RISK ASSESSMENT PLAN DURING CONSTRUCTION & OPERATION

Risk is a potential that a chosen action or activity will lead to a loss of human or property.

Risk assessment is a step for Risk Management. Risk assessment is determination of qualitative and quantitative value of risk related a situation or hazard.

Hazard is a situation that poses a level of threat to life health or environment.

1. HAZARD IDENTIFICATION

There may be following types of hazards:

1.1 Natural hazard:

Earthquake

Flooding

1.2 Manmade hazard:

Health Injuries

Fire & explosion

Electrical

Mechanical

Radiation

Thermal

Chemical

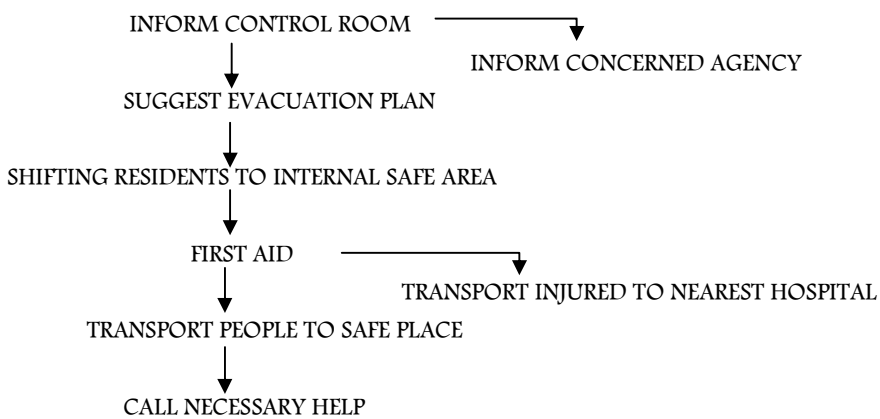
1. EVACUATION PLAN

Standard operating procedures will be formulated and maintained for all eventualities due to attack by armed intruders.

Evacuation plan includes the evacuation due to

- fire hazard in the colony
- Armed Intrusion
- Flood
- Earthquake

During any of the above mentioned hazards, the evacuation will be as follows:



Following mitigation measures shall be adopted during construction & operation phase for risk assessment:

During Construction Phase	During Operation Phase
• Safety mats would be provided at appropriate level and various shafts/ openings would be covered to prevent falls, slips, trips etc. • Necessary safety belts, helmets and eye-masks as required would be enforced at site • Adequate guardrails shall be provided to the staircases and common areas. • Adequate guardrails/ fences shall be provided around the water storage spaces to prevent drowning accidents. • Adequate protection/ fence would be provided around the excavated areas • The machinery and the equipments would be regularly tested and maintained with the specific emphasis against accidents failures • The deployed Safety officers would ensure that the personnel/ labour are kept at a safe distance from working machinery to avoid accidents/ injuries due to toxic gases/ chemical/ noise. • Moving parts of various parts of machineries/ equipments shall be properly guarded • Required fire extinguishers would be maintained at the construction site. • Arrangements for clean drinking water would be made. • Rest rooms and first aid facilities would be made available for the workers • Fire Protection system has been designed as per requirements of NFPA & National Building Code – 2005	• The project is located at Seismic Zone IV, structural designing will be done as per best structural engineering practices complying with all the applicable codes / standards. Also we have received the structural stability certificate. • Proper designing of drainage system for domestic as well as storm water shall be provided. • Rain water harvesting pits will have provision of storage for one hour peak rainfall. • Fire Protection system has been designed as per requirements of NFPA & National Building Code – 2005 • Proper Fire evacuation system shall be provided. • Safety parameters as indicated under Indian Electricity Rules 1956 and ECBC shall be complied. • Elevators shall be properly maintained with record book of maintenance. • Periodic replacement of critical components of elevator/ machines.

❖ **Energy Saving Practices**

- Energy efficient lamps will be provided within the complex.
- Constant monitoring of energy consumption and defining targets for energy conservation.
- Adjusting the settings and illumination levels to ensure minimum energy used for desired comfort levels.

❖ **Behavioral Change on Consumption**

- Promoting resident awareness on energy conservation
- Training staff on methods of energy conservation and to be vigilant to such opportunities.

