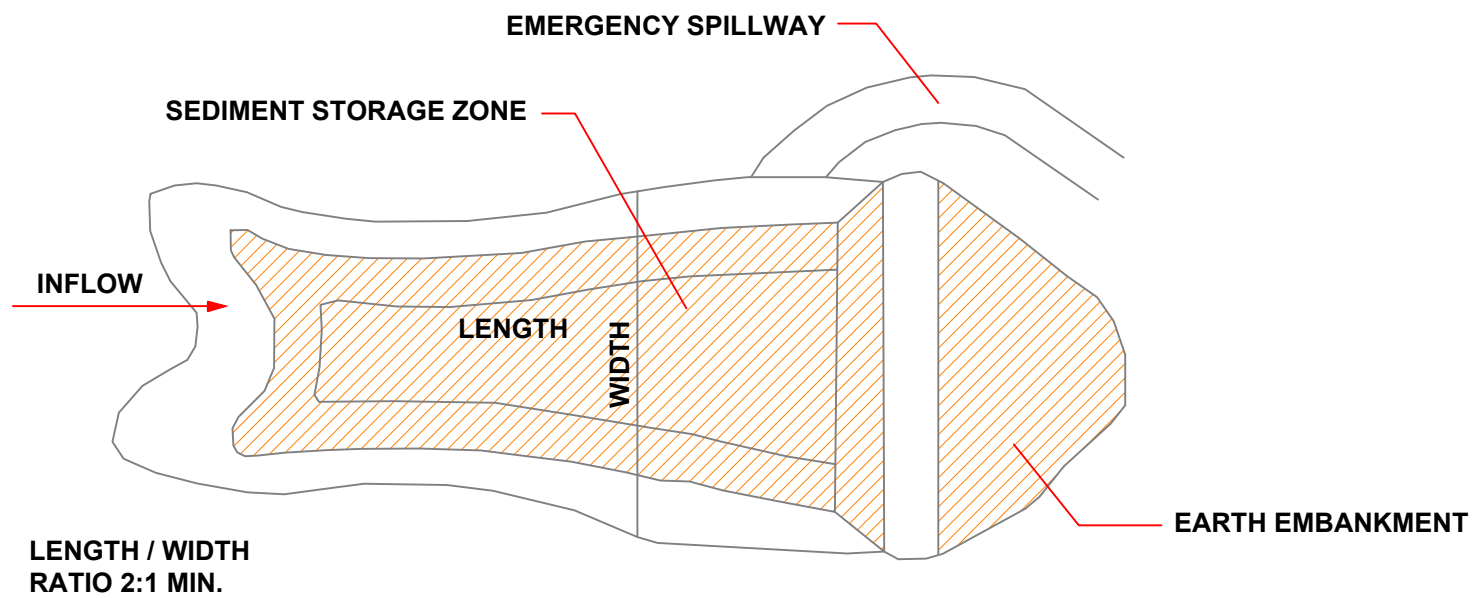
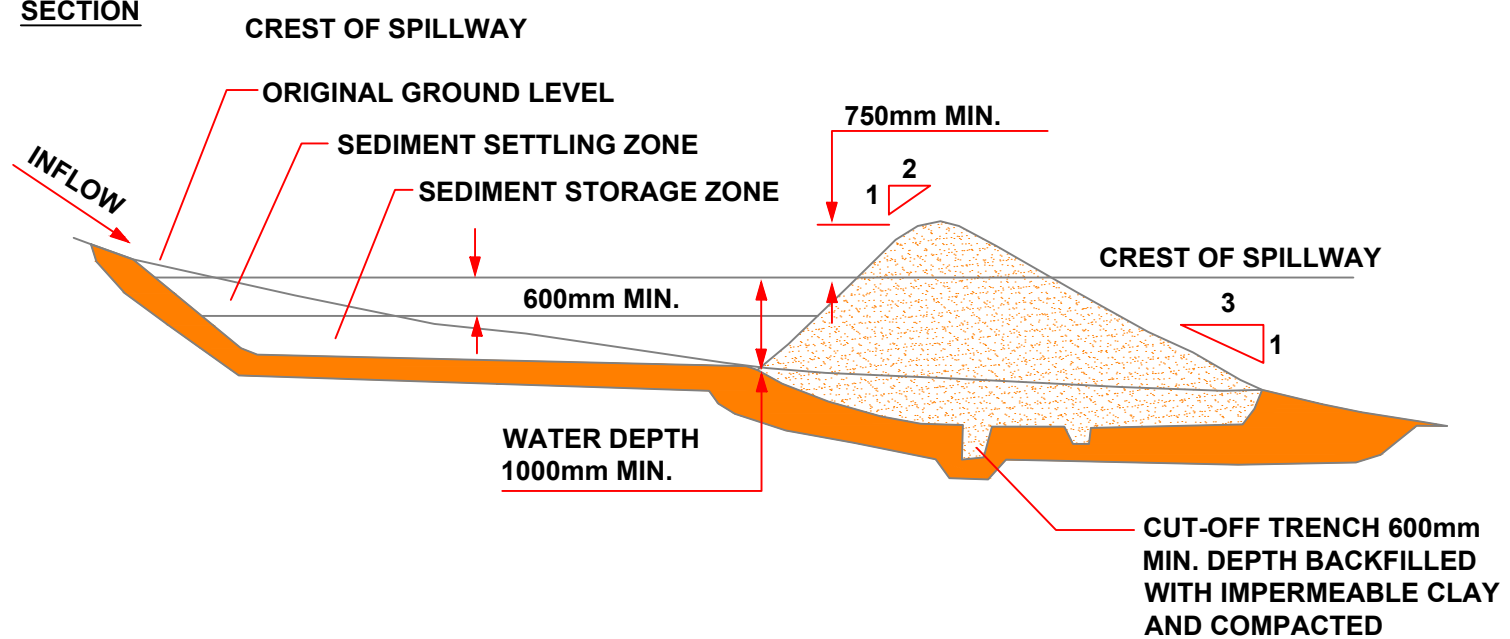


