Conceptual Plan

For

Setting up New AIIMS, Kalyani

at

Mouza- Basantpur, JL No.-90&Mouza-Ghoragacha, JL No.-91, P.S- Chakdah, Dist-Nadia, West Bengal

By

All India Institute of Medical Sciences (AIIMS)

Submitted by

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CONTENTS

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

All-India Institute of Medical Sciences was established as an institution of national importance by an Act of Parliament with the objects to develop patterns of teaching in Undergraduate and Post-graduate Medical Education in all its branches so as to demonstrate a high standard of Medical Education in India; to bring together in one place educational facilities of the highest order for the training of personnel in all important branches of health activity; and to attain self-sufficiency in Post-graduate Medical Education.

The Institute has comprehensive facilities for teaching, research and patient-care. As provided in the Act, AIIMS conducts teaching programs in medical and para-medical courses both at undergraduate and postgraduate levels and awards its own degrees. Teaching and research are conducted in 70 disciplines. In the field of medical research AIIMS is the lead, having more than 2000 research publications by its faculty and researchers in a year. AIIMS also runs a College of Nursing and trains students for B.Sc.(Hons.) Nursing post-certificate) degrees.

Twenty-five clinical departments including four super specialty centres manage practically all types of disease conditions with support from pre- and Para-clinical departments. However, burn cases, dog-bite cases and patients suffering from infectious diseases are not entertained in the AIIMS Hospital. AIIMS also manages a 60-beded hospital in the Comprehensive Rural Health Centre at Ballabgarh in Haryana and provides health cover to about 2.5 lakh population through the Centre for Community Medicine.

1.2 OBJECTIVES OF AIIMS

- To develop a pattern of teaching in undergraduate and postgraduate medical education in all its branches so as to demonstrate high standard of medical education to all medical colleges and other allied institutions in India.
- To bring together in one place educational facilities of the highest order for the training of the personnel in all important branches of the health activity.
- to attain self sufficiency in postgraduate in medical education

1.3 FUNCTIONS OF AIIMS

- Undergraduate and postgraduate teaching in medical and related physical biological sciences.
- Nursing and dental education

- Innovations in education.
- Producing medical teachers for the country.
- Research in medical and related sciences.
- Health care: preventive, promotive and curative; primary, secondary & tertiary.
- Community based teaching and research

As per Government Policy under Pradhan Mantri Swasthya Suraksha Yojana (PMSSY) , it is proposed to establish ALL INDIA INSTITUTE OF MEDICAL SCIENCES consisting of Medical College along with 960 bedded Super Specialty Hospital with residential accomodation As per Government Policy under Pradhan Mantri Swasthya Suraksha Yojana (PMSSY) , it is proposed to establish ALL INDIA INSTITUTE OF MEDICAL SCIENCES consisting of Medical College along with 960 bedded Super Specialty Hospital with residential accomodation in at Mouza- Basantpur, JL No.-90 &Mouza- Ghoragacha, JL No.-91, P.S- Chakdah, Dist-Nadia, West Bengal.

The design approach shall be sensitive to environmental issues. The main thrust shall be laid on environmental pollution, energy conservation, safety and use of maintenance and use of current technological development. The Design Philosophy is to ensure fulfillment of all functional requirements in accordance with Design Guidelines, Relevant Standards and Codes as well as local Bye laws.

The following design standards/guidelines with latest amendments shall be followed during detailed design of services. In case of any discrepancy, the stringent shall be followed:

- National Building Code of India – 2005.
- Relevant Codes of National Fire Codes 2008.
- Relevant Codes of Bureau of Indian Standards
- Energy Conservation Building Codes 2009
- Indian Electricity Rules 1956
- Environmental Guidelines.
- State Byelaws.
- IEC 60726/ IS: 2026 (Part 1, II and IV)/ IS 11171(Part III): Transformers (Cast Resin)
- IEC 60831/ IS 13340 & IS 13341: Capacitors
- IEC 60947/ IS 13947: Specification for low voltage switch gear & control gear
- BS 6651/ IS 2309: Lightning protection system
- BS 7430, IS 3043: Earthing & bonding
- BS 7671 requirements for electrical installation
- NEC – NFPA 70, National Electric Code.

1.4 PROJECT SURROUNDING

Nearest National Highway	NH-34 is about 2.5 Km towards Eastern direction
Nearest Railway Station	Kalyani Railway Station about 5.7 Km towards Western side
Nearest Airport	Netaji Shubash Chandra Bose International Airport is about 37 Km towards South West Direction
Nearest Town/ City	Town: Kalyani (5 Km) City: Krishnanagar (47 Km) District Head Quarter – Krishnanagar (47 Km)
River Body	Hoogly river is about 12 Km towards Western side.
Hills/ Valleys	Nil
Site Topography	Plain
Archaeologically Important Site	Nil
National Parks/ Wildlife Sanctuaries	Nil
Reserved/ Protected Forests	Nil
Seismicity	The proposed project is located in Seismic Zone III as per IS: 1893 and all designs will be as per IS Codes.

CHAPTER 2: PROJECT DESCRIPTION

2.1 PROJECT DETAILS

ALL INDIA INSTITUTE OF MEDICAL SCIENCES (AIIMS) is proposed to construct a Medical college and 960 bedded Super Specialty Hospital with residential accomodation in at Mouza- Basantpur, JL No.-90 &Mouza- Ghoragacha, JL No.-91, P.S- Chakdah, Dist-Nadia, West Bengal. The total land area requirement of the proposed Super specialty hospitalhas been obtained from Government. The concerned authority approved the master plan of the proposed Super specialty hospital project. There will be no major change in the topography of the area since existing land is barren land.Therefore no changes in land use/landcover/topography.

The total land area is 179.82 acres and it owned by AllIndia Institute of Medical Sciences (AIIMS). The total ground coverage will be 57650.21 sq.m which is about 7.92% of the total area. Total built up area will be 222786.81 sq.m and this land is sufficient for construction of Medical College with 960 bedded hospital, with U.G & P.G Hostels (Male, Female & Married), Nursing Hostels (Male & Female), Staff Housing, Guest house, Directors Bunglow, Amenities block in Phase I & Phase II.

The proposed Super Specialty Hospital comprising of Medical college, U.G & P.G Hostels (Male, Female & Married), NursingHostels (Male & Female), Staff Housing,Guest house, Directors Bunglow, Amenities block in PHASE –I.

In PHASE –II comprises of Hospital block, Ayush block, Logistics, Admin & Library block, Nursing labs & Offices, Medical college labs & offices, Skill training centre, Student common area, Research Block, Animal house, auditorium, staff housing, Dharamshala block, guest house expansion, community hall/shopping centre, student activity, utility block.

Salient Features of proposed Super Specialty Hospital

Latitude	22°58'9.52"N
Longitude	88°31'26.81"E
Total Land Area	179.82 Acres
Total Built up area	222786.81 sq.m
Total Ground coverage	57650.21 Sqm
Permissible FAR	2.5
FAR available	0.305
Height of building	Maximum Height of Building- 42.6m
Total No. of Floors (proposed)	Phase I OPD Block: B+G+5 Hostel : G+13

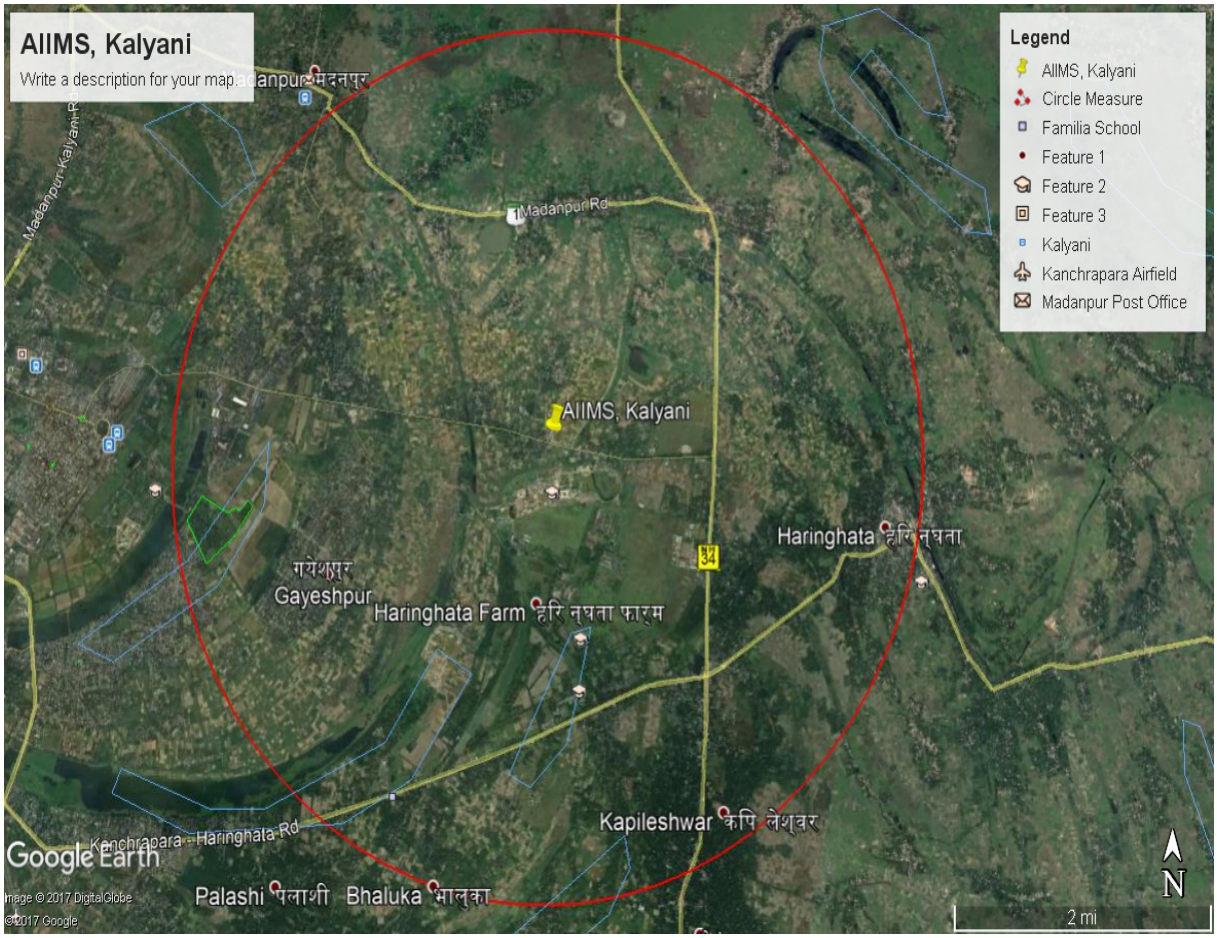
	Phase II Hospital Block: G+5 Medical College Labs Block: G+6 Nursing College: G+4
Parking area	Total parking area proposed to be 68981 sq.m for about 2999 vehicles.
Power consumption	14 MVA from power supply by WBSEDCL
Water Consumption	4185 m3/day (Domestic – 2560 m3/day, HVAC – 1625 m3/day)
Backup power	DG sets will be installed of 5 no.s of 2 MVA and 1 no. of 1MVA Total capacity will be 11MVA Proper acoustic control DG sets will be installed as per the guidelines of WBPCB and necessary NOC will be taken before installation of DG sets.
Connectivity	The proposed AIIMS IS adjacent to NH 34 connector and about 5 Km from Kalyani Railway Station and 6 Km from Kalyani town.

