Validity expires on 16.03.2025

सत्यमेव जयते

Proceedings of the State Environment Impact Assessment Authority Kerala

Present: Prof. (Dr.) K.P. Joy, Chairman, Dr. J. Subhashini, Member &
Sri. P.H. Kurian, I.A.S., Member Secretary.

Sub: SEIAA- Environmental clearance for the proposed Establishment of Thrissur Zoological Park, Wildlife Conservation & Research Centre in Sy. No. 310(Puthur Village) & Sy. No. 74 & 243 (Kainoor Village), Ollukkara Taluk, Thrissur District, Kerala of Sri Rajesh Ravindran, IFS, Chief Conservator of Forests, Thrissur Zoological Park- Granted-Orders issued

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STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY, KERALA

No. 1127/EC/SEIAA/ KL/2017 ***dated, Thiruvananthapuram 17.03.2018***

Ref: 1. Application received dated 23.03.2017 from Sri Rajesh Ravindran, IFS, Chief Conservator of Forests,(Central Circle) & Special Officer, Thrissur Zoological Park, Vanapriya Forest Complex, Paravattani, Thrissur District, Kerala-680005.

2. Minutes of the 73rd meeting of SEAC held on 30th & 31st May, 2017.
3. Minutes of the 74th meeting of SEAC held on 14th&15th June 2017.
4. Minutes of the 82nd meeting of SEAC held on 25th November, 2017.
5. Minutes of the 84th meeting of SEAC held on 22nd & 23rd January 2018.
6. Minutes of the 86th SEAC held on 27th February 2018.
7. Minutes of the 81st meeting of SEIAA held on 08.03.2018.
8. Affidavit dated 17.03.2018 from Sri Rajesh Ravindran, IFS, Chief Conservator of Forests,(Central Circle) & Special Officer, Thrissur Zoological Park

ENVIRONMENTAL CLEARANCE NO. 37/2018

Sri Rajesh Ravindran, IFS, Chief Conservator of Forests,(Central Circle) & Special Officer, Thrissur Zoological Park, Vanapriya Forest Complex, Paravattani, Thrissur District, Kerala-680005, vide his application received online, has sought Environmental Clearance under EIA Notification, 2006 for the proposed Establishment of Thrissur Zoological Park in Puthur Village, Ollukkara Taluk, Thrissur District, Kerala. It is interalia, noted that the project comes under the Category B, 8(a) of Schedule of EIA Notification 2006. The total

forest land involved in the present project is 136.85 ha. The total cost of the project is Rs. 150 Crores.

Details of the project as furnished by the applicant are as follows :-

BASIC INFORMATION OF PROJECT
PART A

PROJECT DETAILS			
File No	**1127/EC/SEIAA/KL/2017**		
Name /Title of the project	Prior Environmental Clearance for The Establishment of Thrissur Zoological Park at Puthur		
Name and address of project proponent.	Shri Rajesh Ravindran IFS, Chief Conservator of Forests (Central Circle) & Special Officer, Thrissur Zoological Park, Vanapriya Forest Complex, Paravattani, Thrissur- 680 005		
Owner of the land	Kerala Forest and Wildlife Department		
Survey Nos. District/Taluk/ and Village etc.	Survey Nos	Puthur Village: 310 Kainoor Village: 74 & 243	
	District	Thrissur	
	Taluk	Ollukkara	
	Village	Puthur & Kainoor	
Category/Sub Category and Schedule	8 (a)		
Date of submission of Application	Online submission was made on 23.03.2017		
Total Built up Area & No. of Floors	The buildings proposed for the Zoological Park includes the Zoological administration and services buildings. Only site allocation has been done in this earlier stage.		
No of apartments	NA		
Height of the building from the ground level			
GPS Co-ordinate	NE	10°29'22.12"N	76°18'6.20"E
	NW	10°30'8.32"N	76°17'47.99"E
	SE	10°28'58.18"N	76°17'39.61"E
	SW	10°29'27.13"N	76°17'21.15"E
Brief description of the project.	The Government of Kerala has entrusted Kerala Forest and Wildlife Department as a law enforcement agency for the state of Kerala. Forest Department is one of the few oldest and important administrative organs of the State with its Headquarters at Vazhuthacaud, Thiruvananthapuram. The department was established for the management of		

	forests of Kerala, with the following: objectives • To conserve and expand unique and complex natural forests of Kerala for posterity, in particular with regard to water; biodiversity; extent; productivity; soil, environmental, historical, cultural and aesthetic values, without affecting their ecological processes. • To increase the productivity of forest plantations through appropriate management interventions and use of modern technology to meet the needs of the present and future generations. To increase the tree cover both inside and outside the forest to meet the timber & non-timber demands of the society. • To conserve, maintain and enhance the existing gene pool of the state for posterity. To reduce pressure on forest through appropriate interventions. To meet the livelihood needs of tribals and other forest dependent communities. • To sustainably conserve and manage biodiversity-rich and sensitive ecosystems such as mangroves, sacred groves, coastal areas, wetlands, homesteads, private plantations etc. which are outside the control of the Forest Department. • To improve the standard of living of the forest dependent tribal and village communities. The Forest department is also bounded with the duties includingGeneral Administration together with Recruitment and Establishment matters, Biodiversity Conservation, Forest Protection, Wildlife Management and Research, Forest Development, Social Forestry, Forest Vigilance and Evaluation, Eco-development and Tribal Welfare, Planning and Research, Tribal Rehabilitation and Special Afforestation, Infrastructure and Human Resource Development, FMIS etc.
Is it a new Project or expansion/modification of an existing project?	Relocation of existing zoo as per the instructions of the Central Zoo Authority, New Delhi
Details of the Project Cost	RS. 150 crore
If CRZ recommendation applicable?	NA
Distance from nearby habitation	The site boundary is bounded with road and the nearby habitation is about 20m from the project boundary.
Distance from nearby forest, if applicable	Government of Kerala has issued orders vide the G.O (MS) 16/2012/F&WLD dated 24.02.2012, according approval for establishment of a zoological park in Paravattani Reserved Forests in the Pattikkad Forest Range of Thrissur, Puthur Grama Panchayath by the Forest Department.

