LAND DISTURBING POLLUTION PREVENTION AND MITIGATION MEASURES (LD-P2M2)

DECLARATION BY ESCP PREPARER

I certify that LD-P2M2 that is designed based on Best Management Practices (BMPs) in compliance with the criteria/standards/code of practices stipulated in the relevant documents and best engineering practices in erosion and sediment control.

PROJECT TITLE
Proposed Landfill Rehabilitation And Land Reclamation Works For Mixed Development At Seksyen 8, Bandar Jelutong, Daerah Timur Laut, Pulau Pinang

PROJECT ADDRESS/LOCATION
At Seksyen 8, Bandar Jelutong, Daerah Timur Laut, Pulau Pinang

Name of ESCP preparer Ir. Dr. Lee Aik Heng

Signature: _____ Date: 30th April 2024

CPESC Registration: 6681

LAND DISTURBING POLLUTION PREVENTION AND MITIGATION MEASURES (LD-P2M2)

DECLARATION BY OWNER/AUTHORIZED PERSON

I certify that I shall undertake the responsibility to ensure the Land Disturbing Pollution Prevention And Mitigation Measures (LD-P2M2) will be implemented and the Best Management Practices (BMPs) stated in the LD-P2M2 will be installed, inspected and maintained according to the best engineering practices in soil erosion and sediment control.

PROJECT TITLE

Proposed Landfill Rehabilitation And Land Reclamation Works For Mixed Development At Seksyen 8, Bandar Jelutong, Daerah Timur Laut, Pulau Pinang

PROJECT ADDRESS/LOCATION

At Seksyen 8, Bandar Jelutong, Daerah Timur Laut, Pulau Pinang

DATO' SIOW KOK YONG, JP

Name of project proponent/authorized person

Signature:( ) Designation: GROUP CHIEF OPERATING OFFICER

Date: 2ND MAY 2024

3.1 Annual Soil Loss

The Revised Universal Soil-Loss Equation (RUSLE) can be used to predict the longtime average annual soil loss carried by runoff from specific slopes in specified management conditions. Annual Soil Loss is calculated in terms of A as:-

$A = R \cdot K \cdot Ls \cdot C \cdot P$ (Equation12.1 of MSMA 2nd Edition, 2012)
where
A = Spatial average soil loss and (tonnes/ha/yr)
R = Rainfall-Runoff Erosivity Factor (MJ.mm/ha/h)
K = Soil Erodibility Factor (tonnes/ha/(MJ.mm/ha/h))
Ls = Topographic Factor
C = Cover Management Factor
P = Support Practice Factor

3.1.1 Rainfall-Runoff Erosivity Factor (R)

The rainfall-runoff erosivity factor for Penang Island shall be taken in the range of 15000 – 17500 MJ.mm/ha/h as shown in Figure 12.5 of MSMA 2nd Edition, 2012. The value of 17500 has been used in the following calculations for conservative estimation.

3.1.2 Soil Erodibility Factor (K)
Soil erodibility defines the resistance of the soil to both detachment and transport. It is an important index to measure soil susceptibility to water erosion and it is a function of soil texture, aggregate stability, shear strength, infiltration capacity, soil organic and chemical content. Equation 12.3 of MSMA 2nd Edition, 2012 by Tew, 1999 has been adopted to determine the K factor for the construction site and presented as follows:-

$K = [10 \cdot 10^{-4} \cdot (12\text{-}OM) M^{1.14} + 4.5 (S-3) + 8.0 (P-2)]/100$ (Equation 12.3 of MSMA 2nd Edition, 2012)
where
M = (% silt + % very fine sand) (100 - % clay);
OM = % of organic matter;
S = soil structure code; and
P = permeability class

3.1.4 Slope Length and Steepness Factor (Ls)
The effect of topography on erosion is accounted by the Ls factor. Erosion increases as slope length and steepness increases. Typical Ls values for different combinations of slopes and slope lengths can be found under Table 12.3 of MSMA 2nd Edition, 2012. Linear interpolation has been performed for intermediate slope % and slope length values.