Main features of the facility:

1	Foundation	Earth Quake resistant foundation and RCC column and beams
2	Structural &walls	RCC framed, PT Slab structure and class I brick walls
3	Internal finish	Plaster of paris finish over brick wall inside the flats, suitable paint finishes in common areas.
4	External finish	Combination of Structural Cladding and anti fungal paint finish (Weather coat)
5	Windows	Powder coated Aluminium framed glass windows with glazing MS grills as applicable
6	Flooring	Granit, Marble and Vitrified Tiles
7	Fittings & fixtures	C.P fittings for water supply & Vitreous Chinaware fittings for sanitary ware
8	Electricals	Concealed insulated copper wiring with ISI mark modular switches AC points in bedrooms/dining rooms TV & Telephone points bedrooms/dining rooms

		Geyser/exhaust fan point in kitchen and bathroom Intercom/EPBX facilities
9	Staircase	Spacious staircase as per hospital norms with marble finish & MS railings
10	Lift & Stair lobby	Marble flooring & stone cladding on lift fascia
11	Water supply	Internal water supply through KMC supplied water for each block with reserve tank of suitable capacity
12	Electricity supply	The total power requirement will be about 10-15 MVA/day which will be provided by WBSEDCL
13	Facilities	Landscaping, blooming with flowers, plants, herbs and fruit plants Green belt around the periphery
14	Disposal of liquid waste	Underground sewerage line will be connected to the sewage treatment plant from each facility. Laundry wastewater will be collected and treated in separate system.
15	Solid Waste disposal	About 4 Ton/Day of municipal waste out of which 2.4 Ton will be biodegradable and the remaining non-biodegradable. These wastes shall be disposed off suitably as per the guidelines. Solid wastes generating from the construction activities such as bricks, stonechips, sand etc. will be used in the site & road construction. The construction waste will not contain any asbestos or hazardous materials. Sludge (100 kgs/day) generated from sewage treatment plant will be disposed locally as manure in the greenbelt.
16	Construction waste disposal (non hazardous)	To be disposed through Kalyani Municipality to the nearest dumping ground
17	Biomedical waste	It has been estimated that about 45 tons per month of Bio Medical Waste (BMW) is generated from the existing health care facility which is being disposed off to Medicare Environmental Management Pvt. Ltd. facility in line with the prescribed guidelines.
18	Hazardous wastes (as per Hazardous Waste Management Rules)	There will be no storage of hazardous waste within the complex except small amount of spent oil from D.G. Sets, which will be either disposed off to an authorized vendor.

Fig 1: Satellite Image of proposed AIIMS, Kalyani



2.2 PROJECT SCENARIO

The AIIMS is the pioneer of integrated healthcare delivery in India. This vision led the group to earmark time and resources to strengthen each vital cog in the process of ealthcare delivery. As a result of these efforts, the group today is in a unique position to exponentially increase its healthcare cover. This will be critical in order to meet future requirements.

In addition, the group's service offerings include healthcare at the patient's doorstep, clinical & diagnostic services, medical business process outsourcing, third party administration services and health insurance. To enhance performance and service to customers, the company also makes available the services to support business, telemedicine services, education, training programs & research services and a host of other non-profit projects.

Table 2.1: Total Land Details

Buildings		Floors	Total Ground Coverage area (Sq.m)	Total Floor Area (Sq.m)
Phase I				
Institutional Area				
1	OPD Block Phase I	B+G+5	7685.9	30701.15
Residential Area				
1	UG Hostel (Male)	G+12	417.00	4910.70
2	UG Hostel (Female)	G+5	417.00	2334.10
3	PG Hostel (Male)	G+13	575.30	7012.00
4	PG Hostel (Female)	G+11	351.50	3427.50
5	PG Hostel (Married)	G+13	570.80	6640.90
6	Nursing Hostel (Female)	G+12	569.90	6628.50
7	Nursing Hostel (Male)	G+12	346.00	3778.30
8	Amenities Block 1	G	684.20	684.20
9	Amenities Block 2	G	845.20	845.20
10	Staff Housing Type 2 (2 Blocks)	G+8	498.50	8736.80
11	Staff Housing Type 3	G+2	581.30	1686.54
12	Staff Housing Type 4	G+5	616.90	3196.70
13	Staff Housing Type 5	G+5	860.30	5047.01
14	Director's Bunglow	G+1	257.80	436.50
15	Guest House	G+1	2114.40	3067.77
Service Area				
1	STP 1	B	800.00	800.00
2	UGT 1	B	360.00	360.00
3	UGT 1	B	360.00	360.00
4	Electrical Substation 1 cum utility block	G	210.00	210.00
5	Electrical Substation 2	G	150.00	150.00
6	Electrical Substation 3	G	150.00	150.00
7	Electrical Substation 4	G	60.00	60.00
Total			**19482.00**	**91223.87**
Phase 2				
Institutional Area				
1	Hospital Block	G+5	22574.16	88548.08
2	Ayush Block	G+1	1932.16	3290.39
3	Admin	G+1	1461.04	2476.16
4	Library	G+2	971.04	2337.26

Buildings		Floors	Total Ground Coverage area (Sq.m)	Total Floor Area (Sq.m)
5	Medical College Labs Block	G+6	3208.48	15788.26
6	Medical College Offices	G+4	804.86	3858.86
7	Connecting Corridor	G	317.00	317.00
8	Nursing College	G+4	804.86	3846.78
9	Auditorium	G+4	2446.29	6398.14
Residential Area				
1	Dharamshala Block	G+1	1084.67	2138.36
Service Area				
1	ESS-1 Expansion	G	1866.93	1866.93
2	STP-2	G	696.72	696.72
Total			**38168.21**	**131562.94**
Grand Total (Phase 1 and Phase 2)			**57650.21**	**222786.81**

Parking Area:

Description	Area (Sq.m)
P1	12756
P2	11500
P3	11500
P4	17500
P5	4000
P6	5000
P7	4000
P8	2725
Total	**68981**
Total parking area proposed	**@23 sqm PER ecs**
Total ECS	**2999**

Total Area Statement:

Sl.No.	Description	Area (sq.m)
1	Total Plot area	727731
2	Plinth Area	57650.25
3	Parking area (Open)	68981
4	Open Area	601099.75
5	Total Built up area	222786.81

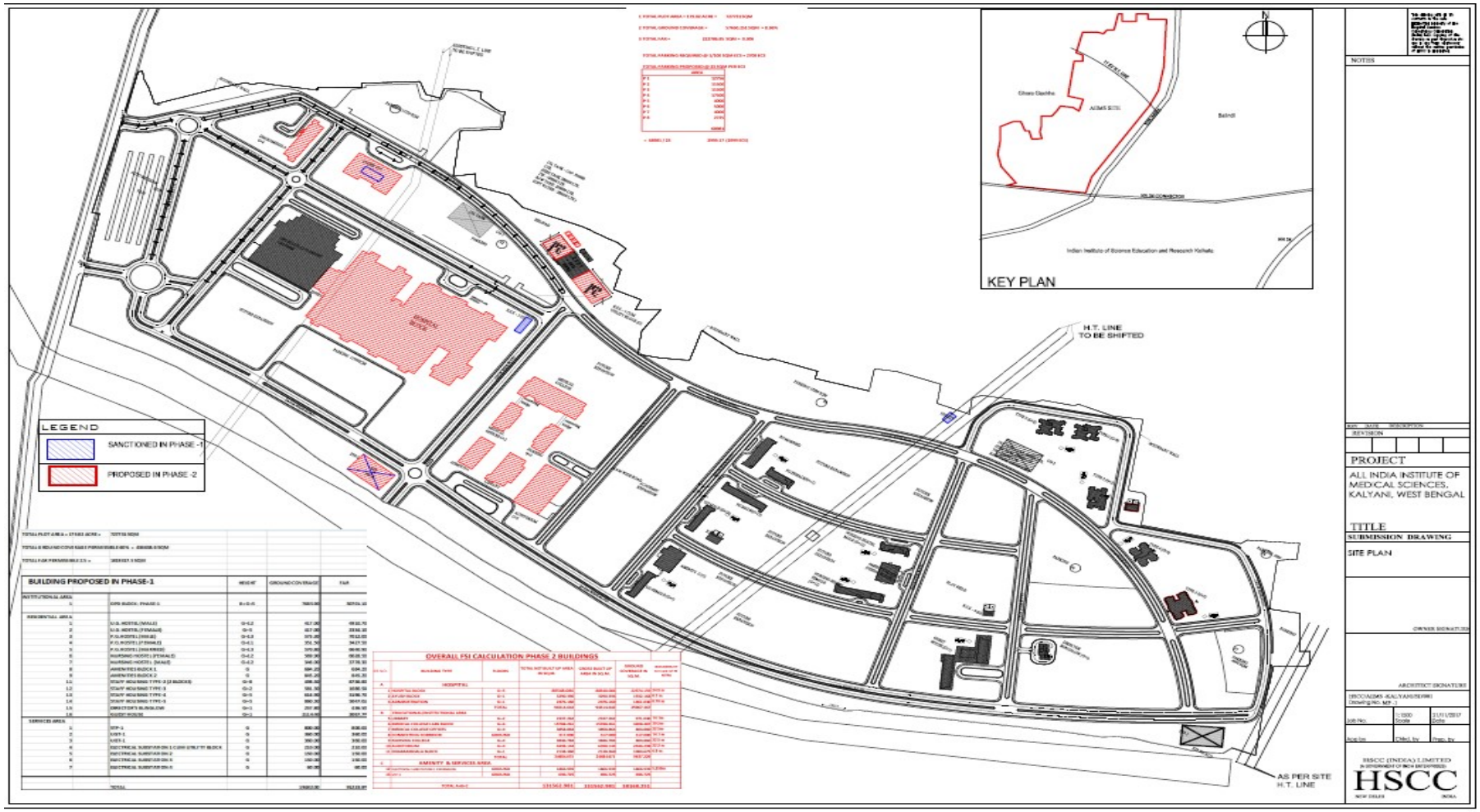


Fig 2.2: Master Plan of Proposed Hospital Complex

2.3 WATER AVAILABILITY

Water is required for the construction as well as during occupation stage as the same is an important resource. The source of water is by Municipal authorities and bore well.

S. No.	Description of Area		No. of Floors	No. of DU/ Block	No. of Blocks	Total DU	Population/Beds	Water demand	Total Water Demand (litres / day)
I	Residential-(A)-Phase-I								
	Residents								
1	Director bunglow (1 block)			1	1	1	9	200	1800
2	Type-II (2 blocks)		G+8	54	2	108	540	200	108000
3	Type-III (1block)		G+2	18	1	18	90	200	18000
4	Type-IV (1 block)		G+5	21	1	21	105	200	21000
5	Type-V (1 block)		G+5	24	1	24	120	200	24000
5	Type-VI (12 block)		G+1	1	12	12	60	200	12000
6	Guest House (14 rooms)		G+1		1	1	21	135	2835
7	Night Shelter		G+4				500	135	67500
II	Hostels-Phase-I								
8	PG Hostel-Boys (1 block)		G+13		1		312	135	42120
9	PG Hostel-Girls (1 block)		G+11		1		133	135	17955
10	PG Hostel-MR (1 blocks)		G+13		1		156	135	21060

S. No.	Description of Area		No. of Floors	No. of DU/ Block	No. of Blocks	Total DU	Population/Beds	Water demand	Total Water Demand (litres / day)
11	**UG Female (1 Block)**		G+5		1		118	135	15930
12	**UG Male 1 (1 Block)**		G+12		1		246	135	33210
13	**Nurses Male (1 block)**		G+12		1		144	135	19440
14	**Nurses Female (1 block)**		G+12		1		288	135	38880
Total									**443730**
	Add 15% for wastage								66559.5
I	**Total (A)**								**510289.5**
II	**Hospital (B)-Phase-I**								
1	Hospital		G+5				5405	45	243225
2	Ayush		G+1				146	45	6570
3	OPD		B+G+5				3071	45	138195
	Beds (Hospital & Ayush: 920 Beds +OPD: 40 Beds)						900	450	405000
4	Logistics		G+1				520	45	23400
	Total								**816390**
	Add 10% for wastage								81639
II	**Total (B)**								**898029**

S. No.	Description of Area		No. of Floors	No. of DU/ Block	No. of Blocks	Total DU	Population/Beds	Water demand	Total Water Demand (litres / day)
III	**Academic Block(C)-Phase-I**								
1	Admin		G+1				245	45	11025
2	Shared and Nursing		G+3				542	45	24390
3	Nursing Offices		G+3				303	45	13635
4	Medical college labs		G+3				542	45	24390
5	Medical college Offices		G+3				303	45	13635
6	Skills Training centre		G+1				152	45	6840
7	Students commons		G+1				273	45	12285
8	Research		G+1				182	45	8190
9	Animal House		G				39	45	1755
10	Auditorium		G+1				400	15	6000
	Total								**122145**
	Add 10% for wastage								12214.5
III	**Total (C)**								**134359.5**

