EXECUTIVE SUMMARY OF
DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT
FOR
KALESHWARAM LIFT IRRIGATION SCHEME
(FILLING UP OF 14 MINOR IRRIGATION TANKS)
in
JAYASHANKAR BHOOPALPALLY DISTRICT, TELANGANA

Project By

CHIEF ENGINEER
KALESHWARAM PROJECT
IRRIGATION & CAD DEPARTMENT
LMD COLONY, KARIMNAGAR - 505527
TELANGANA

Consultants

DOCUMENT NO. EHSC/ICAD/LMD/SYPC/2017-18/KLIS

APRIL 2018
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ENVIRONMENTAL HEALTH & SAFETY
CONSULTANTS PVT LTD
# 13/2, 1st MAIN ROAD, NEAR FIRE STATION, INDUSTRIAL TOWN,
RAJAJINAGAR, BENGALURU-560 010, KA

NABET/EIA/1518/SA024

DOCUMENT NO. EHSC/ICAD/LMD/SYP/C/2017-18/KLIS

APRIL 2018
## REVISION RECORD

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<td>EHSC/01</td>
<td>27.04.2018</td>
<td>Issued as Executive Summary of Draft EIA Report for Comments and Suggestions to I&amp;CAD department and experts</td>
</tr>
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<td>EHSC/02</td>
<td>24.07.2018</td>
<td>Issued as Draft EIA Report for submission to TSPCB for conducting Environmental Public Hearing</td>
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</tbody>
</table>

## DISCLAIMER

The contents of this EIA/ EMP report are prepared based on the technical information provided by the project proponent. The data submitted in this report is factually correct to the best of our knowledge. The ToRs have been complied subject to its applicability with respect to project site. Any typographical errors in this report shall be brought to the notice of EHSCPL for further rectification.
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1. Introduction

Kaleshwaram LIS envisages lifting of 4.5 TMC of water from Godavari River to fill 14 Minor irrigation tanks in Mahadevpur Mandal, Jayashankar Bhoopalpally district (previously Karimnagar) to benefit 18,211 Ha of command area under the existing MI tanks. Out of 4.5 TMC of water, the project envisages supply of 0.3 TMC drinking water to the enroute villages. This scheme benefits 63 villages belonging to 4 Mandals. Construction work involves intake canal, pumping stations, pressure main and gravity canals. The water will be lifting through pump house and with the help of pressure main (pipelines) and the water will be conveyed to tanks through pipelines buried underground. Gravity canal network will be constructed under each tank to convey the water to the fields.

The proposed project has been accorded administrative approval vide order No. G.O. MS No. 220 dt: 11.10.2007 for 443 Crores and revised administrative approval vide order No. G.O.Ms No.158 dt: 30.07.2008 for 632 Crores and the total cost of the project is 499.23 Crores. The project requires diversion of 258.028 Ha of forest land for laying pipelines for which Stage-II Forest Clearance has been accorded by the Ministry on 27.12.2017.

M/s Environmental Health & Safety Consultants Private Limited, Bengaluru was entrusted by I&CAD to carry out the Environmental Impact Assessment & Environmental Management Plan studies for Kaleshwaram Lift Irrigation Scheme. The Terms of reference (ToRs) for the project was accorded by the MoEF&CC vide letter No. J-12011/20/2017-IA-I(R).

2. Project Description

Kaleshwaram project is a flagship project of the Government in the drought prone areas and Naxal affected areas to improve the socio-economic conditions of the society. The project doesn't involve submergence and hence no Rehabilitation and Resettlement. The salient features of the project are given below;

<table>
<thead>
<tr>
<th></th>
<th>Name of the project</th>
<th>Kaleshwaram Lift Irrigation Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Type of project</td>
<td>Tank filling and drinking water supply</td>
</tr>
<tr>
<td>3</td>
<td>Type of Irrigation</td>
<td>Gravity Flow Irrigation</td>
</tr>
<tr>
<td>4</td>
<td>River</td>
<td>Godavari</td>
</tr>
<tr>
<td>5</td>
<td>Latitude and Longitude of Lift Point</td>
<td>18°46' 40.3&quot;N, 79°56'22.3&quot;E</td>
</tr>
</tbody>
</table>
| 6 | Water Utilization   | 4.5 TMC  
(4.2 TMC – Filling of MI tanks and |
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Command Area</td>
<td>18,211 Ha</td>
</tr>
<tr>
<td>8</td>
<td>Villages Benefitted</td>
<td>63 villages (belonging to 4 Mandals)</td>
</tr>
<tr>
<td>9</td>
<td>Cost of the Project</td>
<td>499.23 Crores</td>
</tr>
<tr>
<td>10</td>
<td>Total Land required for Project</td>
<td>1467 ha (568 Ha Govt., land + 640 Private land + 258 Ha forest land)</td>
</tr>
<tr>
<td>11</td>
<td>Forest Land requirement</td>
<td>258.028 Ha (Stage II FC obtained)</td>
</tr>
<tr>
<td>12</td>
<td>Submergence</td>
<td>Nil</td>
</tr>
<tr>
<td>13</td>
<td>R &amp; R</td>
<td>Nil</td>
</tr>
<tr>
<td>14</td>
<td>Earthquake zone</td>
<td>Zone-III</td>
</tr>
<tr>
<td>15</td>
<td>Power requirement</td>
<td>29 MW Source- TSNPDCL</td>
</tr>
<tr>
<td>16</td>
<td>B.C Ratio</td>
<td>1.68</td>
</tr>
</tbody>
</table>

Kaleshwaram Lift Irrigation Scheme near Kannepally village, Mahadevpura mandal, Jayashankar Bhoopalpally district, Telangana

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Total Land required for Project 1467 ha (568 Ha Govt., land + 640 Private land + 258 Ha forest land)

Forest Land requirement 258.028 Ha (Stage II FC obtained)
Kaleshwaram Lift Irrigation Scheme near Kannepally village,
Mahadevpur mandal, Jayashankar Bhoopalpally district, Telangana

Fig 1 Location map of Kaleshwaram Lift Irrigation Scheme on SoI toposheets
2.1 Need for the project

The proposed lift irrigation scheme near Kannepally village utilizes 4.5 TMC of water from River Godavari to provide irrigation facilities to an area of 18,211 Ha and also to supply drinking water to enroute villages in the drought prone areas of Jayashankar Bhupalpally district (previously Karimnagar) which otherwise flows off to Bay of Bengal. The scheme is proposed to accelerate the development of backward, naxal affected and drought prone areas, by proposing an intake structure near Godavari River, Kannepally village, Mahadevpura Mandal, Jayashankar Bhupalpally district.

2.2 Water availability

The barrage location of Kaleshwaram Irrigation project (big) is located at Medigadda which is 34.25 km from the proposed lift location of Kaleshwaram LIS project (tank filling). Hence, the water availability of the Kaleshwaram Irrigation Project has been considered for the present study. CWC in its letter dated 30.10.2017 confirmed the availability of 284.3 TMC of water at the Kaleshwaram Irrigation Project at 75% dependability from the period 1971-72 to 2011-12. Hence, after due consideration of the water requirement of Kaleshwaram Irrigation Project of 180 TMC, still there will be surplus flow of 100 TMC in the Godavari river. Out of which, 4.5 TMC will be utilised for tank filling project.

