

APPENDIX II

(See Paragraph 6)

FORM-1 A

(Only for construction projects listed under item 8 of the Schedule)

CHECK LIST OF ENVIRONMENTAL IMPACTS

(Project proponents are required to provide full information and wherever necessary attach explanatory notes with the Form and submit along with proposed Environmental Management Plan & Monitoring Program).

1. LAND ENVIRONMENT

Attach panoramic view of the project site and the vicinity)

- 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) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

Location of the Project Site

The Proposed project is a Proposed Expansion of Existing “ARTEMIS HOSPITAL” at Sector-51, Gurgaon (Haryana) within existing project premises is located at Sector-51, Gurgaon (Haryana). The location map of the project site is shown in **Annexure IV**

The Proposed Expansion of Existing “ARTEMIS HOSPITAL” at Sector-51, Gurgaon (Haryana). In earlier project planning the total plot area & total built-up area was 33588.908 sq. mt. & 32222.508 sq. mt. respectively. After above said expansion the proposal will have same plot area, as per earlier area and total built up area of the project after expansion in project planning is 67485.162 sq. mt.

Key plan showing location of the project site is enclosed as **Annexure IV**.

Proposed Land Use

The proposed project is a Proposed Expansion of Existing “ARTEMIS HOSPITAL” within existing project premises. The project will be constructed as per defined local building by-laws. The development in the project site will be consistent with the surrounding. There will be no change in land-use due to project activities and the land-use will be conforming to the approved development Plan of the area.

There is existing Punjab Institute of Medical Science and the construction of new building with in the project premises. The Google image showing location of the project site including surrounding area within 500 m of the project site is being enclosed as **Annexure V**.

- 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.

SALIENT FEATURES OF THE PROJECT

Sr. No.	Particular	Existing Details	Proposed (Additional)	Total After Expansion	Remark
1	Plot Area Sq. mt.	8.3 acres or 33588.908 sq. mt.	-	8.3 acres or 33588.908 sq. mt.	No Change
2	Permissible F.A.R. Sq. mt. @ 1.5	50383.362 sq. mt.	-	50383.362 sq. mt.	No Change
	Proposed F.A.R. Sq.mt.	30351.796 sq. mt. (Hospital + Residential)	19561.73 sq. mt. + 40.50 sq. mt. (Hospital + Pharmacy + Residential)	49954.02 sq. mt.	Increase
3	Permissible Ground Coverage Sq. mt.	9127.227 sq. mt.	-	9127.227 sq. mt.	No Change
	Proposed Ground Coverage Sq. mt.	5907.39 sq. mt. (Hospital + Residential)	3134.984 sq. mt. (Hospital + Pharmacy)	9043.174 sq. mt.	Increase
4	Built-up area (Total area in sq. m.)	32222.508 sq. mt.	35262.654 sq. mt.	67485.162 sq. mt.	Increase
	a. F.A.R Area in sq. m.	30351.796 sq. mt.	19602.239 sq. mt.	49954.02 sq. mt.	Increase
	b. Non F.AR Area in sq. m.	1870.712 sq. mt.	5391.97 sq. mt.	7262.682 sq. mt.	Increase
	c. Basement Area in sq. m.	-	10268.44 sq. mt.	10268.44 sq. mt.	Increase
5	No. of Beds	206 Beds	400 Beds	606 Beds	Increase
6	Green area sq.mt.	10076.67 sq. mt. (30 % of total plot area)			No Change
7	Parking required	405 ECS	261 ECS ECS	666 ECS	Increase
	Parking Provided	425 ECS	348 ECS ECS	773 ECS	Increase
8	Basement area Details				
	Parking Area (Sq.mt.)	-	9241.596 sq. mt.	9241.596 sq. mt.	Increase
	Service Area (Sq.mt.)	-	1026.844 sq. mt.	1026.844 sq. mt.	Increase
	Total (Sq. mt.)	-	10268.44 sq. mt.	10268.44 sq. mt.	Increase
9	Solid Waste Generation				
	a. Domestic waste @ 0.45 Kg/ Person	175 kg/day	1073 kg/day	1248 kg/day	Increase
	b. Biomedical Waste	590 kg	269 kg/day	859 kg/day	Increase
	c. Hazardous waste	0.7 Ltr/day	2.74 Ltr/day	3.44 Ltr/day	Increase
	d. E-Waste	13.15 kg	20 kg	33.15 kg	Increase
10	Population Details	2024	1305	3329	Increase
11	Cost of project	>100 Cr.	>100 Cr.	-	-
12	EMP cost				-

	a. Capital Cost	0.50 Cr.	1.67 Cr.	2.17 Cr.	-
	b. Recurring Cost	27 LPA	~34 LPA	~61 LPA	Increase
13	CSR / ESR Cost details	37 LPA (Current Year)	15 LPA	52 LPA	Increase
14	Maximum height	30 mtr	30 mtr	30 mtr	No Change
15	Maximum no. of floors	8 floors	11 floors (including 2 basements & service floor)	11 floors (including 2 basements & service floor)	Increase
16	Power requirements	2200 kW	2320 kW	4520 kW	Increase
17	No. of D. G. Sets along with their capacity	2 No. 1250 KVA, 1 No. 250 KVA	1 No. 1500 KVA, 1 No. 1000 KVA & 2 No. 750 KVA	1 No. 1500 KVA, 1 No. 1000 KVA, 2 No. 750 KVA & 2 No. 1250 KVA, 1 No. 250 KVA	Increase
18	STP capacity (in KLD)	350 KLD	400 KLD	750 KLD	Increase
19	ETP capacity (in KLD)	10 KLD	20 KLD	30 KLD	Increase
20	Water requirement and source (in KLD)	Total Water Requirement: 268 KLD (Fresh=233 KLD + Recycled=35 KLD)	Total Water Requirement: 426 KLD (Fresh=370 KLD + Recycled=57 KLD)	Total Water Requirement: 694 KLD (Fresh=602 KLD + Recycled=92 KLD)	Increase
21	R.W.H Pit	5 No.	1 No.	6 No.	Increase

Connectivity: The proposed Hospital is situated at extensive developing area of Gurgaon, Haryana & project site is well connected with other regions. The site is well connected to Netaji Shubhash Marg adjacent to the project site & Delhi-Gurgaon Expressway approx 4.0 km in NW direction. The nearest railway station is Gurgaon railway station approx 9 km in NW direction. The project site is well connected by network of roads leading to various parts of state.

The project perspective view, layout plan (Site plan), Sections, are being enclosed as an *Annexure VI*

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, disturbance to the local ecology).

The proposed project is a Proposed Expansion of Existing “ARTEMIS HOSPITAL” within the project premises. The project will be constructed as per defined local building by-laws. The area adjacent to the project is under development as per development plan (evident from the Google image).The project activities will be confined in the site only and the likely impacts on land-use, commercial facilities and open space will be very meager. The

project will not have any adverse impact on the surrounding environment. Instead, the development through Proposed Expansion of Existing “ARTEMIS HOSPITAL” in this area will increase employment opportunities and development activities as well as increase the Medical reach of the area. There will be no major disturbance to local ecology and will enhance the aesthetic value of the area. Total green area development will be done on 10076.67 sq. mt. (30 % of total plot area). The green area will be develop as Shelter belt along with avenue plantation on both sides of road and Landscaping lawns area including plantation of herbs & shrubs.

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).

The proposed activity will not affect any significant land disturbance resulting in soil erosion, subsidence and instability. The area is not susceptible to erosion.

