

Undertaking

We, undersigned partner of Avadh Heliconia, undertake that we are ready to implement all the recommendations given by Expert Appraisal Committee (EAC) as mentioned in the S.O 805(E) dated: 14.03.2017 - Process for appraisal of TOR/EC projects under violation of EIA Notification, 2006.

We also undertake that as per recommendation of EAC and finalized by regulatory authority, we will submit bank guarantee (if required)

Date: 14/5/2017

For Avadh Heliconia



Place : Valsad

Partner



ENVIRONMENTAL MANAGEMENT PLAN

1. STRUCTURE OF EMP

Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. The desired results from the environmental mitigation measures proposed in the project may not be obtained without a management plan to assure its proper implementation & function. The EMP envisages the plans for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities. EMP has been prepared addressing the issues like:

- Pollution control/mitigation measures for abatement of the undesirable impacts caused during the construction and operation stage.
- Institutional set up identified/recommended for implementation of the EMP.
- Post project environmental monitoring programme to be undertaken.
- Expenditures for environmental protection measures and budget for EMP.

2. PROPOSED ENVIRONMENTAL IMPACT MITIGATION MEASURES

The major impacts due to different project activities and their mitigation measures have been identified and given in the following table. These measures together constitute part of Environmental Management Plan (EMP). The environmental impact mitigation measures for construction and operation phases are also given in Table 1.

Table 1: Proposed Environmental Impact Mitigation Measures

Area	Mitigation measures
	Construction Stage:
Water quality	• Toilet and drinking water facilities for construction workers will be provided by the contractor at the construction site to avoid unhygienic condition at site.
Air quality	• Dust suppression measures will be undertaken such as regular sprinkling of water around vulnerable areas of the construction

	<p>site by suitable methods to control fugitive dust during earthwork and construction material handling / over hauling.</p> <ul style="list-style-type: none"> • Properly tuned construction machinery & vehicles in good working condition with low noise & emission will be used and engines will be turned off when not in use.
Noise level	<ul style="list-style-type: none"> • Protective wears such as ear mufflers etc. will be provided to construction personnel exposed to high noise levels.
Solid wastes	<ul style="list-style-type: none"> • Waste construction materials will be recycled and excess construction debris will be disposed at designated places in tune with the local norms.
Green Belt development	<ul style="list-style-type: none"> • Appropriate landscape including plantation of evergreen and ornamental flowering trees, palms, shrubs and ground covers at open spaces within the complex will be done, which would serve the dual purpose of controlling fugitive dust and improving the aesthetics of the area.
Safety	<ul style="list-style-type: none"> • Adequate safety measures complying with the occupational safety manuals will be adopted to prevent accidents/hazards to the construction workers.
	Operation Stage:
Water quality	<ul style="list-style-type: none"> • Sewage will be treated up to the tertiary level in the proposed STP. • Treated sewage will be reused for toilet flushing, and green belt. • Regular monitoring of STP effluent quality will be carried out as per norms.
Air quality	<ul style="list-style-type: none"> • Back up DG sets will have the applicable emission norms. • Adequate stack height for DG sets will be provided as per norms. • Back up DG sets will be used only during power failure. • Regular monitoring of emissions from DG sets and ambient air quality will be carried out as per norms.
Noise level	<ul style="list-style-type: none"> • DG room will be treated acoustically as per norms to control the

	<p>noise from DG sets.</p> <ul style="list-style-type: none"> • Pumps, STP, Compressors, DG sets, etc., will be properly maintained for fuel efficiency and noise control. • Personal protective equipment will be provided to the maintenance staff working in high noise areas.
Solid wastes	<ul style="list-style-type: none"> • Solid wastes will be segregated into organic and inorganic components. • The recyclable inorganic wastes will be sold to prospective buyers. • Dewatered/ dried sludge from STP will be used as manure in horticulture.
Hazardous waste	<ul style="list-style-type: none"> • Used/spent oil from DG sets will be sold to registered recyclers.
Storm water management	<ul style="list-style-type: none"> • Adequate Storm water drainage facility, rainwater harvesting pits and roof top harvesting sump are proposed.
Fire protection	<ul style="list-style-type: none"> • Adequate fire protection facilities will be installed including fire detectors, fire alarm and fire fighting system as per National Building Code of India.
Landscape	<ul style="list-style-type: none"> • Proper maintenance of landscape round the year including replacement of the decayed plants.
Safety	<ul style="list-style-type: none"> • Adequate safety measures will be added the occupational safety manuals to prevent accidents/hazards with the maintenance workers.
Others	<ul style="list-style-type: none"> • The building will be provided with disabled-friendly design, timber-free construction, energy efficient lighting & ventilation, and control of indoor environment. • Undertaking all necessary pollution control measures to maintain the emissions and discharges within the prescribed/stipulated limits.