S. No.	Description of Area		No. of Floors	No. of DU/ Block	No. of Blocks	Total DU	Population/Beds	Water demand	Total Water Demand (litres / day)
IV	**Amenity Buildings(D)-Phase-I**								
1	Fire station		G				34	45	1530
2	Market place Amenities		G				103	45	4635
3	Main Utility Block		G				209	45	9405
	Total								**15570**
	Add 10% for wastage								1557
IV	**Total (D)**								**17127**
V	**Green Area (Total plot area -727731-(172 acre), built up area Ph-I-222786.85 sqm.)**	120,000.00						5	**600,000.00**
Total water Demand (DOMESTIC USE)-I to V excluding green area		**GRAND TOTAL**							**1559805**

Abstract of Water Demand

S. No.	Description of Area	Total Water requirement(KLD)
	Phase-I	
I	**Residential-(A)**	**510**
II	**Hospital & OPD-(B)**	**898**
III	**Academic Block-(C)**	**134**
IV	**Amenity Building-(D)**	**17**
	Total -Phase-I- Domestic Water Demand	**1560**
	Total -Phase-I- HVAC(950- Hosp + 200 MC) KLD	**1150**
Total water demand -Phase-I(HVAC +Domestic)		**2710**
	Phase-II	
I	**Residential-(A)-** 100% of Phase-I Residential	**510**
II	**Hospital & OPD-(B)-** 50% of Phase-I Hospital & OPD	**449**
III	**Academic Block-(C)-** 25% of Phase-I Academic Block	**34**
IV	**Amenity Building-(D)-** 25% of Phase-I Amenity Building	**5**
	Total -Phase-II- Domestic Water Demand	**1000**
	Total -Phase-II- HVAC	**475**
Total water demand -Phase-II(HVAC +Domestic)		**1475**
Total water demand -Phase-I& II(HVAC +Domestic)		**4185**

2.4 POWER DEMAND

Approximately 14 MVA from power will be required and will be supplied by WBSEDCL.

CHAPTER 3: ENVIRONMENTAL MANAGEMENT PLAN

3.1 INTRODUCTION

The Environmental Management Plan (EMP) is a site specific plan developed to ensure that the project is implemented in an environmental sustainable manner where all contractors and subcontractors, including consultants, understand the potential environmental risks arising from the proposed project and take appropriate actions to properly manage that risk. EMP also ensures the project implementation is carried out in accordance with the design by taking appropriate mitigative actions to reduce adverse environmental impacts during its life cycle. The plan outlines existing and potential problems that may adversely impact the environment and recommends corrective measures where required. Also, the plan outlines roles and responsibility of the key personnel and contractors who are charged with the responsibility to manage the All India Institute of Medical Sciences (AIIMS), Kalyani.

The impact previously identified having some adverse effect on the different environmental attributes along with some beneficial impact of the project, both during construction and operation of the All India Institute of Medical Sciences (AIIMS), Kalyani. Proper mitigatory measures if implemented can reduce the negative impact during construction and operation. The environmental management plan is therefore prepared to minimise the adverse impact.

The EMP is generally:

- ✓ Prepared in accordance with rules and requirements of the MOEF and the West Bengal State Pollution Control Board (WBPCB);
- ✓ To ensure that the component of facility are operated in accordance with the design;
- ✓ Process that confirms proper operation through supervision and monitoring;
- ✓ System that addresses public inconvenience during construction and operation of the facility; and
- ✓ Plan that ensure remedial measures are implemented immediately.

The key benefits of the EMP are that it provides the organization with means of managing its environmental performance thereby allowing it to contribute to improved environmental quality. The other benefits include cost control as improved relations to the stakeholders.

Environmental management plan (EMP) during construction stages with possible mitigatory measures are presented below.

3.2 EMP DURING THE CONSTRUCTION AND OPERATION STAGES

3.2.1 AIR QUALITY MANAGEMENT

There are three potential sources of air pollution on construction sites. They are exhaust gases from vehicles and machinery and exhaust material from chippers. Ambient Air Quality indicates of overall state of environment of a particular area. It was ensured that all vehicles and machinery are fitted with appropriate emission control equipment, maintained frequently and serviced to the manufacturers' specifications. Smokes from internal combustion engines were not visible for more than ten seconds. Ambient air quality (AAQ) is an important criterion of a sound environment and its degradation causes various long-term impacts on the human health & wealth.

Adjacent areas of the site consist of Residential ares, Institutes etc. Therefore, Construction and decommissioning activities might generate emission of fugitive dust caused by a combination of on-site movement of construction materials. As there will be no excavation activities thus the fugitive dust emission will not cause problems within the existing hospital area and the surrounding. A secondary source of emissions might have included exhaust from diesel engines of construction equipments. Adequate mitigation measures were adopted to reduce and control air emissions from construction and decommissioning site.

- **Air Pollution Monitoring and Management**

Regular Monitoring of air pollution within the complex may be undertaken as per the advice of WBPCB and the report has to be submitting to the regulatory authority. Detailed management plan given in below section.

- **Mitigation measures of air pollution**

There is a chance of adverse impact on the air quality in respect to particulate matter and other gaseous pollutants in the local environment due to different construction activities as mentioned earlier can be minimised by taking the following mitigatory measures.

- ✓ The sources of dust generation are to be identified as mentioned earlier in the assessment of impact.
- ✓ Water sprinkler or simple spray of water can prevent the generation and propagation of dust in and around the construction site.
- ✓ Polythene sheets or similar covers can be used to cover the areas expected to generate more dust.
- ✓ The loading and unloading of construction material should be in a confined space with covering as far as practicable.

- ✓ The raw material storage area can be covered with proper covering material to avoid generation of windblown dust due to storage.
- ✓ The vehicles used for carrying the construction material must be covered and the movement of other vehicles should be restricted in numbers.
- ✓ All the vehicles should maintain a controlled speed inside the construction site so that no dust spread out.
- ✓ The vehicles moving inside the construction site must have the proper auto emission test certificate/PUC.
- ✓ The debris generated should not be dumped inside the premises and must be disposed off with the help of Kalyani Municipality.
- ✓ It is advisable to go for ready mixed concrete rather than concreting at site.
- ✓ The gas cutting and welding as generates gaseous pollutants; the use of the same is to be reduced as far as practicable.
- ✓ The emergency running of generator will generate pollutants and therefore the proper combustion of fuel must be checked.
- ✓ The generator set should be placed at a suitable place and the exhaust gases should be let out through a stack in such a way that it dispersed in the atmosphere properly.

The above precautionary measures during construction will reduce the adverse impact of the air quality of the local environment to a large extent.

The operation of the project is expected not to generate any air pollution if proper housekeeping maintained. Therefore the environmental management plans for the air environment during the occupancy of the building is not required. More over the green belt developed around the site will definitely reduce the existing air pollutants.

3.2.2 Noise Quality Management

Mitigation of noise is most effective, and potentially least expensive, when it is done at the source, before the noise escaped. During construction activities, noise and vibration may be caused by the operation of pile drivers, concrete mixers, cranes, vehicular movement and the transportation of equipment, materials and people within the project site. In the operational phase, the only probable major source of noise pollution is D.G Set. Apart from this noise can be generated from the vehicular movement in and around the project site and from the generators during operation. Appropriate mitigate measures will be adopted for noise minimization. The D.G Set will be provided with acoustics to reduce the noise generated.

- **Noise Quality Monitoring and Abatement**

Regular monitoring for the following environmental aspects as per the requirements of West Bengal State Pollution Control Board (WBPCB) will be carries out to ensure conformity to the specified standards. Detailed management plan given in below section.

- **Mitigation measures of noise pollution**

There is a chance of adverse impact on the noise environment in the local area due to different construction activities as mentioned earlier, can be minimised by taking the following mitigatory measures.

- ✓ The manual process must be adopted for demolition if any rather than any mechanical means, which will reduce the noise to a large extent.
- ✓ For piling the direct mud circulation (DMC) should be used instead of pile driver to reduce the noise.
- ✓ The vibrator and other noise producing equipment should be operated during the daytime only.
- ✓ The equipment if generates excessive noise due to any mechanical fault must be replaced.
- ✓ The generator set should have an acoustic enclosure and good quality silencer, or a noise-less generator is to be installed.
- ✓ The above precautionary measures during construction will reduce the adverse impact of the water quality of the local environment to a large extent.

As the project will be a Hospital complex, it is not expected to generate any type of noise during operation phase. The following measures will be taken for mitigation of noise generated from DG sets.

- **Description about room acoustic:**

1. Fabrication of sound proof room acoustic:

Fabrication of soundproof enclosure with glass wool of 2 inch thickness covered with perforated G.I. sheet. Fabrication of door with outer sheet insulated with glass wool of 4 inch thickness covered with perforated G.I. sheet and lock systems. Acoustical Treatment of Wall & Ceiling Surface: Providing and fixing G. I sheet on M. S framework, GI frame fixed to wall and ceiling with thick M S angle support.

2. Sound Reducing Door:

Sides of enclosure are provided with suitable size of airtight doors, which give enough access for operator to carry out day to day maintenance. The doors are provided with locking system. Providing and fixing 100mm thick sound reducing door comprising GI perforated sheets on MS framework. Doors to be hung with heavy special pressure closing hardware with handle. Exposed surfaces of door shall be painted a coat of primer.

3. Ventilation Air Inlet & Discharge:

Ventilation implies fresh Air supply for cooling and freshening. It also removes contaminants and heat. Proper care is taken for air requirement of DG sets so that the requisite air circulation for engine aspiration, heat rejection & additional dissipation of heat generated in enclosure by the engine is reduced by axial Flow Fan to the acceptable limits. Providing and fixing air inlet and discharge silencers intermix complete with louvers and GI weld mesh bird screen removal type for cleaning. For co- Axial Fans, a sound insulated silencer will be provided to control vibration/ noise of Co-Axial Fan.

4. Silencer and Exhaust System:

To reduce exhaust noise without creation back pressure an absorption type residential silencer have been provided if existing silencer not control the reactive noise standards. The silencer works on the principle of sound attenuation. The exhaust pipe & silencer are insulated to muffle sound & to prevent it from radiation heat.

3.2.3 WATER QUALITY MANAGEMENT

Water is the most important component for any society and is an important sustainable development indicator. In Kalyani, there is a growing demand on the existing water resources which mainly includes the Ground water sources, precipitation and Municipal supply. The increase in usage and water demand is due to rapid increase in population, urbanization and industrialization. There is also huge quantity of Water required in the process of building construction and during the Operation phase of the hospital. In Construction Phase water was used in mixing of construction materials, dust suppression and use of labours.

It is important that any sustainable hospital development project should integrate the sustainable and environment friendly water management plan at the design stage. Hence the management of water quality during the construction as well as operation period of the proposed complex is required. Construction activities might have included the generation of sanitary wastewater discharges in varying quantities depending on the number of workers involved. As there will be few numbers of residing labours at the project site, so small amount of wastewater will be generate from the construction activities. Most of the water was used for mixing the construction materials, curing & dust suppression.

However, domestic effluent that was generated from toilets will be channeled to existing sewage treatment plant for treatment. During the operational phase, the effluent will be treated in a proposed STP. Treated effluent will be used for landscaping and green belt development. Efforts should be made to use minimal water resources because conserving water also indirectly saves energy. Hence to have the maximum savings, optimal and economical use of water through water conservation should be given priority in this project.

- **Mitigation measures of water pollution**

There is a chance of adverse impact on the water quality in respect to contamination with particulate matter increases suspended solids in the surface water bodies and with the waste water contamination in the local environment due to different construction activities as mentioned earlier, can be minimised by taking the following mitigatory measures.

- ✓ The reduction of dust generation during the construction activities will automatically reduce the surface water contamination. The mitigatory measures mentioned in air quality management plan should be followed.
- ✓ Although the construction process will not generate significant quantity of wastewater but all efforts should be made to avoid the surface water contamination.
- ✓ Providing temporary embankments or diversion of the drains can prevent impacts due to runoff of wastewater generated during construction.
- ✓ The water logging or flooding in the project site must be prevented by proper drainage system.
- ✓ The wastewater generated due to temporary accommodation of the workers can be minimised by restricting the accommodation as far as practicable.
- ✓ The accommodation of the workers in the construction site can be provided only in the emergencies.
- ✓ The workers if accommodated must be instructed for use of toilets.
- ✓ Most importantly all precautionary measures to be taken for the waste water discharge so that it should not pose any problem in the municipal drainage system and local water quality.
- ✓ The above precautionary measures during construction will reduce the adverse impact of the water quality of the local environment to a large extent.