This is a Proposed Expansion of Existing “ARTEMIS HOSPITAL” within the project premises. Land/soil environment may be temporarily affected due to activities like site preparation, excavation, material handling & storage etc. during construction phase. Proper drainage system shall be provided to deal with the storm water in case of rain.

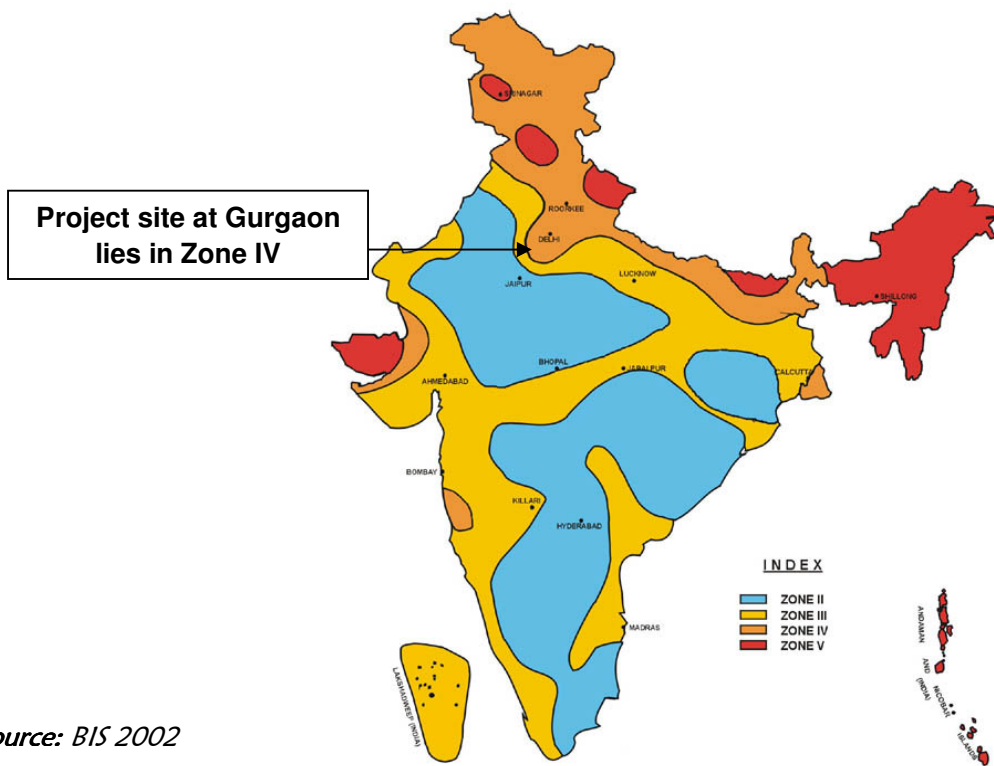
Soil type: A quantitative assessment of the particle size distribution in the soil was made by wet sieve analysis and sedimentation analysis using hydrometer, as per procedures laid down in IS: 2720 Part IV. The particle sizes were designated according to the scale given in IS: 1498, which is given in table below and the soil type in the area is found to be silty clay. The laboratory test results of project site soil analysis are given as **Annexure VIII**.

PARTICLE SIZE SCALE (IS: 1498)

S. No.	Soil Type		Particle Size Range
1.	Gravel		4.75-20mm
2.	Sand	Coarse	2.0-4.75 mm
		Medium	0.425-2.0 mm
		Fine	0.075-0.425
3.	Silt & clay		Less than 0.075 mm

Slope Analysis: Contour map is enclosed as **Annexure VII**

The area is located in an area of moderate seismic risk (zone IV) by national standards.



Source: BIS 2002

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)

The project is not likely to alter or obstruct any natural drainage courses. There is no natural watercourse passing through the project site, as site is located in well developed area. Hence the proposal does not involve alteration of natural drainage systems. As a result of excavation of topsoil during construction phase, the impact on drainage pattern, and run off characteristics will be restricted to the small area and may not last more than one monsoon. Proper rain water drainage facility will be provided and the run-off generated shall be reused for recharging the ground water level through recharging pits.

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?)

Excavation will also be carried out for foundation and construction of building. The total estimated excavated quantity of earth material will be used at the site itself for the purpose of backfilling & leveling at project site.

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

Water demand during the construction period will be met through municipal water supply and ground water at site.

The solid waste generated during the construction phase like metal cuttings, debris, plastic material, and wooden logs etc. will be collected and sold to vendors and the other construction wastes like bricks, concretes, etc. will be reused in the site. The estimated quantity of excavated earth material shall be utilized at site for the purpose of back filling. The waste generated during construction activities shall be limited to project site only and during construction phase only. These will be reused for backfilling and road development after manual segregation. This waste shall be utilized for construction of roads. Conclusively, it can be stated that impacts may be confined to small area (mainly to project site) and for short duration. Proposed mitigation plan suggests maximum re-use of construction waste on site, removal of non-reusable waste from the site and its proper disposal, which would reduce the impact significantly.

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).

There are no wetlands or low-lying area present in and around the project site. So, there will be no impact.

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

During the construction phase, there will be no waste generated which can cause health hazard. The surplus earth will be disposed off into low lying areas. Construction debris will be collected and stored at earmarked place for reuse immediately from the construction site and no accumulation shall be allowed.

0 There will be local labours deployed which will have no contribution to the pollution. The construction labours will have no residential facility except for rest shelter so no waste materials are expected to be generated.

2. WATER ENVIRONMENT

2.1. Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources & quantities and furnish a water balance statement.

Water Management:

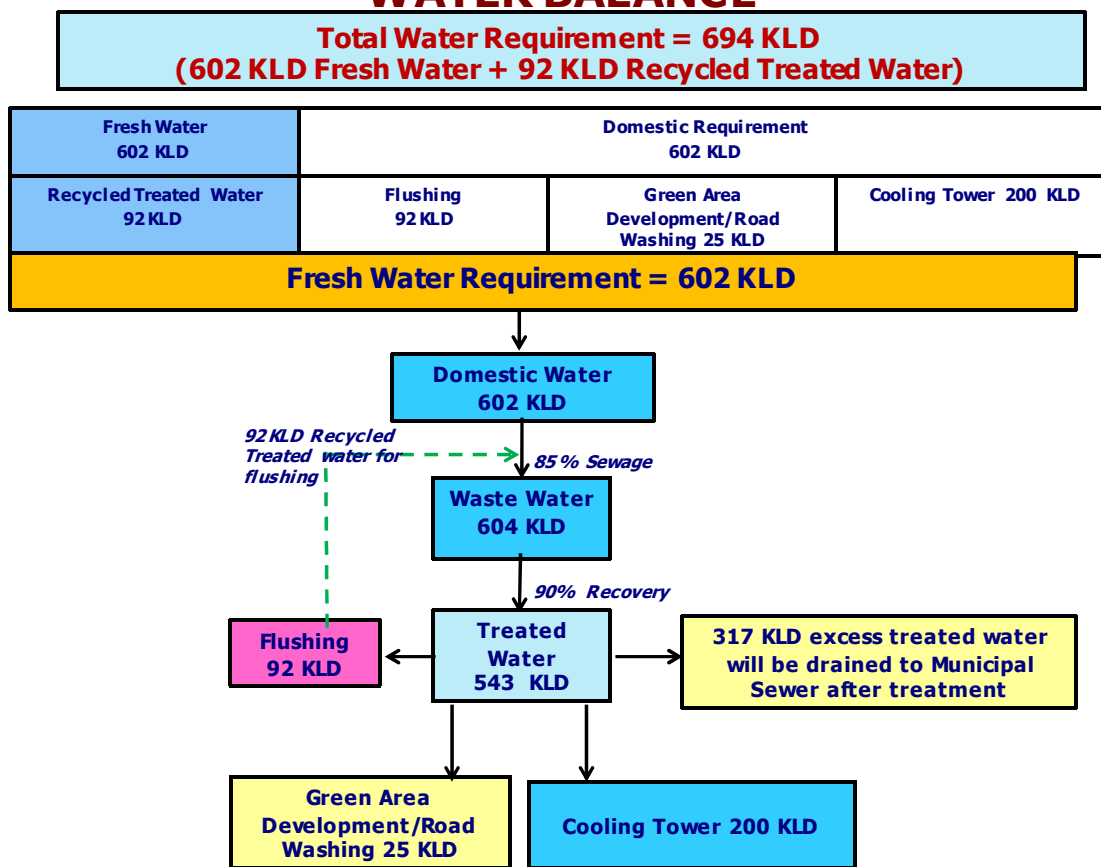
Total water requirement of entire project will be 694 KLD, which will be include the fresh water requirement of 602 KLD and recycled treated water requirement of 92 KLD. Total waste water generation from the project will be 604 KLD, which will be includes 85% of sewage generation from domestic uses and 100 % of flushing uses. The capacities of STP for expansion will be 750 KLD. Treated water recovery from STP will be 543 KLD for

