### 3.9.3.2 Results and Discussions

A summary of analytical results are presented below:

- The average pH ranges from 7.2-8.04
- In the study area, Na and K concentration in the ground water range from 69 to 297 mg/l and 5 to 21 mg/l respectively.
- The acceptable limit for Mg is 30 mg/l and the permissible limit is 100 mg/l. The concentration of Mg ion found in groundwater samples of the study area ranges from 24.3 to 75.33 mg/l. Some values are exceeding the acceptable limits but all the values are within the permissible limits of IS 10500:2012 drinking water standards.
- The acceptable and permissible limit of Fluoride is 1mg/l and 1.5mg/l respectively. The concentrations of fluoride in all the ground water samples are within the limit.
- In the present findings the TDS value varied from 591 mg/l to 1310 mg/l for the ground water and for few samples it exceeds the acceptable limits of IS 10500: 2012.The acceptable and permissible limit of TDS for drinking water is 500 mg/l and 2000 mg/l. All the samples were having TDS values above the acceptable limit, but all are within the permissible limit.
- The chloride concentration ranged from 143.52 mg/L to 425.6 mg/L and is below the IS acceptable limit except three samples. The acceptable limit of the chloride content is 250mg/l and permissible limit is 1000 mg/l.
- The acceptable limit of the sulphate content is 200mg/l and permissible limit is 400mg/l. the sulphate content of the ground water of the study area is varied between 84.18 mg/l – 238.19 mg/l meeting the desirable limit of the IS 10500: 2012.
- The Total hardness ranges is between 200 mg/l – 611 mg/l. for ground water and for few samples it exceeds the permissible limit of the IS 10500: 2012.
- The Total alkalinity as calcium carbonate, Magnesium and Chloride are well within the permissible limits.

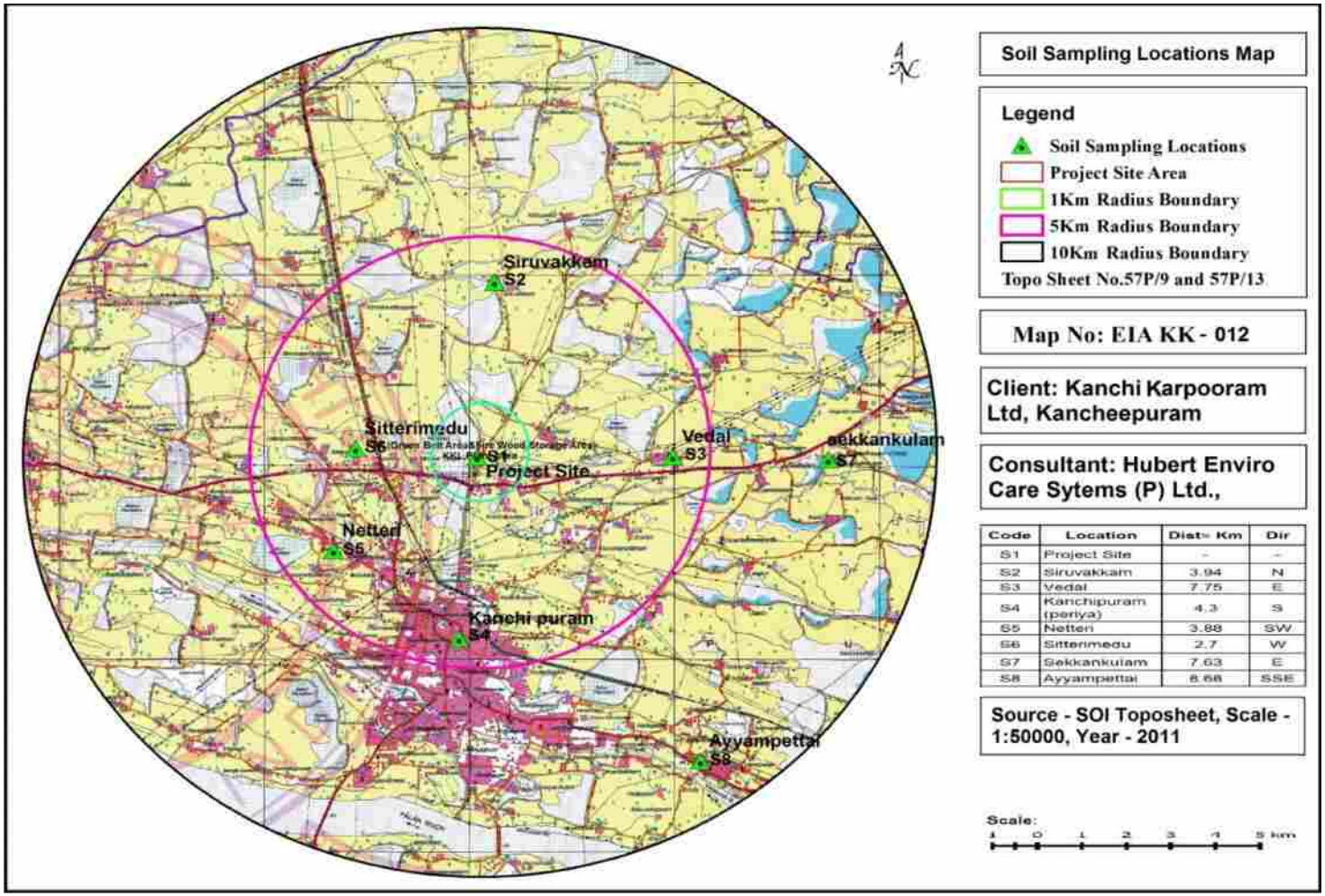
## 3.10 Soil as a resource and its Quality

Soils have been classified into 1) clayey soil, 2) red sandy or red loamy soil 3) Red sandy brown clayey soil and 4) Alluvial soil. Of the above soils brown clayey soil is the most predominant, covering more than 71 percent of the areal extent of Kancheepuram district. Alluvial soils are found on the banks of Palar, Cheyyar and other rivers. The river alluvium is transported and is seen in coastal area of this district. Sandy coastal alluvial (arenacious soil) occurs along the seacoast as a narrow belt.Soil quality monitoring locations & results are given in **Table 3-19** &**Table 3-20** respectively**.** Map showing the soil monitoring locations are given in **Figure 3-26**

Source: http://cgwb.gov.in/district_profile/tamilnadu/kancheepuram.pdf

**Table 3-19 Soil & Sediment Quality Monitoring Locations**

| Location Code | Location | Distance (Km) w.r.t project site | Direction w.r.t. project site |
|---|---|---|---|
| S1 | Project Site | Within Site | |
| S2 | Siruvakkam | 3.94 | N |
| S3 | Vedal | 7.75 | E |
| S4 | Kanchipuram (periya) | 4.30 | S |
| S5 | Netteri | 3.88 | SW |
| S6 | Sitterimedu | 2.70 | W |
| S7 | Sekkankulam | 7.63 | E |
| S8 | Ayyampettai | 8.68 | SSE |




| Code | Location | Dist~ Km | Dir |
|---|---|---|---|
| S1 | Project Site | - | - |
| S2 | Siruvakkam | 3.94 | N |
| S3 | Vedal | 7.75 | E |
| S4 | Kanchipuram (periya) | 4.3 | S |
| S5 | Netteri | 3.88 | SW |
| S6 | Sitterimedu | 2.7 | W |
| S7 | Sekkankulam | 7.63 | E |
| S8 | Ayyampettai | 8.68 | SSE |

**Figure 3-26 Map showing the soil monitoring location**

**Table 3-20 Physico Chemical parameters of soil samples from the study area**

| S. No | Parameters | Units | S1- Project site | S2- Siruvakkam | S3- Vedal | S4- Kanchipuram (Periya) | S5-Netteri | S6- Sitterimedu | S7- Sekkankulam | S8- Ayyampettai |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Colour | - | Brown | Brown | Brown | Brown | Brown | Brown | Brown | Brown |
| 2 | Soil Texture | - | Clay | Clay | Sandy Clay Loam | Sandy Clay Loam | Sandy Loam | Clay | Sandy Clay | Clay |
| 3 | Soil Texture i)Sand | % | 34.4 | 44.26 | 52.84 | 55.24 | 64.27 | 38.2 | 50.52 | 40.12 |
| 4 | Soil Texture ii)Silt | % | 17.38 | 5.32 | 12.26 | 12.26 | 17.33 | 7.72 | 10.26 | 16.26 |
| 5 | Soil Texture iii)Clay | % | 48.22 | 50.42 | 34.9 | 32.5 | 18.4 | 54.08 | 39.22 | 43.62 |
| 6 | pH | - | 7.16 | 6.97 | 7.16 | 7.22 | 6.93 | 7.08 | 7.24 | 7.5 |
| 7 | Electrical Conductivity | µS/cm | 320 | 192 | 224 | 212 | 200 | 330 | 260 | 412 |
| 8 | Bulk density | gm/cc | 1.43 | 1.46 | 1.32 | 1.30 | 1.3 | 1.45 | 1.29 | 1.44 |
| 9 | Cation exchange capacity | meq/ 100g | 31.4 | 31.7 | 24.6 | 26.2 | 29.6 | 31.3 | 28.9 | 28.8 |
| 10 | Moisture Content | % | 20.36 | 25.6 | 26.3 | 15.6 | 21.7 | 26.4 | 18.6 | 26.4 |
| 11 | Water holding capacity | % | 39.12 | 39.64 | 30.29 | 32.1 | 25.52 | 39.08 | 40.17 | 39.57 |
| 12 | Organic Carbon | % | 0.4563 | 0.4256 | 0.3215 | 0.2836 | 0.2945 | 0.3489 | 0.3256 | 0.3625 |
| 13 | Organic Matter | % | 0.86 | 0.28 | 0.56 | 0.54 | 0.22 | 0.52 | 0.32 | 0.92 |
| 14 | Nitrogen | Kg/ha | 784.26 | 252.26 | 512.24 | 492.24 | 212.32 | 780.06 | 296.66 | 840.06 |
| 15 | Phosphorus | Kg/ha | 43 | 41 | 47 | 39 | 37 | 43 | 42 | 44 |
| 16 | Potassium | Kg/ha | 420 | 180 | 220 | 330 | 120 | 416 | 200 | 500 |
| 17 | Calcium as Ca | mg/kg | 380 | 200 | 240 | 400 | 320 | 420 | 220 | 512 |
| 18 | Magnesium as Mg | mg/kg | 122.42 | 96.24 | 112.24 | 220 | 142.26 | 216.34 | 101.2 | 284.6 |

| S. No | Parameters | Units | S1- Project site | S2- Siruvakkam | S3- Vedal | S4- Kanchipuram (Periya) | S5-Netteri | S6- Sitterimedu | S7- Sekkankulam | S8- Ayyampettai |
|---|---|---|---|---|---|---|---|---|---|---|
| 19 | Boron | mg/kg | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) |
| 20 | Cadmium | mg/kg | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) | BDL (DL0.1) |
| 21 | Copper as Cu | mg/kg | 3.42 | 6.23 | 5.29 | 3.25 | 6.98 | 4.89 | 4.98 | 3.9 |
| 22 | Iron | mg/kg | 162 | 98 | 194 | 139 | 95 | 167 | 182 | 137 |
| 23 | Manganese | mg/kg | 1.33 | 3.74 | 4.72 | 1.27 | 3.23 | 1.68 | 3.91 | 2.27 |
| 24 | Zinc | mg/kg | 9.4 | 15.1 | 11.6 | 13.4 | 11.8 | 19.7 | 10.3 | 9.4 |

### 3.10.1 Results and Discussions

Summary of analytical results

- The pH of the soil samples ranged from 6.93-7.24.
- Conductivity of the soil samples ranged from 192 –330µS/cm. As the EC value is less than 2000 µS/cm, the soil is found to be non-saline in nature
- The water holding capacity of the soil samples varied from 25.52-40.17 (%).
- Nitrogen content ranged from 212.32 mg/kg to 840.06 mg/kg,
- Phosphorous ranged from 37 mg/kg to 47 mg/kg,
- Potassium content ranges from 120 mg/kg to 500 mg/kg.

## 3.11 Biological Environment

Baseline Biological survey was carried out to assess the ecology of the study area. The floral diversity is grouped into trees, shrubs, climbers, herbs, aquatic plants and phytoplankton. Similarly, the faunal diversity is grouped into mammals, birds, reptiles, amphibians and zooplankton. Discussions were held with local people to gather related information on the richness of plant and animal resources, employment opportunities, facilities for education, health and socio-economic condition.To identify any floral species of conservation importance existing in the study area, the status evaluation of the observed flora has been done as per the IUCN.

### 3.11.1 Flora

There is a very little vegetation within the study area. The predominant species are small trees and shrubs. The growth of natural flora is limited. Azadirachta indica and Cocos nucifera have better adaptability among the naturally growing species. Floral species observed in the study area is given in**Table 3-21.**

**Table 3-21 List of flora observed in the study area**

| Sl. No | Botanical Name | Family Name | Local Name(Tamil) | IUCN status |
|---|---|---|---|---|
| 1. | Abrus precatorius | Legumes | Kudri mani | NA |
| 2. | Asparagus racemosus | Asparagaceae | tannir-vittan | NA |
| 3. | Acacia auriculoformis | Fabaceae. | Kaththi Savukku | NA |
| 4. | Acacia nilotica | Fabaceae | Karuvelamaram | LC |
| 5. | Annona squamosal | Annonaceae | Sitapalam | NA |
| 6. | Azadirachta indica | Meliaceae | Veppai | LC |
| 7. | Barringtonia acutangula | Lecythidaceae | Samudra Pazham | NA |
| 8. | Cocos nucifera | Arecaceae | Tennai | NA |
| 9. | Chloris montana | Poaceae | - | NA |
| 10. | Crotolaria verrucose | legume | Salangaichedi | NA |
| 11. | Digitaria bicornis | Poaceae | menmaiyana kutai pul | NA |
| 12. | Ficus religiosa | Moraceae | Bothimaram | NA |
| 13. | Heteropogan contortus | Poaceae | - | NA |
| 14. | Mangifera indica | Anacardiaceae | Mangai | DD |
| 15. | Psidium guajava L. | Myrtaceae | Koiyya | NA |
| 16. | Syzygium cumini | Myrtaceae | Navva Pazham | NA |
| 17. | Solanum trilobatum | Nightshade | Thoodhuvalai | NA |
| 18. | Tamarindus indica | Legumes | Puli | LC |

| | | | | |
|---|---|---|---|---|
| 19. | Ziziphus mauritiana | Rhamnaceae | Elentha | NA |

LC- Least Concern, NT- near Threatened, EN- Endangered, NA-Not yet assessed, DD -Data Deficient, VU-Vulnerable, IUCN- International Union for Conservation of Nature.

### 3.11.2 Fauna

This area hosts common animals like Indian Dogs, Jungle and Domestic cat, Rhesus macaque, Domestic Cows, Buffaloes, Bullocks, Oxen, and Goat etc. are found amongst mammals. List of fauna reported/observed in the study area is given in **Table 3-22.**There is no National park/Wild life Sanctuary within 10Km radius of the study area &there are no of reserve forest are present There is no rare/endangered species within study area of 10 Km radius.

**Table 3-22List of Fauna observed in the study area**

| Sl. No | Botanical Name | Family Name | Common Name | IUCN status |
|---|---|---|---|---|
| **Amphibians** | | | | |
| 1. | Bufo Melanostictus | Bufonidae | Toad | LC |
| 2. | Hyla arborea | Hylidae | Tree frog | LC |
| 3. | Rana cyanophlyctis | Bufonidae | Frog | LC |
| 4. | Hoplobatrachus tigerinus | Bufonidae | Bull Frog | LC |
| **Mammals** | | | | |
| 5. | Bandicota bengalensis | Muridae | Sind Rice Rat | LC |
| 6. | Cynopterus sphinx | Megabat | Short-nosed Fruit Bat | LC |
| 7. | Funambulus palmaram | Sciuridae | Three striped palm Squirrel | LC |
| 8. | Herpestes edwardii | Herpestidae | Indian Grey Mongoose | LC |
| 9. | Rattus norvegicus | Muridae | Field mouse | LC |
| 10. | Rattus rattus | Muridae | House rat | LC |
| **Reptiles** | | | | |
| 11. | Calotes ellioti | Agamidae | Elliot's Forest Lizard | LC |
| 12. | Chameleo zeylanicus | Chamaeleonidae | Indian chameleon | LC |
| 13. | Ptyas mucosa | Clubridae | Rat snake | LC |

LC- Least Concern, NT- near Threatened, EN- Endangered, NA-Not yet assessed, DD -Data Deficient, VU-Vulnerable, IUCN- International Union for Conservation of Nature.

## 3.12 Socio Economic profile of Project Influenced Area

Kancheepuram district lies between 11°00' and 12°00' latitudes and between 77°28' and 78°50' longitudes. It has an area of 4393 sq.kms and coastline of 87.2 km. Kancheepuram district stands 15th place in terms of the large area. Kancheepuram district is bordering Bay of Bengal in the east, Tiruvannamalai district in the west, Thiruvallur district in the north, Chennai district in the north-east, Vellore district in the northwest and Viluppuram district in the south.The population of the district is 39, 98,252 which comprises of 20, 12,958 male and 19, 85,294 female population.

### 3.12.1 Socio Economic Aspects

A socio-economic study was undertaken in assessing aspects which are dealing with social and cultural conditions, and economic status in the study area. The study provides

information such as demographic structure, population dynamics, infrastructure resources, and the status of human health and economic attributes like employment, per-capita income, agriculture, trade, and industrial development in the study area. The study of these characteristic helps in identification, prediction and evaluation of impacts on socio-economic and parameters of human interest due to proposed project developments. The parameters are:

- Demographic structure
- Infrastructure Facility
- Economic Status
- Health status
- Cultural attributes
- Awareness and opinion of people about the project and Industries in the area.

The following **Table 3-23** provides the certain important social indicators of kancheepuram District and Taluk.

**Table 3-23 Social Indicators**

| S.No | Social Indicators | District * |
|---|---|---|
| 1 | Urban population | 63.49% |
| 2 | Decadal growth | 39% |
| 3 | Density (the number of persons per square kilometre) | 892 |
| 4 | Sex ratio (the number of females per 1000 of males) | 986 |
| 5 | Literacy | 84.5% |
| 6 | Female literacy | 79% |
| 7 | Work Participation rate | 41.79% |
| 8 | Main workers | 81.69% |
| 9 | Agriculture workers | 21.62% |
| 10 | Scheduled Caste | 23.7% |
| 11 | Scheduled Tribe | 1% |
| 12 | Infant mortality rate (the number of deaths per 1,000 live births of children under one year of age.) | 10 |
| 13 | Maternal Mortality Ratio (the annual number of female deaths per 100,000 live births ) | 79 |
| 14 | institutional deliveries | 100 |

Source: Census 2011

### 3.12.2 Socio Economic profile

Regarding modern improvement, Kancheepuram is an energetic and a vibrant area. Kancheepuram region in the course of the most recent decade has quick moved from an agribusiness based economy to a mechanical and tertiary part economy.

Agriculture was the mainstay of the district economy till about a decade or so. The net sown area was 128,584 hectares in 2007 and it decreased to 110,872 in 2011-12. The land is distributed more in terms of smaller, less than 2 hectares farms comprising 66.5 % of area

and above 2 hectares area is 33.52 %. The land is mostly irrigated by wells and tanks. The rivers in the district are not perennial and paddy cultivation depends on the monsoons

Income: Per capita income decides one's purchasing power and capability to access the goods and services needed for ones' livelihood. It plays a major role in shaping human development Per Capita Income at Constant Prices (2004 – 05) (in Rupees)

| Year | Kancheepuram District | Tamil Nadu |
|---|---|---|
| 2008-09 | 62571 | 48473 |
| 2009-10 | 70289 | 53359 |
| 2010-11 | 83498 | 59967 |
| 2011-12 | 92713 | 63996 |

Source: Department of Economics &Statistics, Kancheepuram district

**Table 3-24Demographic details of the study area**

| Name | Household | Population | Male | Female | Children below 6 | Scheduled Caste | Scheduled Tribe |
|---|---|---|---|---|---|---|---|
| Within 5 Km | | | | | | | |
| **Kancheepuram Taluk** | | | | | | | |
| Chitterimedu | 314 | 1186 | 567 | 619 | 133 | 225 | 6 |
| Enadur | 1227 | 6531 | 3423 | 3108 | 522 | 1900 | 53 |
| Illuppapattu | 232 | 876 | 419 | 457 | 84 | 193 | 54 |
| Injambakkam | 256 | 1000 | 498 | 502 | 126 | 438 | 0 |
| Kancheepuram (M) | 41807 | 164384 | 81992 | 82392 | 15955 | 5833 | 151 |
| Karai | 518 | 2091 | 1064 | 1027 | 234 | 338 | 19 |
| Konerikuppam (CT) | 2804 | 11406 | 5655 | 5751 | 1274 | 3086 | 95 |
| Periyakarambur | 144 | 605 | 318 | 287 | 70 | 247 | 67 |
| Poondithangal | 26 | 109 | 60 | 49 | 13 | 33 | 0 |
| Sembarambakkam | 367 | 1505 | 784 | 721 | 182 | 898 | 0 |
| Siruvakkam | 561 | 2283 | 1126 | 1157 | 270 | 402 | 0 |
| Siruvallur | 304 | 1278 | 635 | 643 | 149 | 798 | 0 |
| Thimmasamudram | 1136 | 5064 | 2563 | 2501 | 544 | 2694 | 26 |
| Thulukkanthandalam | 125 | 537 | 279 | 258 | 57 | 3 | 0 |
| Vedal | 300 | 1120 | 564 | 556 | 133 | 349 | 0 |
| Veliyur | 352 | 1383 | 656 | 727 | 153 | 402 | 0 |
| Vishakandikuppam | 59 | 232 | 108 | 124 | 24 | 0 | 0 |
| 5 to 10 Km | | | | | | | |
| **Kancheepuram Taluk** | | | | | | | |
| Alavandarmedu | 40 | 161 | 73 | 88 | 22 | 161 | 0 |
| Ariyambakkam | 223 | 903 | 451 | 452 | 128 | 745 | 0 |
| Attuputhur | 223 | 928 | 454 | 474 | 95 | 633 | 47 |
| Ayyampettai (CT) | 1699 | 6610 | 3298 | 3312 | 655 | 522 | 3 |
| Govindavadi | 1050 | 4073 | 2008 | 2065 | 427 | 1256 | 19 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Kaliyanur | 453 | 1834 | 911 | 923 | 249 | 880 | 28 |
| Kallipattu | 8 | 32 | 15 | 17 | 8 | 25 | 5 |
| Kamugampallam | 49 | 217 | 107 | 110 | 31 | 0 | 74 |
| Karur | 206 | 906 | 448 | 458 | 116 | 160 | 10 |
| Kilambi | 1182 | 4704 | 2311 | 2393 | 574 | 1628 | 0 |
| Kilkadirpoor | 1010 | 4256 | 2134 | 2122 | 444 | 1911 | 226 |
| Kottavakkam | 437 | 1784 | 897 | 887 | 215 | 489 | 0 |
| Kuram | 547 | 2177 | 1079 | 1098 | 240 | 392 | 59 |
| Kuruvimalai | 388 | 1508 | 769 | 739 | 173 | 24 | 15 |
| Kuthirambakkam | 340 | 1312 | 665 | 647 | 141 | 197 | 6 |
| Mangalpadi | 42 | 149 | 68 | 81 | 32 | 5 | 130 |
| Maniyachi | 63 | 242 | 116 | 126 | 30 | 91 | 0 |
| Melambi | 95 | 354 | 174 | 180 | 41 | 284 | 50 |
| Melkadirpoor | 348 | 1319 | 676 | 643 | 142 | 604 | 0 |
| Mettukuppam | 272 | 1016 | 501 | 515 | 125 | 0 | 24 |
| Moolapattu | 53 | 187 | 91 | 96 | 30 | 0 | 0 |
| Murukkanthangal | 1 | 4 | 3 | 1 | 0 | 0 | 0 |
| Muttavakkam | 259 | 1004 | 481 | 523 | 112 | 191 | 0 |
| Nallur | 186 | 732 | 359 | 373 | 87 | 75 | 30 |
| Narapakkam | 326 | 1311 | 665 | 646 | 129 | 780 | 75 |
| Nattapettai (CT) | 4964 | 19883 | 9986 | 9897 | 2121 | 3309 | 219 |
| Neervalur | 175 | 671 | 411 | 260 | 74 | 36 | 17 |
| Nelveli | 165 | 667 | 322 | 345 | 88 | 577 | 0 |
| Nelvoy | 144 | 496 | 264 | 232 | 72 | 179 | 40 |
| Olaiyur | 251 | 923 | 453 | 470 | 87 | 0 | 23 |
| Olakkalpattu | 272 | 1024 | 531 | 493 | 116 | 527 | 0 |
| Orikkai (CT) | 3183 | 12638 | 6318 | 6320 | 1308 | 2048 | 234 |
| Padunelli | 381 | 1494 | 752 | 742 | 172 | 568 | 24 |
| Parandur | 695 | 2556 | 1239 | 1317 | 276 | 152 | 6 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Podavur | 133 | 479 | 238 | 241 | 52 | 332 | 0 |
| Pondavakkam | 80 | 319 | 152 | 167 | 44 | 0 | 0 |
| Pullambakkam | 166 | 732 | 372 | 360 | 97 | 228 | 0 |
| Putheri | 78 | 290 | 141 | 149 | 32 | 290 | 0 |
| Sekkankulam | 155 | 654 | 322 | 332 | 73 | 168 | 0 |
| Sevilimedu (TP) | 5863 | 23454 | 11701 | 11753 | 2375 | 4238 | 33 |
| Sirukaveripakkam (CT) | 1931 | 8032 | 3945 | 4087 | 942 | 895 | 252 |
| Sirunaiperugal | 527 | 2002 | 1000 | 1002 | 200 | 538 | 22 |
| Siruvedal | 151 | 610 | 296 | 314 | 71 | 286 | 73 |
| Sittiyambakkam | 189 | 745 | 390 | 355 | 70 | 253 | 5 |
| Thandalam | 192 | 649 | 331 | 318 | 78 | 506 | 0 |
| Thiruppukuzhi | 1778 | 6923 | 3411 | 3512 | 769 | 1795 | 122 |
| Thodur | 150 | 550 | 272 | 278 | 54 | 188 | 30 |
| Uveri | 123 | 452 | 221 | 231 | 60 | 60 | 0 |
| Vaiyavur | 840 | 3441 | 1733 | 1708 | 349 | 1851 | 42 |
| Valathur | 328 | 1218 | 619 | 599 | 153 | 637 | 0 |
| Vathiyur | 216 | 807 | 413 | 394 | 78 | 1 | 0 |
| Vippedu | 522 | 2079 | 1031 | 1048 | 214 | 974 | 97 |
| **Total** | **83684** | **333101** | **166329** | **166772** | **34194** | **49528** | **2511** |

- The average family size is 3.98
- The male and female population are equal in numbers - 49.93% Vs. 50.06
- The male and female children below 6 years also equal in numbers: 50.79 %Vs 49.21%
- The share of children age below six is 10.27% of the total population
- The Scheduled Caste population is 14.87 %
- The Scheduled tribe population is 0.75%
- The urban population is 73.97%

Source: Census 2011

### 3.12.3 Occupation

The main workers constitute 85.60% of the total workers. They have a regular occupation of more than six months in a year. Only 18.09 % are involved in agriculture due to the urbanization. As per Census classification, 70.70% of workers are “other workers” i.e. labors, industry workers, professionals, govt employees, etc.

