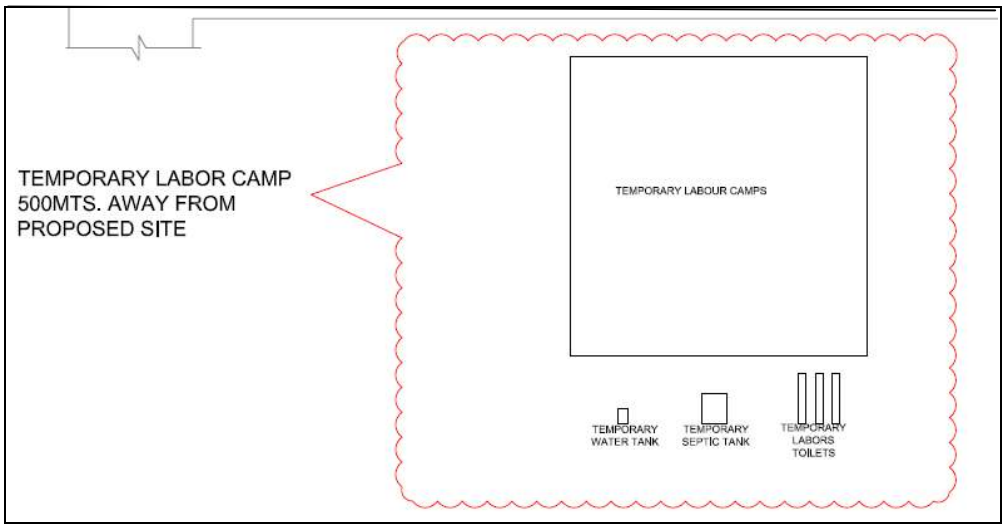


Fig 4-1: Temporary Labour Camp

4.4.2 Operation Phase:

Water conservation and development measures need to be taken including all possible potential for reuse and recycling of water. These could be in the form of the following.

4.4.3 Wastewater Treatment Plant

The wastewater generated during the operational phase will be 780 KLD. For treatment of sewage, STP of 1000 KLD capacity will be provided. The sewage treatment will be carried out using Activated sludge process, the treatment and disposal will be designed as follows

Treatment process

The treatment process is aimed to convert the influent quality into the required quality standards so that the treated effluent can be re-used for non-potable uses such as Cooling Towers Gardening/Horticulture/Flushing or disposal to the public drain. It is proposed to perform the treatment of the effluent by the biological aerobic process. The process is designed to induce the growth of bacteria, which by physical and physio-chemical action retain the organic pollution and live on it.

Different components of the plant

In the proposed treatment scheme the following component units shall be provided.

- Equalization sump [Two Parts]
- Submersible type raw effluent re-lifts pumps – 3 nos.
- Aeration Tanks
- Treated effluent storage tanks, secondary clarifier, chlorine contact and sludge holding tanks.
- Filter feed pump.
- Sludge return pump.

- Sludge holding tank of required capacity.
- Sludge de-watering & handling apparatus
- Ultra filtration Equipments.

Process description

The effluent from all the contributing units shall be brought by pipe to the underground Equalization tank. From the equalization tank the wastewater will be pumped via three submersible solids handling pumps (2 working + 1 standby) into equalisation tank 300 KL capacity at grade level.

In the aeration tank, wastewater will be mixed with microorganisms in the presence of dissolved oxygen. Microorganisms will assimilate organic impurities. The mixed liquor suspended solids (MLSS) will be maintained at levels of 3500 mg/lit to 4000 mg/lit. The bottom of the aeration tank will have positive displacement (roots type) air blowers (1 working + 1 standby) located outside the tank. Submerged air diffusers will provide mixing and oxygen for the needs of microorganisms.

The blowers will be sized to maintain dissolved oxygen level in the aeration tank of approximately 2 mg/lit.

Excess sludge will be taken periodically into sludge holding tank. In this tank sludge will be aerated for self-stabilization. The final sludge will be dried and shall be collected in HDPE bags and used as manure for horticultural purposes.

4.4.4 Minimizing Water Consumption

Water consumption will be minimized by a combination of water saving devices and other domestic water conservation measures.