An alternative equation was used to calculate Ls and it is shown as follows:-

$Ls = (\lambda/\Psi)^m \cdot (0.065 + 0.046 \cdot s + 0.0065 \cdot s^2)$ (Equation 3.9 of Guideline for Erosion and Sediment Control in Malaysia)

where
λ = Sheet Flow Path Length (m)
Ψ = 22.13 for SI Units
s = Average Slope Gradient (%)
m = 0.2 for $s<1$, 0.3 for $1 \leq s<3$, 0.4 for $3 \leq s<5$, 0.5 for $5 \leq s<12$ and 0.6 for $s \geq 12\%$

3.1.4 Cover Management Factor (C)
The C factor reflects the effect of management practices on erosion rates. It indicates how the practices will affect the average annual soil loss and how that soil-loss potential will be distributed in time during construction activities. C factor was chosen based on Table 12.4a, 12.4b and 12.4c of MSMA 2nd Edition, 2012.

3.1.5 Support Practice Factor (P)
The support practice factor is the ratio of soil loss with a specific support practice to the corresponding loss with upslope and downslope tillage.Typical values for P factor can be found on Table 12.5 of MSMA 2nd Edition, 2012.

3.1.6 Summarised RUSLE Results

The annual soil loss for each development phase is summarised as follows:-

Condition	R [MJ.mm/ha/h]	K [tonnes/ha/[MJ.mm/ha/h]	LS	C	P	Annual Soil Loss [tonnes/ha/year]
Pre-Development	17500	0.462	11.901	0.03	0.1	288.78
Construction Without Mitigation	17500	0.462	11.901	1	1	96261.19
Construction With Mitigation	17500	0.462	11.901	0.1	0.06875	661.80
Post Development	17500	0.461	0.121	0.05	0.1	4.89

3.2 Sediment Yield

The Modified Universal Soil-Loss Equation (MUSLE) can be used to predict the sediment yield in a watershed to a specific location for a specific storm event. This allows designers to accurately determine the sizings of sediment basin based on design storms. Sediment yield per design storm event is calculated in terms of T as:-

$T = 89.6(V \cdot Q_p)^{0.56} K \cdot Ls \cdot C \cdot P$ (Equation 12.4 of MSMA 2nd Edition, 2012)

where

T = Sediment yield for a specific storm event (tonnes)

V = Volume of runoff due to the storm event (m^3)

Q_p = Peak flow for the storm event (m^3/s)

K·Ls·C·P = Same Parameters as RUSLE

3.2.1 Design Storm

The sediment yield is predicted based on 10 year ARI 20 minutes design storm.

Since the design storm duration is less than 30 minutes, Equation 13.3 MSMA 2016 which involves data interpolation of 30 minutes & 60 minutes design storm is recommended to calculate the precipitation depth and Equation 13.4 MSMA 2016 can be used to convert the precipitation depth into rainfall intensity.

The rainfall intensity and precipitation depth for 10 year ARI 30 minutes & 60 minutes design storm is calculated based on Equation 13.2 MSMA 2016: Polynomial Approximation for IDF curves method.

Parameters

Location: Penang Island

ARI = 10 years

Storm Duration = 20 minutes

a = 3.7277 (Table 13.A1 MSMA 2016)

b = 1.4393 (Table 13.A1 MSMA 2016)

c = -0.4023 (Table 13.A1 MSMA 2016)

d = 0.0241(Table 13.A1 MSMA 2016)

$^2P_{24h}$ = 140 mm (Figure 13.3 MSMA 2016)

F_D = 0.38 (Table 13.3 MSMA 2016)

$^{10}I_{30min} = \exp(3.7277+1.4393 \cdot \ln(30)-0.4023 \cdot [\ln(30)]^2+0.0241 \cdot [\ln(30)]^3) = 136.6$ mm/hr

$^{10}P_{30min} = 136.6 \cdot (30/60) = 68.3$ mm

$^{10}I_{60min} = \exp(3.7277+1.4393 \cdot \ln(60)-0.4023 \cdot [\ln(60)]^2+0.0241 \cdot [\ln(60)]^3) = 92.8$ mm/hr.

