EIA GUIDANCE DOCUMENT FOR HOUSING, ACTIVITY 7 IN AREAS GAZETTED FOR HOUSING

1.0 INTRODUCTION

- This guidance document must be read together with *"Environmental Impact Assessment Guidelines for Housing Project".* This guidance document is designed to be applicable to housing development covering 50 hectares or more under Activity 7 of the Environmental Quality (Prescribed Activity)(Environmental Impact Assessment) Order 1987.

2.0 LEGAL REQUIREMENT AND RELEVANT REFRENCES

Legislation related under EIA Order:

Under EQA 1974:

1. Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1989;
2. Environmental Quality (Sewage and Industrial Effluent) Regulations 1979
3. Environmental Quality (Clean Air) Regulations 1977
4. Environmental Quality (Scheduled wastes) Regulations, 1989
5. Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Regulations 1989
6. Environmental Quality (Prescribed Activities) (Open Burning) Order 2000
7. Environmental Quality (Compounding of Offences) (Open Burning) Rules 2000
8. Environmental Quality (Delegation of Powers) (Investigation of Open Burning) Orders 2000

Relevant References:

1. Handbook of EIA Guidelines, for Housing and New Township Development Project, November 2003, Department of Environment, Malaysia;
2. Guidelines for Prevention and Control of Soil Erosion and Siltation in Malaysia, Department of Environment 1996;

3. Guidelines for the Siting and Zoning of Industries, Department of Environment Malaysia, 1994;
4. Urban Darinage Standards and Proceduring for Peninsular Malaysia (1975), Department of Irrigation and Drainage, Malaysia.
5. Urban Stormwater Management Manual for Malaysia (2002). vol.4 (Design Fundamentals), Department of Irrigation and Drainage, Malaysia.
6. Urban Stormwater Management Manual (2002), Vol. 5 (Design Estimation) Department of Irrigation and Drainage, Malaysia.
7. Urban Stormwater Management Manual (2002), Vol. 6 (Runoff Estimation), Department of Irrigation and Drainage, Malaysia.
8. Urban Stormwater Management Manual (2002), Vol. 7 (Network System and Computation), Department of Irrigation and Drainage, Malaysia.
9. Urban Stormwater Management Manual (200) Vol. 8 (Retention), Department of Irrigation and Drainage, Malaysia.
10. Garis Panduan Pembangunan Di Kawasan Tanah Tinggi (Kementerian Sumber Asli Dan Alam Sekitar), 2005 ;
11. Geotechnical Land use Map;
12. Planning Guidelines for the Preservation of Natural Topography in Physical Planning and Development in Accordance with the Town and Country Planning Act, 1976 (Act 172), The Federal Department of Town and Country Planning.
13. National Physical Plan

3.0 PROJECT DESCRIPTION

Project description as known including the likely size and scale of the project and the main activities envisaged including as much information on construction material requirements; transport and utilities required; discharges to air, water and land; and labour and market requirements. Related requirements include:

- Component of housing to develop

- Infrastructure, including the access road, internal road, drains, culverts, water mains, solid wastes disposal collection and sewerage plants serving to housing estate
- A plan showing the boundary of the development including any land required temporarily during the construction
- The physical form of the development (layout, buildings, other structures, construction materials, etc)
- A work programme for construction, operation and commissioning phases, and restoration and after-use where appropriate

4.0 LOCATION OF THE PROJECT (SITING)

Site and project selection will largely determine the type and magnitude of environmental and social impacts resulting from the development of housing. The criteria for selecting a new site normally include engineering, geology, environmental and economic aspects. Usually, some of these criteria limit the choice of potential sites to a given few. These sites are then investigated further for their suitability through site visits and analysis if existing information is inadequate.

The project location description (siting) information:

- Maps and photographs showing the location of the project relative to surrounding physical, natural and man-made features.
- Existing land-uses on and adjacent to the site and any future planned land uses
- Zoning or land-use policies. Buffer zones: the site should be able to accommodate buffer zones with respect to air, water and noise pollution and solid and toxic waste problems. Reference should be made to the DOE Guidelines on a Siting and Zoning, 1995.

5.0 EXISTING ENVIRONMENT

- Geology/hydrology:

  - The housing development should have due regard for their potential to contaminate cause man-induced geohazards such as slope failures and flooding.
  - Clearance must be sought from State Land Office after the Mineral and Geosciences Department Malaysia for the national mineral reserves;
- Surface water resources:
  - Maximise distance from areas used for catchments, abstraction or areas of potable water resource potential.
- Topography of natural contours;
- Cultural and Natural heritage:
  - Avoid areas of unique or important archaeological, historical or cultural interest, site of special scientific interest.

