4.0 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 POTENTIAL ENVIRONMENTAL IMPACTS

4.1.1 Impacts during Construction Phase

Negative or adverse impacts during the construction phase are:

Land environment:
- Change in existing profile and drainage pattern of the land
- Loss of agricultural land due to land acquisition for residential development
- Generation of solid waste in the form of construction spoils

Water environment:
- Impact on the local water source due to use of construction water
- Water pollution due to sediment load in construction water and wastewater from construction camps

Air environment:
- Dust, noise and gaseous pollution from construction equipment and traffic
- Dust pollution due to excavation, backfilling and concreting, hauling and dumping of earth materials and construction spoils

Biological environment:
- There is no loss of flora as there is no tree on the construction area

Social environment:
- Sanitation and health hazards due to inflow of construction labour
- Influx of construction work-force and supplier who are likely to construct temporary facilities in the vicinity.
- Improved economic activities and trade opportunities in the region.
Positive or beneficial impacts during the construction phase are:

- Employment opportunities: recruitment of local labourers
- Trading opportunities: procurement of construction materials locally
- Clean up operations, landscaping and plantations

Therefore, construction phase activities would have moderate impacts on on-site noise and air quality, land use and ecology. It could also develop minor impacts on on-site soils, water use and water quality. It will also have major local socio-economic impacts.

The main impacts of construction phase are loss of agricultural land and such impact is long term. The other impacts of construction phase will be small in magnitude as well as temporary in nature and are expected to wear out gradually once the construction activity is completed.

4.1.2 Impacts during Operation Phase

Negative or adverse impacts during the operation phase are:

Land environment:
- Disposal of domestic solid wastes

Water environment:
- Disposal of sewage
- Demand of water for domestic consumption

Air environment:
- Air pollution due to vehicular emission
- Noise pollution due to traffic noise

Social environment:
- Demand for additional resources like water and electricity
Positive or beneficial impacts during the operation phase are:

- Cultural intermixing among of new residents
- Trading opportunities in the area
- Working and job opportunities in the commercial zone and SMEs

Therefore, operation phase activities would have major socio-economics benefits and moderate impact on water resources. It could also develop minor impacts on land, air quality and noise. The main impacts of operation phase are waste disposal, traffic and socio-economic benefits and such operational impacts are long term.

4.2 MITIGATION MEASURES

The preventive, mitigation, compensatory and enhancement measures to be taken up during design, construction and operation stages are listed below.

4.2.1 Mitigation Measures during Design Stage

- Adequate drainage facilities will be provided.
- Provision of internal and approach roads.
- Design of the infrastructures like roads, water and electricity supply, drainage and solid waste disposal, with adequate safety margin and as per applicable design codes and norms.
- Provision of adequate green areas.

4.2.2 Mitigation Measures during Construction Phase

Land environment:

- Proper drainage facilities will be provided along the roads.
- Appropriate measures like green areas plantation would be undertaken.
- The quantity of earth generated from cutting shall be used as filling material during site development.
• The small amount of construction debris and surplus excavated material will be disposed of in suitable pre-identified areas.
• Dumping areas will be biologically reclaimed.

Water environment:

• The construction activities/erosion would be limited to possible smallest area.
• Control of quality of construction wastewater within the construction site through suitable drainage system with traps for arresting the sediment load for its proposed disposal into the main natural drainage system around the site
• Implementation of suitable disposal methods of sediment/construction debris in tune with the local condition to avoid water logging at construction site
• Proper drainage and sanitation facilities (as per the OSHA 2005) shall be provided at the construction site.
• Formation of stagnant water pools will be eliminated to avoid soil erosion & breeding of mosquitoes.

Air environment:

• Proper and prior planning and appropriate sequencing and scheduling of all major construction activities.
• Identification of infrastructural supports needed for the construction programme and ensuring their timely availability.
• Construction materials would be stored in covered stores or enclosed spaces.
• Adequate dust suppression measures such as regular sprinkling of water around vulnerable areas of the construction sites by suitable means, to control fugitive dust during construction, material handling/over hauling activities particularly near habitation.
• Stringent construction material handling/overhauling procedures
• Regular inspection of haul roads and construction site should be carried out to ensure regular and timely removal of construction debris to the dumping sites.
• Low emission construction vehicles and generator sets should be used.
• It would be ensured that all the vehicles plying during construction are properly tuned and maintained to keep emissions within the permissible limits.
• Construction machinery should be in good working condition and engines turned off when not in use.

**Noise Generation**

• Careful planning of the operation of construction equipment is required during this period so that minimum disturbances are caused.
• Construction camp and temporary labour sheds would be located away from the immediate vicinity of the construction sites and major road traffic.
• Provision of protective gears such as ear mufflers for construction personnel exposed to high noise levels
• Low noise construction equipment should be used as far as possible.
• It would be ensured that the equipment used during construction is properly maintained to keep noise emissions within the permissible limits.
• Construction machinery should be in good working condition and engines turned off when not in use.

**Biological environment:**

• Avenue plantation is proposed to be implemented.
• Provision of cooking fuel for construction workers to avoid cutting/felling of trees for fuel wood. Wherever possible, site cooking will be avoided.

**Social environment:**

• Significant number of semi-skilled and unskilled labourers would be recruited from the nearby areas to create some employment opportunities and sense of well being among local people. This will also reduce social tension of migration.
• Some of the construction materials like stone chips and sand will be procured locally. Thus, there is a possibility of generation of local trading opportunities.
• Most of the construction work is labour intensive. As most of the job will be done by contractors, it will be ensured that the contractor's workers are provided with proper camp facilities including sanitation, drinking water supply, washing facilities and primary health facilities.
• Proper accommodation would be provided in the construction camps for the skilled personnel.
• Adequate safety measures complying with the occupational safety manuals (OSHA 2005) to prevent accidents/hazards to the construction workers.
• Provision of construction camps facilities at designated and demarcated sites for all construction workers with the following amenities:
  a) Adequate potable water supply
  b) Adequate sanitary facilities (as per OSHA 2005) with removable septic tanks
  c) Washing facilities for the workers
  d) Solid waste collection and disposal system
  d) Primary health facilities at construction site
  e) Electricity

4.2.3 Mitigation Measures during Operation Phase

• Future residents must comply with the District Council (Collection and Disposal of Refuse) Regulations, which make it mandatory for households to use plastic bags, refuse bins and receptacles for the storage of household waste until they are collected by the local authorities.
• Future residents must construct individual septic tank and absorption pit (as per the guidelines and the requirements of the authorities) in their plot for subsurface sewage disposal.
• Future residents must strictly adhere to the CWA regulations and specifications on water supply and pipe laying works within their plots.
• Periodical maintenance of roads and drainage system.
• The commercial development shall be mitigated by appropriate measures such that all emissions are in compliance with the air emission standards promulgated under the Environment Protection Act.
• Only light and non-polluting industries (not involved in water intensive and polluting activities) will operate in the commercial zones. Moreover, noise levels will be mitigated by appropriate means such that noise emissions are within the permissible limits as per the standards for noise promulgated under the Environment Protection Act.
The landscape master plan includes provision of a green aromatic buffer zone on the North and North Eastern boundary of Grove Cottages to mitigate any faint odour that may come from Mare Chicose should the wind direction change, thereby ensuring the community quality of life and sustaining a livable environment for the future residents.