**Table 3-25occupation details**

| Name | Total Workers | Main Workers | Marginal Workers | Agriculture Workers | | | | Main | | Marginal | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Main | | Marginal | | | | | |
| | | | | Cultivators | Agri.lanors | Cultivators | Agri.lanors | Household | Others | Household | Others |
| Within 5 Km | | | | | | | | | | | |
| **Kancheepuram Taluk** | | | | | | | | | | | |
| Chitterimedu | 482 | 454 | 28 | 18 | 360 | 6 | 10 | 20 | 56 | 5 | 7 |
| Enadur | 2047 | 1811 | 236 | 59 | 419 | 28 | 72 | 21 | 1312 | 5 | 131 |
| Illuppapattu | 462 | 449 | 13 | 78 | 229 | 3 | 6 | 31 | 111 | 0 | 4 |
| Injambakkam | 347 | 313 | 34 | 55 | 136 | 7 | 8 | 5 | 117 | 0 | 19 |
| Kancheepuram (M) | 61567 | 57110 | 4457 | 320 | 317 | 61 | 79 | 8865 | 47608 | 700 | 3617 |
| Karai | 1008 | 916 | 92 | 303 | 237 | 8 | 18 | 13 | 363 | 10 | 56 |
| Konerikuppam (CT) | 4410 | 3510 | 900 | 31 | 157 | 12 | 43 | 105 | 3217 | 90 | 755 |
| Periyakarambur | 201 | 106 | 95 | 42 | 6 | 4 | 78 | 2 | 56 | 1 | 12 |
| Poondithangal | 46 | 25 | 21 | 1 | 8 | 0 | 16 | 0 | 16 | 0 | 5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sembarambakkam | 537 | 358 | 179 | 209 | 3 | 97 | 5 | 7 | 139 | 5 | 72 |
| Siruvakkam | 1222 | 690 | 532 | 219 | 189 | 27 | 415 | 9 | 273 | 15 | 75 |
| Siruvallur | 536 | 291 | 245 | 17 | 132 | 7 | 175 | 2 | 140 | 4 | 59 |
| Thimmasamudram | 2264 | 1317 | 947 | 94 | 111 | 31 | 126 | 26 | 1086 | 68 | 722 |
| Thulukkanthandalam | 271 | 193 | 78 | 34 | 115 | 7 | 16 | 16 | 28 | 12 | 43 |
| Vedal | 596 | 571 | 25 | 102 | 223 | 3 | 11 | 6 | 240 | 0 | 11 |
| Veliyur | 680 | 491 | 189 | 89 | 155 | 7 | 158 | 3 | 244 | 0 | 24 |
| Vishakandikuppam | 89 | 20 | 69 | 2 | 7 | 1 | 59 | 0 | 11 | 1 | 8 |
| 5 to 10 Km | | | | | | | | | | | |
| **Kancheepuram Taluk** | | | | | | | | | | | |
| Alavandarmedu | 90 | 88 | 2 | 0 | 55 | 0 | 2 | 1 | 32 | 0 | 0 |
| Ariyambakkam | 534 | 391 | 143 | 43 | 42 | 0 | 63 | 17 | 289 | 1 | 79 |
| Attuputhur | 373 | 210 | 163 | 32 | 47 | 0 | 158 | 3 | 128 | 1 | 4 |
| Ayyampettai (CT) | 3016 | 2703 | 313 | 15 | 16 | 3 | 19 | 863 | 1809 | 81 | 210 |
| Govindavadi | 2039 | 1283 | 756 | 172 | 683 | 7 | 643 | 33 | 395 | 26 | 80 |
| Kaliyanur | 1037 | 791 | 246 | 182 | 329 | 12 | 217 | 5 | 275 | 0 | 17 |
| Kallipattu | 15 | 15 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Kamugampallam | 69 | 65 | 4 | 10 | 8 | 0 | 1 | 2 | 45 | 0 | 3 |
| Karur | 305 | 257 | 48 | 130 | 23 | 3 | 20 | 13 | 91 | 5 | 20 |
| Kilambi | 2133 | 1915 | 218 | 169 | 870 | 20 | 74 | 62 | 814 | 19 | 105 |
| Kilkadirpoor | 1975 | 1778 | 197 | 91 | 576 | 5 | 50 | 22 | 1089 | 12 | 130 |
| Kottavakkam | 1083 | 710 | 373 | 221 | 293 | 0 | 179 | 1 | 195 | 3 | 191 |
| Kuram | 1186 | 1033 | 153 | 253 | 443 | 8 | 90 | 20 | 317 | 2 | 53 |
| Kuruvimalai | 829 | 710 | 119 | 29 | 50 | 3 | 6 | 184 | 447 | 18 | 92 |
| Kuthirambakkam | 725 | 721 | 4 | 15 | 498 | 0 | 3 | 6 | 202 | 0 | 1 |
| Mangalpadi | 82 | 77 | 5 | 0 | 17 | 2 | 1 | 0 | 60 | 0 | 2 |
| Maniyachi | 147 | 74 | 73 | 10 | 24 | 1 | 70 | 5 | 35 | 2 | 0 |
| Melambi | 178 | 178 | 0 | 3 | 158 | 0 | 0 | 1 | 16 | 0 | 0 |
| Melkadirpoor | 752 | 725 | 27 | 8 | 543 | 1 | 15 | 14 | 160 | 2 | 9 |
| Mettukuppam | 625 | 575 | 50 | 244 | 181 | 18 | 14 | 54 | 96 | 6 | 12 |
| Moolapattu | 95 | 94 | 1 | 74 | 0 | 0 | 0 | 0 | 20 | 0 | 1 |
| Murukkanthangal | 3 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| Muttavakkam | 559 | 465 | 94 | 113 | 237 | 25 | 64 | 20 | 95 | 1 | 4 |
| Nallur | 316 | 219 | 97 | 13 | 34 | 1 | 29 | 3 | 169 | 2 | 65 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Narapakkam | 649 | 637 | 12 | 58 | 248 | 1 | 7 | 1 | 330 | 0 | 4 |
| Nattapettai (CT) | 8157 | 6553 | 1604 | 41 | 194 | 16 | 259 | 1244 | 5074 | 304 | 1025 |
| Neervalur | 495 | 400 | 95 | 25 | 8 | 4 | 28 | 4 | 363 | 4 | 59 |
| Nelveli | 350 | 52 | 298 | 8 | 3 | 25 | 271 | 1 | 40 | 0 | 2 |
| Nelvoy | 243 | 186 | 57 | 38 | 114 | 1 | 21 | 0 | 34 | 5 | 30 |
| Olaiyur | 521 | 92 | 429 | 10 | 27 | 57 | 320 | 21 | 34 | 11 | 41 |
| Olakkalpattu | 627 | 538 | 89 | 189 | 301 | 13 | 74 | 3 | 45 | 0 | 2 |
| Orikkai (CT) | 4962 | 4049 | 913 | 85 | 167 | 28 | 110 | 311 | 3486 | 53 | 722 |
| Padunelli | 746 | 445 | 301 | 32 | 97 | 1 | 179 | 14 | 302 | 1 | 120 |
| Parandur | 1429 | 1128 | 301 | 377 | 305 | 27 | 161 | 82 | 364 | 10 | 103 |
| Podavur | 217 | 123 | 94 | 30 | 41 | 9 | 51 | 5 | 47 | 5 | 29 |
| Pondavakkam | 140 | 140 | 0 | 113 | 7 | 0 | 0 | 0 | 20 | 0 | 0 |
| Pullambakkam | 377 | 273 | 104 | 47 | 155 | 13 | 83 | 5 | 66 | 1 | 7 |
| Putheri | 180 | 77 | 103 | 2 | 16 | 0 | 96 | 0 | 59 | 3 | 4 |
| Sekkankulam | 423 | 171 | 252 | 3 | 3 | 142 | 46 | 130 | 35 | 59 | 5 |
| Sevilimedu (TP) | 9695 | 8074 | 1621 | 129 | 208 | 24 | 367 | 706 | 7031 | 249 | 981 |
| Sirukaveripakkam (CT) | 3422 | 3048 | 374 | 25 | 158 | 3 | 37 | 138 | 2727 | 11 | 323 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sirunaiperugal | 1144 | 974 | 170 | 281 | 383 | 3 | 88 | 27 | 283 | 3 | 76 |
| Siruvedal | 263 | 228 | 35 | 50 | 53 | 2 | 1 | 9 | 116 | 2 | 30 |
| Sittiyambakkam | 416 | 391 | 25 | 92 | 135 | 4 | 10 | 3 | 161 | 0 | 11 |
| Thandalam | 373 | 333 | 40 | 94 | 140 | 3 | 28 | 1 | 98 | 0 | 9 |
| Thiruppukuzhi | 2953 | 2245 | 708 | 181 | 316 | 28 | 295 | 81 | 1667 | 81 | 304 |
| Thodur | 318 | 207 | 111 | 72 | 47 | 13 | 96 | 0 | 88 | 0 | 2 |
| Uveri | 135 | 91 | 44 | 0 | 3 | 3 | 12 | 3 | 85 | 1 | 28 |
| Vaiyavur | 1594 | 1274 | 320 | 104 | 179 | 9 | 179 | 70 | 921 | 13 | 119 |
| Valathur | 608 | 589 | 19 | 130 | 187 | 1 | 1 | 57 | 215 | 2 | 15 |
| Vathiyur | 496 | 300 | 196 | 147 | 80 | 14 | 171 | 7 | 66 | 0 | 11 |
| Vippedu | 1071 | 909 | 162 | 56 | 401 | 10 | 66 | 36 | 416 | 4 | 82 |
| **Total** | **136935** | **117230** | **19705** | **5919** | **11922** | **872** | **6071** | **13419** | **85970** | **1919** | **10843** |

Source: Census 2011

### 3.12.4 Education

**Literacy**: The literacy rates of the Kancheepuram district have risen considerably since the last decade. Average literacy rate of Kancheepuram in 2011 was 84.49 compared to 76.85 in 2001.Gender-wise; male and female literacy was 89.89 and 79.02 respectively. For 2001 Census, the same figures stood at 84.73 and 68.79 in Kancheepuram district. The literacy rate of the study area is 83.42%. The project area has good number of primary and secondary schools. The following table shows the literacy rate of villages in the impact area.

**Table 3-26 literacy percentage**

| Name | Literates | % |
|---|---|---|
| Name | P_LIT | |
| Within 5 Km | | |
| **Kancheepuram Taluk** | | |
| Chitterimedu | 765 | 72.65 |
| Enadur | 5104 | 84.94 |
| Illuppapattu | 670 | 84.60 |
| Injambakkam | 617 | 70.59 |
| Kancheepuram (M) | 130703 | 88.06 |
| Karai | 1315 | 70.81 |
| Konerikuppam (CT) | 8878 | 87.62 |
| Periyakarambur | 387 | 72.34 |
| Poondithangal | 57 | 59.38 |
| Sembarambakkam | 1037 | 78.38 |
| Siruvakkam | 1319 | 65.52 |
| Siruvallur | 783 | 69.35 |
| Thimmasamudram | 3880 | 85.84 |
| Thulukkanthandalam | 290 | 60.42 |
| Vedal | 825 | 83.59 |
| Veliyur | 872 | 70.89 |
| Vishakandikuppam | 153 | 73.56 |
| 5 to 10 Km | | |
| **Kancheepuram Taluk** | | |
| Alavandarmedu | 107 | 76.98 |
| Ariyambakkam | 643 | 82.97 |
| Attuputhur | 554 | 66.51 |
| Ayyampettai (CT) | 4780 | 80.27 |
| Govindavadi | 2760 | 75.70 |
| Kaliyanur | 1156 | 72.93 |
| Kallipattu | 17 | 70.83 |
| Kamugampallam | 127 | 68.28 |
| Karur | 600 | 75.95 |
| Kilambi | 2903 | 70.29 |
| Kilkadirpoor | 2854 | 74.87 |
| Kottavakkam | 1042 | 66.41 |
| Kuram | 1332 | 68.77 |

| | | |
|---|---|---|
| Kuruvimalai | 886 | 66.37 |
| Kuthirambakkam | 797 | 68.06 |
| Mangalpadi | 38 | 32.48 |
| Maniyachi | 149 | 70.28 |
| Melambi | 207 | 66.13 |
| Melkadirpoor | 838 | 71.20 |
| Mettukuppam | 609 | 68.35 |
| Moolapattu | 96 | 61.15 |
| Murukkanthangal | 3 | 75.00 |
| Muttavakkam | 675 | 75.67 |
| Nallur | 547 | 84.81 |
| Narapakkam | 955 | 80.80 |
| Nattapettai (CT) | 14284 | 80.42 |
| Neervalur | 499 | 83.58 |
| Nelveli | 403 | 69.60 |
| Nelvoy | 339 | 79.95 |
| Olaiyur | 602 | 72.01 |
| Olakkalpattu | 686 | 75.55 |
| Orikkai (CT) | 9482 | 83.69 |
| Padunelli | 938 | 70.95 |
| Parandur | 1505 | 66.01 |
| Podavur | 288 | 67.45 |
| Pondavakkam | 191 | 69.45 |
| Pullambakkam | 417 | 65.67 |
| Putheri | 204 | 79.07 |
| Sekkankulam | 440 | 75.73 |
| Sevilimedu (TP) | 18474 | 87.64 |
| Sirukaveripakkam (CT) | 5091 | 71.81 |
| Sirunaiperugal | 1171 | 64.98 |
| Siruvedal | 400 | 74.21 |
| Sittiyambakkam | 601 | 89.04 |
| Thandalam | 419 | 73.38 |
| Thiruppukuzhi | 4883 | 79.35 |
| Thodur | 330 | 66.53 |
| Uveri | 280 | 71.43 |
| Vaiyavur | 2368 | 76.58 |
| Valathur | 750 | 70.42 |
| Vathiyur | 610 | 83.68 |
| Vippedu | 1373 | 73.62 |
| **Total** | **249358** | **83.42** |

Source: Census 2011

Completion Rate shows the students completing their class, neither dropping out nor repeating the academic year. The Completion Rate (CR) has remained consistently above 99% in the district in almost all blocks at primary level.

**Table 3-27Completion and dropout rates in study area**

| S. No | District/Block | Completion Rate in % (2013-14 ) | Dropout Rate in%2013-14 ) |
|---|---|---|---|
| 1 | Kancheepuram district | 99.38 | 0.38 |
| 2 | Kancheepuram Block | 98.95 | 0.84 |

Source: SSA, Kancheepuram

The flowing table shows the available primary and high schools in the Kancheepuram Block.

**Table3-28 Primary and high schools in study area**

| S.No | Category | Nos |
|---|---|---|
| 1 | Primary Only | 104 |
| 2 | Pri with Up Pri | 47 |
| 3 | Pri With UP and Sc and Higher Sec | 13 |
| 4 | U Primary Only | 1 |
| 5 | UP with Sec and Higher Sec | 17 |
| 6 | Pri with U Pri and Sec | 11 |
| 7 | UP with Sec | 15 |

Source: DISE 2016-17

### 3.12.5 Health

The area has good private and public health services. Also the area is well connected to nearby urban locations. The following table shows the available facility in the study area.

**Table 3-29Types of Hospitals**

| S.No | Area | Type of Hospital |
|---|---|---|
| 1 | Kancheepuram | Govt.Hqrs Hospitals |
| 2 | Thiruppukuzhi | CHC |
| 3 | Kooram | Addl. PHC |
| 4 | Ayyampettai | Addl. PHC |
| 5 | Parandur | Main PHC |

### 3.12.6 Project area Socio Economic Indicators

Summary of socioeconomic indicators within the study area is given in **Table 3-30.**

**Table 3-30 Summary of socioeconomic indicators in study area**

| S.No | Particulars | Study Area |
|---|---|---|
| 1 | Number of villages in the Study Area | 69 |
| 2 | Total Households | 83684 |
| 3 | Total Population | 333101 |
| 4 | Children Population (<6 Years Old) | 34194 |
| 5 | SC Population | 49528 |
| 6 | ST Population | 2511 |
| 7 | Total Working Population | 136935 |
| 8 | Main Workers | 117230 |
| 9 | Marginal Workers | 19705 |
| 10 | Agricultural Workers | 24784 |
| 11 | Household Industries | 15338 |
| 12 | Other Workers | 96813 |
| 13 | Literates | 249358 |

**Source: Census 2011**

# CHAPTER – 4

# ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

# 4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

## 4.1 Introduction

Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers. By using EIA both environmental and economic benefits can be achieved, such as reduced cost and time of project implementation and design, avoided treatment/clean-up costs and impacts of laws and regulations. The main purpose of identifying the impacts is that it helps in adopting appropriate mitigation measures for the adverse consequences if any. The impacts on the environmental indices viz. air, water, soil, noise, biological and socioeconomic conditions are scrutinized methodically and assessed.

The most likely impacts on the environment due to the proposed project need to be appraised during the operation phase. The particulars on impacts that could be triggered on the environmental attributes by the activities of the proposed project are discussed below.

## 4.2 Construction Phase

Since, it is an expansion project for enhancement of Camphor production and its derivatives and increase in total land area at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, KancheepuramTaluk, Tamil Nadu– 631552.

Impact assessment during the construction phase of the project is of importance as the construction activities lead to adverse effects on the environment on a short term basis. The major activities that are undertaken during this phase are civil works, mechanical works, machinery works and transportation works.

During the construction phase, the following activities among many are considered to be important towards creating environmental impacts:

- Site preparation (fencing, boundary & clearing of site).
- Excavation, backfilling and leveling
- Hauling and dumping of earth materials & construction spoils.
- Foundation works.
- Fabrication erection of Steel structures such as, Tanks, Pipelines and Sheds.
- Construction of internal roads drains & water supply.
- Painting and finishing.
- Cleaning, landscaping and plantations.

### 4.2.1 Land Environment

**Impacts**

Since it is an expansion project and will be implemented within the Kanchi Karpooram Ltd premises, there is no additional land to be acquired for the proposed project. The proposed expansion project will be done in 13269.24 sq. Meters of land area, which is identified as appropriate location based on environmental and engineering requirements. The activities carried out during the construction phase will involve a change in the land use from vacant industrial land to a built up industrial land, which will pose the following impacts on the land environment.

1. Compaction of soil and a change in the soil structure due to the use of heavy construction vehicles and machineries.
2. Removal of soil from the site.
3. Mixing of the topsoil and subsoil.
4. Dispersion of dust.

**Mitigation Measures**

1. Employing techniques such as restricting access during wet conditions, using protective boarding and low ground pressure machineries to minimize compaction of soil.
2. The removed soil will be properly stored for subsequent reinstatement.
3. Reuse of excess excavated material for road development, green belt development and landscaping.
4. A well designed closed depository for storage of construction materials to prevent land/soil pollution.
5. Effective stabilization of altered landforms to minimize soil erosion and the potential for water pollution (e.g. Vegetation).
6. Reuse of construction wastes such as sand, brick, gravel, cement for developing internal road and project structures.

### 4.2.2 Air Environment

In order to predict the impact of constructional and operational activities on the ambient air quality, the data on emission, micrometeorology and from Indian meteorological department (IMD) were collected. All these data will be used to predict ground level concentration of (GLCs) of $SO_2$, $NO_X$ and $PM_{10}$ for different temporal variations.

In the construction phase, activities like site clearance, site leveling, movements of workers and material, construction of road, transportation activities will generate dust, gaseous pollutants and particulate matter and affect the air quality, other impacts include -

1. Site Preparation-fencing, boundary and clearing of site will cause disturbance to the surroundings.
2. Excavation, backfilling and leveling.
3. Hauling and dumping of earth materials and construction spoils.
4. Foundation works can cause dust generation which will decrease the air quality and it can impact the labors working.
5. Fabrication, erection of steel structures such as tanks, pipelines and sheds.
6. Construction of internal roads drains and water supply.
7. Cleaning and landscaping.
8. Emission from Construction DG & Construction Equipments.

**Mitigation Measures**

1. Barricading the construction area and minimizing exposed areas to reduce dust generation.
2. Areas generating dust during dry weather will be sprayed with water.
3. Creation of vegetation screens to act as a barrier to dust.
4. Appropriate enclosed areas for storage of construction materials.
5. Facilitating the workers with the required personal protective equipments.
6. Efficient usage and maintenance of equipments/machineries to lower air emissions, noise pollution and consumption of energy resource.
7. Exhaust vent of DG set will be provided with adequate stack height to ensure quick dispersal of gaseous emissions.
8. Periodic monitoring and maintenance of transport vehicles to check on the quality of emission to be within permissible limits and consumption of fuel.
9. Regular inspection of construction site to ensure timely removal and disposal of construction debris to the dumping sites or for recycle/reuse.

### 4.2.3 Water Environment

**Impacts**

1. Contamination of watercourses by leakage from fuel and materials storage areas.
2. Oil and suspended solids in run-off from vehicles and access roads.
3. Use of heavy machineries and vehicles causes compaction of topsoil due to which a change in the surface water drainage pattern may occur.
4. Generation of sewage / process effluent and blow down.

**Mitigation measures**

1. The water demand during the construction phase will be met through borewell within the premisis.
2. Impenetrable lining will be provided to storage premises to avoid accidental mixing or fugitive losses.
3. Storehouse will be located at a distance away from the water storage area to prevent accidental release or spillage.
4. Proper management of rain water run-off during monsoon and creating bunds to utilize the rain water for construction purpose.
5. An appropriate water management system will be implemented.

### 4.2.4 Noise Environment

**Impacts**

During construction phase, the noise will mostly be produced because of building activities and machineries used for carrying out construction. Construction activities mainly involve diesel generators, laying of foundation, erection of superstructure, clearing of obstruction and trees if any from the proposed area. Activities such as construction of labor camps, onsite office, pneumatic hammers, compressors, concrete mixers, construction material plants however does not cause significant noise pollution but if the work continuous for longer duration, it can affect the health of local people and workers involved in the project work.

**Mitigation Measures**

1. Barricading the construction site.
2. The green belt will help in reducing the noise nuisance.
3. Selection of equipments of high quality.
4. Proper planning and organizing of construction activities which will help in avoiding loud verbal exchanges between the intervening parties.
5. Transportation activities will be carried out only during the day and only in case of emergency, the transportation activities will be permitted in night time.
6. The vehicles used for construction activities and transportation of materials will be provided with the horn of low noise level as recommended by RTO/ concerned authorities.
7. Minimization of operation time of noisy equipment and operation of machineries/equipment that generate high levels of noise only during day time.
8. Inadequate use of plant and equipment, namely, running on full power when the work does not necessitate it will be avoided.
9. Personal protective equipments, education and public awareness and exposure control through rotation of work will be provided to the workers engaged in construction activities in the area generating high levels of noise.

### 4.2.5 Waste Generation

The source of waste are metal pieces, cardboards, wooden scrap, sand gravels etc., generation of chemical waste by general site practices (e.g. vehicle and plant maintenance/servicing), municipal waste generated by site workers.

**Mitigation measures**

1. Recycling/reusing/recovering materials where possible and thereby neglecting or reducing the disposal requirements.
2. Separation of construction material for reuses either to be used on onsite filling or can be used as public fill.
3. Training the staff in waste minimizing practices.
4. Chemical waste should be stored in a locked area so as to avoid leaching of harmful chemicals in the soil or nearby water bodies (If any).

### 4.2.6 Ecology

The proposed expansion project is within the existing facility for enhacement of Camphor and its derivatives production capacity and crease in total land area; hence no impacts have been expected to arise on the biological environment. Except for the removal of weeds, the ecological status of the site will be well maintained by conserving/developing the greenbelt at the site.‘

### 4.2.7 Social Environment

Predicting socio-economic impacts can be best done by planned survey accompanied with questionnaire from the local public. Such a survey will help in knowing the response of people about the expansion project. The proposed expansion project has a positive impact

by providing employment to about 140 people in the area improving the standard of living and quality of life.

## 4.3 Operation phase

From an environmental perspective, this phase is of paramount significance due to its potential to invoke long-term impacts. The adverse effects that are likely to occur during this operational phase of the project are: Air Pollution (gaseous emissions), Effluent generation, Noise generation, Solid waste generation etc.

### 4.3.1 Land environment

The project site area is allotted for industrial use GOs (GO. No 526, 704& Lt No.998/2017) obtained from Govt. of Tamil Nadu is enclosed as **Annexure-2**. Newly acquired land for proposed expansion is categorized as a patta land& applied for land conversion from concern departments. Existing & Proposed Land ownership document are enclosed as **Annexure-1**& **Annexure-1A** respectively**.** Since it is expansion of production capacity along with addition of 3.28 Acres land adjacent to existing facility with few additional of infrastructure facilities hence there will be no change in land use pattern and no impact due to location.

#### 4.3.1.1 Discharges on land impact

The sewage generated in existing is beingsent to septic tank, 10KLD of STP is proposed for proposed expansion project. Treated domestic wastewater will be used for Green Belt with the facility. 20 KLD capacity of ETP is facilitated within the existing facility for treatment of wastewater and treated water is being used for Cooling tower makeup, area washings and fire hydrant storage tank make up. Hence there will be no discharges on land premises.

**Mitigation Measures**

1. Periodic maintenance and check of wastewater conveyance pipelines
2. Attempt to restore by replacing a part or putting together the torn or broken parts of the conveyance pipeline in case of any leakage is detected.
3. Necessary preventive measures for spillage from pipelines, such as surface RCC channels along the pipelines are adopted.
4. Treated wastewater quality shall be ensured as per standards before using it for various requirements.

### 4.3.2 Impacts – soil contamination

Potential impacts on land environment are envisaged due to hazardous and non-hazardous wastes generated due to various operations in the project site. ETP Sludge, Diesel waste oil, waste furnace etc are the source of hazardous waste/non hazardous wastes is generated. Poor management of such materials/wastes from the operations is a potential risk of soil contamination.

#### 4.3.2.1 Soil – mitigation measures

Good housekeeping and best practices of waste handling shall be adopted to eliminate/minimize the risks of soil contamination. Hazardous waste generated due to the proposed activity is sludge from wastewater treatment plant and wastes like oil and grease from machinery which will be disposed off after proper treatment as per hazardous waste (management and handling) Amendment rule 2000. The wastes generated will be stored in temporary storage facility and transferred to nearby Treatment, Storage and Disposal Facility (TSDF) and also to the approved vendors of Tamil Nadu State Pollution Control Board (TNPCB) landfill and Co-processing. However, waste minimization techniques will be adopted in order to minimize the generation of wastes.

### 4.3.3 Air environment

Base line data reveals that ambient air quality in the study area for the Parameters $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$, CO, Pb, $O_3$ , $NH_3$ , $C_6H_6$, $C_{20}$ $H_{12}$, As, Ni are well within the permissible Limits as prescribed by the National Ambient Air Quality Standards (NAAQS) for Industrial Area, Residential, Rural & Other areas.

The major air pollution sources from the industry are DG sets, boilers and reactors. The DG set and boiler sources are provided with stacks of adequate height so as to disperse the emanating flue gases containing suspended particulate matters, oxides of sulphur and nitrogen without affecting the ground level concentrations. The emissions generated from DG sets and boiler.

#### 4.3.3.1 Meteorological data

The site specific meteorological data for three months from July 2018 to Sept 2018 was collected and processed in AERMET to plot wind rose diagram (**Figure-4.1**). Other data included for AERMET were daily wind speed, wind direction, temperature, relative humidity, air pressure, precipitation, and solar radiation recorded during the period. AERMET reformats meteorological data so that it can be used as input for AERMOD model.

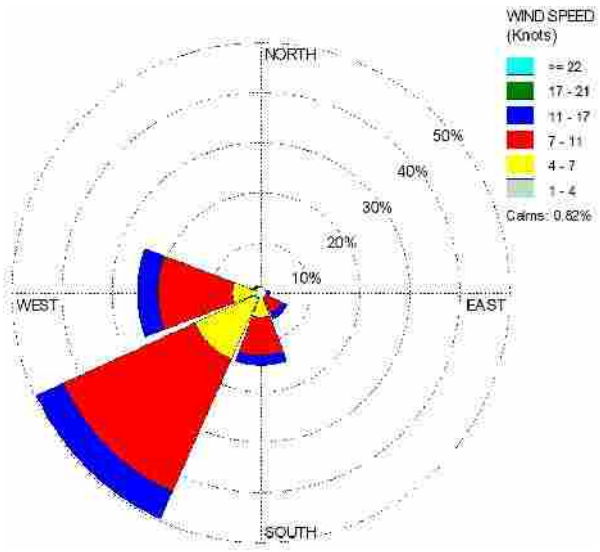



**Figure 4-1 Wind rose diagram considered for Dispersion Modeling (July to September 2018)**

### 4.3.3.2 AERMET Process

For the 3 phase AERMET processing of the meteorological data, specifications of the land use in the area are required to determine the terrain roughness for modeling. The land use was characterized for in and around the site. The surface characteristics for the site and surroundings were selected and used to calculate the Albedo, Bowen ratio and surface roughness parameter.

The meteorological data were processed in the AERMET software to generate wind flow pattern & to generate surface meteorological data and profile meteorological data in a prescribed format that can be fed to AERMOD for modeling.

### 4.3.3.3 AERMOD Process

AERMOD Software Version 8.0.5 was used for air dispersion modeling and is applicable to a wide range of buoyant or neutrally buoyant emissions up to a range of 50 km. In addition to more straight forward cases, AERMOD is also suitable for complex terrain and urban dispersion scenarios.

AERMOD is a steady-state plume model. In the stable boundary layer (SBL), it assumes the concentration distribution to be Gaussian in both the vertical and horizontal. In the convective boundary layer (CBL), the horizontal distribution is also assumed to be Gaussian, but the vertical distribution is described with a bi-Gaussian probability density function (pdf). This behavior of the concentration distributions in the CBL was demonstrated by Willis and Deardorff (1981) and Briggs (1993). Additionally, in the CBL, AERMOD treats "plume lofting," whereby a portion of plume mass, released from a buoyant source, rises to and remains near the top of the boundary layer before becoming mixed into the CBL. AERMOD also tracks any plume mass that penetrates into the elevated stable layer, and then allows it to re-enter the boundary layer when and if appropriate. For sources in both the CBL and the SBL, AERMOD treats the enhancement of lateral dispersion resulting from plume meander. The emissions from existing and proposed stacks are estimated and these stack emissions are used for the air dispersion modelling as shown in **Table 4.1 & Table 4.2.**

Maximum incremental value for $SO_2$, NOx and PM during daytime is shown in **Figures 4-2-4-4** and Ground Level Concentration (GLC) for existing and proposed stacks is given in **Table 4-3 & 4-4** respectively.

**Table 4-1 Existing Stack Emission details**

| Source | Fuel used | Stack Details | | | | | Emission per stack (g/s) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | No of Stack | Height (m) AGL | Dia. (m) | Temp (°C) | Exit Velocity (m/s) | PM | $SO_2$ | NOx |
| 1 x 250 KVA DG | Diesel | 1 | 12 | 0.3 | 380 | 6.1 | 3.85E-05 | 3.59E-03 | 5.44E-02 |
| 1 x 180 KVA DG | Diesel | 1 | 7.5 | 0.3 | 340 | 6.1 | 2.77E-05 | 2.58E-03 | 3.92E-02 |
| 1.74 MW/Hr TFH | Fire Wood/ FO for ignition | 1 | 30 | 0.5 | 160 | 9 | 0.194 | 0.093 | 0.270 |
| | | | | | | **Total Emission (g/s)** | **1.17E-01** | **6.22E-02** | **2.56E-01** |

Note: Existing 250 kVA DG will be replaced with 380 kVA DG after expansion& Existing 1x1 T/hr Stream Boiler is not in use &will be removed during expansion, So, Emissions are not considered for modeling.