4.4.5 Domestic and Commercial Usage

- Use of water efficient plumbing fixtures. Water efficient plumbing fixtures use less water with no marked reduction in quality and service.
- Leak detection and repair techniques.
- Sweep with a broom and pan where possible, rather than hose down for external areas.
- Meter water usage, employ measurement and verification methods. Monitoring water use is a precursor for management.
- Awareness campaign to disseminate knowledge on strategies and technologies that can be caused for water conservation.

4.4.6 Horticulture

- Drip irrigation and controlled tap system shall be used for the lawns and other green area. Drip irrigation can save between 15-40% of the water use, compared with other watering techniques.
- Plants with similar water requirements shall be grouped on common zones to match precipitation heads and emitters.

- Use of low-volume, low-angle sprinklers for lawn areas.
- Select controllers with adjustable watering schedules and moisture sensors to account for seasonal variations and calibrate them during commissioning.
- Selecting a drought resistant grass and using lawn chemicals and fertilizer sparingly also reduces watering needs.
- Place 3 to 5 in. of mulch on planting beds to minimize evaporation.

4.4.8 Storm Water Management

As discussed earlier, most of the storm water produced on site will be harvested for ground water recharge, thus proper management of this resource is must to ensure that it is free of contamination. Contamination of storm water is possible from the following sources.

- Diesel and oil spills in the fuel storage area.
- Oil spills and leaks in vehicle parking lots.
- Silt from soil erosion in garden.
- A detailed “Storm Water Management Plan” will be developed which will consider the above sources. The plan will incorporate best management practices, which will include the following.
- Regular inspection and cleaning of storm drains.
- Cover waste storage areas.
- Avoid application of pesticides and herbicides before wet season.
- Conducting routine inspections to ensure cleanliness.
- Preparation of spill response plans, particularly for fuel and oil storage areas.
- Provision of slit traps in storm water drains.
- Good housekeeping in the above areas.

4.5 SOLID WASTE MANAGEMENT

4.5.1 Construction Phase:

Waste generated from construction activity includes construction debris, biomass from land clearing activities, waste from the labour camp, and hazardous waste. Following section discusses management of each type of waste. Besides, management of topsoil is an important area for which management measures are required.

4.5.1.1 Top Soil Management

To minimize disruption of soil and for conservation of topsoil, the contractor shall take the topsoil out separately and stockpile it. After the construction activity is over, topsoil shall be utilized for landscaping activity. Other measures, which would be followed to prevent soil erosion and contamination include:

- Maximize use of organic fertilizer for landscaping and green belt development.
- To prevent soil contamination by oil/ grease, leak proof containers should be used for storage and transportation of oil/ grease and wash off from the oil/ grease handling area shall be drained through impervious drains and treated appropriately before disposal.
- Removal of as little vegetation as possible during the development, and re-vegetation of bare areas after the project.
- Working in a small area at a point of time (phase wise construction).
- Construction of erosion prevention troughs.

About 480 kg of municipal solid waste will be generated during the construction phase, this waste will be treated as per MSW Rules 2000.