2.3 Command area of the project

The command area of 18,211 Ha is spread across Mahadevpura Mandal, Jayashankar Bhupalpally district. Totally 14 MI tanks are being proposed under KLIS. List of tanks being benefited by the scheme is as follows:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the tank</th>
<th>Name of the village</th>
<th>Ayacut (Ha.)</th>
<th>Capacity of tank (Mcft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Erra cheru</td>
<td>Mahadevpura</td>
<td>1250</td>
<td>15.95</td>
</tr>
<tr>
<td>2</td>
<td>Mandiram cheru</td>
<td>Bommapur</td>
<td>1563</td>
<td>54.21</td>
</tr>
<tr>
<td>3</td>
<td>Garepally tank</td>
<td>Garepally</td>
<td>766</td>
<td>10.5</td>
</tr>
<tr>
<td>4</td>
<td>Adivarampet tank</td>
<td>Adivarampet</td>
<td>1250</td>
<td>0.02</td>
</tr>
<tr>
<td>5</td>
<td>Gummalapalli cheruvu/ Ooracheruvu</td>
<td>Gummalapalli</td>
<td>1450</td>
<td>0.16</td>
</tr>
<tr>
<td>6</td>
<td>Veerapur Cheruvu</td>
<td>Veerapur</td>
<td>1593</td>
<td>38.96</td>
</tr>
<tr>
<td>7</td>
<td>Gudur/ Peddacheruvu</td>
<td>Gudur</td>
<td>1417</td>
<td>11.981</td>
</tr>
<tr>
<td>8</td>
<td>Thanda cheruvu</td>
<td>Kothapalli</td>
<td>1012</td>
<td>0.09</td>
</tr>
<tr>
<td>9</td>
<td>Yellapur tank</td>
<td>Mulugupally</td>
<td>1764</td>
<td>14.83</td>
</tr>
<tr>
<td>10</td>
<td>Polaram cheru</td>
<td>Polaram</td>
<td>1708</td>
<td>168.87</td>
</tr>
<tr>
<td>11</td>
<td>Kothapalli cheruvu</td>
<td>Kothapalli</td>
<td>931</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Kaleshwaram Lift Irrigation Scheme near Kannepally village, Mahadevpura mandal, Jayashankar Bhoopalpally district, Telangana

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<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the tank</th>
<th>Name of the village</th>
<th>Ayacut (Ha.)</th>
<th>Capacity of tank (Mcft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Rudraram Cheruvu/ Ooracheruvu</td>
<td>Rudraram</td>
<td>1793</td>
<td>312.63</td>
</tr>
<tr>
<td>13</td>
<td>Dhanwad/ Ooracheruvu</td>
<td>Dhanwada</td>
<td>891</td>
<td>22.25</td>
</tr>
<tr>
<td>14</td>
<td>New tank</td>
<td>Garepally</td>
<td>823</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>18,211</td>
<td></td>
</tr>
</tbody>
</table>

2.4 Irrigation Planning and structural components of the project

2.4.1 Intake Canal

An intake canal of length 200 m is proposed to convey water to Pumping station - I. Intake comprises of trash rack structure, stop log and RCC concrete. Size of the jack wall is 35.8 m x 14.5 m and 21.5 m height. The technical details of the intake canal are given below;

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CBL</td>
<td>+90.00 m</td>
</tr>
<tr>
<td>2</td>
<td>Avg. ground level</td>
<td>105 m</td>
</tr>
<tr>
<td>3</td>
<td>Length</td>
<td>200 m</td>
</tr>
<tr>
<td>4</td>
<td>FTL</td>
<td>108 m</td>
</tr>
<tr>
<td>5</td>
<td>LWL</td>
<td>92 m</td>
</tr>
</tbody>
</table>

2.4.2 Pumping station – I

PS-I (RL 92.0 m) is located near Godavari River and it is proposed to pump 600.71 cusecs of water to Mandiram Cheruvu and to Pumping station – II (RL 134.0 m). The three rows of pressure mains shall be taken parallel to Ch.13.300 km to feed Mandiram Cheruvu near Mahadevpura.

2.4.3 Pumping station – II

It is proposed to lift 505.01 cusecs from PS-I to PS-II, two no. of metallic volute pumps with synchronous motors capacity 8.1 MW each are proposed to meet the requirement of normal pumping head of 88.80 m with 2 rows of 2.15 m dia MS pressure mains with 2 m/s velocity for 20.48 km length where a cistern to drop water into the proposed new tank across a stream near Kataram to act as a balancing reservoir in case of break downs for a short period of 3-4hrs. From PS-II water is fed to cistern at Garepally, Polaram, Rudram, Adivarampet etc.

2.4.4 Delivery Cistern

Suitable delivery cisterns are proposed at Adivarampet Cheruvu, Rudram Cheruvu, Mandiram Cheruvu, PS-II, Garepally Cheruvu and Polaram Cheruvu.
2.4.5 Gravity Canal

Following gravity canals are proposed as per the feasibility of tank levels.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of proposed Gravity canal</th>
<th>Length in kms</th>
<th>Canal level From</th>
<th>Canal level To</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gravity canal from PS-II</td>
<td>0.4</td>
<td>+137.00</td>
<td>+136.665</td>
</tr>
<tr>
<td>2</td>
<td>Gravity canal from cistern at Adivarampet to Oora Cheruvu, Gummalapally tank</td>
<td>2.4</td>
<td>+151.275</td>
<td>+150.590</td>
</tr>
<tr>
<td>3</td>
<td>Gravity canal from Gummalpally tank to Verapura tank</td>
<td>2.55</td>
<td>+150.590</td>
<td>+139.815</td>
</tr>
<tr>
<td>4</td>
<td>Gravity canal from Verapura tank to Gudur tank</td>
<td>1.45</td>
<td>+139.815</td>
<td>+129.57</td>
</tr>
<tr>
<td>5</td>
<td>Gravity canal from high level cistern to Oora cheruvu, Rudram</td>
<td>1.25</td>
<td>+166.750</td>
<td>+156.515</td>
</tr>
<tr>
<td>6</td>
<td>Gravity canal from high level cistern to Oora cheruvu, Dhanwada</td>
<td>5.35</td>
<td>+166.750</td>
<td>+145.640</td>
</tr>
<tr>
<td>7</td>
<td>Gravity canal from high level cistern to Kothapalli tank and Tanda tank of Kothapalli village</td>
<td>1.40</td>
<td>+166.750</td>
<td>+140.250</td>
</tr>
</tbody>
</table>

The alignments of gravity canals are fixed as contour canals and ridge canals so as to irrigate maximum ayacut.