- ✓ During the running of the project there will be generation of domestic wastewater, which will be treated in STP Therefore the environmental management plans for the water environment during the occupancy of the building is not required but proper housekeeping and regular checking for waste water contamination into surface water body should be done.

A. Operational action plan for Storm Water Management:

- **Storm water collection system**

Rain water from roof top, paved and unpaved area will be collect by storm water drainage system. Landscaped areas where necessary will be drained through 150mm dia perforated pipes running 250mm below the surface at 1 in 200 slopes. Perimeter drainage channels will be provided where necessary. Concealed drain with Gully Pit will provide along the side of Road.

Best management practices

- ✓ Regular inspection and cleaning of storm drains.
- ✓ Clarifiers or oil/water separators shall be installed in all the parking areas.
- ✓ Oil/water separators installed for parking areas and garages will be sized according to peak flow guidelines. Both clarifiers and oil/water separators must be periodically pumped in order to keep discharges within limits.
- ✓ Cover waste storage areas.
- ✓ Avoid application of pesticides and herbicides before wet season
- ✓ Secondary containment and dykes in fuel/oil storage facilities
- ✓ Conducting routine inspections to ensure cleanliness
- ✓ Preparation of spill response plans, particularly for fuel and oil storage areas.
- ✓ Provision of slit traps in storm water drains
- ✓ Good housekeeping in the above areas.

Fig 3.1: Drainage Network Plan

- **Sanitary & Plumbing System**

According to Plumbing Fixture Unit, size of Soil, Waste & Vent pipe is fixed. Kitchen Waste is provided with a grease removal system. We have considered chemical resistant pipe for all waste, soil & vent piping serving lavatory fixtures & photographic developing equipment. Chemical drainage also considered to pass through an acid neutralising tank before connecting to the building sanitary drainage system. Also we have considered chemical resistant vent pipe independently through the roof.

As per Indian Plumbing Code we have considered Combined Stack System. So from the toilet, soil & waste will come out into the Common stack (Minimum 100 mm dia) & anti-syphonage pipe is not required as per above mentioned IS code. Soil & Waste stack from toilet are directly connected into the branch sewer through Inspection Chambers and finally connected into the Sewage Treatment Plant. Kitchen waste coming from food court will pass through Grease Trap. After separation of Oil & Grease from Grease Trap waste line connected in to nearest Manhole / Inspection Chambers.

Treated water from STP will use for flushing, gardening, road washing, etc. Excess water will store into the treated storage tank after tertiary treatment. From this storage tank water will use for gardening.

External Sewerage & Drainage, we will consider underground DWC HDPE pipe, Stiffness Value SN-4 N/sqmm as per IS: 15328 with rubber tight ring fit type socket & spigot joint. Chances of leakage are also negligible. As per CPHEEO Manual the minimum inner diameter of pipe is 150 mm will use.

Inside the building Soil & Waste water supply line by CCI (centrifugally Cast Iron) pipe as per confirming to IS :- 3989 or as per ASTM-A 74-04a Specification for Cast Iron Soil, waste & vent Pipe & Fittings with M- seal joint will use.

All vertical pipes will terminate as vent pipe at & above 1.8 meter from roof or as per requirement of Architect.

As discussed earlier, most of the storm water produced on site will be harvested for ground water recharge, thus proper management of this resource is must to ensure that it is free of contamination. Contamination of storm water is possible from the following sources:

- ✓ Oil spills and leaks in vehicle parking lots
- ✓ Silt from soil erosion in gardens

A detailed "Storm Water Management Plan" will be developed after considering the above sources. The plan incorporates best management practices which include the following:

- ✓ Regular inspection and cleaning of storm drains.
- ✓ Clarifiers or oil/water separators shall be installed in all the parking areas.

- ✓ Oil/water separators installed for parking areas and garages will be sized according to peak flow guidelines. Both clarifiers and oil/water separators must be periodically pumped in order to keep discharges within limits.
- ✓ Cover waste storage areas.
- ✓ Avoid application of pesticides and herbicides before wet season
- ✓ Secondary containment and dykes in fuel/oil storage facilities
- ✓ Conducting routine inspections to ensure cleanliness
- ✓ Preparation of spill response plans, particularly for fuel and oil storage areas.
- ✓ Provision of slit traps in storm water drains
- ✓ Good housekeeping in the above areas.

B. Sewage Treatment Plant (STP)

Sewage treatment is a process of removing contaminants from sewage water to produce liquid and solids suitable for discharge to the environment or for reuse. Sewage treatment includes physical, chemical and biological treatments to remove these contaminants. Its objective is to produce an environmentally safe fluid waste stream (or treated effluent) and a solid waste (or treated sludge) suitable for disposal or reuse (usually as farm fertilizer). The objective of sewage treatment is to produce a disposable effluent without causing harm to the surrounding environment, and prevent pollution.

The sewage treatment plant is based on Activated Sludge technology. The biological treatment system will consist of an aeration tank with Air Blower. The treatment scheme will consist of Screening, Equalization, Biological Treatment (Aeration), Clarification, Sludge Recirculation, Filtration and Disinfection. The treated water will be low in BOD, COD, TSS, O&G etc.

The major source of wastewater includes the grey water from kitchens, bathrooms and black water from toilets. The proposal for 160 m3/day sewage treatment plant has been designed based on the specified sewage characteristics provided by the client. The treated water from the plant shall be used mainly for toilet flushing and gardening purposes.

- **Technical Details of proposed Sewage Treatment Plant (STP)**

Concept of Activated Sludge Process:

Activated sludge technology is proven under a variety of operating conditions, and is highly flexible in operation. By the concept of Activated sludge technology the requirement of expensive land is reduced. Basically a conventional treatment requires large space, and large operating force but the Activated sludge technology based plants individually occupy much less space, making the plants more manageable.

Activated sludge process is a common method of aerobic wastewater treatment. The purpose of the process is to reduce amount of dissolved organic matter from wastewater, using microorganisms growing in aeration tanks. Microorganisms convert dissolved organic matter into their own biomass, oxidizing carbonaceous matter, oxidizing nitrogenous matter and removing phosphates. The system utilizes aeration tank of much smaller size, thereby reducing the overall power required in aerating the raw effluent. In Aeration tank moisture free Air is bubbled for the purpose of aeration.

The treated wastewater runs over the edges of clarifier. A part of the settled sludge is being returned into aeration tank, where is mixed with fresh primary treated wastewater and bio-oxidation process goes on. The treated wastewater from clarifier passes through the filters for removing colour and odour. Now this treated water can be permissible to reuse for flushing, landscaping and cleaning etc.

Process Description

Sewage treatment plant is design to treat 1500 M3/day waste water. Treatment plant proposed for the proposed campus is completely aerobic treatment. The treatment scheme consist Aerobic Treatment with the help of Air blower, then Clarifier and Tertiary Treatment in Multi Grade Filter & Activated carbon filter. In this process the sewage will be treated in three stages:

- ✓ Primary treatment
- ✓ Secondary treatment
- ✓ Tertiary treatment

Primary treatment:

In the primary treatment the raw sewage will pass through the bar screen chamber and oil and grease removal unit. In this section suspended matters, oil, grease, sand, grit and floating material etc will be removed from the sewage. Then the sewage is sent to a collection tank cum equalization tank by gravity. The sewage will be pumped from equalization tank to Aeration Tank for Aerobic Treatment.

Secondary treatment:

In the secondary treatment the sewage in Aeration tank is treated by aerobic process followed by clarifier. In Aeration tank biological degradation of organic load will take place with the help of aeration.

The bio-reactions are carried out in controlled environment in the Aeration tank. The bacterial activity needs dissolved oxygen, to synthesize the organic matter. This is supplied by passing air from the Air Blower in form of small bubbles. The air is passed at the bottom of the tank, so that complete volume of tank is utilized. Oxygen dissolves in liquid, which can now be used by the bacteria. A very large surface area is available for the

bacterial population to grow. Air supply is done through perforated pipes by the Air Blower.

Mixed liquor suspended solids (MLSS) will be maintained in Aeration tank in definite proportion by recycling the bio sludge trapped in the clarifier. Recycling the bio sludge will be carried out by non clog, centrifugal, semi open type impeller. The clear overflow from clarifier will go to the filter feed tank. The excess sludge from the clarifier shall be withdrawn by the Sludge Transfer Pump to sludge holding tank. The screw pump transfers the settled sludge to the Filter press for sludge dewatering. The Filter presses work in a batch manner. The plates are clamped together, and then screw pump starts feeding the slurry into the filter press to complete a filtering cycle and produce a batch of solid filtered material, called the filter cake.

Tertiary treatment:

In the tertiary treatment the clear water from filter feed tank will be filtered by pumping through the MGF (Multi Grade filter) and ACF (Activated Carbon Filter) for further polishing i.e. for removing colour and smell from the treated water. The treated sewage is then added with chlorine to kill the pathogens / E-Coli coliforms, so that it becomes fit for disposal in the lake / water ways. Chlorine being a very strong oxidising agent, a small dose of 3 – 4 mg /l is enough to achieve desired levels of disinfection. Small residual chlorine (of the order of 0.2 – 0.25 mg / L) also ensures that there is no re-growth of E-coli, till the final disposal point. The treated sewage, now substantially free from organic contamination, free from coli-form bacteria can be safely disposed off in the river, or in other water bodies. This water can also be re-used for gardening / toilet flushing or for other secondary applications.

Design Basis

- Nature of sewage : Domestic sewage
- Quantity of sewage : 1.5 MLD (1500 M3 / Day)
- Mode of disposal of treated water : Reuse for gardening/ cooling tower/-flushing etc.

Assumptions

- The STP plant is designed to operate at max. +/- 10% variation in raw wastewater parameters.
- No other parameters other than mentioned above is present in the raw wastewater which is beyond Pollution Control Norms and hazardous to micro – organisms.

Parameters	**Raw Incoming Sewage Characteristics**	**Treated Outgoing Sewage Characteristics as per PCB Norms.**
Flow	1500 Kld	1500 Kld

pH	6.5 – 8.5	7 to 8
COD	450-700 ppm	< 150 ppm
BOD (3 Days)	250 – 300 ppm	< 30 ppm
Oil & Rease	15- 25 ppm	< 10 ppm
TSS	300 – 500 ppm	< 100 ppm

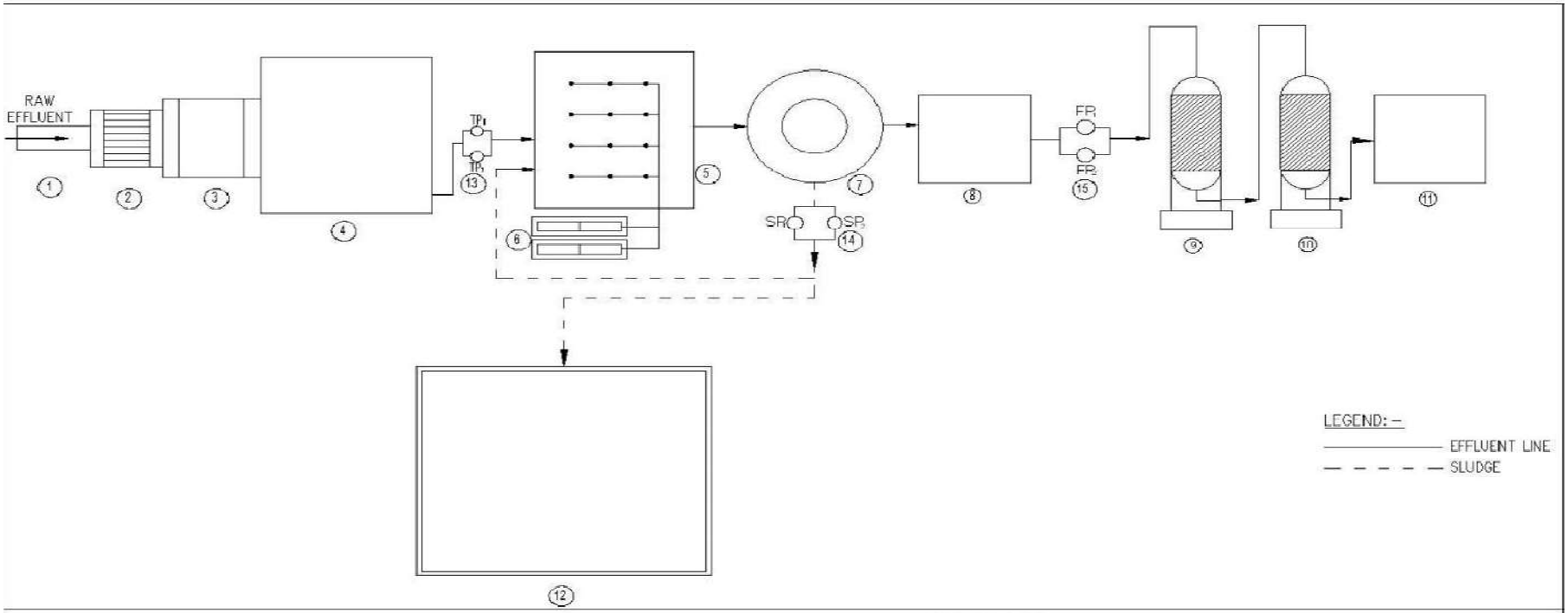
Treatment Philosophy

The treatment process will be designed strictly based on the Raw Sewage characteristics mentioned in the above Table.