CONSTRUCTION PROCESS

Design team

In the modern industrialized world, construction usually involves the translation of designs into reality. A formal design team may be assembled to plan the physical proceedings, and to integrate those proceedings with the other parts. The design usually consists of drawings and specifications, usually prepared by a design team including surveyors, civil engineers, cost engineers (or quantity surveyors), mechanical engineers, electrical engineers, structural engineers, fire protection engineers, planning consultants, architectural consultants, and archaeological consultants. The design team is most commonly employed by (i.e. in contract with) the property owner. Under this system, once the design is completed by the design team, a number of construction companies or construction management companies may then be asked to make a bid for the work, either based directly on the design, or on the basis of drawings and a bill of quantities provided by a quantity surveyor. Following evaluation of bids, the owner will typically award a contract to the most cost efficient bidder.

The modern trend in design is toward integration of previously separated specialties, especially among large firms. In the past, architects, interior designers, engineers, developers, construction managers, and general contractors were more likely to be entirely separate companies, even in the larger firms. Presently, a firm that is nominally an "architecture" or "construction management" firm may have experts from all related fields as employees, or to have an associated company that provides each necessary skill. Thus, each such firm may offer itself as "one-stop shopping" for a construction project, from beginning to end. This is designated as a "design Build" contract where the contractor is given a performance specification and must undertake the project from design to construction, while adhering to the performance specifications.

Several project structures can assist the owner in this integration, including design-build, partnering and construction management. In general, each of these project structures allows the owner to integrate the services of architects, interior designers, engineers and constructors throughout design and construction. In response, many companies are growing beyond traditional offerings of design or construction services alone and are placing more emphasis on establishing relationships with other necessary participants through the design-build process.

The increasing complexity of construction projects creates the need for design professionals trained in all phases of the project's life-cycle and develop an appreciation of the building as an advanced technological system requiring close integration of many sub-systems and their individual components, including sustainability. Building engineering is an emerging discipline that attempts to meet this new challenge.

Financial advisors

Construction projects can suffer from preventable financial problems. Underbids ask for too little money to complete the project. Cash flow problems exist when the present amount of funding cannot cover the current costs for labour and materials, and because they are a matter of having sufficient funds at a specific time, can arise even when the overall total is enough. Fraud is a problem in many fields, but is notoriously prevalent in the construction field. Financial planning for the project is intended to ensure that a solid plan with adequate safeguards and contingency plans are in place before the project is started and is required to ensure that the plan is properly executed over the life of the project.

Mortgage bankers, accountants, and cost engineers are likely participants in creating an overall plan for the financial management of the building construction project. The presence of the mortgage banker is highly likely, even in relatively small projects since the owner's equity in the property is the most obvious source of funding for a building project. Accountants act to study the expected monetary flow over the life of the project and to monitor the payouts throughout the process. Cost engineers and estimators apply expertise to relate the work and materials involved to a proper valuation. Cost overruns with government projects have occurred when the contractor was able to identify change orders or changes in the project resulting in large increases in cost, which are not subject to competition by other firm as they have already been eliminated from consideration after the initial bid.

Large projects can involve highly complex financial plans and often start with a conceptual estimate performed by a building estimator. As portions of a project are completed, they may be sold, supplanting one lender or owner for another, while the logistical requirements of having the right trades and materials available for each stage of the building construction project carries forward. In many English-speaking countries, but not the United States, projects typically use quantity surveyors.

Legal aspects

A construction project must fit into the legal framework governing the property. These include governmental regulations on the use of property, and obligations that are created in the process of construction.

The project must adhere to zoning and building code requirements. Constructing a project that fails to adhere to codes will not benefit the owner. Some legal requirements come from considerations, or the desire to prevent things that are indisputably bad – bridge collapses or explosions. Other legal requirements come from considerations, or things that are a matter of custom or expectation, such as isolating businesses to a business district and residences to a residential district. An attorney may seek changes or exemptions in the law governing the land where the building will be built, either by arguing that a rule is inapplicable (the bridge design will not collapse), or that the custom is no longer needed (acceptance of live-work spaces has grown in the community).