**Table 4-2Proposed Stack Emission details**

| Source | Fuel used | Stack Details | | | | | Emission per stack (g/s) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | No of Stack | Height (m) AGL | Dia. (m) | Temp (°C) | Exit Velocity (m/s) | PM | $SO_2$ | NOx |
| 1 x 380 kVA DG | Diesel | 1 | 12 | 0.3 | 410 | 8 | 5.85E-05 | 5.45E-03 | 8.27E-02 |
| 1 x 4.65 MW/Hr TFH | Fire Wood/ FO for ignition | 1 | 30 | 0.5 | 160 | 9 | 0.194 | 0.093 | 0.270 |
| | | | | | | **Total Emission (g/s)** | **0.0606** | **0.0497** | **0.0848** |

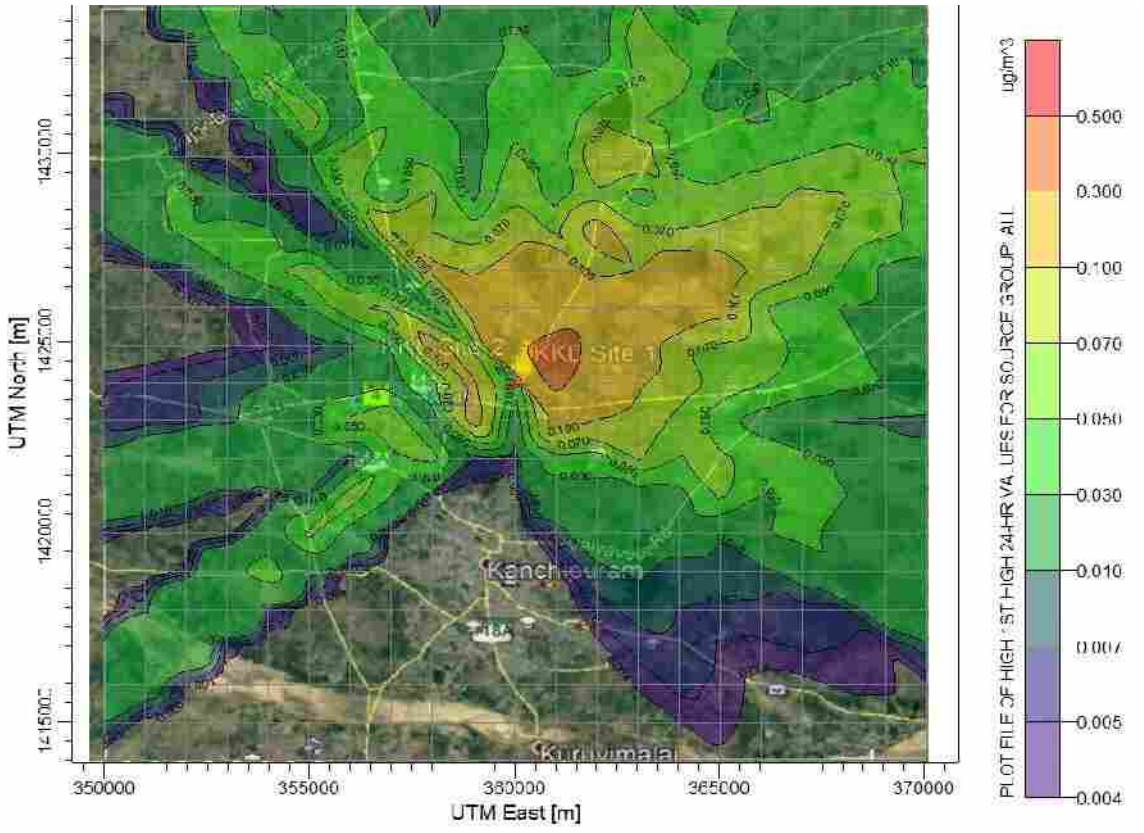



**Figure 4-2Predicted 24 hrs GLC's of PM within 10 km radius of the Study area**

**Table 4-3Predicted Top 10 Highest Concentration of Particulate Matter**

| S.NO | UTM coordinates (m) | | Conc. (µg/m³) | Distance from Centre of Sources (Km) | Direction from Source Centre |
|---|---|---|---|---|---|
| | E | N | | | |
| 1 | 361011.8 | 1424927 | 0.40966 | 1.5 | NE |
| 2 | 361011.8 | 1423932 | 0.37529 | 1 | E |
| 3 | 360008.1 | 1424927 | 0.25591 | 1 | N |
| 4 | 362015.4 | 1424927 | 0.24078 | 2.3 | ENE |
| 5 | 363019.1 | 1425922 | 0.20638 | 3.5 | ENE |
| 6 | 360008.1 | 1425922 | 0.16726 | 2 | N |
| 7 | 362015.4 | 1425922 | 0.16711 | 2.8 | NE |
| 8 | 361011.8 | 1426918 | 0.15645 | 3.3 | N |
| 9 | 364022.7 | 1425922 | 0.15353 | 4.5 | ENE |
| 10 | 362015.4 | 1423932 | 0.13448 | 2 | E |

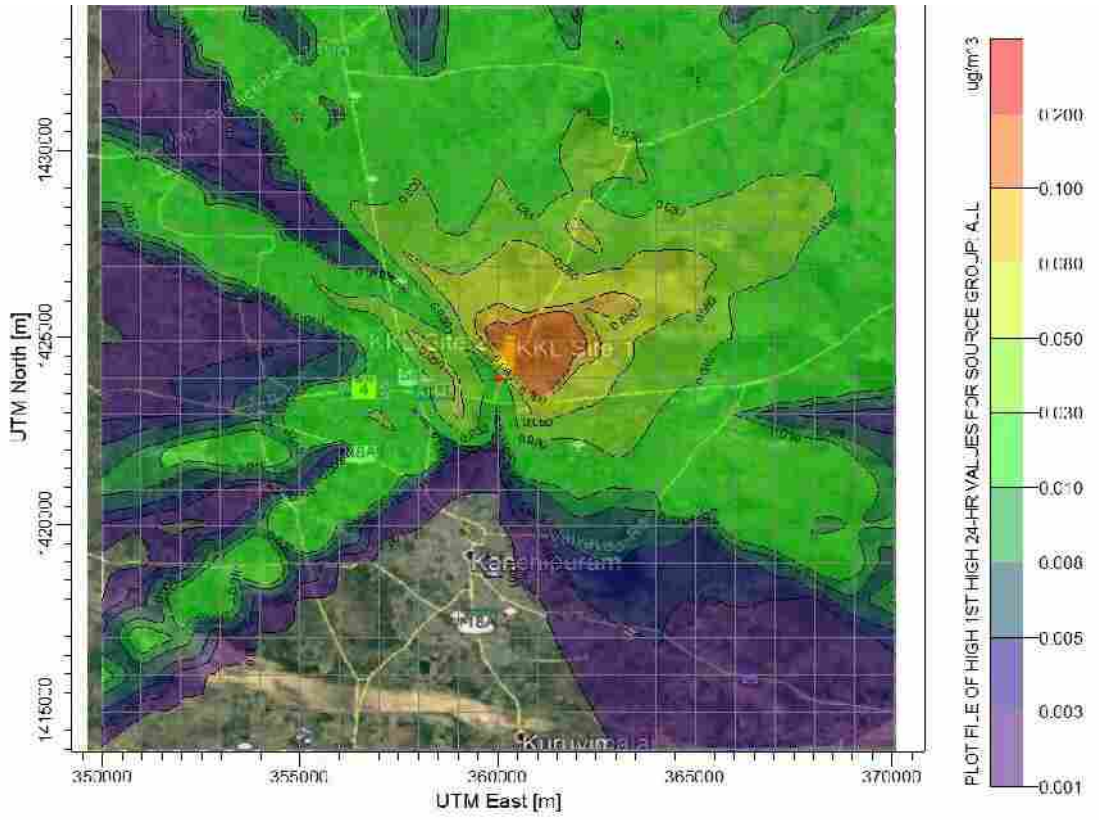



**Figure 4-3Predicted 24 hrs GLC's of $SO_2$ within 10 km radius of the Study area**

**Table 4-4Predicted Top 10 Highest Concentration of Sulfur Dioxide**

| S.NO | UTM coordinates (m) | | Conc. ($\mu g/m^3$) | Distance from Centre of Sources (Km) | Direction from Source Centre |
|---|---|---|---|---|---|
| | E | N | | | |
| 1 | 361011.8 | 1424927 | 0.19638 | 1.5 | NE |
| 2 | 361011.8 | 1423932 | 0.17991 | 1 | E |
| 3 | 360008.1 | 1424927 | 0.12268 | 1 | N |
| 4 | 362015.4 | 1424927 | 0.11542 | 2.3 | ENE |
| 5 | 363019.1 | 1425922 | 0.09893 | 3.5 | ENE |
| 6 | 360008.1 | 1425922 | 0.08018 | 2 | N |
| 7 | 362015.4 | 1425922 | 0.08011 | 2.8 | NE |
| 8 | 361011.8 | 1426918 | 0.075 | 3.3 | N |
| 9 | 364022.7 | 1425922 | 0.0736 | 4.5 | ENE |
| 10 | 362015.4 | 1423932 | 0.06447 | 2 | E |

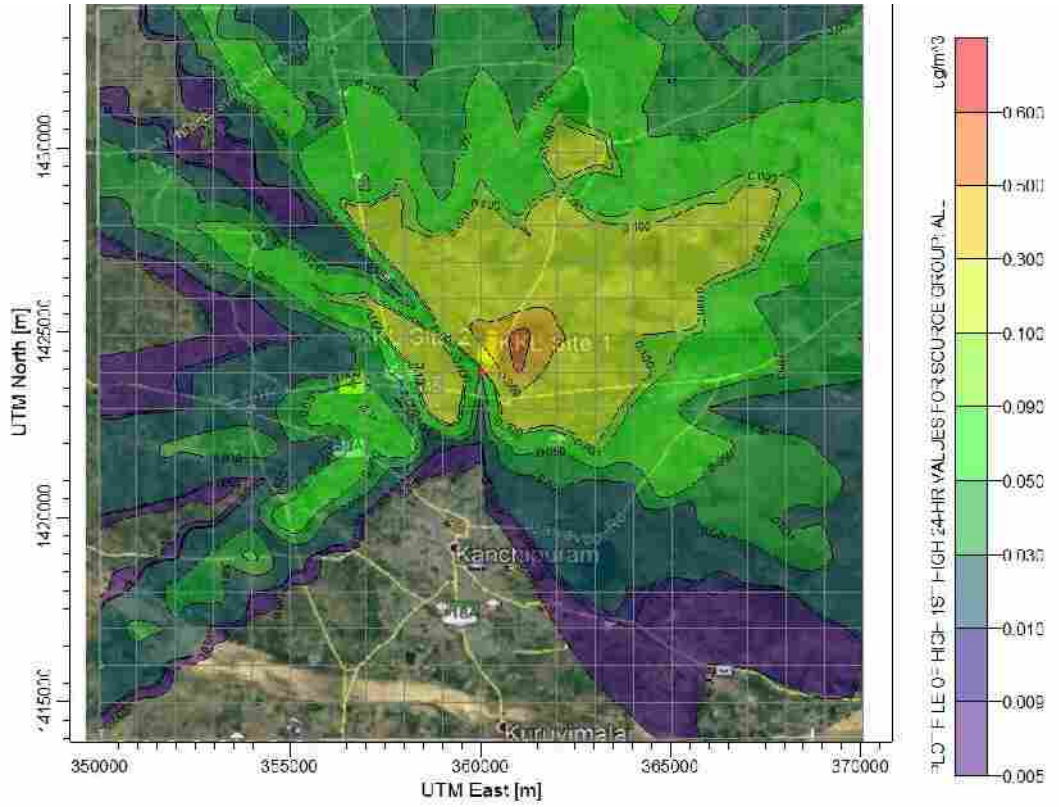



**Figure 4-4Predicted 24-Hrs' GLC's of NOx within 10 km Radius of the Study Area**

**Table 4-5Predicted Top 10 Highest Concentration of Nitrogen Oxide**

| S.NO | UTM coordinates (m) | | Conc. (µg/m³) | Distance from Centre of Sources (Km) | Direction from Source Centre |
|---|---|---|---|---|---|
| | E | N | | | |
| 1 | 361011.8 | 1424927 | 0.57015 | | NE |
| 2 | 361011.8 | 1423932 | 0.52231 | 1 | E |
| 3 | 360008.1 | 1424927 | 0.35616 | 1 | N |
| 4 | 362015.4 | 1424927 | 0.3351 | 2.3 | ENE |
| 5 | 363019.1 | 1425922 | 0.28722 | 3.5 | ENE |
| 6 | 360008.1 | 1425922 | 0.23278 | 2 | N |
| 7 | 362015.4 | 1425922 | 0.23258 | 2.8 | NE |
| 8 | 361011.8 | 1426918 | 0.21774 | 3.3 | N |
| 9 | 364022.7 | 1425922 | 0.21367 | 4.5 | ENE |
| 10 | 362015.4 | 1423932 | 0.18716 | 2 | E |

### 4.3.3.4 Conclusion

It was observed that the maximum concentration observed due to proposed expansion for PM, $SO_2$ and NOx are 0.4096 µg/m$^3$, 0.1964 µg/m$^3$ and 0.5701µg/m$^3$. So it can be concluded that even after the expansion of the plant the impact envisaged is minimum. The total increase in concentrations above baseline status to estimate the percentage increase and summarized in**Table 4-6.**

**Table 4-6Total Maximum GLCs from the proposed Stack Emissions**

| Pollutant | Maximum Base line Conc. (µg/m³) | predicted Conc. at source (µg/m³) | Total Conc. (µg/m³) | NAAQ standard | % Contribution in Existing Concentration Levels |
|---|---|---|---|---|---|
| PM | 71.2 | 0.4096 | 71.6096 | 100 | 0.57 |
| $SO_2$ | 18.2 | 0.1964 | 18.3964 | 80 | 1.08 |
| NOx | 33.6 | 0.5701 | 34.1701 | 80 | 1.70 |

### 4.3.3.5 Mitigation measures

1. Ambient air quality monitoring will be carried out regularly at selected locations in order to check and compare the predicted concentrations with the measured concentrations. NAAQS exceedance if any may be checked thoroughly and adequacy/Performance of Air Pollution Control measures shall be reviewed.
2. Water sprinkling shall be carried out on road surfaces in the project area where ever necessary.
3. Adequate Greenbelt width is available however additional greenbelt to be provided as per space availability.
4. Trucks with cargo susceptible for fugitive suspension will be covered with tarpaulin.
5. All the vehicles will be periodically checked to ensure compliance to the emission standards.
6. EMC will ensure that unit will be with essential pollution control measures as to be stated by TNPCB. Air Pollution Control Measures for existing and proposed are given in
7. **Table** 4-7 & Fugitive &Noise Emission control measures are shown in **Table 4-8.**

**Table 4-7 Air Pollution Control Measures (Existing and Proposed Expansion)**

| S. No | Details | Capacity | | | APC | Stack Height in meters (AGL) | Gaseous Discharge ($Nm^3/Hr$) |
|---|---|---|---|---|---|---|---|
| | | Existing | Proposed | After expansion | | | |
| 1 | DG Power Back up(kVA) | 1 No x250* | 1 No x380 | 1 No x380 | Stack | 12 | 2239 |
| | | 1 No x180 | - | 1 No x180 | Stack | 7.5 | 1707 |
| 2 | Steam Boiler (Not in Use) T/Hr | 1 No x1* | - | - | Stack | 20 | 6997 |
| 3 | TFH (Wood Fire Heater)MW/hr | 1 No x1.74 | 1 No x4.65 | 1 No x1.74 | Stack with Dust collector | 30 | 1669** |
| | | | | 1 No x4.65 | | | 18000 |

Note: 1.*Steam Boiler (Not in Use) will be discarded during expansion
2. *1 x250(Not in Use) will be removed during expansion
3. Each TFH will have individual dust collector and common stack
4. Existing 4 (Nos) stacks are available, after expansion it will be reduced to 3 (Nos) stacks
5. ** 1(No) TFH will be operational & remaining 1 (No) TFH will be standby

**Table 4-8Fugitive & Noise Emission control measures**

| S. No. | Fugitive or Noise Emission Sources | Type of Emission | Existing | Proposed | After expansion | Control measures Proposed | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | Reactors | Acid fumes/ VOC | 11 | 10 | 21 | Individual condenser | It' is a closed loop system |
| 2 | Distillation columns | Acid fumes/ VOC | 5 | 3 | 6 | Individual condenser | -- |
| 3 | DG 1(kVA) | Noise | 1 x 250* | 1 x 380 | 1 x 380 | Acoustic enclosures | -- |
| 4 | DG 2 (kVA) | Noise | 1 x 180 | - | 1 x 180 | Acoustic enclosures | -- |

### 4.3.4 Impacts due to Traffic and Transportation

The vehicular movement for the proposed project is given in **Table 4-9.**

**Table 4-9 Existing & Proposed Vehicular movement per hour**

| S. No | Type of Vehicle | Existing vehicles trips/ hr | Existing PCU | Proposed vehicles trips/ hr | Proposed PCU | Total Vehicles after project implementation | PCU Factors IRC (SP 41) | Total PCU after project implementation |
|---|---|---|---|---|---|---|---|---|
| 1 | Cars | 10 | 10 | 5 | 5 | 15 | 1 | 15 |
| 2 | 2 wheelers | 30 | 15 | 10 | 5 | 40 | 0.5 | 20 |
| 3 | 3 Wheeler | 40 | 32 | 5 | 4 | 45 | 0.8 | 36 |
| 4 | Truck / Lorry | 30 | 105 | 5 | 17.5 | 35 | 3.5 | 122.5 |
| **Total** | | **110** | **162** | **25** | **31.5** | **135** | **5.8** | **193.5** |

Based on the traffic for the proposed project, the expected LOS due to the project is given in **Table 4-10.**

**Table 4-10 Traffic Volume after Implementation of the Project**

| For the Road | Volume of Traffic | Total PCU/hr | LOS Category* | Traffic Classification |
|---|---|---|---|---|
| Existing | 110 | 162 | A | Free Traffic Flow |
| Proposed | 25 | 31.5 | A | Free Traffic Flow |
| **Total** | **135** | **193.5** | **A** | **Free Traffic Flow** |

*LOS categories are A-Free Flow, B- Reasonably Free Flow, C-Stable Flow, D-Approaching unstable flow, E- Unstable flow, F- Forced or breakdown flow

Due to propose project there will be slight increment in the vehicle movement but the level of service (LOS) anticipated will be Free Flow.

### 4.3.5 Noise environment

#### 4.3.5.1 Impact

The noise generated during the operational phase can be divided into two categories

1. Stationary source due to heavy duty machineries at the project site such as compressors, DG sets, pumps etc.
2. Mobile source corresponding to mainly vehicular traffic for staff mobilization, materials, material transportation, liquid fuel transportation to project site, etc.

Vibrations are expected to be generated by various activities associated with the proposed project during operational phase. The impact of vibrations beyond the site would be negligible during normal operation phase. However, the impacts on workers engaged in the plant area would be considerable due to occupational exposure. The proposed fixed major equipment/units such as compressors, pumps, DG sets etc., also generate vibrations during operational phase and may cause exposures to the workers/operators engaged at these units.

#### 4.3.5.2 Mitigation measure

1. The major noise generating equipment like Compressors, DG sets, pumps etc. will be enclosed in an acoustic enclosure designed for an insertion loss of 25 dB (A) and silencers to other equipment etc.
2. Major noise generating equipment will be designed with 85 dB (A) ensuring that the noise levels remains at 85 dB (A) within 1.0m from the generating source.
3. The occupational noise exposure to the workers in the form of eight hourly times weighted average will be maintained well within the prescribed Occupational Safety and Health Administration (OSHA) standard limits.
4. Adequate PPE will be provided to the staff exposing to noise risks.
5. Acoustic silencers will be provided in equipment wherever necessary.
6. Acoustic design with sound proof glass paneling will be provided for critical operator cabins / control rooms of individual modules as well as central control facilities.
7. Use of personal protective equipments/devices such as ear-muffs, ear plugs etc. will be strictly enforced for the workers engaged in high noise areas.

8. Periodic maintenance of the equipment to be used in the developmental works will be carried out. Worn out parts will be replaced and rotating parts will be lubricated to minimize noise emissions.
9. Implementation of greenbelt for noise attenuation will be undertaken: shrub plantation; landscaping with horticulture; and Tree plantation at vehicle parking areas and along approach roads.
10. Ambient noise levels will be monitored at regular intervals during operational phase of the project.
11. Vibration generating sources and their platforms should be maintained properly to minimize vibrations and related impacts.

### 4.3.6 Water environment

#### 4.3.6.1 Potential impact due to location

#### 4.3.6.2 Impact on existing water resource

Water requirement of existing unit will be mainly for saponification washings, cooling water, domestic use& green belt etc.The total water requirement for the existing unit is 28.1 KLD, of which 21.2 KLD is fresh water and 6.9 KLD is treated water. The water requirement is met through Bore wells located within the Plant premises.

Sewage (9.0KLD) is generated from domestic use, disposed through septic tank followed by soakpit. An effluent is generated from saponification washings (6.5KLD) and cooling tower blowdown (1.0KLD). The wastewater from saponification washings is being used for Green Belt. Cooling Tower blowdown is treated in dedicated ETP, treated water used for utilities. Hence no adverse impacts due to existing facility on water environment.

#### 4.3.6.3 Impact on proposed expansion

The total water requirement for the proposed is 96 KLD, of which 77.5 KLD is fresh water (Direct use 19 KLD, reuse 22.5 KLD and pretreated water 36KLD) and 18.5 KLD is treated water. The water requirement for construction phase will be 50 KLD. The total water requirement is met through Bore wells (3Nos) located within the Plant premises. NOC is obtained from Water resource Department Tamil Nadu for abstraction of Ground Water is enclosed as **Annexure-20.**

Industrial wastewater generation from saponification washings (9.5 KLD) &Cooling Tower (2.0KLD) blow down; it will be treated in existing ETP. ZLD Concept will be proposed for expansion. Treated water will be used for Cooling Tower makeup, floor washings and firewater storage tank makeup.

Domestic effluent will be treated in proposed 10KLD of packed STP. Treated domestic wastewater will be used for Green Belt. Treated wastewater is being recycled within the facility.Hence no adverse impact due to the proposed project on water environment

#### 4.3.6.4 Impacts on surface water bodies

The surface water and groundwater are the life line of the villages. All the ponds in the area are working as recharge sites for the under lying groundwater and hence the surface water

and ground water systems are acting like a single unit and therefore cannot be seen in Isolation.

Any contamination in surface drainage due to operation of project could collapse the system and will have serious impacts to the water resources especially the availability of potable water in the PIA area.The impacts will be high in the core area especially the 5.0 km radius area. The efficiency of the Zero Liquid Discharge Concept will be ensured with proper regulatory and institutional arrangements.

#### 4.3.6.5 Mitigation measures

The following measures proposed as a part of development to improve the ground water scenario and also to ensure that ground water is not contaminated.Strategic plans such as implementing the following structures for rain water harvesting and groundwater recharging purposes in project site will be adhered.

- Recharge pits
- Only roof-top rain water harvesting
- Rainwater storage ponds/tanks
- Storage cum recharge ponds
- Monitoring of water quality and groundwater level variations in the project site.

#### 4.3.6.6 Impacts due to wastewater generation

The source of wastewater generation from the project is as follows:

- Industrial process wastewater/effluent
- cooling water blow down
- Domestic wastewater/Sewage
- Equipment cleaning and floor washings, etc.
- The untreated wastewater if discharged into nearby surface water may affect the surface water and/or if disposed off on land without treatment may pollute the ground and surface water.

#### 4.3.6.7 Mitigation measures

Various mitigation measures are proposed to be adopted to minimize the impact if any on the water environment due to the wastewater/runoff generation during the operation phase of the project.

- Institutional arrangement for monitoring of water by pollution.
- Corrective and preventive measures if any contamination happens.
- Monitoring should ensure early determination of any threats to water resources in terms of contamination.
- If contaminated, proper expertise will be brought to schematize the various recharge mechanism to reduce or nullify the impact effects.

#### 4.3.6.8 Waste water quality, quantity and treatment method

##### 4.3.6.8.1 Domestic Wastewater

Existing sewage from domestic use is sent to Septic tank. 10 KLD capacity of Packed STP is proposed for expansion project & treated domestic water will be used for green belt. STP sludge is used as manure to green belt.

**Proposed Package STP Process description:**

The Sectional View of Package Sewage Treatment Plant is shown in **Figure 2-19** & STP Inlet & outlet characteristics of domestic wastewater are given in **Table 2-18.**

**Industrial Wastewater**

The total wastewater is being sent to dedicated 20KLD capacity of ETP is facilitated with the existing facility; treated water is being used for green belt and floor/area washings. There will be no discharge to land environment.The layout of ETP is shown in **Figure 2-14.**

**Process description for ETP**:

**Stage 1 Primary Treatment**

- All Effluent will be pass through a Bar Screen Chamber to remove solids and other larger sized floating substances which is likely to clog pumping machinery
- Effluent after screening will enter into Oil Separation Tank provided with a baffle and Tee to remove free oil. Oil will be removed periodically, manually, being a small amount. If required Oil Skimmer will be provided.
- The Oil Free effluent will be collect in a tank provided with a diffuse Aeration System for effluent pH homogenization. This effluent will be Neutralize by addition of Acids. The neutral effluent will be pump to the Flash mixer for further treatment.
- Alum solution will be added for final pH correction of effluent entering into the flash mixer. For floc formation suitable polyelectrolyte will be added in the flash mixer which increases the floc size to increase the settling rate of solids.
- The effluent will be taken to Clariflocculator to settle solids. The settled sludge from the bottom of the Clariflocculator will be sent to the sludge drying beds/Decanter for dewatering. Filtrate from the beds will be sent back to the Equalization Tank and sludge cake will be send to CHWTSDF for disposal. Primary clarification/treatment is expected to reduce BOD – COD by about 40 to 50%. After primary treatment, effluent will enter into Anaerobic Tank for biological treatment.

**Stage 2 Biological Treatment**

The biological treatment will be in two stages of Anaerobic (Up flow Anaerobic) and Aerobic (Activated Sludge Process)

**Up flow Anaerobic Filter**

The effluent from the Clariflocculator will enter into up flow anaerobic Bioreactor for BOD and COD reduction. The anaerobic system consists of plastic media on which anaerobic bacteria will be cultivated which will degrade the organic matter which in turn will reduce BOD & COD of the effluent.

Effluent will move upwards in the Anaerobic Bioreactor thereby coming in contact with microbes. To develop microbes, sewage/cow dung or similar seeding will be used. Once microbes are developed, effluent will be added in increments of 5%, reaching to 100 % over a time. Seeding and cultivation process is expected to be 15-30 days. Effluent BOD/COD reduction across Anaerobic Process is expected to be 75 to 80%.

**Activated Sludge Process**

After anaerobic process, effluent will be further treated by Activated Sludge Process (ASP) to further reduce BOD/COD and meet prescribed limits for disposal. Activated Sludge Process will comprise of the following

- An Aeration Tank equipped with Self closing diffusers powered by Twin Lobe Blowers.
- Secondary Clarifiers for settling of biological sludge which will be recycled back to Aeration tank
- Return sludge pumps to recycle settled sludge in the secondary clarifiers back to the aeration tank

In the activated sludge process, the bacteria in the Aeration Tank will degrade the organic matter into simple substances like minerals and water thus reducing its BOD and COD up to 80 to 90%. In the Aeration Tank extended Aeration System is designed on following basis,

Self-closing diffusers are provided on the floor of the Aeration Tank, which feed air. In the Aeration Tank there is a mixture of incoming organic waste, return sludge and air provided by fine bubble diffusers. After 24 hrs .of aeration mixture of microbes & organic waste is sent to Secondary Clarifiers for separation of sludge from water. The sludge is settled whereas the clear effluent overflows to the Treated Water Tank.

The settled sludge will be recycled back to the Aeration Tank using the Return Sludge Pumps to maintain the 3000mg/l of MLSS concentration. Excess sludge will be sent to sludge drying beds for dewatering purpose, in a calculated quantity. The dried sludge from the beds will be used as manure whereas the filtrate will be sent to raw effluent sump.

Activated sludge process is expected to reduce the BOD/COD by 80 to 90 %.

**Stage 3 Tertiary Treatment**

The effluent after biological treatment will be further treated to reduce BOD and COD using Pressure Sand Filter and Activated Carbon Filter to remove all the suspended solids and to remove color. This step will reduce BOD and consequentially COD. Treated for water will be used for area washings, Fire water storage tank make up & Green belt.

**Table 4-11 Details Sewage/Wastewater Treatment and Disposal (Existing&Proposed)**

| S. No | Description | Wastewater in KLD | | Treatment | | Remarks |
|---|---|---|---|---|---|---|
| | | Existing | Proposed | Existing | Proposed | |
| 1 | Sewage | 7.0 | 8.0 | Septic tank | STP | Treated water to Green Belt |
| 2 | Wastewater | 8.2 | 11.5 | ETP | ETP (ZLD Concept) | Treated in Effluent Treatment Plant (ETP) and treated effluent will be used for Cooling Tower make up, area washings, Fire water storage tank make up. ETP Sludge(Solar Ponds) will be disposed to TNPCB authorizedTSDF |

Characteristics of effluents are provided in**Table 4-12.**

**Table 4-12Characteristics of Effluent Generated**

| S. No. | Parameter | Raw Effluent Characteristics | RO permeate characteristics |
|---|---|---|---|
| 1. | pH | 5.5 To 6.5 | 7.0-8.0 |
| 2. | TSS | 1095 | 50-80 |
| 3. | TDS | 1497 | <1000 |
| 4. | COD | 500 | 50-100 |
| 5. | BOD | 350 | 20-30 |
| *** All parameters except pH are expressed as mg/l** | | | |

**Table 4-13: Package STP Inlet &outlet characteristics of domestic wastewater**

| S. No | Parameter | HECS-Daiki STP Inlet | HECS-Daiki STP Outlet | MoEF &CC Standard |
|---|---|---|---|---|
| 1 | pH | 3.0-8.0 | 6.0-8.0 | 6.5-9.0 |
| 2 | BOD (mg/l) | 300 | 20 | <20 |
| 3 | COD (mg/l) | 500 | <50 | - |
| 4 | TSS (mg/l) | 240 | <30 | <50 |
| 5 | Oil & Grease (mg/l) | 40 | <10 | - |
| 6 | T-N (mg/l) | 50 | <45 | - |
| 7 | F. Coliform (MPN/100ml) | 600 | <100 | <1000 |

**Conveyance of Wastewater to ETP:**

The wastewater will be conveyed to ETP through pipeline.

## Wastewater Collection

There are 2 no of tanks for each type of wastewater generated and the holding capacity tanks are 10KL.

## Mitigation measures

- The proponent will maintain ZLD (Zero waste discharge) Concept to the existing ETP whose design is for 20 KLD and the existing inflow is 6.5 KLD and after expansion it is expected to be 11.5 KLD.
- The RO permeate water of 9.0 KLD will be utilized in Cooling Tower makeup water. The RO rejects water of 2.5 KLD will be used in fire water make up and floor washings.
- Impervious Solar Pond of 120 Sq.mts will be utilized as backup provision.
- Sewage from domestic use will be treated in STP.
- Treated wastewater will be recycled for various applications as shown in **Table 4-11.**
- The runoff from uncontaminated areas will be used for lawn area in factory premises.
- The oil contaminated water, if any will be sent to oil water separator; separated oil will be sent to TNPCB approved vendors and water will be sent to ETP for further treatment.

### 4.3.7 Biological Environment

The proposed expansion is taking place in the existing plant of M/s Kanchi Karpooram Ltd. Therefore, no impact on the biological environment is envisaged.

There are no notified ecologically sensitive locations, wildlife/ avifauna migratory path, sanctuary etc. within the study area/impact zone. At present the flora and fauna within 10 km range of study area does not consist of any rare or endangered species. Therefore, the proposed project operations are not likely to have any adverse impact on the paths for avid-fauna.Awareness will be given to workers about the importance and conservation of terrestrial ecology and biodiversity.

#### 4.3.7.1 Mitigation Measures

- Discharge of wastes/wastewater without treatment into the water bodies during the operation phase would not be allowed.
- Awareness will be given to workers about the importance and conservation of terrestrial ecology and biodiversity.

### 4.3.8 Solid waste management

#### 4.3.8.1 Impact due to solid waste generation

During operation phase, various types of solid waste are likely to be generated which can be broadly categorized as Hazardous Waste and Non-hazardous Waste. Further, the generated solid waste generation may include Biodegradable, Recyclable and Inert compounds. The details of solid waste generation and its management proposed are discussed in **Chapter 2.** If the solid waste generated is not properly managed and disposed in unauthorized manner, it will impact on soil quality, groundwater and air quality.

### 4.3.8.2 Solid waste management

Strict guidelines will be put in place in order to manage the solid waste generation during the operational phase of the development. The main goals of the guidelines will be to ensure adopting recycling techniques and encouraging sorting of solid waste at source into organic and inorganic wastes. Waste management is given in **Figure 4-5.**

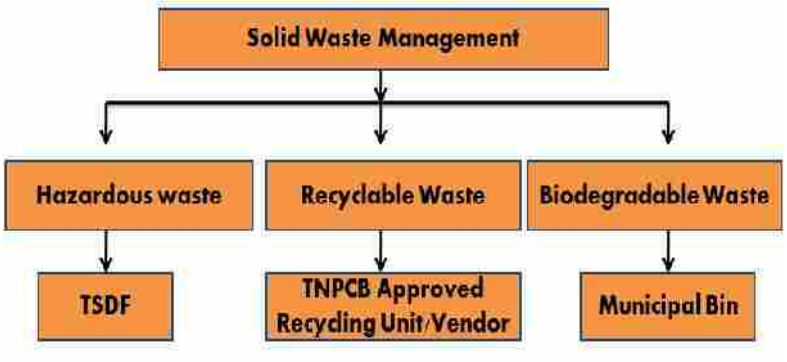



**Figure 4-5 Waste Management Concept**

# CHAPTER – 5

# ANALYSIS OF ALTERNATIVES

# 5 ANALYSIS OF ALTERNATIVES

## 5.1 Introduction

This project doesn't have alternative for site and technology and the justifications are described below.

## 5.2 Alternate site analysis

Since,it is an expansion of production capacity along with addition 3.28 acres of land adjacent to existing facility with few additional of infrastructure facilities. Hence no alternate sites were considered for the project.