Distance from protected area, Wildlife Sanctuary, National Park etc.	The site is within the reserve forest by Kerala Forest and Wildlife department. As per letter No. F. No.11-66/2004-FC dated 13.11.2007 of the Ministry of Environment & Forests, Government of India, activities related to development of zoos undertaken as per the Master Plan approved by the CZA are considered as forestry activities. The Master Plan for the Thrissur Zoological Park has been approved by the CZA vide their letter no F.No.19-113/92-CZA (140) (M)/161/ dated 31.08.2012. Hence, additional clearance is not required under F.C Act 1980.
Distance from nearby streams/rivers/National Highway Roads and Airport	Manali River - 2.5 km (aerial distance) NH 47- about 3.28Km(aerial distance) Thrissur Railway Station: 10.5km Cochin International Airport, Nedumbassery: 46.7km
Is ESA applicable? If so, distance from ESA limit	NA
IMPACT ON WATER	
Details of water requirement per day in KLD	Operation Phase 247 KLD – During Rainy Days. 391 KLD – During non-Rainy days
Water source/sources.	During construction phase, the expected water source is the Manali River which is about 2.5 km from the proposed site. Also the existing bore well inside the site is proposed as the supplementary source during operation phase. Considering the ground water potential at the site, it is recommended for open wells with 10-15m depth as supplementary source. Besides, the quarry pond inside the proposed location, will be utilized as water storage facility. Also, five numbers of conservation areas ponds of capacity 1 ML, two artificial lakes of capacity 15ML & 17 ML capacity and an underground storage sump of capacity 0.2 MLD is proposed for the collection of rainwater during operation phase.
Details of water requirements met from water harvesting.	Five numbers of conservation areas ponds of capacity 1 ML, two artificial lakes of capacity 15ML & 17 ML capacity and an underground storage sump of capacity 0.2 MLD is proposed for the collection of rainwater during operation phase.
What are the impacts of the proposal on the ground water?	Ground water potential of the site is very limited, and restricted to the deep seated fractures at depth. Measurement of water table in the abandoned quarry close to the site shows it at 4.5 m below ground level (bgl) in the month of February, 2016. Surface water storage on a large scale is planned to meet the needs of the zoological park, besides the proposed water

	sourcing from the intake well at Moorkanikara, in Manali River. During the construction phase, main water source of the site is the water from Manali and rainwater harvesting will serve as the water source during operation phase. Since the ground water potential of the site is insignificant and there is no plant to tap it, the impact of the proposal on the ground water table of the surrounding area is insignificant. It is envisaged that the ground water recharging pits connected with the drain and open wells and water storage in the quarries would enhance the ground water percolation and hence increase the availability of water in the surrounding area. .
WASTE MANAGEMENT	
Explain the facilities for Liquid waste Management	Two STPs each of capacity 75 cum/day is proposed for the treatment of sewage generated from the Zoological Park during the operation phase.
Solid Waste Management	The solid waste from the Zoological Park includes the faecal matter, leftover food from the animal enclosures, and waste from zoo hospital and garbage from the visitor's facility. The waste will be properly managed as per the waste management scheme for the Park.
E-Waste Management	Sent to Authorized E Waste disposers
Facilities for Sewage Treatment Plant	Two STPs each of capacity 75 cum/day is proposed for the treatment of sewage generated from the Zoological Park during the operation phase.
How much of the water requirement can be met from the recycling of treated waste water? (Facilities for liquid waste treatment)	Two STPs of capacity 75 KL each is proposed for the treatment of waste water generated from the facilities. The treated water will be 142 KLD. And the treated water meeting the standards as specified in IS 10500 will be reused for flushing and landscape purpose.
What is the incremental pollution load from waste water generated from the proposed activities?	No incremental pollution is anticipated as the sewage generated is proposed for recycling to meet non-contact requirements such as flushing, landscaping etc. in the proposed project. The treated water meeting the standards as specified in IS 10500 will reused for flushing and gardening and for chillers. Hence no incremental pollution load is anticipated.

How is the storm water from within the site managed?	The proposed development may also increase runoff from the site. This increased run off will be collected by drains of adequate size considering the slope of the site and will be directed to the rain water harvesting ponds. Drains will be fitted with intermediate recharge pits provided on either side of the internal roads.
Will the deployment of construction labourers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation)	The construction workers would be accommodated offsite. Adequate number of sanitary toilets will be provided. A systematic waste management will also be provided for the construction period including the management of municipal and solid waste produced form the labour camps. The detailed plan for waste management during the construction period is presented in **Annexure X of Form IA**
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)	During the construction period of toilets will be provided for male & female with adequate water supply. Septic tank will be attached to soak pit sealed bottom with honey comb walls and a 75 cm thick 2mm sand envelop, so that no health hazard occurs and no pollution to the air ground, and adjacent water causes takes places. Waste management during the construction period is presented in **Annexure X of Form IA**
Give details of dual plumbing system if treated waste is used for flushing of toilets or any other use.	The treated water from the STPs shall be used for the flushing of visitors' facility inside the Zoological park.

TRAFFIC MANAGEMENT

Sufficiency of Parking Space (Explain)	Four wheeler	281
	Two wheelers	129
	Coach Parking	40 (Proposed was 15, number increased as per the suggestion from SEAC)
	VIP car Parking	8
Widthofaccess road	Thrissur Mannamangalam Road- 6m	

ENERGY CONSERVATION

Details of power requirement and source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area	The source of electricity will be the Kerala State Electricity Board (KSEB) for the zoo services buildings and administration buildings.

? How have you tried to minimize energy consumption?	
What type of, and capacity of power back-up to you plan to provide?	DG sets and UPS will be provided as per the requirement during construction and operation phase.
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?	Most of the animal enclosures are open type as their wild habitat. Glass enclosures are provided for snakes and other reptiles. The glass used will be as per the standards only.
What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project	The major construction works proposed includes the animal enclosures and zoo buildings including the administration, hospital and other service buildings. The animal enclosures are designed as per the Central Zoo Authority of India guidelines and the master plan has been approved by the CZA
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	Solar power will be utilized for lighting up the street light and other office space and some enclosures.
Is the shading effectively used to reduce cooling/heating loads? What principles have	The enclosures are designed in such a way that the natural setting and the geographical features of the location has been fully utilized. The buildings proposed are the zoo services buildings, administration buildings, orientation building and biodiversity center. All these buildings are designed in such a way that natural light can be utilized.

been used to maximize the shading of Walls on the East and the West and the Roof ? How much energy saving has been effected?	Also, trees will be planted as part of the landscape plan to provide shading to the whole building.
Do the structure use energy-efficient space conditioning , lighting and mechanical systems? Provide technical details. Provide details of transformers and motor efficiencies, lighting intensity and air-conditioning load assumptions ? Are you using CFC and HCFC free chillers? Provide specifications.	No.
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 F.A.R for the total construction proposed is 0.262. The built up area includes the animal enclosures also, which will only be the natural setting of the animals.
What are the thermal characteristics of the building envelope? (a) roof (b) external walls; and (c) fenestration? Give details of the	The building materials used for the construction of buildings will be materials natural and indigenous materials of low RF value. The locally available bamboo, stone etc. will be used for the purpose. Also the project will be focusing the usage of green materials in order to promote the usage of ecofriendly materials. Also, the proposed activity will ban the usage of plastic inside the Zoological Park as a part of conservation.