A construction project is a complex net of contracts and other legal obligations, each of which must be carefully considered. A contract is the exchange of a set of obligations between two or more parties, but it is not so simple a matter as trying to get the other side to agree to as much as possible in exchange for as little as possible. The time element in construction means that a delay costs money, and in cases of bottlenecks, the delay can be extremely expensive. Thus, the contracts must be designed to ensure that each side is capable of performing the obligations set out. Contracts that set out clear expectations and clear paths to accomplishing those expectations are far more likely to result in the project flowing smoothly, whereas poorly drafted contracts lead to confusion and collapse.

Legal advisors in the beginning of a construction project seek to identify ambiguities and other potential sources of trouble in the contract structure, and to present options for preventing problems. Throughout the process of the project, they work to avoid and resolve conflicts that arise. In each case, the lawyer facilitates an exchange of obligations that matches the reality of the project.

Interaction of expertise

Design, finance, and legal aspects overlap and interrelate. The design must be not only structurally sound and appropriate for the use and location, but must also be financially possible to build, and legal to use. The

financial structure must accommodate the need for building the design provided, and must pay amounts that are legally owed. The legal structure must integrate the design into the surrounding legal framework, and enforce the financial consequences of the construction process.

Procurement

Procurement describes the merging of activities undertaken by the client to obtain a building. There are many different methods of construction procurement; however the three most common types of procurement are:

1. Traditional (Design-bid-build)
2. Design and build
3. Management contracting

There is also a growing number of new forms of procurement that involve relationship contracting where the emphasis is on a co-operative relationship between the principal and contractor and other stakeholders within a construction project. New forms include partnering such as Public-Private Partnering (PPPs) aka private finance initiatives (PFIs) and alliances such as "pure" or "project" alliances and "impure" or "strategic" alliances. The focus on co-operation is to ameliorate the many problems that arise from the often highly competitive and adversarial practices within the construction industry.

Traditional

This is the most common method of construction procurement and is well established and recognized. In this arrangement, the architect or engineer acts as the project coordinator. His or her role is to design the works, prepare the specifications and produce construction drawings, administer the contract, tender the works, and manage the works from inception to completion. There are direct contractual links between the architect's client and the main contractor. Any subcontractor will have a direct contractual relationship with the main contractor.

Design and build

This approach has become more common in recent years and involves the client contracting a single entity to both provide a design and to build that design. In some cases, the Design and Build (D & B) package can also include finding the site, arranging funding and applying for all necessary statutory consents.

The owner produces a list of requirements for a project, giving an overall view of the project's goals. Several D&B contractors present different ideas about how to accomplish these goals. The owner selects the ideas he or she likes best and hires the appropriate contractor. Often, it is not just one contractor, but a consortium of several contractors working together. Once a contractor (or consortium/consortia) has been hired, they begin building the first phase of the project. As they build phase 1, they design phase 2. This is in contrast to a design-bid-build contract, where the project is completely designed by the owner, then bid on, then completed.

Management procurement systems

In this arrangement the client plays an active role in the procurement system by entering into separate contracts with the designer (architect or engineer), the construction manager, and individual trade contractors. The client takes on the contractual role, while the construction or project manager provides the

active role of managing the separate trade contracts, and ensuring that they all work smoothly and effectively together.

Management procurement systems are often used to speed up the procurement processes, allow the client greater flexibility in design variation throughout the contract, the ability to appoint individual work contractors, separate contractual responsibility on each individual throughout the contract, and to provide greater client control.

Authority having jurisdiction

In construction, the authority having jurisdiction (AHJ) is the governmental agency or sub-agency which regulates the construction process. In most cases, this is the municipality in which the building is located. However, construction performed for supra-municipal authorities are usually regulated directly by the owning authority, which becomes the AHJ.