flushing (92 KLD), Green area development/Road Washing (25 KLD) and 200 KLD for Cooling Tower rest 317 KLD will be drained to Municipal Sewer.

WATER REQUIREMENT CALCULATION FOR PROPOSED EXPANSION

S. No.	Description	Occupancy	Domestic Water Requirement					Flushing Water Requirement		Gross Water Req.	Water Flow to STP			
			Cold		Hot		Total	LPC D	LPD		LPD	Domestic		Flushing
			LPC D	LPD	LPCD	LPD	LPD			% age		LPD	LPD	LPD
A. Existing Phase														
1	Patient Beds	206	280	57680	170	35020	92700	65	13390	106090	85%	78795	13390	92185
2	Staff & Employees (3 Shift/day)	618	30	18540	15	9270	27810	15	9270	37180	85%	23639	9270	32909
3	Visitors (2000 persons/day)	2000	6	12000	6	12000	24000	6	12000	36000	85%	20400	12000	32400
4	Kitchen (5 meals/room)	L. S	16	20000	8	9000	29000	-	-	29000	85%	24650	-	24650
5	De-ionized water for OTs	L. S	-	25000	-	-	25000	-	-	25000	85%	21250	-	21250
7	Sand Filter	L. S	20000		-	-	20000	-	-	20000	-	-	-	-
8	Water Body makeup	L. S	15000		-	-	15000	-	-	15000	-	-	-	-
Sub Total in LPD		-	-	168220	-	65290	233510	-	34660	268170	-	-	-	203394
B. Proposed Expansion														
9	Patient Beds	400	250	100000	135	54000	154000	65	26000	180000	85%	130901	26000	156901
10	Paramedical Staff & Employees (3 shifts per day)	1250	20	25000	10	12500	37500	15	18750	56250	85%	31875	18750	50625
11	Visitors	2050	6	12300	3	6150	18450	6	12300	30750	85%	15682	12300	27983
12	Kitchen for staff & employees.	L. S	-	28000	-	18000	46000	-	-	46000	85%	39100	-	39100
13	Café	L. S	-	8500	-	6000	14500	-	-	14500	85%	12325	-	12325
14	De-ionized water for medical uses	L. S	-	17500	-	-	17500	-	-	17500	85%	14875	-	14875
15	Dialysis (250 lts/cycle)	L. S	-	28000	-	-	28000	-	-	28000	90%	25200	-	25200
16	Filter backwash and RO Reject	L. S	-	53000	-	-	53000	-	-	53000	-	-	-	-
Total in LPD		-	-	272300	-	96650	368950	-	57050	426000	-	-	-	327008
Grand Total in LPD		-	-	440520	-	161940	602460	-	91710	694170	-	-	-	530402
Grand Total in KLD		-	-	440.52	-	161.94	602.46	-	91.71	694.17	-	-	-	530.40

WATER BALANCE



WATER REQUIREMENT

TOTAL DAILY WATER DEMAND		
i)	TOTAL WATER REQUIREMENT	694 KLD
ii)	TOTAL FLUSHING	92 KLD
iii)	TOTAL DOMESTIC	602 KLD
iv)	TOTAL WASTE WATER GENERATION	604 KLD
v)	WATER RECOVER FROM STP	543 KLD
vi)	DOMESTIC + FLUSHING USE	694 KLD
vii)	WATER FOR COOLING TOWER	25 KLD
Viii)	STP CAPACITY	750 KLD

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

Total water requirement of entire project will be 694 KLD, which will be include the fresh water requirement of 602 KLD and recycled treated water requirement of 92 KLD. Total waste water generation from the project will be 604 KLD, which will be includes 85% of sewage generation from domestic uses and 100 % of flushing uses. The capacities of STP for expansion will be 750 KLD. Treated water recovery from STP will be 543 KLD for flushing (92 KLD), Green area development/Road Washing (25 KLD) and 200 KLD for Cooling Tower rest 317 KLD will be drained to Municipal Sewer.

2.3. What is the quality of water required, in case; the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)

The quality of ground water samples near project site has been analyzed. All the parameters are well within the permissible limits and water can be used for drinking and domestic purposes. Bore-Well water sample analysis project site report is enclosed as *Annexure VIII*

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).

Total water requirement of entire project will be 694 KLD, which will include the fresh water requirement of 602 KLD and recycled treated water requirement of 92 KLD. Total waste water generation from the project will be 604 KLD, which will include 85% of sewage generation from domestic uses and 100 % of flushing uses. The capacities of STP for expansion will be 750 KLD. Treated water recovery from STP will be 543 KLD for flushing (92 KLD), Green area development/Road Washing (25 KLD) and 200 KLD for Cooling Tower rest 317 KLD will be drained to Municipal Sewer.

Details of Dual Plumbing: - There will be a dual plumbing system for use of water with different water quality namely domestic water supply, flushing water supply, which will result in optimal use of water for different applications thus saving on the high quality water. Installation of dual plumbing for using recycled water will save the potable water from ground water. There will be two pipe lines, one supplying freshwater for drinking, cooking etc. and other for supply of recycled water for flushing of toilets this will result in saving of fresh water demand and life of existing sewerage will be improved. Dual Plumbing plan & external water supply layout plan has been attached as *Annexure IX*

2.5. Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption).

No, there will not be any diversion of water from other users. Rise in water demand is a local phenomenon but the project would have limited regional impact on water reserves.

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).

This is an Expansion of existing hospital and hence the project activity will be commercial in nature. During operation, 604 KLD of wastewater will be generated from the project, which will be treated in the sewage treatment plant and treated water recovery from STP will be 750 KLD. It will be utilized for flushing (92 KLD), Green area development (25 KLD) and cooling towers (200 KLD).

