

**Affordable Housing Project under Samajwadi Awas Yojna
Pocket – B, Sector 12-D, Awas Vikas,
Agra, U.P.**

RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

Affordable Group Housing Colony project encompasses the lives of a large number of people. It is thus important to take care of the safety of the occupants in case of an accident. It is thus considered necessary to carry out a risk assessment and disaster management plan for the project.

Risk Hazard & its control measures

It is attempted to plan and construct the buildings following all safety norms. However, it is not always possible to totally eliminate such eventualities and random failures of equipment or human errors. An essential part of major hazard control has therefore, to be concerned with mitigating the effects of such emergency and restoration of normalcy at the earliest. A detailed table showing activities during construction and operation phase along with mitigation measures are given in Table 1

Table 1: Activities during construction and operation along with mitigation measures

HAZARDS ASSOCIATED WITH ACTIVITIES (During Construction & Operation)	CONTROL/MITIGATION MEASURES
Manual Handling <ul style="list-style-type: none">- Strains and sprains due to incorrect lifting- too heavy loads- twisting - bending - repetitive movement - body vibration.	<ul style="list-style-type: none">- Exercise/warm up- get help when needed- control loads- rest breaks/no exhaustion- no rapid movement /twisting/ bending / repetitive movement- good housekeeping
Falls - Slips - Trips <ul style="list-style-type: none">- Falls on same level- falls to surfaces below- poor housekeeping- slippery surfaces- uneven surfaces	<ul style="list-style-type: none">- Good housekeeping- tidy workplace- guardrails, handholds, harnesses, hole cover, hoarding, no slippery floors/trip hazards- clear/ safe access to work areas

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<ul style="list-style-type: none"> - poor access to work areas climbing on and off plant - unloading materials into excavations wind - falling objects. 	<ul style="list-style-type: none"> - egress from work areas - dust/water controlled - PPE
<p>Fire</p> <ul style="list-style-type: none"> - Flammable liquids/Gases like LPG, Diesel Storage area and combustible building materials - poor housekeeping - grinding sparks - open flames, absence of Fire hydrant network. 	<ul style="list-style-type: none"> - Combustible/flammable materials properly stored/used - good housekeeping - fire extinguishers made available & fire hydrant network with reserve fire water (As per NFPA Code) - Emergency plan in case of fire or collapse of structure
<p>Absence of Personal Protective Equipment</p> <ul style="list-style-type: none"> - Lack of adequate footwear - head protection - hearing/eye protection - respiratory protection - gloves -goggles. 	<ul style="list-style-type: none"> - Head/face - footwear - hearing/eye - skin - respiratory protection provided - training - maintenance
<p>Defective or wrong Hand Tools</p> <ul style="list-style-type: none"> - Wrong tool - defective tool - struck by flying debris - caught in or on - missing guards 	<ul style="list-style-type: none"> - Right tool for the job - proper use of tools - good condition/ maintenance guards - isolation/ proper demarcation of work space - eye/face protection - flying debris controlled
<p>Electricity</p> <ul style="list-style-type: none"> - Electrocution - overhead/underground services - any leads damaged or poorly insulated - temporary repairs 	<ul style="list-style-type: none"> - Leads good condition and earthed - no temporary repairs - no exposed wires - good insulation

