

ADDITIONAL INFORMATION

FOR

VENSUB LABORATORIES PVT. LTD.

ON

**PROPOSED BULK DRUG & INTERMEDIATES
MANUFACTURING UNIT**

AT

**SY.No:29, TUPAKULAGUDEM (V), TALLAPUDI (M),
WESTGODAVARI (DIST.) ANDHRA PRADESH**



Proposal No: IA/AP/IND2/60127/2014

File No: J-11011/401 /2014 IA II (I)

Project Name: **Vensub Laboratories Pvt. Ltd.**

Project Location: SY.No:29, Tupakulagudem (V), Tallapudi (M), Westgodavari (DIST.)
Andhra Pradesh

Reference: Minutes for 17th Expert Appraisal Committee (Industry-2) Meeting Held
during 26th – 29th December, 2016

File No: J-11011/401 /2014IA II (I)

Agenda No: 17.5.1

The committee asked the following additional information:

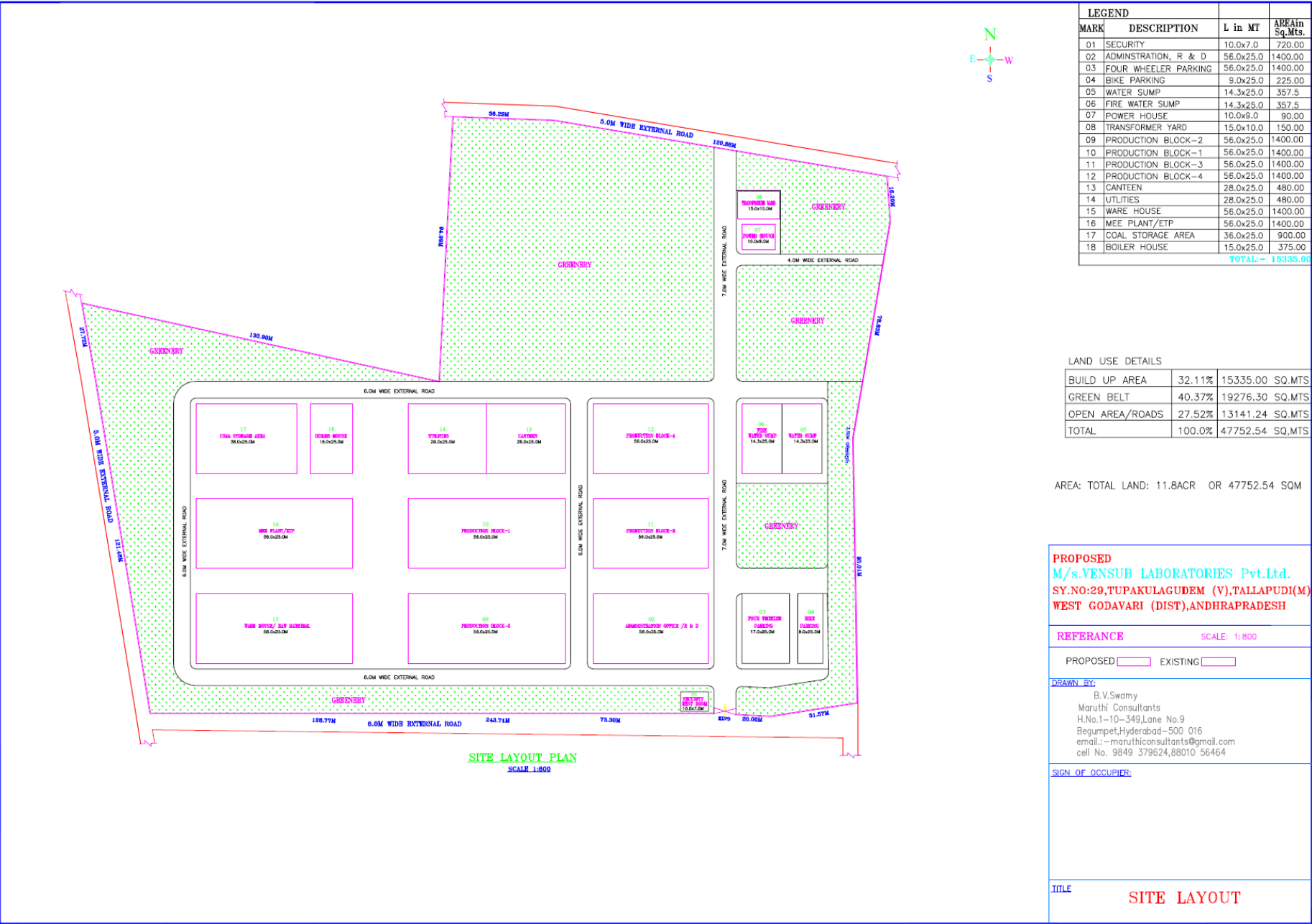
1. Layout is not acceptable. PP need to submit revised layout plan in which green belt should be 10 m wide around plant periphery.
2. Point wise response and commitments w.r.t. issues raised in earlier public hearing.
3. Health study of nearby villagers and photographs with current status report of nearby forest area.
4. List of plants to be planted at green belt area.
5. List of existing industries around plant site.
6. Coliforms and fecal coliform test in ground and surface water

1. Layout is not acceptable. PP need to submit revised layout plan in which green belt should be 10 m wide around plant periphery.