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

The rainwater collected from the rooftop and other paved areas within the project area will be conveyed into to the rainwater harvesting system consisting of de-silting-cum-filter

Chamber, Oil & Grease Separators and Boreholes for recharge into the groundwater. The external storm drainage layout plan & schematic layout rainwater harvesting are enclosed as **Annexure X**.

Rainwater harvesting plan is as per the design approved in the manual issued by the GOI. Details of rainwater harvesting calculation are given below:

Rain Water Harvesting- The rainwater collected from the rooftop and other paved areas within the project area will be conveyed into to the rainwater harvesting system consisting of de-silting-cum-filter Chamber, Oil & Grease Separators and Boreholes for recharge into the groundwater. Rainwater harvesting plan is as per the design approved in the manual issued by the GOI.

RAIN WATER HARVESTING CALCULATION

Type of Catchment Area	Area (m ²)	Runoff Coefficient (C)	Rainfall Intensity (I) (mm/h)	Runoff (Q=CIA) (m ³ /h)
Roof/Terrace area	9043.174	0.8	45	325.5
Other Paved Area	14469.064	0.6	45	390.7
Unpaved area	10076.67	0.2	45	90.7
Total Area under development	33588.908			806.9

Volume of rainwater to be retained (m ³) in 15 min	201.725
Volume of one pit (m ³) of size Dia=3.0 m, Hieght=4.0 m.	2.4.3
No. of pits - required	1
No. of pits – proposed	2

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

No adverse impacts are envisaged due to this project on the runoff characteristics of the area as adequate arrangements will be made to trap the rainwater and suitable storm water drainage system will be provided. During the post-construction phase, Runoff from the project shall not be allowed to stand or enter into the roadside or nearby drain. Adequate measures shall be taken to collect such run off and either shall be reused or recharged through pits Suitable garlanding drain as per the existing contours of the plot will be developed. No problem of flooding and water logging is envisaged as excess run-off will be drained to Ground water.

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

Bore well water is being using for water requirement in existing structure and the proposed building structure will have a rainwater-harvesting infrastructure. The rainwater

harvesting facility will store the rain water and this water will be used within project premises after filtration. The rain water harvesting pit will also provide for ground water recharge.

The ground water will be abstracted to meet the water requirement of the project in operational phase.

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).

To prevent degradation and maintain the quality of the water source, adequate control measure has been proposed to check the surface run-off. Following management measures are suggested to protect the water quality during the construction phase: -

- Avoiding excavation during monsoon season.
- Care will be taken to avoid soil erosion.
- The storm water disposal system for the premises shall be self-sufficient to avoid any collection/ stagnation and flooding of water. Maximum harvesting will be done within the site.
- No natural water body exists near the site so; no pollution of any kind is envisaged.

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

The storm water disposal system for the premises shall be self-sufficient to avoid any collection/ stagnation and flooding of water. Maximum harvesting will be done within the site campus.

A detailed “Storm Water Management Plan” will be developed. The plan will incorporate best management practices which will include following:

- Rain water outlets/ spouts/ Khurras will be provided in terrace for taking out rainwater.
- Percolation wells will be provided for rainwater harvesting.
- The rainwater collected through channels and catch basins will be disposed off into Percolation / rain water harvesting pits and storage tanks. The overflow from the percolation / rainwater harvesting pits will be connected to the nearby storm water drain available from local public body.
- A grating at the main entrance will be provided to prevent entry of outside rainwater to the premises.
- All road crossings for services shall be provided with RCC Hume pipe and manholes for the ease of maintenance and to avoid any digging of roads.

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, temporary sites will be provided for housing of construction labors. Most of the workers will come from the nearby areas. They will be coming by their own and will return same day after their work is over. Rest shelters, wash place, toilets will be provided to local labors on the project site. Portable toilets connected to the existing STP will be provided to treat the wastewater generated during construction phase. This water will be recycled back, to be re-used during construction phase.

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).

This is a construction project for expansion of existing hospital building; it will be used for Commercial purpose. During operation, 604 KLD of wastewater will be generated which will be treated in the sewage treatment plant. Treated water recovery from STP will be 543 KLD out of which for flushing (92 KLD), Green area development (25 KLD) and cooling towers (200 KLD).

The schematic diagram of the STP & external sewage layout plan is given in *Annexure I*.

SEWAGE QUANTITY, TREATMENT, REUSE & DISPOSAL

Quantity of sewage	604 KLD
Collection of sewage	Sewage generated during the operation phase will be collected through underground sewerage system (pipe drain) for treatment in STP.
Treatment of sewage	The STP is based on extended aeration. Sewage will be treated up to the tertiary level in a Sewage Treatment Plant (STP) 750 capacity.
Reuse/recycle and Disposal of treated sewage	During normal operations, there will be zero discharge, as the entire treated sewage will be reused and recycled. The treated water obtained from STP shall be utilized for flushing of toilets, HVAC Cooling,
Location	Basement

CHARACTERISTICS OF WASTE WATER

SL NO	Parameters	Characteristics	
		Inlet	Outlet
1	pH	6.5-8.5	6.0-8.5
2	BOD	250-300 mg/l	<10 mg/l
3	COD	350-450 mg/l	< 100 mg/l
4	Suspended Solids	400-600 mg/l	<10 mg/l
5	Oil and Grease	10-50 mg/l	Nil

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

Total water requirement of entire project will be 694 KLD, which will include the fresh water requirement of 602 KLD and recycled treated water requirement of 92 KLD. Total waste water generation from the project will be 604 KLD, which will include 85% of sewage generation from domestic uses and 100 % of flushing uses. The capacities of STP for expansion will be 750 KLD. Treated water recovery from STP will be 543 KLD for flushing (92 KLD), Green area development/Road Washing (25 KLD) and 200 KLD for Cooling Tower rest 317 KLD will be drained to Municipal Sewer.

3. VEGETATION

3.1. Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with its unique features, if any).

No threatened, rare, endangered or endemic species were observed during the survey in core zone.

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

The land for proposed project is a developed land presently utilized for hospital purpose & will be used for expansion of existing Punjab Institute of Medical Science. Further as the project related activities (during construction and operation) are confined within the project premises, Permission from Forest department will be obtained for the trees to be cut in the proposed building area.

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?).

Extensive plantation and Green area development will be done on 10076.67 sq. mt. (30 % of total plot area). The Indigenous / local plants will be planted all around the periphery of the project area and along the roadsides.

Tree species proposed/existing are *Azadirachta indica* (Neem), *Polyalthia longifolia* (Ashoka), *Dalbergia sissoo* (Shisham), *Cassia fistula* (Amaltas), *Delonix Regia* (Gulmohur), *Jacaranda Mimosaefolia* (Nili Gulmohur), *Schliechera Trijuga* (Kusum), *Tabebuia Argentia* (Yellow Cedar), *Callistemon Lanceolatus* (Bottle Bush), *Phumeria Calcutta Star* (Champa), *Alstonia scholaris* (Devil’s Tree), *Bauhinia varigeata* (kachnar), *Bauhinia blackeana* (Kachnar), *Tabebula rosea* (Trumpet Tree), *Chorisia speciosa*. Other species are *Washingtonia felifera*, *Cycus speciosa* etc. Green-area development on the project lay-out is given in **Annexure XVI**

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 threatened, rare, endangered or endemic faunal species were observed during the survey in core zone.

No displacement of fauna is envisaged due to this project. The proposed site and its surrounding urban set up do not support any habitat for any group of wild animals except a few small animals which are well adapted to urban areas.

