

**APPENDIX - II****FORM-1 A****CHECK LIST OF ENVIRONMENTAL IMPACTS****1. LAND ENVIRONMENT:**

- 1.1 Will the existing land use get significantly altered from the project that is not consistent with the surroundings? (Proposed land use must conform to the approved Master Plan / Development Plan of the area. Change of land use if any and the statutory approval from the competent authority are submitted). Attach Maps of**

- (i) Site location,**
- (ii) Surrounding features of the proposed site (within 500 meters)**
- (iii) Contour plan**

The proposed land is classified as Settlement zone as per regional plan 2021. Part of this land is demarcated under no development slope.

- (i)** The project is located on the land bearing survey no. 33/1 of Candola Village, Ponda Taluka, Goa.  
Latitude - 15°31'54.26"N Longitude - 73°57'43.92"E
- (ii)** The Google image with 500 metres radius circle is annexed as **Annexure 10**.  
Within 500 metres of surrounding the project is bounded by  
Towards North – Amona River  
Towards South – Vacant plot  
Towards East – Vacant plot  
Towards West – Settlements
- (iii)** The contour plan for the project site is annexed as **Annexure 11**.

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

**Area Statement**

A detailed area statement is given in the Site plan annexed as **Annexure 3**.

**Water consumption**

Refer **Annexure 8**.

**Power requirement****Construction Phase**-50 KW (Source:-Goa state electricity board)

DG set of 2X150 KVA

**Operation Phase**- 7595 KW (Source:-Goa state electricity board)

Power backup-DG set of 2X150 KVA

**Connectivity**

State highway	SH 31 approx. 4.31 Km
Railway	Karmali railway station 6.13 Km
Airport	Dabolim airport 21.68 Km
Community facilities	Bus stop – 500m Hospital -2 Km Market – 1 Km Temple – 900 m

**Parking needs**Detailed parking statement given in the site plan annexed at **Annexure 3**.**1.3 What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing land use and disturbance to the local ecology).**

The proposed buildings are planned in such a way that there will be minimum impact in open spaces in the adjacent areas. Adequate open spaces have been planned. The project will have rather positive impact on the surrounding community facilities. CSR activities will be designed so has to benefit the local population.

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

Not envisaged. A detailed soil investigation report is annexed as **Annexure 4**. There is no possibility of land disturbances resulting in the erosion, subsidence or instability. The proposed development falls under seismic zone III as per the Geological survey of India.

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

No. The project will have rain water harvesting system. The harvested rain water will be reused in post monsoon months. Excess rain water will be drained off through the natural drains.

- 1.6 What are the quantities of earthwork involved in the construction activity cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc.)**  
Earthwork will include foundation and excavation for creation of basement. A detailed debris management plan is annexed as **Annexure 9**.
- 1.7 Give details regarding water supply, waste handling etc during the construction period.**  
Details regarding Water supply is annexed as **Annexure 8**.  
A detail regarding waste handling is annexed as **Annexure 6**.
- 1.8 Will the low-lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)**  
No
- 1.9 Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labour and the means of disposal)**  
The plan for management of construction debris is annexed as **Annexure 9** and waste during construction phase is annexed as **Annexure 6**.

## **2. WATER ENVIRONMENT:**

- 2.1 Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources & quantities and furnish a water balance statement.**  
The detailed water management plan is annexed as **Annexure 8**.
- 2.2 What is the capacity (dependable flow or yield) of the proposed source of water?**  
The detailed water management plan is annexed as **Annexure 8**.
- 2.3 What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)**  
The quality of water required is as per IS: 10500:2012 standards.
- 2.4 How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage)**  
The detailed water management plan is annexed as **Annexure 8**.
- 2.5 Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption)**  
No, water will not be diverted from other sources. Water requirement will be augmented by use of recycled sewage.

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

Waste water from all sources will be treated in the proposed STPs (2 no X 150 CMD and 1 no. X 100 CMD). Characteristics of sewage at inlet of STP are as follows:

**Characteristics of untreated Sewage**

Parameter	Value	Unit
pH	7 – 8.5	---
BOD	250 – 400	mg/l
Suspended Solids	200 – 450	mg/l
COD	600 – 800	mg/l
Oil & Grease	20	mg/l

**Characteristics of treated water**

Parameter	Value	Limits	Units
pH	7 – 8.5		
BOD	8- 10	30	mg/l
Suspended Solids	20-30	100	mg/l
COD	70-80	250	mg/l
Oil & Grease	5	10	mg/l

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

Rainwater harvesting will be proposed in the form of recharge pits along with the storm water drains. A detailed rain water harvesting plan is under process.