<table>
<tr><td>materials used.</td><td></td></tr>
<tr><td>What is the rate of air non-conventional energy technologies are utilized in the overall energy consumption? Provide details of the renewable energy technologies used.</td><td>Roof top solar panels will be provided on the proposed buildings and waiting sheds and also the higher elevation points.</td></tr>
<tr><td>Details of renewable energy (non – conventional) used.</td><td>Roof top solar panels will be provided on the proposed buildings and waiting sheds and also the higher elevation points.</td></tr>
<tr><td colspan="2">IMPACT ON AIR ENVIRONMENT</td></tr>
<tr><td>What are the mitigation measures on generation of dust, smoke , odours, fumes or hazardous gases</td><td>During construction phase, dust will be generated from the activities such as excavation which will have direct impact on the nearby facilities depending on the proximity and wind direction at particular time. Nearby residential limits and commercial establishments will be inconvenienced during the construction phase. A 3 m high barrier will be erected at the construction site to avoid noise and dust spreading the adjoining area. The dust generation during construction phase will be suppressed by spraying water at regular interval.

Vehicular movement along the site during the construction and operation phase will lead to dust and smoke emissions which will be minimized by sprinkling of water along the way and providing proper vegetative cover along parking area and circulation.</td></tr>
<tr><td>Details of internal traffic management of the site.</td><td>The movement and parking of vehicles within the Park will be restricted to parking zones close to the entry and exit points. Walkways and tram roads covered walkways are designed accordingly.</td></tr>
<tr><td>Details of noise from traffic, machines and vibrator and mitigation measures</td><td>The proposed development will enhance the traffic noise and vibrations in the site surroundings. The significant sources for noise and vibration and migration measures proposed are presented in Table
<table><tr><td>Construction Phase</td><td>Noise would be generated from construction machineries</td><td>➢ Low amplitude displacement machineries would be used.
➢ All the machines would comply with the norms set by CPCB.
➢ Machines will be maintained</td></tr></table></td></tr>
</table>

			periodically to meet CPCB standard. ➢ Appropriate fencing will be provided between construction site and existing activity area to reduce the propagation of sound
		Noise generated from vehicular movement along the site.	➢ Noise level of vehicles used for construction activities should meet the noise standards set by Central Pollution Control Board (maximum 80 dB(A)
	Operation Phase	Noise would be generated from DG sets	➢ DG sets would be in compliance for acoustics and air quality.
		Noise would be generated from traffic	➢ The entry and exit points of the Zoological Park where the traffic induced noise will predominate is near to the human settlements. As mostly the LMV will be operating for commuting purpose, traffic induced noise level is not expected to have significant impact on the ambient setting.

Air quality monitoring in detail	The ambient air quality levels are far below the critical limits. Hence it is expected that the contribution from the proposed activities will give insignificant incremental concentration which will be within acceptable limits. The air pollution control measures as per Environmental Management Plan would be implemented to further reduce the impact on the ambient air quality during construction and operation phases. There is no significant activities or point source of air pollution to warrant a modelling dispersion of pollutants. The ambient air quality of the proposed site is presented in **Annexure XII of Form IA**
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	No. Since the proposal is a new project in the reserve Forest area and a dedicated parking space is allocated for the entire facility, shortage of parking space for vehicles is not anticipated. Four wheeler: 281 Two wheelers: 129 Coach Parking: 40 (Proposed was 15, number increased as per the suggestion from SEAC) VIP car Parking: 8 The visitors can move inside the park either by walking or using tram service. A dedicated road for pedestrians and tram are proposed for the entire facility.

<table>
<tr><td>project site.</td><td></td></tr>
<tr><td>Provide details of the movement patterns with internal roads, bicycles tracks, Pedestrian pathways, footpaths etc., with areas under each category</td><td>The parking of vehicles will be restricted to the parking zone proposed near the entry and exit points of the Zoological work.
<table>
<tr><td>Four wheeler</td><td>281</td></tr>
<tr><td>Two wheelers</td><td>129</td></tr>
<tr><td>Coach Parking</td><td>40 (Proposed was 15, number increased as per the suggestion from SEAC)</td></tr>
<tr><td>VIP car Parking</td><td>8</td></tr>
</table>
The visitors can move inside the park either by walking or using tram service. A dedicated road for pedestrians and tram are proposed for the entire facility.</td></tr>
<tr><td>Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above.</td><td>The proposed development will enhance the traffic noise and vibrations in the site surroundings.</td></tr>
<tr><td>What will be impact of DG sets & other equipments on noise levels & vibration in & ambient air quality around the project site? Provide details</td><td>There would be increased noise levels and degradation of air quality due to the operation of DG sets and equipments. The following mitigation measures will be adopted to reduce the impact on noise levels and ambient air quality:
1. Diesel generator should have noise control measures to meet the noise standards set by Central Pollution Control Board (75 dB (A) at 1 m from the enclosure surface for generators with integral acoustic enclosure.
2. Acoustic enclosure for generators without integral acoustic enclosure shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side at 0.5 m from the enclosure).
3. Workers shall not be exposed to sound of more than 85 – 90 dB for more than eight hours a day and shall be provided with ear plugs.
4. Noise quality monitoring shall be conducted as per Environmental Monitoring Plan to detect noise pollution.
5. Noise level of vehicles used for construction activities should meet the noise standards set by Central Pollution Control Board (maximum 80 dB (A).
6. Construction contract shall clearly specify the use of equipment emitting noise of not greater than 90 dB (A) for the eight hour operation shift.</td></tr>
</table>

IMPACT ON BIODIVERSITY AND ECO RESTORATION PROGRAMMES	
Will the project involve extensive clearing or modification of vegetation (Provide details)	The project execution requires clearing of bamboos and lopping of cashew plants in the specific locations where construction activities are proposed. At the same time planting of trees, shrubs and bushes of educational, aesthetic and ecological value in such areas as part of environmental enrichment of enclosures, landscaping and beautification. Therefore, the partial clearing will not adversely affect the flora and ecology of the region. Moreover, the proposed area is predominantly covered by plantations, either bamboo or cashew, or teak and Xyliaxylocarpa in the past. Nevertheless, it is planned to retain endemic and other conservation significant species wherever possible and include them along with other indigenous plants in the planting, beautification and conservation of the whole area.
What ate the measures proposed to minimize the likely impact on vegetation (details of proposal for tree plantation/ landscaping)	Major portion of the site proposed for the project will be planted with mixture of evergreen, semi evergreen and deciduous species of native plants and protected and maintained as conservation area. Storm water harvesting ponds will be created in the said areas. In those areas where developmental activities such as laying roads & pathways, construction of animal enclosures, visitor facilities and other administrative infrastructure are proposed, tree planting, landscaping, creation of water pools, creation of lawns etc. will be done. The following species will be retained or replanted within the park.

