APPLICATION FOR GRANT OF ENVIRONMENTAL CLEARANCE
FORM I & IA

FOUR SEASONS RESORT GOA & GOLF CLUB AT TIRACOL

Tiracol Village

Pernem Taluka

North Goa

Goa State

Project Proponent

M/s Leading Hotels Ltd.

CONTENTS

APPENDIX - I
FORM 1

Sr. No.	Item	Details
1.	Name of the project/s	Development of 18 hole Golf Course and an Eco Tourism resort at village Tiracol, Taluka Pernem, North Goa
2.	S. No. in the schedule	Category 8a of the Schedule annexed to New EIA Notification dated 14.09.2006
3.	Proposed capacity/ area/ length/ tonnage to be handled/ command area/ lease area/ number of wells to be drilled	Total area=244.6 acres approximately (9,90,000 Sq.m.) Built up Area of Resort & Associated Facilities = 40,000 sq.m. Gross covered Area= 58,000 sq.m.
4.	New/ Expansion/Modernization	New project
5.	Existing Capacity/Area etc.	Not Applicable
6.	Category of Project i.e. 'A' or 'B'	8a
7.	Does it attract the general condition? If yes, please specify.	NA
8.	Does it attract the specific condition? If yes, please specify.	NA
9.	Location	Tiracol village
	Plot/ Survey/ Khasra No.	Tiracol- survey no's = 2-13 (All or in part)
	Village	Tiracol
	Tehsil	Pernem
	District	North Goa
	State	Goa
10.	Nearest railway station/airport along with distance in kms.	Airport: Dabolim Airport at approx. 40 km Pernem Railway Station: 11 km towards east.
11.	Nearest Town, City, District Headquarters along with distance in kms.	Town: Pernem at about 13km from site District HQ of North Goa: Panaji at about 30 km from Tiracol
12.	Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (complete postal addresses with telephone nos. to be given)	Village Panchayat Querim village,
13.	Name of the applicant	Leading Hotels Limited
14.	Registered Address	Leading Hotels Limited, # 573, La Campala Road no 4, Miramar, Panjim.Goa
	Designation (Owner/Partner/CEO)	General Manager -Technical Leading Hotels Limited.
	Address	#573, La Campala Road no 4, Panjim Miramar, Goa
	Pin Code	
	Telephone no.	Tel : 0832 - 2904241
	Mobile	Mob: +918308846566

Sr. No.	Item	Details
	Email Fax No.	p.ravi@theleadinghotels.in ns.ashok@theleadinghotels.in Fax : 0832 - 2463674
16.	Details of Alternative Sites examined, if any. Location of these sites should be shown on a topo sheet.	Not applicable
17.	Interlinked Projects	NA
18.	Whether separate application of interlinked project has been submitted?	For CRZ clearance at GCZMA. CRZ clearance received on 9th December 2014.
19.	If yes, date submission	NA
20.	If no, reason	NA
21.	Whether the proposal involves approval/ clearance under: if yes, details of the same and their status to be given. (a) The Forest (Conservation) Act, 1980? (b) The Wildlife (Protection) Act, 1972? (c) The C.R.Z Notification, 1991?	Yes. The project falls under CRZ III therefore involves approval/ clearance under The C.R.Z Notification, 1991. Copy of map showing CRZ lines is enclosed as **Annexure III**
22.	Whether there is any Government Order/ Policy relevant/ relating to the site?	NA
23.	Forest land involved (hectares)	No
24.	Whether there is any litigation pending against the project and/or land in which the project is proposed to be set up? (a) Name of the Court (b) Case No. (c) Orders/directions of the court, if any and its relevance with the proposed project.	No

(II) Activity

1. **Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (Topography, land use, changes in water bodies, etc.)**

Sr. No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)	Yes	Land has been converted to non-agriculture by the Collector- North Goa. Copy of Sanad attached in **Exhibit-II** as **Annexure –IV & V.**
1.2	Clearance of existing Land, vegetation and building?	Yes	About 1966 Trees come in the path of the development and of these 1101 trees are endogenous to Konkan and shall be transplanted at a new location as per the master plan for the development. Balance trees will be cleared. No buildings exist on the plot to be developed
1.3	Creation of new land uses?	Yes	Land has been converted into non-agricultural for development purpose

1.4	**Pre-construction investigation e.g. borehole, soil testing?**	Yes	Kindly refer **Annexure IV** for Soil investigation report
1.5	**Construction works**	Yes.	Proposed development will comprise of villas, F&B areas, golf club house, back of house and other facilities. Please refer **Annexure V for proposed Master Plan superimposed on the CRZ map and the Area statement for entire development**
1.6	**Demolition work**	No	Not applicable as there are no existing structures.
1.7	**Temporary sites used for construction works or housing of construction workers?**	Yes	There will be temporary housing facility for the construction workers on the site, which will be located outside CRZ Zone.
1.8	**Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations**	Yes	Minimum earthwork for foundations, roads etc. will be undertaken. The landscaping elements (like small hillocks, undulations etc) & Water harvesting features like lakes etc will be incorporated in the Golf course design which will involve some amount of cutting, dressing and filling in accordance with the grading plan. However, no cutting will be done in CRZ area
1.9	**Underground works including mining or tunneling?**	No	Not Applicable
1.10	**Reclamation works?**	No	Not Applicable
1.11	**Dredging?**	No	Not Applicable
1.12	**Offshore structures?**	No	Not Applicable
1.13	**Production and manufacturing processes?**	No	Not Applicable
1.14	**Facilities for storage of goods or materials?**	Yes	Temporary sheds will be constructed for storage of construction materials.
1.15	**Facilities for treatment or disposal of solid waste or liquid effluent?**	Yes	**Construction Phase:** The site will have temporary toilet blocks connected to septic tanks and disposal through soak pits for sewage generated by construction workers **Operation Phase:** Site will have a Garbage Management Site (GMS), wherein solid waste will be segregated. Biodegradable waste will be treated in mechanical composting units within the resort premises and recyclable waste will be sold to scrap dealers. Inert waste will be compacted and sent to authorized waste disposal site. Details of Solid Waste Treatment proposed is enclosed in EIA. Sewage generated in the resort will be segregated into Grey & Black water. Grey Water comprises Water from shower / wash brain etc. & will be treated by Ultra filtration Plant. The black water (from toilet & urinal) will be treated separately using MBR Technology. Treated sewage water will be used within the plot for flushing, landscaping or for golf course irrigation/landscaping. Details of Water requirements, sourcing and