Source of Wastewater

The Raw Sewage is generated from different blocks comprises of kitchen, domestic sewage, laundry etc streams will be brought to STP through sewerage network/ pipe/ drain.

The raw sewage is collected at source itself & routed to the Sewage Treatment Plant.



LEGEND: –

1. INLET CHANNEL.
2. SCREEN CHAMBER.
3. OIL & GREASE TRAP UNIT.
4. EQUILISATION TANK.
5. EXTENDED AERATION TANK.
6. AIR BLOWER.
7. SECONDARY CLARIFIER.
8. CHLORINATION TANK.
9. MULTI GRADE FILTER.
10. ACTIVATED CARBON FILTER
11. TREATED WATER COLLECTION TANK.
12. SLUDGE HOLDING TANK.
13. TRANSFER PUMP FOUNDATION –TP1, TP2
14. SLUDGE PUMP FOUNDATION –SP1, SP2.
15. FILTER FEED PUMP FOUNDATION –FP1, FP2.

Fig 3.2: STP Flow Diagramme

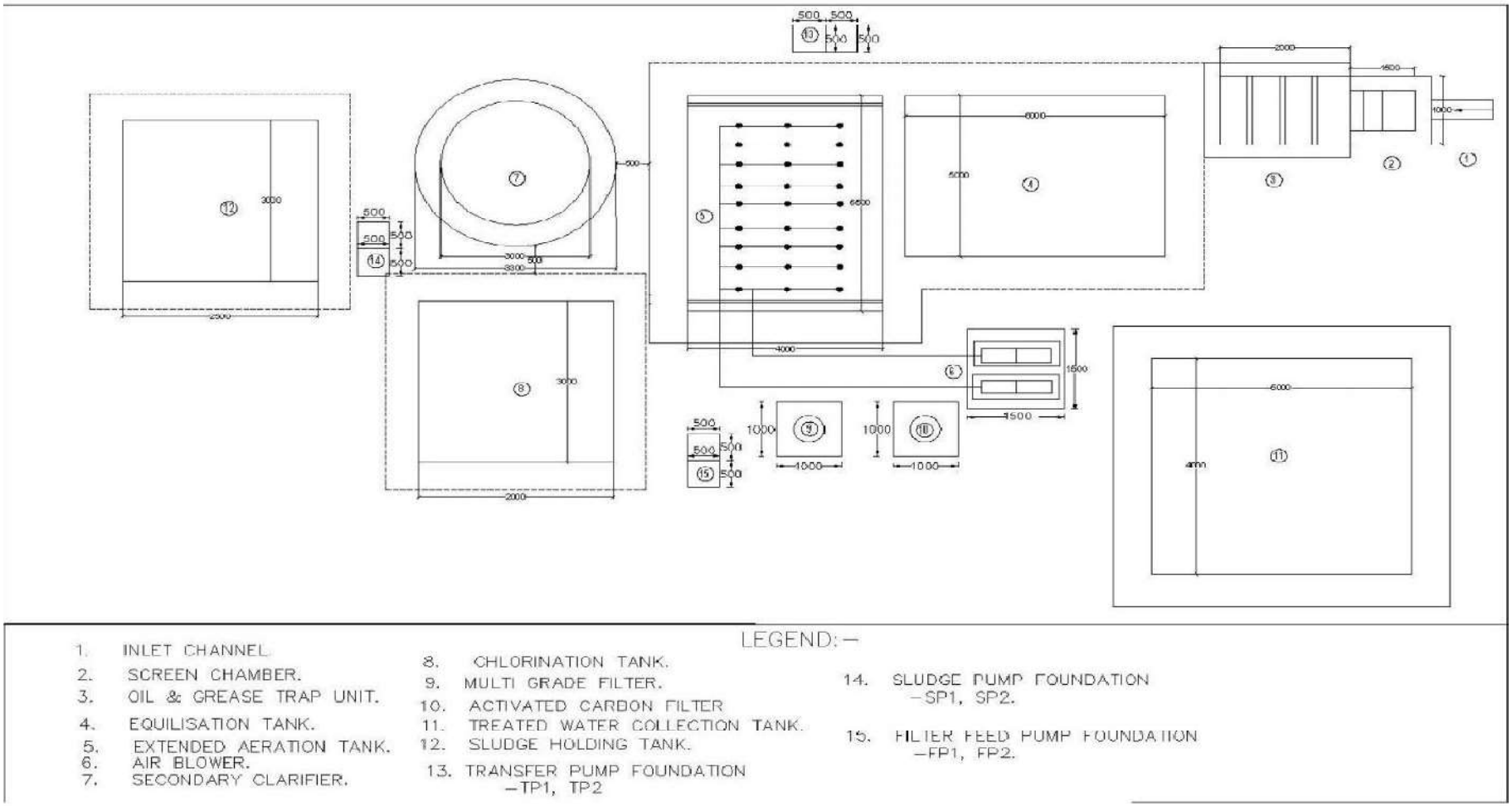


Fig 3.3: Layout of STP

Instrumentation

Sl.No.	Units	Quantity	Indication
1	LEVEL INDICATOR FOR EQUALIZATION TANK	1 No	HIGH & LOW LEVEL
2	LEVEL INDICATOR FOR DOSING TANKS	2 No.s	GLASS TUBE TYPE
3	AIR ROTAMETER	2 No.s	WEIGHT TYPE
4	V-NOTCH	1 No	PLATE TYPE
5	PRESSURE GUAGES FOR PUMP & AIR BLOWER	1 LOT	DIAL INDICATOR

C. Management of ground water hydrology

There is a chance of little impact on the ground water hydrology in the local environment due to different construction activities as mentioned earlier, can be minimised by taking the following mitigatory measures.

- ✓ The use of ground water should be limited during the construction stages. There must be more use of Kalyani Municipality supply.
- ✓ The load on the construction field should be such that it will not exert much pressure on the aquifer.
- ✓ All chances of ground water contamination must be restricted. There should not be any leaching of construction wastes into the ground water through soil.
- ✓ The project proponent will go for rainwater harvesting and proper use of the stored water if not during construction but definitely during operation stages. The recharging of ground water has also been considered.
- ✓ The above precautionary measures during construction will reduce the adverse impact of the water quality of the local environment to a large extent.
- ✓ During the operation stages there will be more requirement of water. Efforts should be made to avoid the misuse of ground water. The water collected in the tank from rainwater storage can be used along with the Kalyani Municipality supply.

D. Rainwater Harvesting

The storm water disposal system for the premises shall be self-sufficient to avoid any collection/stagnation and flooding of water. The amount of storm water run-off depends upon many factors such as intensity and duration of precipitation, characteristics of the

tributary area and the time required for such flow to reach the drains. The drains shall be located near the carriage way along either side of the roads. Taking the advantage of road camber, the rainfall run off from roads shall flow towards the drains. Storm water from various blocks shall be connected to adjacent drain by a pipe through catch basins.

Design specifications of the rain water harvesting plan are as follows:

- ✓ Catchments/roofs would be accessible for regular cleaning.
- ✓ The roof will have smooth, hard and dense surface which is less likely to be damaged allowing release of material into the water. Roof painting has been avoided since most paints contain toxic substances and may peel off.
- ✓ All gutter ends will be fitted with a wire mesh screen and a first flush device would be installed. Most of the debris carried by the water from the rooftop like leaves, plastic bags and paper pieces will get arrested by the mesh at the terrace outlet and to prevent contamination by ensuring that the runoff from the first 10-20 minutes of rainfall is flushed off.
- ✓ No sewage or wastewater would be admitted into the system.
- ✓ No wastewater from areas likely to have oil, grease, or other pollutants has been connected to the system.

3.2.4 Solid Waste Management

3.2.4.1 During Construction

Solid waste like excavated earth and used construction materials will be generated during Construction period. Excavated earth will be properly collected and stored within the project area. Excavated earth will be used for filling up the low-lying areas of the project site to the extent possible. During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete. Building materials will be stored on a platform within a covered area. Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.

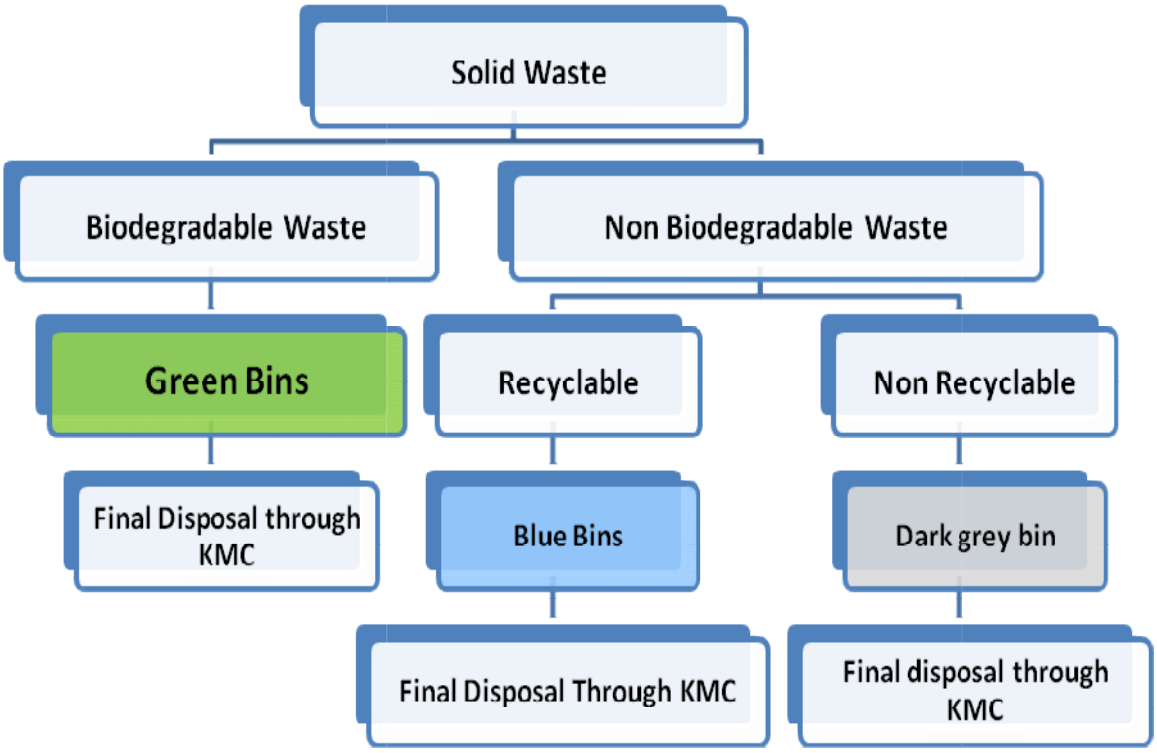
3.2.4.2 During Operation

The proposed AIIMS, Kalyani Hospital complex will generate solid waste in form of food waste from kitchen/ canteen and other general waste. The waste will be generated from the hospital area about 4 TPD of Municipal waste which will be disposed off suitably through Kalyani Municipality. The generated Municipal Solid Waste (MSW) will be collected by Kalyani Municipality and disposed to local municipal dumping site at nearest Dumping ground.