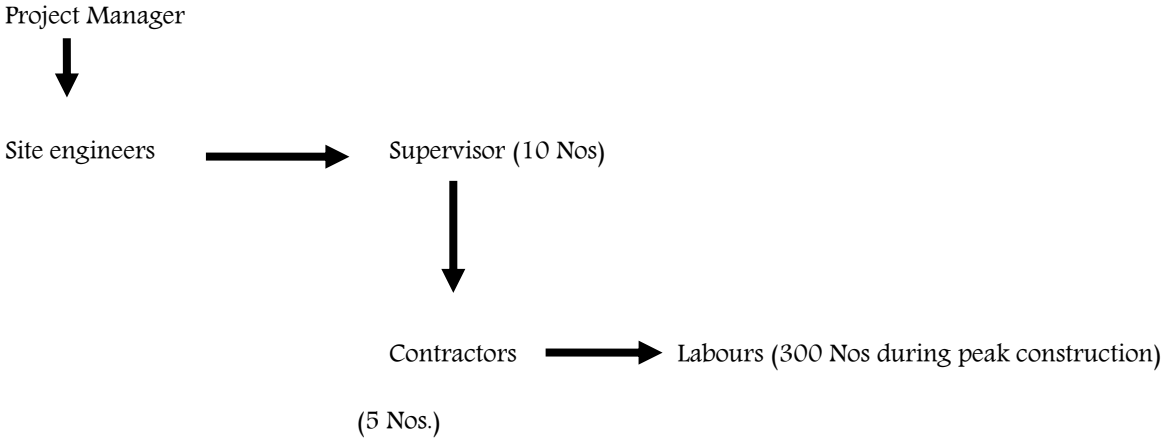
Before the foundation can be dug, contractors are typically required to verify and have existing utility lines marked, either by the utilities themselves or through a company specializing in such services. This lessens the likelihood of damage to the existing electrical, water, sewage, phone, and cable facilities, which could cause outages and potentially hazardous situations. During the construction of a building, the municipal building inspector inspects the building periodically to ensure that the construction adheres to the approved plans and the local building code. Once construction is complete and a final inspection has been passed, an occupancy permit may be issued.

An operating building must remain in compliance with the fire code. The fire code is enforced by the local fire department.

Changes made to a building that affect safety, including its use, expansion, structural integrity, and fire protection items, usually require approval of the AHJ for review concerning the building code.

List of Machinery & Main power required

Manpower – The peak work force requirement for the project will be about 500 nos. workers which will be hired locally. Temporary shelters at the site will be provided during the construction period. One project manager would be engaged with a team of skilled professional to look after the project.



List of Machinery used in Construction Phase

1. JCB
2. Tracks
3. Batching Plant
4. Concrete Bucket
5. Cement Silo
6. Builders Hoist
7. Wheel Barrow
8. Tower Crane

List of Equipment used in assessment of Air Pollution/Vibration/Noise on site

1. Respirable Dust Sampler
2. Noise Level Meter
3. Vibration Analyzer

CODES OF EARTHQUAKE

Following Codes and Standards specify for earthquake resistance building:

1. IS 1893:1984 Criteria for Earthquake Resistant Design of Structures
2. IS 1893(Part 1):2002 `Criteria for Earthquake Resistant Design of Structures: Part 1 General provisions and Buildings
3. IS 1893(Part 4):2005 `Criteria for Earthquake Resistant Design of Structures: Part 4 Industrial Structures Including Stack Like Structures
4. IS 4326:1993 Earthquake Resistant Design and Construction of Buildings - Code of Practice
5. IS 13827:1993 Improving Earthquake Resistance of Earthen Buildings – Guidelines
6. IS 13828:1993 Improving Earthquake Resistance of Low Strength Masonry Buildings – Guidelines
7. IS 13920:1993 Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces – Code of Practice
8. IS 13935:1993 Repair and Seismic Strengthening of Buildings – Guidelines
9. IS 6922:1973 Criteria for Safety and Design of Structures Subject to Underground Blasts
10. IS 4991:1968 Criteria for Blast Resistant Design of Structures for Explosions Above Ground
11. IS 4967:1968 Recommendations for Seismic Instrumentation for River Valley Projects

These standards endeavour to provide a guideline in designing and repairing of buildings under seismic forces**.**