$^{10}P_{60min} = 92.8 \cdot (60/60) = 92.8$ mm

$^{10}P_{20min} = 68.3 - 0.38(92.8-68.3) = 59.01$ mm

$^{10}I_{20min} = 59.01 \cdot (60/20) = 177.0$ mm/hr

3.2.2 Peak Flow of the Storm Event

The peak flow for the design storm event can be calculated using the Rational Method MSMA 2012.

$Q = (C \cdot I \cdot A)/360$

where

Q = Peak Discharge (m^3/s)

C = Coefficient of Runoff (Table 2.5 MSMA 2012)
I = Design Rainfall Intensity (mm/hr)
A = Catchment Area (ha)

$C_{pre\text{-}development}$ = 0.30 (Table 2.5 MSMA 2012: Agriculture)
$C_{uncontrolled\ construction}$ = 0.50 (Table 2.5 MSMA 2012: Baresoil with no cover)
$C_{controlled\ construction}$ = 0.50
$C_{post\text{-}development}$ = 0.80 (Table 2.5 MSMA 2012: Residential/Commercial)
$^{10}I_{20min}$ = 177.0 mm/hr

3.2.3 Runoff Volume

The site runoff volume shall be calculated using the rational hydrograph method proposed by MSMA 2nd Edition, 2012 and the equation is presented as follows:-

$V = 0.5 \cdot (2\,T_c) \cdot Q_p$
Where
T_c = time of concentration = $(107 \cdot n \cdot L^{1/3})/S^{1/5}$ (Table 2.1 of MSMA 2nd Edition, 2012)

3.2.4 Summarised MUSLE Results

The sediment yield per 10 year ARI 20 minutes storm event for each development phase is summarised as follows:-

Condition	V (m3)	Qp (m3/s)	K*LS*C*P	Y (tonnes)
Pre-Development	258	1.03	0.01650	33.72
Construction Without Mitigation	364	0.79	5.50064	11765.53
Construction With Mitigation	364	0.79	0.03782	80.89
Post Development	610	1.19	0.00028	1.00

Sediment yield for construction with mitigation (i.e. BMPs have been practiced on site) serves as a guideline to assess the adequacy of the sediment basin sizing. The proposed sediment storage zone of the sediment basin should be able to cater for sediment loads during construction with mitigation. In the event of proposed sediment basin effluent not complying with DOE requirements of 50 ppm, site engineers is required to assess whether the proposed BMPs are installed accordingly as per LDP2M2.

PLB ENGINEERING BERHAD

(Company No: 199701002728 (418224-X))

REHABILITATION AND RECLAMATION PLAN & EARTHWORK EROSION AND SEDIMENT CONTROL PLAN (ESCP) REPORT

PERMOHONAN PELAN KERJA TANAH UNTUK KERJA-KERJA TEBUSGUNA TANAH BAGI PEMBANGUNAN BERCAMPUR DAN PERDAGANGAN DENGAN NISBAH PLOT 5:1, DI ATAS TANAH KERAJAAN TEBUSGUNA JELUTONG (TAPAK PELUPUSAN SAMPAH SEDIADA), SEKSYEN 8, BANDAR GEORGETOWN, PULAU PINANG.

GLOBAL WATER CONSULTANTS SDN. BHD. (200601017878)

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Prepared for:
PLB ENGINEERING BERHAD
1320, Jalan Baru,
Taman Chai Leng,
13700 Prai,
Penang.

April 2024

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1.0 INTRODUCTION

Global Water Consultants Sdn. Bhd. has been engaged by PLB Engineering Bhd. (hereinafter refer to as the 'Client'), as the reclamation and geotechnical consultant for land reclamation of the proposed development (hereinafter refer to as the 'Project') titled:

"PERMOHONAN PELAN KERJA TANAH UNTUK CADANGAN PEMBANGUNAN BERCAMPUR DAN PERDAGANGAN DENGAN NISBAH PLOT 5:1, DI ATAS TANAH KERAJAAN TEBUSGUNA JELUTONG (TAPAK PELUPUSAN SAMPAH SEDIADA), SEKSYEN 8, BANDAR GEORGETOWN, PULAU PINANG UNTUK TETUAN: PLB ENGINEERING BHD".