Sl. No.	Scientific Name	Family	Local / Common name
1.	*AbrusprecatoriusL.*	Fabaceae	Kunni
2.	*Alangiumsalvifolium (L.f.) Wang.*	Alangiaceae	Ankolam
3.	*Alstonia scholaris (L.) R. Br.ex DC.*	Apocynaceae	Ezhilam-pala
4.	*Artocarpus heterophyllus Lam.*	Moraceae	Jackfruit tree, Plavu
5.	*Artocarpus hirsutus Lam.*	Moraceae	Anjili
6.	*Azadirachta indica A. Juss.*	Meliaceae	Aryaveppu
7.	*Bambusa bambos (L.) Voss.*	Poaceae	Thorny bamboo
8.	*Barleria courtallica Nees*	Acanthaceae	Venkurinji
9.	*Bombaxceiba L.*	Bombacaceae	Elavu
10.	*Briedeliaretusa (L.) A. Juss.*	Euphorbiaceae	Mulluvenga
11.	*ButeaparvifloraRoxb. ex Nees*	Fabaceae: Caesalpinioidea e	Valliplash
12.	*Cassia fistula L.*	Fabaceae	Kanikkonna
13.	*DalbergiavolubilisRoxb.*	Fabaceae: Papilonaceae	
14.	*Ficusbeddomei King*	Moraceae	Thavittal

15.	*FicusexasperataVahl*	Moraceae	Therakam
16.	*Ficusracemosa L.*	Moraceae	Athi
17.	*GrewialatifoliaVahl*	Tiliaceae	Chadachi
18.	*Holarrhena pubescens (Buch.-Ham) Wall. ex G. Don*	Apocynaceae	Kudakappala
19.	*Mangifera indica L.*	Anacardiaceae	Mango tree, Mavu
20.	*Murrayapaniculata (L.) Jack*	Rutaceae	Honey bush, Maramulla
21.	*Mussaenda bellila Buch.-Ham.*	Rubiaceae	Vellila
22.	*Naregamiaalata Wight &Arn.*	Meliaceae	Nilanarakam
23.	*Naringicrenulata (Roxb.) Nicolson*	Rutaceae	Narinarakam
24.	*Phyllanthusemblica L.*	Euphorbiaceae	Nelli
25.	*Rauvolfia serpentine (L.) Benth. ExKurz.*	Apocynaceae	Sarpagandhi
26.	*Santalum album L.*	Santalaceae	Chandanam
27.	*Saracaasoca (Roxb.) De Wilde*	Fabaceae: Caesalpinioidea e	Asokam
28.	*Strychnosnux-vomica L.*	Loganiaceae	Kanjiram
29.	*Syzygiumcumini (L.) Skeels*	Myrtaceae	Njaval
30.	*Tabernaemontanaalternifolia L.*	Apocynaceae	Kundalappala
31.	*Terminaliabellerica (Gaertn.) Roxb.*	Combretaceae	Thanni
32.	*Terminaliapaniculata Roth*	Combretaceae	Maruthi
33.	*Wrightiatinctoria (Roxb.) R. Br.*	Apocynaceae	Danthappala
34.	*Xyliaxylocarpa (Roxb.) Taub.*	Fabaceae: Mimosoideae	Irul
35.	*Zanthoxylumrhetsa (Roxb.) DC.*	Rutacae	Kothumurukk u

Is there any displacement of fauna – both terrestrial and aquatic. – If so what are the mitigation measures ? Presence of any endangered species or red listed	Presence of animals such as porcupine, mongoose and wild boar was recorded from the proposed site. The porcupines, are likely to shift to the area where no construction activities are proposed. Other animals may continue to inhabit in the zoo site as free ranging inhabitants.

<table>
<tr><td>category (in detail)</td><td></td></tr>
<tr><td colspan="2">SOCIO- ECONOMIC ASPECTS</td></tr>
<tr><td>Will the proposal result in any change to the demographic structure of local population ? Provide the details.</td><td>As per Revenue jurisdiction the proposed site falls within the Puthur and Kainur villages of Thrissur Taluk in Trissur District. Under the Local Self-Government System the development site is located in four wards namely Kainur, Thonippara, Cherukunnu and Puthur East of Puthur Gramapanchayath under Ollukkara Block. The site comes within the boundary of Ollur Assembly Constituency

As the proposed site is under the possession of the Forest and Wildlife Department of Kerala, no rehabilitation and resettlement is required.

The proposed Zoological Park is planned in the land under the possession of Forest Department. However, further land acquisition is required for the proposed quarry park and crocodile Gharial. Pond. If further land acquisition and rehabilitation is required for the subsidiary infrastructural development like widening of roads and other constructions etc., the proponent will have to adopt principles and procedures in accordance with the provisions of "National Land Acquisition and Rehabilitation and Resettlement Bill, 2011".</td></tr>
<tr><td>Give details of the existing social infrastructure around the proposed project</td><td>
<table>
<tr><th>Sl no</th><th>Name</th><th>Distance (Km)</th></tr>
<tr><td colspan="3">Public Amenities</td></tr>
<tr><td>1</td><td>Kainoor Village office</td><td>1.18</td></tr>
<tr><td>2</td><td>Puthur Lake</td><td>1.95</td></tr>
<tr><td colspan="3">Places of worship</td></tr>
<tr><td>1</td><td>Suriyani Church, Maachery, Kurishumoola</td><td>0.62</td></tr>
<tr><td>2</td><td>St Thomas Forane Church</td><td>1.52</td></tr>
<tr><td>3</td><td>Annal Gandhi Adigal Government Hospital</td><td>1.46</td></tr>
<tr><td>4</td><td>Homoeo hospital</td><td>0.56</td></tr>
<tr><td colspan="3">Defense Installations</td></tr>
<tr><td>1</td><td>BSF Center</td><td>1.62</td></tr>
</table>
</td></tr>
<tr><td>Will the project cause adverse effects on local communities, disturbances to sacred sites or other cultural values? What are the safeguards proposed?</td><td>The construction or operation of the proposed Zoological Park will not have any adverse impact either on the socio-economic and cultural scenario of the area or on any sacred sites. The locality is devoid of tribal groups and weaker sections of the society. Though there are no Tribal families in this area, the proposed site is surrounded by residential buildings, cultivated and cultivable fields. Most of the families are very poor and belong to daily wage workers and agricultural laborers.