			Sewage Treatment & recycle enclosed in EIA Report.
1.16	**Facilities for long term housing of operational workers?**	No	Not applicable
1.17	**New road, rail or sea traffic during construction or operation?**	Yes	**Construction phase:** There will be temporary increase in traffic due to transport of construction material. **Operation phase:** Presently the site is secluded and away from heavy vehicular traffic. There will be an increase in vehicular traffic due to tourists visiting the resort. Proponent purposes to widen public road from North from existing 4.5m to 15m and also provide round about & underpass below public road to ensure that village traffic will not be affected in the proposal.
1.18	**New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?**	Yes	Internal roads are planned and designed to accommodate the traffic due to proposed resort. Bridge has been proposed by the Government connecting Querim village on South bank of river to village Tiracol on the Northern bank. Proponent will provide design services for road bridge free of cost to the Government.
1.19	**Closure or diversion of existing transport routes or infrastructure leading to charges in traffic movements?**	No	Not Applicable
1.20	**New or diverted transmission lines or pipelines?**	Yes	Proposed routing of Water and power pipeline to be finalized by the statutory authorities
1.21	**Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?**	Yes	Rain water harvesting lakes have been proposed in keeping with the site Topography
1.22	**Stream crossing?**	No	Not Applicable
1.23	**Abstraction or transfers of water from ground or surface waters?**	Yes	Bore well have been proposed to source 300 cmd of water during non monsoon season & will be located outside CRZ Area.
1.24	**Changes in water bodies or the land surface affecting drainage or run-off?**	No	The contours will be kept so that existing natural drainage is unaffected.
1.25	**Transport of personnel or materials for construction, operation or decommissioning?**	Yes	**Construction phase:** Construction materials will be transported to the site. Maximum of 400 trucks are expected on any day bringing material for resort construction **Operation phase:** Residents as well as workforce employed during operation phase will use vehicular transport. Maximum of 450 cars and few buses are expected to come to the resort on peak operational day.
1.26	**Long-term dismantling or decommissioning or**	No	Not Applicable

	restoration works?		
1.27	Ongoing activity during decommissioning which could have an impact on the environment?	No	Not Applicable
1.28	Influx of people to an area either temporarily or permanently?	Yes	**Construction phase:** There will be temporary and minor influx of construction workers during the construction phase. **Operation phase:** Tourists and Professional/Amateur Golfers will visit site during operation phase.
1.29	Introduction of alien species?	Yes	(Paspalum TE- a species of grass has been proposed for the Golf Course- this grass can survive on saline water having TDS upto 6000 ppm. The grass species has been used in Mumbai & Pune Golf courses & other Golf Courses in the country. It has been used in the Commonwealth Stadium, New Delhi and is not an alien species to India).
1.30	Loss of native species or genetic diversity?	No	Not Applicable
1.31	Any other actions?	No	Nil

2. **Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):**

Sr. No.	Information/checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)	Yes	Major area of land is barren and fallow.
2.2	Water (expected source & competing users) unit: cubic meters per day (CMD).	Yes	**Construction phase:** **Source:** Water for drinking purpose for construction labour will be sourced from bore wells after necessary treatment. Water to be used for construction will be supplied by rainwater harvesting lakes. **Requirement:** 100 m^3/day **Operation phase:** Details of Water requirements, sourcing and Sewage Treatment & recycle enclosed in EIA Report.
2.3	Minerals (MT)	No	The proposal pertains to construction of resort and no use of minerals is proposed.
2.4	Construction material – stone, aggregates, sand / soil (expected source – MT)	Yes	Raw material requirement for construction:

Materials	Units	Consumption	Source
Cement	bags	9 lakh	Approved suppliers
Steel	kgs.	89 lakh	Approved suppliers
Bricks/ Blocks	no.	2.2 crore approx.	Nearest kiln
Murrum	Cum	3,61,180	Govt. approved site/mining overburden

Sr. No.	Information/checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
			Sand: cum: 90,300: Govt. approved site. Artificially crushed rock sand Soil: cum: 18,060: Govt. approved borrow area
2.5	Forests and timber (source – MT).	No	Not applicable.
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (kW)	Yes	**Construction phase:** Source: Grid supply Requirement: 500 KVA **Operation phase:** Source: Grid supply Requirement: 6300 KVA DG set power back-up: 100% MVA (6 nos. DG set 750 KVA each)
2.7	Any other natural resources (use appropriate standard units)	Yes	Solar power is being examined for pathways landscape lighting & water heating to meet 10% of the power requirement.

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies)	YES	Diesel for DG Sets & LPG for kitchen. However, quantities used /stored will be very small.
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	No	Not Applicable
3.3	Affect the welfare of people e.g. by changing living conditions?	No	Not Applicable
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.	No	Not Applicable
3.5	Any other causes, that would affect local communities, fisher folk, their livelihood, dwelling units of traditional local communities etc	No	Not Applicable