PLAN



SECTION



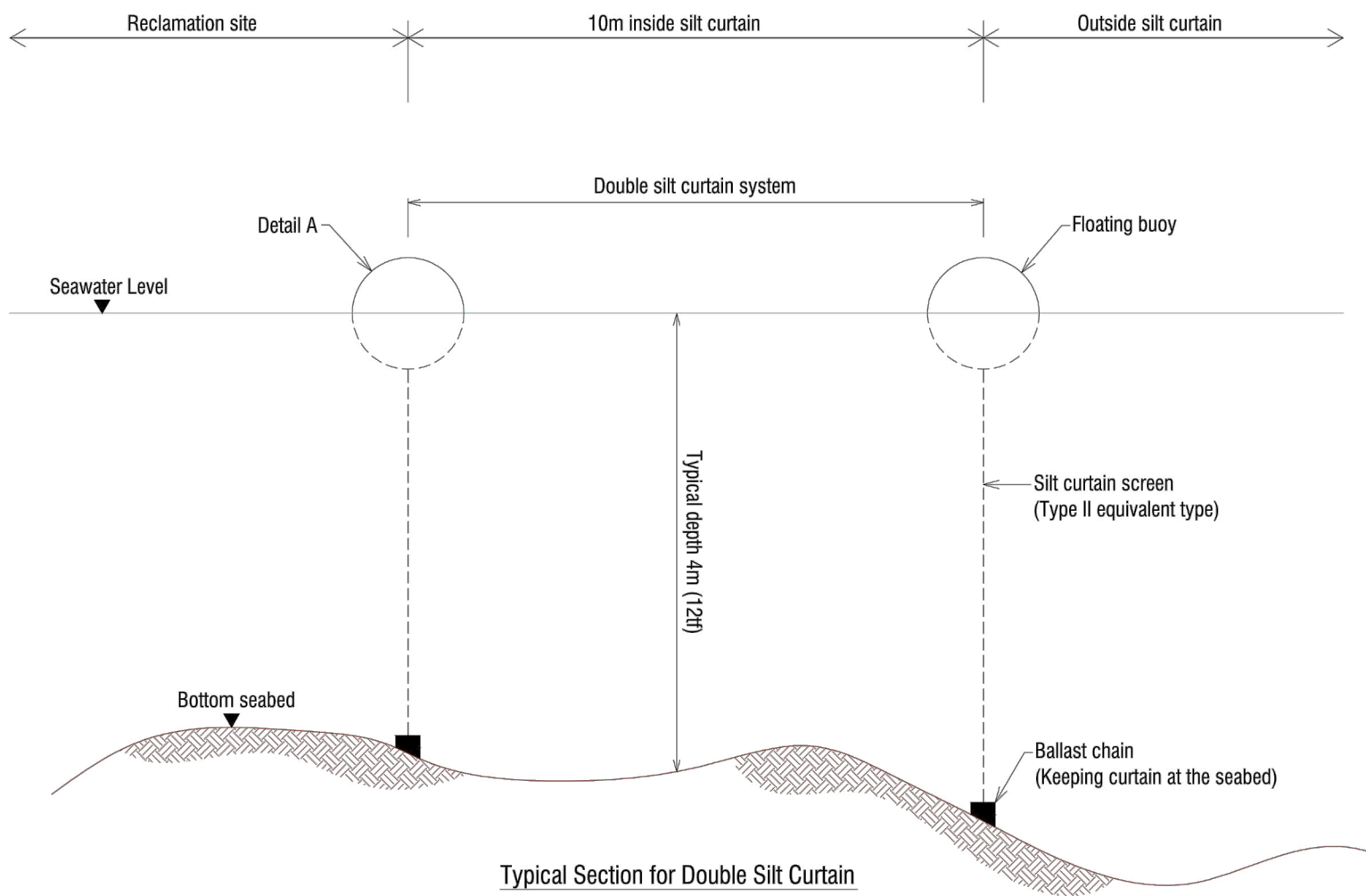
CONSTRUCTION NOTES:

1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM THE STORAGE AREA.
2. CONSTRUCT A CUT-OFF TRENCH 600mm DEEP AND 1200mm WIDE ALONG THE CENTRELINE OF THE EMBANKMENT EXTENDING TO A POINT ON THE GULLY WALL LEVEL WITH THE RISER CREST.
3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIALS TO 95% STANDARD PROCTOR DENSITY.
4. SELECT FILL ACCORDING TO THE DIRECTIONS OF THE ESCP THAT IS FREE OF ROOTS, WOOD, ROCK, LARGE STONE OR FOREIGN MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING AT LEAST 100mm DEEP TO HELP BOND COMPACTED FILL TO EXISTING SUBSTRATE.
6. SPREAD FILL IN 100mm TO 150mm LAYERS AND COMPACT AT OPTIMUM MOISTURE CONTENT 2%
7. CONSTRUCT EMERGENCY SPILLWAY.
8. REHABILITATE STRUCTURE IN ACCORDANCE WITH THE ESCP.
9. PLACE A 'FULL OF SEDIMENT MARKER TO SHOW WHEN LESS THAT DESIGN CAPACITY OCCURS AND SEDIMENT REMOVAL IS REQUIRED.