6.0 ENVIRONMENTAL BASELINE DATA

The key areas for the preparation of baseline data for housing projects are outlined below:

- Types of soil and geology:
  - Granitic terrain
  - Metamorphic / sedimentary terrain
  - Limestone or karstic terrain
  - Hilly or undulating terrain
  - Coastal and low-lying terrain
  - Ex-mining land (modified terrain)
  - Ex-dumping sites (modified terrain)
  - Ex-agricultural land (modified terrain)
  - Composite terrain (combination of two or more types of terrain)
- Drainage and hydrology information:
  - drainage system,
  - water balance,

- hydrology of streams and rivers,
- meteorological data,
- estimation of probable maximum peak flow,
- identification of flood-prone area,
- water demand or use,
- soil and geotechnical information,
- land use in term of surface characteristics;

- Water quality information:
  - Water quality of receiving streams likely to be affected by the project.
  - Data for upstream, within the project site and downstream areas need to be obtained from primary or secondary sources.
  - Beneficial uses of water (for water supply, fisheries, irrigation, recreational and others) need to be established for streams and water bodies likely to be impacted by the project.
  - Locations and consumption quantum of these uses should be identified. Sources of pollutants within the stream catchments.
  - Point and non-point sources should be identified.
- Air quality information:
  - Air quality data collected from a minimum of three representative locations within the project site.
  - The sampling location should included areas with impact potentials.
  - Parameters to be analysed include PM_{10}, total suspended solid (TSP), dust fallout, NOx, SOx, carbon monoxide and lead.
  - Seasonal or annual meteorological information. Data on temperature, rainfall, wind speed and direction and meteorological phenomena such as inversions should be complied from sampling stations nearest and relevant to the project site.
  - Air pollutant sources from existing activities.
- Noise information:
  - Noise level data collected at the site.

- Parameters to be analysed include Equivalent Sound Level (Leq), 90% of the time or background or Residual Noise (L_{90}), 10% of the time or Peak Sound Level (L_{10}), Maximum Noise Level (L_{max}) and Minimum Noise Level (L_{min}).
- Noise pollutant sources from existing activities.

- Landuse information:
  - existing and adjacent landuse (site survey) covering 3-5 km radius
  - Proposed land use especially in terms of compatibility and buffer zones
  - Committed landuse and designated (zoned) areas
  - Past landuse, particularly in relation to any contaminated land which may be inherited or incompatible past land use such as landfills
  - Ownership
  - Water use – including all downstream users
  - Development policy (Master, Structure and Local Plans)
  - Infrastructure and utilities – existing and proposed.
- Transportation and traffic information:
  - Existing transportation networks (road, rail, river, air, sea) in the vicinity of the proposed project;
  - Existing transportation systems in the area – all modes, operational characteristics, public transport, terminals etc;
  - Traffic flow characteristics (volumes, composition, speeds etc) on existing roads in the vicinity of proposed project site.

7.0 CHARACTERISTIC OF THE POTENTIAL IMPACTS

Evaluation of impacts is the stage when predicted impacts are compared against various standards or criteria to judge their significance on the environment. The degree of significance consequently determines the level of mitigation required to bring the impacts to acceptable levels.

- Impacts on inhabitants, human health, land use, water quality, air quality, noise pollution, soil and geology, ecology, and possible interactions between them.
- Nature of the impacts: direct, indirect, secondary, cumulative, short-term, medium-term and long-term, positive and negative impacts
- Extent of the impact and complexity and magnitude of the impact
- Duration, frequency and reversibility of the impact.

7.1 Soil and Geology

EIA for a development of new housing should take into account the physical impacts resulting from the project implementation. The physical impacts are as follows:

- **Erosion**

  The rate of soil erosion by water is dependent upon many factors such as soil characteristics, climate, topography, and soil cover. If the effects of each of these can be quantified, the rate of soil erosion can be predicted. Many methods for quantification of the soil erosion process have been proposed and applied with varying degrees of success. One simplistic approach is called the Universal Soil Loss Equation (USLE, 1950). Modifications were made to the original USLE and the Revised Universal Loss Equation (RUSLE) was developed.

- **Landslides**

  Landslide or any other forms of downward and outward movement of slope forming materials (soil and rock) reacting under the force of gravity, can be assessed by several methods. Landslide hazards assessment in a proposed project area should have been assessed at the very early stage in the feasibility studies, by carrying out terrain analysis, terrain classification/mapping, landslide hazard delineation/mapping, and/or landuse suitability studies. Degrees of landslide or slope failure hazards along a proposed or existing roadway or other development can be

illustrated on slope hazard maps. Such maps provide the basis not only for establishing the form of treatment required, but also for establishing the degree of urgency for such treatment in case of existing works, or the programming treatment for future works. They represent the product of a regional assessment. Through proper land-use planning, landslide hazards can be greatly reduced. As a broad-brush method, suitability of slope gradients for development purposes as proposed by the Federal Department of Town and Country Planning, (1976).