4.5.2 Operation Phase:

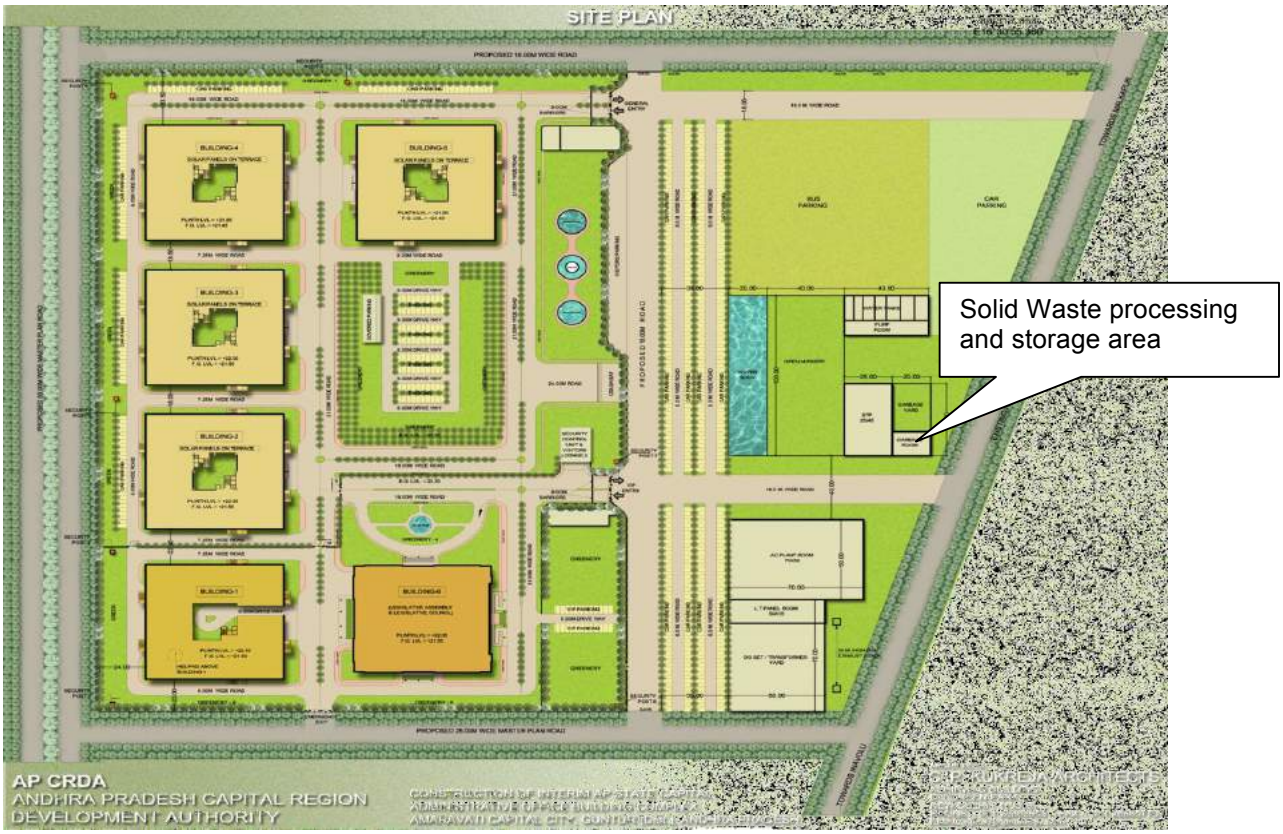
The philosophy of solid waste management at proposed project will be to encourage the four R's of waste i.e. waste reduction, reuse, recycling, and recovery (materials & energy). This will result in lesser reliance on land filling. Regular public awareness meetings will be conducted to involve the residents in the proper segregation, storage, recycling and individual composting options and techniques.

The Environmental Management Plan for the solid waste focuses on three major components during the life cycle of the waste management system, i.e. collection & transportation, treatment or disposal and closure & post closure care of treatment/disposal facility.

4.5.2.1 Collection, Transport and Disposal

- During collection, the biodegradable and non-recyclable/ non-biodegradable waste will be stored and collected separately. All biodegradable waste (2 TPD) will be treated in Organic Waste Composters (OWC) and non-biodegradable waste (3 TPD) will be handover to local authority for further disposal.
- To minimize littering and odors, waste will be stored in well-designed containers/bins that will be located at strategic locations to minimize disturbance in traffic flow.

  The location of waste storage and processing facility is shown in Fig below:



4.6 PLANTATION, LANDSCAPING AND ECOLOGICAL MANAGEMENT

Proposed project changes the natural environment. But it also creates a built environment for its inhabitants. About 27797.18 m^2 area will be utilized for green development. The project requires the implementation of following choices exclusively or in combination.

4.6.1 Construction Phase:

- Restrictions on location of labour camps and offices for project staff near the project area to avoid human induced secondary additional impacts on the flora and fauna species.
- Cutting, uprooting of trees or small trees present in and around the project site for cooking, burning or heating purposes by the laborers will be prohibited and suitable alternatives for this purpose will be found.
- After completion of major construction work, the green belt will be developed with recommended plant species, as there will be no or less disturbance in these areas.
- After completion of soil work, temporary vegetation preferably grasses are to be planted to minimize soil erosion.

4.6.2 Operation Phase:

Enhancement of the current ecology at the proposed site will entail the following measures:

4.6.2.1 <u>Plantation and Landscaping</u>

Plantation and landscaping in the project area will help to improve the terrestrial habitat for birds, effectively serve as pollutant absorbent, act as recreation place for the residents and add to overall aesthetics of the area.