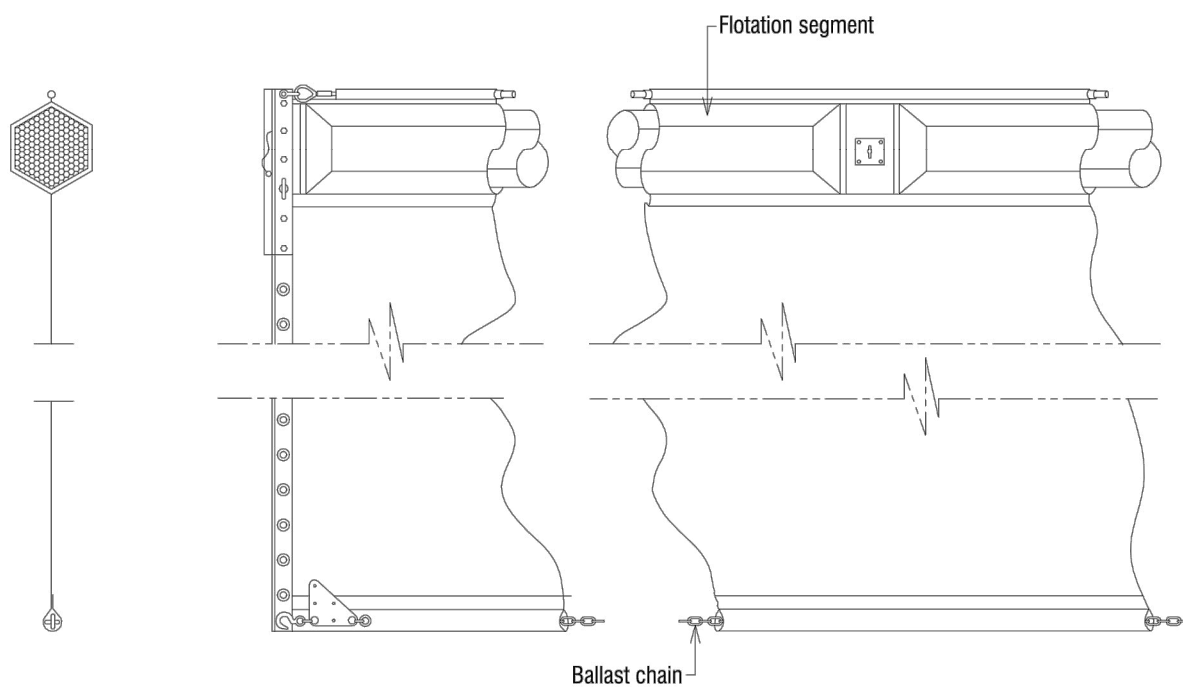
ENVIRONMENTAL IMPACT ASSESSMENT

PROPOSED DEVELOPMENT OF
KUANTAN MARITIME HUB AT MUKIM
SUNGAI KARANG, KUANTAN,
PAHANG DARUL MAKMUR

SEDIMENT BASIN



Typical Section for Double Silt Curtain



Type II Silt Curtain

Scale: N.T.S

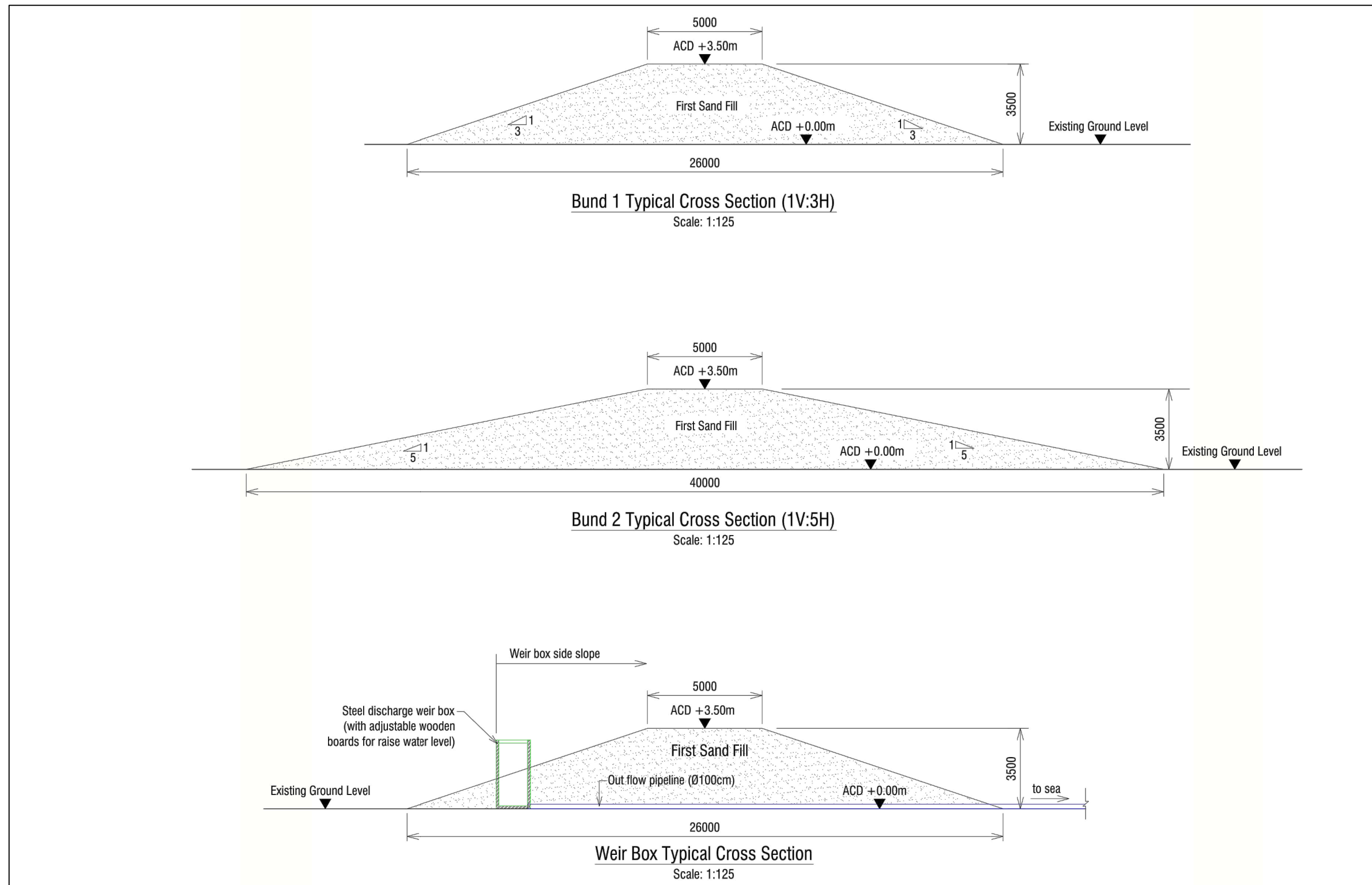
INSTALLATION NOTES:

1. Type II silt curtain or equivalent type is proposed. Type II silt curtain is capable of handling water speed up to 1 m/s.
2. Silt curtain should be oriented parallel to the directions of flow.
3. The curtain should extend the entire depth of the watercourse in calm-water situation.
4. In wave condition, the curtains should extend to within 0.3m (1ft) of the bottom of the watercourse, such that the curtain does not stir up sediment by hitting the bottom repeatedly. If it is desirable for the curtain to reach the bottom in an active-water situation, a pervious filter fabric may be used for the bottom 0.3m (1ft).
5. The top of the curtain should consist of flexible floatation buoys, and the bottom shall be held down by a load line incorporated into the curtain fabric. The fabric shall be brightly coloured impervious mesh.
6. The curtain shall be held in place by anchors placed at not more than 30m (100ft) apart on both sides.
7. First places the anchors, then tow the fabrics out in a furled condition, and connect to the anchors. The anchors should be connected to the floatation devices, and not to the bottom of the curtain. Once in place, cut the furling lines, and allow the bottom of the curtain to sink.