4. Production of solid wastes during construction or operation or decommissioning (MT/month)

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
4.1	**Spoil, overburden or mine wastes**	Yes	Substratum removed during foundation excavation and cutting is 2,41,373 cum and this will be used to offset requirement of fill material during resort and landscaping development
4.2	**Municipal waste (domestic and or commercial wastes)**	Yes	**Construction phase:** Construction waste would be generated which would include debris, concrete, steel and other metals, bricks, pallets, packaging and paper products, railings, door and window casings, fixtures, tiles, furnishings etc. **Operation phase:** During operation phase 520 kg/ day of solid waste will be generated from resort area. A Garbage Mgt. site (GMS) is proposed in the resort facility. This will include: 1. Area for waste segregation 2. Compositing of wet waste 3. Recycling of recyclable waste 4. Compacting of other wastes (Details of Solid Waste Management proposed is enclosed in EIA Report).
4.3	**Hazardous wastes (as per Hazardous Waste Management Rules)**	Yes	1) Lead Acid Batteries 25 nos/annum 2) Used Oil 20KL/annum
4.4	**Other industrial process wastes**	No	Not Applicable
4.5	**Surplus product**	No	Not Applicable
4.6	**Sewage sludge or other sludge from effluent treatment**	Yes	**Operation phase:** Sludge will be generated from proposed STP and composted with other wet wastes for use as manure.
4.7	**Construction or demolition wastes**	Yes	**Construction phase:** Approximately 2,41,373 cu.m substratum will be generated during construction phase. This will be used on fill material in the Golf course development.
4.8	**Redundant machinery or equipment**	No	Not Applicable
4.9	**Contaminated soils or other materials**	No	Not Applicable
4.10	**Agricultural wastes**	No	Not Applicable
4.11	**Other solid wastes**	Yes	A) Bio wastes will be generated from landscaping and garden trimming. Bio waste will be composted in the proposed Organic Waste Converter on site and manure produced will be used for landscaping.

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
			B) Biomedical waste will be generated from Health Care facilities and will be disposed to nearest approved site C) E-Waste will be sorted and sold to nearest approved recycler

5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	Yes	Vehicular pollution during construction and operation phase. Use of DG sets (as emergency power back-up only) & Boiler for laundry will add to slight emission of air pollutants.
5.2	Emissions from production processes	No	Not Applicable
5.3	Emissions from materials handling including storage or transport	Yes	During the construction phase, there will be some dust generation due to handling of raw material and movement of vehicles carrying raw material.
5.4	Emissions from construction activities including plant and equipment	Yes	There will be a slight increase in SPM/ RSPM levels during construction phase.
5.5	Dust or odors from handling of materials including construction materials, sewage and waste	Yes	During the construction phase, there will be some dust generation due to handling of raw material and movement of vehicles carrying raw material.
5.6	Emissions from incineration of waste	No	Not applicable.
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	No	Not applicable.
5.8	Emissions from any other sources	No	Not applicable.

6. Generation of Noise and Vibration, and Emissions of Light and Heat

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	**Construction phase:** Noise will be generated from following sources during construction phase: 1. Construction machinery 2. On-going construction activity **Operation phase:** Potential noise generating sources during operation phase are:

			1. DG sets (only in case of power failures) 2. Vehicular traffic
6.2	**From industrial or similar processes**	No	Not applicable.
6.3	**From construction or demolition**	Yes	Noise will be generated from the construction activity.
6.4	**From blasting or piling**	No	Not applicable.
6.5	**From construction or operational traffic**	Yes	**Construction phase:** Noise will be generated due to trucks carrying construction raw material/ debris. **Operation phase:** During operation phase, it is proposed to use electric golf carts which will help minimize both air and noise pollution.
6.6	**From lighting or cooling systems**	No	Noise and vibrations will be controlled and eliminated by adopting appropriate measures like equipment mufflers, vibration absorptive pads and other acoustic treatment. As per the CPCB regulations, DG sets will be provided with acoustic enclosures.
6.7	**From any other sources**	No	Not applicable.

7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
7.1	**From handling, storage, use or spillage of hazardous materials**	No	Not applicable.
7.2	**From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)**	No	**Construction Phase:** The site will have temporary toilet blocks connected to septic tanks and disposal through soak pits for sewage generated by construction workers **Operation Phase:** Sewage generated in the resort will be segregated into Grey & Black water. Grey Water comprises Water from shower / wash basin etc & will be treated by Ultra filtration Plant and reused. The black water (from toilet & urinal) will be treated separately using MBR Technology. Sewage water will be reused for landscaping, golf course, flushing and cooling. Details of Water requirements, sourcing and Sewage Treatment & recycle enclosed **in EIA Report.** Thus, there will be no risk of contamination of land due sewage discharge.

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
7.3	By deposition of pollutants emitted to air into the land or into water	No	Water sprinkling will be done to suppress dust during construction
7.4	From any other sources	No	Not applicable.
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	No	Not applicable.

8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances	No	Not applicable.
8.2	From any other causes	No	Not applicable.
8.3	Could the project be affected by natural disasters causing environmental damage (e.g., floods, earthquakes, landslides, cloudburst etc)?	Yes	This aspect is examined in detail in the EIA & an outline of Disaster Management Report presented.

9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
9.1	Lead to development of supporting. Facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.: Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.) housing development extractive industries supply industries other	Yes	The proposal pertains to the development of a self-contained eco-friendly resort offering world class facilities to Professional Golfers. Infrastructure accompanying the development will consist of: • Sewage for treatment and recycling of waste water generated on site. • Provision of mechanical composting units for treatment of organic waste generated on site. • Energy efficient electrical and HVAC installations for conserving electricity. • Soft landscaping for roads, gardens, common areas, irrigation systems, street furniture etc. as green belt development.

			• Rainwater harvesting for conserving water • Development of internal roads for onsite traffic movement. • Adequate parking space. Thus it is envisaged to develop a facility having low eco foot print. Secondary development may develop to some extent to support the golfers needs.
9.2	**Lead to after-use of the site, which could have an impact on the environment**	No	Not applicable.
9.3	**Set a precedent for later developments**	No	Not applicable.
9.4	**Have cumulative effects due to proximity to other existing or planned projects with similar effects**	No	Not applicable

III. Environmental Sensitivity

Sr. 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**	Tiracol Fort	200m distance from the south boundary of the site.
2	**Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests**	Arabian Sea and Tiracol river	The site is directly adjacent to the Arabian Sea towards west and Tiracol river on the south.
3	**Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration**	Morjim beach	At about 12.7 km to the South of the site.
4	**Inland, coastal, marine or underground waters**	Arabian Sea and Tiracol river	The site overlooks the Arabian Sea on the west and Tiracol river on the south.
5	**State, National boundaries**	Maharashtra State boundary	Along the northern boundary of the site.
6	**Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas**	No	Not applicable.
7	**Defense installations**	No	Not applicable.
8	**Densely populated or built-up area**	Pernem	Located at about 13 km from the site on the south.