4.6.2.2 Green Belt Development Plan

The plantation matrix adopted for the green belt development includes pits. In addition, earth filling and manure may also be required for the proper nutritional balance and nourishment of the sapling. It is also recommended that the plantation has to be taken up randomly and the landscaping aspects could be taken into consideration.

The plants should exhibit the following desirable characteristic in order to be selected for plantation.

- The species should be fast growing and providing optimum penetrability.
- The species should be wind-firm and deep rooted.
- The species should form a dense canopy.
- As far as possible, the species should be indigenous and locally available
- Species tolerance to air pollutants like SPM, SO_2 and NO_x should be preferred.
- The species should be permeable to help create air turbulence and mixing within the belt.
- There should be no large gaps for the air to spill through.
- Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces.
- Ability to withstand conditions like inundation and drought.
- Soil improving plants (Nitrogen fixing, rapidly decomposable leaf litter).
- Attractive appearance with good flowering and fruit bearing.
- Bird and insect attracting tree species.
- Sustainable green cover with minimal maintenance

It is proposed to take up multi-tier tree planting with long rotation, native, deep rooted with large foliage tree species on the Periphery fallowed by Shrubs and herbs and then followed by Ornamental and flowering plants duly adopting the Landscape techniques with carpet grass which will act as sinks of air pollutants.

In IGC area

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1	*Jacaranda mimosifolia*	59
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7	*Lagerstroemia speciosa*	44
8	*Michaelia champaka*	648
9	*Xanthostemon chrysanthus*	403
TOTAL		1483

In public facility area

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	MADHUCA INDICA	68	GREENERY AREAS
	KIGELIA PINNATA	68	GREENERY - 11 6107.73 Sq.Mts
	MIMUSOPS ELENGI	68	
	PTEROSPERMUM ACERIFOLIUM	68	TOTAL : 6107.73 Sq.Mts
	GOLDEN DURANTA	67	
	BOUGAINVILLEA	69	
	JATROPHA RED	136	

Table 4-4: landscape Plan

The Carbon sequestration calculation for the above landscape plan as per the “Method for calculating Carbon Sequestration by trees in Urban and Sub-urban settings”, by, U.S Department of Energy Information Administration shows the following results of annual Carbon sequestration:

- 2016- 0.62 Tons of CO2 / ha
- 2021- 1.8 Tons of CO2 / ha
- 2026- 2.9 Tons of CO2 / ha
- 2036- 5.0 Tons of CO2 / ha

4.6.2.3 Maintenance of Plantation

Necessary steps to take for better results are:

- One/ two years old seedlings will be planted for plantation
- Regular de-weeding, mulching of seedlings and application of oil cakes and organic manure will be carried out to boost up the growth.

- Watering of the plantation during the dry season

4.7SOCIO-ECONOMIC ENVIRONMENT

The social management plan has been designed to take proactive steps and adopt best practices, which are sensitive to the socio-cultural setting of the region.

4.7.1 Income Opportunity for Local Community

The project provides an employment opportunity for the local community, as tender specification for construction and operation would include a favorable employment opportunities for the locals. The main principles are outlined below:

1. Employment strategy would provide for preferential employment of local labour.
2. General recruitment procedures will be transparent, public and open to all.
3. Recruitment procedures will be publicized in advance.
4. There will be no discrimination on basis of gender, caste or other factors.

Contractors would be required to abide to employment priority towards locals and abide by the Indian labour laws regarding standards on employee terms and conditions.

A health center is provided during the entire construction period to address the emergency health requirement of the workforce engaged in construction activity. The health center will continue to operate during the operation phase.

4.8 ENENGY CONSERVATION

Energy conservation measures are often the easiest, quickest and cheapest way to reduce costs and be environmentally pro-active. Energy conservation programme will be implemented through measures taken both on energy demand and supply. Energy conservation measures are given in following Figure 4-4.