8. Sediment that has been deflected and settled out by the curtain may be removed if so directed by the on-site inspector or the site engineer. Consideration must be given to the probable outcome of the removal procedure. It must be asked if it will create more of sediment problem through resuspension of the particles or by accidental dumping material during removal. It is recommended that the soil particles trapped by the silt curtain only be removed if there has been a significant change in the original contours of the affected area in the watercourse.
9. Particles should always be allowed to settle for a minimum of 6 to 12 hours prior to their removal or prior to removal of the silt curtain.

ENVIRONMENTAL IMPACT ASSESSMENT

PROPOSED DEVELOPMENT OF
KUANTAN MARITIME HUB AT MUKIM
SUNGAI KARANG, KUANTAN,
PAHANG DARUL MAKMUR

EROSION AND SEDIMENT
CONTROL PLAN BMP DETAILS
(SILT CURTAIN)



CONSTRUCTION NOTES:

1. Sand bund to be constructed prior to the reclamation and land improvement works.
2. Embankment bund shall have a low gradient of 1V:3H or 1V:5H or gentler.
3. When the sand has reached the height of the initial weir box level, a second weir box level will be installed on top of the first box.
4. More weir boxes can be added on top to rise the reclamation level to as high as 18m.
5. The outflow pipeline will remain at the lowest weir box.
6. All weir box should be inspected periodically to ensure that access water can be discharged out properly.