## 5.3 Technology alternative

The project was designed for manufacturing of Camphor and its Derivatives. The existing process involves production Camphor and its Derivatives. The Proposed project is for Expansion of Camphor production capacity and increase in total land area. The process flow diagram is shown in **Figure 2-7.** The manufacturing Process enclosed as **Annexure-15.** So there is no requirement for alternative technology considered for this project

## 5.4 Connectivity of the project

The project site is located at Sy. No. 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1 Parandur Road, Karaipettal Post, Enadur village, Kancheepuram Tehsil, Kancheepuram District, Tamil Nadu and the Project connectivity shown in **Table 5-1.**

**Table 5-1Connectivity of the project site**

| S.No | Description | Name of the connectivity | Distance(km) | Direction |
|---|---|---|---|---|
| 1. | Nearest Highway | NH-4 | ~ 0.61 | SSW |
| 2. | Nearest State Highway | SH-58 | ~ 2.21 | W |
| 3. | Nearest Railway Station | New Kancheepuram railway station | ~ 3.09 | SSW |
| 4. | Nearest Airport | Chennai International Airport | ~ 49.63 | ENE |
| 5. | Nearest seaport | Chennai(CPT) | ~ 65.87 | NE |
| 6. | Nearest major city | Kancheepuram District head quarter | ~ 2.18 | S |

# CHAPTER – 6

# ENVIRONMENTAL MONITORING PROGRAM

# 6 ENVIRONMENTAL MONITORING PROGRAMME

## 6.1 Introduction

Environmental monitoring is required to protect the public and the environment from toxic contaminants and pathogens that can be released into a variety of media including air, soil, and water. Air pollutants include sulfur dioxide, carbon monoxide, nitrogen dioxide, and volatile organic compounds, which originate from sources such as vehicle emissions, power plants, refineries, and industrial and laboratory processes.

The plan framed for the intended facility will describe

- The details of the proposed mitigation measures taken for safeguarding the environment at the project site as well as in the vicinity of the industrial site
- Details of management plans (Greenbelt development plan, Solid waste management plan etc.)
- Post project environmental monitoring programme to be undertaken after commissioning of the project.
- The associated cost components of the pollution control systems that will be installed at the site.

For each of the environmental attributes, the monitoring plan specifies the parameters to be monitored, location of monitoring sites, frequency and duration of monitoring and it also denotes the applicable standards, implementation and supervising responsibilities.

## 6.2 Objectives

- To provide a database this can be used to determine any short or long-term environmental impacts of the Project.
- To verify the environmental impacts predicted in the EIA study.
- To monitor the performance and effectiveness of mitigation measures employed.
- To determine project compliance with regulatory requirements, standards and Government policies.
- To provide an early indication and suggest appropriate additional or remedial measures should any of the environmental mitigation measures or controls fail to achieve acceptable standards.
- To ensure that the areas of environmental concern identified during EIA process are carried through to, and appropriately considered and incorporated into the detailed design and tender stage of project.
- To take remedial action if unexpected problems or unacceptable impacts arise.
- To implement water quality, air quality and noise impact monitoring programme during the operational phase.
- To conduct regular reviews of monitored data as the basis for assessing compliance with defined criteria.

## 6.3 Environmental Management Plan during Construction Phase

Environmental impacts during the construction phase can be attributed to the site preparation activity and the mobilization of workforce. The impacts of the construction phase on the environment would be basically of transient nature and are expected to wear out gradually on completion of the construction programme. However, once the construction of the project is completed and its operations started, these operation stage impacts would overlap the impacts due to the construction activities.

- This is an expansion project and all the construction activities will be confined to the plant area only. Therefore no additional impact on the soil quality is expected due to construction activity.
- The proposed site is already having industrial land-use hence no change in land use is envisaged due to the project
- The proposed site already has built up areas including operational areas, plants, stores, office etc. and the expansion area is a barren land and all the construction will be carried out in the premises of the existing plant. The green belt will also be strengthened to carry dust and noise due to various activities. Hence no noticeable impact on ecology is expected.
- Water sprinkling in the vulnerable areas to suppress the dust generated during excavation, leveling and other operations.
- Implementation of suitable disposal methods of sediment/ construction debris at designated places to avoid water logging at construction site.
- Provision of protective gears such as ear mufflers etc. for construction personnel exposed to high noise levels and locating the temporary labour sheds for housing the construction labourers away from the construction site.

## 6.4 Environmental Management Plan during Operation Phase

The control measures which will be imposed to mitigate the impacts caused during the operation phase of the project are as follows:

- Adequate protective measures will be provided in the form of ear muff/ear plugs to the. All the necessary noise protective equipment will be provided to the workers working in high noise areas workers exposed to high noise.
- DG sets will be maintained regularly to ensure stack emission quality within the desirable limit.
- Used spent oil from DG sets would be carefully stored in HDPE in isolated covered facility and disposed off according to the guidelines of hazardous waste (management, handling & Transboundary movement) rule 2008.
- Processed water will be re-circulated within the process where possible.
- No waste or waste material will be discharged to the ground.

## 6.5 Post Project Environmental Monitoring

The goal of having a postproject monitoring (PPM) is to ensure that, an action has been implemented in accordance with the conditions specified, that appropriate measures corresponding with those required and the conditions imposed on the action have been adequately met. In the process, PPM is supposed to provide essential feedback about the

actual environmental impacts of the project and also check if the implementation of the environment management plan is having the desired mitigative effects.

### Monitoring Program

After commissioning of the project, post project monitoring of environmental parameters will be carried out at regular intervals. The monitoring programme in different areas of the environment has been based on the findings of the impact assessment studies. The post project monitoring program is summarized in **Table 6-1.**

**Table 6-1 Post Project Environmental Monitoring Program**

| S. No | Area of Monitoring | Number of Sampling Stations | Frequency of Sampling | Parameters to be Analyzed |
|---|---|---|---|---|
| 1. | Meteorology | One | Hourly and Daily basis. | Wind speed and direction, Temperature, Relative Humidity, Atmospheric pressure, Rainfall. |
| 2. | Ambient Air Quality | 2 Stations (In downwind) | Twice a week:24 hourly period | $PM_{10}$, $PM_{2.5}$, $SO_2$, VOC and $NO_2$ |
| 3. | Noise | 4 (two within plant premises and two outside plant premises) | Once every season | Ambient Equivalent Continuous Sound Pressure Levels (Leq) at day and Night time. |
| 4. | Liquid Effluents | Main Plant Effluents& Sewage | Weekly | pH, Temp, Conductivity, TSS, TDS, BOD. |
| 5. | Exhaust from DG set | Stack of DG set | Quarterly | $PM_{10}$, $PM_{2.5}$, $SO_2$ & CO |
| 6. | Vehicular Emissions | Parking area | Periodic monitoring of vehicles | Air emission and noise, PCU |
| 7. | Solid waste / Hazardous waste | Check conformance to HWM rules | Quantity and Quality monitoring | Periodically |
| 8. | Soil | Two Locations within the Project Site | Yearly Once | Physico chemical properties, Nutrients, Heavy metals |
| 9. | Terrestrial Ecology | Within 10km, around the project | Once in three years | Symptoms of injuries on plants |

## 6.6 Greenbelt Development Plan

Green belts are an effective mode of control of air pollution, where green plants act as absorbent for pollutants and acts as a sink for pollution. Plants grown to function as pollution sink are collectively referred as greenbelts. An important aspect of a greenbelt is that the plants are living organism with their varied tolerance limit towards the air pollutants. A green belt is effective as a pollutant sink only within the tolerance limit of constituent plants. Apart from function as pollution sink, greenbelt would provide other benefit like aesthetic improvement of the area and providing suitable habitats for birds and animals. As per the

rules and regulations laid by Ministry of Environment and Forest, Central Pollution Control Board (CPCB) and State Pollution Control Board (SPCB), it is legally mandatory to earmark 33% of the project area for greenbelt development to promote integration of environmental issues with industrial development projects.

Approximately 600 trees in 2.30 acres(33.1%) of land is being developed in existing facility. 1.08 acres of land proposed for expansion project.1455 Nos of trees(1500/Ha) will be planned for expansion. The total project area after expansion will be 10.23 acres. 3.39 acres (33.14%) will be maintained as per CPCB norms. The survival of the plantation shall be monitored frequently and survival rate of the plantation. A capital cost of INR 30 Lakhs shall be earmarked for recurring expenses towards green belt development and maintenance.

**Selection of plants for Greenbelt:** The main limitation for plants to function as scavenger of pollutants are, plant's interaction to air pollutants, sensitivity to pollutants, climatic conditions and soil characteristics. While making choice of plants species for cultivation in green belts, due consideration has to be given to the natural factor of bio- climate. Plants suitable for green belt are listed in **Table 6-2.** Character of plants mainly considered for affecting absorption of pollutant gases and removal of dust particle are as follows.

**For absorption of Gases:**

- Tolerance towards pollutants in question, at concentration, that is not too high to be instantaneously lethal
- Longer duration of foliage
- Freely exposed foliage
- Adequate height of crown
- Openness of foliage in canopy
- Big leaves (long and broad laminar surface)
- Large number of stomatal apertures

**For Removal of Suspended Particulate matter:**

- Height and spread of crown.
- Leaves supported on firm petiole
- Abundance of surface on bark and foliage
- Roughness of bark
- Abundance of auxiliary hairs
- Hairs or scales on laminar surface
- Protected Stomata.

**Table 6-2 List of plants suitable for Greenbelt**

| Family | Scientific name | Common name | Flowering season |
|---|---|---|---|
| Bignoniaceae | Bignonia ventusa | ampu | Jan-Feb |
| | Bignonia capreolata | ----- | March-April |
| | Bignonia unguis –cati | ----- | April |
| | Bignonia speciose | --- | March-April |
| | Tecoma stans | sonnapatti | Throughout year |
| | Tecoma radicans | --- | Throughout year |
| Caesalpiniaceae | Caesalpinia pulcherrima | mayurkonrai | April-june |
| Rubiaceae | Ixora coccinea | vedchi | Throughout the year |
| | Ixora rosea | ----- | Aug-Sept |
| | Ixora parviflora | Shulundu kora | March-April |

| | | | |
|---|---|---|---|
| | Ixora barbata | ---- | April-May |
| | Ixora lutea | ----- | Throughout the year |
| Euphorbiaceae | Euphorbia pulcherrima | magilkunni | Dec-Jan |
| Apocynaceae | Thevetia peruviana | ponnarali | Throughout the year |
| | Alemanda nerifolia | ----- | April-June |
| | Nerium Indicum | chevarali | Throughout the year |
| | Catharanthus roseus | nithyakalyani | ---------- |
| Malvaceae | Hibiscus mutabilis | semburutti | Sept-Oct |
| | Hibiscus schizopetalus | ----- | April-Sept |
| | Hibiscus rosa –sinensis | ampurukam | Throughout the year |
| Nyctaginaceae | Bougainvillea spectabilis and different varieties | Kagitha poo | Throughout the year |

The purpose of developing the greenbelt in and around the industrial site is for:

1. Preventing land degradation and erosion of topsoil.
2. Containment and Abatement of pollution in the industrial environment, capturing of fugitive emissions if any and thereby improving the quality of the surrounding environment.
3. Substantially reducing the adverse environmental impacts due to the proposed industrial activity.
4. Serving as a barrier for attenuating the intensity of noise generated.
5. Enhancing the biodiversity index of the region.
6. Adding aesthetic value to the project area.
7. Maintaining the ecological equilibrium of the area.

The following general guidelines and measures will be adopted:

- The plantation of trees is initiated with start of the construction stage now, substantial growth is achieved. The greenbelt development programme is drawn to conform to natural climatic conditions and adaptability of the species.
- Species involved in afforestation should be indigenous, fast growing and eco-friendly.
- Proper drainage system and proper plantation techniques is adopted.
- Plantation is being properly maintained and protected by fencing from grazing and felling. The plantations would consist of a mixture of carefully chosen locally available species of trees, shrubs and herbs, preferably evergreen and resistant to pollution.

## 6.7 Cost estimations for Green Belt development

The total project area will be 10.23 acres after expansion. 3.39 acres (33.14%) is allotted and maintained as per CPCB norms. Approximately 600 trees in 2.30 acres(33.1%) of land is being developed in existing facility remaining 1455 trees(1500/Ha) will be planned in proposed expansion. The survival of the plantation shall be monitored frequently and survival rate of the plantation. A capital cost of INR 30 Lakhs shall be earmarked for recurring expenses towards green belt development and maintenance.


**Figure 6-1 Green belt photographs of the project**

# CHAPTER – 7

# ADDITIONAL STUDIES

# 7 ADDITIONAL STUDIES

## 7.1 Public Hearing

The proposed project is located in a Non Notified Industrial area, So, the project attracts the Category 'A' as per EIA Notification 2006 and its Amendments; As per MoEF & CC Office Memorandum, dated 3rd June 2009. So, Public Hearing is mandatory.

Since, KKL have gone for enhancement of Camphor production and its Derivatives and increase in total land area at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, Kancheepuram Taluk, Tamil Nadu – 631552. Project located area is classified as **"**Non notified Industrial area**"**.

The Environmental Clearance application submitted to MoEF&CC on 19th May 2018 vide proposal number IA/TN/IND2/74991/2018. Based on the information furnished in Form-I, PFR MoEF&CC had issued the Desktop Terms of Reference (TOR) for preparing Environmental Impact Assessment (EIA) Report vide No. IA-J-11011/172/2018–IA-II (I) dated 21st June 2018. Base line Studies are carried out during the period of July 2018-Sep 2018 as per obtained ToR.

Later, Project Proponent applied for ToR amendment on 15.11.2018. Proposal appraised in 4th EAC Meeing 26.02.2019. During Presentation EAC Committee has recommended to submitting the ToR application with revised details.

The revised Environmental Clearance application submitted to MoEF&CC on 9thApril 2019 vides proposal number IA/TN/IND2/101471/2019. Based on the information furnished in Form-I& PFR, MoEF&CC had issued the Desk top Terms of Reference (TOR) vide No.IA-J-11011/143/2019–IA-II (I) dated 10th May 2019 to preparing the Environmental Impact Assessment (EIA) Report.

The EIA report submitted for Public Hearing to TNPCB, Public Hearing advertisement was published Dinamani and new Indian Express on 08.06.2019. Public hearing was conducted on 16.07.2019, 3pm at Sri Lakshmi Narayane Mahal & Party Hall, Bagalore Highway, Hotel Saravana Bavan Complex, Enathur Village, Kanchipuram Taluk, Kancheepuram District, Tamil Nadu 631502 in the presence of the District Environmental Engineer Tamil Nadu Pollution Control Board, sriperumdudur and District Collector Kancheepuram.

Public Hearing advertisement details are enclosed as **Annexure-33.** Minutes of Public Hearing and compliance is enclosed as **Annexure-34.** There is no onjections are raised by the public during public hearing. Final EIA will be submitted to MoEF&CC for further appraisal of the project and obtaining Environment Clearance. Puclic Hearing photographs are shown in **Figure 7-1.**

**Figure 7-1 Public Hearing Photographs (dated 16.07.2019)**

## 7.2 Disaster Management Plan

An onsite emergency plan is attributed to the response plan that contains and minimizes the effects due to emergencies within the installations which have a potential to cause damage to people and facilities within the installation premises.

An On-site emergency plan will be prepared and kept at plant premises to deal with emergencies and prevent disasters. Existing Onsite Emergency plan enclosed as **Annexure-31.**

**R&R ACTION PLANS**

Rehabilitation and resettlement is not applicable since the project site is an expansion within the existing facility and new land is adjacent to existing facility which categerised as a poramboke land. The Existing project land converted for industrial use. Land conversions GOs are obtained from Govt. of Tamil Nadu are enclosed as **Annexure-2**& Existing land Ownership documents are enclosed as **Annexure-1** proposed land ownership documents are encloased as **Annexure-1A.**

## 7.3 Risk Assessment

The detailed risk assessment report on storage tanks and pipelines for the proposed project is enclosed as **Annexure-32.** Existing Onsite Emergency Plan is enclosed as **Annexure-31.**

## 7.4 Copy of ToR (Terms of Reference)

Standard ToR issued by MoEF & CC for the preparation of EIA/EMP report is appended in **Section 7.4.1.**

### 7.4.1 Copy of ToR issued by MoEF & CC

The standard ToR issued by MoEF & CC is appended below.

**No.IA-J-11011/143/2019-IA-II(I)**
Goverment of India
Minister of Enviroment,Forest and Climate Change
Impact Assessment Division
***

Indira Paryavaran Bhavan,
Vayu Wing,3rd Floor,Aliganj,
Jor Bagh Road,New Delhi-110003
10 May 2019

To,

M/s M/S KANCHI KARPOORAM LTD
SF No.669, 672, 670/2, 676/1 674/1,
Kanchipuram-631552
Tamil Nadu

**Tel.No.044-26401914; Email:admin@kanchikarpooram.com**

Sir/Madam,

This has reference to the proposal submitted in the Ministry of Environment, Forest and Climate Change to prescribe the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the proponent had submitted online information in the prescribed format (Form-1 ) along with a Pre-feasibility Report. The details of the proposal are given below:

| | |
|---|---|
| **1. Proposal No.**: | IA/TN/IND2/101471/2019 |
| **2. Name of the Proposal**: | ENHANCEMENT OF CAMPHOR AND ITS DERIVATIVES PRODUCTION AND INCREASE IN TOTAL LAND AREA |
| **3. Category of the Proposal**: | Industrial Projects - 2 |
| **4. Project/Activity applied for**: | 5(f) Synthetic organic chemicals industry (dyes & dye intermediates; bulk |
| **5. Date of submission for TOR**: | 06 Apr 2019 |

In this regard, under the provisions of the EIA Notification 2006 as amended, the Standard TOR for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed with public consultation as follows:

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

# 5(f):STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR SYNTHETIC ORGANIC CHEMICALS INDUSTRY (DYES & DYE INTERMEDIATES; BULK DRUGS AND INTERMEDIATES EXCLUDING DRUG FORMULATIONS; SYNTHETIC RUBBERS; BASIC ORGANIC CHEMICALS, OTHER SYNTHETIC ORGANIC CHEMICALS AND CHEMICAL INTERMEDIATES) AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

## A. STANDARD TERMS OF REFERENCE

1) **Executive Summary**

2) **Introduction**

i. Details of the EIA Consultant including NABET accreditation

ii. Information about the project proponent

iii. Importance and benefits of the project

3) **Project Description**

i. Cost of project and time of completion.

ii. Products with capacities for the proposed project.

iii. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.

iv. List of raw materials required and their source along with mode of transportation.

v. Other chemicals and materials required with quantities and storage capacities

vi. Details of Emission, effluents, hazardous waste generation and their management.

vii. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)

viii. Process description along with major equipments and machineries, process flow sheet (quantative) from raw material to products to be provided

ix. Hazard identification and details of proposed safety systems.

x. Expansion/modernization proposals:

c. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In

addition, status of compliance of Consent to Operate for the ongoing /existing operation of the project from SPCB shall be attached with the EIA-EMP report.

d. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.

**4) Site Details**

i. Location of the project site covering village, Taluka/Tehsil, District and State, Justification for selecting the site, whether other sites were considered.

ii. A toposheet of the study area of radius of 10km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (including all eco-sensitive areas and environmentally sensitive places)

iii. Details w.r.t. option analysis for selection of site

iv. Co-ordinates (lat-long) of all four corners of the site.

v. Google map-Earth downloaded of the project site.

vi. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.

vii. Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.

viii. Landuse break-up of total land of the project site (identified and acquired), government/ private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for industrial area)

ix. A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area

x. Geological features and Geo-hydrological status of the study area shall be included.

xi. Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects)

xii. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.

xiii. R&R details in respect of land in line with state Government policy.

## STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

**5) Forest and wildlife related issues (if applicable):**

i. Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable)

ii. Landuse map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland *(in case of projects involving forest land more than 40 ha)*

iii. Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.

iv. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon.

v. Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area.

vi. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife.

**6) Environmental Status**

i. Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.

ii. AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.

iii. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2000 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.

iv. Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.

v. Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.

vi. Ground water monitoring at minimum at 8 locations shall be included.

vii. Noise levels monitoring at 8 locations within the study area.

viii. Soil Characteristic as per CPCB guidelines.

ix. Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.

x. Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.

xi. Socio-economic status of the study area.

**7) Impact and Environment Management Plan**

i. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.

ii. Water Quality modelling - in case of discharge in water body

iii. Impact of the transport of the raw materials and end products on the surrounding environment hall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined.

iv. A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.

v. Details of stack emission and action plan for control of emissions to meet standards.

vi. Measures for fugitive emission control

vii. Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.

viii. Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.

ix. Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.

x. Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to

use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.

xi. Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.

xii. Action plan for post-project environmental monitoring shall be submitted.

xiii. Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.

**8) Occupational health**

i. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers

ii. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.

iii. Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved.

iv. Annual report of heath status of workers with special reference to Occupational Health and Safety.

**9) Corporate Environment Policy**

i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.

ii. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.

iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.

iv. Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report

## STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

10) Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.

11) Enterprise Social Commitment (ESC)

i. Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.

12) Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.

13) 'A tabular chart with index for point wise compliance of above TOR.

## B. SPECIFIC TERMS OF REFERENCEFOREIASTUDIES FOR SYNTHETIC ORGANIC CHEMICALS INDUSTRY (DYES & DYE INTERMEDIATES; BULK DRUGS AND INTERMEDIATES EXCLUDING DRUG FORMULATIONS; SYNTHETIC RUBBERS; BASIC ORGANIC CHEMICALS, OTHER SYNTHETIC ORGANIC CHEMICALS AND CHEMICAL INTERMEDIATES)

1. Detailsonsolvents to be used,measuresfor solventrecovery and for emissions control.
2. Details of process emissions from the proposed unit and its arrangement to control.
3. Ambient air quality data should include VOC, otherprocess-specificpollutants* like NH3*, chlorine*, HCl*, HBr*, H2S*, HF*,etc.,(*-asapplicable)
4. Work zone monitoring arrangements for hazardous chemicals.
5. Detailed effluent treatment scheme including segregation of effluent streams for units adopting 'Zero' liquid discharge.
6. Action plan for odour control to be submitted.
7. A copy of the Memorandum of Understanding signed with cement manufacturers indicating clearly that they co-process organic solid/hazardous waste generated.
8. Authorization/Membership for the disposal of liquid effluent in CETP and solid/hazardous waste in TSDF, if any.
9. Action plan for utilization of MEE/dryers salts.
10. Material Safety Data Sheet for all the Chemicals are being used/will be used.
11. Authorization/Membership for the disposal of solid/hazardous waste in TSDF.

## STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

12. Details of incinerator if to be installed.
13. Risk assessment for storage and handling of hazardous chemicals/solvents. Action plan for handling & safety system to be incorporated.
14. Arrangements for ensuring health and safety of workers engaged in handling of toxic materials.

***

### 7.4.2 ToR Compliance Report

| S. No | Terms of Reference | Compliance |
|---|---|---|
| **A.** | **Standard TOR** | |
| 1 | **Executive Summary** | Brief executive summary is enclosed as Separate Booklet |
| 2 | **Introduction** | |
| | i. Details of the EIA Consultant including NABET accreditation | M/s Hubert Enviro Care Systems Pvt. Ltd., Chennai NABET Accredited vide Certificate No. NABET/EIA/1619/RA0083 & MoEF Recognized Lab vide F. No. Q-15018/13/2016-CPW) Details provided in **Chapter 12.** |
| | ii. Information about the Project Proponent | M/s Kanchi Karpooram Ltd is proposed enhancement of Camphor production and its Derivatives within existing facility & increase in total land area. Details of the project proponent are given in **Chapter 1, Section 1.1 & Section 1.2**. |
| | iii. Importance and Benefits of the Project | The Proposed project will play a vital role in Camphor and its derivatives and thereby address the market demand and Social benefits. Details provided in **Chapter 8.** |
| 3 | **Project Description** | |
| | i. Cost of project and Time of completion | The cost of the project is INR 15 Crores. Time of completion is 2020 (Subject to EC clearance) Details given in **Chapter 2, Section 2.5 & Section 2.6 and Table 2-3& Table 2-4.** |
| | ii. Products with capacities for the proposed project | Details about the products and their capacities are provided in **Chapter-2, Section 2.8.2 & Table 2-5.** |
| | iii. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any. | This is an expansion in production capacitites within the existing facility and increase in total land area.<br><br>Details of the existing products and proposed product capacities are provided in **Chapter-2**, **Section 2.8.2**&**Table 2-5**. |
| | iv. List of Raw materials and their source with mode of transportation | The list of Raw materials and their source with mode of transportation of raw materials are provided in **Chapter 2, Section 2.8 to Section 2.12 & Table 2-6.** |
| | v. Other chemicals and materials required with quantities and storage capacities | Storage details provided in **Chapter 2, Section 2.12, Section 2.14.2, Table 2-7 & Table 2-8.** |
| | vi. Details of emission, effluents, hazardous waste generation and their management | Details on emissions & Sources are provided in **Chapter 2 Section 2.24.2, Table 2-28& 2-29.**<br><br>Effluents generation& Treatment and disposal methods are detailed in **Chapter 2**, **Section 2.16.1**.&**Table 2-15. Table 2-16 & Table 2-17**<br><br>Hazardous wastes generation and their |

| S. No | Terms of Reference | Compliance |
|---|---|---|
| | | management are detailed in **Chapter 2 & Section 2.18.2, Table 2-21.** |
| | vii. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract) | Details on water requirement and source are provided in **Chapter 2, Section 2.15.5**<br><br>Water balance charts are provided in **Figures 2-12, Figure 2-13, Table 2-13 and Table 2-14.**<br><br>Details on power requirement and source are provided in **Chapter 2, Section 2.15.2& Table 2-10.**<br><br>Details on manpower requirement are provided in **Chapter 2, Section 2.15.4, and Table 2-12.** |
| | viii. Process description along with major equipments and machineries, process flow sheet (quantitative) from raw material to products to be provided | Manufacturing process description is given in **Chapter 2, section 2.8.3** and **Figure 2-7.**<br><br>The detailed list of machinery & equipments in the industry are provided in the **Chapter 2, Section 2.20** and **Table 2-24 to Table 2-27.** |
| | ix. Hazard identification and details of proposed safety systems | Hazardous identification and details of proposed safety systems are detailed in **Chapter 7, Section 7.5** |
| | x. Expansion/ modernization proposals<br>(a) Copy of all Environmental Clearance(s) including amendments thereto obtaining for the project from MoEF&CC/SEIAA shall be attached as an Annexure. A certified copy of the latest monitoring report of the Regional office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all existing environmental clearances including Amendments shall be provided. In addition status of compliance of Consent to Operate for the ongoing existing operation of the project from SPCB shall be attached with the EIA-EMP report<br>(b) In case the existing project has not obtained environmental clearance, reasons for not | There is no EC for Existing facility However, KKL approached PCB for obtaining CTE, CTO in order to get capacity enhancement. In this regard, TNPCB recommended obtaining EC as per EIA Notification 2006. |

| S. No | Terms of Reference | Compliance |
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| | obtaining the provisions of the EIA notification 1994 and/or EIA notification 2006 shall be provided. Copies of Consent to Establish / No objection certificate and Consent to Operate (in case of units operating in prior to EIA notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further compliance report to the conditions of Consents from the SPCB shall be submitted. | |
| 4 | **Site Details** | |
| | i. Location of the project site covering village, Taluka/Tehsil, District and State, justification for selecting the site. Whether other sites were considered | Location of the project site is detailed in **Chapter 2, Section 1.6, and Figure 1-1.** Coordinates of the project is shown in **Table 1-3**<br><br>Details related to alternate site consideration are given in **Chapter 5, Section 5.2.** |
| | ii. A Topo sheet of the study area of radius of 10Km and site location on 1:50,000/ 1:25,000 scale on an A3/A2 sheet (including al eco-sensitive areas and environmentally sensitive places) | Topo map of study area is provided in **Chapter 3, Section 3.3 and Figure 3-2.** |
| | iii. Details w.r.t option analysis for selection of site | Details related to alternate site consideration are given in **Chapter 5, Section 5.2** |
| | iv. Co-ordinates (lat-long) of all four corners of the site | Site coordinates of all the corners Provided in **Chapter 1, Section 1.6. & Table 1-3.** |
| | v. Google map Earth downloaded of the project site | **Chapter 1, Section 1.6.1 & Figures 1-2** |
| | vi. Layout maps including existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an industrial area/Estate/Complex, layout of Industrial indicating location of unit within the Industrial area/Estate. | Site layout indicating storage area, plant area, greenbelt area, utilities etc are mentioned in **Chapter 2, Section 2.13, Figure 2-8 and Figure 2-9** |
| | vii. Photographs of the proposed and existing (if applicable) plant site, existing, show photographs of plantations/ greenbelt, in particular | The sites photographs are appended in **Chapter 2, Section 2.8, Figure 2-10 & Figure 2-11.** |
| | viii. Land use break-up of total land of the project site (indicate and acquired), government/ private-agriculture, forest, wasteland, water | The Land use break-up of total land is provided in the **Chapter 2, Section 2.15**<br><br>Detailed breakup is given in **Table 2-9.** |

| S. No | Terms of Reference | Compliance |
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| | bodies, settlements, etc shall be included (not required for industrial area) | |
| | ix. A list of major industries with name and type within the study area (10 km radius) shall be incorporated. Land use details of the study area) | List of major industries with name and type within the study area (10 km radius) is provided in the **Chapter 2, Section2.4& Table 2-1.** |
| | x. Geological features and Geo-hydrological status of the study area shall be included. | Geo-hydrological status of Kancheepuram District is provided in **Chapter 3, Section 3.5.7, and Figure 3-13**. |
| | xi. Details of drainage of the project upto 5km radius of the study area. If the site is within 1Km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum of Flood of the river shall also be provided (mega green field projects) | Drainage map of the study area showing 10Km is appended in **Chapter 3, Section 3.5.9 and Figure 3-15.** |
| | xii. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete procession of the land. | The total land area is 10.23 Acres. The existing project site land (6.95acres) is for industrial use.<br>GOs related to existing land obtained from Govt. of Tamil Nadu are enclosed as **Annexure-2.**<br>Land use classification of newly acquired land for proposed expansion, is categorized as a patta land & applied for land use conversion to industrial use from concern departments.<br>Existing & Proposed Land's ownership document are enclosed as **Annexure-1&Annexure-1A** respectively |
| | xiii. R&R details in respect of land in line with state Government policy | Not Applicable |
| 5 | **Forest and wildlife related issues (if applicable)** | |
| | i. Permission and approvals for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department (if applicable) | Not Applicable. |
| | ii. Land use map based on High resolution satellite imagery (GPS) of the proposed site delineating the forest land (in case of projects involving forest land more than 40 Ha) | Not Applicable. |
| | iii. Status of application submitted for obtaining the stage of Forest Clearance along with latest status shall | Not Applicable. |