The proposed development consists of two parts namely the rehabilitation of the existing 90 acres Jelutong dumpsite (JDS) and 70 acres reclamation fill adjacent to the dumpsite.

The objective of this report is to present the **rehabilitation and reclamation plan & erosion and sediment control plan (ESCP)** for the Project.

1.1 Project Information

Project Title	PERMOHONAN PELAN KERJA TANAH BAGI PEMBANGUNAN BERCAMPUR DAN PERDAGANGAN DENGAN NISBAH PLOT 5:1, DI ATAS TANAH KERAJAAN TEBUSGUNA JELUTONG (TAPAK PELUPUSAN SAMPAH SEDIADA), SEKSYEN 8, BANDAR GEORGETOWN, PULAU PINANG UNTUK TETUAN: PLB ENGINEERING BHD
Developer	**PLB Engineering Bhd.** 1320, Jalan Baru, Taman Chai Leng, 13700 Prai, Penang. Tel: +604-390 5737 Fax: +604-397 5350 Contact Person: Dato Siow Kok Yong
Architect	**W. K. Khor Architect Sdn. Bhd.** 33, College Avenue, 10250, Georgetown, Penang Tel.: +604-228 8770 Fax: +604-226 6771 Contact Person: Ang Boon Huat
Reclamation Engineer	**Global Water Consultants Sdn. Bhd.** 23-4, Jalan Tasik Selatan 3, Bandar Tasik Selatan, 57000 Kuala Lumpur. Tel: +603-9059 5396 Fax: +603-9059 5869 Contact Person: Ir. Lim Choon Lin
Approving Authorities	Majlis Bandaraya Pulau Pinang Jabatan Pengairan dan Saliran Negeri Pulau Pinang Jabatan Kerja Raya Pulau Pinang Jabatan Mineral dan Geosains Malaysia (Kedah / Perlis / Pulau Pinang)

1.2 Limitation on Use and Liability

This report is confined to and for the sole use by the Client and the Local Authorities for the specific purpose to which it refers. It may be disclosed to other professional advisors assisting the Client and/or the Local Authorities in respect of the particular purpose only. This report is given in good faith based on best available information obtained from the Client and the Consultant shall not be held liable in any way whatsoever for misuse of the report.

Please note that as this rehabilitation and reclamation plan & ESCP report is submitted for excavation at existing dumpsite for rehabilitation and sea reclamation works, control measures for landside development are not included. A separate ESCP shall be submitted by the C&S Engineer for infrastructure and landside development.

2.0 BACKGROUND

Based on the report entitled "Jelutong Dump Site, Penang – Preliminary Investigation & Conceptual Closure Options Appraisal" prepared for the Penang Development Corporation by the consultants M.E.I. Consultants Sdn. Bhd. based in Penang and CH2M HILL Malaysia Sdn. Bhd., records indicate that waste disposal commenced within JDS as early as the late 1990s as part of the redevelopment of adjoining land and the construction of the Tun Dr Lim Chong Eu Expressway in 2001. The predominant waste stream is understood to have been residential collection wastes comprising putrescible, biodegradable materials (referred to herein as MSW) such as food, packaging, paper, timber, and plastics.

A majority of the wastes after 2002 comprised of construction, demolition and soils excavated as part of the ongoing development works on Penang Island. Green wastes collected from parkland areas were also disposed at the JDS.

Formal records of individual waste streams are not available prior to 2005. However, it is considered that a greater proportion of the waste input would be comprised of MSW derived from residential dwellings.

From 2005, following the diversion of residential (household) waste streams away from the JDS, disposal of wastes was largely estimated to be from construction, demolition and soil materials derived from foundation construction works on the Island (e.g., piling). Green (park) type wastes are still being accepted at JDS, but is likely to represent a low percentage by tonne of the current total waste input to the site.

Based on a topographic survey of the dumpsite carried out in August 2021, the estimated volume of the dump site materials is 7,380,000 m^3 and the waste height has reached some 37 m above mean sea level (MSL).