ENVIRONMENTAL IMPACT ASSESSMENT
PROPOSED DEVELOPMENT OF
KUANTAN MARITIME HUB AT MUKIM
SUNGAI KARANG, KUANTAN,
PAHANG DARUL MAKMUR

EROSION AND SEDIMENT CONTROL PLAN BMP DETAILS (SAND BUND AND WEIR BOX)

FIGURE: 7.2.116

A Qualified Person is required to oversee the installation and maintenance of all erosion and sediment control measures on site. The responsible person will ensure that:

- The LD-P2M2 is being implemented properly;
- Repairs for the BMPs are undertaken as required; and
- Essential modifications are made to the LD-P2M2 if and when necessary.

Maintenance of BMPs

Proposed maintenance programme and the maintenance requirement for the proposed BMPs are presented in **Table 8.2.1** and **Table 8.2.2**.

Table 8.2.1: Maintenance Programs for the Proposed BMPs

Particular	Activity	Monitor/ Inspection Cycle			
		Daily	Weekly/ Bi-Weekly	Monthly	Immediate After Storm Event
Erosion and Sediment Control Plan	• Review with Contractor		■		
	• Modify/ improve erosion prevention			■	
BMPs	• Sand Bund			■	■
	• Weir Box and Discharge Pipe	■			■
	• Silt Curtain		■		■
	• Construction Entrance Stabilisation			■	■
	• Cut Off/ Earth Drain		■		■
	• Rock filter Check Dam		■		■
	• Sediment Basin		■		■
	• Silt Fence		■		■
	• Wash Trough		■		■
	• Stockpile and Solid Waste Management Area		■		■
Water Quality	Discharge Pipe from Weir Box				
	• Water analysis (Turbidity & TSS)		■		
	• Visual inspection	■			■
	Discharge point of sediment basin				
	• Water analysis		■		

Particular	Activity	Monitor/ Inspection Cycle			
		Daily	Weekly/ Bi-Weekly	Monthly	Immediate After Storm Event
	(Turbidity & TSS)				
	• Visual inspection	■			■

Table 8.2.2: Maintenance Requirements for the Proposed BMPs

BMP	Maintenance Requirements
Cut-Off / Earth Drain	<ul style="list-style-type: none"> Inspect bi-weekly and after each rainfall. Repair as necessary.
Rock Filter Check Dam	<ul style="list-style-type: none"> Inspect weekly and after each rainfall. Inspect for sediment build up and signs of erosion around the check dam to capture dam after each rainfall. Remove accumulated sediment, wherever it reaches one-third of the height of the dam, or one-half of the sump depth if a sump is provided.
Sediment Basin	<ul style="list-style-type: none"> Inspect bi-weekly and after each rainfall. Inlet and outlet of sediment basin shall be checked and all trapped rubbish and debris shall be removed. The sediment basin embankment shall be checked regularly to ensure that it is structural sound and has not been damaged by erosion. Accumulated sediment shall be removed from the basin when it reaches between 600 mm to 750 mm depth.
Silt Fence	<ul style="list-style-type: none"> Inspect weekly and after each rainfall. Repair wherever fence is damaged. Remove sediment when it reached one-third of the height of the fence.
Sand Bund	<ul style="list-style-type: none"> Inspect monthly and after each rainfall. Reshape and refill the sand bund as needed.
Weir Box and Discharge Pipe	<ul style="list-style-type: none"> Inspect daily and after each rainfall. Replace wherever the wooden board is damaged. Add on to the next box level when the sand has reached the height of the initial box level.
Silt Curtain	<ul style="list-style-type: none"> Check the anchor assembly for broken lines or signs that the anchors have been dragged. Ensure the silt curtain remains at the specific location. Check that the entire top edge should be above the water surfaces and the floatation devices is free of abrasion, cuts and holes in any seals; Check the connectors for mechanical damage and tears in the

BMP	Maintenance Requirements
	<p data-bbox="596 241 1126 271">fabric where they are attached to the curtain;</p> <ul data-bbox="549 293 1407 577" style="list-style-type: none"> <li data-bbox="549 293 1407 383">• Check that the curtain is free of tears and gaps which may cause turbidity leaks. Overlap tears on the curtain with a spare section or seal up the tear. <li data-bbox="549 405 1407 577">• Check for indications that the bottom edge is being buried by sediment which will cause the curtain to be gradually pulled downward by the weight of the sediment. If this happens, remove the sediment that accumulates in the folds or pleats. Use a long handled brush or raised the barrier a little to remove the silt in the pleats.
Construction Entrance Stabilization	<ul data-bbox="549 607 1394 730" style="list-style-type: none"> <li data-bbox="549 607 1054 636">• Inspect monthly and after each rainfall. <li data-bbox="549 651 1251 680">• Replace gravel material when surface voids are visible. <li data-bbox="549 696 1394 730">• Remove all sediment deposited on paved roadway within 24 hours.
Wash Trough	<ul data-bbox="549 752 1402 853" style="list-style-type: none"> <li data-bbox="549 752 1043 781">• Inspect weekly and after each rainfall. <li data-bbox="549 797 1402 853">• Ensure tires of the construction vehicle transports moving out from the construction site to be cleaned prior entering the public road.
Stockpile and Waste Management Area	<ul data-bbox="549 875 1402 1061" style="list-style-type: none"> <li data-bbox="549 875 1043 904">• Inspect weekly and after each rainfall. <li data-bbox="549 920 1402 987">• Ensure the stockpile is less than 2 m in height (wherever there is sufficient area). <li data-bbox="549 1003 1402 1061">• Acceptable waste bins will be provided. Frequency off clearances will be determined local authority or as necessary.