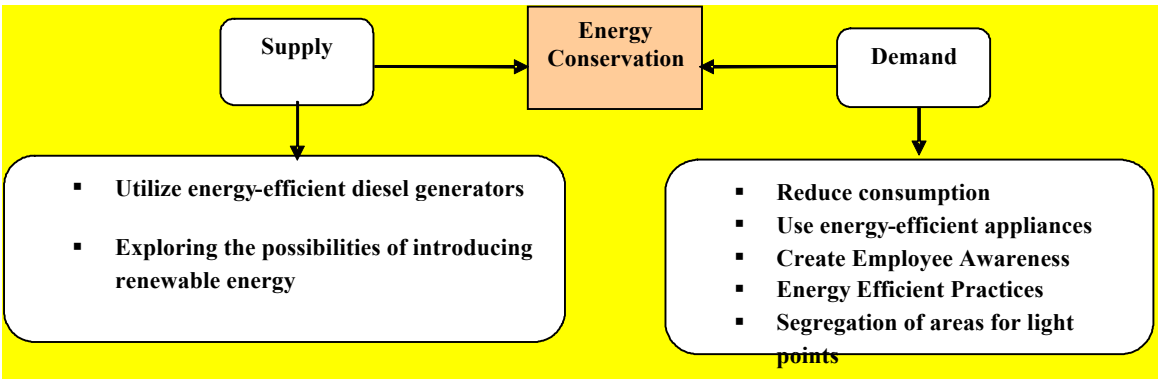

FIGURE 4-4: ENERGY COSERVATION MEASURES

Energy conservation will be one of the focuses during the planning and operation stages. The conservation efforts would consist of the following:

(a) **Architectural Design**

i. Efficient use of air-conditioning.

ii. Maximize the use of natural lighting through design
iii. Passive solar cooling utilising building shading.

(b) **Energy Saving Practices**

i. Energy efficient light fixtures shall be used (FCL, T5 lamps).
ii. Ballast for light fixtures shall be electronic.
iii. Power factor of the complete electrical system shall be maintained close to unity. This will reduce electrical power distribution losses in the installation.
iv. Energy Recovery Ventilators/ Re-heat coils are proposed to recover energy from exhaust air, thus reducing the temperature of incoming fresh air and load on the Air-Handling Units.

4.8.1 Energy Saving Practices

- Promoting use of solar energy.
    a. Solar panels will be used extensively for power generation (> 10 acre of solar surface).
    b. Solar panels on Roof top
    c. Solar panels on parking area
    d. Total expected power generation from Solar will be 1-1.2 MW
- Purchase of energy efficient appliances. All BEE star rated products being used.
- Constant monitoring of energy consumption and defining targets for energy conservation.
- Adjusting the settings and illumination levels to ensure minimum energy used for desired comfort levels.
- Use of compact fluorescent lamps and low voltage lighting.
- Sunscreen films on windows to reduce heating inside the buildings.

4.8.2 Behavioral Change on Consumption

- Promoting awareness on energy conservation.
- Training staff on methods of energy conservation and to be vigilant to such opportunities.

4.9 ENVIRONMENTAL MANAGEMENT SYSTEM

For the effective and consistent functioning of project, an Environmental Management System (EMS) of APCRDA will overview the activities during the two phases. The EMS should include the following:

- An Environmental Management Cell.
- Personnel Training.
- Regular Environmental Audits and Corrective Action.

- Documentation – Standard Operating Procedures, Environmental Management Plans and other records.

4.9.2 Environmental Management Cell

Apart from having an Environmental Management Plan, it is also necessary to have a permanent organisational set up charged with the task of ensuring its effective implementation of mitigation measures and to conduct environmental monitoring. The major duties and responsibilities of Environmental Management Cell shall be as given below:

- To implement the Environmental Management Plan.
- To ensure regulatory compliance with all relevant rules and regulations.
- To ensure regular operation and maintenance of pollution control devices.
- To minimise environmental impacts of operations by strict adherence to the EMP.
- To initiate environmental monitoring as per approved schedule.
- Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit.
- Maintain documentation of good environmental practices and applicable environmental laws as ready reference.
- Maintain environmental related records.
- Coordination with regulatory agencies, external consultants, monitoring laboratories.
- Maintain of log of public complaints and the action taken.

4.9.2 Organizational Structure of Environmental Management Cell

The Environmental Management Cell as envisaged earlier for the Amaravati Capital city (as reported earlier), will take charge of the environmental management of this complex since it is part of Capital city. However, dedicated environmental engineer/staff will be placed during the operational phase of the complex.