2.5 Provision of Micro-Irrigation

As per observations from EAC about 10% of total command area is proposed to be brought under micro irrigation. The details of ayacut proposed for micro irrigation is as follows and the map showing details of micro irrigation is given below;

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Component</th>
<th>Area (Ha.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage-I</td>
<td>Mandiram tank Distributory - 1</td>
<td>733.2904</td>
</tr>
<tr>
<td>Stage-II</td>
<td>Adivarampet D.C/ Distributory -1R</td>
<td>487.6462</td>
</tr>
<tr>
<td></td>
<td>Rudraram DC Main canal - 1/ Distributory -1</td>
<td>188.988</td>
</tr>
<tr>
<td></td>
<td>Rudraram DC Main canal - 2</td>
<td>276.805</td>
</tr>
</tbody>
</table>
2.6 Land Requirement

The proposed project requires 1,467 Ha of total land is required out of which 258.028 Ha is forest land for which Stage II FC has been accorded by ministry, 640 Ha is Government land and 568 Ha is private land. The required private land will be acquired as per the Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act, 2013.

2.7 Existing cropping pattern details

The area is predominantly rainfed cereal – Pulse base cropping pattern. The crops are mostly grown rainfed. Cereals like Paddy, Jowar and Maize jointly occupy the largest area under their cultivation. Among pulses, Green gram, Black gram and Red gram are the crops most commonly grown in the area. Horse gram, cow gram and few other pulses are also taken up in the area. Groundnut is predominant oilseeds crop and followed by Sunflower. Groundnut is generally grown over conjunctive use of rains and ground or tank irrigation. Cotton is another important crop grown either rainfed or irrigated under well or tank irrigation. Among fruits Mangoes and Sweet Oranges are common to grow. A variety of vegetables are grown in the area, mostly irrigated by tanks and wells.

2.8 Benefit cost ratio

The benefit cost ratio has been worked out to 1.68 considering the annual administrative expenses, depreciation charges and electrical energy charges.

3. Description of baseline environment

In order to assess the baseline environmental status, command area, 10 Km radius from the lift component and command area were considered and the data was collected for three seasons namely Monsoon (July 2017 – Sep 2017), Post – Monsoon (Oct 2017 – Dec 2017) and Pre – Monsoon (Jan 2018 – March 2018). In addition to the baseline environmental monitoring, field inspection in the study area, collection of primary and secondary information for all the environmental components and discussions with the officials and local public were conducted by the experts.
3.1 Physical Environment

3.1.1 Topography

Topography is relatively mild to medium slopes. As per the DEM map, the highest elevation is 140-260 m in the study area. Majority area lies between 28 – 130 m elevations.

3.1.2 Ambient air quality

The results of ambient air quality reveal that, PM10 was in the range between 52 - 77 µg/m³ and whereas PM2.5 was in the range between 13 - 29 µg/m³. SO₂ and NO₂ are in the range between 4.63 µg/m³ to 10.18µg/m³ and 20.20 µg/m³ to 43.30 µg/m³ respectively. The air quality index in the study area is found to be satisfactory for PM₁₀ and good for PM₂.₅ and gases (SO₂ and NO₂) during the study period.

3.1.3 Ambient Noise levels

The results of ambient noise levels were compared with Residential standards and results reveal that, the noise levels in the study area ranging from 46.5-49.6 dB (A) for day time and 36.12–38.84 dB (A) for night time during Monsoon. In post – monsoon season, values ranged from 41.92 – 44.16 dB (A) for day time and 35.66 – 36.12 dB (A) for night time. Values were found to be 42.24 – 43.38 dB (A) for day and 34.88 – 37.22 dB (A) for night during pre- monsoon season. Whereas, the noise levels in all the seasons were observed to be well within the CPCB standards.

3.1.4 Seismicity

The proposed lift location and command area falls in seismic Zone III ‘Moderate’ zone. Hence, probabilities of earthquake occurrence are very less.

3.1.5 Surface and Ground Water Quality Results

- Surface water – Results & Discussion

During Monsoon season (July – Sep 2017), the Total Hardness in the surface water ranged from 57 mg/L at Yellapura Cheruvu and 88 mg/L near Lift point, Dissolved oxygen ranged from 4.3 mg/L at Rudram Cheruvu and 7.1 mg/L Lift Point, Conductivity and Chloride were 163 µS/cm at Yellapura Cheruvu and 488 µS/cm at Rudram Cheruvu and 6.74 mg/L at Yellapura Cheruvu and 42.42 mg/L at Rudram Cheruvu respectively.

During Post monsoon (Oct – Dec 2017) Total Hardness ranged from 18 mg/L Yellapura Cheruvu and 88 mg/L Rudram cheruvu, DO ranged between 5.1 mg/L Rudram cheruvu and 5.7 mg/L Yellapura Cheruvu, Conductivity ranged between 168.4 µS/cm Yellapura Cheuvu and 467 µS/cm near Brahmanapalle (downstream of Godavari) and Chloride ranged between 10.42 mg/L Yellapura Cheruvu and 57.57 mg/L at Rudram Cheruvu.
During Pre monsoon Total Hardness ranged from 88 mg/L at Rudram Cheruvu and 118 mg/L near lift point, DO ranged between 4.4 mg/L at Rudram Cheruvu and 5.5 mg/L at Rudram Cheruvu, Conductivity ranged between 282 µS/cm at Yellapura Cheruvu and 638 µS/cm Rudram Cheruvu and Chloride ranged between 14.46 mg/L at Yellapura Cheruvu and 84.85 mg/L at Rudram Cheruvu.

Due to improper sanitation and utilization of river water for various domestic purposes, Total Coliform was present in all the locations in all the seasons.

- **Groundwater – Results & Discussion**

The ground water quality analysis results for monsoon season (July – Sep 2017) revealed that, the Total Hardness ranged from 202 mg/L near Mahamutharam village to 496 mg/L near Gumalpally village, Electrical Conductivity was 610 µs /cm in Mahamutharam village to 3410 µs /cm near Garepally village. Total Coliform was <1.8 MPN/100 mL.

During Post – Monsoon season (Oct – Dec 2017) Total Hardness ranged from 112 mg/L near Mahamutharam village to 500 mg/L near Gumalpally village, Electrical Conductivity was 475 µs /cm in Mahamutharam village to 3150 µs /cm near Garepally village. Total Coliform was <1.8 MPN/100 mL.

During Pre – Monsoon season (Jan – March 2018) Total Hardness ranged from 204 mg/L near Mahamutharam village to 428 mg/L near Gumalpally village, Electrical Conductivity was 461 µs /cm in Mahamutharam village to 3300 µs /cm near Garepally village. Total Coliform was <1.8 MPN/100 mL. Overall, the groundwater quality results were compared with IS 10500:2012 (second revision) in all the seasons and the results were observed to be well within the standards.

### 3.1.6 Soil types

The soil types found in the command area are Red, red and black colored. The black cotton soil is rich in bases (alkaline condition) and has a very high water holding capacity. The soils in the Kaleshwaram project area are mostly red and mixed soils, while the black soil constitutes only 0.72 percent covering 254 ha and are 45-90cms and above, heavy in texture, with 45 to 55 per cent clay and contain free calcium carbonate throughout the profile. There is generally a zone of salt concentration in the black soil profile at a depth of 18 to 36 inches, the principal salt being gypsum. Below the gypsum layer occurs ‘murrum’ which is practically impermeable to water, so that the internal drainage of the soil is lateral rather than vertical within the profile.
Major Soil types in Telangana are Red loamy sands (Dubba soils), Red sandy loams (Chalaka Soils), Lateritic soils, Shallow to Medium black soils, Deep black soils, Salt affected soils and Alluvial soils.