| S. No | Terms of Reference | Compliance |
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| | be submitted | |
| | iv. The projects to be located within 10 Km of the National parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden-thereon. | Not Applicable. |
| | v. Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of schedule of fauna, if any exists in the study area. | Not Applicable. |
| | vi. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972 to the Standing Committee of the National Board for Wildlife. | Not Applicable. |
| 6 | **Environmental Status** | |
| | i. Determination of atmospheric inversion level at the project site and site-specific micrometeorological date using temperature, relative humidity, hourly wind speed and direction and rainfall | The daily inversion level at the project site varies from 50 to 1750m during 6 AM to 6 PM, the maximum recorded at 5 PM, March 2018. Details given in **Chapter 3, Section 3.6.5** |
| | ii. AAQ data (except monsoon) at 8 locations for $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_X$, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based on CPCB guidelines and take into account the pre-dominant wind direction, population zone, sensitive receptors including reserved forests. | AAQ locations detail is provided in the **Chapter 3, Section 3.7, Table 3-8** and sampling location map **Figure 3-20** |
| | iii. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAAQM notification of Nov. 2009 along with-min-max, average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA report | Raw data of all AAQ measurement for 12 weeks of all station are enclosed as **Annexure-25** |
| | iv. Surface water quality of nearby | Surface water quality monitoring locations and |

| S. No | Terms of Reference | Compliance |
|---|---|---|
| | River (1000m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/ MoEF&CC guidelines. | results at eight locations are provided in the **Chapter 3, Section 3.9.2, Table 3-13 & Table 3-14.** |
| | v. Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF& CC, if yes give details | No. |
| | vi. Ground water monitoring at minimum 8 locations shall be included | Ground water monitoring results were provided in the **Chapter 3, Section 3.9.3.1 a**nd **Table 3-18** |
| | vii. Noise level monitoring at minimum 8 locations shall be included | Noise level monitoring results were provided in the **Chapter 3, Section 3.8.** |
| | viii. Soil characteristics as per CPCB guidelines | Soil samples analysis results were provided in the **Chapter 3, Section 3.10.** |
| | ix. Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc. | Details given in **Chapter 4, Section 4.3.4** and **Table 4-9.** |
| | x. Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If schedule-I fauna and found within the study area, a Wildlife Conservation plan shall be prepared and furnished | Flora and Fauna found within the study area are provided in **Chapter 3, Section 3.11** |
| | xi. Socio-economic status of the study area | Socio-economic status of the study area is provided in the **Chapter 3, Section 3.12.** |
| 7 | **Impact and Environmental Management Plan** | |

| S. No | Terms of Reference | Compliance |
|---|---|---|
| | i. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, AQIP modeling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours shall be plotted on a location map showing the location of the project site, habitation nearby, sensitive receptors, if any. | The ground level concentration of pollutants (PM, $SO_2$, $NO_2$) using AERMOD software were assessed and presented in **Chapter 4, Section 4.3.3.3.**<br><br>AERMOD Software Version 8.0.5 was used for air dispersion modeling.<br>**Chapter 4, Sections 4.3.3.3 and Figures 4-2 to 4-4.& Table 4-3 to Table 4-5.** |
| | ii. Water quality modelling- in case of discharge in water body | Not Applicable.<br>Effluent will be treated in ETP. Treated water will be used for utilities. |
| | iii. Impact of the transport of raw material and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined. | Transport of raw materials and finished products and wastes through road ways only. |
| | iv. A note on treatment of waste water from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment, characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) rules. | Wastewater treatment and disposal details are provided in the **Chapter 4, Section 4.3.6.** |
| | v. Details of stack emission and action plan for control of emissions to meet standards. | Details of stack emission provided in **Chapter 4 Section 4.3.3** and control measures (APC) are provided in the **Chapter 4, Section 4.3.3.5 and Table 4-7.** |
| | vi. Measures for fugitive emission control | Fugitive emission details provided in the **Chapter 4, Section 4.3.3.5& Table 4-8.** |

| S. No | Terms of Reference | Compliance |
|---|---|---|
| | vii. Details of hazardous waste generation and their storage, utilization and management, Copies of MOU regarding utilization of solid and hazardous waste in cement plant also be included. EMP shall include the concept of waste-minimization, recycle/ reuse/recover techniques, Energy conservation, and natural resource conservation. | Details of hazardous waste generation and their storage and disposal methods are provided in the **Chapter 2** & **Section 2.18.2**<br><br>Authorization for disposal for hazardous waste enclosed as **Annexure-11**. |
| | viii. Proper utilization of fly ash shall be ensured as per Fly Ash notification, 2009. A detailed plan of action shall be provided. | NA |
| | ix. Acton plan for the green belt development plan in 33% area i.e., land with not less than 1500 trees per Ha. Giving details of Species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated. | The Greenbelt details are provided in the **Chapter 6, Section 6.6.**<br>The total Project area is 10.23 acres. 3.39 acres (33.14%) is allotted and maintained as per CPCB norms. Approximately 600 trees in 2.30 acres(33.1%) of land is being developed in existing facility remaining 1455 trees(1500/Ha) will be planned in proposed expansion. The survival of the plantation shall be monitored frequently and survival rate of the plantation. A capital cost of INR 30 Lakhs shall be earmarked for recurring expenses towards green belt development and maintenance. |
| | x. Action plan for rain water harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reuse the water requirement from other sources. | Rainwater Harvesting & Groundwater Recharging and storm water management are detailed in the **Chapter 10 & Section 10.6.3.1** and **Table 10-5.** |
| | xi. Total capital cost and recurring cost /annum for environmental pollution control measures shall be included. | Total capital cost and recurring cost /annum for environmental pollution control measures is detailed in the **Chapter 10, Section 10.13 and Table 10-12.** |
| | xii. Action plan for Post-project environmental monitoring shall be submitted | Action plan for Post-project environmental monitoring is detailed in the **Chapter 6, Section 6.5 & Table 6-1.** |
| | xiii. Onsite and offsite Disaster (natural and Man-made) preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster | On-site emergency plans are enclosed as **Annexure-31.**<br><br>Risk Assessment report enclosed as **Annexure-32** |

| S. No | Terms of Reference | Compliance |
|---|---|---|
| | Management Plan should be linked with District Disaster Management Plan. | |
| 8 | **Occupational Health** | |
| | I. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers | Fund allocation to ensure the occupational health & safety of all contract and casual workers is detailed in the **Chapter 10, Section 10.8.** |
| | II. Details of exposure specific health status evaluation of worker. If the worker's health is being evaluated by pre-designed format, chest x-rays, Audiometry, Spirometry, Vision testing (Far and near vision, colour vision and any other ocular defect), ECG, during pre-placement and periodical examinations give the details of the same. Details regarding last month analysed data of above mentioned parameters as per age, sex, duration of exposure and department wise. | Occupational Health Monitoring details provided in the **Chapter 10, Section 10.8**<br><br>Medical reports of the employees are given as **Annexure-30** |
| | III. Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are Permissible Exposure level (PEL) if these are not within PEL, what measures the company has adopted to keep them within PEL. So that health of the workers can be preserved. | Occupational Health Monitoring details provided in the **Chapter 10, Section 10.10**<br><br>Medical reports of the employees are given as **Annexure-30** |
| | IV. Annual report of health status of workers with special reference to Occupational Health and Safety | Occupational Health Monitoring details provided in the **Chapter 10, Section 10.10.**<br>Medical reports of the employees are given as **Annexure-30** |
| **9** | **Corporate Environment Policy** | |
| | I. Does the company have a well laid down Environmental Policy approved by its Board of Directors? If so, it may be detailed in the EIA report | Kanchi Karpooram Ltd is prepared Safety, Health and Environment Policy and placed it at appropriate places in the factory premises and record. Environmental policy enclosed as **Annexure-29** |
| | II. Does the Environment Policy prescribe for standard operating process/ procedures to bring into focus any infringement/ deviation/ violation of the environemnt or forest norms/ conditions? If so, it may be detailed in the EIA | Kanchi Karpooram Ltd is prepared Safety, Health and Environment Policy and placed it at appropriate places in the factory premises and record. Environmental policy enclosed as **Annexure-29.**<br><br>A dedicated Environmental Management Cell (EMC) will be in force to bring into focus of any |

| S. No | Terms of Reference | Compliance |
|---|---|---|
| | | infringement/ deviation/ violation of the environemnt. Details provided in **Chapter 10 and Section 10.3**. |
| | III. What is the hierarchical system or Administrative order of the company to deal with the environemntsl issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given. | Hierarchical system or Administrative Order of the company to deal with the environmental issues and for ensuring compliance is provided in **Chapter 10, Section 10.8 & Table 10-1.** |
| | IV. Does the company have system of reporting of non-compliances/ violations of environemntal norms to the Board of Directors of the company and/or Stakeholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report | Reporting mechanism detailed in **Chapter 10, Section 10.8 & Table 10-1.** |
| 10 | V. Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase. | The Existing site layout indicating all the facilities is enclosed as **Annexure-12.** Proposed site layout is enclosed as **Annexure-12A** |
| **11** | **Enterprise Social Commitment (ESC)** | |
| | i. Adequate funds (at least 2.5% of the project cost) shall be earmarked towards the Enterprise Social Commitment based on public Hearing issues and item-wise details along with the bound action plan shall be included. Socio-Economic development activities need to be elaborated upon. | Noted,<br>The EIA report submitted for Public Hearing to TNPCB, Public Hearing advertisement was published Dinamani and new Indian Express on 08.06.2019. Public hearing was conducted on 16.07.2019, 3pm at Sri Lakshmi Narayane Mahal & Party Hall, Bagalore Highway, Hotel Saravana Bavan Complex, Enathur Village, Kanchipuram Taluk, Kancheepuram District, Tamil Nadu 631502.<br>in the presence of the District Environmental Engineer Tamil Nadu Pollution Control Board, sriperumdudur and District Collector Kancheepuram. Public Hearing advertisement details are enclosed as **Annexure-33**. Minutes of Public Hearing and compliance is enclosed as **Annexure-34.**<br><br>CER and CSR Plan Details are provided in **Chapter 10, Table 10-10, & Table 10-11** |
| 12 | Any litigation pending against the project and/ or any direction/ order passed by any Court of Law against the project, if so, details thereof shall also | Nill as per Project proponent information. |

| S. No | Terms of Reference | Compliance |
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| | be included. Has the unit received any notice under the section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance /ATR to the notice(s) and present status of the case. | |
| 13 | A tabular chart with index for point wise compliance of above TOR | Point wise ToR compliance is provided in provided in **Chapter 7 & Section 7.4.2** |
| **B.** | **Specific Terms of Reference for EIA studies for Synthetic Organic Chemicals Industry (Dyes & Dye Intermediates; Bulk Drugs and Intermediates Excluding Drug Formulations; Synthetic Rubbers; Basic Organic Chemicals, Other Synthetic Organic Chemicals and Chemical Intermediates)** | |
| 1 | Details on solvents to be used, measures for solvent recovery and for emissions control. | Details on solvents to be used, measures for solvent recovery is provided in the **Chapter 2, Section 2.14, Section 2.14.2.** |
| 2 | Details of process emissions from the proposed unit and its arrangement to control | Emissions control measure is provided in the **Chapter 2, Section 2.24.2, Table 2-28, & Table2-29.** |
| 3 | Ambient air quality data should include VOC, other process specific pollutants like $NH_3$, Chlorine, HCl, HBr, H2S, HF, etc., (as applicable) | Details provided in the **Chapter 3, Section 3.7.2.1 and Table 3-10.** |
| 4 | Work zone monitoring arrangements for hazardous chemicals | Details provided in the **Chapter 10, Section 10.6.1 & Section 10.7.** |
| 5 | Detailed effluent treatment scheme including segregation of effluent streams for units adopting 'Zero 'Liquid discharge. | Detailed effluent treatment scheme including segregation of effluent streams for units is provided in the **chapter 4, Section 2.24.4** |
| 6 | Action Plan for odour control to be submitted | Details provided in the **Chapter 10, Section 10.6.1.** |
| 7 | A copy of the Memorandum of Understanding signed with cement manufacturers indicating clearly that they co-process organic solid/hazardous waste generated | NA.<br>Details of hazardous waste generation and their storage and disposal methods are provided in the **Chapter 2 & Section 2.18.2** |
| 8 | Authorization/Membership for the disposal of liquid effluent in CETP and solid/hazardous waste in TSDF, if any | 20 KLD capacity of ETP facilitated within the Existing facility to treat the wastewater. ZLD Concept will be followed after expansion.<br><br>Authorization/Membership for thedisposal ofsolid/hazardous waste in TSDFis enclosed as **Annexure-11.** |
| 9 | Action plan for utilization of MEE/dryers salts. | There is no generation/utilization of MEE/dryers salts in existing &proposed project. |
| 10 | Material safety data sheet for all the chemicals being used/will be used | MSDS of raw materials are added as **Annexure-7** |
| 11 | Authorization/Membership for the | Authorization/Membership for thedisposal |

| S. No | Terms of Reference | Compliance |
|---|---|---|
| | disposal of solid/hazardous waste in TSDF. | ofsolid/hazardous waste in TSDFis enclosed as **Annexure-11.** |
| 12 | Details of incinerator if to be installed. | No incineration activity in the facility. |
| 13 | Risk assessment for storage and handling of hazardous chemicals/solvents. Action plan for handling & safety system to be incorporated | Risk Assessments are enclosed as **Annexure-32** |
| 14 | Arrangements for ensuring health and safety of workers engaged in handling of toxic materials | Detail on health and safety of workers is provided in the **Chapter 10, Section 10.7.** |

## 7.5 Hazard Identification and Safety System

**Hazard Identified In the Factory**

1. Health hazard due to exposure to chemicals and chemical spillages.
2. Fire hazard due to use of flammable chemicals.
3. Fire and explosion hazard due to various chemical reactions.

**Scenario Based Emergency Actions**

1. Action plan in case of Solvent leakage from flange joints or from bottom valve etc.,
2. Action plan in case of Fire in Centrifuge due to Solvent vapors
3. Action plan in case of Fire or Explosion
4. Action plan in case of Toxic Release
5. Action plan in case of Electric Fire or Shock
6. Action plan in case of leakage or rupture of Solvent / Fuel storage tanks
7. Action plan in case of Water Reactive Chemical Spillage
8. Action plan in case of Leakage through Pipe Line, Barrel / Drum

**1. Action plan in case of Solvent leakage from flange joints or from bottom valve etc.,**

- Shift In-charge / Department Head shall be informed immediately.
- Access the situation.
- Only trained personnel shall approach the area using suitable personnel protective equipments.
- Stop leakage by closing isolation valve.
- Stop hot work in surrounding area.
- Isolate the power supply of the respective area.
- Other than the needy all shall evacuate the area.
- Cover drains / isolate from other plants with the help of sand or soil.
- Affected persons shall move to fresh air and seek medical help further.

**2. Action plan in case of Fire or Explosion**

- Shout and break MCP.
- Trained personnel shall fight the fire with suitable PPEs.
- Extinguish with DCP / CO2 / Foam Extinguishers installed at site.

- In case the fire not controlled with the use of portable fire extinguishers, start fighting by using fire hydrant system and use mobile foam unit for solvent fire.
- Isolate the power supply of the respective area.
- Other than the needy all shall evacuate the area.
- Cooldown nearby receivers / service tank, reactors etc by water spray.
- Isolate interconnection of tanks, reactors, service tank, charging valves, receivers etc.
- Other pipelines are to be checked for isolation.
- Close / isolate the drains with sand or soil.
- Affected persons shall be given first aid and moved for medical attention.

**3. Action plan in case of Toxic Release**

- Shift In-charge / Department Head shall be informed immediately.
- Only trained personnel shall approach the area using suitable personnel protective equipments like SCBA.
- Check the wind direction; decide route of escape and evacuating persons shall run perpendicular to the wind direction and not against / along the wind direction.
- Evacuating personnel should use wet handkerchief on their nose.
- Inform the neighbourhood if required and if they are likely to be affected.
- Ensure that only essential personnel are in the affected areas.
- Rescue the persons trapped / injured.
- Person present in other buildings should close their windows and doors to prevent any entry of leaked gases.
- Trace the source of leakage or spillage and isolate the system from other equipment.
- Isolate the electrical supply to the affected area.
- Trap the leakage into a suitable scrubber.
- Affected persons shall be given first aid and moved for medical attention.

**4. Action plan in case of Electric Fire or Shock**

- Isolate the power supply to the affected area immediately before approaching the site.
- Do not use water for extinguishing the fire. Use $CO_2$ type or DCP type or dry sand to extinguishing the fire.
- Remove any flammable or combustible material from the vicinity of the incident.
- Remove the affected person to an open area and check his breathing.
- If he is unconscious and not breathing initiate artificial resuscitation procedure.
- Do first aid for any burn injury.
- Physically isolate the burnt electrical components. Do not energize till the entire circuitry is checked with megger or other devices with safety mechanisms.

**5. Action plan in case of leakage or rupture of Solvent / Fuel storage tanks**

- Area shall be evacuated immediately and cordoned off.
- Affected persons shall be thoroughly washed using clean water and given necessary medical aid.
- Personnel entering the area should make use of suitable personnel protective equipments.

- Leaked tank must be depressurized immediately by transferring remaining quantity into another tank or container.
- Leakage source must be traced and plugged.
- Isolate the nearby electrical points and prevent any fire being brought nearby. As a precaution mobilize extra fire extinguishers to the spot to tackle fire if caught. Spilled material spreading should be contained in a dyke and transferred to container or it must be absorbed on sand or earth.
- The contaminated sand or earth must be neutralized and then dumped at safe place or burned in the fire pit. (flammable liquids should not be absorbed by combustible solids like saw dust or combustible fibres)
- If a spilled material in to the trench of electrical cables, then it shall be drained with natural gradient and wash with large quantity of water continuously after de energising the cable.
- If a spilled material gets into the storm water drain or sewer line then it must be flushed with a continuous flow of large stream of clean water till it is neutralized fully.

**6. Action plan in case of Water Reactive Chemical Spillage**

- Do not put water on the spill.
- If it is liquid, use neutralizing agent and inert material like dry sand to absorb spillage.
- If it is powder / crystalline, avoid generating dusty conditions, sweep up material.
- Placed to bag, label the bag and send to ETP for safe disposal.
- Decontaminate spill site with suitable neutralizing material.
- Wash the spill area.

**7. Action plan in case of Leakage through Pipe Line, Barrel / Drum**

- If the leak in a pipe line, immediately stop the supply to corresponding pipe line
- If the leak in a barrel or drum, do not move or transport that barrel or drum.
- Immediately transfer that content to another non leak barrel or drum.
- Transferred barrel / drum should be compatible with the material.
- After the material transferred, empty drums are to be neutralized, washed and then send to ETP for safe disposal.
- To remove the spilled material from that area, procedure to be followed based on the nature of material / chemical.

# CHAPTER – 8

# PROJECT BENEFITS

# 8 PROJECT BENEFITS

## 8.1 Financial and social benefits

- Existing Annual Turnover: INR 55.0 Cr
- Proposed Projected Annual Turnover: INR 150 Cr

## 8.2 Social Benefit

- The project will provide employment to local youth and good supply of products to Domestic & commercial purposes, thus increasing their standard of living and thus helping strengthen the social infrastructures of the region.

## 8.3 CSR benefit to local community

The company is aware of the obligations towards the society and to fulfill the social obligations. Proponent will be allocated 2.5% on Profit to local community development under CSR Plan as follows;

**Table 8-1 Proposed CSR Plan (2019-20 to 2023-24)**

| S. No | Description of Beneficiary | % Allotted | Amount of profit | Amount to be spent | Period |
|---|---|---|---|---|---|
| 1 | Providing Note book and supply of furniture | 20% | 4,598,515 | 919,703 | 2019-20 |
| 2 | Additional Class rooms to schools | 30% | | 1,379,554 | |
| 3 | PM Fund | 50% | | 2,299,257 | |
| 4 | Tree Plantation | 20% | 6,895,230 | 1,379,046 | 2020-21 |
| 5 | Better road Facility | 15% | | 1,034,284 | |
| 6 | Rain water harvesting and water shed in village | 15% | | 1,034,284 | |
| 7 | PM Fund | 50% | | 3,447,615 | |
| 8 | Tree Plantation | 15% | 7,706,408 | 1,155,961 | 2021-22 |
| 9 | Additional Class rooms to schools | 10% | | 770,641 | |
| 10 | Better road Facility | 15% | | 1,155,961 | |
| 12 | Sports Equipment | 10% | | 770,641 | |
| 11 | PM Fund | 50% | | 3,853,204 | |
| 13 | Tree Plantation | 10% | 6,955,686 | 695,569 | 2022-23 |
| 14 | Skill Training Programmes | 20% | | 1,391,137 | |
| 15 | Health- Health Camps | 20% | | 1,391,137 | |
| 16 | PM Fund | 50% | | 3,477,843 | |
| 17 | Sports Equipment | 20% | 5,943,001 | 1,391,137 | 2023-24 |
| 18 | Health- Health Camps | 15% | | 1,043,353 | |
| 19 | Additional Class rooms to schools | 15% | | 1,043,353 | |
| 20 | PM Fund | 50% | | 3,477,843 | |

## 8.4 CER Plan For Next Five Years

The company is allotted 1% of the project cost under Corporate Environmental Responsibility Plan as per Ministry O.M. No. 22-65/2017-IA.II (M) dated: 01.05.2018.

**Table 8-2 CER Plan (2020-21 to 2022-23)**

| S. No | Description of Beneficiary | 2020-2021 | 2021-2022 | 2022-2023 |
|---|---|---|---|---|
| 1. | Construction Toilets to Govt School. | 3.0 | 1.00* | -- |
| 2. | Solar Lights for Enadur Village | -- | 2.00 | -- |
| 3. | Skill Training Programmes | -- | -- | 2.00 |
| 4. | Green Belt development to nearby villages | -- | 2.00 | 2.00 |
| 5. | Rain water harvesting and water shed programmes in village | 2.00 | -- | -- |
| | **Sub total cost(Lakhs)** | **5.00** | **5.00** | **4.00** |
| | **Grand Total(Lakhs)** | **14.0** | | |

## 8.5 Benefits to the environment

- Plantation/Green belt is beingdone around factory site.
- Green belt will enhance the green coverage in the area & aesthetics.
- Rain water harvesting will enhance the ground water table.
- As seen above there is marginal impacts on air, noise, water & soil environments.
- The marginal impact due to the proposed assignment will be fully mitigated by the Environmental Management Plan (EMP).
- There is no demolished activities involved in this proposed project
- ESR will provide the well-being of the society and the protection of the environment will help in conserving the ecosystem. It will also provide employment opportunities to larger population.

Thus, the proposed expansion project will benefit both the local as well as Indian economy.

# CHAPTER – 9

# ENVIRONMENTAL COST BENEFIT ANALYSIS

# 9 ENVIRONMENTAL COST BENEFIT AND ANALYSIS

- Not Recommended during scoping stage

# CHAPTER – 10

# ENVIRONMENTAL MANAGEMENT PLAN

# 10 ENVIRONMENTAL MANAGEMENT PLAN

## 10.1 Introduction

This Environmental Management Plan (EMP) for the M/s. Kanchi Karpooram Ltd (KKL), identifies the principles, procedures and methods that will be used to control and minimize the environmental impacts of the proposed operational activities associated with the expansion project development. It is intended to ensure that commitments made by the KKL to minimize project related environmental and social impacts.

As part of our ongoing commitment to excellence in environmental and social performance we will ensure the following:

- Fulfill all environmental conditions associated with project approvals.
- Develop, promote and foster a shared sense of responsibility for environmental and performance of the project.
- Promote environmental awareness and understanding among employees and contractors through training, identification of roles and responsibilities towards environmental management
- Linking project performance to overall environmental performance.
- To monitor the environmental performance throughout the project and implement an adaptive management approach for continuous improvement and to meet the regulations.

## 10.2 Objectives of the EMP

The EMP has the following goals:

- Identifying project activities that may have a detrimental impact on the environment;
- Detailing the mitigation measures that will need to be taken, and the procedures for their implementation
- Establishing the reporting system.
- An integrated plan for monitoring, assessing and controlling potential impacts once the project has been approved and all permits and conditions granted.
- Facilitate a continual review of post operation activities.
- Preparation of afforestation or Greenbelt Development scheme.
- Preparation of rain water harvesting scheme and energy conservation actions
- To prepare a detailed action plan for implementation of mitigation measures.
- Measure the effectiveness and success of proposed mitigation measures.

The EMP also serves to highlight specific requirements that will be monitored during the development and should the environmental impacts not have been satisfactory prevented or mitigated, corrective action will have to be taken. The document should, therefore, be seen as a guideline that will assist in minimizing the potential environmental impact of activities.

## 10.3 EMP roles and responsibilities

**Environmental Management Cell (EMC)**

- All the activities will be monitored to ensure the appropriate implementation of all environmental mitigation activities and to identify areas where environmental management plan compliance is not satisfied.
- For effective implementation of the system, it is also necessary to have a permanent organizational set-up. Company has set-up permanent Environmental Management Cell (EMC) for the effective implementation and monitoring of environmental management system.
- The company assigned responsibility to the concerned for implementation of environmental control measures.
- The EMC will handle all issues related to different environmental attributes; it will be responsible for overall environmental and social management in project being undertaken by M/s Kanchi Karpooram Ltd from investigation level to execution at project level.
- The EMC will be responsible for the technical planning, implementation and monitoring of all environmental mitigation and compensation measures.The Environmental Management Cell (EMC) set-up by the company is given in**Figure 10-1.**
- Existing EHS policy of Kanchi Karpooram Ltd enclosed as **Annexure-28.**


**Figure 10-1 Environmental Management Cell**

- This section describes the organizational structure and responsibilities for implementation of the EMP as shown in**Table 10-1.**

- Executive Director of the company will be responsible for total environmental management.

**Table 10-1 EMC Responsibility**

| S. No. | Name & Designation | Responsibilities |
|---|---|---|
| 1 | Mr. Suresh Shah Managing Director | ➢ Establish an environment management cell.<br>➢ Responsible for overall environmental management. Regularly coordinate with EHS Head and take feedback regarding all the activities performed under EM and give directions to succeeding |

| | | |
|---|---|---|
| | | component.<br>➢ Provide sufficient funds for environmental management cell to reduce the environment impacts.<br>➢ Any deviations in Non compliance and violations of Environmental norms will be discussed in board. |
| 2 | Mr. Dipesh Shah<br>Executive Director<br>(Works) | ➢ Keep aware the Management about all the activities performed under EMC.<br>➢ To ensure and study the feasibility of ETP working considering the present and future requirements and to suggest for improvements if any.<br>➢ To ensure, implement and follow all the required safety procedures & facilities, avoid the unsafe act & conditions, organizing safety trainings, mock drills, availability of onsite & off site emergency plans. Plan & implement Good safety committee. |
| 3 | Mr. Saminathan<br>Lab Executive | ➢ Treatment and disposal of trade effluents and sewage effluent as per consent.<br>➢ Carryout ambient air quality monitoring as per consent.<br>➢ Monitoring the stack / chimney.<br>➢ Hazardous waste management handling and disposal.<br>➢ Plant and maintain adequate numbers of trees and gardens around the Industry<br>➢ Applying and getting the consent of operation of air & water and authorization to store the hazardous waste<br>➢ Prepare Management Information System (MIS) reports and budget for environment management program.<br>➢ To deal with the environmental issues and for ensuring compliance with the conditions prescribed by TNPCB.<br>➢ Non compliance / violation of environmental norms, if any are reported to EHS Head and immediate required action is taken. |
| 4 | Mr. M. Manoharan<br>Logistic In charge | ➢ Daily ETP department work plan execution.<br>➢ Preparation of SOP and ETP related documents.<br>➢ Sampling the effluent at different stages and analyzing to check the efficiency of the plant such as pH, COD, BOD, TDS and alkalinity.<br>➢ Record the readings in the log sheet and preparation of daily report.<br>➢ Coordinating with outside agency to carry out the AAQ, stack, Fugitive emission, noise level monitoring and water quality parameters checking.<br>➢ Preparation of monthly returns<br>➢ Ensuring Plant and Process Safety |

In addition to the above, company will have Safety, Health & Environment (SHE) policy to adhere with standard operating process in order to comply with the statutory and bring into focus any infringement of any norms and directives with regards to the SHE and to take further corrective actions

## 10.4 Environmental Policy

In addition to the above, company will have Safety, Health & Environment (SHE) policy to adhere with standard operating process in order to comply with the statutory and bring into focus any infringement of any norms and directives with regards to the SHE and to take further corrective actions.

KANCHI KARPOORAM LIMITED

ISO 9001 : 2008 Certified Company - CIN:L35999 TN1982 PLC031109

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**Environmental Policy**

M/s Kanchi Karpooram Ltd is committed to providing a quality service in a manner that ensures a safe and healthy workplace for our employees and minimizes our potential impact on the environment. We will operate in compliance with all relevant environmental legislation and we will strive to use pollution prevention and environmental best practices in all we do.

Our Policy therefore, is to:

- integrate the consideration of environmental concerns and impacts into our decision making and activities,
- Minimize our waste and then reuse or recycle as much of it as is possible.
- Minimize energy and water use within our buildings and processes in order to conserve supplies and minimise the consumption of natural resources.
- As far as is possible, purchase products and services that do the least damage to the environment.
- train, educate and inform our employees about environmental issues that may affect their work,
- promote environmental awareness among our employees and encourage them to work in an environmentally responsible manner,
- communicate our environmental commitment to clients, customers and the public and encourage them to support it
- where required by legislation or where significant health, safety or environmental hazards exist, develop and maintain appropriate emergency and spill response programmes,

KANCHI KARPOORAM LTD

-Management

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**Figure 10-2 Environmental Management Plan**

In addition to the above, company will have SHE policy to adhere with standard operating process in order to comply with the statue and bring into focus any infringement of any norms and directives with regards to the Safety , Health & Environment and to take further corrective actions.The HSE Group will look after the operation of the Effluent Treatment

Plant and to monitor and control the environmental quality. Members of the HSE Group shall be well qualified and experienced in the concerned fields.

Routine tests of wastewater such as pH, solids, temperature etc. will be carried out in the laboratory that would be established on site. However, for additional tests of water, wastewater, soil, air etc., services of accredited laboratories as well as that of a consultant would be hired.

### Compliance against the Consent Condition

Compliance against the consented conditions shall be observed with respect to the following Acts,

- Water (Prevention & Control of Pollution) Act, 1974
- Air (Prevention & Control of Pollution) Act 1981
- Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules 2016.

**Table 10-2Compliance against the Consent Condition**

| S. No. | Description | Frequency | Remark |
|---|---|---|---|
| 1. | Renewal of Consent | Once in 1 years | Application for renewal shall be done 60 days before the expiry date. |
| 2. | Environmental Statement | Once in a year | Would be submitted for every financial year before 30th September of next year. |
| 3. | Hazardous Waste Returns | Once in a year | Would be submitted for every financial year before 30th June of next year. |
| 4. | Cess Returns | Monthly | Twelve Returns would be submitted every year. |

## 10.5 EMP for Construction Phase

The construction phase is for a short period hence the impacts will also be temporary and will be for short duration.

- During construction activities, mainly emission of dust and gases from movement of vehicles and construction activity is expected.
- Water will be sprinkled on loose top soil to prevent re-suspension of dust into ambient air due to movement of vehicles etc.
- Separate civil construction material storage yard will be constructed within the site and it will be covered.
- Possibility of raising green belt along with construction activity will also be explored.
- Transport vehicles and construction equipments / machineries will be properly maintained to reduce air emissions.
- Vehicles and equipments will be periodically checked for pollutant emissions against stipulated norms. All vehicles' Pollution under Control (PUC) Certificate shall be checked regularly.
- Exhaust vent of D.G. set will be kept at proper height to ensure quick dispersal of gaseous emissions.
- There shall not major housing facilities at site for construction workers and hence a major source of impact on water environment can be avoided.
- Proper and sufficient sanitary facilities shall be provided to construction workers to maintain all hygienic conditions at site.