There are occupants in the eastern and western boundary of the proposed land. As per the policy of government, they will be suitably accommodated in due course. The land area occupied by them is excluded from the project area. They have independent access to the</td></tr>
</table>

	panchayath road and hence there is no limitation imposed by the project for their public amenities. Hence no rehabilitation issue arises.
Out of the total plot area % of spaces provided for i)Recreational facility ii)Parking iii)Open Spaces	The proposed Master Plan approved by the Central Zoo Authority is for 65 Ha. Only 31.23 ha will be developed for the construction of enclosures and other facilities. The remaining 33.77 ha will be conservation zone, devoid of developmental activities.
BUILDING MATERIALS	
May involve the use of building materials with high –embodied energy. Are the construction materials produced with energy efficient process? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)	From the economical point of view and also unavailability of the energy efficient material source conventional building materials are proposed in the construction. However practices are made to use maximum natural day light and natural air condition in the building.The following measures would be adopted as energy conservation measures in the selection of building materials: • Locally available materials would be utilized for construction purposes. • Locally available aggregates would be utilized for construction. • Onsite derived stones will be used for paving roads and walkways.
Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?	• The site shall be isolated by installing tall fabric fences to scale down noise and dust problems. • All the materials will be properly covered during transportation. • Sprinkling of water would be conducted periodically to subside dust. • Adequate traffic management measures shall be adopted to monitor the movement of men, vehicles and materials within the project site. • Noise sources would be isolated and would be enclosed with noise absorbing covers/ barriers. • Personnel protective gears would be provided to construction workers. • Machinery of optimum capacity will be employed and low amplitude operation would be preferred to reduce noise pollution. • Man and material transit would be confined to the non-peak hours • The vehicle used in the site will be fitted with speed breakers.
Are recycled materials used in	The soil and rock unearthed for the development will be utilized for

roads and structures? State the extent of savings achieved?	paving of roads, pathways of the Zoological Park and also for the facilities inside the animal enclosures.
Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.	The garbage generated during the operation phase shall be collected in designated color coded bins which shall then be stored in stipulated storage area. Waste management scheme for the Zoological Park is presented in **Annexure X of From IA.**
RISK MANAGEMENT	
Are there sufficient measures proposed for risk hazards in case of emergency such as accident at the site during construction & post construction phase.	Yes. Since the proposed project is the establishment of Zoological Park dealing with live wild animals and visitors, a detailed Disaster Management plan is proposed for the entire facility and is presented as **Annexure IV of Form IA.**
Storage of explosives/hazardous substance in detail	Nil
What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans	As detailed in **Annexure IV of From IA.**
Litigation/court cases if any	Nil
AESTHETICS	
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?	The proposed constructions are designed in such a way that it will not create any obstruction of a view, scenic amenity or landscapes. A well-developed landscape plan is proposed for the Zoological Park including the indigenous species considering the adaptability to the site. Also the hillock portion of the proposed site will be maintained as a conservation zone with indigenous species of plants which will be planted in co-operation with the Kerala Forest Research Institute, Peechi, Tropical Botanical Garden, Palode.

Will there be any adverse impacts from new constructions on the existing structures? What are considerations taken into account?	No impacts are anticipated form the proposed activity on the existing structures.
Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.	No. However, the forms and envelopes for the building are designed to manage merge with the forest landscape.
Are there any anthropological or archaeological sites or artefacts nearby? State if any other significant features in the vicinity of the proposed site have been considered	No
Details of CSR activity and the amount set apart per year	Nil
Details of NABET approved EIA Consultant engaged-Their name, address and accreditation details	KITCO Ltd. Address: KITCO Ltd., Femith's, P.B. No. 4407, Puthiya Road, N.H Bypass, Vennala, Kochi – 682 028 Accreditation Status: Active Accreditation Number: NABET/EIA/SA/338 Accredited Sectors: 29, 33, 34, 37 & 38
Details of Authorized Signatory and address for correspondence	Shri Rajesh Ravindran IFS, Chief Conservator of Forests (Central Circle) & Special Officer, Thrissur Zoological Park, Vanapriya Forest Complex, Paravattani, Thrissur- 680 005
SUMMARY AND CONCLUSION	
Overall justification	❑ The existing Thrissur Zoo is located in a thickly populated location of Thrissur Corporation within an area of 5.2 ha.

for implementation of the project.	❑ More than 40 species of animals and birds are accommodated here. ❑ The zoo has an acute shortage of space. ❑ This has caused a series of problems for the animals and birds under display as well as to the proponent. ❑ The Central Zoo Authority, New Delhi has also recommended shifting of the existing Thrissur Zoo to another site with sufficient space available for rehabilitating the animals.
Explanation of how adverse impact have been mitigated.	A well-developed Management plan for the Entire facility including the Environmental Management Environmental Monitoring Mechanism including the Institutional Framework for implementing EMP are proposed for ensuring the impacts are avoided/minimized/mitigated and is suitably monitored for not exceeding the standards for effective implementation. Also, the Zoo Management is proposed considering the animal enclosures and health.

2. The proposal was placed in the 73rd meeting of SEAC held on 30th & 31st May, 2017.The proponent did not turn up for presenting the details, so the Committee decided to defer the item.

3. The proposal was placed in the 74th meeting of SEAC held on 14th&15th June 2017 and decided to defer the item for field inspection. The committee also directed the proponent to submit the following additional documents/ details.

1. *Considering the fact that the master plan approved by the Zoo Authority of India is for 65 ha, the Form I application should indicate the above figure*
2. *No Objection Letter from the Irrigation Department for sourcing water from the Manali river.*
3. *The corrected water yield data should submitted.*
4. *Total energy requirement for the project should be quantified.*

4. The proposal was placed in the 82nd meeting of SEAC held on 25th November, 2017. The Committee decided to defer the item for field inspection.

Accordingly field visit to the proposed Thrissur Zoological Park, Wildlife Conservation and Research Centre falling in Puthur and Kainoor villages, Thrissur taluk, Thrissur district was carried out on 28.12.2017 by the sub-committee of SEAC, Kerala. The report is as follows;

Officials of the Forest Dept representing the proponent were present at the site at the time of site visit.

Enquiries were made on the necessary clearances for the site as it falls within reserved forest. During the discussion following aspects have been noted

a) *MOEF has clarified that ex-situ conservation of wild animals including upkeep and management through zoo located in forests will not attract provisions of the Forest Conservation act,1980 if carried out as per the approved management plan and with prior approval of CZA.*

b) *In the letter from CZA dt 20.02.2013 and 06.08.2015 has approved the master plan. A copy of the these letters and the plan must be submitted to SEIAA*

c) *Govt of Kerala vide GO(MS) 16/2011/F&WLD dt 24.02.2012 have agreed in principle for the establishment of Zoological Park in Paravattani reserve. The location and extent of area is not mentioned.*

The site earmarked for the project falls in a contiguous area 136.85 ha falling in Kainoor and Puthur villages, out of which 65 ha falling in Puthur village is currently proposed to be developed. The site forms part of an elevated hillock reaching to an elevation of 160 m amsl. The boundary of the project is not clearly demarcated and fenced. The slope within the project area is moderate to steep. The hillock exposes rock out crop at places and the thickness of the soil and OB taken together is limited to less than 3 m. Well defined valleys are lacking except for a minor valley on the northwest that is partly outside. The approach to the site is from the western boundary having a motorable road that is connected to the Puthur-Mannamangalam road. Along the southern and eastern boundary, relatively dense settlement is noticed. The area is currently under open bamboo plantation. Tree cover and floral diversity is virtually absent. A branch canal of Peechi Irrigation project is located on the north and western flanks of the hillock. The enclosures for animals, walkways, tram and service roads are planned on the lower flanks of the hillock while the elevated potion is marked as conservation zone.