The stability of individual slope, particularly the slopes which have been identified as highly susceptible to failure (high hazard slopes); can be assessed by conduction detailed geological and/or geotechnical studies. The data obtained from both field and laboratory studies can then be analysed by adopting various methods of slope stability analyses for both soil and rock slopes.

7.2 Drainage and Hydrology

The predicted impacts associated with the changes of hydrological parameters due to the development need to be evaluated accordingly. The calculation of the predicted sediment yield and the quantity of storm water runoff has to be performed and explained to ensure the economic engineering design can be achieved with adequate standards of safety.

Drainage and Irrigation Department, Malaysia has established procedures for estimating flood flows and low flows for various catchments. Increase in runoff due to the change in landuse should be compared with acceptable flood flows to determine significance and acceptability. Estimation of the possibilities of flash flood occurrence should be performed in accordance with the ‘Urban Stormwater Management Manual for Malaysia (2000) published by the Drainage and Irrigation Department, Malaysia.

For small catchments and where the storage effects are not significant, the Rational Method can be used to calculate the stormwater flows from rainfall. This method relates peak runoff to rainfall intensity through a proportionality factor.

On the other hand, whenever spatial and temporal variations of rainfall or flow routing/storage effects need to be considered, hydrograph methods must be used. Details of this method can be obtained from the 'Urban Stormwater Management Manual for Malaysia – Volume 5 (Runoff Estimation).

7.3 Water quality

For housing development, the main sources of pollutants are suspended sediment resulting from soil erosion and sewage discharge during construction and operational stages. Changes in the water quality of the streams may be evaluated against Interim National Water Quality Standards and Water Quality Index to be adopted for various beneficial uses of water, while effluent discharge from the development and Sewerage Treatment Plan (STP) may be evaluated against effluent discharge limits of the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979. The classification of streams and the establishment of acceptable water quality standards allow better evaluation of the impacts on water quality. For Marine Water Quality, evaluation can be based on standards values indicated in Interim Standards for Marine Water Quality, Malaysia.

7.4 Air Quality

The types of activity, which can cause air pollution are those related to vehicle emissions, vehicle movements and earth work activities. The transport of goods and the labour force for the development project will increase the pollution level. Emissions from the vehicle exhaust such as sulphur dioxide, carbon monoxide and hydrocarbons and dust generated by

vehicle movement and earth work constitute major pollutants, which can affect air quality. The local dust generation may result in typical levels of 100 - 200µg/m^3.

Evaluation and assessment of odour impact need to identify both types of sources present (point or diffuse) and types of pollutants (simple compound or complex mixture).

7.5 Noise

During the construction phase, noise produced by machinery can be predicted using published information. Typical noise levels at a reference distance of 30m for some of equipment are in EIA Guidelines for Housing and New Township Development Project, Department of Environment Malaysia 2003, Annex 7(g). Noise problems may arise if construction work is carried out at night. Thus it is important that no construction work is allowed after 7.00 p.m.

7.6 Solid Waste Management

Identified the types of waste likely to be generated and the impact of its generation during and after the construction. Generally, the proper waste management is considered necessary to avoid generation of any significant environmental impact associated with the handling, collection and disposal of solid waste during and after construction.

The waste categories that would be generated are identified as follows:

- Biomass waste – Indiscriminate biomass dumping into waterways may create undesirable impacts in term of water quality deterioration especially in the increase in BOD level due to excessive organic loading and proliferation of disease vectors.

- Construction waste – The amount of construction waste generated from earthwork and construction activities can have a potential impact when it is not properly disposed of to an appropriate location.
- General refuse – Improper waste storage and collection can cause a hazard to public health as they create a suitable habitat for disease vector.
- Household and commercial waste - waste storage for houses, shops, and commercial areas, will cause an eyesore to public and odour problem, and could lead to breeding of rats and disease vectors.

8.0 MITIGATION MEASURES

The Project Proponent must develop and implement mitigation measures for each significant adverse impact that has been identified. From experience, potentially adverse impacts can be avoided or mitigated to acceptable levels through careful design and implementation of appropriate techniques to reduce the severity of the impacts. The effects of the mitigation must be measurable so that compliance can be demonstrated via monitoring.

The measure adopted to mitigate the adverse impact from project activities carried out must be clearly documented. This will ensure that the mitigation measures address the corresponding adverse impacts identified.

The most important measure with respect to flood is to design the drainage network accordingly. The drainage network must take into account all implicated factors especially the increase in total runoff, the increase in peak flow and reduction of peak time. An adequate drainage system to cater the flood discharges should be designed as per DID specifications.