The current lateral extent of the JDS is already at its capacity for the waste disposal operations to expand southwards, northwards or eastwards. Expansion of the waste disposal operations is blocked by two stormwater / treatment plant drains located immediately north and south of the dumpsite. However, it is understood that wastes are still being dumped at JDS annually by increasing the waste height. This is significant in terms of maintaining stable side slopes now that the waste height is up to 37 m above MSL.

3.0 SITE DESCRIPTION

3.1 Project Location and Layout Plan

The location plan for the proposed reclamation and development is as shown in **Figure 1.** The proposed project site is located at Jelutong Town, bounded between The Light reclamation at the southern side and Sungai Pinang at the northern side. The existing Jelutong dumpsite is located directly adjacent to Tun Dr. Lim Chong Eu Highway and stretches ~820 m seaward and is approximately 90 acres. The existing level of the dumpsite is up to +37 mNGVD at its highest and closer towards Tun Dr. Lim Chong Eu Highway and is +4mNGVD at its lowest further seaward and slopes into the sea. The dumpsite is to be rehabilitated and dump materials removed to platform level of +3.35 mNGVD and subsequently fill with process suitable material to the final platform level of +4.35 m and +5.00m NGVD respectively.

The proposed reclamation is approximately 70 acres and is located north of the existing Jelutong dumpsite and adjacent to Karpal Singh Drive. The final platform level of the proposed reclamation development is +4.35 m and +5.00m NGVD respectively . The layout of proposed reclamation and sections are shown in **Figure 2** and **Figure 3** respectively.

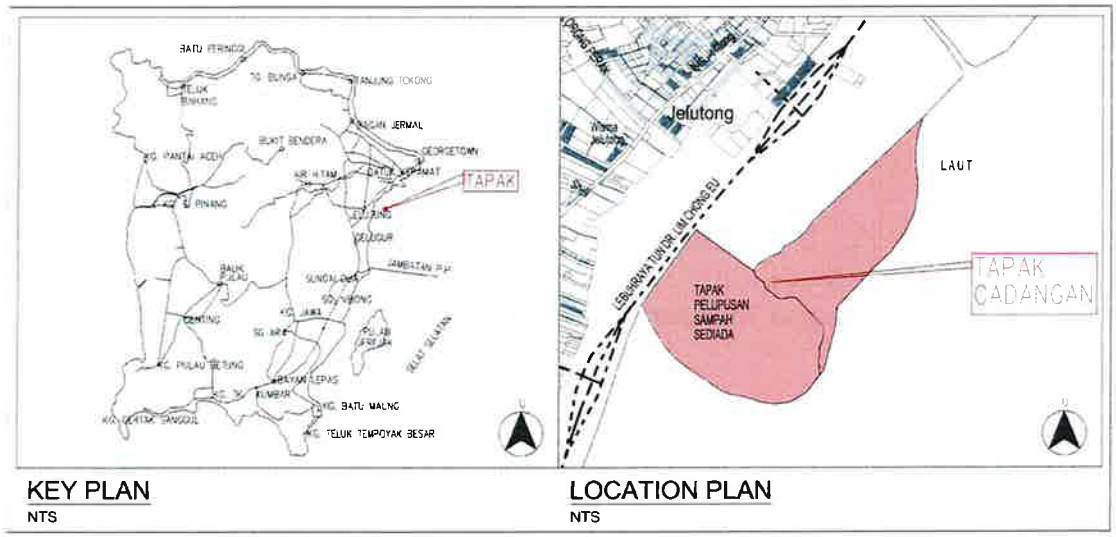


Figure 1: Key Plan and Location Plan.