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

No. There will be minor change in run off characteristic at site due to paving for parking purpose and proposed internal roads. The storm water drains in the plot will be constructed for maximum rainfall intensity and hence there will be no water logging. The velocity in the open drains is estimated to vary from approximately 0.30 m/s at the entry to 2.50 m/s at the exit.

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

Ground water tapping has not been proposed. During the operation phase, a well designed rain water harvesting system will be implemented as a part of the project. The harvested water will be utilized for ground water recharge. Thus, there will be augmentation of the ground water aquifer leading to beneficial impact on the ground water table.

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

Construction area will be isolated and care will be taken to divert run-off storm water drainage, so possibility of pollution from construction run-off will be prevented. Also subsurface work will be carried out only during non monsoon period. The site has steep contours and adequate measures will be taken in order to prevent the run-off from construction activities.

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

The site will have a well designed storm water drainage system which will prevent any flooding. Percolation pits are proposed for recharging the ground water.

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

No. Adequate temporary sanitation facilities will be provided for the construction workers. Also clean drinking water will be provided. It will also be ensured that no accumulation of water will take place. Septic tank will be provided for treatment and disposal of waste water. Onsite first aid and medical facilities will be provided to all the concerned people working on the site.

Proper housekeeping will be maintained throughout the plot premises. Periodic disinfections or mosquito fogging or pesticide spraying will be carried out on the site.

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

On-site sewage arrangements are detailed out in **Annexure 7**.

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

Dual plumbing system is proposed. The building will be provided with two overhead tanks one for fresh water storage and one will be for STP treated water storage. The treated water from STP will be pumped to the overhead tank which will be then used for flushing.

**3. VEGETATION:****3.1 Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with it's unique features, if any)**

There is no sensitive ecosystem present that will be disturbed by the project. The plot area of 1, 02,387.00 m<sup>2</sup> (Development area) is categorized as Settlement Zone as per Regional Plan, 2021.

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

At present there is tree cover mostly with cashew plantation, approximate 300-400 nos. exist on site, Maximum number of trees will be retained or transplanted on site as part of proposed landscape plan, adequate number of trees as per norms will be planted on site

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

At present there is tree cover, approximate 300-400 nos. (With majority of cashew plantation) exist on site. Efforts will be taken to retain maximum number of trees. Forest NOC will be taken before commencement of the work.

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

There may be temporary displacement of avifauna during the construction phase. However since the landscape plan will incorporate local and native species the avifauna will be restored.

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

There will be temporary displacement of avifauna during the construction phase. However since the landscape plan will incorporate local and native species the avifauna will be restored during the operation phase

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

A detailed biodiversity survey is in progress and will be submitted once completed to The Hon' Committee

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

- The proposed plan includes sufficient landscape areas and also proposes to utilize energy efficient materials in the construction of the building. All these factors will together check and offset any heat island effects .
- There will be temporary increase in air pollution (particularly dust levels) due to transport of materials, excavation and land development during the construction phase.
- During operation phase, there will be a minor increase in air pollution due to increase in vehicular exhausts generated due to traffic
- The proposed project will not lead to heat island.

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

- There will be some increase in the SPM levels during construction phase, which will be of temporary impact.
- During operational phase, there will be a minor increase in air pollution due to increase in vehicular exhaust generated due to traffic.

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

A detail statement on the parking required and parking provided is given in Site plan annexed as **Annexure 3**.

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

The proposed site is an undeveloped area. There are existing access roads to the site. Internal road layout for the efficient traffic management within the site has been designed.

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

No. The internal roads will be designed with adequate width to minimize traffic congestion inside the plot.

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

DG sets are proposed to supply power as the emergency supply system in case of shut down/break down of main power supply. All DG sets will be housed in noise insulated enclosures designed to meet standards as laid under Environment (Protection) Act. Noise and vibrations from DG sets will be eliminated with vibration mounts and silencers.

**6. AESTHETICS:**

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

No. There are no civic amenities, landscapes worthy to be viewed from the proposed location.