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<ul style="list-style-type: none"> -no testing and tagging - circuits overloaded - non use of protective devices. 	<ul style="list-style-type: none"> - no overloading - use of protective devices - testing and tagging - no overhead/ underground services
<p>Scaffolding</p> <ul style="list-style-type: none"> - Poor foundation - lack of ladder access insufficient planking - lack of guardrails and toe boards - insufficient ties or other means - all scaffolds incorrectly braced or stabilized to prevent overturning. 	<ul style="list-style-type: none"> - All scaffolds correctly braced and stabilized - 3:1 height to base ratio - firm foundation, plumb and level - ladder access provided and used - proper platform (3 planks/675 mm) - planks secured - guardrails and toe boards - 900mm to 1100mm high, within 200mm of working face, mid-rail
<p>Ladders</p> <ul style="list-style-type: none"> - Carrying loads - not secured against dislodgement - defective ladders - not sufficient length - wrong positions - incorrectly placed (angles, in access ways, vehicle movements. 	<ul style="list-style-type: none"> - secured against movement or footed - ladders in good condition - regularly inspected - extend 1m above platform - 4:1 angle - out of access ways, vehicle movements - not carrying loads - 3 points of contact - no higher than 3rd step down - use for access only, not working platforms
<p>Excavations</p> <ul style="list-style-type: none"> - Trench collapse - material falling in undetected underground services - falls - hazardous atmosphere struck by traffic and mobile plant. 	<ul style="list-style-type: none"> - soil stability known - no water accumulation - existing services known - material 600mm from edge - clear of suspended loads - hardhats/PPE - ladders

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	<ul style="list-style-type: none"> - public protection - atmospheric testing - traffic controls - Emergency plan
Gas Cutting and Welding	<ul style="list-style-type: none"> - Fire - welding flash, burns, fumes, electrocution in wet conditions - flashback in oxygen set, leaking cylinders, acetylene cylinders lying down - poorly maintained leads. <ul style="list-style-type: none"> - welding flash and burns controlled with PPE and shields - fumes controlled with ventilation and PPE (in good condition and properly positioned), Gas cylinders be kept upright & secured position (properly tied) - Combustible materials to be kept at secured place to avoid fire & Fire Extinguishers to be kept in fire prone area with training to people for its use
Noise	<ul style="list-style-type: none"> - Unknown noise levels - known noise levels over 85 decibels <ul style="list-style-type: none"> - Levels below 85 decibels - proper protection
Falling Material	<ul style="list-style-type: none"> - Fall during carrying/Lifting materials- dislodged tools and materials from overhead work areas. <ul style="list-style-type: none"> - Materials to be secured - kept away from edge - toe boards - Use of hard hats
Craneage & Lifts	<ul style="list-style-type: none"> - Display of carrying capacity i.e. load (No. Of person), incorrectly slung, defective lifting equipment, unsecured loads, craning in close proximity to building people and plant - falls - falling materials. <ul style="list-style-type: none"> - Periodic testing by competent authority - correctly slung/secured loads, lifting equipment good condition - use of proper hand signals - falls while unloading controlled
Visitors Presence at site	<ul style="list-style-type: none"> - Falls - struck by dropped materials - road accidents - insufficient hoarding or fencing <ul style="list-style-type: none"> - Sufficient hoarding - Fencing and barricades - Safe pedestrian access past site traffic management for loading and delivery

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- pedestrian access past site	- Construction separated from occupied areas of projects
- mechanical plant movement on and off site.	

7.1.1 Emergency Response Plan (ERP)

The overall objective of an Emergency Response Plan (ERP) is to make use of the combined resources at the site and outside services to achieve the following:

1. To localize the emergency and if possible eliminate it;
2. To minimize the effects of the accident on people and property;
3. Effect the rescue and medical treatment of casualties;
4. Safeguard other people;
5. Evacuate people to safe areas;
6. Informing and collaborating with statutory authorities;
7. Initially contain and ultimately bring the incident under control;
8. Preserve relevant records and equipment for the subsequent enquiry into the cause and circumstances of the emergency;
9. Investigating and taking steps to prevent reoccurrence

The ERP is therefore related to identification of sources from which hazards can arise and the maximum credible loss scenario that can take place in the concerned area. The plan takes into account the maximum credible loss scenario - actions that can successfully mitigate the effects of losses/ emergency need to be well planned so that they would require less effort and resources to control and terminate emergencies, should the same occur.

Main hazards identified for the project include hazards pertaining to fires in buildings and fire in diesel storage areas, earthquake and LPG leakage and an ERP pertaining to these is described in the following section.

RESPONSE IN CASE OF EARTHQUAKE

Response Procedures for Occupants

If indoors:

1. Take cover under a piece of heavy furniture or against an inside wall and hold on.

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2. Stay inside: The most dangerous thing to do during the shaking of an earthquake is to try to leave the building because objects can fall on you.