Some of the possible mitigation measures for the various environmental components are given in EIA Guidelines For Housing and New Township Development Project, Department of Environment Malaysia, page 8-3 to 8-28.

Specific mitigation measures with respect to other physical impacts in relation to soil and geology:

8.1 Erosion

An Erosion Control Plan should be prepared for the proposed project. Considerations should be given to minimizing exposed areas, establishing time needed for installation of control procedures, maintenance, and potential impact on the overall schedule of the project.

Most projects do not have the flexibility to allow each project task to be performed at the perfect time. Erosion control procedures may vary significantly based on whether the project starts in dry or wet seasons. Nothing is more unpredictable than the weather, so contingencies must be developed to cover variations in climatic conditions. Care must be taken to minimise the impact of the weather. Temporary erosion control devices and techniques will require more attention and maintenance in the wetter seasons. Permanent erosion control devices and techniques such as seeding, sodding, spreading of topsoil, and planting will require more attention in the dryer seasons. The point is that care must be taken to assure that control procedures be compatible with the weather conditions at the time they are implemented.

Possible erosion and siltation prevention measures adapted from The Virginia Department of Transportation, USA (1987) are listed below:

- Erosion and siltation control devices are to be beside streams and wetlands before construction;
- There is to be no clearing and grubbing to the edge of a stream unless work will begin immediately;
- Grubbing or stripping is to be limited to surface area where excavation is to begin within 30 days;

- A 50-foot wide buffer zone of undisturbed vegetation is to be left beside waterways where possible;
- Seeding should be accomplished within 48 hours of reaching the grading increment on the slope;
- Temporary seeding should be done upon suspension of a grading operation for more than 15 days;
- Incremental seeding should take place on all slopes having vertical heights greater than 5 feet;
- Slopes steeper than 2:1 should be properly grooved prior to seeding;
- Erosion and siltation control devices should be checked before, during, and after storm events;
- All water discharged from the construction site should be filtered prior to being released into streams, lake, etc.;
- Live streams should not be obstructed by any devices;
- Dirty equipment, especially concrete trucks, should not be cleaned in or near waterways;
- The erosion control plan should cover all temporary as well as permanent structures to be placed in waterways or wetlands.
- Excavation for piers in streams should be performed within cofferdams or other approved conditions.
- Material excavated should not be placed so it can wash back into waterways.
- Sediment should be removed when it reaches one-half the height of the filter fence or, alternately, a new line of fence should be placed down slope.
- Stockpiled fill material should be protected with erosion and siltation control devices.
- Water should be diverted into temporary slope drains.
- Diversion berms should be placed and reshaped as necessary to prevent runoff.

- Streams should be diverted through a stabilized temporary diversion channel or pipe culverts before new culverts are placed.
- No material should be placed or discarded in waterways or wetlands.
- Fuel and lubricants should be stored outside of flood plains and drainageways.
- Erosion and siltation controls in borrow pits and waste areas should be checked weekly.
- Clearing and grubbing of proposed borrow pits and waste areas should not take place prior to receiving approval of those sites.

8.2 Landslides

An initial assessment is necessary to be carried out on the slopes in the project area. The slope condition, the degree of hazard and the risk are assessed. There are then three possible options to consider for slope treatment:

- Avoid the high risk hazard;
- avoid development along the slope or near its base and relocate roadways or other infrastructure where stabilization is feasible.
- Accept the failure or landslide hazard; or
- acceptance is based on an evaluation of the degree of hazard and the economics of prevention.
- Stabilize the slope to eliminate or reduce the hazard.
- change the slope geometry to decrease the driving forces or increase the resisting forces (reduce height, reduce inclination, add weight to toe)
- control surface water infiltration to reduce seepage forces (vegetation, seal cracks, drainage system, etc).
- control internal seepage to reduce the driving forces and increase material strength (deep wells, subhorizontal drains, interceptor trench drains, blanket drains, etc.)
- provide retention to increase the resisting forces (e.g. concrete pedestals, rock bolts, ground anchors, soils nails and retaining walls)

9.0 Conclusion

For the conclusion, the important thing should be consider in the EIA Report for housing are:

- The report on the impacts of the proposed project on the environment should clearly define and quantify.
- The degree or extent of mitigation measures proposed within the EIA report normally varies from project to project since it is dependent on many factors such as site conditions, geographical locations and socio-economic characteristics.
- The study shall examine and recommend suitable mitigating and abatement measures for the adverse impacts identified. The effectiveness of the measure which is proposed should be stated and residual issues of significance to be identified.
- Scope of study and the EIA report that be proposed should complete as in the “Environmental Impact Assessment Guidelines for Housing and New Township Development Project, November 2003”.