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

No direct or indirect impact on avifauna is envisaged. However, after the commissioning of the project the better environmental conditions may provide a better habitat to the avifauna of the area.

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

No direct or indirect impact on fauna is envisaged. However, after the commissioning of the project the better environmental conditions may provide a better habitat to the avifauna of the area.

5 AIR ENVIRONMENT

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

The baseline study of the ambient air quality reveals that the air quality parameters are below NAAQS standards.

Laboratory test results of Ambient Air Quality Monitoring of the project site are enclosed as **Annexure XIII**.

From the monitoring results it is clear that, the 24-hourly average levels of CO, SO₂, NO₂, PM₁₀ and PM_{2.5} were observed to be within the limit as stipulated in the National Ambient Air Quality Standards.

The project activities will not increase the atmospheric concentration of gases to such an extent that it may lead to the formation of heat islands. Emissions will only be through vehicular movement.

The marginal increase in traffic due to project is not going to cause any significant increase in atmospheric concentration of gases and will not result in heat island formation.

With available ambient air quality data and incremental concentrations computed through mathematical modeling the following post project ambient air quality has been predicted.

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 burning of fuel through traffic movements, operation of construction machines / equipment and domestic activities at site. Construction activities will lead to dust generation, emission of NO₂, SO₂ and PM. The impacts on the ambient air quality during construction phase will be temporarily and reversible in nature (for short duration) and will be restricted to only a small area. During operation phase, there will be development of green-area and these efforts will reduce the impact.

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.

There will be the sufficient parking space for the vehicles. The provision of parking space will be as per the Norms. The parking provision will be made at surface and basement. Traffic circulations, parking plans are enclosed as *Annexure XIV*

Total required parking will be 611 ECS and parking provided will be 773 ECS on surface 350 ECS, Basement 258 ECS & Mechanical 165 ECS parking will be provided.

$$\begin{aligned} \text{Required Parking:} &= \text{F.A.R/75} \\ &= 49954.02 / 75 \\ &= 666.05 \text{ say } 666 \end{aligned}$$

Total Required Parking = 666 ECS

PARKING PROVIDED

Type of Parking	Proposed Parking	
	Parking Area	ECS
Surface @ 25 Sq.mt. / ECS	8800 Sq. mt.	350 ECS
Stilt @ 30 Sq.mt. / ECS	-	-
Basement @ 35 Sq.mt. / ECS	9050 Sq. mt.	258 ECS
Mechanical @ 16 Sq.mt. /ECS	2700 Sq. mt.	165 ECS
Total No. of ECS Provided		773 ECS

Total Parking Provided = 773 ECS

Transport Infrastructure: The proposed Hospital is situated at extensive developing area of Gurgaon, Haryana & project site is well connected with other regions. The site is well connected to Netaji Shubhash Marg adjacent to the project site & Delhi-Gurgaon Expressway approx 4.0 km in NW direction. The nearest railway station is Gurgaon railway station approx 9 km in NW direction. The project site is well connected by network of roads leading to various parts of state.

Moreover, the project is such planned; that it has roads running on the periphery at all sides. Hence, the traffic management to and from the site will be effectively managed and no traffic related issues are expected from the proposed project.

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

In the circulation plan of the project, there will be proper entry and exit points for systematic control of the vehicular movement within the complex.

Internal roads will be provided for the smooth traffic movement. The project has roads running on the periphery at all sides that will facilitate the movement of traffic. Internal roads with suitable width have also been provided. Adequate lighting arrangement has been provided covering all corners.

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 a marginal increase in the traffic noise; the sources are due to traffic movement within the project area.

The traffic movement will be only in daytime during the construction phase. In operational phase, only visitors to the proposed project will come and vehicular movement due to them only will be occurring. The pollution will be in small quantity and it will be further minimized by plantation on the sides and around the periphery of whole project.

Noise level Monitoring Report of the Project site is enclosed as *Annexure XIII*

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

During operation, vehicular movement and operation of D.G. sets are the major sources of noise pollution. But both these activities D.G. sets and vehicular movement will not have any significant impact on the people residing in the area. Since D.G. sets will not be operational continuously and moreover it will be placed enclosed with suitable enclosures, hence no or minimal impact will be anticipated. It is envisaged that the movement of the motor vehicles will be restricted to designated carriageways only.

Impacts on Air Quality

Impacts on ambient air quality during operation due to emissions from the stacks attached

to standby DG sets would be very less. However suitable mitigation measures will be adopted.

Mitigation Measures for Impacts of DG Sets on Ambient Air Quality:

- D.G. sets will be used only during power failure
- D.G. sets will comply the applicable emission norms.
- Adequate stack height for D.G. sets will be provided as per norms.
- During operation stage, monitoring of emissions from D.G. sets and ambient air quality will be carried out as per norms.
- Low sulphur Diesel will be used in DG sets.

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?

As the site does not have any scenic amenity or landscaping in its surroundings so there is no possibility of obstruction of above-mentioned conditions. Moreover the approval of the architectural plan of the building will be taken from local development authority.

The proposed expansion proposal will not cause obstruction of a view of scenic amenity or landscapes. The present project itself is planned with provisions of green area development and a forestation. This will surely enhance the aesthetic beauty of the area.

The external finishes proposed are consistent with the contemporary image of efficient and utilitarian built environment.

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

This is a Proposed Expansion of Existing “ARTEMIS HOSPITAL”. The development of the project area is as per the local building by- laws and as per approved building plans by Development Authority. Hence, no adverse impacts are anticipated from Expansion on the existing structures in this area.

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

There are no local considerations of urban forms & urban design influencing the design criteria. The Proposed Expansion of Existing “ARTEMIS HOSPITAL” will be constructed within the designed site as per the defined building by-laws of local authority.

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

There is not any anthropological or archaeological site or artifacts or any other significant features in the vicinity of the site.

7.0 SOCIO-ECONOMIC ASPECTS

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

The proposed project shall provide value addition to the existing infrastructure, as due to development of this Project facility such as public transport, water supply, telecommunications, power lines, road maintenance etc. shall be upgraded in and around the project premises. There will be no change in demographic structure. The details regarding the demographic structure of Gurgaon city is given in the table below:

DEMOGRAPHIC DETAILS OF DISTRICT – GURGAON (HARYANA)

Description	2011	2001
Actual Population	1,514,432	870,539
Male	816,690	470,504
Female	697,742	400,035
Population Growth	73.96%	44.15%
Area Sq. Km	1,258	1,258
Density/km ²	1,204	717
Proportion to Haryana Population	5.97%	4.12%
Sex Ratio (Per 1000)	854	850
Child Sex Ratio (0-6 Age)	830	806
Average Literacy	84.70	78.50
Male Literacy	90.46	88.00
Female Literacy	77.98	67.50
Total Child Population (0-6 Age)	202,602	144,640
Male Population (0-6 Age)	110,705	80,101
Female Population (0-6 Age)	91,897	64,539
Literates	1,111,116	343,135
Male Literates	638,666	226,165
Female Literates	472,450	569,300
Child Proportion (0-6 Age)	13.38%	16.61%
Boys Proportion (0-6 Age)	13.56%	17.02%
Girls Proportion (0-6 Age)	13.17%	16.13%

Source: - Census Data of India, 2011.

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

The ancillary infrastructure like roads, markets, public health, amenities, conveyance facilities are under development in the project area. However all sorts of social infrastructure like transportation facilities, water supply & sanitation facilities,

communication facilities, educational institutions, hospitals, markets, banks, cultural amenities etc. will be provided within the project site.