3. PREVENTIVE MEASURES TO AVOID LEACHING OF TREATED SEWAGE EFFLUENT INTO NEARBY AREA.

- a) The treated sewage will meet the standards post UV disinfection and will be used for gardening/ horticultural needs. We will ensure adequate sand to clay mixture in soil to ensure retention of water and facilitate evaporation.
- b) We will be using controlled irrigation and sprinkling method to ensure more evaporation and ensure that about half to one litre of water / Sq.ft of soil will be used, so that the treated water will not penetrate more than 2 to 3 feet of percolation to the maximum.
- c) The solar evaporation rate of about 1cum/ day will be utilized to enhance evaporation and also assimilation of water for horticultural species and prevent percolation to soil.
- d) Items b and c would eliminate leachate percolation to water totally.
- e) Suitable sampling bore wells will be selected to ensure that there is no ground water or soil contamination in six months period and the reports will be submitted to statutory bodies as required.

4. ENVIRONMENTAL IMPACTS ON PROJECT LAND AND ITS SURROUNDING DEVELOPMENTS AND VICE VERSA

Since the proposed project is residential bungalows along with club house, there will not be any alteration to the surrounding locations. The proposed site is located near residential and commercial units. Also the construction will abide by the Bylaws of Development Authority.

During the construction phase, following measures will be taken;

- Dust suppression by water sprinkling
- Protective wears such as ear plug, mufflers, etc., will be provided to construction personnel exposed to high noise levels.
- Waste construction materials will be recycled and excess construction debris will be disposed at designated places in tune with the local norms.
- Adequate safety measures complying with the occupational safety manuals will be adopted to prevent accidents/hazards to the construction workers.

During the operation phase, following measures will be taken;

- Sewage will be treated up to the tertiary level in the proposed STP.
- Treated sewage will be reused for green belt and toilet flushing.
- Regular monitoring of STP effluent quality will be carried out as per norms.
- Back up DG sets will comply the applicable emission norms and stack height as specified by state PCB.
- Solid wastes will be segregated into organic and inorganic components. Organic waste will be composting and converted as manure.
- Adequate rainwater harvesting will be provided by means of recharge into the groundwater.
- Adequate fire protection facilities will be installed including fire detectors, fire alarm and fire fighting system as per National Building Code of India.
- Monitoring of environmental parameters will be done periodically.

Due to the proposed project, others will be encouraged to put up residential/commercial projects. Hence no significant negative impact is envisaged.

5. GROUND WATER POTENTIAL OF THE SITE AND LIKELY IMPACT OF THE PROJECT

- The depth to water level during pre monsoon in the district varies from 5.14 to 15.05 mbgl
- The depth to water level during post monsoon period, it varies from 4.11 to 13.05 mbgl
- The seasonal fluctuation in water level between pre and post monsoon shows rise in water level ranging from 0.24 to 1.34 m and fall ranging from 0.14 to 1.67 m.
- Fresh water of about 371 KLD is to be utilized from GAM PANCHAYAT and treated sewage of 400 KLD is proposed to be used for flushing and gardening.
- Sewage will be reused for gardening after tertiary treatment and there will be monitoring of ground water near site periodically during and after construction.
- Storm water drainage plan, Rainwater harvesting pits are proposed and roof top collection sump is also proposed.
- Thus has seen above, no impacts are envisaged on ground water.

