

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) GUIDANCE DOCUMENT

FOR COASTAL AND LAND RECLAMATION ACTIVITIES

INTRODUCTION

1. This document is prepared to facilitate project proponent and environmental consultants in preparing the Environmental Impact Assessment (EIA) Report for any proposed coastal and land reclamation projects. It is also intended to ensure proper planning and implementation of coastal development projects in a sustainable manner, thus minimizing the potential negative impact to the environment, arising from such activities.

2. In planning and implementing land reclamation projects, consideration should be made on the existing coastal regime and features, off shore bathymetric conditions, river estuaries, water quality, etc. Responses to the coastal features will fundamentally influence the land shape and deposition of any reclamation and consequently determine the basic plan outline.

POLICY AND LEGAL REQUIREMENTS

3. The following lists are the policy and legal requirements that need to be referred to when preparing the EIA Report:

- National Physical Plan, April 2005;
- Environmental Quality Order (Prescribed Activities) (Environmental Impacts Assessment) 1987;
- Environmental Quality Regulations (Scheduled Waste) 2005;
- Environmental Quality Regulations (Clean Air) 1978;
- Environmental Quality Regulations (Sewage and Industrial Effluent) 1979;
- Town and Country Planning Act
- Federal Department of Town and Country Planning

4. This document is also proposed to complement other guidance given in the following guidelines where terms and procedures are defined:-

- A Handbook of Environmental Impact Assessment Guidelines;
- Environmental Impact Assessment Guidelines for Coastal and Land Reclamation Activities;
- Guidelines on Erosion Control for Development Projects in the Coastal Zones 1/97; and

- Guidelines for Preparation of Coastal Engineering Hydraulic Study and Impact Evaluation, December 2001;

SITE SELECTION

5. It is very important and crucial for the project proponent and environmental consultant to corroborate the National Physical Plan (2005) published by the Department of Town and Country Planning, in selecting the sites to reclaim in order to avoid coastal environmental sensitive areas. The proposed developments at the reclaimed sites have to be inline with the policy stipulated in the National Physical Plan.

STATEMENT OF NEED

6. The basis or need for a project would have been made on certain basis. Basis and rationale for the proposal would reflect the objective of a project and provide direction during planning. A statement of need also highlights the various benefits such as social, economic, cultural and aesthetics that may accrue from the project.

KEY ISSUES AND SCOPE

7. In preparing an EIA report for coastal and land reclamation facilities, the project proponent and EIA consultant shall be able to identify key issues related to the activities being proposed. Below are the key issues and information to be made available to the assessor of the EIA report:-

(i) Description of the Proposed Project

a. Location

- Title details and land tenure;
- Site characteristics;
- Existing Land use and constraints;
- Macro scale maps (1:50,000 & 1:25,000), plans or photographs or satellite images, clearly identifying the location of the proposed project relative to:
 - ✓ Water bodies;
 - ✓ Other land;
 - ✓ Natural vegetation communities
 - ✓ Infrastructure (canals, roads, electricity, pipelines);
- Compatibility of the proposal with:
 - ✓ Any strategy such as local management plans;
 - ✓ Existing land and water uses both on the site and on adjacent land and water bodies;

- ✓ Historical sites or environmental protected areas.
- b. Description and land use plan of the Proposed Project and Associated Facilities
 - Land use plan;
 - Proposed irrigation water quality source; (surface or ground water), irrigation system (surface irrigation, sprinkler or drip irrigation), irrigation layout, drainage locations and layout;
 - Maps with appropriate scale (1:10,000 or 1:2,500 or 1:1,000...etc) showing:
 - ✓ Land features, contour lines and slopes;
 - ✓ Run-off paths and catchments areas;
 - ✓ Proposed infrastructure layout (canals, drainage locations, roads, electricity, pipelines);
 - ✓ Protectorates;
 - ✓ Historical and antiquity sites;
 - ✓ Settlements locations and sizes;
 - ✓ Quality, quantity and locations of drainage discharge;
 - ✓ Number and size of settlements and population expected;
 - ✓ Expected solid waste and wastewater treatment;
 - ✓ Power supply requirements.
- c. Site preparation and Civil Works
Describe the works required prior to commencement of land reclamation

(ii) Description of the Existing Environment

- (a) Hydraulics and coastal Hydrodynamics
 - Existing erosion, sedimentation and accretion areas.
 - Bathymetric surveys
 - Tidal and current patterns
 - Wave climate
 - Geology
- (b) Hydrology and Groundwater
 - Existing drainage patterns and identification of areas prone to flash floods, the range of water heights/depths in the area, daily flushing regime, storm surge or flood levels;
 - Groundwater regime and quality, e.g. depth to groundwater level, whether groundwater is used for water supply and its quality, whether control of groundwater is already exercised in the area;

- Presence and importance of structures likely to be affected by changes in groundwater levels (such as buildings, bridges, flood mitigation works).