LIST OF APPLICABLE INDIAN STANDARDS FOR ELECTRIFICATION WORK

S.No.	STANDARDS	TITLE
(1)	IS:732 - 1989	Code of practice for electrical wiring installations.
(2)	IS: 4648 - 1968	Guide for electrical layout in residential buildings.
(3)	IS:8061 - 1976	Code of practice for design, installation and maintenance of service lines upto and including 650V
(4)	IS: 8884 - 1978	Code of practice for installation of electric bells and call system.
(5)	IS: 5578 - 1985	Guide for marking of insulated conductor.
(6)	IS: 11353- 1985	Guide for uniform system of marking and identification of conductors and apparatus terminals.
(7)	IS: 5728 - 1970	Guide for short-circuit calculations.
(8)	IS: 7752(Part-1)-1975	Guide for improvement of power factor in consumer installation: Low and medium supply voltages.
(9)	IS: 3646(Part-1)-1966	Code of practice for interior illumination: Principles for good lighting and aspects of design.
(10)	IS: 3646(Part-2)-1966	Code of practice for interior illumination: Schedule of illumination and glare index.
(11)	IS: 2672 - 1966	Code of practice for library lighting.
(12)	IS:10118(Part-1)-1982	Code of practice for selection, installation and maintenance of switchgear and control gear : General.
(13)	IS: 10118(Part-2)-1982	Code of practice for selection, installation and maintenance of switchgear and control gear.
(14)	IS: 10118(Part-3)-1982	Code of practice for selection, installation and maintenance of switchgear and control gear: Installation.
(15)	IS: 10118(Part-4)-1982	Code of practice for selection, installation and maintenance of switchgear and control gear: Maintenance.

(16)	IS : 2309 - 1989	Code of practice for the protection and allied structures against lightning.
(17)	IS: 3043 - 1987	Code of practice for earthing.
(18)	IS: 5216(Part-1)-1982	Guide for safety procedures and practices in electrical work: General.
(19)	IS:4237 - 1983	General requirements for switchgear and control gear for voltages not exceeding 1000 V AC or 1200 V DC
(20)	IS: 6875(Part-1)-1973	Control switches (switching devices for control and auxiliary circuits including contractor relays) for voltages upto and including 1000 V AC and 1200 DC : General requirements and tests.
(21)	IS:4064(Part-1)-1978	Air break switches, air break dis-connectors, air-break switch disconnectors and fuse-combination units for voltages not exceeding 1000 V AC or 1200 DC : General requirements.
(22)	IS: 8828 - 1978	Miniature air break circuit breakers for voltages not exceeding 1000 volt.
(23)	IS:13032 - 1991	Miniature circuit breaker boards for voltages upto and including 1000 volts AC.
(24)	IS:12640 - 1988	Residua current operated circuit breakers.
(25)	IS:2959 - 1985	Contactors for voltages not exceeding 1000 V AC or 1200 V DC.
(26)	IS:8623(Part-1)-1977	Factory built assemblies of switchgear and control gear for voltages upto and including 1000 V AC and 1200 V DC: General requirements.
(27)	IS:8623(Part-2)-1980	Factory assemblies of switchgear and control gear for voltages upto and including 1000 V AC and 1200 V DC : Particular requirements for busbar trunking system (busways).
(28)	IS:694 - 1990	PVC Insulated cables for working voltages upto and including 1100 V.

(29)	IS:1554(Part-1)-1988	PVC insulated (heavy duty) electric cables :For working voltages upto and including 1100 V.
(30)	IS:3961 (Part-5)-1968	Recommended current ratings for cables: PVC insulated light duty cables.
(31)	IS:9537(Part-1)-1980	Conduits for electrical installations :General requirements.
(32)	IS:9537(Part-2)-1981	Conduits for electrical installations Rigid steel conduits.
(33)	IS:3480 - 1966	Flexible steel conduits for electrical wiring.
(34)	IS:2667 - 1988	Fittings for rigid steel conduits for electrical wiring.
(35)	IS:3837 - 1976	Accessories for rigid steel conduits for electrical wiring.
(36)	IS: 5133(Part-1)-1969	Boxes for enclosure of electrical accessories :Steel and cast iron boxes.
(37)	IS: 371 - 1979	Ceiling roses.
(38)	IS: 3854 - 1988	Switches for domestic and similar purposes.
(39)	IS: 4615 - 1968	Switch socket outlets (non-interlocking type).
(40)	IS: 4160 - 1967	Interlocking switch socket outlet.
(41)	IS:1293 - 1988	Plugs and socket outlets of rated voltage upto and including 250 volts and rated current upto and including 16 amperes.