Based on the overall evaluation of the site following aspects need to be considered

1. *The cadastral map of the site is to be provided clearly demarcating the survey numbers of the project and its surroundings dwelling units. The coordinates of the corners along the boundary to be incorporated in the drawing.*
2. *It is proposed to acquire 2.5 ha of land (the valley portion to the northwest and quarry pit to the south) to be developed as RWH structures and internal source of water. The project will not be viable without these plots. The current status of acquisition needs clarification. The surface drainages must also be directed to the RWH structures.*
3. *Dependable source of water has been identified as Manalipuzha with the point of extraction near Eravimangalam. The details of the source point, the layout of the pipes, quantity etc along with the permission from Irrigation Dept is to be provided.*
4. *Fencing and walls to be provided along the boundary.*
5. *The approach road needs widening to at least 12 m.*
6. *Considering the slope and undulations in the area proposed for development (buildings, parking etc), cutting and levelling will have to be carried out. The*

formation of terraces and level ground should be done taking topography into consideration. The excess earth must be used internally.

7. *The number of parking bays for coaches may be enhanced to 40 from 15.*
8. *The buildings of the research centre must be clearly separated from the animal enclosures.*
9. *The existing irrigation canal through the site should be maintained to perform its function*
10. *The location of STP and other waste management facilities should be indicated in the plan. Considering the different kind of waste generation in a zoo, the details of treatment need clarification.*
11. *The entire area shall be provided with sturdy shade trees to provide canopy and such other species that are rare to Western Ghats. It shall be done in a planned manner to enrich the floral biodiversity.*
12. *The additional land under cashew located on the northern side of the project and forming a contiguous part should developed as part of the Zoo Complex and Research Centre.*

5. The proposal was placed in the 84th meeting of SEAC held on 22nd & 23rd January 2018. The Chairman explained that since the Forest Department is well protecting the area by erecting cairns along the forest boundaries, we need not insist on Cadastral Map of the area. The Committee considered the suggestions of the Sub Committee Report and decided to seek the following clarifications/details from the proponent.

1) *Survey Co-ordinates of the corners along the boundary indicated in the drawing.*
2) *Dependable source of water has been identified as Manalipuzha with the point of extraction near Eravimangalam. The details of the source point, the layout of the pipes, quantity etc along with the permission from Irrigation Dept is to be provided.*
3) *The location of STP and other waste management facilities should be indicated in the plan. Considering the different kind of waste generation in a zoo, the details of treatment of different types of waste to be provided.*

6. The proponent has been submitted the documents sought by SEAC. The proposal was again considered in the 86th SEAC held on 27th February 2018. The Committee appraised the proposal based on Form I, Form I A, Conceptual Plan, field inspection report of the Sub Committee and all other documents submitted with the proposal. The Committee verified the additional documents submitted by the proponent. The Committee decided to **Recommend for issuance of EC** subject to general conditions and the following specific condition.

1. *NOC for drawing water from Manalipuzha to be obtained from Irrigation Department and produced before SEIAA*
2. *The access road running adjacent to the Zoo wall should be widened to a minimum of 12 m to accommodate to and fro vehicular movement.*
3. *Parking bays for coaches should be enhanced to 40 from 15.*

7. The proposal was placed in the 81st meeting of SEIAA held on 08.03.2018. Authority accepted the recommendation of SEAC and decided to issue EC subject to general conditions in addition to the above specific condition as suggested by SEAC. NOC for drawing water from Manalipuzha should be obtained and submitted to SEIAA before construction. A notarised affidavit agreeing all the general and above specific conditions should be submitted before the issuance of EC.

8. The proponent has submitted the affidavit vide ref (8) above and stating that all the specific and general conditions shall be strictly implemented. Environmental Clearance as per the EIA notification 2006 is therefore granted to the proposed establishment of Thrissur Zoological Park, Wildlife Conservation & Research Centre by Sri Rajesh Ravindran, IFS, Chief Conservator of Forests, Thrissur Zoological Park in Sy. No. 310(Puthur Village) & Sy. No. 74 & 243 (Kainoor Village), Ollukkara Taluk, Thrissur District, Kerala subject to the specific conditions mentioned in para 6 & 7 above, the usual general conditions for projects other than mining appended hereto and the following green conditions should be strictly adhered to.

Green Conditions.

1. Adequate rain water harvesting facilities shall be arranged for.
2. Technology and capacity of the STP to be indicated with discharge point (if any) of the treated effluent.
3. Effluent water not conforming to specifications shall not be let out to water bodies.
4. Maximum reuse of grey water for toilet flushing and gardening and construction work shall be ensured.
5. Dual plumbing for flushing shall be done.
6. Provisions for disposal of e-wastes, solid wastes, non-biodegradables and separate parking facility for the buildings shall be provided.
7. Generation of solar energy to be mandatory for own use and/or to be provided to the grid.
8. There shall be no compromise on safety conditions and facilities to be provided by the project proponent, which shall be ensured for occupation, regularisation or consent to operate.

9. The clearance will also be subject to full and effective implementation of all the undertakings given in the application form, all the environmental impact mitigation and management measures undertaken by the project proponent in the documents submitted to SEIAA, and the mitigation measures and waste management proposal as assured in the Form - 1 and Form-1A, Environment Management Plan as submitted. The assurances and clarifications given by the proponent in the application and related documents will be deemed to be part of these proceedings as conditions as undertaken by the proponent, as if incorporated herein.

10. Validity of the Environmental Clearance will be seven years from the date of issuance of E.C, subject to inspection by SEIAA on annual basis and compliance of the conditions, subject to earlier review of E.C in case of violation or non-compliance of any of the conditions stipulated herein or genuine complaints from residents within the scrutiny area of the project.

11. Compliance of the conditions herein will be monitored by the State Environment Impact Assessment Authority or its agencies and also by the Regional Office of the Ministry of Environment and Forests, Govt. of India, Bangalore.

i. Necessary assistance for entry and inspection by the concerned officials and staff should be provided by the project proponents.

ii. Instances of violation if any shall be reported to the District Collector, Thrissur to take legal action under the Environment (Protection) Act 1986.

iii. The given address for correspondence with the authorized signatory of the project is, Sri Rajesh Ravindran, IFS, Chief Conservator of Forests,(Central Circle) & Special Officer, Thrissur Zoological Park, Vanapriya Forest Complex, Paravattani, Thrissur District, Kerala-680005