From the overall results of physico-chemical analysis of the soil samples, it is noticed that the soil pH values range between 6.03 and 9.05 and most of the values belong to soil reaction index II and III, which shows that the soils of the study area are under the neutral to Alkaline range. The electrical conductivity of the soil samples were observed to be in the range between 51.1 and 187.7 µmhos/cm. Based on the rating chart of soil tests, all the soil samples belong to normal i.e., salt index I. whereas organic carbon content of soil samples were observed to range from 0.01 to 0.54 percent. As per the nutrient index, the organic carbon in soil samples was at all levels from low level. Similarly, the available phosphorus values are in high range in all seasons and soil samples.

### 3.1.7 Land use assessment

The results indicate that the buffer zone is dominated by crop lands followed by forest and water bodies. It also includes built-up and scrub land. The ground truth survey revealed that the major crops cultivated in the region are rice and cotton. The other crops include maize, sorghum, pulses, groundnut, green gram, red gram, bajra, and Bengal gram.

Table 6 Soil types in the study area

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Soil Types</th>
<th>Area in Sq Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Entisols</td>
<td>182.94</td>
</tr>
<tr>
<td>2</td>
<td>Inceptisols</td>
<td>496.93</td>
</tr>
<tr>
<td>3</td>
<td>Vertisols</td>
<td>2.54</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>682.42</td>
</tr>
</tbody>
</table>

Table 7 Land use and Land cover details of study area

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Land use &amp; Land cover</th>
<th>Area in Ha.</th>
<th>Area in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agriculture Plantation</td>
<td>115</td>
<td>0.17</td>
</tr>
<tr>
<td>2</td>
<td>Built-up</td>
<td>1634</td>
<td>2.39</td>
</tr>
<tr>
<td>3</td>
<td>Cropland</td>
<td>35459</td>
<td>51.95</td>
</tr>
<tr>
<td>4</td>
<td>Forest</td>
<td>21656</td>
<td>31.73</td>
</tr>
<tr>
<td>5</td>
<td>Forest Plantation</td>
<td>550</td>
<td>0.81</td>
</tr>
<tr>
<td>6</td>
<td>Mixed Forest</td>
<td>141</td>
<td>0.21</td>
</tr>
<tr>
<td>7</td>
<td>Scrub Forest</td>
<td>330</td>
<td>0.48</td>
</tr>
<tr>
<td>8</td>
<td>Water bodies</td>
<td>7978</td>
<td>11.69</td>
</tr>
<tr>
<td>9</td>
<td>With and without Scrub</td>
<td>396</td>
<td>0.58</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>68,260</td>
<td>100</td>
</tr>
</tbody>
</table>
3.1.8 Biological Environment

The study area supports wide range of floral, avifaunal and mega faunal species as it predominantly involves agricultural plantations (52.12%), forest lands (33.22%) and water bodies (11.69%). The presence of Pranahita WLS and River Godavari also adds biodiversity to the study area.

A total of 35 tree species were recorded during the study. In addition to this, 112 species of herbs, 30 species of shrubs and 21 species of climbers were recorded during Monsoon season. A total of 89 species of herbs, 30 species of shrubs and 11 species of climbers were recorded during Post Monsoon season. Similarly, 147 species of herbs, 29 species of shrubs and 24 species of climbers were recorded during Post Monsoon season. All the species recorded were common to the region and no RET species were observed during the study.

Similarly, a total of 85 avifaunal species and 61 butterfly species were recorded during monsoon season, 86 avifaunal species and 74 butterfly species were recorded during Post monsoon season and 92 avifaunal species and 37 butterfly species were recorded during the Pre monsoon season. Pied tit, Black-headed ibis and Painted stork are the avifaunal species belonging to Vulnerable and Near Threatened category as per IUCN conservation status, 2017. In addition to this, Black-shouldered kite and Oriental honey buzzard are the only avifaunal species belonging to Schedule I of Wildlife (Protection) Act, 1972. Butterflies such as Common pierrot, Blue pea, Common gull and Common crow are the only species belonging to Schedule I, II and IV of Wildlife (Protection) Act, 1972. All other species are common to region.

Mega faunal species such as sloth bear, wild boar, fox, barasingha, nilgai, sambar deer, jungle cats etc are the commonly recorded species in the study area due to the presence of Mahadevpur Reserved Forest nearby. As per IUCN Conservation status, 2017 two vulnerable species namely, sambar deer and sloth bear were recorded. Of which, Sloth bear and Sambar Deer belongs to Schedule-I and Schedule-III of Wildlife (Protection) Act, 1972 respectively. However, no such mega faunal species were recorded during the study. Totally 105 fish species were recorded in Godavari river.

3.1.9 Protected areas

Pranahita Wildlife Sanctuary (13,600 Ha) is located at a distance of 12 Km from the proposed lift point and Sivaram Wildlife Sanctuary (3,629 Ha) is located at a distance of 23 Km from the proposed lift point. The project requires 258 Ha of for which stage II FC has been obtained on 27.12.2017.
4. Anticipated Environmental Impacts and mitigation measures

4.1.1 Air Environment

4.1.1.1 Sources of air pollution

Construction of intake canal and Pumping stations will generate dust during excavation, loading and transportation operations. The following measures will be taken to mitigate the fugitive dust from different operations.

- Pollution due to fuel combustion in equipments: The operation of construction equipments requires combustion fuel. Normally, diesel is used for such equipments. The major pollutant which gets emitted as a result of combustion of diesel is SO₂.

- Dust emissions due to blasting activities will pose serious health concerns for construction labourers.

- Emission due to the usage of firewood for cooking at labour camps will cause eye irritation.

- Due to operation of DG sets and excavation, labourers are prone to health problems.

- Fugitive emissions from various construction activities will pose health concerns (respiratory problems) on the neighbouring village residents (Beerasagara)

- Construction works and operation of construction equipments, movement of vehicles will generate particulate matter, NOx and CO emission causing breathing problem to labours.

- Air pollution (dust) due to various construction activities, movement of vehicles will pose health concerns to the construction work force in terms of respiratory problems.

4.1.1.2 Mitigation measures

- HSD with low sulphur content will be used for the construction equipments/vehicles which have low ash content.

- Unpaved roads in the project construction site are watered frequently as necessary to prevent fugitive dust. All vehicles carrying construction materials are covered with tarpaulin to avoid spillage of construction materials.

- All the trucks carrying construction materials to the site shall be inspected regularly and shall have valid Pollution under Control (PUC) certificate.
• Labours camps will be provided with LPG facilities.
• Usage of PPEs like nose masks will be provided.
• During excavation, regular water sprinkling will be undertaken to avoid fugitive dust.
• Water sprinkling measures will be undertaken thrice a day. Errection of the barricades along the periphery.
• Controlled blasting with water sprinkling will be adopted to suppress the dust generation. PPEs like nose masks will be provided to the labourers involved in the blasting activities.