Sl.No	Building	Existing		
		No.of Occupants	Per capita solid waste genarated (kg/capita/day)	Solid waste generation (Kg/Day)
1	Hostel	2842	0.3	852.6
2	Hospital + Ayush+OPD	9142	0.3	2742.6
3	Academic Block	2981	0.1	298.1
4	Amenity Buildings	346	0.1	34.6
Total				**3927.9**

For better housekeeping, Solid waste handling and disposal, the House keeping group conduct close monitoring of housekeeping action to ensure that solid wastes are properly collected, stored and disposed. The Solid Waste generated from the Hospital will be collected and separated out as biodegradables and non-biodegradable. Biodegradable waste will be stored in green bins whereas non-biodegradable waste separated as Recyclable and Non-recyclable waste, which will be stored in designated bins. Finally the wastes from designated bins send to Kalyani Municipality for final disposal.

Fig 4: Solid Waste Disposal System



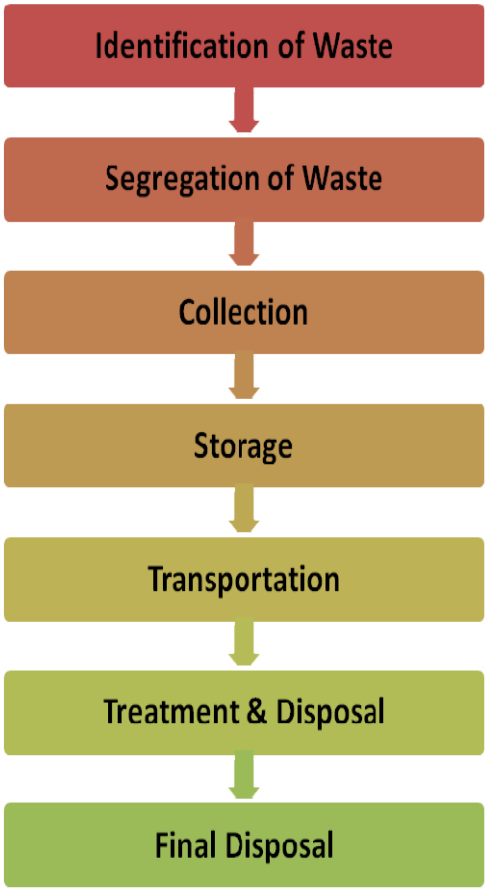
The collection and disposal method of generated solid waste is given below:

- ✓ No indiscriminate disposal of garbage should be allowed within the complex. A proper waste collection system is to be implemented.
- ✓ Waste will be segregated at source. To facilitate this, a multi-bin system will be provided for storing bio-degradable waste as food leftovers, vegetable and fruit peels, non-biodegradable waste such as metal scrap, rubber and recyclable wastes such as papers and plastics. These bins will be in different colours to facilitate the disposal.
- ✓ For each ward, floor to floor garbage collection system will be adopted.
- ✓ Waste from yard and garden should be collected into the small handcarts by the sweeper and transported to the common waste bin.
- ✓ Garbage collection procedure is to be conducted during the early morning hours in a day.
- ✓ Accumulation of garbage in the storage bin will be avoided for more than 24 hours and collected garbage will be disposed off daily through municipal garbage disposal system.
- ✓ Waste storage bin size will be adequate to accommodate at least two days solid waste.
- ✓ To avoid the dumping of garbage along the roads, parks, common areas, few number of solid waste storage bins have to be placed in strategic location.

3.2.5 Biomedical Waste Management

Biomedical waste is the most critical aspect of any hospital project. Biomedical Waste management plan has been prepared to minimize the adverse impacts on the human, land and water environment. Figure below highlights the flow-sheet for managing the bio-medical waste generated during the operational stage. Wastes that are deemed potentially infectious may be treated prior to disposal by a number of different technologies that either disinfect or sterilize them.

These technologies include steam sterilization (autoclaving), dry heat thermal treatment, chemical disinfection processes among others. In order for treatment systems to work properly, distinctive protocols for the classification and segregation of wastes must be in place. These methods, if properly adopted, may significantly cut down the infective and harmful properties of the bio-medical waste.



3.2.5.1 TRAINING AND AWARENESS PROGRAM

For successful implementation of biomedical waste management plan, training and awareness program is a vital step to sensitize the personnel regarding the various aspect of biomedical waste management.

Basic training in biomedical waste handling procedures will be provided to all the hospital personnel in service. The basic components of the training programme are as follows:

- ✓ The hazards associated with healthcare wastes.
- ✓ Methods of preventing transmission of Nosocomial infection related to waste handling methods.
- ✓ The various safety procedures for dealing with chemical, pharmaceutical and radioactive wastes and sharps.
- ✓ Proper waste segregation handling, transport, treatment and disposal methods.

3.2.5.2 TRAINING TOOLS

- ✓ On-site staff training: The staff will be updated with the latest happenings in the field of waste management as well as best practice for healthcare institutions. Reorientation programmes are planned for personnel at regular intervals.
- ✓ Development of training manuals, curriculum and videos: A Hospital Infection Control Committee plan, which is constituted for biomedical waste management shall prepare videos, manuals, curriculum, and training within the hospitals for the purpose of the training of the hospital staffs.
- ✓ Seminars, Forums & Conferences: Routine update on biomedical waste management will be organized for each level of staff to keep them aware of latest happenings in the field like the ways of reducing wastes, safe waste handling practices and alternative methods of treatment of waste.
- ✓ Use of proper personal protective gear like, gloves, during handling of biomedical waste.

3.2.6 RADIOACTIVE WASTE MANAGEMENT

Radio Active Waste management for hospitals is covered under Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987.

The hospital will manage the radioactive waste generated from the hospital as stated under the aforesaid rule and is given below:

Institutions such as hospitals and tracer research laboratories, handling small quantities of radioisotopes of short effective half life may, after obtaining the authorisation, under rule 3, undertake disposal of radioactive waste, in accordance with the following procedures:

1. Disposal of Radioactive Waste by release into Sanitary Sewerage system - An authorized person may discharge radioactive waste into a Sanitary sewerage system, provided:

   - ✓ the waste is readily soluble or dispersible in water;
   - ✓ the maximum quantity of radioactive material released in the sanitary sewerage system is less than the quantity prescribed in Table I of this Schedule and is not in excess of the quantity which, if diluted by the average daily quantity of sewerage

released into the sewerage system by the authorised institution, will result in an average monthly concentration equal to the limits.

- ✓ the gross quantity of radioactive material released into the sewerage system by the institution does not exceed 37 GBq per year;
- ✓ when more than one radionuclide is present in the liquid waste, the sum of the ratios of the individual quantities of each of the radioisotopes present and their respective maximum quantities allowed as per Table 1, does not exceed unity;
- ✓ periodic maintenance and monitoring of the path-ways of the liquid effluents, till the effluents reach the sewerage system, is done by the Radiological Safety Officer, to ensure that the appropriate disposal limits and operational limits are not exceeded in and outside the drainage system;
- ✓ a log book is maintained in Form III recording the identity and quantity of each radioisotope disposed, its time of disposal, the name of the person who has supervised the waste disposal and the data on radiation surveillance.

2. Disposal of Solid Radioactive Waste — An authorized person may dispose of solid radioactive waste by burial into pits prepared in an exclusive burial ground, provided:

- ✓ the burial ground is located in an isolated site owned by the said person;
- ✓ the site is duly fenced off to prevent unauthorized entry;
- ✓ the site is duly approved by the competent authority for burial of radioactive waste, the approval being governed by factors such as the nature of environment including topographical and geological characteristics of the burial site, usage of ground and surface waters in the general area around the site, with a view to minimise the assessed anticipated risk of accidental dispersal of the waste to potentially affected locations or back to the environment;
- ✓ the total activity in the wastes buried in any one pit of the burial ground does not exceed the limits.
- ✓ when more than one radionuclides is present in the solid waste, the sum of the ratios of the individual quantities of each of the radioisotopes present and their respective maximum quantities allowed, does not exceed unity;
- ✓ the depth of the burial pit is so chosen that the wastes have a top layer of compact earth of minimum 120 cm thickness when the pit head is closed;

- ✓ successive burial pits are separated by a distance of at least 180 cm;
- ✓ not more than 12 burials are made in any one year;
- ✓ a closed pit is not opened for reuse till 10 half lives, of the longest lived radioisotope buried in that pit, have elapsed;
- ✓ the burial area is treated as restricted area and subjected to periodic environmental surveillance by the Radiological Safety Officer to ensure that the appropriate disposal limits and operational limits are not exceeded;
- ✓ the material excavated from a closed pit is released for normal disposal, under the supervision of the Radiological Safety Officer before reusing the pit as laid down in (i);
- ✓ periodic monitoring of the burial ground and its environment is done by the Radiological Safety Officer to ensure that the operational limits on radioactive contamination are not exceeded;
- ✓ a log book is maintained in Form III recording identity and quantity of each radioisotope buried, description of waste, time of burial, name of the person who has supervised the burial operations and the data on radiation surveillance.

3. Incineration of Radioactive Waste — An authorised person may undertake incineration of radioactive wastes, including incineration of radioactive animal card cases, provided the competent authority is duly satisfied that —

- ✓ the design of the incinerator is suitable for the intended operations and provides for retention of solid and liquid combustion/scrubbing by products and for controlled discharge of liquid and gaseous effluents;
- ✓ the incineration operations will not result in air borne radioactive contamination in excess of the operational limits prescribed under Radiation Protection Rules, 1971, for unrestricted areas;
- ✓ the solid and liquid radioactive wastes arising from incineration operations will be duly collected and disposed off in accordance with these rules;
- ✓ adequate environmental surveillance, including air monitoring where necessary, will be provided to ensure that the operational limits are not exceeded;
- ✓ the incineration operations are undertaken under direct supervision of the radiological safety officer;

- ✓ up-to-date records are maintained, in Form III annexed to these rules, of the incineration operations indicating the names of radionuclides and their amounts finally disposed in gaseous, liquid and solid form, the details of such disposals, names of the persons involved in these operations and the date of radiation surveillance.

4. Records, etc. — Quarterly records, in respect of the disposal operations, shall be submitted to the competent authority in Form IV.
5. Other conditions — The authorised person shall abide by.

3.2.7 E-Waste Management

E-waste is one of the fastest growing waste streams around the world today, fuelled by the exponential growth of electronic equipments, especially personal computers and their rapid rate obsolescence. Electronic wastes like Television, Monitor, Key Board, Printer, Desktop, Laptop, Telephone, Mobile etc may be generated during the Operation Phase. These wastes contain both precious metals and toxic substances, which if handled properly can result in resource recovery. Various types of above mentioned electrical and electronic wastes generated in the building should be collected separately for transportation to the authorized recyclers approved by the state/Central pollution control boards.

3.2.8 Solid and Hazardous Waste Management

There is a chance of adverse impact on the local environment due to generation of different solid and hazardous wastes, which can be minimised by taking the following mitigatory measures during construction and operation.

- ✓ The daily waste (mostly bio degradable food/kitchen waste) generated from the workers camp if accommodated at site, must be disposed off at the municipal vat. But as there is hardly any chance of accommodation such type of waste will not be generated.
- ✓ The construction debris can be used for the road construction or can be disposed off in the municipal vat.
- ✓ The materials like paints, solvents, adhesives should be stored in sealed containers properly labeled.
- ✓ The above precautionary measures during construction will reduce any adverse impact due to solid and hazardous waste on the local environment to a large extent.

- **Mitigation measures of soil pollution**

There is a chance of adverse impact on the soil quality in the local environment due to different construction activities as mentioned earlier, can be minimised by taking the following mitigatory measures.

- ✓ The probable causes of adverse impact on the soil quality to be identified and eliminated at the source itself.
- ✓ Removing the grass and bushes only from the area where the construction will be made can eliminate the chances of erosion of the soil. There must not be such activity in the areas adjacent to it.
- ✓ No construction waste will be kept or stored on the soil surface. It should be stored in the specified dumpsite before disposal in municipal vat.
- ✓ The windblown construction material should not contaminate the soil in the locality. The mitigatory measures to be adopted for dust suppression for air quality management will automatically reduce the chances of soil contamination.
- ✓ Water logging inside the site should be avoided.
- ✓ The excavated soil should be used for earth filling within the site.
- ✓ The green belt should be developed in the hospital plot area.