ELECTRICAL SAFETY MEASURES

- Lightning Protection to be done as per the IS Codes applicable.
- Safety parameters as indicated under Indian Electricity Rules 1956 and ECBC shall be complied. The following safety measurement are considered
- Earth resistivity test shall be carried out in accordance with IS Code of Practice for earthing IS 3043
- Specifications in respect of conductor material, their installation & jointing and providing earth electrode shall be as stipulated in "EARTHING" sections of Technical Specifications of this tender document.
- The lightning protection system shall use either copper or GI as stipulated in Bill of quantities as conducting material throughout. Galvanizing shall conform class – IV of IS 4736 : 1986. Longest possible unbroken lengths of conductors shall be used to eliminate or at least minimize mid run jointing.
- No work shall be undertaken on live installations, or on installations which could be energized unless one another person is present to immediately isolate the electric supply in case of any accident and to render first aid, if necessary.

FIRE FIGHTING CODES & STANDARDS

TITLE	IMPORTANT INDIAN STANDARDS FOR FIRE FIGHTING WORK
IS 1239-1968 (Part-I)	Specifications for mild steel tube, tubular and other steel pipe fittings.
IS 1239-1968 (Part-II)	Specifications for mild steel tube, tubular and other steel pipe fittings.
IS 1536-1976	Specification for centrifugally Cast (Spun) Iron pressure pipes with flanges for water, gas and sewage.
IS 1538 (Part 1 to 23)	Specification for Cast Iron fittings for pressure pipes for water, gas and sewage.
IS 1726-1960	Code for cast iron manhole frame and cover.
IS 3589-1981	Specification for electrically welded steel pipes for water, gas and sewage.
IS 4736-1986	Galvanizing G.I. Pipes
IS 636-1988	Non percolating flexible fire fighting delivery hose (third revision)
IS 694-1990	PVC insulated cables for working voltages upto and including 1.100 volts (third revision)
IS 778-1984	Copper alloy gate, globe and check valves for water works purposes (fourth revision) (Amendment 2)
IS 780-1984	Sluice valves for water works purposes (50 to 300 mm) size (sixth revision) (amendment 3)
IS 884-1985	Specification for first-aid hose-reel for fire fighting (for fixed installations) (first revision) (with amendment No.1)
IS 900-1992	Code of practice for installation and maintenance of induction motors (second revision)
IS 901-1988	Specification for couplings, double male and double female, instantaneous pattern for fire fighting (third revision)
IS 902-1992	Suction hose coupling for fire fighting of purposes (third revision)
IS 903-1984	Specification of fire hose delivery couplings branch pipe, nozzles and nozzle

	spanner (third revision) (Amendment 5)
IS 937-1981	Specification for washers for water fittings for fire fighting purposes (revised) (with amendment No, 1)
IS 1520-1980	Horizontal centrifugal pumps for clear cold, fresh water (second revision)
IS 1536-1976	Horizontally cast iron pressure pipes for water, gas & sewage (first revision) (with Amendments No. 1 to 4)
IS 1554-1988 Part I	PVC insulated (heavy duty) electric cables (working voltage upto and including 1100 volts (third revision)
IS 1554-1988 Part II	PVC insulated (heavy duty) electric cables (working voltage from 3.3 KV upto and including 11 KV (second revision)
IS 1648-1961	Code of practice for fire safety of buildings (General) Fire fighting equipment and its maintenance (with amendment No.1)
IS 3624-1987	Pressure and vacuum gauges (Second revision)
IS 4736-1968	Hot-dip zinc coatings on steel tubes (with Amendment No.1)
IS 5290-1983	Specification for landing valves (second revision) (with Amendments No.6)
IS 5312- 1984 Part I	Swing check type reflux (non return) valves Part I-single door pattern (with amendments nos. 1 & 2)
IS 5312- 1986 Part II	Swing check type reflux (non return) valves Part II-Multi door pattern (with amendments nos. 1 & 2)
IS 7285	Seamless cylinders for storage of gas at high pressure.
IS 2189-1962	Code of practice for Automatic Fire alarm system
IS 2195-1962	Specification for heat sensitive fire detectors
IS 732-1973	Code of practice for electrical wiring installation
	UL 168 Underwriters Laboratory specification for smoke detector.

LIST OF APPLICABLE STANDARDS FOR FIRE ALARM SYSTEM

(1) IS:2189 – 1962	Code of Practice for Automatic Fire Alarm System.
(2) IS:2195 – 1962	Specifications for Heat sensitive Fire Detectors.
(3) IS:732 – 1973	Code of practice for Electrical Wiring installation
(4) UL 168	Under writers laboratory specifications for smoke detectors.