(c) Marine, River and Brackish

- Water quantity (daily discharge)
- Total Suspended Solids TSS
- Chemical contaminants
- Aquatic biological indicators (invertebrates)
- Nutrients (nitrogen and phosphorus)

(d) Air Quality

- Identification of sources of dust generated which may affect the proposed site;
- Collection of meteorological data which will affect distribution and severity of air quality impacts in particular (heat inversion, dew):
 - Strength and direction of prevailing wind
 - Rainfall frequency, duration and quantity.
- Collection of topographical information which will affect distribution of air quality (e.g. steep slopes, hills and land profiles)
- Identification of sensitive receptor (e.g. protectorates or existing settlements which may be affected by dust) within the area likely to be affected.

(e) Marine and Freshwater Biological & Ecological System

- Identification, description and distribution of areas of terrestrial and aquatic habitats that may be directly or indirectly affected especially those:
 - Supporting threatened or protected species or habitats;
 - Of commercial importance (e.g. for aquaculture or fisheries);
 - Of nature conservation or scenic importance.
- Assessment of the importance of the habitats or species identified above, in terms of International, National, Regional or Local Importance.

(f) Waste Management

- Likely opportunities for re-use of sewage sludge and/or effluent (e.g. attitudes towards use of sewage sludge in agriculture, ease of distributions of sludge to end users, legislative requirements for such re-use);
- Potential sites for solid waste dumping or recycling processes suggested;
- Potential sites and routes for disposal of sewage sludge if unsuitable for reuse and quality required of sludge for disposal;
- Potential sites and routes for disposal of screenings waste;
- Potential disposal sites and routes for excess material from the site during land preparation and civil work.

(g) Transport and Access

- Assessing condition and size of roads on route(s) to be used during land preparation and reclamation;
- Assessing existing traffic levels on these routes at different times of year and times of day;
- Assessing suitability of access to the site for vehicle sizes and types likely to be used during land preparation and reclamation;
- Investigation for the presence of particularly sensitive developments on routes likely to be affected, e.g. schools, gas stations, ongoing constructions, etc...
- A special study may need for vehicle movements and vessel navigation.

(h) Social and Economic Issues

- Existing potable water quality, which may be affected by the project's drainage and wastewater effluents
- Impacts of waste water disposal systems which may be affected by provision of different activities
- Projected water treatment facilities for potable supply, which may be affected by provision of different waste water collection and treatment systems
- Local employment conditions which may be affected during land preparation, reclamation and associated settlements

- Existing economic situation which will be affected by the Land Reclamation Project, especially concerning:
- Land values,
- Job opportunities;
- Identification of items or sites of cultural or historical significance likely to be affected by the project and an assessment of their cultural and/or financial importance.

(iii) Potential Significant Impacts

- Physical system
 - Geology and minerals, erosion and sedimentation
 - Soil Loss Model
- Climate, air quality and noise
 - Micro-climatic change, global warming, accelerated sea level rise (due to potential global warming climatic effects), seawater intrusion, flooding, littoral transport
 - Air Dispersion Model, Noise Impact from Traffic
- Coastal hydrodynamics
 - Erosion, sedimentation, accretion
 - Hydrodynamic simulations
 - Impacts on current flow trends and velocities
 - Impacts on the water level
 - Changes in bathymetry impacts on sea traffic movement and safety
 - Changes in bathymetry
 - Impacts on coastal morphology
 - Sediment dispersion and sediment transportation
 - Changes in wave patterns
 - Impacts on long-term shoreline changes
- Hydrology
 - River sediment spreading and settlement
 - Tidal flushing
 - Suspended sediment plume from riverine and other sources
 - Water Quality (Bacterial pollution, BOD, dissolved oxygen, etc.)
 - Coastal flooding (considering extreme events)
- Water quality
 - Marine, fresh and brackish water quality
 - Suspended solids, E. coli, nutrients level, heavy metals, oil and grease
 - Wastes (solid, effluents and wastewater)

- Biological system
 - Habitat damage
 - Benthic biology
 - Habitat, marine and terrestrial biodiversity
 - Drainage interceptor (drainage and streams for biological communities)
- Socio economic systems
 - Land use change
 - Demographic change
 - Livelihood of those who are dependent on the sea resources (fishermen and tourism operators)
 - Impacts on public perception
- Archeology
- Sea and land traffic

(iv) Economic Assessment of Environmental Impacts

All the significant impacts that have been identified should be classified to use value, non-use value, indirect use value, direct use value, bequest value, existence value, consumptive direct use value and non-consumptive direct use value by using the concept of total economic value. To undertake a good assessment of environmental impacts, project proponent should select suitable methodology for each classified value. For consumptive direct use value, the change of productivity methodology should be used. For non-consumptive direct use value and indirect use value, the revealed preferences and stated preferences methodology should be used. For non-use value, stated preferences methodology should be used.

(v) Mitigation and Abatement Measures

This section considers the proposed mitigation measures and strategies to reduce or prevent adverse impacts on different sectors of the environment. Proposed mitigation must be sustainable, integrated, measurable, achievable and feasible and covers the construction and operation stage.