The industry proposed to develop greenbelt around Plant Periphery and other areas of the industry in an area of 19276 Sqm (around 40 %) from the total area of 11.8 Acres (47752.54SQM) of land.

The Revised site plan is enclosed bellow.

1. Layout is not acceptable. PP need to submit revised layout plan in which green belt should be 10 m wide around plant periphery.



2. Point wise response and commitments w.r.t. issues raised in earlier public hearing.

Compliance on the issues raised during the Environmental Public Hearing held on 28.05.2009 at the proposed to establish M/s. Vensub Laboratories Pvt. Ltd in the limits of Tupakulaqudem Village, Tallapudi Mandal, West Godavari District

| S. No | Name and Comments Received | Compliance. |
|--------------|---|--|
| 1 | Sri Koduru Durga Rao R/o Gopavaram that the livelihood of the people of the surrounding villages is based only on the output of the fruit gardens, and expressed his concerns about Toxic gases and pollution problems from the industry. | There is no any generation of toxic gases during the production. Only Oxygen and Hydrogen will be released. The industry is setting up Zero Liquid Discharge System. Hence there is no any liquid effluent discharge outside of the Factory. |
| 2 | Sri Y. Sivaji , R/o Gopavaram, expressed his concerns on behalf of the surrounding villages mentioning in the following. a. Bulk Drugs industry is nothing but a Hazardous unit. The proposed site is a wrong selection for the establishment of the proposed Bulk Drug project. b. Water requirement for the proposed industry is 40,000 Lit/day. The sources of water is ground water and over drawl may lead to Scarcity in ground water and also cause ground water pollution. c. Due to air pollution of the proposed industry, health problems would come up and there would be impact on climatic change in the area. d. The waste water generated from the industry would cause headache, Depression and Deafness to the nearby people. e. There would be secondary effects on live stock and agricultural production. f. In Toto villagers were against the establishment of a Bulk Drug industry at the proposed site. | We will operate this industry taking all necessary safety precautions at every stage to avoid any type of hardships to surrounding area. The industry Proposing Zero Liquid discharge system and there will not any water pollution to surrounding area. The boiler will have Air pollution control equipment such as Cyclone separator and Bag filters. Hence, there is no impact to the surrounding Area. There are no any harmful process emissions will be released during the production of products. Hence there is no Water pollution or Air pollution due to this industry. The waste water generated |