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

There is no sacred site or cultural heritage site in nearby vicinity of proposed project hence no adverse impacts are envisaged. So, the proposed project will not cause any adverse effects on local communities or disturbance to sacred sites or other cultural values.

8. BUILDING MATERIALS

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)

The major materials used for the construction of the proposed project will be steel, cement, bricks, metal, flooring tiles / stones, sanitary and hardware items, electrical fittings, 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?

During the expansion phase the air quality will have adverse impact. Expansion activities especially related to handling of loose material likely to cause generation of fugitive dust that adversely impacts the air quality of the surrounding area of the project site. To minimize the impact, loose material will be either stacked or transported with proper covering.

During construction phase the expected noise levels will be between 70 – 75 dB (A), which will decrease with increase in distance. Administrative as well as engineering control of noise will be implemented.

8.3. Are recycled materials used in roads and structures? State the extent of savings achieved?

As there is no availability of the recyclable building material in the vicinity of the proposed project site so recyclable materials cannot be used in the construction of proposed project.

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

Total Domestic Solid Waste Generated from Project will be 1278 kg/day, Bio-Medical waste generated will 859 kg/day which will be outsourced to Synergy Waste Management Co., Only source of Hazardous waste generation from the hospital will be from D.G. Sets which will be 3.44 ltr/day and it will be stored in the project site and disposed to CPCB authorized recyclers (M/s Paswara Chemicals Limited-Meerut) and E-waste generation will be 33.15 kg it will be collected separately and transported to CPCB Authorized E-waste Recyclers namely M/s. TIC Group India Pvt. Ltd.

(Calculated as per the norms of MoEF’s Manual on Norms & Standards for Environment Clearance of Large Construction Projects).

DETAILS OF SOLID WASTE DISPOSAL

Solid wastes which are likely to be generated in project will be domestic and biomedical in nature.

Solid wastes which are likely to be generated shall be domestic and biomedical in nature. Domestic wastes will be collected from designated locations and segregated into inorganic and organic wastes at site, after that it will be stored in holding rooms/waste collection center. From waste collection center the waste shall be handed over to authorized vendors for its proper disposal.

The biomedical waste shall be handed over to authorized vendor for its safe disposal, as per biomedical wastes (Handling & Management) Rules 2016.

The scheme for solid waste management & garbage collection processing layout is being attached as ***Annexure XV***

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?

The total power requirement after expansion will be 4520 kW. The details of power requirement, source, backup power arrangement (i.e. generators) are given in the Table below.

Power Requirement, Source and Backup Arrangement

Power Requirement	4520 kW
Sources of power	Source 11 KV supply available from substation
Backup power supply arrangement	7 D.G. Sets of 6750 KVA Capacity (1 No. 1500 KVA, 1 No. 1000 KVA, 2 No. 750 KVA & 2 No. 1250 KVA, 1 No. 250 KVA) will be used for back-up.

Energy Conservation Measures & Management Plan:

In the operational phase, appropriate energy conservation measures and management plan will be adopted in order to minimize the consumptions of non-renewable fuel.

The following measures are suggested to be adopted.

- Power factor of the complete electrical system will be maintained close to unity. This will reduce electrical power distribution losses in the installation.
- Copper conductor cables will be specified for sizes up to 16 sq. m. this will reduce losses and improve reliability.
- Lighting and switching of common area shall be designed keeping in mind day light integration.

- There shall be provision of solar water heating system and provision of solar lighting for common areas.
- Variable frequency drives will be incorporated on Energy Efficient Motors which will save considerable energy.
- The water supply to the tower is by variable speed pumps.
- All vertical fenestration will have high performance Glass Pane

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

In emergency situations, power will be supplied by D.G. set to cater the demand load of the Building.

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?

Suitable thickness of glass depending upon the panel size to keep the U value as per the requirement of ECBC.

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

- The orientation of the building will be done in such a way that maximum daylight is available or utilized in the buildings.
- The orientation of the building would be done in such a manner that most of glazed areas in north and east.
- Lesser opening will be provided on the west facing walls.
- Landscape and green areas will be so spaced so as to cool the surrounding environment, which will reduce energy consumption.

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.

- Orientation is done in such a manner so that surface of the building cuts direct radiation of critical hours and thus building will be less affected with the heat. Building units will be made environment friendly with optimum use of solar energy.
- Feasibility for installation of solar photovoltaic cells for street lighting will be assessed.
- There will be the provision of solar hot water system.

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 shading has been effective to reduce the cooling loads. The following techniques will be adopted:

- For walls of the building, window to wall ratio will be kept to a minimum, to minimize solar radiation, which further helps minimize cooling/ventilation costs.
- Living areas will be aligned to get maximum north south light and services areas are to be located on the western side.
- Shading will be used to increase cooling effect in the buildings.
- There will be less number of openings on the west side and more number of openings on the south side.
- Promoting awareness on energy conservation.
- Training of staff on methods of energy conservation and to be vigilant to such opportunities.
- Passive solar architectural measures will be adopted to provide shading devices for windows and roof, which would effectively reduce heating up of building envelope.
- Roofs will be painted with reflective, aluminum based paints with solar reflectance ranging from 0.3 - 0.6. This will result in less absorption of sunlight causing 40% back reflection and less heating of building structures during summer seasons.

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.

- The design of the building will be such that maximum use of natural lighting can be achieved. The walls, roofs and opening will be designed that influx of heat is minimum. The design also incorporates the optimal and judicious use of natural lighting.

Energy Efficient Features:

- Bulbs will be replaced with CFL & LED lighting
- Solar panels for Hot water
- Roof-top thermal insulation
- Appropriate design to shut out excess heat and gain loss
- Use of solar energy for street lighting
- Maximum utilization of natural light
- Energy efficient light fixtures

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

- The building will use energy efficient and environmental friendly designs that will control formulation of heat island effect. There will be also green cover at the site to reduce formation of heat island. Passive design concepts have been used to minimize energy consumption and maximize the energy efficiency.
- Heat emission from the proposed project can be from the paved and concrete structures & equipments/appliances. However, the heat generated will not be significant.
- Due to the proposed project there would be insignificant emission of air pollutants by vehicular movements and occasional use of D.G sets, hence no heat island effect is envisaged.
- To reduce the heat load reflective insulated glass shall be used in fenestrations to cut on heat loads and subsequently capital & operating cost of air conditioning.

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 building envelope for external walls will be made of bricks, concrete and steel. Proper roof insulation will be provided to achieve desired thermal comfort. The entire building envelope, opening between conditioned and non- conditioned spaces will be sealed by gasket/sealants, and provided with air curtains. Bricks, concrete & Glass will be used as construction material.

R & U Value Detail

S.NO	ENVELOPE PARAMETER	U Value (Btu/hr.sqft.Deg F)	R Value (hr.sqft.DegF)
1	Plaster +Brick Wall +Plaster + Texture Paint	0.35	2.83
2	Glazing (DGU)	0.33	(SHGC-0.41)
3	Glazing High Performance Glass.	1.1	(SHGC-0.56)
4	Roof Insulation	0.12	8.47
Note : The R values has been obtained as $R = 1/U$			

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

In case of emergency, immediate steps will be taken to raise alarm and stop fire. The Fire Protection System would be based on the regulations of National Building Code, 2005 and local fire norms.