4.1.2 Noise Environment

4.1.2.1 Sources of noise pollution

• During construction phase, various sources of noise pollution arise due to Concrete Batch Plant, Crane, Generator, Tractor, Welder, Vibrating Hopper etc.,
• Other source of noise pollution includes movement of vehicles for unloading of construction materials, fabrication, handling of equipments.
• Construction activities are expected to produce noise levels in the range of 80 – 95 dB (A). This has potential to discomfort to the Beerasagara village (109) residents located at 310 m.

4.1.2.2 Mitigation Measures

• Speed limit of vehicles will be restricted to 15-20 kmph in and around the construction site. No honking boards will be displayed within the construction areas.
• DG sets are placed on the rubber cushion padding, enclosed and maintained well in good condition. It is encased and barricaded & taken to all places where it will be used. This reduces the noise level in and around the source by 4 dB.
• Ear plugs must be provided to all employees and labourers while working, irrespective of the noise levels as protection, to receive the noise and as well as exposure of the same for a longer period.
• During construction time, possible chances of number of trucks coming to the project area is more carrying debris, muck etc and the drivers of these vehicles must be instructed with sign boards and not to uses grill horns for any purpose.
• Silent Zone boards must be installed at all places where human activities are there along with proper training to them to handle various equipments, tools and other related items.

• Acoustic hoods, silencers are used at the locations and the noise generating sources are kept under enclosures.

• Supervisory staff must check and monitor to ensure the workers to follow all the above said measures while at work.

• Controlled blasting will be undertaken wherever necessary to minimize the noise even though it is cost effective.

4.1.3 Water Environment

4.1.3.1 Sources of water pollution

• Improper treatment of sewage from labor camps leads to infiltration into the subsurface soil and finally affects the quality of ground water. Labors camp is expecting to generate 52.5 KLD of sewage (considering 75 lpcd for 700 labors) which is expected to pollute ground water in an area of 2 ha from the source at 60-70 m bgl\(^1\). Further, the source of pollution is at a distance of 310 m to the Beerasagara village. Hence, the chances of pollution to drinking water are nil.

• There will be creation of anaesthetic conditions in the site, attracts mosquitoes/flies, thereby chances of deteriorating the health of the workers in unhygienic conditions.

• Improper disposal of construction debris, used oil, diesel for DG sets, etc will result in ground water contamination and in turn affecting drainage of the area.

• Spillage of excavated earth during construction of intake canal leads to turbidity of river water.

• As the agricultural practices flourish with availability of water usage of pesticides and application of fertilizers will naturally increase as such the soil quality deterioration is anticipated.

• Improper maintenance of excavated earth (1,16,673 cum) and dumping of muck, boulders into the nearby river affects natural flow regime.

• Improper management of domestic solid waste from labour camps & dumping near water bodies leads to surface water pollution.

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4.1.3.2 Mitigation Measures

- The sewage generated from the labour camps shall be treated in the Septic Tank and Soak Pits designed and constructed as per IS 2470 Part-I & Part-II.
- There will be no open discharge of sewage from labour camps and the labour camps will be provided with sufficient bathrooms and toilets. Periodical health check-ups (6 monthly once) will be conducted for labour.
- Labour camps will be 1 Km away from the river course and domestic solid waste from labour camps will be collected in different bins and handed over to nearby municipal authorities.
- Construction debris will be reused at site; used oil generated from the DG sets will be stored separately and handed over to authorized recyclers.
- During construction of intake canal, the river course and the point of contact of intake canal will be provided with sand bags.
- The leakages of oil spills from machinery shall be collected in leak proof barrels and then disposed off to TSPCB authorized dealers.
- The recharge to aquifer will be boosted once extensive agriculture is practiced a portion of water will be infiltrated in to ground recharging the aquifers.
- BOD and COD limits of the water shall be checked regularly as part of EMP to monitor eutrophication.
- Restrictions on time, method and rate of application of fertilizers and pesticides shall be imposed to avoid surface run-off and leaching on to the groundwater regime.
- Conjunctive use of groundwater.
- Artificial recharge of the aquifers by construction of suitable harvesting structures like farm ponds, nala bunds, check dams and also desilting of tanks.
- Implementing Muck Disposal Plan. Further excavated earth will be fully utilized for various construction works such as inspection path, stabilization of embankment, land levelling.

4.1.4 Soil Environment

4.1.3.1 Sources of soil pollution

- Excessive utilization of fertilizers
- Soil erosion
4.1.4.10 Mitigation Measures

- Organic farming related agricultural extension activities will be undertaken with the support of Agriculture Dept., to ensure optimal use of Fertilizers and Pesticides in the command area.

- Catchment Area Treatment measures will be implemented to reduce soil erosion and to improve the surface water runoff.

- Restoration of agricultural/open lands utilized as construction site, temporary offices, workers camps, stockyards will be undertaken soon after the completion of construction activities.

- Reclamation of salt affected soils and management of saline and sodic soils. Providing adequate drainage system.

- Organic farming related agricultural extension activities will be advocated with the support of Agriculture Dept and University of Agricultural sciences., to ensure optimal use of Fertilizers (35.2 Kg/Ha/Yr) and Pesticides (24 Kg/Ha/Yr) in the command area in conjunction with organics.

4.1.5 Solid waste assessment

4.1.5.1 Impacts during construction phase

- Temporary loss of soil may be envisaged during the construction phase, if construction site, temporary offices, workers camps, stockyards, borrow areas etc are located on fertile areas and if haul roads and traffic during construction etc are routed through agricultural lands.

- About 315 kgs of solid waste will be generated per day from labour camps like kitchen waste, garbage, plastic waste etc., Improper management of solid waste from labor camp and irregular practice in disposal of waste leads to spread of infectious diseases and un-aesthetic condition.

- Improper handling and storage of used oil generated from the usage of DG sets will lead to soil degradation.

- Movements of heavy machinery will create hard pan thereby affecting crop growth.

- Improper handling of excavated earth for laying pipelines, pump house etc., will create soil loss and menace.

- Salinization of irrigated land, pollution by pesticides used for crop protection.
Improper muck handling & disposal affects natural drainage pattern of the Godavari River and also results in turbid condition of the water affecting aquatic ecosystem.

Improper storage of solid waste leads to leachate formation of 13.99 cu.m/year\(^2\) which will affect the surface water quality and aquatic life.

15.62 L/Annum of used oil generated from the DG Set of capacity 62.5 x 1,250 x 1. Improper storage and disposal affects surface water quality and aquatic life.

### 4.1.5.2 Mitigation Measures

- Labour camps will be constructed in the vacant/ barren lands so that impact on agricultural lands is nullified.
- Used oil will be collected in the leak proof drums and stored in hazardous waste storage area lined with cement lining and will be handed over to Telangana State Pollution Control Board authorized recyclers/ reprocessors.
- Storm water drainages and underground drainage of seepage water from construction area will be provided with retention tanks to hold for at least 2 hours and periodic cleaning of silt collected in the tanks.
- Adequate vertical and horizontal drains, drainage along road sides, cross drainages etc., will be constructed for slope stabilization.
- Implementation of Muck Disposal Plan minimizes the impacts (Chapter-9).
- Plastic waste will be segregated and handed over to TSPCB authorized recyclers.
- Quantity of domestic solid waste being generated from the labour camps shall be separated as organic & inorganic waste at the source itself and later handed over to municipal authorities.