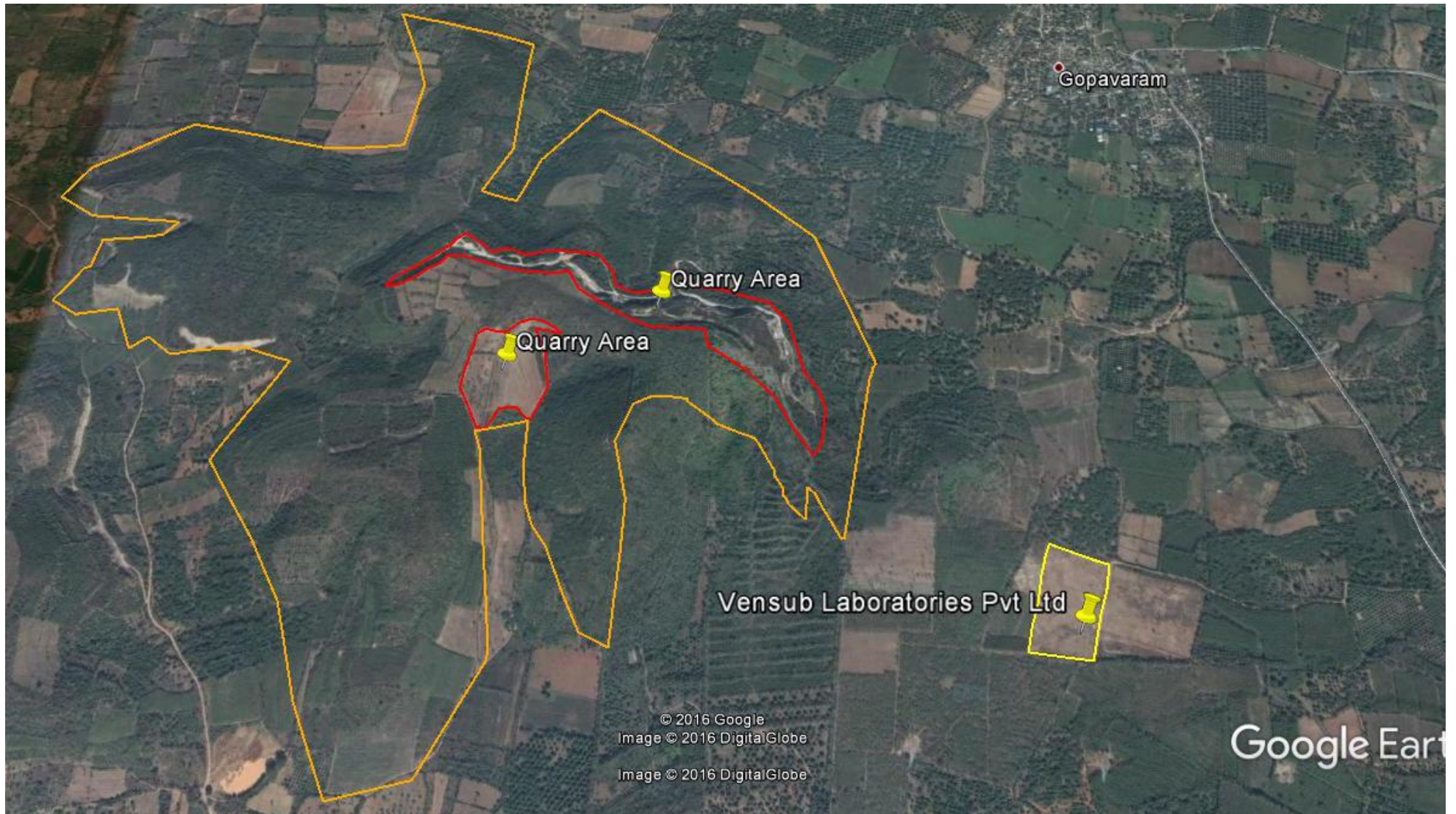
| S. No | Name and Comments Received | Compliance. |
|-------|--|---|
| | | from industry will be treated in ETP. Hence, this industry will not cause any headache, Depression and Deafness and Secondary effects of live stock and agriculture production. |
| 3 | Sri Bulli Raju , R/o Gopavaram expressed his concerns regarding air and water pollution. He informed that the industry would not follow the Pollution Control Board norms and thus, the people of the surrounding villages have doubts against the proposed industry. He also informed that the location of the site was not correct as it was located at around 1.5 Km from Gopavaram Village and would create problems to them. | The industry is setting up Zero Liquid Discharge System to treat waste water generated from industry. Hence, there is no any water pollution to surrounding areas. To control air pollution from boiler the industry is installing Cyclone separator and Bag filters. Hence, there is no any air pollution to surrounding areas. |
| 4 | Sri Bandi Nagababu , R/o Annadevarapeta while welcoming the project requested the project authorities to control pollution problems by providing proper air and water pollution control equipment and also requested to provide employment to the locals. | Thanks for his support. The industry is taking all necessary precautions to avoid air and water pollution. We will look in to the possibility of providing maximum employment to the locals. |
| 5 | Sri Nadipalli Venkateswara Rao , R/o Gopavaram expressed that the proponent would be promise to take proper precautionary steps for control of air and water pollution during the establishment, and would not implement the same when the unit really starts its production activities. | The industry is taking all necessary precautions to avoid air and water pollution. The proponent is giving assurance that he will implement all necessary pollution control measures. |
| 6 | Sri A. Venkata Ratnem R/o Gopavaram expressed that do justice as the proposed site was located in close proximity to the nearby village i.e, Gopavaram. | The Gopavaram Village is located at a distance of 1.2 Kms in NNE direction. The management will implement all necessary Pollution control measures to avoid any negative impacts on the village. |

3. Health study of nearby villagers and photographs with current status report of nearby forest area.

"We met Dr. Chandra Sekhar -Primary health center of Tallapudi Mandal and enquired about Chronic Health Problems of nearby villagers. He informed that as per information and records available there are no chronic health problems such as Respiratory problems, Gastro intestinal infections and Skin diseases in the nearby villages"

During our interaction with villagers we observed that, the villages are having potable drinking water supply and primary health center is well equipped to take care basic health needs in time. Hence there are no notable health problems in nearby villages.

Google Image Showing Quarry Area inside Jungle



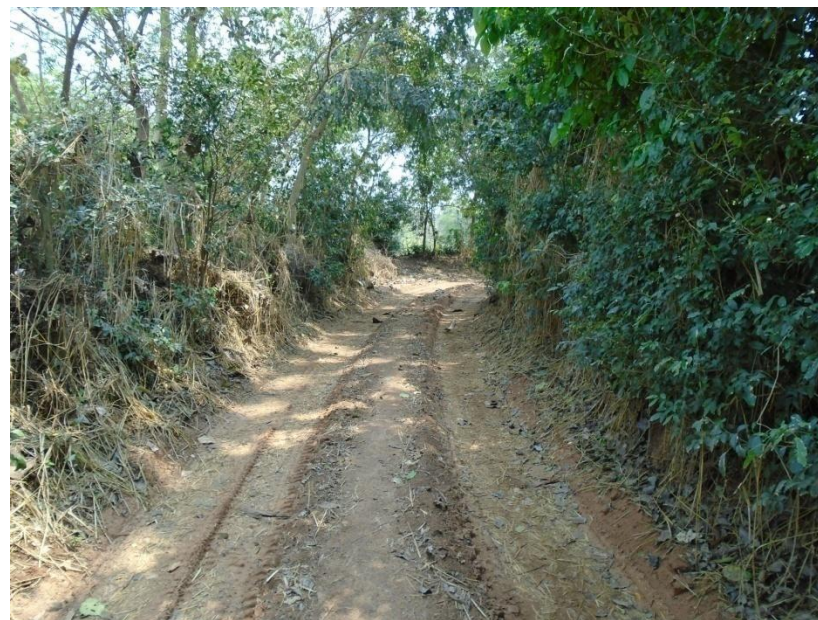
Route to Forest Area



Photographs of Nearest Forest Area (Dense Jungle)