Sr. No.	Areas	Name/ Identity	Aerial distance (within 15 km.) Proposed project location boundary
9	**Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)**	New English high School, Keri, Goa. Redi Ganpati Mandir, Maharashtra	At about 1.26 km from site towards south. At about 2.83 km from site towards northwest.
10	**Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)**	No	Not applicable
11	**Areas already subjected to pollution or environmental damage (those where existing legal environmental standards are exceeded)**	No	Not applicable.
12	**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)**	Goa lies in zone III seismic region	Designing and construction will be undertaken according to requirements of seismic zone III.

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: 9th December 2016
Place: Panaji

Mr. P.Ravi
General Manager – Technical
Leading Hotels Limited,
573, La Campala
Road no 4 ,
Miramar
Panjim.Goa

NOTE:

1. The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a C.R.Z map duly demarcated by one of the authorized agencies, showing the project activities, w.r.t C.R.Z (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Simultaneous action shall also be taken to obtain the requisite clearance under the provisions of the C.R.Z Notification, 1991 for the activities to be located in the CRZ. **(Ministry of Environment, Forest and Climate Change grants CRZ Clearance to Leading Hotels Ltd on 9th December 2014)**

2. 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-a-vis the project location and the recommendations or comments or the Chief Wildlife Warden thereon (at the stage of EC). **Not Applicable**

3. All correspondence with the Ministry of Environment & Forests including submission of application for TOR/ Environmental Clearance, subsequent clarifications, as may be required form time to time, participation in the EAC Meeting on behalf of the project proponent shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being an authorized signatory for the specific project. **Annexure VI**

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 site is located in Tiracol village. It is an open vacant land with lateritic outcrops. The proposed construction is under Large Revenue Generation Scheme (LRGS). . There is no agricultural activity in the on the proposed site. Please refer to the EIA report wherein the following maps are enclosed.

-site location

-features surrounding the proposed site (within 500 m)

-land use map

-layout of the site.

-Plot area = 244.6 acres

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.

a. Area Statement

Description of Area as per CRZ Norms:

Sr. No.	Description	Area	
		(acre)	(sq.m)
1	Area within 200 m of HTL (NDZ)	51.9	2,10,061
2	Plot area between 200-500m of HTL	86	3,48,079
3	Area beyond 500 m of HTL (beyond CRZ)	99	4,00,695
4	Area within 100m of River Bank (NDZ)	7.7	31,165
	Total Area of the plot	**244.60**	**9,90,000**
	Permissible FSI Area	–	40,000
	Gross covered Area	–	58,416

Proposed Area Statement

Sr no.	Description	Area (sq m)
1	Main Resort & Associated facilities	
	Resort villas-125 nos.	9,300
	Lobby and Public spaces	727
	Food and beverages areas	1,520
	Banquet and meeting facilities	2,751
	Administrative offices and ancillary area	466
	Spa and fitness center	1,590
	Sports and children activities	1,760
	Food & beverages related services	1,226
	Truck dock area	371
	Housekeeping and laundry	870
	Human resource and security	182
	Employee facilities	1,266
	Repairs & maintenance	904
2.	Premium resort villas (60 nos)	24,190
3.	Back of house (BOH)	
	General circulation	1,000
	Common BOH (Back of house)	1,993
4.	Community facilities	8,300
	Total Gross Floor Area	**58,416**

b. Parking Statements

Parking facility for guests and service vehicles has been provided within the premises exceeding local regulations. All parking bays will be provided on ground and adequate road network will be designed for smooth movement of vehicles on site.

Proposed Parking Facilities - Resort areas

Description	No.of bays	Area per bay (sq.m)	Total Area (sq.m)
Car parking for Villas	150	12.50	1,875
Car parking for Public Areas/ Banquets	250	12.50	3,125
Parking for Buses	10	60.00	600
Two Wheeler parking for staff	250	3.13	781
Total Surface Parking	**660**		**7,319**

c. Water Requirement

During the construction phase water will be required for construction activity and the daily laborers' domestic activity such as drinking; washing, etc.

Around 70,000 to 80,000 cu m of water has been estimated as the requirement for the construction phase of the project and other ancillary requirements such as setting up of plant nursery, golf course irrigation requirements during dry season, etc. (construction phase is estimated to last for 36 to 40 months and thus the water requirement is estimated upwards of 100 cum/day)

For Operation phase : Total water requirement will be 2550 cmd breakup as under.

	Portable water Use	
a)	Resort and associated facilities	555 cmd
b)	Community facilities Tiracol Village , Disaster Management site, Primary School, Health care centre	95cmd
	Sub Total	**650 cmd**
	Non Potable water Use	
a)	Golf Course Irrigation	1200cmd
b)	Resort landscape	500 cmd
c)	Resort water features	50 cmd
d)	Cooling and Boiler	150 cmd
	Sub Total	**1900 cmd**
	Water will be Sourced as follows	
	Raw water from Public Source (Tillari Dam)	1500 cmd
	Borewell/Rainwater harvesting	250 cmd
	Treated sweage water from STP	500 cmd
	Under drains of Golf course (excess irrigation water	300 cmd

For water balance refer to the EIA report.

d. Sewage generation:

Sewage Generation

Type of sewage water from Resort	Quantity	Source
black water	200 cmd	Kitchen, urinals, toilets blocks laundry
grey water	350 cmd	Shower, wash basin, swimming pool, spa etc.

e. Solid Wastes:

Source Description	Solid waste generated (kg/day)
Office waste	2.9 cmd
Resort waste	18.3 cmd
Restaurant waste	1.3 cmd

Type of waste
organic waste
recyclable waste
inert waste
hazardous waste
bio-medical waste
solid waste