6. ENVIRONMENTAL MANAGEMENT BUDGET ALLOCATION

A capital cost provision of about Rs. 750 Lakhs has been kept in the project cost towards the environmental protection, control & mitigation measures and implementation of the EMP. The budgetary cost estimate for the EMP is given in **Table 2.**

Table 2 Environmental Budget

S.No.	Description	Capital Cost (Rs. In Lakhs)	Operating cost (Rs. In Lakhs)
1.	Sewage Treatment Plant	300	10.0
2.	Landscaping & Gardening	100	7.0
3.	Solid waste Management	50	10.0
4.	Rainwater harvesting	200	2.0
5.	Air pollution Control measures	100	5.0
	Total Cost	750	37.0

7. ENVIRONMENTAL MONITORING PLAN

It is imperative that the Project Authority set up regular monitoring stations to assess the quality of the surrounding environment after the commissioning of the project. An environmental monitoring programme is important as it provides useful information and helps to:

- Verify the predictions on environmental impacts presented in this study,
- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures, and
- Evaluate the performance and effectiveness of mitigation measures proposed in the EMP and suggest improvements in management plan, if required,

- Satisfy the legal and statutory obligations.

The monitoring plan including areas, number and location of monitoring stations, frequency of sampling and parameters to be covered is summarized in **Table 3a & 3b**. Monitoring will be get carried out by recognized laboratories.

Table 3a: Environmental Monitoring Plan – Construction Phase

S.No.	Item	Parameters	Frequency	Unit cost (Rs.)	Sampling /Year	Cost/Year (Rs.)
1	Ambient Air Quality	PM ₁₀ , PM _{2.5} , SO ₂ & NO _x	Monthly	1200	36	43,200
2	Noise Level	Equivalent Noise Level	Monthly	100	24	2400
3	Ground Water	Physical, Chemical and Bacteriological	Monthly	800	36	28,800
4	Soil	General Parameters	Monthly	1000	12	12000
Total						86400

Table 3b: Environmental Monitoring Plan – Post Construction

S.N o.	Item	Parameters	Frequency	Unit cost (Rs.)	Samples /Year	Cost/Year (Rs.)
1	Air Quality	PM ₁₀ , PM _{2.5} , SO ₂ & NO _x	Quarterly	1200	12	14400
2	Noise Level	Equivalent Noise Level	Quarterly	100	8	800
3	Exhaust from DG sets	SPM, SO ₂	Quarterly	800	4	3200
4	Ground Water	Physical, Chemical and Bacteriological	Quarterly	800	4	3200

S.N o.	Item	Parameters	Frequency	Unit cost (Rs.)	Samples /Year	Cost/Year (Rs.)
	Analysis					
5	Waste Water analysis	pH, BOD, COD, TSS, TDS	Monthly	1200	4	4800
6	Soil Quality	General parameters	Quarterly	1200	4	4800
7	Compost Quality	Nutirents, moisture, Ash, pathogens, Heavy metals	Monthly	600	4	2400
Total						33600

8. Damage Assessment Evaluation:

As proposed project involve mainly construction of residential units and construction activity of only 19844.06 Sq.mt. of area is completed and committed to complete remaining work after obtaining Environmental clearance only and summary of construction activity is as under:

Built-up area of construction done = **19844.06** sq. mt.

534/2 plot no. 31 area sq. mt. 180

32 area sq. mt. 180

Club area sq. mt. 16482.32

534/2paiky 89 area sq. mt. 716.02

90 area sq. mt. 716.02

91 area sq. mt. 716.02

97 area sq. mt. 284.56

98 area sq. mt. 284.56

99 area sq. mt. 284.56

Total 19844.06

Built-up area of construction remaining = **64542.35** sq. mt.

As proposed project is mainly of residential project and activity wise damage assessment shall be as under.

Sr. No.	Activity	Impact	Environmental management plan	Damage anticipated
1	Clearance of Land by Cutting of 50 nos of Mango trees	Impact of Ecology	Impact has been mitigated by planting following trees Pethodia 16 Coconut palm 103 Mango tree 25 Tarmelia 50 Codia 58 Gulmore 52 Bahomia 15 Postal palm 144 Dead palm 4 Big tree total 467	As total numbers of tree has been nearly 10 times, No damage on ecology is anticipated.
2.	Discharge of Effluent	Impact on water bodies	STP having capacity of 75 KLD has been installed	No damage on Water bodies is anticipated as effluent is being treated and recycled back for gardening and flushing purpose
3	Increase of Vehicles	Impact on air pollution	Proper traffic management plan along with adequate parking is in place	No damage in air environment is anticipated.

Conclusion on damage assessment:

As proposed project is mainly construction of residential units and proper environmental management plan is in place, no significant environmental damage is anticipated, however, undertaking to implement all the recommendations given by Expert Appraisal Committee (EAC) has been submitted by project proponent.