### 4.1.6 Land use assessment

#### 4.1.6.1 Anticipated impacts

- There shall be medium impact on drainage or on the water regime of the area due to construction activities.

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A total of 1,16,673 cum of top soil will be excavated. Improper disposal of excavated earth will have high impact on land use and land cover of the study area.

The majority of area falls within slope category of 21%. The published literature for the region reveals that soil erosion is minimal, hence it can be safely concluded that the proposed project doesn't have much impact on sedimentation of streams due to construction activities.

Application of Inorganic fertilizers (80-150 kilograms/ha) in the command area will impact on the intrinsic nutrient availability of soil, soil biota, resulting to decline in productivity/yield of soil which in turn changes the agricultural land use pattern in the command area.

Disturbance to the natural flow of Godavari River is anticipated because of construction of barrage. There is diversion of 258 Ha of forest land in the project. This will change the Land use pattern from Forest to non forest.

4.1.6.2 Mitigation Measures

- During crossover of natural drainages, pillars will be provided to cross the drainage without affecting natural course of drainage.
- Entire excavated earth will be reused at site for various construction activities.
- Catchment Area Treatment will be implemented to reduce soil erosion and to improve the surface water runoff.
- Agricultural training programmes will be conducted to the farmers in the command area in association with agricultural dept., Govt., of Telangana. Organic farming practices will be promoted.
- To ensure natural flow of water, gated arrangements provision has been made.
- Compensatory afforestation will be taken up and also Agro-forestry and canal bank plantation will be taken up in the non-forest area to enhance the forest cover.

4.1.8 Impact on Biological Environment

- Pranahita Wildlife Sanctuary and Sivaram Wildlife Sanctuary are located at a distance of 7 Km and 23 Km respectively. However, no rare, threatened, endangered plant or animal species are recorded during the study and all the species recorded were common to the region.
• A total of 258 Ha of forest land is required for the proposed project and the trees situated in the forest land in the RF of Karimnagar East Forest Division for construction of project components. Hence, there will be significant impact on the biological environment of the project area. Stage II FC involving diversion of 258 Ha of forest land in RF of Karimnagar East Forest Division has been obtained on 27.12.2017.

• Emission of dust is expected during vehicular movements for transportation of construction material or construction waste during construction phase which would reduce the photosynthetic activity in plants by its deposition on the foliage.

• Mobilization of machineries and workers during construction phase may create disturbance to the adjacent flora and mega-faunal species/wildlife due to the presence of Mahadevpur RF.

• About 2,450 trees shall be removed during the construction of project components. The trees situated on the bunds of agricultural plantations shall be removed with prior approval from the concerned personnel.

4.1.8.2 Mitigation Measures

• Periodic sprinkling of water to the plants for a alongside the access roads to the construction site shall reduce the deposition of dust on the foliage and thus retaining their photosynthetic activities.

• Utilization of modern equipments during construction phase can produce less sound and vibrations reducing the disturbances to the faunal species especially burrowing animals including avifauna and wildlife.

• Construction activities shall be carried out only during the day time so as to reduce the impacts on the nocturnal animals.

• As suggested by MoEF, additional Compensatory Afforestation (CA) of 62 Ha will be raised on the identified degraded forest land within 3 years.

• As part of CA 260.65 Ha of plantation will be undertaken with the support of Forest Dept., for which Rs. 8,91,92,200/- has been deposited for the proposed project.

• As part of Net Present Value (NPV), a total of Rs. 16,15,25,528/- has been deposited for the proposed project

• Plantation of 98,594 saplings shall be carried out alongside canals, pumping stations, pressure and gravity mains, command area, etc shall be carried out.
4.1.9 Impact on aquatic life

The chances of fishes moving in the intake canal towards Pump house will be anticipated. Because of which, loss of species will be anticipated and in turn leads to blockage of pumps. Fish mesh will be provided near the Intake floor levels so as to arrest entry of fishes inside the Pump to avoid entry of fishes in to motor floor levels.

4.1.9.1 Impact due to project failure

- Failure of this project would result in socio-economic sufferings, no assured water for agriculture and farmers would largely experience drought like situations to a greater extent.
- Improper land acquisition compensations leads to animosity against the project and people lose their livelihood.
- Project failure may occur due to lack of dedicated power supply.
- The chances of fishes moving in the intake canal towards Pump house being anticipated. Because of which, loss of species will be anticipated and in turn may leads to blockage of pumps.
- Due to accumulation of silt in tanks, the water holding capacity gets reduced affecting fish cultural activities to a certain extent.
- Entry of domestic effluents and sewage to the tanks lead adverse impact on the water quality and aquatic life.

4.1.9.2 Mitigation measures

- The project has been planned due to persistent demands of farmers keeping in view of water availability at River. As such, failure shall not be anticipated due to water availability. However, proper catchment area treatment measures will be implemented to increase the surface run off.
- Special Land Acquisition Officers for this project will be engaged to resolve the matters related land acquisitions and compensations.
- Dedicated power supply will be provided to ensure that the project will be in operation throughout the year.
- Fish mesh (50 x 50 mm) will be provided to avoid movement of larger sized fishes.
- De-siltation of tanks will be undertaken during lean season once in 5 years.
• Local authorities will ensure zero discharge of sewage. However, removal of water weeds such as *Ipomoea aquatica* will be undertaken periodically (Yearly once).

5. Environmental monitoring plan

The purpose of the monitoring programme is to ensure that the objectives of the project are achieved through the mitigation measures and result in desired benefits to environment and local population of the region. To ensure the effective implementation of the EMP, it is essential to carry out environment monitoring programmes given below.
### Table 8 Environmental Monitoring Program for Construction phase (2 years)