Photographs of Nearest Forest Area (Dense Jungle)



4. List of plants to be planted at green belt area.

Table: List of Plants Identified for Green Belt Development

| S. No | Botanical name | Local or common name | Importance |
|-------|--------------------------------|----------------------|-----------------------------------|
| 1. | <i>Alstonia scholaris</i> | Devil's tree | Ornamental tree |
| 2. | <i>Acacia auriculiformis</i> | Australian wattle | Avenue tree |
| 3. | <i>Albizia lebbeck</i> | Dirisana | Shade and timber |
| 4. | <i>Anthocephalus indica</i> | Kadamb | Shade and timber |
| 5. | <i>Azadirachta indica</i> | Vepa or Neem | Multipurpose |
| 6. | <i>Dalbergia sissoo</i> | Sissoo | Avenue and timber tree |
| 7. | <i>Dendrocalamus strictus</i> | Bamboo | Bamboo products |
| 8. | <i>Holoptelia integrifolia</i> | Nemali naara | Fiber and timber |
| 9. | <i>Leucaena leucocephala</i> | Subabul | Fodder and pulp wood |
| 10. | <i>Mangifera indica</i> | Mango | Edible fruit |
| 11. | <i>Millingtonia hortensis</i> | Aakasa malle | Ornamental tree |
| 12. | <i>Mimosops elengi</i> | Pogada | Shade and edible fruit |
| 13. | <i>Muntingia calabura</i> | Wild cherry | Shade and edible fruit |
| 14. | <i>Peltophorum pterocarpum</i> | Copper pod | Shade only |
| 15. | <i>Pongamia pinnata</i> | Gaanuga | Source of biodiesel |
| 16. | <i>Polyalthia longifolia</i> | Ashoka | Avenue tree |
| 17. | <i>Samania saman</i> | Nidrabhangi | Shade, timber & fodder. |
| 18. | <i>Spathodea companulata</i> | Flame of the forest | Ornamental avenue tree |
| 19. | <i>Syzygium cumini</i> | Neredu | Edible fruits |
| 20. | <i>Tamarindus indica</i> | Chinta | Tamarind fruit and leaf |
| 21. | <i>Terminalia arjuna</i> | Nallamaddi | Timber and shade tree |
| 22. | <i>Terminalia catappa</i> | Baadam | Edible nuts |
| 23. | <i>Stylosanthes hamata</i> | Hamata grass | Fodder and nitrogen fixing legume |

5. List of existing industries around plant site.

Table :The major list of industries Located near Project site are

| S. No | Name of the Industry | Distance | Direction in kms |
|-------|-------------------------------------|---|------------------|
| 1 | Vensar laboratories Private Limited | Adjacent to the Vensub Laboratories Pvt | -- |
| 2 | Bio Ethanol Agro industries Ltd | 3.5 | SSE |

| S. No | Name of the Industry | Distance | Direction in kms |
|--------------|---|-----------------|-------------------------|
| 3 | Andhra Sugars Ltd (chemical and Fertilizers Division) | 3.7 | NE |
| 4 | Sri Venkata Sai Eswar Poultries | 2.4 | ESE |
| 5 | Sri Lakshmi Padnabha Rice mill | 3.7 | SE |
| 6 | Alluri Casting Private Limited | 3.9 | SE |

6. Coliforms and fecal coliform test in ground and surface water.

Table : Surface And Ground Water Sampling Locations

| S No. | Code | Name of Sampling Location | Distance (km) w.r.t Project | Direction w.r.t Project |
|---|-------------|----------------------------------|------------------------------------|--------------------------------|
| Ground Water Sampling Locations | | | | |
| 1 | GW1 | Near Plant Site | -- | -- |
| 2 | GW2 | Hukumpeta | 4.23 | N |
| 3 | GW3 | Kovvurupadu | 6.84 | NW |
| 4 | GW4 | Gopalapuram | 8.20 | SW |
| 5 | GW5 | Chityala | 7.48 | S |
| 6 | GW6 | Annadevarapeta | 5.49 | SE |
| 7 | GW7 | Pochavaram | 5.48 | ESE |
| 8. | GW8 | Kotta Patteseema | 7.23 | NE |
| Surface Water Sampling Locations | | | | |
| 1 | SW1 | Kovvada kavla | 6.25 | N |
| 2 | SW2 | Tank near Ramannapalem | 7.80 | N |
| 3 | SW3 | Kovvada Kalva Reservoir | 9.62 | NW |
| 4 | SW4 | Tadipudi lift canal | 1.50 | S |
| 5 | SW5 | Tank near Bhimolu | 2.65 | SW |
| 6 | SW6 | Polavaram right canal | 7.22 | SSW |
| 7 | SW7 | Godavari River Downstream | 8.70 | SE |
| 8 | SW8 | Godavari River Upstream | 8.31 | NE |