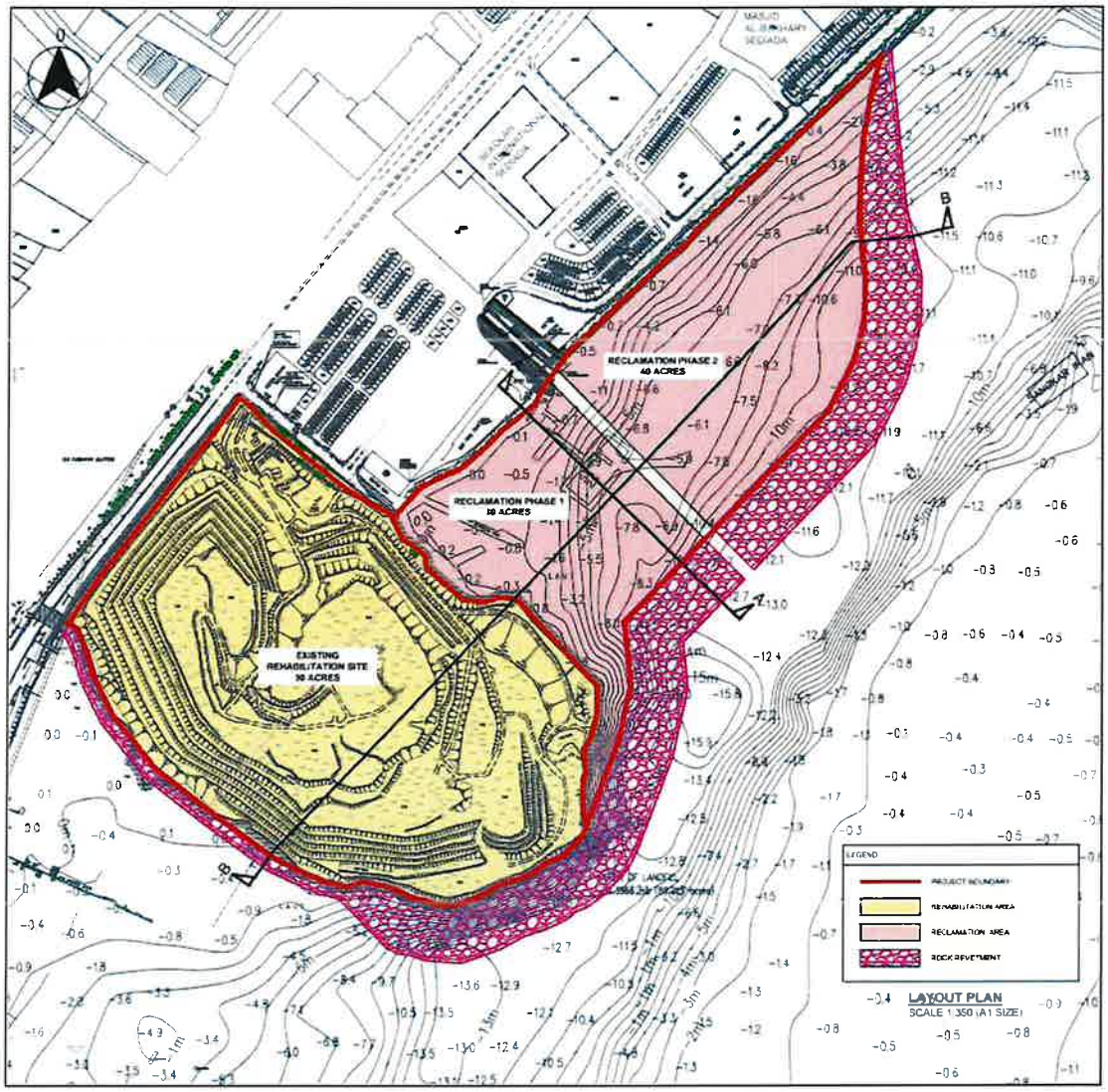
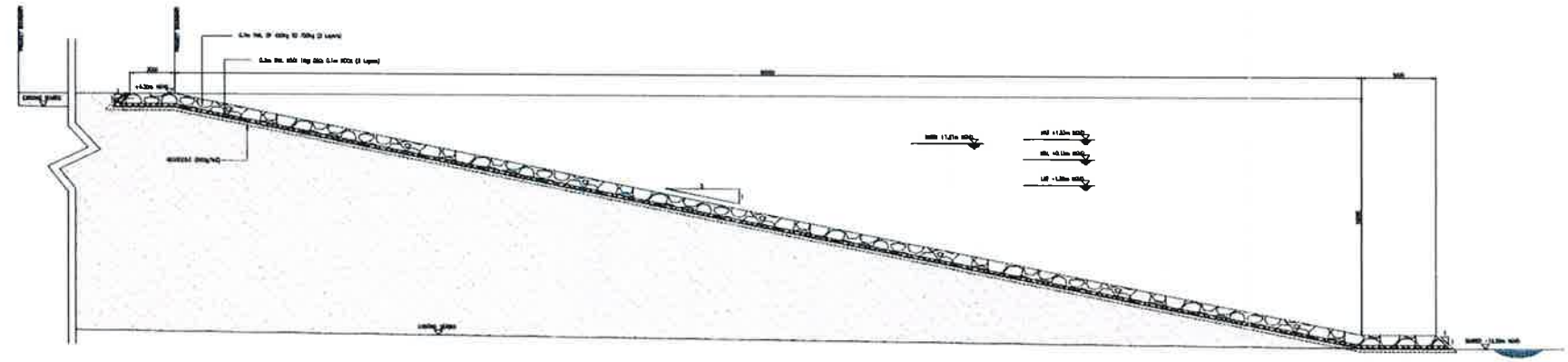