- Care shall be taken during construction work and will not create any obstruction/dips in the topography which can lead to accumulation of water within premises leading to undesirable consequences like health and hygiene problems etc.
- The main solid waste generation during the construction phase includes rubble, brick bats, debris, steel scrap, wooden scrap, sand, gravel etc. However, these materials are inert in nature and will not result into leaching of any substance or constituent.
- Wooden scrap, steel scrap shall be given to scrap dealers.
- Acoustic enclosure shall be provided to all D.G. sets to control the noise during construction activity.
- All construction workers working in high noise areas will be provided appropriate PPEs like ear muffs and made to wear them during working hours.

## 10.6 EMP for Operational Phase

Monitoring during the operation phase shall reflect those environmental and socio-economic issues that may persist upon completion of construction activities. Monitoring shall focus on evaluating the effectiveness of project mitigation measures and continue baseline monitoring and sampling. The mitigation measures to prevent adverse impact during the operation phase of the project shall focus on the following:

1. Air quality
2. Noise environment
3. Water quality and water resources
4. Solid and hazardous waste
5. Land environment
6. Ecology
7. Socio Economic

### 10.6.1 Air quality

The major sources of emission are reactors, boiler,TFH (Fire wood heater)and D.G sets. Stacks will be provided with adequate height. Adequate green belt (33.1%) has been developed &maintained to mitigate the air pollutants. Regular monitoring of DG-Stack and Ambient air quality will be carried out. APC measures for stacks are provided in **Table 10-3.**

**Table 10-3 Air Pollution Control Measures**

| S.No | Details | Capacity | | | APC | Stack Height meters(AGL) | Gaseous Discharge (Nm3/h) |
|---|---|---|---|---|---|---|---|
| | | Existing | Proposed | After expansion | | | |
| 1 | DG Power Back up(kVA) | 1 x 250* | 1 x 380 | 1 x 380 | Stack | 12 | 2239 |
| | | 1 x 180 | - | 1 x 180 | Stack | 7.5 | 1707 |
| 2 | Steam Boiler (Not in Use) Tonne/hr | 1 x 1* | - | - | Stack | 20 | 6997 |
| 3 | TFH (Wood Fire Heater) MW/hr | 1 x 1.74 | 1 x 4.65 | 1 x 1.74 | Stack with Dust collector | 30 | 1669** |
| | | | | 1 x 4.65 | | | 18000 |

Note: 1.* Steam Boiler (Not in Use) will be discarded during expansion

2. * 1 x250(Not in Use) will be removed during expansion
3. Each TFH will have individual dust collector and common stack
4. Existing 4 (Nos) stacks are available, after expansion it will be reduced to 3 (Nos) stacks
5. ** 1(No) TFH will be operational & remaining 1 (No) TFH will be standby

**Table 10-4Fugitive & Noise Emission**

| S. No. | Fugitive or Noise Emission Sources | Type of Emission | Existing | Proposed | After expansion | Control measures Proposed | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | Reactors | Acid fumes/ VOC | 11 | 10 | 21 | Individual condenser | It' is a closed loop system |
| 2 | Distillation columns | Acid fumes/ VOC | 5 | 3 | 6 | Individual condenser | -- |
| 3 | DG 1(kVA) | Noise | 1 x 250* | 1 x 380 | 1 x 380 | Acoustic enclosures | -- |
| 4 | DG 2 (kVA) | Noise | 1 x 180 | - | 1 x 180 | Acoustic enclosures | -- |

Note: *1 x 250(Not in Use) will be removed during expansion

KKL adopts the following action to control fugitive emission from the reactors and odour:

**Fugitive Emission**

- Continuous source of emissions such as thermic fluid heaters, reactors and DG sets should be installed with sufficient number of stacks and at sufficient height, bag filters and Scrubber to ensure adequate dispersion of pollutants.
- Burning of solid and oil waste should be avoided, suggestive use of appropriate incinerators for burning purpose.
- On loading/offloading and storage areas will be paved to reduce dust emission
- Water sprinkling on inner road to prevent re-suspension of dust into ambient air due to movement of heavy vehicle etc
- Regular servicing and maintenance of equipment to reduce the emission of greenhouse gases.
- Vehicular speed will be limited to 20km/hr on areas of unconsolidated or unsealed soil associated with the immediate site work

**Odour & VOC control procedure**

- Tertiary condensers and chilling plant is being developed to prevent the Organic vapours
- The Volatile Organic Compound (VOC) monitoring will be carried out in regular intervals and will be submitted to the board.
- The Environment team will be trained on Industrial hygiene and sampling / testing techniques.
- M/s Kanchi Karpooram Ltd will provide local exhaust ventilation at storage locations.

### 10.6.2 Noise Environment

The major source of noise pollution in the industry is DG sets, Reactors, Distillation column, Condensers, Air compressors, Feed water pumps. DG sets are provided with integral acoustic enclosures. Also the ambient noise levels will be ensured within the ambient

standards by inbuilt design of mechanical equipment and buildings apart from vegetation along the periphery and at various locations within the industry premises. The plant will be specifically designed with due consideration on minimizing noise pollution. Higher noise levels will be felt only near the active working areas and therefore the workers are provided with personal protective equipment as a safety measure.

Following measures are proposed to mitigate negative impact of operation phase of the project on the surrounding noise environment.

i. All the noise generating equipments will be designed / operated to ensure that noise level does not exceed 75-70 dB (A) at plant boundary as per the requirement of Central / State Pollution Control Board.
ii. Noise generating sources will be maintained properly to minimize noise generated by them.
iii. Wherever feasible, acoustic enclosures will be provided for compressors, DG sets.
iv. Compliance with noise control norms will be given due importance at the time of purchase of various equipments and it will be mentioned while placing the purchase orders and guarantee for noise standards will be sought from suppliers.
v. Moreover, all the personnel working in other high noise generating areas too will be provided with sufficient ear protecting devices.
vi. Green belt will act as a noise barrier.
vii. Training will be imparted to personnel to generate awareness about effects of noise and importance of using PPEs.

### 10.6.3 Water and wastewater management

The total water requirement for the existing unit is 28.1 KLD, of which 21.2 KLD is fresh water and 6.9 KLD is treated water.

The water requirement for construction phase will be 50 KLD. During operation phase of expansion, water requirement of proposed units will be mainly for sopanification washings, cooling water, floor washings, domestic use, fire water storage &greenbelt etc.

Water requirement for proposed expansion will be 96KLD of which 77.5KLD is fresh water (includes direct use 19 KLD reuse 22.5 KLD and pretreated water 36 KLD) and 18.5 KLD will be treated/recycled water. Green belt &floor &area washings and Fire fighting water requirement will be through recycling treated Water (18.5 KLD) from STP/ETP.

The water requirement (existing and proposed) is met through ground water through borewell (3Nos within the project premises). NOC is obtained from Ground water resource department Tamil Nadu for abstraction of ground water is enclosed as **Annexure-20.** Wastewater Management details are given in **Chapter 4, Section 4.3.5.4.**

#### 10.6.3.1 Rainwater harvesting and Ground water recharging

Rainwater harvesting is an important component of wise resource use and environmental management. The total amount/quantity of water i.e., received in the form of rainfall over an area is called the rain water endowment of that area, out of which the amount of water that can be effectively harvested is called the rain water harvesting potential. The collection

efficiency accounts for the fact that all the rain water falling over an area cannot be effectively harvested due to losses on account of evaporation, spillage or run off etc.,

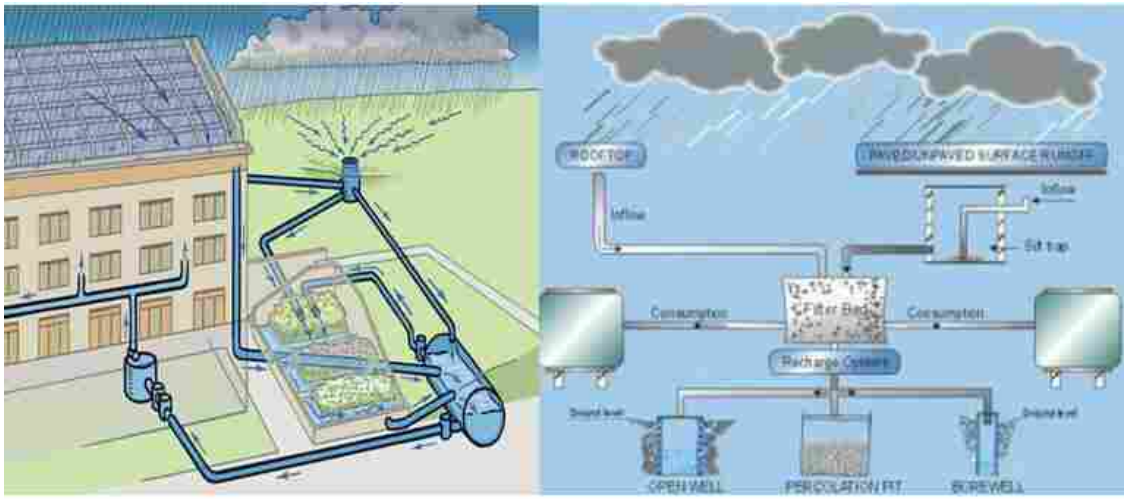


**Figure 10-3Schematic diagram of Rain water Harvesting**

Rainwater Harvesting shall be implemented conserve rainwater. Roof top area,greenbelt/green area, road/paved area and open areas proposed in the IP are considered for arriving the rainwater which can be harvested.The approximate quantities of rainwater that can be harvested at IP are summarized below;

The equation used for run off estimation is based on CPCB guidelines on 'Concepts and Practices for Rain water Harvesting'- Oct 2001.The calculations are based on the following:

- Average annual rainfall is 2214mm based on 1970-2000 IMD data
- Average No of rainy days are 60.5
- Run of co-efficient are considered as given by CPCB guidelines

**Table 10-5 Rainwater Harvesting-run of co-efficient calculations (Proposed)**

| S. No | Land Use Distribution | Area ($m^2$) | Volume ($m^3$) | Run off Coefficient | Volume Harvested | Volume of runoff harvested (KLD) |
|---|---|---|---|---|---|---|
| 1 | Roof Top | 5025.74 | 8901.53 | 0.8 | 7121.22 | 117.71 |
| 2 | Open Space | 3527.91 | 6248.63 | 0.3 | 1874.59 | 30.98 |
| 3 | Green Belt Area | 13708.85 | 24281.12 | 0.2 | 4856.22 | 80.27 |
| 4 | Roads | 5135.20 | 9095.47 | 0.7 | 6366.83 | 105.24 |
| | **Total** | **27397.67** | **48526.74** | **1.3** | **20218.86** | **334.20** |
| only 50% of the roof top area is considered | | | | | | |

**Storage Ponds/ Tanks**

In addition to roof top rainwater harvesting, Kanchi Karpooram Ltd will also adopt storage tank /pond system for storm water storage. 2 Nos of rain water storage tanks are constructed in existing facility; demarcated in plant layout is enclosed as **Annexure-8.** From these storage facilities, water can be pumped directly to points of demand orsupplied through over-head tanks. Silt trap pits and filter beds have to be maintained beforeletting the water to the storage pond / tank. The storage tanks are properly cemented to avoid leakage

or seepage into ground. One tank is proposed during expansion with dimensions of 10 m x 10 m x 2m and these structures will be maintained.

### 10.6.4 Solid and Hazardous waste management

#### 10.6.4.1 Solid waste management

The collection, transportation and disposal of the solid waste generated during the operation phase of the proposed project will be done as per the Municipal Solid Wastes (Management & Handling) Rules, 2000 (MSW Rules). Recyclable items like, paper, glass, iron bits, timber products etc. will be sold to local vendors. These generated solid wastes will be first segregated as plastic, glass, paper and other waste separately and disposed off as per MSW Rule, 2000. The plastic, glass and paper waste may be collected by private vendors for recycling. Sludge generated from STP (after drying) will be filled in HDPE bags and used as manure for gardening purpose.

#### 10.6.4.2 Hazardous Waste Management

The various hazardous waste generated from the process are used or spent oil, Chemical sludge from waste water treatment, waste or residues (not made with vegetable or animal materials, wastes or residues containing oil. ETP sludge waste is stored within the premises and disposed as per the guidelines of CPCB and TNPCB which will be sent to TSDF facility. Hazardous waste materials will be properly disposed as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules 1989 and subsequent amendment in 2016.

Solid and hazardous wastes generated in the facility and their disposal methods are detailed in the **Chapter 2**&**Section 2.9.**

### 10.6.5 Land environment

Following measures are proposed to mitigate negative impact during operational phase of the project on the land environment.

- Air emissions will be effectively controlled by use of scrubbers and therefore deposition of air pollutants in and around the premises and surrounding area is not envisaged.
- Disposal of solid waste will be carried out through authorized vendor.
- Wastewater is being treated in ETP is facilitated with 20 KLD within the existing facility. Treated wastewater is being used for Green Belt. No effluent will be discharged directly on land without treatment. Impact on the land environment is not envisaged.
- Hazardous materials will be prohibited to be drained or dumped in the premises. Accidental spills shall be cleaned, reported and monitored.
- Thus, no impact on land is envisaged due to discharge of gaseous emission, solid waste or liquid effluent from the proposed project.

### 10.6.6 Biological Environment

There is no potential source of impact on terrestrial biology during the operational phase. The air pollution control devices along with greenbelt will control the release of air pollutants

to a greater extent. It is expected that the ecology of the region is preserved by these mitigation measures.

### 10.6.7 Socio-Economic environment

Proposed project creates employment for an additional population of 140 Nos (permanent) for operation phase. Due to the proposed project various modes of indirect employment i.e. transportation, increased business opportunities to shopkeepers, small scale business entrepreneurs etc. will lead to development of the area.

## 10.7 Available safety system

### 10.7.1 Existing Fire & Safety systems

Existing & proposed fire &safety systems are summarized in **Table 10-6.**

**Table 10-6Fire &Safety Systems for Existing and Proposed**

| S. No | Name of the equipment | Qty(Nos) |
|---|---|---|
| 1 | Fire Extinguishers | 50 |
| 2 | Sand Buckets | 100 |
| 3 | Sand pits | 5.0 |
| 4 | Fire Hydrant Points | 10 |
| 5 | Fire Hydrant Pumps | 150m³/hr |
| 6 | Fire Hose(30M) REEL | 10 |
| 7 | First Aid | 2 |
| 8 | Fire siren alarm(Electrical) | 2 |
| 9 | Fire Alarm(Manual Bell) | 1 |
| 10 | Water storage tank 1 | 150m³ underground sump |
| 11 | Water storage tank 2 | 30 m³ underground sump |


**Figure 10-4Existing Fire Hydrant System**

### 10.7.2 Fire Extinguisher

Suitability of fire extinguisher depending on the combustible material, fires has been classified into four types. Suitability of extinguishing media for different fires is provided in **Table 10-7**.

**Table 10-7 Suitability of Extinguishing Media for Different Fires**

| S. No | Class of fire | Suitable Fire Extinguisher |
|---|---|---|
| 1. | **Class A:** Organic Material i.e. wood, papers, rubber & plastics. | DCP, Mechanical Foam |
| 2. | **Class B:** Flammable Liquid and Flammable Gases i.e., Petroleum Products, Paints, Chemicals etc. | Mechanical Foam, $CO_2$ and DCP |
| 3. | **Class C:** Electrical | DCP and $CO_2$ |
| 4. | **Class D:** Flammable Metals i.e. Lithium, Sodium, and Potassium etc. | Special DCP, Sand |

The company will have trained personnel for fire fighting and intends to improve the fire fighting skills of employee by conducting frequent training on Fire fighting. The unit will have 44 Nos. of different types ($CO_2$, ABC, Water Jet, Mechanical Foam, DCP and sand buckets) of portable fire extinguishers placed in all prominent places of the factory. Area wise fire extinguishers are given in **Table 10-8**.

**Table 10-8 Area wise Fire Extinguishers plan**

| S. No. | Type of Fire Extinguishers | Quantity | Section | Location | F.E. S. No. |
|---|---|---|---|---|---|
| 1 | BC (Dry Powder) | 25 kg | Camphene | Infront of Dis. Camphene st. tank | 38 |
| 2 | AB (Mechanical Foam) | 45 lt. | Camphene | Infront of Dis. Camphene st. tank | 44 |
| 3 | AB (Mechanical Foam) | 50 lt. | Camphene | Infront of Dis. Camphene st. tank | 40 |
| 4 | BC (Dry Powder) | 50 kg | Camphene | Infront of Dis. Camphene st. tank | 37 |
| 5 | BC (Dry Powder) | 25 kg | Camphene | Infront of Dis. Camphene st. tank | 39 |
| 6 | BC (Dry Powder) | 10 kg | Camphene | Infront of MCC2 & MCC3 | 8 |
| 7 | BC (Dry Powder) | 25 kg | Camphene | Infront of MCC2 & MCC3 | 9 |
| 8 | BC (Dry Powder) | 25 kg | Camphene | Near by IBA final transfer pump | 3 |
| 9 | AB (Mechanical Foam) | 9 lt. | Camphene | Near by IBA final transfer pump | 1 |
| 10 | BC (Dry Powder) | 25 kg | Camphene | Near by IBA final transfer pump | 4 |
| 11 | BC (Dry Powder) | 50 kg | Camphene | Near by IBA final transfer pump | 2 |
| 12 | AB (Mechanical Foam) | 50 lt. | Camphene | Near by IBA final transfer pump | 5 |
| 13 | BC (Dry Powder) | 10 kg | Camphene | Opp. D4 vessel | 6 |
| 14 | AB (Mechanical Foam) | 9 lt. | Camphene | Near by Fresh Acid measuring tank | 7 |
| 15 | CO2 | 2 kg | Camphene | PLC Room | 42 |
| 16 | BC (Dry Powder) | 50 kg | Camphor | Near camphor control room | 33 |
| 17 | AB (Mechanical Foam) | 50 lt. | Camphor | Near camphor control room | 36 |
| 18 | BC (Dry Powder) | 25 kg | Camphor | Near camphor control room | 35 |
| 19 | BC (Dry Powder) | 25 kg | Camphor | Near J7 vessel | 34 |
| 20 | BC (Dry Powder) | 50 kg | Camphor | Infront of Camphor filter | 16 |
| 21 | BC (Dry Powder) | 10 kg | Camphor | First floor near G6 vessel | 11 |
| 22 | BC (Dry Powder) | 10 kg | Camphor | First floor Near J1 column | 12 |

| | | | | | |
|---|---|---|---|---|---|
| 23 | BC (Dry Powder) | 10 kg | Camphor | Near H1C vessel | 19 |
| 24 | BC (Dry Powder) | 5 kg | OPR | Near OPR Vacuum trap | 27 |
| 25 | BC (Dry Powder) | 10 kg | OPR | Near OPR blower | 22 |
| 26 | AB (Mechanical Foam) | 9 lt. | OPR | Ester Gum packing room | 20 |
| 27 | AB (Mechanical Foam) | 9lt. | OPR | Ester Gum packing room | 21 |
| 28 | BC (Dry Powder) | 10 kg | OPR | Near Big kettle 2 | 24 |
| 29 | BC (Dry Powder) | 25 kg | IB | Near Pusher centrifuge | 17 |
| 30 | AB (Mechanical Foam) | 9 lt. | IB | Near Pusher centrifuge | 15 |
| 31 | AB (Mechanical Foam) | 45 lt. | IB | Near Pusher centrifuge | 43 |
| 32 | BC (Dry Powder) | 10 kg | Electrical | Near 180 KVA generator | 32 |
| 33 | BC (Dry Powder) | 10 kg | Electrical | Inside MV Panel | 31 |
| 34 | BC (Dry Powder) | 25 kg | Electrical | MCC1 Room inside | 41 |
| 35 | BC (Dry Powder) | 10 kg | Store | Infront of store | 30 |
| 36 | BC (Dry Powder) | 10 kg | Grinding | Inside grinding room | 26 |
| 37 | BC (Dry Powder) | 10 kg | Lab | Lab entrance | 23 |
| 38 | CO2 | 2 kg | Lab | Lab Inside | 18 |
| 39 | CO2 | 2 kg | Office | Office Inside | 10 |
| 40 | BC (Dry Powder) | 10 kg | Workshop | Workshop Inside | 25 |
| 41 | BC (Dry Powder) | 10 kg | Godown | Godown entrance | 28 |
| 42 | BC (Dry Powder) | 25 kg | Godown | Godown entrance | 29 |
| 43 | BC (Dry Powder) | 10 kg | Room | Infront of Room 1 | 13 |
| 44 | BC (Dry Powder) | 10 kg | Room | Infront of Room 2 & 3 | 14 |

### 10.7.3 Emergency Equipments and PPEs

The unit will have total 2 numbers of Emergency cupboards, in that one at Production Block and another at Utility Area.

Each Emergency Cupboard will have the following items;

- Air suits / Air Line Respirators
- Nose Mask
- PVC / Acid Suit
- Helmet- Provided to individuals
- Ear Plug
- Safety Glass- 10 & Face Shield- to individuals
- Gum boot- to individuals
- Safety Belt- in safety dept.
- Manila Rope / Life Safety Rope
- Fire Axe
- Fire Proximity Suit
- Fire Gel Blankets / Water Gel Blanket
- Resuscitator
- Spill Kit
- Safety Ladder
- Emergency Flameproof Torches
- Hand gloves

**Table 10-9 Description of Emergency Equipments and PPEs**

| S .No | Description | Image |
|---|---|---|
| 1 | **Fire Axe**<br>A fire axe is a type of axe which has been designed specifically for the use of fire-fighters, and it includes several features which makes it ideally suitable to mitigate emergency services. |  |
| 2 | **Helmet**<br>A helmet with face shield is a form of protective gear worn on head to protect head and face from hazards such as flying objects and chemical splashes or potentially infectious fluid. |  |
| 3 | **Fire Suit**<br>Fire suit is a protective clothing designed to protect a firefighter from high temperatures, especially near fires of extreme temperature |  |
| 4 | **Manila rope**<br>Manila rope is very durable, salt water and damage resistant, flexible fiber which shall be used to access at height/Confined space during emergency |  |
| 5 | **Smoke escape mask**<br>Smoke masks assist people in safe egress from fire emergencies. It will provide respiratory protection from particulate matter, carbon monoxide, and other toxic gases commonly produced by structural fires. |  |
| 6 | **Canvas Stretcher**<br>A stretcher is a medical device used to carry injured or an incapacitated person from one place to another during emergency. |  |
| 7 | **Compressed Air Pack**<br>An emergency air supply which will provide a sufficient quantity of air to allow a worker to exit oxygen depleted or contaminated area. |  |
| 8 | **Powered Air purifying respirator**<br>Powered Air Purifying Respirator (PAPR) is a device equipped with a face piece, hood or helmet, breathing tube, canister, cartridge, filter, canister with filter or cartridge with filter and a powered blower.<br>PAPR utilizes a powered mechanism to move ambient air through an air-purifying element(s) to remove contaminants from the ambient air. |  |

| | | |
|---|---|---|
| 9 | **Safety torch**<br>Compact and simple to use, this torch is designed for use in emergency situations or wherever the need arises for a handheld safety torch. |  |

**Spill Emergency Mitigation Procedure**

- Spill Kit is kept in all Emergency cupboards.
- Once the spill is observed, Spill Kit shall be collected from the nearest area/emergency cupboard installed and neutralizing agent (if required) based on the nature of the spill. In case if the spill is not controlled, immediately declare the emergency as per emergency response procedure.
- While handling the spill, use most appropriate PPE's like chemical suit, acid/ alkali proof hand gloves, face shield, safety goggles, gum boots or even respiratory masks with suitable cartridges.
- Once the spill is controlled using Sorbent pad/Boom collect in a double polythene bag and secure with the plastic ties. Dispose it as per applicable disposal procedure.
- Report the incident of spill to EHS department through online incident reporting System.
- Once in a month, the items of the Spill Kit shall be inspected and recorded by EHS representatives of the individual area.

### 10.7.4 Eye Wash Fountain and Safety Shower

The units have 1 Nos. of Eye wash fountain / Safety showers, one in Production Block.

### 10.7.5 Work Zone Monitoring Equipments

The unit will have multi gas / toxic gas and oxygen detectors in that multi gas detector can be used to check oxygen, LEL, VOC, CO and $H_2S$ concentration in atmosphere and also in confined spaces like inside the reactor, overhead tanks, underground tanks, sump etc and oxygen detector can be used for checking oxygen concentration in atmosphere and also in confined spaces like inside the reactor, overhead tanks, underground tanks, sump etc.

### 10.7.6 Wind Sack / Wind Direction Indicator

Wind sacks are placed above the Administration Block buildings.

## 10.8 Occupational Health Centre (OHC)

M/s Kanchi Karpooram Ltd is located at ~2.18 km away to kancheepuram. 24/7 ambulance facility is available at factory premises to provide the valuable service during emergency. Rs. 2, 00, 000/- Fund will be allocated for occupational health & safety of all contract and casual workers.

### 10.8.1 First aid Boxes

A first aid kit is a collection of supplies and equipment for use in giving first aid. First Aid boxes will be kept available in Security Room, Admin Block and at OHC. First Aid items will be issued to injure only by authorized persons.

Following are the contents of First Aid Box,

1. Dettol – Antiseptic solution
2. Ciplox – Eye Drops
3. Soframycin – Skin ointment
4. Silverex – Burn ointment
5. Betadine – Microbicidal solution
6. Iodex – Pain reliever
7. Sterilized Cotton Wool
8. Surgical Paper Tape
9. Small Sterilized Dressings
10. Medium Sterilized Dressings
11. Roller Bandage – 5 cm wide
12. Roller Bandage – 10cm wide
13. Band Aid
14. Crocin / Paracetamol Tablet

Along with the above safety systems, company also ensured the below safety features to ensure Zero Accident.

1. No ignitable zones are declared and marked so.
2. Work permit system with strict compliance.
3. Dedicated chemical storage area with good ventilation and exhaust system and all chemical are stored as per compatibility.
4. Dyke walls provided for the day storage chemical tanks.
5. All reactors provided with safety valves followed by rupture discs and relief valve outlets are extended.
6. Calibration is ensured for the gauges of pressure, temperature and vacuum.
7. All reactors will be hydro tested and certified by the competent person once in a year.
8. Body earthing provided to all equipments involved in the process, electrical earthing, static earthing and instrument earthing provided wherever required.
   Ventilation air units (VAUs) and Exhaust air units (EAUs) and are provided to ensure good ventilation in the work environment. The Organization Chart is shown in **Figure 10-5.**

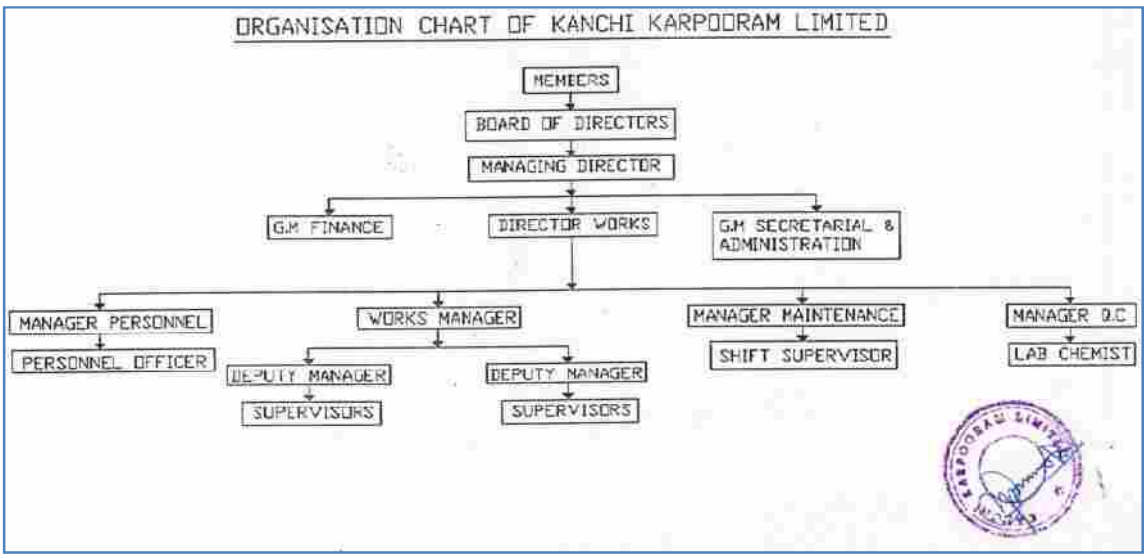


**Figure 10-5Organization chart of the project**

## 10.9 Occupational Health and Safety program

M/s Kanchi Karpooram Ltd will provide a safe and healthy work environment to its employees by conducting annual medical check-ups for all the employees.Existing health checkup reports are enclosed as **Annexure-30.**

The main objectives are

1. Maintenance and promotion of workers' health and working capacity.
2. Improvement of working environment by following well-being program for its employees.
3. Monitor the workplace to maintain industrial hygiene practices.
4. Development of work culture in a direction which will support health and safety at work and thereby promoting positive social climate for smooth operation that will enhance productivity. Area monitoring is done.
5. Employees undergo annual health check-up.
6. All personnel will be provided with personal protective equipments individually as required.

### 10.9.1 Construction Phase

Since, it is an Expansion project for enhancement of Camphor production and its derivatives and increase in total land area, there is a few additional or new construction activities are proposed.

### 10.9.2 Operational phase

General functions of the safety committee will be;

a. Conduct routine workplace inspections.
b. Provide Personal Protective Equipment.
c. Develop and implement safe work procedures and rules.
d. Provide on-going safety training & Enforce safety rules and appropriate discipline.

e. Promote safety awareness and reduce the potential for injury/loss.
f. Identify workplace hazards.
g. Enforce of safety rules, measure safety performance & reduce frequency/severity of injuries.

## 10.10 Occupational Health Monitoring

Medical Surveillance Program: Medical surveillance program is essential to assess and monitor employees' health and fitness both prior to employment and during the course of work; to determine fitness for duty and to provide emergency and other treatment as needed. Effectiveness of a medical program depends on active involvement of employees. M/s Kanchi Karpooram Ltd medical surveillance program will include the following major elements;

1. Developing a OH-IH Medical Surveillance Program.
2. Pre-Employment Examination and Periodic Medical Examinations
3. Determination of Fitness for Duty.
4. Communications.
5. Emergency Medical Treatment.
6. Medical Records.

**Pre-Employment Screening / Examinations** - All employees will be subjected to pre-placement medical examinations to determine their fitness for the jobs on site. Potential exposures to the work environment will be considered before placing an employee on the job.

**Periodic Medical Examinations** - Periodic medical examination is the same as the pre-employment screening and may be modified according to current conditions, such as changes in the employee's symptoms, site hazards or exposures.