Table: Ground Water Quality in the Study Area

| S. No | Parameter | Method | Unit | GW1 | GW2 | GW3 | GW4 | IS 10,500 Limits | |
|-------|-----------------------------|------------------------------|------------|-----------|-----------|-----------|-----------|--|---------------|
| | | | | | | | | Acceptable | Permissible |
| 1 | pH | APHA 22nd Edition 4500 H+ B | -- | 7.52 | 8.22 | 7.65 | 7.69 | 6.5-8.5 | No Relaxation |
| 2 | Color | APHA 22nd Edition 2120 B | CU | < 1.0 | <1.0 | < 1.0 | < 1.0 | 5 | 15 |
| 3 | Total Dissolved Solids | APHA 22nd Edition 2540 C | mg/l | 785.0 | 1380.0 | 810.0 | 720.5 | 500 | 2000 |
| 4 | Total Alkalinity (as CaCO3) | APHA 22nd Edition 2320 B | mg/l | 310.0 | 370.0 | 320.0 | 265.0 | 200 | 600 |
| 5 | Total Hardness (as CaCO3) | APHA 22nd Edition 2340 C | mg/l | 370.0 | 610.0 | 385.0 | 290.0 | 200 | 600 |
| 6 | Calcium (as Ca) | APHA 22nd Edition 3500 Ca B | mg/l | 122.5 | 142.06 | 110.5 | 86.04 | 75 | 200 |
| 7 | Magnesium (as Mg) | APHA 22nd Edition 3500-Mg B | mg/l | 15.04 | 55.04 | 19.04 | 18.62 | 30 | 100 |
| 8 | Sulphate (as SO4) | APHA 22nd Edition 4500 SO4 D | mg/l | 75.0 | 69.0 | 73.5 | 62.95 | 200 | 400 |
| 9 | Chloride (as Cl) | APHA 22nd Edition 4500 Cl- C | mg/l | 129.9 | 449.6 | 119.9 | 149.9 | 250 | 1000 |
| 10 | Lead as Pb | APHA 22nd Edition 3111B | mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.01 | No Relaxation |
| 11 | Cadmium as Cd | APHA 22nd Edition 3111B | mg/l | < 0.001 | <0.001 | < 0.001 | < 0.001 | 0.003 | No Relaxation |
| 12 | Total Chromium as Cr | APHA 22nd Edition 3111B | mg/l | < 0.05 | <0.05 | < 0.05 | < 0.05 | 0.05 | No Relaxation |
| 13 | Copper as Cu | APHA 22nd Edition 3111B | mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.05 | 1.5 |
| 14 | Zinc as Zn | APHA 22nd Edition 3111B | mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 5 | 15 |
| 15 | Nickel as Ni | APHA 22nd Edition 3111B | mg/l | < 0.01 | <0.01 | < 0.01 | < 0.01 | 0.02 | No Relaxation |
| 16 | Fluorides as F | APHA 22nd Edition 4500 F- D | mg/l | <0.5 | <0.5 | <0.5 | <0.5 | 1 | 1.5 |
| 17 | Aluminium as Al | APHA 22nd Edition 3500 Al B | mg/l | < 0.03 | <0.03 | < 0.03 | < 0.03 | 0.03 | 0.2 |
| 18 | Boron as B | APHA 22nd Edition 4500 B B | mg/l | <0.2 | <0.2 | <0.2 | <0.2 | 0.5 | 1 |
| 19 | Manganese as Mn | APHA 22nd Edition 3111B | mg/l | <0.02 | <0.02 | <0.02 | <0.02 | 0.1 | 0.3 |
| 20 | Iron as Fe | APHA 22nd Edition 3500 Fe B | mg/l | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.3 | No Relaxation |
| 21 | Nitrate Nitrogen | APHA 22nd Edition 4500 NO3 B | mg/l | 13.2 | 14.5 | 13.2 | 12.4 | 45 | No Relaxation |
| 22 | Sodium as Na | APHA 22nd Edition 3500 Na B | mg/l | 110.5 | 155.0 | 130.5 | 125.0 | -- | -- |
| 23 | Potassium as K | APHA 22nd Edition 3500 K B | mg/l | < 5.0 | < 5.0 | < 5.0 | < 5.0 | -- | -- |
| 24 | Odour | APHA 22nd Edition 2150 B | -- | Agreeable | Agreeable | Agreeable | Agreeable | -- | -- |
| 25 | Electrical Conductivity | APHA 22nd Edition 2510 B | µmho/cm | 1240.0 | 2200.0 | 1265.0 | 1220.0 | -- | -- |
| 26 | Phosphorus as P | APHA 22nd Edition 4500 P C | mg/l | 0.21 | 0.23 | 0.21 | 0.44 | -- | -- |
| 27 | Total Coliform | IS 1622 | MPN/100 ml | Absent | Absent | Absent | Absent | Shall not be detectable in any 100 ml sample | |
| 28 | Fecal Coliforms | IS 1622 | MPN/100 ml | Absent | Absent | Absent | Absent | -- | -- |