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

Not applicable

There will not be any adverse impacts from new construction

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

No. Not applicable. The proposal is in conformity with the land use of the area as per the RP 2021, Goa. There are no special considerations which will have influence on our project design.

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

No such site in the vicinity.

**7. SOCIOECONOMIC IMPACT:**

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

Yes, During construction phase, there will be temporary increase in the number of people working on site.

During operation phase, there will be marginal increase due to the people residing in the residential and commercial development.

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

The Site is located at village Candola in taluka Ponda. Access to the site is from Karmali Railway Station at a distance of 6.31 km and Goa Domestic Airport at the distance of 21.68 km. The proposed site is an undeveloped. There are existing access roads to the site. One to old Goa which lies to the South of the proposed site and another goes to Amona Village. Internal road layout for traffic management within site has been designed.



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

No. Care would be taken to prevent impact of increased traffic leading to increase in air and noise pollution caused due to proposed development. The proposed site will create direct and indirect employment opportunities boosting the economic development of Candola Village. This project shall also involve local contractors.

**8. BUILDING MATERIAL:**

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

Embodied energy is the energy consumed by all the processes associated with the production of a building, from the acquisition of natural resources to product delivery, including mining, manufacture of material and equipment, transport and administrative functions.

- To enhance the energy conservation wherever possible, following measures will be adopted:
- Use of recycled material
- Maximum use of local resources and skills
- Reduction of transportation
- Use of water based paints etc.

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

The material required for construction activities will be procured from company's authorized vendor only. In case of urgency or non-availability of materials it will be procured from open market to maintain the pace of work. The mode of transportation for these materials will be by road through trucks or trailers.

Following measures will be taken to minimize the impacts caused by transportation & handling of materials during construction:

1. Construction materials will be carried out in enclosed vehicles.
2. All contractors will be instructed to use good condition vehicles with valid PUC certificates.
3. The movement of these vehicles will be restricted only during non-peak hours.
4. Water will be sprinkled on the site to prevent dust emissions.
5. Barricades will be raised along the boundary of the plot to prevent noise pollution.

- 8.3 Are recycled materials used in roads and structures? State the extent of savings achieved?**  
Materials with recycled content are proposed to be used to reduce environmental impacts. All structures are designed with minimum use of glass, granite and aluminum composite panel. Recycled material will be used for concrete and building materials. Bricks metal, chips, cut tiles will be used. Substratum removed during foundation and excavation will be used as filling material.
- 8.4 Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.**  
Refer **Annexure 6** for garbage management

## **9. ENERGY CONSERVATION:**

- 9.1 Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?**  
**POWER REQUIREMENT:**  
Construction Phase-50 KW  
DG set of 2X150 KVA  
Source:-Goa state electricity board.
- Operation Phase:- 7595 KW  
Power backup-DG set of 2X150 KVA  
Source:-Goa state electricity board
- \*\* Energy consumption assumed:- 7 W per Sq.ft**
- 9.2 What type of, and capacity of, power back-up do you plan to provide?**  
Power Back Up: It is proposed to install back up using Diesel Generating (D.G) set for supply of power when grid power is not available or during emergencies like power failure.
- Power backup-DG set of 2X150 KVA
- 9.3 What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation?**  
It will be a normal clear annealed glass.
- 9.4 What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project.**
- Attempts will be made to maximize the use of natural lighting through design
  - Besides this, a green cover consisting of trees of native species with large canopy size will be made.
  - Only plain annealed glass to be used.
  - Sloping roofs with decorative tiles are planned which will assist in heat reduction.

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

We will be providing solar streetlight for area lighting and will be providing solar water heating for individual flat / villa.

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

- Yes, attempts will be made to maximize the use of natural lighting through design
- Only plain annealed glass to be used.
- Sloping roofs are being planned which will assist in heat reduction. The roof bottoms shall be insulated to achieve a U-value of 0.4 to 0.85 w/Sq.m °C
- Besides this, a green cover consisting of trees of native species with large canopy size will be made.

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

**Lighting:** Lighting of Common Area, Utility Rooms shall be based on the following average lighting level considerations which are as per NBC 2005.

Area/Space	Average Illumination Range in lux	Type of Lamps /Fixtures
Service areas/Utility Areas such as DG Set Room, substation area, Electrical Room, Pump Room, Plant	100-150-200	T-5's Fluorescent/MH Lamps in high bay area.