Keeping of Log Book

Logbook should always be kept on site for inspection by authorities with entries covering:

- Dates of installation and removal of BMPs;
- Repair of any damage to BMPs;
- Rainfall depths, duration and times;
- Condition of BMPs, structures and stabilised surfaces; and
- Water quality monitoring report (e.g. TSS and Turbidity).

8.2.2 Sewage

Containment and treatment of sewage generated during the construction and operational stages are important to prevent deterioration of the water quality and surrounding environment. The following measures are recommended.

- Temporary toilet facilities which fulfil specifications set by the Ministry of Health or National Water Services Council (SPAN) shall be made available throughout the construction stage. Toilets with septic tanks and portable toilets shall be adequately and strategically located at workers' rest area and site office.
- Septic tanks and portable toilets shall regularly inspected and de-sludged.
- The Proponent has proposed 4 units of Sewage Treatment Plant (STP) which are to be installed accordingly to the development phases as presented below. These STP shall be designed to at least Standard B of the Environmental Quality (Sewage) Regulations 2009. The proposed process flow and layout are presented as **Figure 5.3.6** and **Figure 5.3.7** respectively.

Table 8.2.3: Estimation of Population Equivalent (PE) for STP

STP	Phase	Establishment	Total PE
1	1a	Shipyard	1012
2	1b	Fabrication Yard	1720
3	1c	Institution Business Residential	8061
4	1c	Maritime Industrial Park	2467

- Operator of the STP shall be competent person. The competent person is responsible to ensure performance monitoring of STP is conducted and maintenance of the STP is planned and recorded.
- Periodical inspection and maintenance of the sewer pipeline system to ensure no leakage.
- Prohibit discharge of untreated sewage into the sea.

8.2.3 Drainage

The potential impact on upstream flooding from the KMH development are generally found to be small. This is due to the artificial channels created on the back of and across the reclamation being designed wide enough to convey severe floods without causing aggravated flooding of the hinterland. To minimize the project-related impacts on flooding, the following measures have been recommended in the channel design:

- An increase of the width of the extended Kuantan Port channel from 7 m to 10 m. The width of 10 m's has already been incorporated in the models and the modelling results presented above. It has also been adopted in the KMH masterplan.
- The (top-) width of the Sg. Pengorak extension channel being increased from 30 to 40 m. A (top-) width of 40 m is approximately 10 m's wider than that of the (top-) width of the existing engineered outlet which is nearly 30 m. A channel with a (top-) width of 40 m has already been incorporated in the model and the results of the modelling. It is also adopted in the KMH masterplan. It is noted that the relatively large channel width will ensure that the extended channel can convey severe flows to the sea without aggravating upstream flooding; both:
 - For Phases 1, 2 and 3 of the development, and
 - When the combined flows from Sg Pengorak and the culvert of Rumah Pangsa LPK peak concurrently.
- A decrease of the curvature of the bends in the channels near the existing outfalls. The proposed bends will generate super-elevations along the outer bank of the bend as well as impose a general head loss to the drainage system. See also in **Figure 7.2.117**. It is noted that the bend at the Sg. Pengorak river mouth can be accomplished only upon the approval to encroach the small parcel of land west of Sg. Pengorak and just seaward of the coastal road.



Figure 8.2.12: Previous (left) and recommended (right) realignment in front of Sg. Pengorak river mouth.

- A reduction of the channel bottlenecks by streamlining the reclamation frontage - see also **Figure 7.2.118**. This has already been incorporated in the model and the results of the modelling as well as the KMH masterplan.
- Adopt the L-shaped cross-sections for the Kuantan Port and Rumah Pangsa LPK drain extensions.