Table: Ground Water Quality In The Study Area

| S. No | Parameter | Method | Unit | GW5 | GW6 | GW7 | GW8 | IS 10,500 Limits | |
|-------|-----------------------------|------------------------------|------------|-----------|-----------|-----------|-----------|--|---------------|
| | | | | | | | | Acceptable | Permissible |
| 1 | pH | APHA 22nd Edition 4500 H+ B | -- | 7.12 | 7.56 | 7.89 | 7.65 | 6.5-8.5 | No Relaxation |
| 2 | Color | APHA 22nd Edition 2120 B | CU | <1.0 | <1.0 | < 1.0 | <1.0 | 5 | 15 |
| 3 | Total Dissolved Solids | APHA 22nd Edition 2540 C | mg/l | 825.0 | 1320.0 | 1155.0 | 720.0 | 500 | 2000 |
| 4 | Total Alkalinity (as CaCO3) | APHA 22nd Edition 2320 B | mg/l | 285.0 | 340.0 | 330.0 | 210.0 | 200 | 600 |
| 5 | Total Hardness (as CaCO3) | APHA 22nd Edition 2340 C | mg/l | 340.0 | 580.0 | 520.0 | 370.0 | 200 | 600 |
| 6 | Calcium (as Ca) | APHA 22nd Edition 3500 Ca B | mg/l | 105.5 | 125.62 | 115.5 | 98.04 | 75 | 200 |
| 7 | Magnesium (as Mg) | APHA 22nd Edition 3500-Mg B | mg/l | 20.06 | 65.85 | 55.04 | 35.06 | 30 | 100 |
| 8 | Sulphate (as SO4) | APHA 22nd Edition 4500 SO4 D | mg/l | 65.50 | 86.4 | 83.0 | 52.5 | 200 | 400 |
| 9 | Chloride (as Cl) | APHA 22nd Edition 4500 Cl- C | mg/l | 129.9 | 385.6 | 349.9 | 135.9 | 250 | 1000 |
| 10 | Lead as Pb | APHA 22nd Edition 3111B | mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.01 | No Relaxation |
| 11 | Cadmium as Cd | APHA 22nd Edition 3111B | mg/l | < 0.001 | <0.001 | < 0.001 | < 0.001 | 0.003 | No Relaxation |
| 12 | Total Chromium as Cr | APHA 22nd Edition 3111B | mg/l | < 0.05 | <0.05 | < 0.05 | < 0.05 | 0.05 | No Relaxation |
| 13 | Copper as Cu | APHA 22nd Edition 3111B | mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.05 | 1.5 |
| 14 | Zinc as Zn | APHA 22nd Edition 3111B | mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 5 | 15 |
| 15 | Nickel as Ni | APHA 22nd Edition 3111B | mg/l | < 0.01 | <0.01 | < 0.01 | < 0.01 | 0.02 | No Relaxation |
| 16 | Fluorides as F | APHA 22nd Edition 4500 F- D | mg/l | <0.5 | <0.5 | <0.5 | <0.5 | 1 | 1.5 |
| 17 | Aluminium as Al | APHA 22nd Edition 3500 Al B | mg/l | < 0.03 | <0.03 | < 0.03 | < 0.03 | 0.03 | 0.2 |
| 18 | Boron as B | APHA 22nd Edition 4500 B B | mg/l | <0.2 | <0.2 | <0.2 | <0.2 | 0.5 | 1 |
| 19 | Manganese as Mn | APHA 22nd Edition 3111B | mg/l | < 0.02 | <0.02 | <0.02 | < 0.02 | 0.1 | 0.3 |
| 20 | Iron as Fe | APHA 22nd Edition 3500 Fe B | mg/l | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.3 | No Relaxation |
| 21 | Nitrate Nitrogen | APHA 22nd Edition 4500 NO3 B | mg/l | 13.4 | 14.32 | 11.5 | 12.4 | 45 | No Relaxation |
| 22 | Sodium as Na | APHA 22nd Edition 3500 Na B | mg/l | 65.55 | 165.4 | 150.5 | 170.0 | -- | -- |
| 23 | Potassium as K | APHA 22nd Edition 3500 K B | mg/l | < 5.0 | < 5.0 | < 5.0 | < 5.0 | -- | -- |
| 24 | Odour | APHA 22nd Edition 2150 B | -- | Agreeable | Agreeable | Agreeable | Agreeable | -- | -- |
| 25 | Electrical Conductivity | APHA 22nd Edition 2510 B | µmho/cm | 1270.0 | 1985 | 1785.0 | 1110.0 | -- | -- |
| 26 | Phosphorus as P | APHA 22nd Edition 4500 P C | mg/l | 0.41 | 0.31 | 0.23 | 0.33 | -- | -- |
| 27 | Total Coliform | IS 1622 | MPN/100 ml | Absent | Absent | Absent | Absent | Shall not be detectable in any 100 ml sample | |
| 28 | Fecal Coliforms | IS 1622 | MPN/100 ml | Absent | Absent | Absent | Absent | - | - |