4.9.3 Personnel and Training

Training and human resource development is an important link to achieve sustainable operation of the facility and environmental management. For successful functioning of the project, relevant EMP should be communicated to the following groups of people:

(a) **Staff and Contractors**

Everyone must be made aware of the importance of waste segregation and disposal, water and energy conservation. This awareness can be provided through leaflets and periodic meetings. They should be informed of their responsibilities for successful operation of various environmental management schemes inside the premises of project.

(b) **Site Staff**

Relevant personnel at site must be trained for the following:

i. Collection, transport, treatment and disposal of solid and hazardous waste.

ii. Operation and Maintenance of Sewage Treatment Plant.
iii. Requirements of the Disaster Management Plan in case of an emergency.
iv. Techniques for waste minimisation, water conservation and energy conservation.
v. Applicable environmental, health and safety regulations and compliance requirements for the same.
vi. Functioning of the Environmental Management System including environmental monitoring, reporting and documentation needs.

4.9.4 Record Keeping and Reporting

Record keeping and reporting of performance is an important management tool for ensuring sustainable operation of the proposed development. Records should be maintained for regulatory, monitoring and operational issues. Typical record keeping requirements for the proposed development is summarized in Table 4.

Table 4-5: Record Keeping Requirements

Parameter	Particulars
Solid Waste Handling and Disposal	(a) Daily quantity of waste received. (b) Daily quantity treated and recycled. (c) Daily quantity sent for disposal.
Hazardous Wastes	(a) Quantity of waste generated. (b) Quantity of wastes sent out for treatment/ disposal. (c) Waste manifests as per regulations.
Sewage Treatment Plant	(a) Daily quantity of raw and treated sewage. (b) Quantity and point of usage of treated wastewater. (c) Treated wastewater quality.
Regulatory Licenses (Environmental)	(a) Environmental Permits/ Consents from APPCB (b) Copy of waste manifests as per requirement
Monitoring and Survey	(a) Records of all monitoring carried out as per the finalized monitoring protocol.
Accident reporting	(a) Date and time of the accident. (b) Sequence of events leading to accident. (c) Name of hazardous waste involved in the accident. (d) Chemical datasheet assessing effect of accident on health and environment. (e) Emergency measure taken. (f) Step to prevent recurrence of such events.
Other	(a) Log book of compliance. (b) Employee environmental, health and safety records. (c) Equipment inspection and calibration records, where applicable. (d) Vehicle maintenance and inspection records.

4.9.5 Environmental Audits and Corrective Action Plans

To assess whether the implemented EMP is adequate, periodic environmental audits will be conducted by the proponent. These audits will be followed by Corrective Action Plans (CAP) to correct various issues identified during the audits.

Table 4-6: Summary Of Potential And Mitigation Measures For Construction Phase (Implementing Agency- Development Contractor)

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation
1.	Groundwater Quality	Ground water contamination	• Waste water generated during construction activity containing various chemicals, solvents, etc.	• Careful handling of materials. • Controlling spillage through better management. • Provision of dykes for material storage units of material such as oil.	Minor negative impact as quantity generated is small and execution of EMP will reduce the impact to acceptable level.
2.	Groundwater Quantity	Ground Water Depletion	• Use of ground water for construction activity.	• Controlled withdrawal of ground water during construction in case of absence of other water source.	No significant impact on ground water quantity is envisaged.
3.	Surface Water Quality	Surface water contamination	• Surface runoff carrying loose soil particles.	• On-site diversion ditches will be constructed to control any surface run-off during site development. • Ready Mixed Concrete (RMC) will be used so soil runoff contamination is not expected.	No off site impact envisaged as there is no surface water receiving body in impact zone.
4.	Air Quality	Dust Emissions	• Heavy construction activities.	• Suitable control measures will be adopted as per a Dust Control Plan. • Where ever possible construction area will be	Not significant because dust generation will be temporary and will settle fast due to dust suppression techniques used.