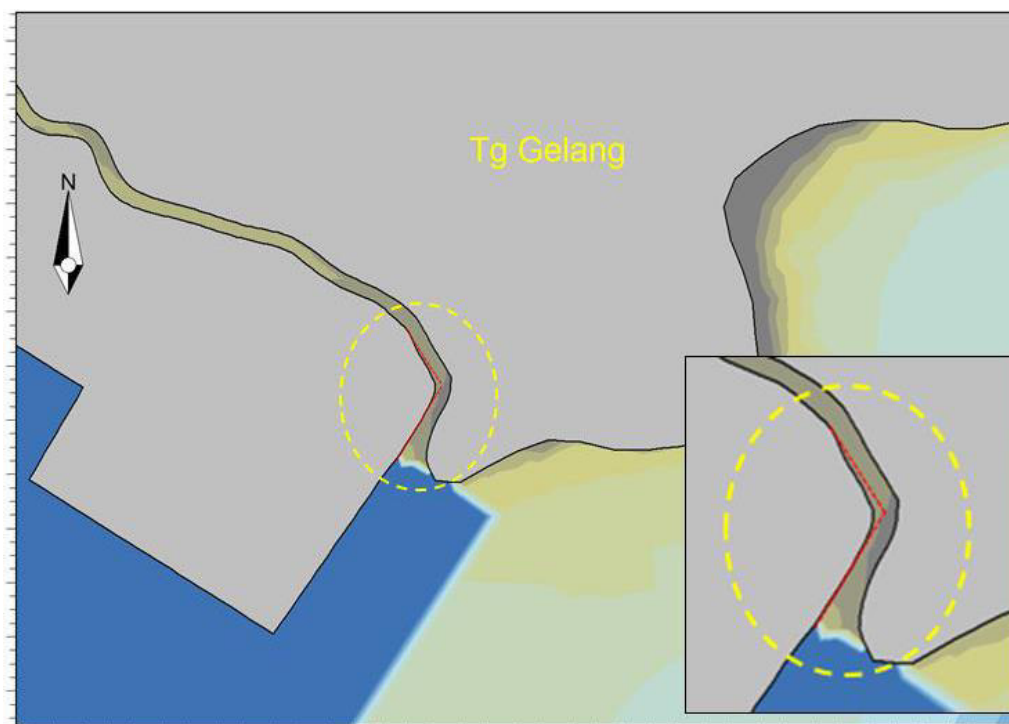


Figure 8.2.13: Rounded reclamation corner at the exit (red dotted lines indicates previous layout). Changes to the reclamation frontage is already incorporated in the modelling results.

8.2.4 Shoreline

Based on the sediment transport model results, it is considered that the current erosion and deposition patterns observed along the coastline further south of headland of Tg. Gelang is predicted to be shifted further south corresponding to the width of the project development after construction of this project due to a change in the sediment transport condition. It should be noted that the actual coastal erosion rates each year are dependent on the wave conditions. Therefore there is always some uncertainty on the erosion lengths. It is therefore also proposed that shoreline monitoring is carried out in the potential coastline changes area.

The coastal erosion and the sedimentation of river mouths and outfalls should be monitored closely. The determination of location, length and space of profile surveys must take the following features into consideration:

- River mouths (Kuala Pengorak during Phase 1a and 1b, Kuala Balok)
- Existing storm water / industrial outfalls nearby (if any)
- Recreational spots
- Home stays and beach resorts including the beaches resorts just south of Kuala Balok, i.e., Swiss garden, Muara and De Rhu.
- Potential erosion/accretion areas from development to Kuala Balok

If coastal erosion associated with the development is identified by the monitoring, then proper mitigation measures should be implemented. Due to the recreational value and the usage of the

coastline south of the development, any incremental erosion should be mitigated using either carefully designed hard structures or simply nourishment of the foreshore with suitable sand. Foreshore nourishment should be targeted to strategic locations and nourishment volumes should be sufficient to secure coastal stability for 5-10 years.

The detailed shoreline monitoring plan is summarised in **Section 9.4.2** of this EIA report.

8.2.5 Other General Measures

- All temporary fuel tanks and storage areas should be provided with drip collection devices and be sited on sealed areas with a bund enclosure capable of containing 110% of the inventory of the largest tank; the provision of a weather shelter over the storage tank is an appropriate measure to prevent the accumulation of rainwater within the bund. This fuel storage facilities and refuelling activities shall be located away from any waterways.
- Heavy machinery and vehicles need to be maintained regularly and checked for leaks. Maintenance of vehicles, machinery and equipment on site involving the handling of oil and grease is to be carried out at an appropriate workshop which is to be appropriately bund and equipped with oil and grease trap that is regularly inspected and maintained.
- Spill cleaning kits are to be made available and located at strategic locations on-site and be used in the unlikely event of a spillage of chemical or oil related material. The disposal of used rags and spill kit materials is to be in accordance with the Environmental Quality (Scheduled Waste) Regulation 2005.
- All site workers are to be trained regarding the appropriate use, handling and disposal of site based chemicals and lubricants, as well as emergency spill response.
- All drainage system shall be checked and maintained periodically to ensure the functionality of the system.
- Any other wastewater generated shall be treated to Standard B of the Environmental Quality (Industrial Effluent) Regulations 2009 prior to discharge or contain for off-site treatment.
- Vessels involve in the Project activities are to comply with MARPOL requirements which covers preventions of pollution by oil, pollution by noxious liquid substances in bulk and harmful substances, pollution by sewage and garbage from ships. Oily effluents from the moving vessels must be treated to meet MARPOL requirements of 15 mg/L.
- The use of anti-fouling paint shall comply with International Maritime Organisation's (IMO) Convention on the Control of Harmful Antifouling Systems for Ships by using organotin-free anti-fouling paints or biocide-free non-stick coatings.

8.3 Air Quality

In Chapter 7 of this EIA report, the potential impacts of the Project to the air quality have been assessed for different stages of the Project. The expected impacts are deemed insignificant in all marine work, land work and operational stages. However, the following mitigation measures are recommended to minimise the potential short term increase of combustion gases associated with the marine works, land construction work and operation stage.

8.3.1 Marine Works

- Fuel burning equipment to be regularly maintained and serviced to prevent emission of excessive dark smoke.
- Engine to be switched off in enclosed or partially enclosed area if to be stationary for more than 3 minutes.