<table>
<thead>
<tr>
<th>Environmental Parameters</th>
<th>Parameters to be Monitored</th>
<th>Frequency of Monitoring</th>
<th>Locations</th>
<th>Responsibility</th>
<th>Estimated Cost in Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water quality of Godavari River</td>
<td>pH, Temperature, EC, TDS, Alkalinity, TH, DO, BOD, COD, NO₃⁻, PO₄³⁻, Cl, SO₄²⁻, Na, K, Ca, Mg, Silica, Oil &amp; grease and Total Coliform</td>
<td>Monthly once</td>
<td>Near Lift Point, Downstream of lift point, Upstream of lift point (3 Nos.)</td>
<td>Contractors or agencies appointed by I&amp;CAD Department, Government of Telangana</td>
<td>22,680/-</td>
</tr>
<tr>
<td>Ground water quality</td>
<td>pH, Temperature, EC, TDS, Alkalinity, TH, NO₃⁻, Fluoride, PO₄³⁻, Cl, SO₄²⁻, Na, K, Ca, Mg, Silica, Oil &amp; grease &amp; Total Coliform</td>
<td>Monthly once</td>
<td>Beerasagara village, Mahadevpura village, Garepally village (3 Nos.)</td>
<td>Contractors or agencies appointed by I&amp;CAD Department</td>
<td>18,180/-</td>
</tr>
<tr>
<td>Soil Quality</td>
<td>pH, EC, Mg, Ca, Alkalinity, Cl, Na, K, Organic Carbon, PO₄³⁻, SAR, N and Salinity</td>
<td>Monthly once</td>
<td>Beerasagara village, Mahadevpur village, Garepally village, Chidnepally village (4 Nos.)</td>
<td>Contractors or agencies appointed by I&amp;CAD Department</td>
<td>23,260/-</td>
</tr>
<tr>
<td>Air Quality</td>
<td>PM₁₀, PM₂.⁵, NO₂ and SO₂</td>
<td>Monthly once</td>
<td>Near Beerasagara village and Garepally village (2 Nos.)</td>
<td>Contractors or agencies appointed by I&amp;CAD Department, Government of Telangana</td>
<td>9,810/-</td>
</tr>
<tr>
<td>Noise Levels</td>
<td>Leq Day, Leq Night in dB(A)</td>
<td>Monthly once until completion of construction works</td>
<td>Near Beerasagara village and Garepally village (2 Nos.)</td>
<td>Contractors or agencies appointed by I&amp;CAD Department, Government of Telangana</td>
<td>14,000/-</td>
</tr>
</tbody>
</table>

Irrigation and CAD department, Telangana

Executive summary

M/s EHS Consultants Pvt., Ltd., Bengaluru
### Environmental Parameters

<table>
<thead>
<tr>
<th>Parameters to be Monitored</th>
<th>Frequency of Monitoring</th>
<th>Locations</th>
<th>Responsibility</th>
<th>Estimated Cost in Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic life</td>
<td>Limnological and biological studies</td>
<td>Six monthly once until completion</td>
<td>Near lift point (1 No.)</td>
<td>Contractors or agencies appointed by Irrigation and CAD Department, Government of Telangana</td>
</tr>
<tr>
<td>Health check ups</td>
<td>Spirometry, Pulse Oxymetry, Blood Test, Lung Function Test, Eye test, Physical fitness tests</td>
<td>Six monthly once until completion</td>
<td>Labor camp (1 No.)</td>
<td>Contractors or agencies appointed by Irrigation and CAD Department, Government of Telangana</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub-Total / 6 month</th>
<th>Sub-Total A - For 24 months</th>
<th>Sub-Total B - For 24 months</th>
<th>Total (A+B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,50,000/-</td>
<td>21,10,320/-</td>
<td>10,00,000/-</td>
<td>31,10,320/-</td>
</tr>
</tbody>
</table>
### Table 9 Environmental Monitoring Program for Operation phase (3 years)

<table>
<thead>
<tr>
<th>Environmental Parameters</th>
<th>Parameters to be Monitored</th>
<th>Frequency of Monitoring</th>
<th>Locations</th>
<th>Responsibility</th>
<th>Estimated Cost in Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water quality of Godavari River</td>
<td>pH, Temperature, EC, TDS, Alkalinity, TH, DO, BOD, COD, NO3, PO4, Cl, SO4, Na, K, Ca, Mg, Silica, Oil &amp; grease, &amp;Total Coliform</td>
<td>Quarterly once for 3 years</td>
<td>Near Lift Point, Downstream and Upstream of lift point, (3 Nos.)</td>
<td>Agencies appointed by Irrigation and CAD Department, Government of Telangana</td>
<td>22,680/-</td>
</tr>
<tr>
<td>Soil Quality</td>
<td>pH, EC, Mg, Ca, Alkalinity, Cl, Na, K, Organic Carbon, K, PO4, SAR, N and Salinity</td>
<td>Quarterly once for 3 years</td>
<td>Kannepally, Mahadevpur, Kataram, Metapalli, and Gunturpalli village (5 Nos.)</td>
<td>Agencies appointed by Irrigation and CAD Department, Government of Telangana</td>
<td>29,075/-</td>
</tr>
<tr>
<td>Aquatic life</td>
<td>Limnological and biological studies</td>
<td>6 Monthly once for 3 years</td>
<td>Near intake canal (1 No.)</td>
<td>Agencies appointed by Irrigation and CAD Department, Government of Telangana</td>
<td>1,00,000/-</td>
</tr>
</tbody>
</table>

Sub-Total /3 months once 51,755/-

Sub-Total A-for 3 years 6,21,060/-

Sub-Total B-for 3 years 6,00,000/-

Total (A+B) 12,21,060/-

Based on the above and as per the guidelines of MoEF under the supervision of Executive Engineer, SYP division no-1, Ramagundam, six monthly compliance reports shall be submitted to Regional Office of MoEF, Chennai.

In order to verify the effectiveness of monitoring program, Regional Office, MoEF, Chennai and Regional Office, TSPCB, Karimnagar / Jayashankar Bhupalpally will be the enforcing agency to monitor the project activities.

### 6. Social Impact Assessment

_Irrigation and CAD department, Telangana_ 25  
_M/s EHS Consultants Pvt., Ltd., Bengaluru_
The proposed project requires 1,467 Ha of total land is required out of which 258.028 Ha is forest land for which Stage II FC has been accorded by ministry, 568 Ha is Government land and 640 Ha is private land. The required private land will be acquired as per the Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act, 2013.

### Table 10 Status of land acquisition and compensation

<table>
<thead>
<tr>
<th>Total land required for the project (ha)</th>
<th>Compensation already paid as per LA, 1894</th>
<th>Balance land to be acquired as per RFC&amp;TLA, 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Extent (ha)</td>
<td>Amount in Crores</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>1,467</td>
<td>322</td>
<td>25.50</td>
</tr>
</tbody>
</table>

### 7. Project benefits

The KLIS is proposed to accelerate the development of backward, naxal affected and drought prone areas. Irrigation is important to the health of the agricultural industry. Improving the viability of individual farming and increasing the efficiency and economic stability of the command area Mandal and also contributing to the economic and social objectives of the Telangana State are the expected outcomes of the proposed scheme. Some of the important project benefits are given below:

- Agricultural linkages will be considerably improved.
- The project improves total farm output and hence raises farm income.
- Project improves yields through reduced crop loss due to erratic, unreliable or insufficient rainfall. The details before and after the advent of irrigation is given below.
- Extensive agricultural production supplies raw materials to the nearby small scale industries thereby increasing the economy in the region.
- Altogether 88,608 households in the command area will be benefitted directly under the scheme.
- Direct employment opportunities for 700 peoples (120 Technical and 580 construction labourers) are expected to get employment for the construction of intake channel, jack well cum pump house, raising main, delivery chambers and distribution network consisting of Lift cum Flow Irrigation System. During operation phase indirectly labourers will be appointed operation and maintenance of the jack well.
The project requires only 1467 Ha for implementation of the scheme, out of which 258 Ha belongs to forest land and the scheme does not envisage rehabilitation and resettlement.