Sd/-

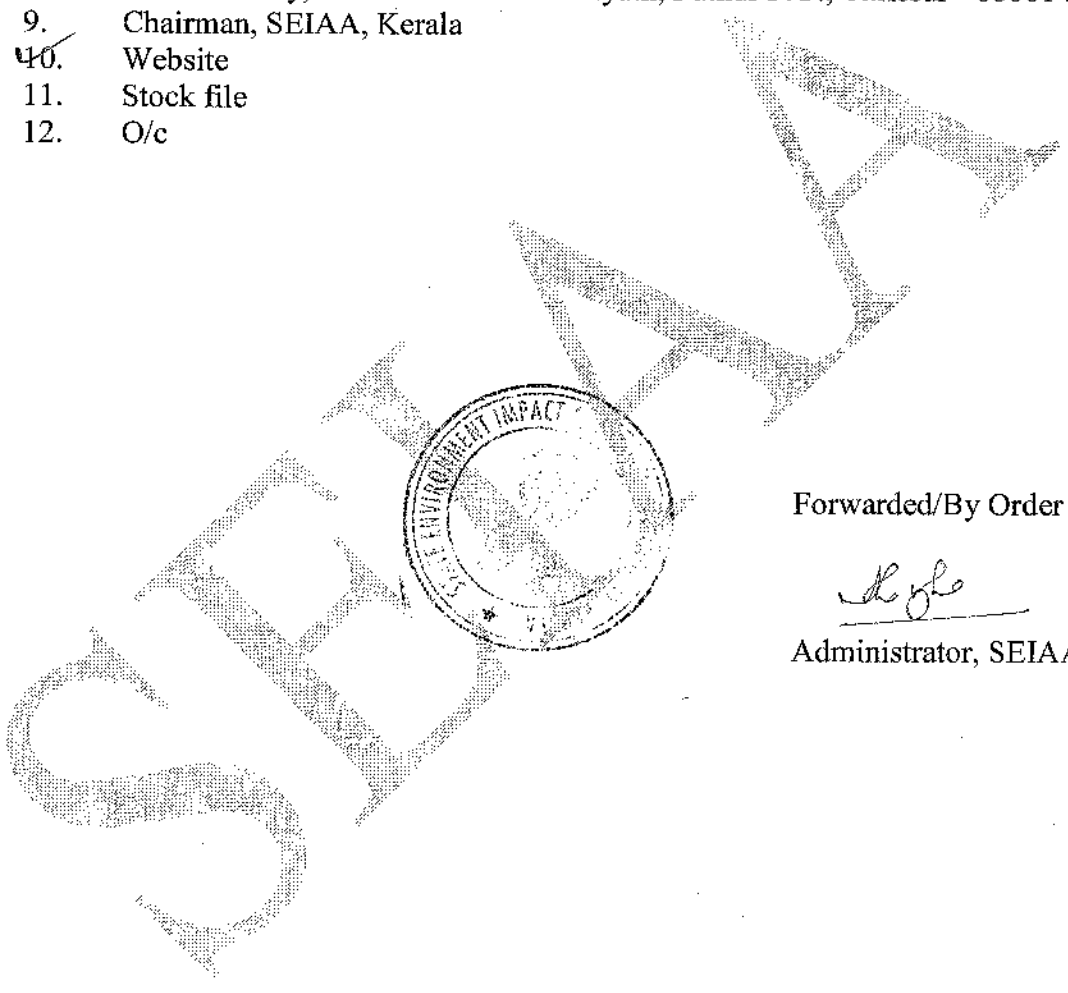
P.H. KURIAN, .I.A.S,
Member Secretary (SEIAA)

To,

Sri Rajesh Ravindran, IFS,
Chief Conservator of Forests,(Central Circle) & Special Officer,
Thrissur Zoological Park,
Vanapriya Forest Complex,
Paravattani, Thrissur - 680005

Copy to:

1. MoEF Regional Office, Southern Zone, Kendriya Sadan, 4th Floor, E&F Wing, II Block, Koramangala, Bangalore-560034
2. The Additional Chief Secretary to Government, Environment Department
3. The District Collector, Thrissur
4. The District Town Planner, Thrissur
5. The Tahsildhar, Ollukkara Taluk, Thrissur District
6. The Member Secretary, Kerala State Pollution Control Board
7. The Director, Dept. of Environment and Climate Change, Govt. of Kerala, Tvm-24
8. The Secretary, Puthur Grama Panchayath, Puthur P.O., Thrissur - 680014
9. Chairman, SEIAA, Kerala
10. Website
11. Stock file
12. O/c



Forwarded/By Order

Administrator, SEIAA

GENERAL CONDITIONS *(for projects other than mining)*

(i) Rain Water Harvesting capacity should be installed as per the prevailing provisions of KMBR / KPBR, unless otherwise specified elsewhere.

(ii) Environment Monitoring Cell as agreed under the affidavit filed by the proponent should be formed and made functional.

(iii) Suitable avenue trees should be planted along either side of the tarred road and open parking areas, if any, inclusive of approach road and internal roads.

(iv) The project shall incorporate devices for solar energy generation and utilization to the maximum possible extent with the possibility of contributing the same to the national grid in future.

(v) Safety measures should be implemented as per the Fire and Safety Regulations.

(vi) STP should be installed and made functional as per KSPCB guidelines including that for solid waste management.

(vii) The conditions specified in the Companies Act, 2013 should be observed for Corporate Social Responsibility.

(viii) The proponent should plant trees at least 5 times of the loss that has been occurred while clearing the land for the project.

(ix) Consent from Kerala State Pollution Control Board under Water and Air Act(s) should be obtained before initiating activity.

(x) All other statutory clearances should be obtained, as applicable, by project proponents from the respective competent authorities including that for blasting and storage of explosives.

(xi) In the case of any change(s) in the scope of the project, the project would require a fresh appraisal by this Authority.

(xii) The Authority reserves the right to add additional safeguard measures subsequently, if found necessary, and to take action including revoking of the environment clearance under the provisions of the Environment (Protection) Act, 1986, to ensure effective implementation of the suggested safeguard measures in a time bound and satisfactory manner.

(xiii) The stipulations by Statutory Authorities under different Acts and Notifications should be complied with, including the provisions of Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and control of Pollution) act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification, 2006.

(xiv) The environmental safeguards contained in the EIA Report should be implemented in letter and spirit.

(xv) Provision should be made for supply of kerosene or cooking gas and pressure cooker to the labourers during construction phase.

(xvi) Officials from the Regional of MOEF, Banglore who would be monitoring the implementation of environmental safeguards should be given full co-operation, facilities and documents/data by the project proponents during their inspection. A complete set of all the documents submitted to MoEF should be forwarded to the CCF, Regional Office of MOEF, Bangalore.

(xvii) These stipulations would be enforces among others under the provisions of Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control Pollution) at 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification, 2006.

(xviii) Environmental Clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation Vs. Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.

(xix) Any appeal against this Environmental Clearance shall lie with the National Environment Appellate Authority, if preferred, within a period of 30 days as prescribed under section 11 of the National Environment Appellate Act, 1997.

(xx) The project proponent should advertise in at least two local newspapers widely circulated in the region, one of which (both the advertisement and the newspaper) shall be in the vernacular language informing that the project has been accorded Environmental Clearance and copies of clearance letters are available with the Department of Environment and Climate Change, Govt. of Kerala and may also be seen on the website of the Authority at www.seiaakerala.org. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same signed in all pages should be forwarded to the office of this Authority as confirmation.