8.3.2 Land Works

- Exposed areas including access roads and stockpiles of loose construction materials shall be damped (water sprinkler) or covered during dry and windy days to reduce fugitive dusts.
- Exposed areas shall be stabilised or vegetated (where applicable) as soon as practicable. Vegetation and trees are effective wind breaker and could trap entrained dust.
- Provision of full hoarding along the land side boundary of the work areas. This is to trapped entrained dust from the work areas to the nearby receptor areas.
- Vehicle wash trough with silt trap is to be constructed at the exit point from the Project site prior entering to the public road. This is to reduce sediment from work areas being carry onto the public roads. Also refer Section 7.2.4.1 of this EIA report.
- Speed limit to be imposed on vehicles entering the Project site to reduce dusts entrainment.
- Fuel burning equipment to be regularly maintained and serviced to prevent emission of excessive dark smoke.
- Contractor shall adhere to all applicable requirements including the Environmental Quality (Control of Emission from Diesel Engines) Regulations, 1996. Maximum concentration of smoke from construction vehicles shall not exceed Ringlemann No.2, in accordance with the procedure specified in the Fourth Schedule of the said regulations. All vehicles used on site must adhere to the emission standard of pollutants as in the Second Schedule of the said regulations.
- Engine to be switched off in enclosed or partially enclosed area if to be stationary for more than 3 minutes.
- Prohibit open burning at site.

8.3.3 Operational Stage

- Major blasting and painting activities to be done within enclosed space / building to contain any fugitive emissions.
- Proposed bag filters and scrubber shall be designed and operated to meet the requirement of Environmental Quality (Clean Air) Regulations 2014 and associated design guidance documents. Competent person is required to operate and ensure the performance of these pollution control systems.
- Maintenance of pollution control systems shall be scheduled and spare parts are to be made available for efficient repairs when required.
- Fuel burning equipment to be regularly maintained and serviced to prevent emission of excessive dark smoke.
- Engine to be switched off in enclosed or partially enclosed area if to be stationary for more than 3 minutes.

8.4 Noise

Noise impact assessment during construction and operation has been discussed in Chapter 7. It is concluded that noise during construction will mainly be generated by piling work, which is short term and temporary in nature; while noise during operation is deemed insignificant during daytime and night time, with proper mitigating measures implemented and standard working time adhered.

At the same time, noise exposure to workers manning the machinery and workers in the general vicinity may be significantly higher. Without protection, workers subjected to high noise level are at risk of hearing impairments. The risk of noise-induced permanent hearing loss becomes greater if either noise levels and/or duration of exposure increases. With proper measures implemented, the risk and effect from noise will be further reduced.

The following measures are recommended.

- Provision of full hoarding along the land side boundary of the work areas. This is to attenuate noise generated from the work areas to the nearby receptor areas.
- Establish periodical maintenance schedule for all motorised machineries and equipment as preventive measure to minimise emission of loud noise. Attention shall be given to efficiency of mufflers / silencers to reduce noise emission.
- Enclosure or other type of acoustic measures shall be applied on equipment which contribute to noise levels higher than 85 dB(A).
- Safety signage shall be installed to inform workers of areas with high noise level. To ensure a safe and healthy workforce, proponent and its contractors shall provide workers who work in high noise level areas with adequate protective devices such as earmuffs or earplugs. Exposure to high noise levels shall be managed and limited as prescribed in the First Schedule of the Factories and Machinery (Noise Exposure) Regulation 1989.

8.5 Waste Management

Waste generated during development and operation stages of the Project will potential deteriorates the condition of the surrounding environment if they are not properly managed. Waste generators are responsible to establish effective waste management programme prior to waste generation. Anyhow, the proposed Project is expected to generate some wastes during both the construction and operation stages. The anticipated type of waste, sources of waste and proposed management approach is presented in **Table 7.5.1** in Chapter 7.

8.5.1 Construction Stage

- Good housekeeping
- Establish a waste management plan which includes allocation of a dedicated construction waste storage area on site, frequency of waste collection and disposal and periodical inspection on site.
- Minimise generation of solid waste by sound planning of material usage, using reusable items and encourage 3Rs (Reuse, Reduce and Recycle) concept among workers.
- Scheduled wastes shall be managed and handled in accordance with the Environmental Quality (Scheduled Waste) Regulation 2005.
- Provide adequate number of waste bins at strategic locations around the site office and work areas.
- No open burning at the Project site.

8.5.2 Operation Stage

- Good housekeeping
- Minimise generation of wastes by sound planning of material usage, using reusable items and encourage 3Rs (Reuse, Reduce and Recycle) concept.
- To establish scheduled waste management plan to ensure that scheduled wastes are managed and handled in accordance with the Environmental Quality (Scheduled Wastes) Regulation, 2005.
- To dedicate storage areas for scheduled wastes where floor should be concreted, roofed, provision of concrete dyke and sump for spillage containment. Incompatible scheduled wastes shall be segregated accordingly.
- Scheduled wastes shall be stored in leak-proof containers, labelled, inventoried and temporarily stored within the dedicated scheduled waste storage area prior to disposal off site. These wastes may be stored on site for 180 days or less, provided that the accumulation quantity does not exceed 20 MT at one particular time.
- Spill kits are to be made available for the containment or clean-up of spills. Material used to contain / clean-up spillage shall be handled as scheduled waste.

- Collection, recovery or disposal of scheduled wastes shall be by DOE licensed transporters to approved and licensed premises.
- Waste with recovery value should be reused or recovered to minimize the actual amount of waste that needs to be disposed.