3.2.9 Green Area and Landscaping

3.2.9.1 Green Area Development

Greenery means planting of special type of plants suitable to that particular agro-climate zone and soil characteristics in a place which will make the area cooler, reduce air pollution, prevent soil erosion and further improve the soil fertility status. A green area around the periphery of boundary and road side was created to avoid erosion of soil, prevention of landslides, minimize the air pollution and noise pollution in the project area. Plants with large leave size and foliage cover provide shade and help in cooling the atmosphere by the process of transpiration. The green plants are capable of absorbing air pollutants and forming sinks for pollutants. Leaves with their vast area in a tree crown, absorb pollutants on their surface, effectively reducing their concentration and noise level in the ambient.

According to the CPCB guide line there are 15 Agro climatic regions , each of these region is further divided in to 68 sub zones based on annual rain fall, Climatic condition and soil types. The species recommended for the Green area were quite adapted to such Climatic condition and grow well in the above soil types. For effective removal of pollutants, the plants were grown under following conditions.

- ✓ Adequate nutritional supply (for health and vigour of growth),
- ✓ Avoid water stress condition (to maintain openness of stomatal apertures and form of epidermal structures),
- ✓ Well-exposed to atmospheric conditions of light and breeze (away from engineering structures hindering free flow of air) to maintain free interaction with gases.

Development of green area not only minimizes these impacts but also improves the aesthetic environment of the region. Therefore, a "Green Area Development Plan" was proposed & implemented around the project area in general and along the project components in particular using the local flora.

Vehicular emissions were considered as ground level mobile sources of air pollution of both types gaseous as well as particulate, the sound release from the vehicular movement is also a source of noise pollution. To minimize the effects of air and noise pollution inside the area adequate green area or plantation around the campus and green area along roadside were developed. It will also helpful in controlling the wind velocity, which arrest the movement of sand and soil particles and reduce the soil erosion from the project site.

For green area development the plant species were selected as per the CPCB guidelines. Fast growing local species with better canopy cover and suitable to the above climatic conditions were selected, in vacant spaces some ornamental and grass vegetation was planted. This is also helpful in preventing soil erosion and improving the aesthetic quality of the Hospital area.

3.2.9.2 GUIDELINES & TECHNIQUES FOR GREEN AREA DEVELOPMENT

Extensive survey in the project area was undertaken to observe the structure and composition of vegetation. All these traits are difficult to fulfill in a single species. Hence a combination of plant was selected depending upon the topographical suitability and species selected as per CPCB Guideline. The soil characteristics were also kept in mind. Based on this survey and environmental conditions suitable native plants species was proposed & implemented for green area development plan. Plantation along roads must take into account visibility aspects on curves so as to ensure safe driving. The schematic arrangement of green area plantation of proposed area was presented in Figures. Plantation will be done in a three tier system consisting of large trees, smaller trees and shrubs. Some grasses and flowering plants will be grown on lawns and garden, keeping in mind to provide freshness to its staffs, patients and visitors.

- ✓ First layer consisting of shrubs and grasses.
- ✓ Second layer consisting of smaller trees.
- ✓ Larger trees planted on the outer ring of the three tier system.

3.2.9.3 DEVELOPMENT OF GREEN AREA

It was decided to retain the existing vegetation along the boundary. In addition more trees will be plant according to the landscape plan. Thus, the landscaping and plantation programme within the project site will improve the aesthetic quality of the project site as well as of the surrounding environment. The general consideration involved while proposing the green area plan are:

- ✓ Broad leaf trees growing above 10 m in height should be planted along the approach roads and project boundary.
- ✓ Plantation of trees should be undertaken in appropriate encircling rows.
- ✓ Generally local/indigenous fast growing trees, evergreen habit, large crown volume and shrubs should be planted.
- ✓ The trees should be protected by plantation of shrub species to avoid browsing by animals and human activities.
- ✓ Placement of Iron tree guards should be provided to save the plant saplings.

3.2.9.4 LANDSCAPE AND PLANTATION MANAGEMENT (DURING OPERATIONAL PHASE)

- ✓ Sufficient number of trees will be planted inside the campus. Mostly native with less water consuming species will be planted.
- ✓ Open spaces should be covered with grass.
- ✓ No bare open space should be allowed to left as it may lead to soil erosion.
- ✓ Proper care should be taken to maintain the trees and plants.

3.2.9.5 SPECIES SUITABLE FOR PLANTATION

Table 13: Tree species selected for green area

Sl.No.	Scientific Name	Standard Name	Time when flowering fruiting occurs
1	*Azadirachta indica*	Neem	June-July
2	*Mangifera indica*	Aam	April-July
3	*Cassia fistula*	Amaltas	March-June
4	*Syzygium cumini*	Jamun	June-July
5	*Albizia lebbeck*	Sirish	January-March
6	*Albizia procera*	Safed Sirish	January-March
7	*Leucaena leucocephala*	Subabul	February-May
8	*Bauhinia variegata*	Kanchan	May-June
9	*Erythrina indica*	Dadap	July-August

Sl.No.	Scientific Name	Standard Name	Time when flowering fruiting occurs
10	*Grevillea robusta*	Silver oak	February-April
11	*Butea monosperma*	Palash	February-April
12	*Ailanthus excels*	Maharuk	January-March
13	*Nyctanthes arbortristis*	Harsingar	Throughout the year
14	*Emblica officinalis*	Amla	January

- **Mitigation measures on ecological environment**

There is a chance of adverse impact on the terrestrial and aquatic ecology in the local area due to different construction activities as mentioned earlier, can be minimised by taking the following mitigatory measures.

- ✓ The dust generated during the construction stages when deposited on the leaves affects the photosynthesis; therefore the steps taken for the dust suppression will reduce the adverse impact on the terrestrial ecology.
- ✓ The wastewater management as stated earlier if properly done can reduce the chances of any adverse impact on the aquatic ecology.
- ✓ There should not be any removal of trees from the construction site in any cases. If any small tree obstructs the construction that can be taken out carefully and replanted in a suitable location.
- ✓ The proponent must start plantation at the beginning of the construction.
- ✓ The existing trees in and around the project site should be protected.
- ✓ The workers should be prohibited for cutting or uprooting of trees inside the project site for cooking or burning.

The above precautionary measures during construction will reduce the adverse impact on the local ecological environment to a large extent.

As the project is a Hospital complex it is not expected to generate any type of activities that will affect the ecology of the local area during operation phase. The green belt should be maintained properly during the operation stages. Therefore the environmental management plans for the ecological environment during the occupancy of the building is not required.

3.2.10 SOCIO-ECONOMIC ENVIRONMENT

3.2.10.1 MITIGATION MEASURES OF SOCIO-ECONOMIC ENVIRONMENT

Both the construction and operation phases of the project have a beneficial impact on the socio-economic environment either directly or indirectly. Therefore there is hardly any necessity for any management plan for the betterment of socio-economic condition.

3.2.10.2 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT

There is a chance of adverse effect on the workers at site during construction as some of the activities involve risk and occupational health hazard, which can be minimised by taking the following mitigatory measures during construction.

- ✓ The construction works generates respirable dusts, so in some cases the workers must use musk.
- ✓ If handling of hazardous chemicals required at any stages of construction the workers must use the hand gloves.
- ✓ The workers must be provided with earplugs and earmuffs for any job, which will generate excessive noise.
- ✓ As the workers will have to work at height, they must be trained and cautioned about the possible danger.
- ✓ While working at height the tools and other heavy materials can fall down causing accidents, so the adequate PPE like helmets, safety shoes must be made available to the workers.
- ✓ The workers must use safety goggles during gas cutting or welding.
- ✓ Proper training and awareness programme can be carried out so that the workers can understand the risk involved in any construction process and also the importance of use of personal protective equipments.
- ✓ The electrical equipments and fittings to be used must be having ISI mark to avoid short-circuiting.
- ✓ There must be adequate fire fighting arrangements during both construction and operation stages.

Sanitation and Healthcare at Workers Camps

The following measures will be taken to ensure health aspects of workers.

- ✓ The contractor shall install adequate lavatories and baths at the construction camp.
- ✓ The contractor shall treat the waste in package type treatment system at the worker colony and construction yard.
- ✓ All organic waste generated at construction yard and worker camp should be compost composted in trench
- ✓ Periodic health check-ups of construction workers should be organized
- ✓ Adequate provision of water supply should be made at workers
- ✓ The living space at workers camp should meet the norms of Indian Labour Law.

3.2.11 EMERGENCY MANAGEMENT PLAN

3.2.11.1 OBJECTIVE OF ON-SITE EMERGENCY PLANNING

Objectives of Emergency planning are to maximize the resource utilization and made combined efforts towards emergency operations, which includes:

- ✓ To localize the emergency and if possible eliminate it.
- ✓ To minimize the effect of accidents on people and property.
- ✓ To take remedial measures immediately and control it with minimum damage.
- ✓ To keep the required emergency equipment in stock at right places and ensure that they are in working condition.
- ✓ To keep the concerned personnel fully trained in the use of emergency equipment.
- ✓ To give immediate warning to the surrounding localities in case of an emergency situation arising.
- ✓ To mobilize transport and medical treatment of the injured.
- ✓ To arrange for rescue, treatment of casualties and communicate to relatives.
- ✓ To safe guard the people.
- ✓ To render necessary help to concerned.

3.2.11.2 HEALTH & SAFETY MEASURES FOR THE LABOURS

- ✓ Building and structures: No walls, galleries, staire ways, floor, platform, staging or structure whether of permanent or temporary character will be constructed in such manner as to cause risk or bodily injury.

- ✓ Service platforms: whenever practicable and demanded service platforms and gangways will be provided for overhead shafting, and when required by him this will be securely fence with guard rails and toe boards.
- ✓ Belts, etc: All belts will be regularly examined to ensure that the joints are safe and the belts are proper tension.
- ✓ Helmets: Helmets will be provided to the workers for safe guarding themselves against any head injuries.
- ✓ Machinery: No machineries are equipments will be situated, Operated or maintained in such a manner as to cause risk of bodily injury.
- ✓ Methods of work: No process of work will be carried out in such a manner as to cause risk of bodily injury.
- ✓ Electricity: No electricity installation will be provided during construction so as to be dangers to human body or safety.
- ✓ Medical Check-up: medical examination for every labourer will be done by certified surgeon at least once in 3 months.

3.2.11.3 Emergency Action Plans for Fire Hazards

3.2.11.3.1 Portable First Aid Fire Extinguishers

Portable First Aid Fire Extinguishers such as carbon-dioxide extinguishers, dry chemical powders, Mechanical foam and Fire buckets etc. shall be provided in all areas of the buildings. The type of portable fire extinguishers and their numbers shall be as per NBC. Service tags shall be provided and attached on all extinguishers installed.

3.2.11.3.2 Wet Riser and Hose Reel System

An arrangement of fire fighting within the building by means of vertical rising mains not less than 100mm nominal diameter with landing valves on each floor/landing for firefighting purposes and permanently charged with water from pressurized supply.

3.2.11.3.3 Automatic Sprinkler System

Automatic Sprinkler System for the stilt area shall be provided. Water supply to the sprinkler system shall be fed from the common header of the individual systems. This system shall be designed hydraulically to meet the flow and pressure requirements as per codes and standards. This system shall comprise of network of piping, valves, and sprinkler heads, flow switches, etc. The Sprinklers shall be of satin-chromed finish.

Sprinkler pipes shall be so installed that the system can be thoroughly drained. Four Way breaching inlet with check valves shall be provided and connected to each sprinkler riser to feed the risers of the sprinkler system. The mode of operation of the sprinkler system is as follows.

In the event of fire in any section of the area to be protected by the sprinkler system, the sprinklers in that particular section shall open initiating the flow of water and annunciating the flow of water through flow switch provided at each sprinkler tap off riser. During sprinkler system operation, a local alarm shall be raised by activation of flow switch. Stopping of the pumps shall be manual.