Percentage of different types of waste will vary according to the source of generation. Solid waste from the Resort & associated facilities will be segregated into dry and wet garbage. Dry garbage will be further segregated into recyclable and non-recyclable wastes. Recyclables will be sent to scrap dealers and non-recyclables will be compacted and disposed off by authorized dealers at MSW landfills. Wet garbage will undergo composting. Other waste which will be generated include: Hazardous waste (eg Lead acid batteries, used oild etc) biomedical wastes (soilid dressings form 25bed health centre -50 kg/month). This will be disposed off as authorized by GSPCB.

f. Power Requirement

Power Requirement Break Up

Particulars	**Power Requirement (kVA)**
Village (Around 65 Families)	100
Community (School, DMS , Hospital)	250
Resort:	
1. Standard Resort Villas	715
2. Premium Resort Villas	1700
3. Public Spaces + F&B	930
4. Banquets & Meeting Spaces	136
5. Back Of House	616
6. Golf	70
Total	**6300**

Alternate and renewable sources of power generation such as SOLAR POWER for the resort amenities are being explored. The external load for landscape lighting is around 730 KVA and the management are currently examining it as an alternate energy source and will implement if found feasible.

Solar Power

Items	Watt
Driveway	900
Courtyards	18,000
Semipaved area	2,500
Pool and Decks	6,750
Buggy Parks	2,800
Gardens and Golf Course	400,000
Solar lanterns	50,000
Solar water heater	250,000
Total	**730,950**
Total KVA	730

g. CONNECTIVITY :

Pernem Railway Station is located at about 13 km. Dabolim International Airport at approx. 40 km.

Road connectivity: The National Highway no.17 (NH17) is located at about 1.7 km from the site and access to the site is from Shiroda- Tiracol road which leads upto the Tiracol Fort located to the south of the site just outside the plot boundary. The site is accessible by an asphalted road which further bifurcates and runs along the east and north boundary of the plot.

h. COMMUNITY FACILITIES

The Project incorporates development of various facilities for upgradation of community infrastructure in Tiracol as follows :

-Primary School

-Health Care Center

- Disaster Management site

-Community Center

-Garbage Management site.

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 development will be a LEED Certified Gold rated Resort and an environment friendly Golf Course. The Resort will have very low ground coverage-
Resort/cluster villas and main building 39,544.77 sq.m
Recreation area, pools associated facilities 11,197.03 sq.m
Health clubs, gyms, substations etc 5607.35 sq,m
Total ground coverage will be 56,349.15 sq.m
This means that ground coverage is only about 6% o the total plot area (9,90,000 sq.m

The site for the proposed Tiracol Resort comprises 244.6 acres land located in Tiracol, Goa at the confluence of the Tiracol River and the Arabian Sea. The site is mostly undeveloped, having natural vegetation in patches with some barren outcrops. The undulating topography mainly slopes from North-West to South-East flattening into a plateau.

On the western edge lies the Arabian sea

On southern boundary lies the Tiracol river and village

On the North lies Tata Metallic's Ltd- a closed industrial unit.

The Project will make ore organized spacs available for recreation, sports and Tourism. Impacts due project are presented in EIA report and are minor and mitigable and the EMP is also presented.

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).

No, there will not be any land disturbance resulting in instability. The existing shoreline erosion will be prevented by using barrier material such as boulders, gabions, silt fences and conventional concrete blocks. Adequate measures will be taken considering the natural drains to prevent soil erosion.

Seismicity: Goa lies in Zone-III of seismic region and the designing and the construction will be done accordingly.

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. Natural drain lines will be maintained as far as possible. The proposed development will create minimal modification/ alteration of natural drainage pattern

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 cut & fill. Cutting volume will be 241,373 cum and fill volume will be 710,913 cum. Fill material required will be around 469,540 cum. Excavated material will be reused on the site for backfilling, construction of roads etc.

1.7

Give details regarding water supply, waste handling etc. during the construction period.

Source: during construction phase, the water requirement will be around 100 cmd (domestic + construction). Drinking water will be sourced from borewell, and water for construction will be stored in the lakes.

Construction Waste handling: The details are as follows:

1. Various types of construction debris such as bricks, blocks, steel, formwork, finishing materials, etc. will be generated.
2. Broken bricks, metal chips, cut tiles will be used for internal paving.
3. The damaged/ cut pieces of steel, glass etc. will be sold to scrap dealer.
4. Substratum removed during foundation and excavation will be used for plot filling.

Construction wastes will be used within the project premises as filling material.

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. There are no low lying areas and wetlands on proposed site. The proposed development will

incorporate appropriate design features like storm water drainage systems.

1.9 Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labor and the means of disposal)

- Various types of construction debris such as bricks, steel, formwork, finished materials will be generated.
- The debris will be segregated and stored in separately earmarked area at a distance from construction site.
- Recyclable materials will be sold off to scrap dealers. Inert materials will be used for filling .
- No health hazards are anticipated on the workers.

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 be met? State the sources & quantities and furnish a water balance statement.

During construction phase, water will be utilized for domestic use of construction laborers will be sourced from public water source and for construction activity will be supplied by tankers.

Total water requirement during the operation phase will be 2550 m^3/day which will be sourced from public source (Tilari Dam) and partly by resue of trated sweage from STP. Rainwater harvesting and by providing underdrains to recycle excess irrigation water from Golf course. Details are given in 1.2(c) and also in the EIA report.

2.2 What is the capacity (dependable flow or yield) of the proposed source of water?

It is proposed to obtain water for domestic use from public water source. Water supply will be augmented by recycling of sewage from the proposed STPs & Rain Water Harvesting. Please refer EIA report for details of water requirement.

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 supply will be from Tilari irrigation canal and water will be treated prior to use. Quality of water will be as per IS – 10500 drinking water 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)

It is proposed to set up sewage treatment and recycling plants and rain water harvesting ponds as additional water source. Approximately 500 m^3/day of treated sewage will be available for reuse. This water will be used for gardening, cooling etc.

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)

Water will be sourced from Tilari irrigation canal. Water requirement will be augmented by use of

treated water from proposed STP and treated sewage water will be used for Golf course irrigation and balance if any will be used for gardening and cooling etc. Water requirement will also be supplemented by creation of water bodies as they will act as large reservoirs. This will considerably decrease load on the existing water supply system.