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation
				barricaded to avoid dust spreading	
		Emissions of SPM, SO_2, NOx and CO	• Operation of construction equipment and vehicles during site development.	• Emission control particle filters on Construction equipment • Rapid on site construction • Improved maintenance of construction equipment • Use of vehicles with valid Pollution Under Check (PUC) certificate	Not significant.
5.	Noise Environment	Noise emissions	• Operation of construction equipment and vehicles during site development.	• Use of well-maintained equipment fitted with silencers. • Providing noise shields near the heavy construction operations • Construction activity will be limited to daytime hours only.	Considering the present traffic flowing through the area, and existing commercial activities no noise increase expected from the project activities.
6.	Land Environment	Soil contamination	• Disposal of construction Debris.	• Contractors will be appointed for debris disposal as per rules.	Not significant. Impact will be local, as any waste generated will be reused for construction activities. Not significant.

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation
7.	Biological Environment	Displacement of Flora and Fauna on site	• Site development during construction.	• Landscape area will be developed with local species.	Beneficial Impact.
8.	Socio-Economic Environment	Population displacement and loss of Income	• Construction activities.	• There will be generation of employment for local labour due to the ensuing construction activities.	Beneficial Impact.
9.	Traffic Pattern	Increase of Vehicular traffic	• Heavy vehicular movement during construction.	• Heavy vehicular movement will be restricted to non-peak traffic hours only. • Adequate parking facility will be provided.	No Negative Impact.

Table 4-7: Summary of Potential and Mitigation Measures for OPERATION PHASE (Implementing Agency-APCRDA)

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation
1.	Groundwater Quality	Ground water contamination	• Sewage discharge on site or off site.	• Sewage will not be discharged into any sewer line/ water body.	No negative impact on ground water quality envisaged.
2.	Surface Water Quality	Surface water contamination	• Discharge of domestic wastewater to surface water body.	• Waste water will be collected from all buildings by properly designed drainpipes and will be treated in Sewage Treatment Plant (STP). • Treated sewage will be totally reused for flushing and landscaping	No off site impact envisaged.

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation
				requirement	
3.	Air Quality	Emissions of SPM, SO_2, NOx and CO	• Emissions from vehicular traffic in operations.	• Improve traffic management in the campus. • Adequate provision of parking space for the residents and visitors.	No impact is envisaged.
4.	Noise Environment	Noise emissions	• Noise from vehicular movement and DG sets.	• Better acoustic control will be maintained by use of noise absorbent measures and DG sets will be acoustically enclosed.	Not significant. The background noise levels are considerably high, thus noise mingling would occur in a few metres distance.
5.	Land Environment	Soil contamination	• Municipal solid waste on land.	• The characteristics of solid waste to be generated during operation of the proposed project are mainly biodegradable and recyclable waste. • Solid waste will be segregated at source and biodegradable waste will be composted while non-biodegradable waste will be sent for disposal system. • Sludge from STP would be used as manure. • Overall solid waste management shall be carried out as per MSW	No impact on site.

Sr. No.	Environmental Components	Potential Impacts	Potential Source Of Impact	Controls Through EMP & Design	Impact Evaluation
				Rules 2000.	
6.	Socio-Economic Environment	Population displacement and loss of Income	• Site operation.	• Project will provide employment opportunities to the local people in terms of service personnel during operations. • Providing comparatively better infrastructure.	Beneficial Impact.
7.	Traffic Pattern	Increase of Vehicular traffic	• Traffic once the site is operational.	• Provision of adequate parking. • Proper internal traffic management plan will be developed to avoid traffic congestion in and out of site. • Access road and internal will developed as per norms.	Overall positive impact.

4.10 ENVIRONMENTAL MANAGEMENT FUNDS

After due discussions with environmental consultant and project proponent the funding allotted on each planning and following table shows the budgetary requirement for the same.

Table 4.8: Budgetary requirement for E.M.P.