- Physical Environment
 - Geology and Minerals, Soil Erosion and Sedimentation
 - Suitability of fill material needs to be sufficiently addressed
 - Adequately proposed the overall stability

- Abatement measures to ensure stability of the new landform and other superstructures
- Climate, Air Quality and Noise
 - Selection of haulage route
 - The location of stockpiles
 - Frequent spraying of water on stockpiles and access roads, covering of lorry loads
 - Using anti-vibration mountings, fitting silencers on internal combustion engine to control noise.
- Coastal Hydraulics
 - Construction of proper containment structure during reclamation such as silt curtain or sheet piles and permanent structures after reclamation works.
- Water Quality
 - Turbidity/Suspended Solids
 - Surface run-off should be directed to a number of silt traps. Any degraded area identified must be covered with mulch, fibromat, etc.
 - Oil and Grease
 - Discharge of oily wastewater from sea vehicles' engine room should be channelled into the oil separator.
 - Waste (solid waste, effluents, wastewater, sewerage and sullage)
 - Providing sufficient number of mobile toilets and treating the effluent from the toilets and the sullage in self-contained septic tank system.
 - Nutrients and Heavy Metals
 - Using available state of the art technology.
- Biological System
 - Habitat Damage
 - Types of equipment used for dredging and dumping
 - Ensure minimum seabed disruption and dispersion of sand
 - Fixing a specific depth of sand dredged
 - Ensure that aquatic food web is not disrupted
 - Benthic, Biology, Habitat and Marine Biodiversity
 - Employment of suitable dredging technique
 - No discharges directly into sea
 - Spillage and fugitive release should be minimised
 - Dredged materials should be disposed off at designated dumping area only
 - Proper drainage should be ensured

- Controlled human activities
- Installation of artificial reefs
- Exposure of coastal ecosystem
- Drainage Interceptor
 - The natural flow of rivers and streams to the sea must not be blocked.
 - The natural outlets should be maintained.
- Navigation and Safety
 - avoid using busy sea naval routes when transporting fill materials and also spoils.
 - use necessary signals approved by the authority when working at nights.
- Socio-Economic System
 - Economy
 - compensatory 'assisted area' package for other employment.
 - improve potential employment benefits, commerce and income for local people.
 - register of local suppliers to help encourage local links
 - Social
 - reduce in-migration
 - providing additional accommodation for the workforce
 - funding of local community projects
 - Compensation to those affected
- Archaeology
 - Any monumental remains must be first excavated, studied and relocated in another area.
 - Any work on sites must be stopped if archaeological sites discovered during construction.
 - Efforts must be made to preserve the cultural remains and archaeological sites located outside the development area.
 - Set up markings where cultural remains and archaeological sites are located before they are salvaged or moved.

LIST OF CONSULTANTS/STUDY TEAM

8. A list of EIA Consultant team with their relevant qualifications and verification on the competency of the firm engaged to prepare the Detailed EIA report. The environmental consultant team should be headed by a project manager, whose ultimate responsibility is to co-ordinate the inputs of individual specialists and to provide an overview. For EIA Study of Land Reclamation, members of the study team should have the following specialization/expertise:

- Soil Erosion
- Hydrology
- Hydrodynamic
- Coastal Hydraulics
- Ecology, fisheries and marine and freshwater biology
- Drainage & Irrigation Expert
- Geology Minerals
- Marine, river and brackish water quality
- Sediment quality
- Climate and weather
- Air quality and noise
- Civil engineering
- Urban planning
- Sociology
- Waste management
- Wastewater treatment
- Environmental health

PROPOSED DEVELOPMENT

9. For the benefits of the Department of Environment, other relevant agencies and Panel Experts in the assessment of the Detailed EIA Report, the following framework shall take place in the scope of study for the submission of the Detailed EIA Report:

- (i) Scope to be covered in the Detailed EIA Study for Coastal Land Reclamation:
 - Ports
 - Marinas
 - Jetties
 - Dredging
 - Sea-sand mining (borrow area)
 - Site for disposal of spoils
 - Airports
 - Breakwaters
 - Groynes
 - Causeway
 - Bridges
 - Undersea tunnels
 - Sewerage pipelines
 - Submarine cables
- (ii) Separate Comprehensive EIA Study
 - Construction of hotels, industrial and residential

ENVIRONMENTAL MANAGEMENT PLAN

10. A key outcome of the EIA process will be an Environmental Management Plan (EMP) which:

- Identifies key potential project impacts areas;
- Sets up a programme for monitoring the potential impacts;
- Establishes reporting and mitigation (including emergency) response procedures.

REFERENCES

1. *A Handbook of Environmental Impact Assessment Guidelines;*
2. *Environmental Impact Assessment Guidelines for Coastal and Land Reclamation Activities;*
3. *Guidelines on Erosion Control for Development Projects in the Coastal Zones 1/97; and*
4. *Guidelines for Preparation of Coastal Engineering Hydraulic Study and Impact Evaluation, December 2001;*