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)

Total waste water generated from the proposed activity is about 550 m^3/day. Treated waste water will be used for toilet flushing, gardening, AC cooling etc.

Expected Quality of Raw & Treated Sewage from Black Water Treatment

Items	Unit	Raw Sewage Quality	Treated Sewage Quality
Average Daily Flow Rate	cmd	550	550
pH	——	6 to 8	6 to8
BOD	mg/L	300	Less than 10 (target <5)
COD	Mg/L	1000	30
Suspended solids	Mg/L	300	< 5 (target < 1)
Total Nitrogen	Mg/l	80	<5 (target < 1)
Total Phosphorous	Mg/l	20	<5 (target < 1)
Total coiliforms	CFU/100ml	–	none
E-Coli	CFU/100ml	–	none
Oil/grease	Mg/L	100	5

2.7

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

- Rain water harvesting is proposed as a water conservation measure. Harvested rain water can be used for flushing and cooling tower make-up.
- Roof drain pipes will be designed considering maximum intensity of rainfall for 100 years.
- Rain water will be collected by down take pipes, proper site grading, storm water drainage channels, catch basins/ pits and piped drainage system, as appropriate.
- Separate storage tanks and treatment plants will be provided.
- Storm water will be discharged to recharge pits and soak ways to augment the ground water.

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?

The Project is located on a Plateau. Due to the proposed development, paved areas and built up areas will be increased, hence there will be runoff from the site. A well engineered storm water drainage system will be provided as a part of the proposal and runoff from roof tops will be harvested and reused. Hence, there will be no problem of flooding and water logging.

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, approvals obtained from competent authority, if any)

Proponent proposes to use borewells to source 250 cmd of water demand. During the operation phase, a well designed rain water harvesting system will be implemented. The harvested water will be utilized for ground water recharge. Thus, there will be 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 the run-off to storm water drainage, so possibility of pollution from construction run-off is prevented. Also, subsurface work will be carried out only during non-monsoon period.

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)

- Adequate storm water drainage system is planned and creation of new additional secondary/ minor drains along the roads of requisite sizes. The proposed storm water drainage system shall help in avoiding any flooding or water logging in the site area.
- The proposed storm water drainage system is designed with peak rainfall intensity.

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. During the construction phase, temporary toilet blocks for construction labour shall be provided and treatment and disposal of the waste will be by septic tank and soak pit arrangement. Also clean drinking water will be provided. It will also be ensured that no accumulation of water will take place, and thus prevent breeding of mosquitoes.

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)

Construction Phase:

The site will have temporary toilet blocks connected to septic tanks and disposal through soak pits for sewage generated by construction workers

Operation Phase:

Site will have a Garbage Management Site (GMS), wherein solid waste will be segregated. Biodegradable waste will be treated in mechanical composting units within the resort premises and recyclable waste will be sold to scrap dealers. Inert waste will be compacted and sent to authorized waste disposal site. Details of Solid Waste Treatment proposed is enclosed in EIA.

Sewage generated in the resort will be segregated into Grey & Black water. Grey Water comprises Water from shower / wash brain etc. & will be treated by Ultra filtration Plant.

The black water (from toilet & urinal) will be treated separately using MBR Technology.
Treated sewage water will be used within the plot for flushing, landscaping or for golf course irrigation/landscaping.
Details of Water requirements, sourcing and Sewage Treatment & recycle enclosed **in EIA Report.**

2.14

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

Water from public source will be used for domestic purpose. There will be separate lines and storage tanks for fresh water and for treated wastewater to be used for flushing, cooling and gardening purposes. The pipelines of the dual plumbing system will also be color coded for demarcation.

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)

No. The proposed project will not pose any threat to biodiversity. For details, please refer to the EIA report.

3.2

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

About 1966 trees will come int eh path of the development – of these 1001 trees are endemic to Konkan region and efforts will be made to retain /transplant them. Balance 965 trees are common species such as Acacia, Cashew etc. Proponent plans to plant more than 4000 trees as part of the development. For details od landscape plan please refer EIA report.

The proposed development will take into consideration the existing trees on the site such that there is minimum cutting and existing vegetation on the site is retained.

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)

The proposal would take into consideration the surrounding sea and river ecosystem. Proposed green belt will consist of trees planted as per the guidelines issued by the local DCR. The trees would be the fruit bearing type and of the species suiting the local climate as far as possible.

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.

No. Adequate care will be taken during the planning stage to prevent creation of barriers to the movement of local terrestrial or aquatic fauna.

4.2

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

No. The development proposal will take adequate care to create green spaces and buffer areas in order to reduce impacts due to the proposed activity.

4.3

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

Not applicable.

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)

- 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 and use of DG sets/ boilers.
- Due to presence of open spaces and landscape, and also as the project has very less built-up area, there will be no heat island effects.

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/ RSPM levels during construction phase, which will have a temporary impact.
- During operational phase, vehicular exhausts will be the only source of air pollution.

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.

Proposed project is of a resort and parking facility for guests and service vehicles will be provided within the premises. Both four wheeler and two wheeler parking as per local regulations are proposed. All parking bays will be provided on ground and adequate road network will be designed for smooth movement of vehicles on site. It is proposed to widen the public road from 4.5 to 15 m. a roundabout will be created for access at site. An underpass will be created to connect eastern part of the property to the western part.

Proposed parking details:

Description	No.of bays	Area per bay (sq.m)	Total Area (sq.m)
Car parking for Villas	150	12.50	1,875
Car parking for Public Areas/ Banquets	250	12.50	3,125
Parking for Buses	10	60.00	600
Two Wheeler parking for staff	250	3.13	781
Total Surface Parking	**660**		**7,319**

5.4

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

Adequate provisions will be made through provision of internal roads for smooth vehicle entry and exit and as well as walkways for pedestrian movements. For detailed circulation plan please refer EIA report.

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.

There will be marginal increase in noise due to the traffic from the resort activities. However, internal roads within the premises will be designed with adequate width to ensure smooth movement of traffic.