(xxi) A copy of the clearance letter shall be sent by the proponent to concerned GramaPanchayat/ District Panchayat/ Municipality/Corporation/Urban Local Body and also to the Local NGO, if any, from whom suggestions / representations, if any, were received while processing the proposal. The Environmental Clearance shall also be put on the website of the company by the proponent.

(xxii) The proponent shall submit half yearly reports on the status of compliance of the stipulated EC conditions including results of monitored data **(both in hard copies as well as by e-mail)** and upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the respective Regional Office of MoEF, Govt. of India and also to the Directorate of Environment and Climate Change, Govt. of Kerala.

(xxiii) The details of Environmental Clearance should be prominently displayed in a metallic board of 3 ft x 3 ft with green background and yellow letters of Times New Roman font of size of not less than 40.

(xxiv) The proponent should provide notarized affidavit *(indicating the number and date of Environmental Clearance proceedings)* that all the conditions stipulated in the EC shall be scrupulously followed.

SPECIFIC CONDITIONS

I.Construction Phase

i. "Consent for Establishment" shall be obtained from Kerala State Pollution Control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at the site.

ii. All required sanitary and hygienic measures should be in place before starting construction activities and to be maintained throughout the construction phase.

iii. A First Aid Room will be provided in the project both during construction and operation of the project.

iv. Adequate drinking water and sanitary facilities should be provided for construction workers at the site, Provision should be made for mobile toilets. The safe disposal of wastewater and solid wastes generated during the construction phase should be ensured.

v. All the topsoil excavated during construction activities should be stored for use in horticulture/landscape development within the project site.

vi. Disposal of muck during construction phase should not create any adverse effect on the neighbouring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.

vii. Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants.

viii. Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.

ix. Any hazardous waste generated during construction phase, should be disposed off as per applicable rules and norms with necessary approval of the Kerala State Pollution Control Board.

x. The diesel generator sets to be during construction phase should be low sulphur diesel type and should conform to Environment (Protection) Rules prescribed for air and noise emission standards.

xi. The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from Chief Controller of Explosives shall be taken.

xii. Vehicles hired for bringing construction material to the site should be in good condition and should have a pollution check certificate and should conform to the applicable air and noise emission standards and should be operated only during non-peak hours.

xiii. Ambient noise levels should conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/KSPCB.

xiv. Fly ash should be used as building material in construction as per the provisions of Fly Ash Notification of September, 1999 and amended as on 27th August 2003. (The above condition is applicable Power Stations).

xv. Ready mixed concrete must be used in building construction.

xvi. Storm water control and its re-use per CGWB and BIS standards for various applications.

xvii. Water demand during construction should be reduced by use of pre-mixed concrete, curing agents and other best practices referred.

xviii. Permission to draw ground shall be obtained from the Computer Authority prior to construction/operation of the project.

xix. Separation of grey and black water should be done by the use of dual plumbing line for separation of grey and black water.

xx. Fixtures for showers, toilet flushing and drinking should be of low flow either by use of aerators or pressure reducing devices or sensor based control.

xxi. Use of glass may be reduced by upto 40% to reduce the electricity consumption and load on airconditioning. If necessary, use high quality double glass with special reflective coating in windows.

xxii. Roof should meet prespective requirement as per Energy Conservation Building Code by using appropriate thermal insulation material to fulfil requirement.

xxiii. Opaque wall should meet perspective requirement as per energy Conservation Building Code which is proposed to be mandatory for all airconditioned spaces while it is aspirational for non-airconditioned spaces by use of appropriate thermal insulation material to fulfil requirement.

xxiv. The approval of the competent authority shall be obtained for structural safety of the buildings due to earthquake, adequacy of fire fighting equipments, etc. as per National, Building Code including protection measures from lightening etc.

xxv. Regular supervision of the above and other measures for monitoring should be in place all through the construction phase, so as to avoid disturbance to the surroundings.

xxvi. Under the provisions of Environment (Protection) Act, 1986, legal action shall be initiated against the protect proponent if it was found that construction of the project has been started without obtaining environmental clearance.

II. **Operation Phase**

i. The installation of the Sewage Treatment Plant (STP) should be certified by an independent expert and a report in this regard should be submitted to the Ministry before the project is commissioned for operation. Treated affluent emanating from STP shall be recycled / reused to the maximum extent possible. Treatment of 100% grey water by decentralised treatment should be done. Discharge of unused treated affluent shall conform to the norms and standards of the Kerala State Pollution Control Board. Necessary measures should be made to mitigate the odour problem from STP.

ii. The solid waste generated should be properly collected and segregated. Wet garbage should be composted and dry/inert solid waste should be disposed off to the approved sites for land filling after recovering recyclable material.

iii. Diesel power generating sets proposed as source of back up power for elevators and common area illumination during operation phase should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. Use low sulphur diesel. The location of the DG sets may be decided with in consultation with Kerala State pollution Control Board.

iv. Noise should be controlled to ensure that it does not exceed the prescribed standards. During night time the noise levels measured at the boundary of the building shall be restricted to the permissible levels to comply with the prevalent regulations.

v. The green belt of the adequate width and density preferably with local species along the periphery of the plot shall be raised so as to provide protection against particulates and noise.

vi. Weep holes in the compound walls shall be provided to ensure natural drainage of rain water in the catchment area during the monsoon period.

vii. Rain water harvesting for roof run-off and surface run-off, as plan submitted should be implemented. Before recharging the surface run off, pre-treatment must be done to remove suspended matter, oil and grease. The borewell for rainwater recharging should be kept at least 5 mts.above the highest ground water table.

viii. The ground water level and its quality should be monitored regularly in consultation with Central Ground Water Authority.

ix. Traffic congestion near the entry and exit points from the roads adjoining the purposed project site must be avoided. Parking should be fully internalized and no public space should be utilized.

x. A Report on the energy conservation measures confirming to energy conservation norms finalise by Bureau of Energy Efficiency should be prepared incorporating details about building materials & technology, R & U Factors etc and submit to the Ministry in three months time.

xi. Energy conservation measures like installation of CFLs/TFLs for the lighting the areas outside the building should be integral part of the project design and should be in place before project commissioning. Use CFLs and TFLs should be properly collected and disposed off/sent for recycling as per the prevailing guidelines/rules of the regulatory authority to avoid mercury contamination. Use of solar panels may be done to the extent possible.

xii. Adequate measures should be taken to prevent odour problem from solid waste processing plant and STP.

xiii. The building should have adequate distance between them to allow movement of fresh air and passage of natural light, air and ventilation.

III Post Operational Phase

Environmental Monitoring Committee with defined functions and responsibility should foresee post operational environmental problems e.g. development of slums near the site, increase in traffic congestion, power failure, increase in noise level, natural calamities, and increase in suspended particulate matter etc. solve the problem immediately with mitigation measures

For Member Secretary, SEIAA