- Fire extinguishing system shall include the following: -
 - External Fire Hydrant System
 - Wet Riser System

- Portable Fire extinguisher like; Dry chemical powder, CO₂ fire extinguisher, Fire bucket with sand & Foam extinguisher.
- Sprinkler System.
- Smoke & heat detection system
- Electrical system except the lighting & fire fighting system shall be isolated.
- Water spray systems in the exposed area shall be used.
- In case of LPG & other gases leakage, precautions to avoid source of ignition shall be taken.
- Fire fighting personnel shall be protected with water spray and equipped with fire entry suit, water jet blanket, a safety area and a manned lifeline.
- The water required for fire reserve will be stored in underground and terrace tanks.

Fire Fighting Plan & Fire Tender Movement Plan is enclosed in ***Annexure XVII***

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

Building has glass wall on two floors. The Glass will be clear reflective with low solar heat gain coefficient (SHGC = 0.41) and low U factor of 0.33.

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

The spaces inside the building are pressurized and hence infiltration is minimal.

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.

Non- conventional energy technologies shall be used to save overall energy consumption.

Following technologies would be used in order to conserve energy:

- Solar water heating system
- Solar street lighting

10.0 ENVIRONMENTAL MANAGEMENT PLAN:

DURING CONSTRUCTION PHASE

AIR MANAGEMENT

- A team of housekeeping employees will be made available to remove dirt/debris from the floor/sites.
- Will go through regular maintenance & pollution check-up.
- Screens will be put up all along the periphery to contain the dust within the premises.

WATER QUALITY MANAGEMENT

- The water requirement during construction phase will be met by Bore well/municipal water supply.

- Proper storage and internal supply facilities shall be installed before undertaking construction activities.
- During construction phase proper ‘bandh’ will be made to prevent runoff.

NOISE MANAGEMENT

- Provision of silencer to modulate padding / noise isolators at equipment / machinery used for construction.
- Provision of silencer to modulate the noise generated by machines.
- Provision of protective device like ear muff/plugs to the workers.
- Regular maintenance of vehicles & machinery would be taken up.
- Construction activity limited up to Day time only.

SOIL MANAGEMENT

- Top soil generated will be reused in green area development and rest soil will be for leveling and site development activities.
- Soil shall be covered by tarpaulin sheets, while transporting from site.
- Area shall be properly fenced and provided with proper drainage system.
- Construction work will not be carried out during heavy rainfall. It will be ensured that no soil is left unconsolidated after completion of work.
- Construction debris collected and stored at earmarked place for reuse immediately from the construction site and no accumulation shall be allowed.
- Proper collection & disposal of metal cuttings debris, plastic packing material, wooden logs etc. will be done during construction.

WELFARE & SAFETY MEASURES FOR LABOURS

WELFARE:

- Potable drinking water
- Provide proper toilets and washing facility.
- Provide medical aid.
- Admission in the hospital in case of emergency.

SAFETY:

- Measures for medical aid, fire-fighting.
- Safety helmets, belts and slings, nets
- Properly braced scaffoldings
- Properly laid electrical cables and connections
- D.G. sets with acoustic enclosures to reduce noise pollution

ELECTRICAL HAZARDOUS PLAN

THE ELECTRICAL HAZARDS PLAN:

- To keep the power lines at standard heights such that these are beyond the reach of the workers.

- All connections to be provided with proper earthing.
- Provide Electrical Earth Leak Circuit Breakers.
- All equipment to be used in the manner prescribed.
- Avoid improper use of expansion/flexible wires
- Provision of proper fuses to avoid short circuits
- Use of insulated tools by the concerned persons.

IN CASE OF ACCIDENTS

- Provide medical aid at site
- Provide medical aid in the Hospital

The electric layout plan is being enclosed as *Annexure XVIII*

ENVIRONMENTAL MANAGEMENT PLAN

DURING OPERATION PHASE

AIR MANAGEMENT

- Proper ventilation system shall be provided to all part of the work areas at site.
- All operational vehicles will go through regular maintenance and pollution check up.
- All the private vehicle owners will be asked to have updated PUC (Pollution under Control) certificate.
- DG stack will be provide as per CPCB Norms.
- Large leaf plants will be use in tree plantation all around the project site

WATER MANAGEMENT

- The total water requirement for the proposed project is 694 KLD, which includes fresh water 602 KLD and recycled water 92 KLD.
- The waste water generated from the project will be about 604 KLD and treated water availability will be 543 KLD.
- The waste water generated will be treated in Sewage Treatment Plant by primary, secondary and tertiary treatment. The capacity of sewage treatment plant will be approx 750 KLD.
- The treated water will be re-utilized in flushing of toilet, HVAC Cooling and Green area development.

NOISE & VIBRATION MANAGEMENT

- Proper road network has been designed as per the prevailing guidelines for smooth operation of traffic; impact in noise level due to the operational traffic will be negligible.
- High class acoustic enclosure will be provided to reduce the noise level of DG sets.
- Enclosure construction will be fully bolted keeping in view the major service requirements; all doors will be provided with specially designed hinges.

- The landscape design along the periphery of the plot has been developed to achieve attenuation factor conforming to noise standards.
- The open spaces inside the plot is suitably landscaped and covered with vegetation to reduce the impact of noise.
- Provision of silencer to modulate padding / noise isolators at equipment / machinery used for construction.
- Provision of silencer to modulate the noise generated by machines.
- Provision of protective device like ear muff/plugs to the workers.
- Regular maintenance of vehicles & machinery would be taken up.
- Construction activity limited up to Day time only.

SOLID WASTE MANAGEMENT

- Total Solid Waste generated from Project (Residential & visiting population) will be 1278 kg / day, and biomedical waste will be 859 kg/day.
- Biodegradable & Non-Biodegradable waste will be segregated at source in accordance with MSW (M&H) Rules, 2016.
- The biomedical waste shall be sold to authorized vendor for its safe disposal and as per the biomedical wastes (Handling and Management) Rules 2016.
- There will be site for solid waste management at site.
- The type of solid waste generated from the project activity will be of domestic and biomedical type only.
- The sewage sludge generated from sewage treatment plant will be converted manure and use for gardening purposes after proper digestion.
- Waste storage bins will be provided for wet and dry garbage. The same shall be segregated and stored in bins.
- Recyclable inorganic wastes will be sold to authorized vendors for its proper recycling and reuse.
- The collection, transportation, treatment and disposal of Biomedical waste will be serviced by the Authorized Agency/ Contractor.

Mercury Waste Management

- There is a proper management plan for the management of mercury spillage from instruments and thermometers and waste containing mercury & X-ray & other radiation emitting rooms is meeting with the prescribed norms by BARC.