3.2.11.4 Fire Safety Plan

Fire escape route printed in signal red color shall be fixed near fire exit staircases, which shall show directions to the inmates for escape in case of fire. Fire order as per NBC shall be fixed near lift/lift lobby, which shall guide action to be taken in case of fire.

3.2.11.4.1 Yard Hydrant system

The yard hydrant shall be located at various places around the buildings. The water supply for yard hydrant shall be tapped off from wet riser system headers. Each single headed yard hydrant shall be provided with hoses, nozzles, and accessories. All Hydrant accessories shall be located in a Hose box adjacent to hydrant valve. Brick masonry valve chambers with cast iron covers shall be provided wherever required for isolating the system to enable maintenance if any without affecting the complete system.

The mode of operation of the hydrant system is as follows. In the event of fire, hydrant valves are opened manually and at the preset low pressure the main fire pump shall start automatically In case of failure of main pump, stand by fire pump shall come into operation automatically.

3.2.11.4.2 Automatic Fire Detection and Alarm system

Smoke detectors shall be provided as per IS 2189 in all the floors, electrical switch gear room, electrical riser/ducts, lift shaft, lift machine room, Heat/Smoke detectors shall be provided in pantry, DG room, kitchen and in all the floors of the building.

Manual call points shall be provided at all entrances and exits. Hooters shall be provided at all entrances and exits. Controller panel shall be located in the smoke free lobby, to indicate the location of fire. A central fire alarm panel shall be located at the Fire command demand centre at ground floor. This panel shall have the indication to identify the location of fire in the buildings.

3.2.11.4.3 Emergency Action plan for Cylinder Fire

- ✓ When filled container containing LPG is involved in fire, internal pressure if not relieved, will build up above 70 kg/sqcm and ultimately rupture the container.

- ✓ Rupture weak by direct flame impingement. Ruptured containers can be propelled at distance by jet action.
- ✓ If container's pressure is not raised upto 70 Kg/sqcm leakage from screwed valve joint can occur due to different expansion of steel and brass.
- ✓ Ignition of the escaping gas would aggravate the fire but release of fire reduces the possibility of rupture.
- ✓ No attempt should be made to extinguish the burning gas but the container under fire and other containers in vicinity should be kept cool by water spray.
- ✓ If the gas leakage does not ignite, the container should be approached from top and removed to the place of safety away from, the source of ignition.

3.2.11.4.4 EMERGENCY ACTION PLAN FOR ELECTRIC FIRE

- ✓ Disconnect the electric supply of the affected areas.
- ✓ Attempt to extinguish fire with the help of CO2, DCP
- ✓ If the fire is not extinguished, extinguish by spraying water with fog nozzle after ensuring complete isolation of electric circuit.

3.2.11.4.5 EMERGENCY ACTION PLAN FOR OIL FIRE

- ✓ Attempt to extinguish fire with the help of DCP.
- ✓ If the fire is not controlled, use water foam to blanket the fire and further action is to be taken.

3.2.11.4.6 EMERGENCY ACTION PLAN FOR MEDICAL AID

Emergency action plan for Electric Shock Casualties:

Electric shock results is irreversible damage to brain cell begins followed by deterioration of the organs.

- ***Rescue and first aid:***

- ✓ Do first aid quickly and without fuss and panic.
- ✓ Switch off the supply if this can be done at once.
- ✓ If not possible use a dry stick, dry cloth or other non-conductor to separate the victim from electrical contact.

- ✓ The rescuer must avoid receiving shock himself by wearing gloves or using a jacket to pull the victim. Always keep in mind that delay in rescue and recuscitation may be fatal.

3.2.12 NATURAL HAZARDS

3.2.12.1 EMERGENCY ACTION PLAN FOR EARTHQUAKES

Proposed project area comes under seismic zone –III. Considering the seismic zone adequate design will be adopted during constrction of AIIMS hospital complex.

- **Conduction Design:**

During construction of a building some simple precautions will be taken.

- ✓ Providing a Separation Section in between two buildings so that they have enough space to vibrate independently.
- ✓ Precautions to be taken while deciding the way electrical conduits are to be placed so as not to create planes of weaknesses in the slabs and walls.
- ✓ Precautions to be taken while doing sanitary works and plumbing so as not to puncture structural components and weaken walls by chasing.

- **Proposed project adopted some technology during construction of building is given below:**

Construction

A. Steel Frame Structures
B. R.C.C Frame Structures

A. Steel Frame Structures

Foundations: Here a suitable foundation is already designed and constructed taking into consideration the test reports of the soil conditions, various forces and loading coming on it from the building is calculated. On this rubber bearings are placed. These rubber bearings are designed to take the vertical load of the building above and the calculated horizontal displacements due to earthquake. Above this the frame of the superstructure rests thus isolating it from the base that is the foundation. Thus even though the building foundation may experience horizontal movements caused by say an earthquake having an intensity of 8 on the Richter scale the building above it would experience very low impact as if that caused by an earthquake of negligible intensity.

Frames: Frames of the superstructure are generally made of Steel Sections and is designed for the stresses acting on the structure with cross bracing and shear walls where required.

Slabs: The slabs used are again supported by steel sections and made of wooden sections; this system provides nominal flexibility and thus safety, since in an extreme condition a falling plank from the roof has less chances of giving a fatal injury than a falling concrete slab. All connections and joints are designed to withstand shear forces and where required flexible joints are provided so that there are minimum chances of slab failure. The safety of the human life during the worst scenario should always be of the highest consideration during the selection of structural components and the design of the building.

Walls: The walls are again made of wood, toughened glass with flexible anchorage systems or of any other material taking precaution that in case of extreme condition of breakage they have minimum chances causing the total failure of the structure system. The walls are also designed to be tough enough to protect you from the impacts of nature such as cyclones, storms and hurricanes.

B. R.C.C Structures

In the case of R.C.C. structures a major change in approach to design has to be undertaken.

The design should be done using a ductility approach under assumed magnitude 8 earthquakes, where force levels of up to 2.0 g are applied to the columns of the structure. Gal is the same as centimeters per second squared (cm/s2), and 980 gal equals 1 g (gravity force).

- **Action Plan:**

✓ When first tremors are sensed during an earthquake, all people should evacuate buildings and assemble at safe place/open place away from structures, walls and falling objects.

✓ Emergency services should be contacted for assistance.

✓ After the status is restored, people should inspect all the facilities for rescue, first aid and damage control activities, damage assessment, cleanup, restoration and recovery.

3.2.12.2 Emergency Action Plan for Flood due to excess rainfall

✓ All people should evacuate buildings and assemble at safe place on higher elevation.

✓ Emergency services should be contacted for assistance.

✓ Do not attempt to drive over a flooded road, as it might be washed out.

✓ While you are on the road, watch for possible flooding at bridges, dips and low areas.

- ✓ Watch for damaged roads, slides and fallen wires.
- ✓ Drive slowly in water; use low gears.
- ✓ If driving and vehicle stalls, abandon it immediately and seek higher ground.
- ✓ Do not attempt to cross a stream on foot where water is above your knees.
- ✓ After the status is restored, people should inspect all the facilities for rescue, first aid and damage control activities, damage assessment, cleanup, restoration and recovery.

3.2.12.3 Emergency Action Plan for Manmade threat

When bomb threat call is received the following measures are to be taken:

- ✓ Information of the message to be provided to the highest local police authority and seek their assistance for patrolling and security need.
- ✓ Request the Local Fire Bridge to position at least on fire tender at the location immediately.
- ✓ Keep the concerned department at the regional level informed with the development at regular intervals.
- ✓ Alert the local Govt. / private hospitals and seek their help for providing ambulances if necessary.

- **In the Location premises:**

- ✓ Keep the Fire hydrant System/all fire fighting and personal protective Equipment in readiness.
- ✓ Have through inspection of the location for any suspected dangerous object.
- ✓ Organize security cell for round the clock observation of the premises.

3.2.13 Parking Provisions and Traffic Management Plan

3.2.13.1 Parking Provisions

Traffic overcrowding is a serious problem in most Indian cities. For smooth flow of traffic and to avoid accidents during movement of vehicles, the road system has been designed in accordance with the NBC codes/regulations. Parking space has been provided at suitable locations proximity to activity stations. The requirement of parking area is provided as per NBC guidelines. A total area of 68981 sq.m is earmarked for 2999 parking vehicles, two wheelers and four wheelers.

3.2.13.2 Objective of Traffic Circulation Plan

- ✓ To provide a safe route for people to Enter and Exit.
- ✓ To identify any risks to the general public and local traffic from construction vehicles and to put control measures in place to protect all members of the public, drivers & site workers, from any injury involving traffic travelling to and from the site.
- ✓ To provide measures to control the speed of vehicular movement.
- ✓ To prevent parking within the local estates.
- ✓ Existing Emergency access routes will be maintained to permit emergency vehicles to attend the premises at all times.
- ✓ To outline procedures for dealing with emergencies and safe evacuation.
- ✓ To consider the safety of all road users including pedestrians and cyclists and particular attention to the safety of students, the elderly, cyclists and the disabled.

3.2.13.3 Traffic Calming

Traffic calming improves the transportation systems and helpful in smooth movement of vehicles inside the complex as well as minimize the traffic congestion and accidents. So for better movement and transportation traffic calming is essential. To minimize the traffic congestion and accidents inside the complex, security out post will be provided. Speed breakers will be provided for speed control inside the complex. This is also helpful in reducing the noise and air pollution and makes the system pedestrian and bicyclist friendly.

3.2.13.4 Traffic Management Plan

- ✓ The management of All India Institute of Medical Sciences (AIIMS), Kalyani of the proposed AIIMS Hospital complex will provide the car parking spaces for the doctors and other staffs of the hospitals.
- ✓ The management of All India Institute of Medical Sciences (AIIMS), Kalyani has decided to instruct all its visitors not to park any of their vehicles in the EM Bypass road rather than using the available parking spaces.
- ✓ The security of the entry/exit will be responsible for clearance of any traffic jam within the hospital area and EMERGENCY route.
- ✓ Any kind of car/vehicle maintenance work will be carried out at separate place rather than the available road within the hospital area or the parking place.

CHAPTER 4: ENVIRONMENTAL MONITORING PLAN

4.1 ENVIRONMENTAL MONITORING

The purpose of environmental monitoring is to evaluate the effectiveness of implementation of Environmental Management Plan (EMP) by periodically monitoring the important environmental parameters within the impact area, so that any adverse affects are detected and timely action can be taken. In consultation with the West Bengal Pollution Control Board (WBPCB), the project proponent will monitor ambient air quality, noise levels, groundwater quality, soil quality in accordance with an approved monitoring schedule. The monitoring protocol and location selection will have to done carefully. The monitoring sampling program should be discussed and approved by the WBPCB. A suggested monitoring protocol, based on the predicted impacts, is given in the following table.

Table 4.1: Suggested Monitoring Programme

Sl. No.	Type	Locations	Parameters	Period and Frequency
1	Ambient Air Quality	Project Site	Criteria Pollutants: SO2, NOx, PM10, PM2.5, CO	24-hr average samples every quarter during operation
2	Ambient Noise near the site	Project site main gate	dB(A) levels	Hourly Day and Night time Leq levels every quarter during operation phase.
3	Surface Water Quality	3 stations in project Site	-Physical and chemical Parameters. -Bacteriological parameters. -Heavy metals and toxic constituents.	Once a month. Once in a year Once in 3 months
4	Ground Water Quality and depth of Water Table	3 stations The ground water monitoring wells needs to be drilled	-Physical and chemical parameters, Total Organic matter concentration -Bacteriological parameters. -Heavy metals and toxic constituents.	Once a month. Once in a year Once in 3 months
5	Terrestrial Ecology		The health and the density of the vegetation, green belt and proper maintenance	Once a year

Sl. No.	Type	Locations	Parameters	Period and Frequency
6	Waste Characterization		Rejects Physical and Chemical composition	Annual

4.2 ESTIMATED COST OF EMP

Table 4.2: Estimated Cost for Environmental Management Plan

Sl.No.	Details	Capital Cost in Lakhs (Non-recurring)	Recurring Cost per annum (in lakhs)
1	Air Pollution Control	30	10
2	Waste Water Management	150	20
3	Solid Waste Management	30	15
4	Environmental Monitoring	-	10
5	Green Area Development	30	10
	Total	**240**	**65**

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