Comparison of sequential medical reports with baseline data is essential to determine biologic trends that may mark early signs of adverse health effects, and thereby facilitate appropriate protective measures. The frequency and content of examinations are normally one year. Apart from this for workers working in Hazardous area, medical examination is conducted by Doctor Authorized by Factory Inspectorate. Existing Medical reports of the employees are given as**Annexure-30.**

## 10.11 Safety, Health and Environment policy

Kanchi Karpooram Ltd prepared Environment Health and Safety Policy (HSE) and placed it at appropriate places in the factory premises and record. Existing HSE policy was enclosed as **Annexure-28.**

## 10.12 Corporate social responsibility

The company is aware of the obligations towards the society and to fulfill the social obligations, company will employ semi-skilled and skilled labour from the nearby villages as much as possible and also try to generate maximum indirect employment in the nearby villages by appointing local contract workers. Proponent allocated 2.5% to local community development under CSR Plan. CSR Plan is shown in **Table 10-10**.

**Table 10-10 CSR plan for next five years**

| S. No | Description of Beneficiary | % Allotted | Amount of profit | Amount to be spent | Period |
|---|---|---|---|---|---|
| 1 | Providing Note book and supply of furniture | 20% | 4,598,515 | 919,703 | 2019-20 |
| 2 | Additional Class rooms to schools | 30% | | 1,379,554 | |
| 3 | PM Fund | 50% | | 2,299,257 | |
| 4 | Tree Plantation | 20% | 6,895,230 | 1,379,046 | 2020-21 |
| 5 | Better road Facility | 15% | | 1,034,284 | |
| 6 | Rain water harvesting and water shed in village | 15% | | 1,034,284 | |
| 7 | PM Fund | 50% | | 3,447,615 | |
| 8 | Tree Plantation | 15% | 7,706,408 | 1,155,961 | 2021-22 |
| 9 | Additional Class rooms to schools | 10% | | 770,641 | |
| 10 | Better road Facility | 15% | | 1,155,961 | |
| 12 | Sports Equipment | 10% | | 770,641 | |
| 11 | PM Fund | 50% | | 3,853,204 | |
| 13 | Tree Plantation | 10% | 6,955,686 | 695,569 | 2022-23 |
| 14 | Skill Training Programmes | 20% | | 1,391,137 | |
| 15 | Health- Health Camps | 20% | | 1,391,137 | |
| 16 | PM Fund | 50% | | 3,477,843 | |
| 17 | Sports Equipment | 20% | 5,943,001 | 1,391,137 | 2023-24 |
| 18 | Health- Health Camps | 15% | | 1,043,353 | |
| 19 | Additional Class rooms to schools | 15% | | 1,043,353 | |
| 20 | PM Fund | 50% | | 3,477,843 | |

## 10.13 CER Plan For Next Five Years

The company is allotted 1% of the project cost under Corporate Environmental Responsibility Plan as per Ministry O.M. No. 22-65/2017-IA.II (M) dated: 01.05.2018.

**Table 10-11 CER Plan (2020-21 to 2022-23)**

| S. No | Description of Beneficiary | 2020-2021 | 2021-2022 | 2022-2023 |
|---|---|---|---|---|
| 1. | Construction Toilets to Govt School. | 3.0 | 1.00* | -- |
| 2. | Solar Lights for Enadur Village | -- | 2.00 | -- |
| 3. | Skill Training Programmes | -- | -- | 2.00 |
| 4. | Green Belt development to nearby villages | | 2.00 | 2.00 |
| 5. | Rain water harvesting and water shed programmes in village | 2.00 | -- | -- |
| | **Sub total cost(Lakhs)** | **5.00** | **5.00** | **4.00** |
| | **Grand Total(Lakhs)** | **14.0** | | |

## 10.14 Cost Estimate for Environment Management Plan (EMP)

Environment management planfor Existing & proposed is summarized in**Table 10-12.**

**Table 10-12 EMP of the existing and proposed**

| S. No | Particulars | Cost in Lakhs (Rs.) | |
|---|---|---|---|
| | | Proposed | Recurring |
| 1 | Effluent Treatment Plant(ZLD Concept) | 33.0 | 10.0 |
| 2 | Sewage Treatment Plant | 20.0 | 5.0 |
| 3 | Environmental Monitoring equipments | 2.0 | 0.5 |
| 4 | Environmental Monitoring Cost | - | 5.0 |
| 5 | DG Acoustic | 2.0 | 1.0 |
| 6 | DG Chimney | 3.0 | 1.0 |
| 7 | Heater Chimney | 40.0 | 5.0 |
| 8 | Green Belt development and maintenance | 30.0 | 2.0 |
| 9 | Over Head Tank (for fire hydrant) (200 KL capacity) | 40.0 | 0.5 |
| | **Total** | **170** | **30** |

# 11 SUMMARY & CONCLUSION

## 11.1 Project Background

M/s KanchiKarpooram Limited (KKL) a Public Limited Company is engaged in the manufacture of Camphor and Derivative Products & Incorporated in the year 1992. Unit is located at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, Kancheepuram Taluk, Tamil Nadu - 631552. KKL is in this arena for more than two decades with a proven track record for quality products, competitive price and timely supply of its products. The main product is Camphor which has been well accepted in the market. Besides Camphor and its Derivatives, KKL's other products such as Gum rosin and Rosin Derivatives also enjoy an enviable share in the market including Corporate Clientele.

KanchiKarpooram Limited was originally conceived by Suresh shah, one of the largest consumers in the country and a leading tableteer of AMBICA brand. He was encouraged in this vision by some of the directors of M/s Twin city Organics Ltd which was one of two major manufacturers of Camphor in the country at that time.

Thus, KanchiKarpooram Ltd was incorporated with Suresh shah, his associates and some of the directors of M/s Twincity Organics Pvt Ltd and their associates being the initial subscribers to the memorandum and Articles of Association of the Company. However, with effect from 31.03.1993 the directors of Twincity Organics PvtLtd disassociated themselves from the project because of non-receipt of term finance assistance from IDBI and pre-occupation with their own business. Thereupon, Shri.Suresh shah who is the main customer of the products which are proposed to be manufactured by the company, decided to go ahead with the project by flushing in the required finance himself and by taking into confidence his other businessassociated//friends who area convinced about the company's potential.

KKL's (ISO 9001:2008 Certified Company) unit is situated very near Kancheepuram& just 70 Km from Chennai, on Chennai - Bangalore highway, thus geographically well connected. KKL's turnover is around 600 Million INR and well planned to augment the sales in a phased manner in the years to come.Existing and proposed expansion production details are shown in **Table 11-2.**

## 11.2 Project Summary

The proposed Expansion project envisages increasing the Camphor Production capacity from 110 MT/Month to 550 MT/Month, overall production capacity increase from 1566.855 MT/month to 4146.805 MT/month and increase in total land area 10.23 acres (Existing 6.95+ proposed 3.28 acres). The project site is coming under the schedule 5 (f) Synthetic Chemicals, category 'A' as per EIA Notification 2006 and it Amendments.

The company is assigning prime importance for environmental protection. The company will implement zero discharge concepts and comply the environmental laws. The industry will maintain well developed greenbelt. Project summary is provided in**Table 11-1.**

**Table 11-1Project Summary**

| S. No | Particulars | Existing | Proposed | After Expansion |
|---|---|---|---|---|
| 1 | Category of products | Camphor and its Derivatives | Camphor and its Derivatives | Camphor and its Derivatives |
| 2 | Product | 1 | No change | 1 |
| 3 | By Products | 7 | No change | 7 |
| 4 | Intermediates: | 15 | No change | 15 |
| 5 | Total | 23 | No change | 23 |
| 6 | Product (TPA) | 110 | 440 | 550 |
| 7 | By Products (TPA) | 696.88 | 764.95 | 1461.83 |
| 8 | Intermediates (TPA) | 759.975 | 1375 | 2134.975 |
| 9 | Total (TPA) | 1566.855 | 2579.95 | 4146.805 |
| 10 | Total Land area(acres) | 6.25 | 3.28 | 10.23 |
| 11 | Total Built up area (sq .m) | 6664.1 | 3387.3 | 10051.4 |
| 12 | Total Water Requirement(KLD) | 28.1 | 67.9 | 96 |
| 13 | Recycled (KLD) | 6.9 | 11.6 | 18.5 |
| 14 | Fresh water(KLD) | 21.2 | 56.3 | 77.5 |
| 15 | Source of Water | Bore well | Bore well | Bore Well |
| 16 | Effluent Generation in KLD | 8.2 | 11.5 | 19.7 |
| 17 | Sewage Generation in KLD | 7.0 | 1.0 | 8.0 |
| 18 | Wastewater Treatment System & capacity | 20 KLD ETP | ETP 20KLD Proposed (ZLD Concept) | ETP 20KLD Proposed (ZLD Concept) |
| 19 | Domestic Wastewater treatment system &Capacity | Septic tank followed by Soak pit | 10 KLD STP | 10 KLD STP |
| 20 | Power (kVA) Source: TNEB | 260 | 100 | 360 |
| 21 | Power Backup-DGs (kVA) | 1 x 250<br>1 x 180 | 1 x 380 | 1 x 380<br>1 x 180<br>1 x 250 (will be removed during expansion) |
| 22 | Thermo Pack Heater (Nos) | 3 | 0 | 3 |
| 23 | TFH (Wood Fire heater(MW/hr) | 1 x 1.74 | 1 x 4.65 | 1 x 1.74<br>1 x 4.65 |
| 24 | Diesel requirement (liters/Month) | 300 | - | 300 |
| 25 | Furnace oil (KL/Month) | 13.8 | - | 13.8 |
| 26 | Fire wood (MT/Month) | 300 | 500 | 800 |
| 27 | Man-Power (Nos) | 100 | 40 | 140 |
| 28 | Municipal Solid Waste (kg/day) | 45 | 9 | 54 |
| 29 | Ash from Fire wood (kg/day) | 8 | 8 | 16 |
| 30 | STP Sludge (kg/day) | - | 1.0 | 1.0 |
| 31 | ETP Sludge (MTPA) | 0.551 | 0.544 | 1.095 |
| 32 | Project Cost (Crores) | 1.0 | 13.0 | 14.0 |

**Table 11-2 Existing and proposed expansion production details**

| S. No | Units | Existing Capacity (MT/Month) | Proposed Expansion (MT/Month) | After Expansion (MT/Month) |
|---|---|---|---|---|
| **I.** | **Product** | | | |
| 1 | Camphor | 110 | 440 | 550 |
| | **Sub Total** | **110** | **440** | **550** |
| **II.** | **By Products** | | | |
| 1 | Terpeneolene / Dipentene | 49.6 | 300 | 349.6 |
| 2 | Rosin Oil | 5.05 | 4.95 | 10 |
| 3 | Spent Caustic lye | 36.11 | 0 | 36.11 |
| 4 | Sodium Acetate Tri Hydrate | 115.5 | 460 | 575.5 |
| 5 | Sodium Acetate as liquor/Alternate to Solid tri hydrate) | 193 | 0 | 193 |
| 6 | Gum Rosin | 295.62 | 0 | 295.62 |
| 7 | Camphor Oil | 2 | 0 | 2 |
| | **Sub Total** | **696.88** | **764.95** | **1461.83** |
| **III.** | **Intermediates** | | | |
| 1 | Turpentine oil(Turpentine KATEL) | 98.475 | - | 98.475 |
| 2 | Camphene | 110 | 440 | 550 |
| 3 | Iso Bornyl Acetate | 170 | 340 | 510 |
| 4 | Esters | 15 | 0 | 15 |
| 5 | Maleics | 15 | 0 | 15 |
| 6 | Phenolics | 20 | 0 | 20 |
| 7 | Rosin Size | 100 | 0 | 100 |
| 8 | Other Rosin Derivatives | 20 | 0 | 20 |
| 9 | Terpenic Oil | 20 | 0 | 20 |
| 10 | Pine Oil (Terpenol) | 40 | 60 | 100 |
| 11 | Longifoluences | 10 | 0 | 10 |
| 12 | Double Distilled Turpentine | 10 | 20 | 30 |
| 13 | Pine Tar | 15 | 45 | 60 |
| 14 | Pine Pitch | 6.5 | 30 | 36.5 |
| 15 | Iso Bornyl Crude | 110 | 440 | 550 |
| | **Sub Total** | **759.975** | **1375** | **2134.975** |
| | **Grand Total (I+II+III)** | **1566.855** | **2579.95** | **4146.805** |

## 11.3 Management Commitment

The company is assigning prime importance for environmental protection. The company will implement zero discharge concepts and comply the environmental laws. The industry has maintained well developed Greenbelt. Also, all the environmental statutory requirements will be implemented and maintained continually.

## 11.4 Environmental Sensitive Areas

The details of environmentally/ecologically sensitive areas covering within 15 km from project boundary are given in **Table 11-3 and Figure 3-3.**

**Table 11-3Environmentally Sensitive Areas within 15km radius from Project Boundary**

| S. No | Areas | Name/ Identity | Aerial distance (within 15 km.) proposed project location boundary |
|---|---|---|---|
| 1 | Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value | No | Nil |
| 2 | Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests | Yes | See nested table below |
| 3 | Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration | No | Nil |
| 4 | Inland, coastal, marine or underground waters | No | Nil |
| 5 | State, National boundaries | No | Nil |

| S. No | Name of the Location | Distance(~km) | Direction |
|---|---|---|---|
| **Rivers** | | | |
| 1 | Palar river | 8.27 | SSW |
| 2 | Vegavati river | 5.39 | SW |
| **Lakes** | | | |
| 1. | Tamarai Tangal | 0.02 | W |
| 2. | Tonneri Tank | 12.06 | E |
| 3. | Kaveripak N | 14.47 | WSW |
| 4. | Pamba Kalvai | 4.07 | NNW |
| 5. | Nathapettai lake | 4.92 | SE |
| 6. | Mamandur Tank | 12.62 | SSW |

| | | | |
|---|---|---|---|
| 6 | Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas | No | **Monuments:**<br>**S. No / Name of the Monuments / Distance (~km) / Direction**<br>1. Kailasanathar Temple — 4.25 — SW<br>2. Vaikuntaperumal Temple — 4.28 — SSE<br>3. Piravathanesvara Temple — 3.37 — S<br>4. Iravathanesvara Temple — 3.39 — S<br>5. Muktesvara Temple — 4.15 — SSW<br>6. Mathangesvara Temple — 4.41 — S<br>**Places of worships :**<br>**S. No / Places of worships / (~)Distance / Direction**<br>1. Sri Manikandeswara Swamy Temple — 9.95 — NW<br>2. Najma - Masjid — 10.12 — W<br>3. Sri Vijaya Raghava Perumal temple — 9.98 — W<br>4. Ekambareswarar Temple — 3.18 — SSW<br>5. Sri Pachai Vanna Perumal Temple — 3.49 — S<br>6. Sri Pavala Vanna Perumal Temple — 3.53 — S<br>7. Kailasanathar Temple — 4.25 — SW<br>8. Pandavar Perumal Temple — 3.87 — SSW<br>9. Jurahareswar Temple — 3.87 — SSW<br>10. Kamachi Amman Temple — 3.84 — S<br>11. Ulagalantha Perumal Temple — 4.05 — S<br>12. Kachabeswarar Temple — 4.21 — S<br>13. TMN Temple — 4.89 — SSW<br>14. Perinba Prayer House — 5.55 — SW<br>15. Bodhidharma Temple — 4.42 — SSE<br>16. Sathyanateswarar Temple — 5.21 — SSE<br>17. Perumal Temple — 5.63 — S<br>18. Jerusalem Workship — 6.31 — SSW<br>19. Panadudeeswarar Temple — 5.97 — S<br>20. Thiruvelakai Temple — 5.91 — S<br>21. Manikandeswar Temple — 5.95 — SSE<br>22. Narashima Temple — 7.85 — SSW<br>23. Sri Varadharaja Perumal Temple — 6.37 — SSE |

| | | | |
|---|---|---|---|
| | | | 24. Punniyakodeswarar Temple 6.57 SSE<br>25. Mosque 10.74 SSW<br>26. Thalapureeswarar Temple 13.31 SW<br>27. Rani Amman Temple 10.35 SE<br>28. Sri Ashtabujangaram Temple 5.85 S<br>29. Punadudeeswarar Temple 5.95 SSW<br>30. Govimthavadi Temple 8.67 NW<br>31. Vaikuntaperumal Temple 4.28 SSE<br>32. Iravathanesvara Temple 3.39 S<br>33. Mathangesvara Temple 4.41 S<br>34. Muktesvara Temple 4.15 SSW |
| 7 | Defense installations | No | Nil |
| 8 | Densely populated or built-up area | Yes | Kancheepuram = 2.18Km (S) |
| 9 | Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities) | No | S. No – Hospitals – Dist. (~Km) – Direction<br>1 Upgraded PHC 10.35 W<br>2 Meenakchi Medical College & Research Centre 1.58 SE<br>3 Aringer Anna Cancer Institute 0.96 SE<br>4 ABCD Hospital 4.17 S<br>5 Lakshmi Hospital 4.28 S<br>6 Narbhavi Hospital 4.35 SW<br>7 Govt Hospital 5.44 SW<br>8 Surya Clinic 4.45 S<br>9 CSI Hospital 4.58 S<br>10 Manohar Hospital 4.53 SSE<br>10 DKK Hospital 4.78 S<br>12 Life Care Hospital 4.7 S<br>13 Govt Dist HQ Hospital 4.78 S<br>14 Vasan Eye Care Hospital 5.06 S<br>15 Vengudi Hospital 5.15 S |

| | | |
|---|---|---|
| 16 | K.H. Hospital | 6.35 | SSW |
| 17 | PH Center GH | 5.31 | SSE |
| 18 | PH Centre | 14.44 | SSW |

| S .No | Schools and collages | Distance(~Km) | Direction |
|---|---|---|---|
| 1. | Park Global School | 8.2 | NNW |
| 2. | P.T.Lee College of Engg & Tech | 5.95 | NNW |
| 3. | Jai Mathaajee College of Engg | 3.44 | NW |
| 4. | L&T Safety School | 10.31 | ENE |
| 5. | Narasimma Pallavan Polytechnic College | 1.96 | W |
| 6. | Pallavan College of Engg | 1.87 | W |
| 7. | University College of Engg | 0.79 | WSW |
| 8. | Janus CBSC School | 7.21 | W |
| 9. | Govt School | 9.88 | W |
| 10. | Sri Krishna College of Arts & Science | 6.14 | WSW |
| 11. | Tirumalai Engg College | 5.67 | WSW |
| 12. | Meenakchi Medical College | 1.43 | ESE |
| 13. | Bakthavachalam Polytechnic College | 0.73 | SE |
| 14. | SCSVMV University | 2.55 | SE |
| 15. | Sri CSV Mahavidyalaya | 2.61 | SE |
| 16. | Sri Sankara Arts & Science College | 2.99 | SE |
| 17. | Govt Primary School | 3.45 | SSW |
| 18. | Cholan MHSS | 3.32 | SSW |
| 19. | Dwarkesh Vidhyashram | 3.78 | SSW |
| 20. | SSKV MHSS | 4.03 | S |
| 21. | Guruksetra PS | 4.56 | SSE |
| 22. | Mamallan MHSS | 4.63 | SSE |
| 23. | Kanchi Global School | 4.56 | SSW |
| 24. | Govt. School | 6.06 | SSW |
| 25. | Sanskrit College | 6.31 | SSW |
| 26. | Aadura Spl School | 6.73 | S |
| 27. | Pachaiappas Womens College | 6.13 | S |
| 28. | Bharathidasan MHSS | 7.68 | SSW |

| | | |
|---|---|---|
| 29. | Govt MS | 7.67 | SE |
| 30. | Pachaiappas College for Men | 7.42 | SE |
| 31. | Govt HSS | 8.99 | SE |
| 32. | JSN School of Management | 10.04 | S |
| 33. | Dusi Polytechnic College | 10.75 | S |
| 34. | Kanchi Pallavan Engg College | 11.64 | SSW |
| 35. | AMA College of Engg | 13.38 | SW |
| 36. | Govt HS | 14.29 | SSW |

| S. No | Places of worships | Distance(~Km) | Direction |
|---|---|---|---|
| 1. | Sri Manikandeswara Swamy Temple | 9.95 | NW |
| 2. | Najma – Masjid | 10.12 | W |
| 3. | Sri Vijaya Raghava Perumal temple | 9.98 | W |
| 4. | Ekambareswarar Temple | 3.18 | SSW |
| 5. | Sri Pachai Vanna Perumal Temple | 3.49 | S |
| 6. | Sri Pavala Vanna Perumal Temple | 3.53 | S |
| 7. | Kailasanathar Temple | 4.25 | SW |
| 8. | Pandavar Perumal Temple | 3.87 | SSW |
| 9. | Jurahareswar Temple | 3.87 | SSW |
| 10. | Kamachi Amman Temple | 3.84 | S |
| 11. | Ulagalantha Perumal Temple | 4.05 | S |
| 12. | Kachabeswarar Temple | 4.21 | S |
| 13. | TMN Temple | 4.89 | SSW |
| 14. | Perinba Prayer House | 5.55 | SW |
| 15. | Bodhidharma Temple | 4.42 | SSE |
| 16. | Sathyanateswarar Temple | 5.21 | SSE |
| 17. | Perumal Temple | 5.63 | S |
| 18. | Jerusalem Workship | 6.31 | SSW |
| 19. | Panadudeeswarar Temple | 5.97 | S |
| 20. | Thiruvelakai Temple | 5.91 | S |

| | | |
|---|---|---|
| 21. | Manikandeswar Temple | 5.95 | SSE |
| 22. | Narashima Temple | 7.85 | SSW |
| 23. | Sri Varadharaja Perumal Temple | 6.37 | SSE |
| 24. | Punniyakodeswarar Temple | 6.57 | SSE |
| 25. | Mosque | 10.74 | SSW |
| 26. | Thalapureeswarar Temple | 13.31 | SW |
| 27. | Rani Amman Temple | 10.35 | SE |
| 28. | Sri Ashtabujangaram Temple | 5.85 | S |
| 29. | Punadudeeswarar Temple | 5.95 | SSW |
| 30. | Govimthavadi Temple | 8.67 | NW |
| 31. | Vaikuntaperumal Temple | 4.28 | SSE |
| 32. | Iravathanesvara Temple | 3.39 | S |
| 33. | Mathangesvara Temple | 4.41 | S |
| 34. | Muktesvara Temple | 4.15 | SSW |

| S. No | Common places | Distance(~Km) | Direction |
|---|---|---|---|
| 1. | AJS Kalyana Mahal | 6.32 | WSW |
| 2. | Railway Station, Kanchipuram | 2.99 | S |
| 3. | East Railwaystation, Kanchipuram | 3.78 | SSE |
| 4. | Police Station | 3.44 | S |
| 5. | Sringeri Saradha Peetam Kalyana Mandapam | 3.73 | SSW |
| 6. | Sub Post Office | 4.22 | SSW |
| 7. | Taluk Police Station | 4.65 | S |
| 8. | District Sports Stadium | 4.76 | SSE |
| 9. | Head Post Office | 4.83 | S |
| 10. | Taluk Office | 5.53 | S |
| 11. | District Collector Office | 5.87 | S |
| 12. | S.P. Office | 6.1 | S |
| 13. | DIG Office | 6.46 | SSW |
| 14. | Walajabad Railway Station | 14.57 | SE |

<table>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td>15.</td><td>Anna Memorial House</td><td>6.26</td><td>SSE</td></tr>
</table>
</td></tr>
<tr><td>10</td><td>Areas containing important, high quality or scarce resources<br>(ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)</td><td>No</td><td>
<table>
<tr><th>S. No</th><th>Name of the Location</th><th>Distance(~km)</th><th>Direction</th></tr>
<tr><td colspan="4">Rivers</td></tr>
<tr><td>1</td><td>Palar river</td><td>8.27</td><td>SSW</td></tr>
<tr><td>2</td><td>Vegavati river</td><td>5.39</td><td>SW</td></tr>
<tr><td colspan="4">Lakes</td></tr>
<tr><td>1.</td><td>Tamarai Tangal</td><td>0.02</td><td>W</td></tr>
<tr><td>2.</td><td>Tonneri Tank</td><td>12.06</td><td>E</td></tr>
<tr><td>3.</td><td>Kaveripak N</td><td>14.47</td><td>WSW</td></tr>
<tr><td>4.</td><td>Pamba Kalvai</td><td>4.07</td><td>NNW</td></tr>
<tr><td>5.</td><td>Nathapettai lake</td><td>4.92</td><td>SE</td></tr>
<tr><td>6.</td><td>Mamandur Tank</td><td>12.62</td><td>SSW</td></tr>
</table>
</td></tr>
<tr><td>11</td><td>Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)</td><td>No</td><td>Nil</td></tr>
<tr><td>12</td><td>Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)</td><td>No</td><td>The project location falls under Seismic Zone –III as per India Seismic Mapping</td></tr>
</table>

## 11.5 Categorization of the Project

The Proposed Project termed under Schedule 5(f), Category'A' (project located in "Non notified Industrial area".) synthetic organic chemicals as per the EIA Notification 2006 and its Amendments. Since, KKL have gone for enhancement of Camphor production and its Derivatives and increase in total land area situated at S.F. No: 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Enadur Village, Parandur Road, Karaipettai Post, Kancheepuram Taluk, Tamil Nadu – 631552.

The Environmental Clearance application submitted to MoEF&CC on 19th May 2018 vides proposal number IA/TN/IND2/74991/2018. Based on the information furnished in Form-I, PFR MoEF&CC had issued the Desk topTerms of Reference (TOR) for preparing Environmental Impact Assessment (EIA) Report vide No. IA-J-11011/172/2018–IA-II (I) dated 21st June 2018. Base line Studies are carried out during the period of July 2018-Sep 2018 as per obtained ToR.

Later, Project Proponent applied for ToR amendment on 15.11.2018. Proposal appraised in 4th EAC Meeing 26.02.2019. During Presentation EAC Committee has recommended to submitting the ToR application with revised details.

The revised Environmental Clearance application submitted to MoEF&CC on 9thApril 2019 vides proposal number IA/TN/IND2/101471/2019. Based on the information furnished in Form-I& PFR, MoEF&CC had issued the Desk top Terms of Reference (TOR) vide No.IA-J-11011/143/2019–IA-II (I) dated 10th May 2019 to preparing the Environmental Impact Assessment (EIA) Report.

The EIA report submitted for Public Hearing to TNPCB, Public Hearing advertisement was published Dinamani and new Indian Express on 08.06.2019. Public hearing was conducted on 16.07.2019, 3pm at Sri Lakshmi Narayane Mahal & Party Hall, Bagalore Highway, Hotel Saravana Bavan Complex, Enathur Village, Kanchipuram Taluk, Kancheepuram District, Tamil Nadu 631502 in the presence of the District Environmental Engineer Tamil Nadu Pollution Control Board, sriperumdudur and District Collector Kancheepuram.

Public Hearing advertisement details are enclosed as **Annexure-33.** Minutes of Public Hearing and compliance is enclosed as **Annexure-34.** Final EIA will be submitted to MoEF&CC for further appraisal of the project and obtaining Environment Clearance. Public Hearing Photographs are shown in **Figure 7-1.**

## 11.6 Project Requirements

### 11.6.1 Land Requirement

The total land available is 41394.89 sq. Meters (10.23 acres). The existing factory is established in the area of 6664.11 sq. Meters. The area break up detail for existing &proposed expansion is given in**Table 11-4.** Project site layout plan is given in**Figure 2-8**. Photographs of the factoryare appended in **Figure 2-10.** Photographs of the facilities in factory are given in **Figure 2-11.**

**Table 11-4Land Use Pattern of the project**

| S. No | Description | Existing | | | Proposed | | | After Expansion | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Sq. m | Acres | % | Sq. m | Acres | % | Sq. m | Acres | % |
| 1 | Built-up area | 6664.11 | 1.65 | 23.74 | 3387.30 | 0.84 | 25.61 | 10051.41 | 2.48 | 24.24 |
| 2 | Green Belt | 9330.00 | 2.31 | 33.24 | 4378.85 | 1.09 | 32.93 | 13708.85 | 3.39 | 33.14 |
| 3 | Roads | 1989.21 | 0.49 | 7.05 | 3145.99 | 0.78 | 23.78 | 5135.20 | 1.27 | 12.41 |
| 4 | Parking area | 0 | 0.00 | 0.0 | 2313.50 | 0.57 | 17.38 | 2313.50 | 0.57 | 5.57 |
| 5 | Firewood storage | 6658.02 | 1.65 | 23.60 | 0 | 0.00 | 0.0 | 6658.02 | 1.65 | 16.13 |
| 6 | Vacant Land | 3484.31 | 0.86 | 12.37 | 43.60 | 0.01 | 0.30 | 3527.91 | 0.87 | 8.50 |
| | **Total** | **28125.65** | **6.95** | **100** | **13269.24** | **3.28** | **100** | **41394.89** | **10.23** | **100** |

### 11.6.2 Water Requirement

The total water requirement for Existing is 28.1 KLD (fresh water 21.2 KLD and treated water 6.9 KLD). Water requirement for Proposed will be 96KLD (fresh water 77.5 KLD and treated water 18.5 KLD). Direct use 19 KLD, reuse 22.5KLD and pretreated 36KLD is considered as a Fresh Water. Water requirement for construction phase is 50 KLD, since it is expansion of production capacity along with addition of 3.28 Acres land adjacent to existing facility with few additional of infrastructure facilities.

The water requirement will be met from existing bore well (3Nos) within project premises. NOC is obtained from Water Resource Deparment Tamil Nadu for abstracting ground water is enclosed as **Annexure-20.**

#### 11.6.2.1 Existing Water Requirement

The total water requirement for existing is 28.1 KLD Water balance chart for the existing facility is show in **Figure 2-12** enclosed as **Annexure-8.** Existing water requirement and break up details given in**Table 11-5.**

**Table 11-5 Existing water Requirement**

| S. No | Description | Total requirement | Water requirement (KLD) | | Wastewater generation | Loss | Remarks |
|---|---|---|---|---|---|---|---|
| | | | Fresh water | Treated water | | | |
| 1 | Cooling & Boiler feed | 5.0 | 5.0 | - | 1.0 | 4.0 | 1 KLD of wastewater is sent to ETP |
| 2 | Saponification Washings | 6.5 | 6.5 | - | 6.5 | - | Wastewater from saponification washings is being used for Greenbelt after treatment. |
| 3 | Softener regeneration | 0.7 | 0.7 | - | 0.7 | - | Wastewater is being sent to Solar evaporation pond after treatment in ETP |
| 4 | Domestic usage | 9.0 | 9.0 | - | 7.0 | 2.0 | Wastewater is being disposed to septic tank followed by soak pit. |
| 5 | Green Belt | 6.9 | - | 6.9 | - | - | Treated water from ETP is being used for Green Belt. |
| **Total** | | **28.1** | **21.2** | **6.9** | **15.2** | **6.0** | |

### 11.6.2.2 Water requirement for Proposed Expansion

The total water requirement for Operation Phase will be 96 KLD (fresh water is 77.5KLD and treated/recycled water is 18.5KLD). Direct use 19 KLD, Reuse 22.5 KLD and pretreated water is 36KLD is considered as Fresh water. Water balance chart for the proposed expansion is shown in Figure 2-13 and enclosed as **Annexure-9.** Water requirement and break up details are given in**Table 11-6**.