Fire Protection measures

Fire Protection System has been designed as per requirements of National Building Code 2005.

Fire protection system consists of following pumps for the Complex.

- Sprinkler pump
- Hydrant Pump

Apart for the above, following are also proposed:

a) Wet riser and hydrant system with accessories.

b) Underground fire tank

c) Overhead fire tank

c) Landing valve, Fire hose cabinets at each level, branch pipe , landing valve & fireman's axe.

d) Fire Extinguishers at every landing valve.

e) Hand Held fire extinguishers

f) Automatic Detection and Alarm System

g) Portable Fire Extinguishers.

HEALTH, SAFETY & OCCUPATION MEASURES

1. Measures shall be taken to identify the Electrical Environment Impacts (hazards) arising during the land preparation for use, building construction operation, and the entire cycle activities of the project and proper mitigation measures shall be adopted. All the standards, codes or legal requirements required to be adopted during the installation of electrical equipments,

2. All Fire and Explosion Hazards in the entire cycle activities of the project and all possible sources of fire hazards and fire mitigation measures shall be noted. All the standards, codes & legal requirements of line diagram for fire protection systems shall be fulfilled.

3. Environment Management Plan shall be prepared with Emergency Procedures (Emergency Plan) to deal with localized fire and electrical hazards and hazards due to natural calamities at the entire cycle of the activities of the project.

4. Provision of Health and Welfare Facilities has to be provided to the labour to be engaged in land preparation and building construction at the entire cycle activities of the project such as:
    a. Provision of drinking water from an approved source.
    b. Provision of latrines and urinals and accommodation as per the rules and their drainage and disposal treatment. Layout diagram of sewer system (drains, septic tanks, overhead water tanks and drainage gases ducting systems.
    c. Provision of medical and first aid treatment.
    d. Facilities for sitting, shelters, rest rooms and lunch rooms, crèches, canteen etc.
    e. Provision of Daily working hours, day shifts, night shifts.

5. Provision of mitigation measures regarding the Health and Safety has to be made to the workers employed or proposed to be employed in the entire cycle activities of the project (land preparation, construction & operation).

    a. Noise, vibrations, generated by lifting appliances, gears, earthmovers and transport.
    b. Fencing of moving parts of the transmission machinery.
    c. Restriction of lifting and excessive weight material.
    d. Framing of Health and Safety Policy, On Site Emergency Plan.
    e. Dangerous and harmful environment impact in the confined places (Excavation and underground work).
    f. Eyes and head protection.
    g. Dust, gases, fumes, corrosive substances, toxic gases and chemicals.
    h. Chemical safety date sheet of diesel solvent and paints.
    i. Vehicular traffic.
    j. Illumination of passages, ways, stairs, roads excavation and basement work.
    k. Means of communications, signals, warning, signboards and barricades at the construction site, demolition site, excavation and basement work.

6. Restrictions imposed and safe means adopted at height, demolition, excavation and basement work (Work on steep roof, installation of roofing brackets cads etc. crawling boards, ladders, and step ladders, scaffolds, catch platform hoarding, safety belts and nets).

MITIGATION MEASURES TO CONTROL THE GREEN HOUSE EFFECT, RADIATION EFFECT, OZONE DEPLETION EFFECT AND RADIATION EFFECT

Mitigation Measures to control the Green House Effect, Acid Rain Effects, Ozone depletion Effects & Radiation Effects are as follows:

Impacts	Mitigation Measures (During Construction)	Mitigation Measures (During Operation)
Green House Effect Acid Rain Effects Ozone depletion Effects Radiation Effects	Low sulphur diesel will be used for DG sets, fuel efficient machinery and equipments shall be used, efforts would be made to minimize metal cutting and welding at site by procuring finished items from factories, black top roads would be minimized and efforts would be made to use factory manufactured products for roads/ pavements. Efforts would be made to minimize the sewage conveyance time in the sewer lines. Landfill/ swamps/ wetland/ water ponds shall not be provided. The water bodies would be maintained and the water regularly cleaned/ re-circulated. Planned plantation, thereby specifically providing plantation which can contribute the carbon sink action would be done. Maintenance of vehicles engines and machineries. Proper protective measures shall be taken to avoid adverse human effects in the complex.	Plants in more number and big foliage of trees around the complex boundary as well at the pedestrian and driveway. Sulphur free diesel/petrol shall be used to run the vehicles to avoid air emissions as far as possible. Turn off computers, lights & other electronic equipments when not in use. To prevent acid rain, DG sets shall be provided scrubber to reduce air emissions, if necessary. PVC free products such as flooring, wall covering etc. shall be used to avoid Ozone depletion. Use of CFLs and other energy conservation measures shall be taken High energy efficiency equipments shall be used and max. use of renewable energy. CFC free/ low CFCs ACs and Fridge shall be used. Regular environmental monitoring shall be done of the site. Mobile Towers will not be allow to get installed at this complex to control radiation effects

NOISE & VIBRATION REDUCTION PLAN

INTRODUCTION

This plan has been developed to address construction noise and vibration control and mitigation measures to be implemented during site activities to manage noise and vibration issues associated with site workers, the surrounding community and infrastructure.

The following plan contains details on the management procedures to be used to control noise and vibration levels during site works.

NOISE

Earthmoving equipment has the potential to cause nuisance noise, especially if large numbers of machinery are used that are in poor operating condition (i.e. noisy mufflers). Therefore the earthmoving activities associated with the excavation of waste has the potential to create a social disturbance as a result of generating nuisance noise.

Noise will be generated from vibrating machinery, movement of trucks, operation of front end loaders and vehicle reversing alarms. During Operational Phase, Noise generated from DG sets are the major source of Noise pollution.

VIBRATION

Vibration can occur as a result of earthmoving machinery and vehicles, which if excessive can cause damage to nearby buildings and structures. During operational phase, the only major source of vibration is the working of DG sets. Due to the isolated nature of the site and absence of heritage structures, vibration is not considered to be an issue.

IMPACTS

Excessive noise and vibration levels can result in a serious nuisance and loss of amenity for site and surrounding occupants including surrounding residents, site workers etc.

Occupational health risks to site workforce including:

1) Noise induced hearing loss, tinnitus, etc;
2) Communication problems including safety instructions;

3) Stress.

RISK

Moderate

NOISE AND VIBRATION MANAGEMENT

Objective

To avoid and/or minimize adverse noise/vibration impacts associated with the operation of any plan, machinery or other equipment on site at all times through implementation of construction methodology and appropriate management measures.

- To minimize the occurrence of noise complaints associated with site works from nearby residents.

Noise & Vibration Reduction Management Plan

1. Following mitigation measures will be adopted to minimize the noise levels generated due to construction activities:
2. Adhering to the hours of normal operation and no work will be done on public holidays.
3. Remedial works to ensure no damage has occurred.
4. All plant equipment and vehicles being fitted with appropriate noise suppression equipment to reduce noise levels as far as are practicable.
5. The Remediation Contractor will need to demonstrate and have procedures in place to ensure that all equipment is operating in good condition.
6. A list of all proposed machinery is to be provided with the expected noise levels at the operator position and an estimate provided as to the noise hazard.
7. All site workers to be trained in noise reduction (such as proper use of machinery and the use of hearing protection) and informed of locations requiring the use of such equipment.
8. All outside workers must wear appropriate hearing protection if in close proximity to machinery for extended periods. Workers exposed to elevated noise levels above occupational limits to have hearing tests.
9. Warning signs should be set up in active work areas, prohibiting entry to persons without hearing protection.

10. Vehicles will not be left turned on or idling at the site for longer than minimum amount of time required completing site activities. In addition, machines/equipment used intermittently during construction activities (i.e. cranes, excavators, bobcats, lifting equipment, etc) will be shut down, as practicably achievable, in the period between works activities rather than allowed to idle.
11. During operational phase of the project, DG sets will be kept far away from residential units, in a different room with in-built acoustic enclosures in order to minimize the noise and vibration generated.
12. Low Sulphur Diesel will be used in DG sets which will increase the efficiency of the DG sets and also will lower down the maintenance cost resulting in increased life of the machinery.

    As a part of the management program, Noise level will be monitored from time to time to ensure that noise generated as a result of construction activities does not disturb local residents and that occupational health and safety guidelines are complied with.