If outdoors:

Move into the open, away from buildings, streetlights, and utility wires. Once in the open, stay there until the shaking stops.

If in a moving vehicle:

Stop quickly and stay in the vehicle. Move to a clear area away from buildings, trees, overpasses, or utility wires. Once the shaking has stopped, proceed with caution. Avoid bridges or ramps that might have been damaged by the quake.

After the quake:

1. After the quake be prepared for aftershocks.
2. Although smaller than the main shock, aftershocks cause additional damage and may bring weakened structures down. Aftershocks can occur in the first hours, days, weeks, or even months after the quake.

Help injured or trapped persons:

1. Give first aid where appropriate. Do not move seriously injured persons unless they are in immediate danger of further injury. Call for help.
2. Remember to help those who may require special assistance--infants, the elderly, and people with disabilities.
3. Stay out of damaged buildings.
4. Use the telephone only for emergency calls.

Response Procedure for Emergency Team

1. Formulate an Emergency Response Team for earthquake response.

Using the public address system, inform residents of response procedures discussed above.

2. Inform the necessary authorities for aid.
3. Ensure no person is stuck beneath any debris, in case of a structural failure.
4. Ensure that all occupants standing outside near the buildings are taken to open areas.

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5. Ensure that the first aid ambulance and fire tender vehicles are summoned if necessary.
6. Inform the nearby hospitals if there are any injuries.
7. Check the utilities and storage tanks for any damage.

RESPONSE FOR LPG LEAKAGE

1. The affected area should be evacuated and cordoned off immediately
2. Initiate an Emergency Response Team for LPG leakage.
3. Shut down the main valves in the gas bank.
4. Ensure that only concerned personnel are present in the affected area and all other personnel and visitors are moved to the nearest assembly points.
5. Rescue trapped personnel, also check if any personnel are unconscious in the area and immediately move them outside and provide first aid. Ambulance should be summoned to take injured personnel to the nearest hospital.
6. Personnel in the nearby buildings to close all doors and windows to prevent entry of the leaked gas.
7. Source of leakage to be traced and isolated from all the other areas. And if required use pedestal fans to bring down the gas concentration.
8. In case of a fire follow the instructions in case of fire.

RESPONSE IN CASE OF FIRE

1. Required response during in the event of a fire should be described in signs located in the lobby.
2. On sighting a fire, it should be immediately informed to the environment manager giving the exact location and type of fire in detail.
3. Initiate the Emergency Response Team for fires.
4. If the fire is small, engage in extinguishing the fire using the nearest fire extinguisher.
5. Guide the Emergency Response Team staff to the emergency assembly point.
6. The Emergency Response Team should immediately inform the nearest dispensary and security force. If required a fire tender should be summoned.

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7. The response team should immediately move to the point of fire and take all necessary steps to stop the fire. If the fire is not controllable and spreads then the manager in charge should inform the district authorities and call for external help.
8. The Emergency Response Team will provide immediate relief to the injured residents at the scene of incident. Any injured persons should be evacuated on priority to the dispensary or one of the nearest hospitals based on their condition.

Instructions for occupants

1. Get out of buildings as quickly and as safely as possible.
2. Use the stairs to escape. When evacuating, stay low to the ground.
3. If possible, cover mouth with a cloth to avoid inhaling smoke and gases.
4. Close doors in each room after escaping to delay the spread of the fire.
5. If in a room with a closed door.
6. If smoke is pouring in around the bottom of the door or if it feels hot, keep the door closed.
7. Open a window to escape or for fresh air while awaiting rescue.
8. If there is no smoke at the bottom or top and the door is not hot, then open the door slowly.
9. If there is too much smoke or fire in the hall, slam the door shut.
10. Stay out of damaged buildings.
11. Check that all wiring and utilities are safe.