Agro forestry shall be taken up in command area and it improves the ecosystem services.

The proposed project aims at providing Drinking water to projected population of 1,83,824 by the year 2051. The scheme also envisages filling of 14 MI tank.

8. Environmental management plan

EMP provides a delivery mechanism to address the adverse environmental impacts of a project during its execution, to enhance project benefits, and to introduce standards of good practice to be adopted for all project related work.

Integrated approach during project planning, design, construction and operation work acts as a better tool for implementation of Environmental Management Plan. The EMP measures include mitigation or enhancement measures as appropriate to the nature of impacts and are explained in the following sections. These include:

- Catchment area treatment plan
- Command area development
- Compensatory afforestation
- Green belt development
- Fisheries conservation and management plan
- Muck disposal plan
- Restoration of quarry sites and landscaping
- Groundwater management plan
- Public health delivery system and provision of drinking water supply to local community
- Sanitation and Solid Waste Management Plan in labour camps
- Energy conservation measures
- Local Area Development Plan
- Environmental Safeguards during construction activities
- Environmental monitoring programme
• Reservoir RIM treatment Plan
Fig 2 Environmental Management Plan flow chart for – Construction phase

- Compensatory afforestation - 26,97,10,000/-
- Canal bank plantation - 18,85,000/-
- LA cost - 70,23,00,000/-
- Air & noise pollution control measures - 17,35,250/-
- Embankment to Intake canal - 3,50,000/-
- Installation of fish mesh - 2,00,000/-
- Health checkup - 1,50,000/-
- Emergency care - 75,000/-
- PPE's - 75,000/-
- Creches - 1,00,000/-
- SW bins - 75,000/-
- Hazardous bins - 25,000/-
- Solar lighting - 5,00,000/-
- Sanitation & SW mgt.,
- EMP - 31,10,320/-
Environmental Management Plan – Operation Phase

- Catchment Area Treatment
- Command Area Development plan
- Green belt maintenance
- Fisheries development plan
- Local area development plan
- Environmental monitoring programme

- Communication network – 10,00,000/-
- Agriculture Extension – 15,00,000/-
- WUA’s formation & maintenance – 20,00,000/-

- Stocking of fingerlings – 5,00,000/-
- Miscellaneous – 3,00,000/-

- Up gradation of existing schools – 12,80,000/-
- Cultural activities – 6,00,000/-
- Smart classes – 5,00,000/-
- Up gradation of PHC’s – 10,00,000/-

- Soil conservation measures and implementation of CAT – 31,88,65,500/-
- Reclamation of Salt affected soils – 6,55,60,000/-

- Maintenance of Green belt – 10,00,000/-

EMP – 12,21,060/-

Fig 3 Environmental Management Plan flow chart for – Operation phase
8.1 Environmental safeguards

During construction phase of the proposed project following measures will be taken to control Air, Noise and Water pollution.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Item wise activity</th>
<th>Anticipated pollution (Importance of concern)</th>
<th>Proposed Environment safeguards</th>
<th>Frequency</th>
<th>Cost</th>
<th>Implementing agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Site clearing/ leveling</td>
<td>Air pollution due to dust</td>
<td>Water sprinkling</td>
<td>3 times a day</td>
<td>75,000/-</td>
<td>I &amp; CAD department, Telangana</td>
</tr>
<tr>
<td>2</td>
<td>Excavation works / foundation works / cut and fill works</td>
<td>Air pollution due to dust</td>
<td>Water sprinkling, erecting of barricades construction sites</td>
<td>3 times a day</td>
<td>1,00,000/-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Road formation works</td>
<td></td>
<td>Water sprinkling</td>
<td>3 times a day</td>
<td>3,00,000/-</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Construction vehicles movement</td>
<td>Air pollution due to dust</td>
<td>Water sprinkling</td>
<td>3 times a day</td>
<td>2,00,000/-</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Loading and unloading works</td>
<td>Air pollution due to dust</td>
<td>Water sprinkling</td>
<td>3 times a day</td>
<td>3,00,000/-</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Erection works/fabrication works/concreting works</td>
<td>Air pollution due to dust and noise pollution</td>
<td>Water sprinkling and erecting of barricades</td>
<td>3 times a day</td>
<td>3,00,000/-</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Stacking of excess excavated earth</td>
<td>Air pollution due to dust</td>
<td>Water sprinkling, covering by green mesh/ sheets</td>
<td>3 times a day</td>
<td>2,00,000/-</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Operation of temporary DG sets (1 × 62.5 kVA) (1 ×250 kVA)</td>
<td>Air and noise pollution</td>
<td>Provision of stack and acoustic enclosed for DG</td>
<td>--</td>
<td>10,250/-</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Operation of heavy earth movers</td>
<td></td>
<td>Water sprinkling, barricading and temporary fencing</td>
<td>3 times a day</td>
<td>2,50,000/-</td>
<td></td>
</tr>
</tbody>
</table>

Total 17,35,250/-
8.2 Cost estimates for implementation of EMP

Cost for implementing Environmental Management Plan. The total amount estimated for implementation of Environmental Management Plan (EMP) for construction phase is 36.09 Crores and operation phase is 39.53 Crores.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>Cost in Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Construction Phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Environmental safeguard measures to control air, noise and water pollution</td>
<td>17,35,250/-</td>
</tr>
<tr>
<td>2</td>
<td>Land acquisition</td>
<td>70,23,00,000/-</td>
</tr>
<tr>
<td>3</td>
<td>Green belt development</td>
<td>27,15,95,000/-</td>
</tr>
<tr>
<td>4</td>
<td>Construction of embankment for intake canal</td>
<td>3,50,000/-</td>
</tr>
<tr>
<td>5</td>
<td>Fisheries conservation and management plan</td>
<td>2,00,000/-</td>
</tr>
<tr>
<td>6</td>
<td>Public health delivery system</td>
<td>4,00,000/-</td>
</tr>
<tr>
<td>7</td>
<td>Sanitation and Solid waste management plan</td>
<td>1,00,000/-</td>
</tr>
<tr>
<td>8</td>
<td>Energy conservation measures</td>
<td>5,00,000/-</td>
</tr>
<tr>
<td>9</td>
<td>Environmental monitoring programme</td>
<td>31,10,320/-</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>98,02,90,570/-</strong></td>
</tr>
<tr>
<td>B. Operation Phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Catchment area treatment plan</td>
<td>38,44,25,500/-</td>
</tr>
<tr>
<td>2</td>
<td>Command area development</td>
<td>45,00,000/-</td>
</tr>
<tr>
<td>3</td>
<td>Local area development plan</td>
<td>33,80,000/-</td>
</tr>
<tr>
<td>4</td>
<td>Maintenance of green belt plan</td>
<td>10,00,000/-</td>
</tr>
<tr>
<td>5</td>
<td>Fisheries conservation and management plan</td>
<td>8,00,000/-</td>
</tr>
<tr>
<td>6</td>
<td>Environmental monitoring programme</td>
<td>12,21,060/-</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>39,53,26,560/-</strong></td>
</tr>
</tbody>
</table>