Figure 2: Rehabilitation and Reclamation Layout Plan.



SECTION A-A
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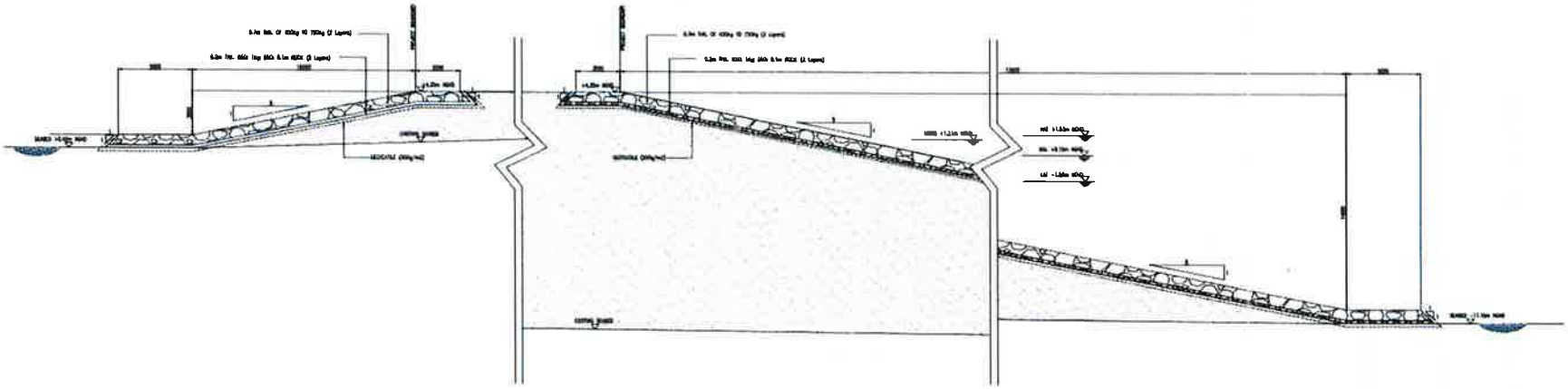


SECTION B-B
SCALE 1:150 (A1 SIZE)

Figure 3: Reclamation Cross Section (Section A-A) & (Section B-B).

3.2 Water Levels and Tidal Range

Due to the influence of tidal effects in the open sea (near-shore and off-shore), seawater levels can vary considerably. As such, it is important to be aware of the seawater levels under the influence of tidal effects. **Table 1** summarises the abovementioned tidal levels at Standard Port at Kedah Pier, Penang.

According to the Tide Tables Malaysia 2023 published by the National Hydrographic Centre, Royal Malaysian Navy and the Bathymetric Survey of the proposed site dated July 2020, the seawater levels at the outermost region of the proposed reclamation is estimated to range from 9m to 13m above the seabed (based on Mean High Water Spring – MHWS at +1.13mNGVD).

Table 1: Tidal Chart.