5.6

What will be the impact of DG sets & other equipment on noise levels & vibration & 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.

Natural beauty of the region will be retained. Proposed structures will be aesthetically pleasing and will not obstruct views.

6.2

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

No. Not applicable.

6.3

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

Local architectural elements and design features will be adopted to make the buildings aesthetically pleasing.

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.

Tiracol fort is located to the south of the site.

7.

SOCIO-ECONOMIC IMPACT

7.1

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

There will be marginal change in the demographic structure with the proposed development. There will be temporary increase in the number of people during the construction phase and an influx of tourists in the area after completion of the project.

7.2

Give details of existing social infrastructure around the proposed project.

The site is located in a rural and no major social infrastructural facilitites area located in close vicinity. In fact the project proponent proposes to provide water supply, GMS, DMS, Primary School & Health Center.

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. There are no sacred sites or places of cultural value in the area and the proposed project will not cause any adverse effects on local communities.

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 materials & equipments, transport and administrative functions. To enhance the energy conservation while selection of building material following measures will be adopted:

1. Use of recycled material
2. Maximum use of local materials such as laterits.
3. Reduction of transportation
4. 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?

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

1. Transportation of raw material will be done in covered trucks.
2. The movement of these vehicles will be restricted only during non-peak hours.
3. Water will be sprinkled on the site to prevent dust emissions.
4. 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?

Recycled material & recycled water will be used for concrete & building material. Construction waste materials like bricks, metal, chips, cut tiles will be used for internal paving. Substratum removed during foundation and excavation will be used for plot filling and for making pathways.

8.4

Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.

Construction phase:
Construction waste would be generated which would include debris, concrete, steel and other metals, bricks, pallets, packaging and paper products, railings, door and window casings, fixtures, tiles, furnishings etc.
Operation phase: During operation phase 520 kg/ day of solid waste will be generated from resort area. A Garbage Mgt. site (GMS) is proposed in the resort facility. This will include:

- Area for waste segregation
- Compositing of wet waste
- Recycling of recyclable waste
- Compacting of other wastes

(Details of Solid Waste Management proposed is enclosed in EIA Report).

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?

Construction phase:
Source: Grid supply
Requirement: 500 KVA

Operation phase:
Source: Grid supply
Requirement: 6300 KVA

DG set power back-up: 100% MVA (6 nos. DG set 750 KVA each)

9.2

What type of, and capacity of, power back-up do you plan to provide?

Backup power will be provided by - DG set power back-up: 100% MVA (6 nos. DG set 750 KVA each)

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?

Use of low emissive glass will be made to help reflect the solar radiation to the outside. Material specifications as per latest ECBC norms will be followed.

Glass which will be used for building will have following characteristics:

- Glass, which can help in heat avoidance, will be used for the construction. The glass will be low emissive with double glazed unit with a coating on the second face of the glass.
- Under-deck insulation will be used to prevent roofing from heating via direct exposure to sun.
- Special coating – "Green Shield" will be utilized.
- It will blend with the interiors & exteriors as well to improve the productivity.
- It will be transparent yet heat resistant.
- Double glazed system will be used to lower heat gain.

The specifications including emissivity and thermal characteristics will be as follows:

Characteristics of Clear Glass

Frame Type	Glazing Type	U-factor	SHGC	VLT
All frame types	Single Glazing	7.1	0.82	0.76
Wood, vinyl or fiberglass frame	Double Glazing	3.3	0.59	0.64
Metal and other frame type	Double Glazing	5.1	0.68	0.66

Characteristics of Tinted Glass

Frame Type	Glazing Type	U-factor	SHGC	VLT
All frame types	Single Glazing	7.1	070	0.56
Wood, vinyl or fiberglass frame	Double Glazing	3.4	0.42	0.39
Metal and other frame type	Double Glazing	5.1	0.50	0.40

9.4

What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project.

- 10% of external/ facade lighting on solar power generation.
- Glass, which can help in heat avoidance, will be used for the construction. The glass will be low emissive with double glazed unit with a coating on the face of the glass.
- Under-deck insulation will be used to prevent roofing from heating via direct exposure to sun.

9.5

Does the layout of streets & buildings maximize 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.

The conservation efforts would consist of the following:

- Maximize the use of natural lighting through design.
- Passive solar cooling utilizing building shading.
- Promoting use of solar water heating, Solar water system shall be provided of 1/5 of total hot water requirement as per ECBC norms
- Sunscreen films on windows to reduce heating inside the buildings.
- Purchase of energy efficient appliances.
- Use of compact fluorescent lamps and low voltage lighting.

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?

The proposed buildings orientation will be in the east-west direction with maximum openings on north and south sides. Service cores will be placed on east and west to prevent direct solar radiation from affecting building interiors. Use of solar water heating sunscreen films on windows will be promoted to reduce heating inside the buildings.

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.

Heating Ventilation Air Conditioning and Refrigeration (HVAC&R) systems

- Use of highly efficient centrifugal compressor water cooled water chilling machines (high COP

chillers- 6.1 or above)

- Secondary chilled water system with variable speed pumps through adjustable frequency drives for maximizing energy conservation. Secondary zones as per time based operational hours
- Energy efficient motors; minimum energy performance as per energy simulation report
- Use of Variable Air Volume (VAV) boxes for specific areas (meeting rooms, Board rooms etc); AHU's w ith Variable Frequency Drive (VFD) for specific areas
- Energy Recovery Wheels in AHU's for energy conservation for specific areas.
- Indoor air quality as per ASHRAE IAQ standards (ASHRAE 62.1 – 2007)
- Cooling tow er selection for minimum drift and noise level; energy efficient motors, VFD for motor speed control.
- Car park exhaust system equipped w ith CO (Carbon Monoxide) sensors so that exhaust fans are operated as per permitted CO concentration levels

Refrigerants

- Where mechanical cooling is used, HVAC&R systems for the refrigeration cycle will be utilized that minimize direct impact on ozone depletion.
- Use of refrigerant with zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP)
- Zero use of chlorofluorocarbon (CFC)-based refrigerants in HVAC&R systems.
- Equipment will be maintained to prevent leakage of refrigerant to the atmosphere.
- Use of fire suppression systems that do not contain HCFCs or halons.