Table: Surface Water Quality In The Study Area

| S. No | Parameter | Method | Unit | SW1 | SW2 | SW3 | SW4 |
|-------|--|--|------------|--------|--------|--------|--------|
| 1 | pH | APHA 22 nd Edition 4500 H ⁺ B | -- | 7.22 | 7.65 | 7.52 | 7.78 |
| 2 | Color | APHA 22 nd Edition 2120 B | CU | <1.0 | < 1.0 | < 1.0 | <1.0 |
| 3 | Turbidity | APHA 22 nd Edition 2130 B | NTU | 1.0 | 1.0 | 1.0 | 1.0 |
| 4 | Total Dissolved Solids | APHA 22 nd Edition 2540 C | mg/l | 495.5 | 650.0 | 585.0 | 720.0 |
| 5 | Total Alkalinity (as CaCO ₃) | APHA 22 nd Edition 2320 B | mg/l | 210.0 | 255.0 | 215.0 | 270.0 |
| 6 | Total Hardness (as CaCO ₃) | APHA 22 nd Edition 2340 C | mg/l | 260.0 | 280.0 | 270.0 | 295.0 |
| 7 | Calcium (as Ca) | APHA 22 nd Edition 3500 Ca B | mg/l | 50.06 | 55.25 | 62.26 | 65.35 |
| 8 | Magnesium (as Mg) | APHA 22 nd Edition 3500-Mg B | mg/l | 32.04 | 35.06 | 28.04 | 32.64 |
| 9 | Sulphate (as SO ₄) | APHA 22 nd Edition 4500 SO ₄ E | mg/l | 63.4 | 72.2 | 55.5 | 82.0 |
| 10 | Chloride (as Cl) | APHA 22 nd Edition 4500 Cl ⁻ B | mg/l | 79.46 | 139.9 | 142.5 | 154.9 |
| 11 | Lead as Pb | APHA 22 nd Edition 3111B | mg/l | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 12 | Cadmium as Cd | APHA 22 nd Edition 3111B | mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 13 | Total Chromium as Cr | APHA 22 nd Edition 3111B | mg/l | <0.05 | < 0.05 | < 0.05 | <0.05 |
| 14 | Copper as Cu | APHA 22 nd Edition 3111B | mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 15 | Zinc as Zn | APHA 22 nd Edition 3111B | mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 16 | Nickel as Ni | APHA 22 nd Edition 3111B | mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 17 | Fluorides as F | APHA 22 nd Edition 4500 F ⁻ D | mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 18 | Aluminium as Al | APHA 22 nd Edition 3500 Al B | mg/l | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| 19 | Boron as B | APHA 22 nd Edition 4500 B B | mg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 20 | Manganese as Mn | APHA 22 nd Edition 3111B | mg/l | <0.05 | < 0.05 | < 0.05 | <0.05 |
| 21 | Iron as Fe | APHA 22 nd Edition 3500 Fe B | mg/l | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| 22 | Nitrate Nitrogen | APHA 22 nd Edition 4500 NO ₃ B | mg/l | 9.6 | 9.2 | 3.6 | 5.3 |
| 23 | Chemical Oxygen Demand | APHA 22 nd Edition 5220 B | mg/l | 145.0 | 160.0 | 120.0 | 102.5 |
| 24 | BOD(3day's at 27°C) | IS 3025 (Part – 44) 2009 | mg/l | 43.5 | 50.4 | 35.0 | 31.3 |
| 25 | Sodium as Na | APHA 22 nd Edition 3500 Na B | mg/l | 65.5 | 85.0 | 75.0 | 105.0 |
| 26 | Potassium as K | APHA 22 nd Edition 3500 K B | mg/l | 3.9 | 4.4 | 1.5 | 2.6 |
| 27 | Total Suspended Solids | APHA 22 nd Edition 2540 D | mg/l | 11.6 | 12.4 | 11.1 | 12.6 |
| 28 | Dissolved Oxygen | APHA 22 nd Edition 4500 O C | mg/l | 4.6 | 4.9 | 5.1 | 4.8 |
| 29 | Oil and grease | APHA 22 nd Edition 5520 B | mg/l | <5.0 | <5.0 | <5.0 | <5.0 |
| 30 | Electrical Conductivity | APHA 22 nd Edition 2510 B | µmho/cm | 855.0 | 1075.5 | 985.5 | 1125.0 |
| 31 | Phosphorus as P | APHA 22 nd Edition 4500 P C | mg/l | <1.0 | <1.0 | <1.0 | <1.0 |
| 32 | Total Coliform | IS 1622 | MPN/100 ml | 75.0 | 82.0 | 68.0 | 92.0 |
| 33 | Fecal Coliforms | IS 1622 | MPN/100 ml | 7.0 | 8.0 | 6.0 | 9.0 |