**Table 11-6 Water requirement and breakup for proposed expansion**

| S. No | Details | Total requirement | Water requirements | | | | Wastewater Generation | Loss | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | | | Fresh water | Treated water | Pretreated water | Reuse water | | | |
| 1 | Cooling Tower | 45 | - | 9.0 | 36 | -- | Ro Reject 22.5<br>CT blow down 2.0 | 43 | RO Reject will have TDS of <2100 mg/l it will beused for Utilities CT Blow down will be sent to ETP |
| 2 | Saponification washings | 10 | 10 | - | -- | -- | 9.5 | 0.5 | Wastewater will send to ETP (ZLD Concept) treated water will be used for cooling Tower |
| 3 | Domestic | 9.0 | 9.0 | -- | -- | -- | 8.0 | 1.0 | 10 KLD of STP is proposed for expansion project. Treated water will be used for Green Belt. |
| 4 | Green Belt | 27 | -- | 7 | -- | 20 | - | 27 | Ro Reject (20KLD)Treated water(7KLD) from STP will be used for Green Belt |
| 5 | Fire water Storage tank | 2.0 | 0 | 2.0 | -- | -- | - | 2.0 | Ro Reject will be used for Firewater storage make up |
| 6 | Floor & Area washings | 3.0 | -- | 0.5 | -- | 2.5 | - | 3.0 | Ro Reject will be used for Floor &Area washings |
| **Total** | | **96** | **19.0** | **18.5** | **36.0** | **22.5** | **19.5** | **76.5** | |

- Total requirement for proposed expansion is 96 KLD
- Fresh water requirement: 19+36+22.5=77.5 KLD(Direct use 19KLD, Pretreated water 36KLD and reuse water 22.5 KLD is considered as a fresh water)
- Recycled water will be 18.5 KLD.
- No fresh water required for Green Belt, Fire water storage tank makeup and Floor washings.

**Note:** RO permeate water will be Cooling Water. Ro Reject water will have TDS <2100mg/l so, will be used for Green belt, Fire water storage tank makeup & Floor /area washings. Existing WastewaterTest reports are enclosed as **Annexure-19.**

### 11.6.3 Power Requirement

The existing power requirement is 260 kVA and for the proposed expansion, additional power required will be 100 kVA. The Power supply is from Tamil Nadu Electricity Board, TNEB agreement enclosed as **Annexure-10.** DG set used as an alternate source of power during power failure**.** The Power requirement for existing and proposed expansion is summarized in**Table 11-7.**

**Table 11-7Power/Energy requirement details (Existing and after Expansion)**

| S. No | Details | Existing | Proposed | After Expansion |
|---|---|---|---|---|
| 1 | Power Requirement (kVA) | 260 | 100 | 360 |
| 2 | DG Backup- (kVA) | 1 x 250*<br>1 x 180 | 1 x 380<br>- | 1 x 380<br>1 x 180 |
| 3 | TFH(Wood Fire heater)MW/hr | 1 x 1.74 | 1 x 4.65 | 1 x 1.74<br>1 x 4.65 |

Note: Existing 1 x 250*kVA DG will be removed during expansion

### 11.6.4 Fuel Requirements

Diesel and Fire wood are the major fuels for Existing and Proposed expansion project. The details of fuels and their quantities are given in **Table 11-8.**

**Table 11-8 Fuel Requirement Details (Existing &Proposed Expansion)**

| S.No | Details | Capacity | | | Source | Fuel for |
|---|---|---|---|---|---|---|
| | | Existing | Proposed | After Expansion | | |
| 1 | Fire wood ( MT/Month) | 300 | 500 | 800 | Local Suppliers | Fuel for TFH 1 x 1.74 & 1 x 4.65 MW/hr |
| 2 | Furnace oil (KL/Month) | 13.8 | - | 13.8 | Local Suppliers | Ignition of firewood in fire wood heaters |
| 3 | Diesel (HSD) liters/Month | 300 | - | 300 | HP/BPCL/ IOCL/Reliance | Fuel for DG set |

### 11.6.5 Manpower

KKL Currently providing employment for about 100 employees which include employees on roll and contract workmen. After expansion, the company will additionally employ around 20 employees. The Manpower details are provided in**Table 11-9.**

**Table 11-9 Man power of the Project**

| S. No | Description | Permanent | Contractual | After Expansion |
|---|---|---|---|---|
| 1 | Existing (Nos) | 100 | 0 | 100 |
| 2 | Proposed (Nos) | 20 | 20 | 40 |
| | **Total**(Nos) | **120** | **20** | **140** |

Manpower during construction phase: 20 Nos

### 11.6.6 Municipal & Other Solid Waste

#### Construction Phase

Reuse of construction wastes such as sand, brick, gravel, cement for developing internal road and project structures.

Municipal waste generation during construction phase will be 9 kg/day& will be disposed as per norms. No Demolitions activities are involved in this proposed project.

#### Operation Phase

- Municipal Solid Waste generation for existing facility is 53 kg/day and 69.0 kg/day (STP Sludge 1.0 kg/day will be used as manure for green Belt) will be generated after expansion and will be disposed offinto local municipal bins.
- Ash generation from fire wood is8 kg/day (existing), 16 kg/day (After expansion)
- Ash from fire wood is also being taken by farmers to be used in their fields.
- Sludge from ETP will be send to TSDF. Solid waste generation and management details are summarized in **Table 11-10.**

**Table 11-10Solid Waste Generation and Management (Existing &Proposed Expansion)**

| S. No | Waste | Quantity (kg/day) | | | Collection method | Treatment / disposal method |
|---|---|---|---|---|---|---|
| | | Existing | Proposed Expansion | After Expansion | | |
| 1 | Organic | 40.5 | 8.1 | 48.6 | Bins | Municipal bin including food waste |
| 2 | Inorganic | 4.5 | 0.9 | 5.4 | Bins | TNPCB Authorized dealers |
| 3 | Ash from Fire wood | 8.0 | 8.0 | 16.0 | Bags | Given to local former for agriculture purpose |
| 4 | STP Sludge | - | 1.0 | 1.0 | Bins | Dried and used as manure for green belt development |
| **Total** | | **53.0** | **18.0** | **71.0** | | |

**Note:** Manpower- Existing: 100 Nos, after Expansion: 140 Nos, Construction Phase is 20NosAs per CPCB guidelines: MSW per capita/day =0.45

### 11.6.7 Hazardous Waste Management

The high calorific value waste like used filter cloth etc. will be sent to TSDF (TNWML, Gummudipoondi). Hazardous waste materials will be properly disposed as per the Hazardous and Other wastes (Management, Handling and Transboundary Movement) Rules 2016. Agreement will be made with TSDF approved dealers for safe disposal of hazardous wastes. Agreement for Hazardous waste disposal is enclosed as **Annexure-11**. The type of hazardous waste and the quantity generated are detailed in**Table 11-11.**

**Table 11-11Hazardous Waste Generation and Management**

| S. No | Schedule | Type of the Hazardous waste | Quantity | | | Mode of Disposal |
|---|---|---|---|---|---|---|
| | | | Existing | Proposed | After Expansion | |
| 1 | 33.1 | Discarded containers/ barrels/liners contaminated with hazardous wastes / chemicals(MTPA) | 88 | 6 | 94 | Will be disposed to TNPCB authorized recyclers |
| 2 | 5.2 | DG Waste oil (Litre /M) | 100 | 10 | 110 | Re use in Process (Pine Tar) |
| 3 | - | Waste Furnace oil (Litre /M) | 1.0 | -- | 1.0 | Re use in Process (Pine Tar) |
| 4 | 34.3 | ETP Sludge (MTPA) | 0.551 | 0.544 | 1.095 | TNWML, Gummidipoondi (TSDF) |

### 11.6.8 Analysis of Alternative Sites Considered

Since the proposed project is an enhancement of Camphor Production and its Derivatives and increase in total land area, the new land is adjacent to the existing facility with few additional of infrastructure facilities

### 11.6.9 Project Cost

The total capital investment for proposed expansion is INR 1400 Lakhs &break up of cost is detailed in**Table 11-12.**

**Table 11-12 Capital Investment for proposed expansion Project**

| S. No. | Cost | INR (Lakhs) |
|---|---|---|
| 1 | Land | 750 |
| 2 | Machineries | 400 |
| 3 | Erection | 50 |
| 4 | Implementation of Environmental Management Plan | 200 |
| | **Total** | **1400** |

## 11.7 Base Line Study

### 11.7.1 Meteorological Environment

Available secondary data pertaining to the meteorological parameters was obtained from the IMD Climatological tables. In addition, baseline meteorological data (primary data) was generated during (July – Sept 2018). The methodology adopted for monitoring surface observations is as per the standard norms laid down by Bureau of Indian Standards (BIS) i.e. IS:8829 and Indian Meteorological Department (IMD).

The nearest Indian Meteorological Department (IMD) station located to project site is minambakam. The Climatological data for minambakam (13°' N and 80° 11' E), published by the IMD, based on daily observations at 08:30 and 17:30 hour IST for a 30-year period

The site specific meteorological data of study period during the study period (July-Sept 2018). Daily maximum temperature is $38^0$C, Minimum is $22^0$C. Average Relative Humidity is 68.66%. Average Wind speed is 3.9 m/s.The predominant wind pattern is South West.

### 11.7.2 Ambient Air Quality

Maximum concentrations of $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$, CO, Pb, $O_3$, $NH_3$, $C_6H_6$, $C_{20}$ $H_{12}$, As,Ni, are well within the National Ambient Air Quality Standards for Industrial, Commercial and Residential areas at all monitoring locations during the study period.The ambient air quality has been monitored at 8 locations and 12 parameters are compared to standards as per NAAQS, 2009 within the study area.

The baseline levels ranged as $PM_{10}$(38.4-71.2µg/m³), $PM_{2.5}$(18.9-35.7µg/m³), $SO_2$ (5.0-18.2µg/m³), $NO_2$(16.8-33.6µg/m³), CO (0.24-0.65 mg/$m^3$) and some are BDL, all the parameters are well within the National Ambient Air Quality Standards for Industrial, Commercial and Residential areas at all monitoring locations during the study period.

### 11.7.3 Noise Environment

It is observed that the day equivalent and night equivalent noise levels at all locations are within prescribed CPCB standards

- In industrial area day time noise levels was about 65.3 dB(A) and 60.0 dB(A) during night time, which is within prescribed limit by MoEF&CC (75 dB(A) Day time & 70 dB(A) Night time).
- In commercial area, day time max noise levels were about 59.1 dB(A) and 48.3 dB(A) during night time, which is within prescribed limit by MoEF&CC (65 dB(A) Day time & 55 dB(A) Night time).
- In residential area day time noise levels varied from 50.5 dB (A) to 52.3 dB (A) and night time noise levels varied from 42.1 dB (A) to 44.1 dB (A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels in Residential area noise are within the limit prescribed by MoEF&CC (55 dB (A) Day time & 45 dB (A) Night time).

### 11.7.4 Water Environment

#### 11.7.4.1 Surface Water Quality

- pH in the collected surface water samples varies between 6.65-8.41.
- The Total Dissolved Solids range from 251 mg/l to 544 mg/l, highest being in sample from SW-2 Lake near parandur while lowest in SW3- lake near Sivankoodal all the TDS values are well within limit except SW2 IS :2296:1992
- The chloride content in the surface water for study area ranges from 40.46 mg/l to 162.82 mg/l highest from location SW2.

- The sulphate content in the surface water of the study area varies between 18.4 mg/l – 70 mg/l.
- The Total hardness ranges between 50.1mg/l – 332.5 mg/l, highest from SW2 i.e .lake near parandur and lowest from SW4 siruvedal lake
- The concentrations of heavy metals like As, Cd, Cr, Pb, Mn, Hg, Ni and Se at all the locations are below the limits of IS 2296:1992.
- The concentration of heavy metals like As, Cd, Cr, Pb, Mn, Hg, Ni and Se at some locations are exceeding the limits of IS 2296:1992.

### 11.7.4.2 Ground Water Quality

A summary of analytical results are presented below:

- The average pH ranges from 7.2-8.04
- Na concentration ranges from 69 to 297 mg/l
- K concentration ranges 5 to 21 mg/l
- The Magnesium ranges from 24.3 to 75.33 mg/l.
- The concentrations of fluoride in all the ground water samples are within the limit.
- The TDS value varied from 591 mg/l to 1310 mg/l
- The chloride concentration ranged from 143.52 mg/L to 425.6 mg/L
- The sulphate content of the ground water of the study area is varied between 84.18 mg/l – 238.19 mg/l.
- The Total hardness ranges is between 200 mg/l – 611 mg/l.
- The Total alkalinity as calcium carbonate, Magnesium and Chloride are well within the permissible limits.

### 11.7.4.3 Land Environment

Summary of analytical results of Soil Samples

- The pH of the soil samples ranged from 6.93-7.24.
- Conductivity of the soil samples ranged from 192 –330µS/cm. As the EC value is less than 2000 µS/cm, the soil is found to be non-saline in nature
- The water holding capacity of the soil samples varied from 25.52-40.17 (%).
- Nitrogen content ranged from 212.32 mg/kg to 840.06 mg/kg,
- Phosphorous ranged from 37 mg/kg to 47 mg/kg,
- Potassium content ranges from 120 mg/kg to 500 mg/kg.

### 11.7.4.4 Biological Environment

There is a very little vegetation within the study area. The predominant species are small trees and shrubs. The growth of natural flora is limited. Azadirachta indica and Cocos nucifera have better adaptability among the naturally growing species. Floral species observed in the study area is given in**Table 3-21.**

This area hosts common animals like Indian Dogs, Jungle and Domestic cat, Rhesus macaque, Domestic Cows, Buffaloes, Bullocks, Oxen, and Goat etc. are found amongst mammals. List of fauna reported/observed in the study area is given in **Table 3-22.** There is no National park/Wild life Sanctuary within 10Km radius of the study area &there are no of

reserve forest are present There is no rare/endangered species within study area of 10 Km radius.

### 11.7.4.5 Socio Economic Environment

A socio-economic study was undertaken in assessing aspects which are dealing with social and cultural conditions, and economic status in the study area. The study provides information such as demographic structure, population dynamics, infrastructure resources, and the status of human health and economic attributes like employment, per-capita income, agriculture, trade, and industrial development in the study area. The study of these characteristic helps in identification, prediction and evaluation of impacts on socio-economic and parameters of human interest due to proposed project developments. The parameters are:

- Demographic structure
- Infrastructure Facility
- Economic Status
- Health status
- Cultural attributes
- Awareness and opinion of people about the project and Industries in the area.

The following **Table 3-23** provides the certain important social indicators of kancheepuram District and Taluk.

**Demographic details of the study area**

- The average family size is 3.98
- The male and female population are equal in numbers - 49.93% Vs. 50.06
- The male and female children below 6 years also equal in numbers: 50.79 %Vs 49.21%
- The share of children age below six is 10.27% of the total population
- The Scheduled Caste population is 14.87 %
- The Scheduled tribe population is 0.75%
- The urban population is 73.97%

## 11.8 Anticipated Environmental Impacts

### 11.8.1 Air Environment

Base line data reveals that ambient air quality in the study area for all the parameters are well within the permissible limits as prescribed by National Ambient Air Quality Standards. The main sources of emissions will be from the D.G sets&TFH (Fire wood Heater) which are facilitated with stacks of adequate height &dust collectors as an air pollution control measure. Proposed TFH (Fire wood Heater-4.65 MW/hr) will be provided with dust collectors, Cyclone separator & Bag filter to control the pollutants. All reactors are being connected to individual condensers. Proposed TFH and dust collector specification is enclosed as **Annexure-37.**

### 11.8.2 Noise Environment

Baseline study showed that the noise levels in both Industrial area and in Residential area are slightly exceeded the limit prescribed by MoEF&CC. The designed equipment with noise levels not exceeding beyond the requirements of Occupational Health and Safety Administration Standard will be employed.

### 11.8.3 Land Use

As the manufacturing facility is located in Non notified industrial area, the proposed products enhancement project does not change the land use classification of the site.

## 11.9 Environmental Monitoring Program

A monitoring schedule with respect to Ambient Air Quality, Water & Wastewater Quality, Noise Quality as per Tamil Nadu State Pollution Control Board (TNPCB), shall be maintained.

## 11.10 Pollution Control Measures

APC measures are adequate stack height to disperse the pollutants. Adequate green belt has been developed to mitigate the pollution arising due to movement of vehicles. Regular monitoring of DG-Stack and Ambient air quality will be carried out. Air Pollution Control Measures for existing and proposed are provided in **Table 11-13.**

**Table 11-13Air Pollution Control Measures (Existing and Proposed Expansion)**

| Details | Capacity | | | APC | Stack Height in meters (AGL) | Gaseous Discharge (Nm3/hr) |
|---|---|---|---|---|---|---|
| | Existing | Proposed | After expansion | | | |
| DG Power Back up(KVA) | 1 x 250* | 1*380 | 1 x 380 | Stack | 12 | 2239 |
| | 1 x 180 | - | 1 x 180 | Stack | 7.5 | 1707 |
| Steam Boiler (Not in Use)T/Hr | 1 x 1* | - | - | Stack | 20 | 6997 |
| TFH (Wood Fire Heater) MW/Hr | 1 x 1.74 | 1 x 4.65 | 1 x 1.74 | Stack with Dust collector | 30 | 1669** |
| | | | 1 x 4.65 | | | 18000 |

Note: 1.* Steam Boiler (Not in Use) will be discarded during expansion

2. * 1 x250(Not in Use) will be removed during expansion
3. Each TFH will have individual dust collector and common stack
4. Existing 4 (Nos) stacks are available, after expansion it will be reduced to 3 (Nos) stacks
5. ** 1(No) TFH will be operational & remaining 1 (No) TFH will be standby

**Table 11-14Fugitive & Noise Emission control measures (Exiting and Proposed)**

| S. No. | Fugitive or Noise Emission Sources | Type of Emission | Existing | Proposed | After expansion | Control measures Proposed | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | Reactors | Acid fumes/ VOC | 11 | 10 | 21 | Individual condenser | It' is a closed loop system |
| 2 | Distillation columns | Acid fumes/ VOC | 5 | 3 | 6 | Individual condenser | -- |
| 3 | DG 1(kVA) | Noise | 1 x 250* | 1 x 380 | 1 x 380 | Acoustic enclosures | -- |
| 4 | DG 2 (kVA) | Noise | 1 x 180 | - | 1 x 180 | Acoustic enclosures | -- |

Note: *1 x 250(Not in Use) will be removed during expansion

**Odour & VOC control procedure**

- Tertiary condensers and chilling plant is being developed to prevent the Organic vapours
- The Volatile Organic Compound (VOC) monitoring will be carried out in regular intervals and will be submitted to the board.
- The Environment team will be trained on Industrial hygiene and sampling / testing techniques.
- M/s Kanchi Karpooram Ltd will provide local exhaust ventilation at storage locations.

## 11.11 Wastewater Management

During operation phase, water requirement of proposed units will be mainly for process, condenser cooling water, floor washings, domestic use, fire water & greenbelt etc.

The total water requirement for the existing unit is 28.1 KLD, of which 21.2 KLD is fresh water and 6.9 KLD is treated water**.**

Water requirement for proposed expansion will be 96 KLD of which 77.5 KLD is fresh water (Direct use 19 KLD reuse 22.5 KLD and pretreated water 36 KLD) and 18.5KLD is treated/recycled water. Green belt & floor &area washings and Fire fighting water requirement will be met through recycling treated Water (18.5KLD) from STP/ETP. The water requirement existing and proposed) is met through Bore Well within the factory premises. The NOC is obtained for abstracting ground water is obtained from GCW-Tamil Nadu enclosed as **Annexure-20**. Details Sewage/Wastewater Treatment and Disposal (Existing&Proposed) is shown in **Table 11-15.**

**Table 11-15 Details Sewage/Wastewater Treatment and Disposal (Existing&Proposed)**

| S. No | Description | Wastewater in KLD | | Treatment | | Remarks |
|---|---|---|---|---|---|---|
| | | Existing | Proposed | Existing | Proposed | |
| 1 | Sewage | 7.0 | 8.0 | Septic tank | Packeged 10 KLD STP | Treated water to Green Belt |
| 2 | Wastewater | 8.2 | 11.5 | 20 KLD ETP | 20 KLD ETP(ZLD Concept) | Treated in Effluent Treatment Plant (ETP) and treated effluent will be used for utilities. ETP |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | Sludge will be disposed to TNPCB authorized TSDF |

Characteristics of effluents are provided in**Table 4-7.**

## 11.12 Solid/ Hazardous Waste Management

Municipal Solid Wastes including food waste are being disposed to municipal bin and the same will be continued for proposed project also. The Hazardous waste are being segregated and stored separately in hazardous waste storage and is being disposed to TNPCB authorized TSDF sites within the stipulated period of time. The same will be continued for proposed also. Hazardous waste materials will be properly disposed as per the Hazardous Waste (Management and Transboundary Movement) Rules 1989 and subsequent amendment in 2016.

## 11.13 Greenbelt Development

The total project area is 10.23 acres. 3.39 acres (33.14%) is allotted and maintained as per CPCB norms. Approximately 600 trees in 2.30 acres(33.1%) of land is being developed in existing facility remaining 1455 trees(1500/Ha) will be planned in proposed expansion. The survival of the plantation shall be monitored frequently and survival rate of the plantation. A capital cost of INR 30 Lakhs shall be earmarked for recurring expenses towards green belt development and maintenance.

## 11.14 Risk Analysis

Hazard Identification and Risk Analysis including identification, screening of scenarios, and consequence analysis of the various risk scenarios. Risk Assessment has been done with respect to the Solvent Storage Tanks and Pipe lines.

Major hazards from the hazardous material storage have been identified and evaluated using Aloha and Phast lite 8.1 software examines the progress of potential incident from the modeling of pool fire, flash fire and dispersion of vapour cloud.

The scope of the study mainly involves:

- Identifications of Hazards
- Consequence modeling
  - ❖ Flash fire
  - ❖ Jet Fire analysis
  - ❖ dispersion of vapour cloud
  - ❖ pool fire

As per the NFPA rating, the fire hazard is observed in chemicals such as Xylene and Turpentine Oil. The chemical such as Acetic acid, Caustic soda lye and HCL are observed to be health hazard.

The Consequence analysis is conducted in order to assess the level of impacts associated with storage and handling of hazardous chemicals. The storage tanks will be located within industry boundary of Kanchi karpooram and the surrounding is ideal without external interface. The

location is safe for storage and handling of solvents. All other hazards are easily within control limits and away from habitation area.

All the pipelines operated are at ambient temperature and atmospheric pressure conditions only.

**Risk Control Measures**

- Pressure safety valves for storage tanks
- Pressure alarm high and pressure alarm low for storage tanks
- Level indicators with monitoring from control for storage tanks
- Level transmitter, Level gauge and Temperature indicators for the storage tanks
- Fire protection arrangements in the form of Fire Hydrants and Monitors for the storage tanks.
- Emergency Handling checklist and procedure

## 11.15 Disaster Management Plan

The salient features of Disaster Management Plan include

- Emergency shutdown procedure
- Electrical Power Failure & Key Utility failures
- Fire protection system
- Emergency safety equipment & Reporting and response to emergency
- Emergency Control Room - is the focal point in case of an emergency from where the operations to handle the emergency are directed and coordinated. It will be equipped with Internal and P & T telephones, Paging system and Emergency siren.

## 11.16 On-site Emergency Plan

- To provide effective planning, communication and to ensure discipline while mitigating identified emergencies at the earliest utilizing available resources, safety gadgets and systems.
- Synchronized action from all the internal and external agencies at the earliest to initiate corrective and preventive action.
- To minimize the human injury and illness during emergency mitigation, priority is given to rescue of incident victims, rendering them first aid onsite and if required providing further medical services at the earliest, which is available nearest to our plant.
- To minimize damage to property, general environment or work environment.
- To effectively refer and utilize this revised onsite emergency plan while conducting on site emergency and preparedness response drills and also during real emergencies.

To identify any deviations during above drills and real situations to ensure any identified and recorded observations for continual corrective actions and preventive actions.

## 11.17 Public Hearing

The Environmental Clearance application submitted to MoEF&CC on 9thApril 2019 vides proposal number IA/TN/IND2/101471/2019. Based on the information furnished in Form-I& PFR, MoEF&CC had issued the Desk top Terms of Reference (TOR) vide No.IA-J-11011/143/2019–IA-II (I) dated 10th May 2019 to preparing the Environmental Impact Assessment (EIA) Report.

The EIA report submitted for Public Hearing to TNPCB, Public Hearing advertisement was published Dinamani and new Indian Express on 08.06.2019. Public hearing was conducted on 16.07.2019, 3pm at Sri Lakshmi Narayane Mahal & Party Hall, Bagalore Highway, Hotel Saravana Bavan Complex, Enathur Village, Kanchipuram Taluk, Kancheepuram District, Tamil Nadu 631502 in the presence of the District Environmental Engineer Tamil Nadu Pollution Control Board, sriperumdudur and District Collector Kancheepuram.

Public Hearing advertisement details are enclosed as **Annexure-33.** Minutes of Public Hearing and Compliance is enclosed as **Annexure-34.** Final EIA will be submitted to MoEF&CC for further appraisal of the project and obtaining Environment Clearance. Public Hearing Photographs are shown in **Figure 7-1.** There is no onjections are raised by the public during public hearing.

## 11.18 Benefits of the Proposed Project

**Financial and social benefits**

- Existing Annual Turnover: INR 55.0 Cr
- Proposed Projected Annual Turnover: INR 150 Cr

**Social Benefit**

- The project will provide employment to local youth and good supply of products to Domestic & commercial purposes, thus increasing their standard of living and thus helping strengthen the social infrastructures of the region.

## 11.19 CSR benefit to local community/CER

- The company is aware of the obligations towards the society and to fulfill the social obligations. Hence, proponent is allocated 2.5% on Profit to local community development under CSR Plan.
- The company is allotted 1% of the project cost under Corporate Environmental Responsibility Plan as per Ministry O.M. No. 22-65/2017-IA.II (M) dated: 01.05.2018

## 11.20 Benefits to the environment

- Plantation/Green belt is beingdone around factory site.Green belt will enhance the green coverage in the area & aesthetics.
- Rain water harvesting will enhance the ground water table.
- As seen above there is marginal impacts on air, noise, water & soil environments.

- The marginal impact due to the proposed assignment will be fully mitigated by the Environmental Management Plan (EMP).
- There is no demolished activities involved in this proposed project
- ESR will provide the well-being of the society and the protection of the environment will help in conserving the ecosystem. It will also provide employment opportunities to larger population.

Thus, the proposed expansion project will benefit both the local as well as Indian economy.

# CHAPTER – 12
# DISCLOSURE OF CONSULTANTS

# 12 DISCLOSURE OF CONSULTANTS

In order to assess the potential environmental impacts due to the proposed project is located at Sy. No. 669, 672, 670/2, 676/1, 674/1, 667/1, 668/1, 668/2A, 667/2, 668/2, 667/2A, 668/2A & 670/1, Parandur Road, Karaipettal Post, Enadur village, Kancheepuram Tehsil, Kancheepuram District, Tamil Nadu to undertake EIA study. The nature of consultancy service rendered covers terrestrial environmental assessment.

## 12.1 Brief Profile of Hubert Enviro Care Systems (P) Limited (HECS)

Enviro Care Systems was started in the year of 1997 by Dr. J.R.Moses with the vision to serve the world in all environmental related problems by completing the latest technological advancements available.

In the year 2004, Enviro Care Systems became Hubert Enviro Care Systems (P) Ltd (HECS) after having collaboration with Hubert Stavoren B.V. for higher Technology.

The company provides total pollution control solutions to several industries like Thermal Power Plant, Pharma, R&D Facilities, Electroplating and Manufacturing, IT Parks, Residential Complexes, Dairies, Food Processing, Textile mills, Breweries, etc.

The company is specialized in executing projects right from concept development, supply, erection, commissioning and operation on turnkey basis. HECS has successfully executed more than 200 environmental engineering projects for various industrial sectors both in India and overseas.

HECS has state-of-art facilities to provide quality environmental consultancy and engineering solutions.

**Strengths of HECS**

Number of Employees as on April 2018

| | |
|---|---|
| Total No of Employees | 736 |
| Consultancy | 26 |
| Laboratory | 77 |
| Projects | 19 |
| Operation & Maintenance | 614 |

## 12.2 Quality Policy of HECS

**Hubert Enviro Care Systems (P) Ltd**

**HECS**

**IMS POLICY**

*We are committed to achieve customer satisfaction in our activities of provision of environmental services such as Project Engineering/ Consultancy / EIA services/ Laboratory and site monitoring / testing services / operations and maintenance of Pollution control systems with best quality, on time service and value for their money by*

- *Meeting the ever-changing Customer requirements and their latent expectation so as to focus on customer delight through proactive measures using latest technology and team work.*
- *Conserving resources, reducing waste generation and prevention of pollution through respecting nature*
- *Minimizing the Occupational health and safety hazards and prevention of injury and ill health at work place.*
- *Complying with all applicable legal & other requirements.*
- *Enhancing total quality in all aspects of management, environmental & safety responsiveness and Mind set among the work force.*
- *Continually improving the overall organizational performance by adopting the integrated Management system through appropriate planning, implementing and reviewing the objectives and targets and there by achieve, sustain and improve over all organizational development.*

Date: 01-02-2013 *J R Moses*

Place: Chennai *C E O*

## 12.3 Copy of QCI NABET Accreditation

# Quality Council of India

National Accreditation Board for Education & Training

## CERTIFICATE OF ACCREDITATION

**Hubert Enviro Care Systems (P) Ltd.**

**A-21, III Phase, Behind Lions Club School, ThiruViKa Industrial Estate, Guindy, Chennai – 600 032**

Accredited as **Category - A** organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations: Version 3 for preparing EIA-EMP reports in the following Sectors:

| Sl. No. | Sector Description | Sector (as per) | | Cat. |
|---|---|---|---|---|
| | | NABET | MoEFCC | |
| 1 | Mining of minerals including opencast / underground mining | 1 | 1 (a) (i) | A |
| 2 | Onshore oil and gas exploration, development & production | 2 | 1 (b) | A |
| 3 | Thermal power plants | 4 | 1 (d) | A |
| 4 | Metallurgical industries (secondary metallurgy only) | 8 | 3 (a) | B |
| 5 | Cement plants | 9 | 3 (b) | B |
| 6 | Petroleum refining industry | 10 | 4 (a) | A |
| 7 | Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics) | 18 | 5 (c) | A |
| 8 | Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes) | 20 | 5 (e) | A |
| 9 | Synthetic organic chemicals industry | 21 | 5 (f) | A |
| 10 | Isolated storage & handling of Hazardous chemicals | 28 | 6 (b) | B |
| 11 | Industrial estates/ parks/ complexes/areas, export processing Zones(EPZs), Special Economic Zones(SEZs), Biotech Parks, Leather Complexes | 31 | 7 (c) | A |
| 12 | Common Municipal Solid Waste Management Facility (CMSWMF) | 37 | 7 (i) | B |
| 13 | Building and construction projects | 38 | 8 (a) | B |
| 14 | Townships and Area development projects | 39 | 8 (b) | B |

***Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RA AC minutes dated Nov. 03, 2017 posted on QCI-NABET website.***

*The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/18/0566 dated Feb. 16, 2018.The accreditation needs to be renewed before the expiry date by Hubert Enviro Care Systems (P) Ltd., Chennai following due process of assessment*

**Sr. Director, NABET**
**Dated: Feb. 16, 2018**

**Certificate No.**
**NABET/ EIA/1619/ RA 0083**

**Valid till**
**13.10.2019**

**For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.**

Further details may be seen on the following URL: www.hecs.in

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