The proper management for the mercury spillage is given below & we are following the same:-

- Evacuate area: Remove everyone from the area that has been contaminated and shut the door. Turn off interior ventilation system to avoid dispersing mercury vapour throughout the facility.
- Put on face mask: In order to prevent breathing of mercury vapour, wear a protective face mask.
- Put on old clothes: Change into old clothes and shoes that can be discarded if they become contaminated.
- Remove jewellery: Remove all jewellery from hands and wrists so that the mercury cannot combine (amalgamate) with the precious metals.
- Wear gloves: Put on rubber or latex gloves. If there are any broken pieces of glass or sharp objects, pick them up with care. Place all broken objects on a paper towel. Fold the paper towel and place in a zip lock bag. Secure the bag and label it as containing items contaminated with mercury. When labeling bags, do so as directed by your local health or fire department to prevent confusion about contents
- Identify surface: Wood, linoleum, tile and any other like surfaces can easily be cleaned. Carpet, curtains, upholstery or other such surfaces cannot. These items should be thrown away according to the method outlined below. (For carpets, only the affected portion needs to be cut out and removed.)
- Locate mercury beads: Locate all mercury beads, then carefully use the cardboard to gather them together. Use slow sweeping motions to prevent accidentally spreading the mercury. Small and hard-to-see beads can be located with the flashlight: hold it at a low angle close to the floor in a darkened room and look for additional glistening beads of mercury that may be sticking to the surface or have gathered in small cracks in the surface. Mercury can move a surprisingly long distance on hard and flat surfaces be sure to carefully inspect the entire room.
- Use eyedropper and sticky tape: Use an eyedropper or syringe (without a needle) to draw up the mercury beads. Slowly and carefully transfer the mercury into an unbreakable plastic container with an airtight lid (such as a plastic film canister). Place the container in a zip-lock bag. Label the bag as containing items contaminated with mercury. After you remove larger beads, use sticky tape to collect smaller hard-to-see beads. Place the sticky tape in a zip lock bag and secure. Powdered sulphur or zinc stains mercury a darker colour and can make smaller beads easier to see. Be careful not to breathe the powder, as it can be mildly toxic.
- Leak-Proof Bag: Place all materials used during the cleanup, including gloves, into a leak-proof plastic bag or container. Seal and label it.

- Final disposal: We will contact for toxic cleanup and proper disposal to ensure that all mercury contaminated waste now secured in labeled bags is dealt with in accordance with national and EU legislation.
- Outside ventilation: We will keep the affected area ventilated to the outside (with Windows open and ventilation running) for at least 24 hours after your successful cleanup. If sickness occurs, we will seek medical attention immediately.

E WASTE GENERATION & MANAGEMENT

- Commercial waste (E-wastes) will start being generated after a latency period of 4-5 years. Since most of these components are recyclable in nature, efforts will be made to recycle it to the maximum extent, hence actual waste generated as E-waste should be minimal.
- It is estimated that from the proposed project about 0.25 – 0.50 MT/yr E-waste will be generated.
- The principle idea of E-waste management is to recycle the E-waste generated.
- Authorized vendors of electronic goods will take back their old equipment/cartridge/toner rolls etc. and pay some concessions on the new equipment. On the other hand, reusable material like cartridges/toners will be refilled and reused. Outdated computers/fax/phones etc. will be value added and sold to downstream uses through resellers. These arrangements will be made with existing vendors to simultaneously effectively reduce the quantity of E-waste generated and also to generate substantial revenue for running the management system. Whatever E-waste left, will be collected separately in HDPE drums and will be stored in special containments, onto pukka platforms and under lock and key.

GREEN AREA DEVELOPMENT MANAGEMENT

- Green area will be developed in an area of 10076.67 sq. mt. (30 % of total plot area).
- Planning has been done to plant local and indigenous plants / trees within the project premises.

FIRE & SAFETY MANAGEMENT

The design and planning of Fire Protection System shall be done keeping in view the following criteria:

- National Building Code Sept 2005: Part IV for Fire Protection
- Local Bye-Laws.
- Consultation with the Chief Fire Officer.
- The entire fire safety installation shall be compliant with the most stringent codes / standard for the entire Complex to ensure the highest safety standard and uniformity of system.

- Further, before property is opened to public, the fire protection shall be fully operated and tested under simulated conditions to demonstrate compliance with the most stringent standards, codes and guidelines.
- Provision of fire escape staircase.

DETAILS OF ENERGY CONSERVATION MEASURES

In the operational phase, appropriate energy conservation measures and management plan will be adopted in order to minimize the consumptions of non-renewable energy. The following measures are suggested to be adopted:

- All fluorescent light fixtures will be specified to incorporate electronic ballast with less watt-loss compared to electromagnetic ballast and result in superior operating power factor. Electronic chokes also improve the life of the fluorescent lamps.
- Power factor of the complete electrical system will be maintained close to unity. This will reduce electrical power distribution losses in the installation.
- Copper conductor cables will be specified for sizes; this will reduce losses and improve reliability.
- Lighting and switching of common area shall be designed keeping in mind day light integration.
- All cables will be de-rated to avoid heating during use. This also indirectly reduces losses and improves reliability.
- Variable frequency drives will be incorporated on Energy Efficient Motors which will save considerable energy.
- Variable volume secondary pumps with VFD shall be used for the chilled water pumps while the chillers shall be high efficiency water cooled chillers.
- The water supply to the tower is by variable speed pumps.
- There shall be provision of solar water heating system and provision of solar lighting for common areas.

ENERGY CONSERVATION

1. The following design concepts will be adopted to minimize the energy consumption. The secondary Chilled water pumps in the HVAC system will be provided with Variable frequency drive to conserve energy at part load conditions.

$$\text{Power} \propto (\text{Speed ratio})^3$$

When the speed of the chilled water pump reduces corresponding to reduction in load, the power consumption reduces by the cube of speed ratio resulting in substantial saving in power consumption of the secondary chilled water pumps.

Thus if the pump runs at 80% of its full rated speed the power changes to cube of 0.8 (0.8 x 0.8 x 0.8) that is at 51.2 % of full load.

2. CFC chillers with good IKW/TR are planned to conserve energy. Environmental friendly refrigerant R 134 A shall be used with chillers.
3. The Air conditioning areas are split into smaller zones as per hours of operation of A/C. Proper zoning has been done according to no. of hours of usage of each area and separate AHUs provided.
4. High quality glass to conserve electricity consumption.
5. Highly efficient HVAC fans/Blowers (Imported) are planned to conserve energy.
6. Double skin AHU's are planned instead of single skin AHU for Air Conditioning to conserve energy.
7. Roof insulation is planned to conserve energy.
8. Proper maintenance of chillers to reduce load.
9. Building air conditioning systems designed as per ASHRAE standards for maximum efficiency
10. Overall building parameters planned so that daylight and natural ventilation can be exploited to maximum.
11. Indoor air quality maintained at a safe and comfort level by use of intelligent control systems.

ENVIRONMENTAL MONITORING PLAN – CONSTRUCTION PHASE

Source	Monitoring Location	Parameters to be Monitored	Frequency
Ambient Air Quality	At 1 location at boundary of the project site.	PM _{2.5} , PM ₁₀ , SO ₂ , NO ₂ , CO	Once in three months
Ambient Noise	At 1 location at boundary of the project site.	Day and night equivalent noise level	Once in three months
Ground water	At 1 location nearest to the project site.	As per standards	Once in three months
Soil	At 1 location outside the project site.	As per standards	Once in three months

ENVIRONMENTAL MONITORING PLAN – OPERATION PHASE

Source	Monitoring Location	Parameters to be Monitored	Frequency
DG set emissions	DG stacks	PM, SO ₂ , NO ₂	Twice in a year or as per requirement of SPCB
DG set noise	At 0.5 m distance from enclosure	Noise level	Twice in a year or as per requirement of SPCB
Sewage Treatment Plant	Inlet and Outlet	pH, BOD, Suspended Solid, Oil & Grease	Twice in a year or as per requirement of SPCB
Ambient Air Quality	At 3 locations	PM _{2.5} , PM ₁₀ , SO ₂ , NO ₂ , CO	Once in each non-monsoon season or as per requirement of SPCB
Ambient Noise	At 3 locations	Day and night equivalent noise level	Once in a season or as per requirement of SPCB