Table: Surface Water Quality In The Study Area

| S. No | Parameter | Method | Unit | SW5 | SW6 | SW7 | SW8 |
|-------|--|--|------------|--------|--------|--------|--------|
| 1 | pH | APHA 22 nd Edition 4500 H ⁺ B | -- | 7.75 | 7.60 | 7.85 | 7.60 |
| 2 | Color | APHA 22 nd Edition 2120 B | CU | <1.0 | < 1.0 | < 1.0 | < 1.0 |
| 3 | Turbidity | APHA 22 nd Edition 2130 B | NTU | 1.0 | 1.0 | 1.0 | 1.0 |
| 4 | Total Dissolved Solids | APHA 22 nd Edition 2540 C | mg/l | 762.0 | 580.0 | 850.0 | 540.0 |
| 5 | Total Alkalinity (as CaCO ₃) | APHA 22 nd Edition 2320 B | mg/l | 270.0 | 196.0 | 290.0 | 185.0 |
| 6 | Total Hardness (as CaCO ₃) | APHA 22 nd Edition 2340 C | mg/l | 360.0 | 310.0 | 400.0 | 280.0 |
| 7 | Calcium (as Ca) | APHA 22 nd Edition 3500 Ca B | mg/l | 72.14 | 60.12 | 84.16 | 53.0 |
| 8 | Magnesium (as Mg) | APHA 22 nd Edition 3500-Mg B | mg/l | 43.74 | 38.88 | 46.17 | 36.45 |
| 9 | Sulphate (as SO ₄) | APHA 22 nd Edition 4500 SO ₄ E | mg/l | 81.0 | 43.0 | 98.60 | 34.0 |
| 10 | Chloride (as Cl) | APHA 22 nd Edition 4500 Cl ⁻ B | mg/l | 179.94 | 164.0 | 199.94 | 156.0 |
| 11 | Lead as Pb | APHA 22 nd Edition 3111B | mg/l | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 12 | Cadmium as Cd | APHA 22 nd Edition 3111B | mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 13 | Total Chromium as Cr | APHA 22 nd Edition 3111B | mg/l | <0.05 | < 0.05 | < 0.05 | < 0.05 |
| 14 | Copper as Cu | APHA 22 nd Edition 3111B | mg/l | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 15 | Zinc as Zn | APHA 22 nd Edition 3111B | mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 16 | Nickel as Ni | APHA 22 nd Edition 3111B | mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 17 | Fluorides as F | APHA 22 nd Edition 4500 F ⁻ D | mg/l | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| 18 | Aluminium as Al | APHA 22 nd Edition 3500 Al B | mg/l | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| 19 | Boron as B | APHA 22 nd Edition 4500 B B | mg/l | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 20 | Manganese as Mn | APHA 22 nd Edition 3111B | mg/l | <0.05 | < 0.05 | < 0.05 | < 0.05 |
| 21 | Iron as Fe | APHA 22 nd Edition 3500 Fe B | mg/l | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| 22 | Nitrate Nitrogen | APHA 22 nd Edition 4500 NO ₃ B | mg/l | 3.50 | 2.70 | 3.8 | 2.10 |
| 23 | Chemical Oxygen Demand | APHA 22 nd Edition 5220 B | mg/l | 72.0 | 48.0 | 88.0 | 40.0 |
| 24 | BOD(3day's at 27°C) | IS 3025 (Part – 44) 2009 | mg/l | 12.0 | 12.0 | 22.0 | 10.0 |
| 25 | Sodium as Na | APHA 22 nd Edition 3500 Na B | mg/l | 96.0 | 71.0 | 118.0 | 65.0 |
| 26 | Potassium as K | APHA 22 nd Edition 3500 K B | mg/l | 4.1 | 3.80 | 5.2 | 3.10 |
| 27 | Total Suspended Solids | APHA 22 nd Edition 2540 D | mg/l | 16.00 | 13.4 | 18.2 | 12.3 |
| 28 | Dissolved Oxygen | APHA 22 nd Edition 4500 O C | mg/l | 5.2 | 5.4 | 5.3 | 5.5 |
| 29 | Oil and grease | APHA 22 nd Edition 5520 B | mg/l | <5.0 | <5.0 | <5.0 | <5.0 |
| 30 | Electrical Conductivity | APHA 22 nd Edition 2510 B | µmho/cm | 1270.0 | 965.0 | 1380.0 | 895.5 |
| 31 | Phosphorus as P | APHA 22 nd Edition 4500 P C | mg/l | <1.0 | <1.0 | <1.0 | <1.0 |
| 32 | Total Coliform | IS 1622 | MPN/100 ml | 70.0 | 64.0 | 75.0 | 88.0 |
| 33 | Fecal Coliforms | IS 1622 | MPN/100 ml | 7.0 | 6.0 | 7.0 | 9.0 |