Sr. No.	Method Adopted	Setting-up Cost (in lakhs)	Annual Maintenance & Operational Cost (in lakhs)
1	EMP cell and staff	Included in CRDA budget	Included in CRDA budget
2	MSW	85.0	18.0
3.	STP		
A	Estimated Electromechanical and Equipment	395	1st year 34 lakh 2nd Year 37.5 lakh 3rd Year 41.0 lakh
B	SCADA System	5	
C	Civil Cost	550	
4.	Solar Energy System	700.0	35.0
5.	Landscaping	500.0	100.0
Total		**2235**	**188**

PROPOSED 50.00M WIDE MASTER PLAN ROAD

SECURITY POST-1
SECURITY POST-2
SECURITY POST-3
SECURITY POST-4
SECURITY POST-5
403.00

GREEN
CAR PARKING
6.00M WIDE ROAD
24.00
20.00
22.00
18.00
18.50
33.50
18.00M WIDE ROAD
CAR PARKING
GREENERY - 5
6.00M WIDE ROAD
7.25M WIDE ROAD
HELIPAD ABOVE BUILDING-1
PLINTH LVL.= +22.10
F.G. LVL.= +21.60
BUILDING-1
6.00M DRIVE WAY
PLINTH LVL.= +22.05
F.G. LVL.= +21.55
BUILDING-2
SOLAR PANELS ON TERRACE
PLINTH LVL.= +22.00
F.G. LVL.= +21.50
BUILDING-3
PLINTH LVL.= +21.95
F.G. LVL.= +21.45
BUILDING-4
FOOT PATH
GREENERY - 1

EMERGENCY EXIT
274.00
PROPOSED 25.00M WIDE MASTER PLAN ROAD
120.75

21.00M WIDE ROAD
FOOT PATH
GREENERY
COVERED PARKING
6.00M DRIVE WAY
PARKING
GREENERY
E.G. LVL = 20.30
9.00M WIDE ROAD
PLINTH LVL.= +21.90
F.G. LVL.= +21.40
BUILDING-5
SOLAR PANELS ON TERRACE
BUILDING-6
(LEGISLATIVE ASSEMBLY & LEGISLATIVE COUNCIL)
PLINTH LVL.= +22.05
F.G. LVL.= +21.55
GREENERY - 4
WATER POND
18.00M WIDE ROAD
GREENERY - 5

21.00M WIDE ROAD
GREENERY
VIP PARKING
6.00M DRIVE WAY
BOOM BARRIERS
SECURITY CONTROL UNIT & VISITORS LOUNGE-2
24.00M ROAD
CRASH BAY
MEDIA POINT
WATER POND
STATUE
VISITORS PARKING
SECURITY POST-8
GATE
VIP ENTRY
SECURITY POST-7
PROPOSED 18.00M ROAD
SECURITY POST-6
GENERAL ENTRY
GATE

CAR PARKING
6.0 M. WIDE ROAD
2 WHEELER PARKING
3.0 M. WIDE ROAD
18.00
BUS PARKING
30 Buses
18.0 M. WIDE ROAD
DG SET / TRANSFORMER YARD
50.00
70.00
L.T.PANEL ROOM
50X15
60.00
AC PLANT ROOM
60X30
30.00
30 M. HIGH D.G. EXHAUST STACK
40.00
WATER BODY
100.00
20.00
OPEN NURSERY
40.00
STP
25x61
25.00
61.00
GARBAGE ROOM
GARBAGE YARD
20.00
45.00
WATER TANKS
PUMP ROOM
60.00
155.29
EXISTING ROAD

TENDER DRAWING

KEY PLAN

CLIENT DEPT.
AP CRDA
ANDHRA PRADESH CAPITAL REGION DEVELOPMENT AUTHORITY

PROJECT
CONSTRUCTION OF INTERIM AP STATE CAPITAL ADMINISTRATIVE OFFICE BUILDING COMPLEX, AMARAVATI CAPITAL CITY, GUNTUR (Dist.), ANDHRA PRADESH.

DATE	CHECKED BY	APPROVED BY
APR 2016	DEEPAK	
SCALE	DEALT BY	
1:800	SHANKY	V C MISRA D C KUKREJA

DRAWING TITLE
SITE PLAN

ARCHITECTS:-
C. P. KUKREJA ARCHITECTS
ASHIRWAD BUILDING,
D-1, GREEN PARK,
NEW DELHI - 110016
PHONE:- 011 26863953 FAX:- 011 26865770
EMAIL- cpk@cpkukreja.com

DRAWING NO.
16006 / IGC AMARAVATI / TEN /A-SP00

CAD NO:
V:\SS\APCRDA, IGC AMARAVATI\ARCH\TEN\SHA-SP00

REVISION
R0

NO. OF PRINTS	DATE	ISSUED TO	REMARKS

REVISION	DATE	DESCRIPTION	BY