External and Landscaping lighting shall be provided in consultation with the landscape architect. Road, Parking and Area lighting shall be provided for visual guidance and security purposes. Around 5 to10 lux shall be maintained for road lighting. Pathways, Garden and landscape lighting shall be designed keeping in mind the architectural features.

Area/Space	Average Illumination Range in lux	Type of Lamps /Fixtures
Road and Parking Areas	5 to 10 Lux	HPSV/MHI lamps in street light fixtures
Path and landscape areas	Aesthetics more important	Bollards with CFL's

Energy Conservation Measures for lighting :

- Using energy efficient light fixtures with good photometric properties.
- Using CFL's in external lighting bollards.
- Using T-5 (28W) fluorescent lamps in place of T-8 lamps (26W) in basements, stilts and underground parking areas.
- Employing LED light sources for some of the external lighting fixtures.
- Employing solar powered lighting for part of the external lighting fixtures.

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

- Energy conservation will be one of the focuses during the building planning.
- Attempts will be made to maximize the use of natural lighting through design
- Besides this, a green cover consisting of trees of native species with large canopy size will be made.
- All these factors will help in reducing heat island effects.

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

- (a.) Roof design: Roof will meet prescriptive requirement as per ECBC by using appropriate thermal insulation material to fulfill requirement.
- (b.) Vertical fenestration: Vertical fenestration will comply with SHGC requirements to meet prescriptive requirement as per ECBC by use of appropriate solar control strategies.
- (c.) Glazing: Clear annealed glass.

Following is the Envelope Performance Factor coefficients for building with 24 hour occupancy located in hot humid climate  
Envelope Performance Factor Coefficients

Building Components	U-factor (W/sq mtr deg C)	R –Value (sq mtr deg C/W)	SHGC
Vertical	3.17	---	0.2 to
Walls	0.35	2.35	-
Roofs	0.26	3.5	-

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

The provisions made in the complex for the purpose of fire safety shall be in accordance with fire NOC requirements of the authorities. They include underground and overhead water tanks, automatic fire pumps, wet risers, hydrant valves, hose reels, fire detection system, etc.

**SAFETY**

- All the workers will be covered under insurance policy.
- First Aid and Medical facilities will be provided to all the concerned people working in the complex premises.
- Proper precautions will be taken at all electrical installations, cables, and electrical connections to avoid short circuit and electrical shocks. All cabling in the Complex will be with fire resistant PVC cables /wires, running in PVC Conduits.
- All other Safety Measures as required by Concerned Government Authorities shall be complied with.

**FIRE PROTECTION**

- Fire Hydrant System for the buildings will be provided based on NBC Codes.
- 6.0 meters wide internal road is planned in the complex for Fire Tender with access from all sides of buildings. The strength of the access roads will be designed accordingly as per CFO directions.
- The Fire fighting equipments / system and Fire Fighting Alarm Control Panels will be installed and will take the required approved as per Chief Fire Officer of Panjim.
- About 120 m<sup>3</sup> reserved stock of water will be maintained for Firefighting.
- In case of emergency, STP treated water will be also be available at site for firefighting.

Please refer **annexure 15** for emergency evacuation plan.

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

Glass will be not be used as a wall material.

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

1. Mechanical ventilation & exhaust will be provided for the following spaces: Mechanical plant rooms, DG room and electrical substation & panel rooms.

2. Air will be exhausted from following spaces:

- Toilets
- Basement Parking

3. Fans will be centrifugal limit load, centrifugal cabinet, axial flow or propeller type depending on the application.

4. Fans will be complete with filters and gravity louvers wherever required.

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

We will be providing solar streetlight for area lighting and will be providing solar water heating for individual flat / villa.

## **10. ENVIRONMENTAL MANAGEMENT PLAN:**

**Environment Management Plan would consist of all mitigation measures for each item wise activity to be undertaken during the construction, operation and the entire life cycle to minimize adverse environmental impacts as a result of the activities of the project. It would also delineate the environmental monitoring plan for compliance of various environmental regulations. It will state the steps to be taken in case of emergency such as accidents at the site including fire.**

The Environment Management Plan is annexed as **Annexure 12** shows the stage wise activities that may be potential sources of pollution and the mitigation measures for the same.

### **Undertaking**

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

Date: 08.02.2016

Place: Goa



**Sunaina Gera**  
**Project Proponent**

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