Electrical Medium Voltage System

- Use of Dry type transformers with On Load Tap Changer (OLTC).
- DG sets for 100% power backup.
- Automatic power factor correction to maintain power factor around 0.95 to 0.99.
- Timers for basement parking area lighting (if any) for energy savings.
- 10% of external/ facade lighting on solar power generation.
- Use of energy efficient fixtures and lamps i.e. Compact Fluorescent Lamps (CFL), T-5 Lamps.
- Dimmers shall be proposed for public area lighting like Entrance lobby, Banquet hall etc.
- Energy saving units shall be proposed for each villa.

Low Voltage Systems

- The building shall be proposed with intelligent addressable fire alarm system
- Fire alarm system shall be integrated with public address system for automatic evacuation messaging
- All services in the building shall be controlled and monitored through an integrated building management system (IBMS) for greater reliability and to effect optimum level of operating engineering services systems
- MATV/ CATV shall be proposed for Entire Resort

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?

The plot includes sufficient landscapes and open spaces intermediating with the proposed resort units. The project proposes to utilize energy efficient materials in the construction of the buildings (that will emit less energy). All these factors will together check and offset any heat island effects and help in keeping the temperature cool.

At present, there is green cover on site. In addition, materials and landscaping techniques will be adopted that reduce the heat absorption of exterior materials. The following strategies are suggested for roads, sidewalks, courtyards and parking lots:

- Providing shade from the existing tree canopy

- Provide shade from architectural devices or structures that have a solar reflectance index (SRI) of at least 29.

- Use hardscape materials with an SRI of at least 29.
- Use an open-grid pavement system (at least 50% pervious).

Consider replacing constructed surfaces (e.g., roof, roads, sidewalks, etc.) with vegetated surfaces such as vegetated roofs and open grid paving or specify high-albedo materials, such as concrete, to reduce heat absorption.

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.

The thermal characteristics for the building envelope will be as per the ECBC norms. In accordance with Energy Conservation Building (ECBC) Code 2008 norms, Goa comes under warm & Humid climate zone.

Hence, based on the ECBC norms, U Values considered may be as follows:

Wall Facia U = 0.077 BTU/HR/SFT/DEGF

Roof (exposed to sun) with thermal insulation equivalent to 4 layers of 8 mm. thick expanded polyethylene

External glazing (DGU's) :

U = 0.072 BTU/HR/SFT/DEGF

U = 0.58 BTU/HR/SFT/DEGF

Shading Coefficient- 0.287

9.10

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

Please refer **EIA Report** for details on Fire Fighting System

9.11

If you are using glass as wall material, provide details and specifications including emissivity and thermal characteristics.

Material specifications as per latest ECBC norms will be followed. The specifications including emissivity & thermal characteristics are as follows:

Characteristics of Clear Glass

Frame Type	Glazing Type	U-factor	SHGC	VLT
All frame types	Single Glazing	7.1	0.82	0.76
Wood, vinyl or fiberglass frame	Double Glazing	3.3	0.59	0.64
Metal and other frame type	Double Glazing	5.1	0.68	0.66

Characteristics of Tinted Glass

Frame Type	Glazing Type	U-factor	SHGC	VLT
All frame types	Single Glazing	7.1	070	0.56
Wood, vinyl or fiberglass frame	Double Glazing	3.4	0.42	0.39
Metal and other frame type	Double Glazing	5.1	0.50	0.40

9.12

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

- Fresh air quantity for air conditioned areas shall be as follows in line with Indoor Air Quality as per ASHRAE 62.1-2007

The following areas shall be provided with dedicated ventilation system with the number of air changes for each space, as identified herewith:

a) Plant Room / Pump Room / LT Room / Transformer Room : 15 ACPH

b) Toilets (Public areas) : Minimum 10 ACPH

c) Toilets (Rooms) : 50 CFM

d) Car Parking in basement (if any) : 12 ACPH for normal exhaust, 30 ACPH exhaust in case of fire, 12 ACPH for supply air

e) Lockers : 15 ACPH

f) Laundry : 10 ACPH

g) DG Room : Minimum 150 ACPH

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.

Following renewable energy technologies have been proposed:

- Solar Passive Architectural Features (Shading devices and Building envelope.)
- Solar energy devices

Non-conventional energy technologies to reduce the overall energy consumption:

- All services in the building shall be controlled and monitored through an integrated building management system (IBMS) for greater reliability and to effect optimum level of operating engineering services systems
- Use of dry type transformers with On Load Tap Changer (OLTC).
- DG sets for 100% power backup.
- Automatic power factor correction to maintain power factor around 0.95 to 0.99.
- Timers for basement parking area lighting (If any) for energy savings.
- 10% of external/ facade lighting on solar power generation.
- Use of energy efficient fixtures and lamps i.e. Compact Fluorescent Lamps (CFL), T-5 Lamps.
- Dimmers shall be proposed for public area lighting like Entrance lobby, Banquet hall etc.
- Energy saving units shall be proposed for each villa.

10.

ENVIRONMENTAL MANAGEMENT PLAN

As part of the project lies in CRZ III, EIA report has been prepared and enclosed with the application. EMP from chapter 7 of the EIA report explains in detail all the environmental management plans made and to be followed.

Date: 9th December 2016
Place: Panaji

Mr. P.Ravi
General Manager – Technical
Leading Hotels Limited,
573, La Campala
Road no 4
Miramar
Panjim.Goa - 403001

List of Annexures

Annexure Number	Details/contents
I	Order dated 29th November 2016 by the Hon'ble National Green Tribunal Bench , Pune in Application 135/2015
II	Notification of Ministry of Environment Forest & Climate Change, New Delhi, dated 9th December 2013
III	CRZ delineation by Anna University
IV	Soil Investigation Report
V	Master Plan for proposed development and proposed Area statement
VI	Letter of Authority Authorizing Mr. P.Ravi for signing forms