A state of the art fire fighting system is proposed for the project to prevent and control fire outbreaks. The fire fighting system will consist of portable fire extinguishers, hose reel, wet riser, yard hydrant, automatic sprinkler system, and manual fire alarm system. The group housing buildings will also be provided with automatic fire detection and alarm system.

RESOURCE CONSERVATION

The project will lead to utilization of various natural resources. As an environmentally responsible corporate, the developers endeavor to conserve these resources by judicious management and recycling and strive to build up these resources where possible.

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Water Resources: The project will use treated water from nearby STP during construction phase and HUDA supply during operation phase of the project. Given the national water scenario, where availability of fresh water is fast dwindling, judicious use of the same cannot be over emphasized. Following means are proposed to be adopted for conservation of this life sustaining resource:

Limited withdrawal of groundwater: There will be no use of groundwater both during construction and operational phase of the project. The construction phase will make use of recycled water from STP while water demand for operational phase will be met by HUDA water supply.

Reduced use of water: To further minimize the use of available freshwater, various low flow fixtures may be provided such as low flow flushing systems, sensor based fixtures, waterless urinals, tap aerators. Awareness will also be spread amongst the residents on the following lines:

- Timely detection and repair of all leakages;
- Turning off tap while brushing teeth;
- Use of mug rather than running water for shaving;
- Avoiding/minimizing use of shower/bath tub in bathroom;
- Turning off faucets while soaping and rinsing clothes;
- Using automatic washing machine only when it is fully loaded;
- Avoiding use of running water while hand-washing;
- Avoiding use of running water for releasing ice tray ahead of time from freezer;
- Turning off the main valve of water while going outdoor;
- Avoiding use of hose for washing floors; Use of broom may be preferred;
- Watering of lawn or garden during the coolest part of the day (early morning or late evening, hours) when temperature and wind speed are lowest. This reduces losses due to evaporation.
- Planting of native and/or drought tolerant grasses, ground covers, shrubs and trees. Once fully grown, they need not to be watered frequently.

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- Avoiding over watering of lawns. Good rains eliminate the need for watering for more than a week.
- Setting sprinklers to water the lawn or garden only, not the street or sidewalk;
- Avoiding installation or use of ornamental water features unless they recycle the water and avoiding running them during drought or hot weather;
- Installation of high-pressure, low-volume nozzles on spray washers;
- Replacement of high-volume hoses with high-pressure, low-volume cleaning systems;
- Equipping spring loaded shutoff nozzles on hoses;
- Installation of float-controlled valve on the make-up line, closing filling line during operation, provision of surge tanks for each system avoid overflow;
- Washing vehicles less often, or using commercial car wash that recycles water;

Treatment and Recycling: The sullage generated from the sites will be treated in an on-site Sewage Treatment Plant. This will enable the treated sullage to be used for flushing and landscaping thereby reducing the requirement of freshwater for these purposes.

Rainwater harvesting: The increased hard surface of Group Housing increases the runoff as compared to the otherwise barren land. It is proposed to harvest this rainwater runoff that will recharge the groundwater resource while reducing the burden of storm water management of the city and eventually natural water bodies. Apart from the open spaces, it is proposed to harvest the roof top rainwater. The storm water will be treated through an oil and grease trap and allowed to flow through layers of sand and gravel for filtration prior to reaching the water table, to avoid any possibility of groundwater contamination.

Construction materials: As a large construction, the project will require various kinds of natural construction materials such as sand, gravel etc. It is proposed for prior estimation of required quantities of these materials and procurement only as per requirement. This will also result in cost-efficiency. Excavated soil from the project site will be used within the site to the extent feasible. Excess soil will be made available to the construction sites, as per need.

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Energy: To conserve the energy resources, good practices will be followed during the construction phase such as turning off lights and equipments when not in use, ensuring fuel efficiency of motors and vehicles through proper maintenance and minimal work at night. The principles of energy conservation will also be embedded in the buildings through use of energy efficient fixtures, maximum availability of natural light and use of solar energy for street lighting.

RESETTLEMENT AND REHABILITATION

The project will not result in displacement of any local population and hence, does not require a resettlement and rehabilitation study.