Tide	Chart Datum Level (mCD)	National Geodatic Vertical Datum Level (mNGVD)
Lowest Astronomical Tide (LAT	0.00	-1.56
Mean Low Water Spring (MLWS)	0.72	-0.84
Mean Low Water Neap (MLWN)	1.45	-0.11
Mean Sea Level (MSL)	1.71	0.15
Mean High Water Neap (MHWN)	1.96	0.40
Mean High Water Spring (MHWS)	2.69	1.13
Highest Astronomical Tide (HAT)	3.09	1.53
Proposed Platform Level	5.91	4.35

Note: Tidal Levels above are referenced to the Standard Port at Kedah Pier, Penang.

4.0 REHABILITATION / RECLAMATION STRATEGY

PLB Engineering Bhd. has proposed a combination of the following strategies when carrying out the rehabilitation / reclamation plan:

- The need to reduce waste heights to improve amenity and safety for surrounding communities. One of the key outcomes of the community consultation process is to provide some open space when JDS is rehabilitated. It is thus considered that some reshaping of the current waste profile is required in order to achieve this.
- In reducing the waste heights a large proportion of materials would be recovered, recycled and used to construct engineered fill development platforms within the JDS site and also along other sections of the coastline. This not only enhances the current dumpsite but would also provide additional land along the coastline.
- In constructing an engineered fill development platform at JDS there is also a need to cap, contain and manage MSW within the JDS.

In order to rehabilitate the JDS site an adjacent 70 acres reclamation site platform need to be reclaimed so that recycling equipment could be installed progressively to meet the schedule masterplan timeline. The details of this combined 90 acres JDS rehabilitation plan and 70 acres adjoining reclamation plan is described in the next section. Broadly, the volumes involved are as follows:

1. Estimated Volume of waste at Rehabilitation Area from level 0.00m MSL to +37.00m MSL = **7,380,000 m^3** ;
2. Volume of suitable sand required at adjoining reclaimed site to fill up to an initial platform level of Mean High-Water Spring (MHWS) + 0.5 m, 1.63m NGVD = **2,520,000 m^3;**
3. Volume of recycled suitable material that is required to fill the 70 acres reclamation area from MHWS + 0.5 m until the surcharge height of 7 m = **3,350,000 m^3;**
4. Estimated volume of **6,225,800 m^3** available from level +3.35m MSL to +37.00m MSL that can be recycled to usable material for reclamation in **Item 3** above is 65%* = 0.65 x 6,225,800 = **4,046,770 m^3;**
5. Of the 4,046,770 m^3, 3,350,000m^3 would be utilised for Item 3 above and the balance **696,770m^3** could be used for topping up the platform level from +4.35m NGVD to +5.00m NGVD and +5.35m NGVD at New Reclamation Area and Rehabilitation Area respectively.
6. Estimated volume of the balance 35% = 0.35 x 6,225,800 m^3 = **2,179,030 m^3** unsuitable material can be sold as secondary bulk aggregate material (reinforcement bars, old tyres, etc) for construction and the balance would be disposed of at an approved dumping ground at Pulau Burong.

**Note: Assumption on the information provided by Project Proponent.*

In total, 20 waste bulk construction material recycling machines (see **Figure 4** below) would be installed progressively commencing from the only suitable site on the 90 acres JDS dumpsite and the balance to be installed on the adjoining 70 acres reclamation site.

Below information and assumptions was obtained from Project Proponent.

Each sorting line of Recycling Machines input / output and performance criteria would be as follows:

a) Design capacity for 1 sorting line is 60 m^3/hr.
b) Working operation for the machine is 10 hours.
c) 1 sorting line will need 5,000 m^2 of drying area for lowering moisture of waste.
d) 25 days to finish installation of 1 sorting line.
e) Working platform for 1 line will be about 55 m long, 22 m wide and 9 m high.
f) Working platform for 1 line with another sorting line is 20 m.
g) Estimated time for setting up 1 rehabilitation working platform to accommodate 2 recycling machines (2 sorting lines) is 4 months.
h) Designed capacity for 1 sorting line is 60m^3 / hr
i) Working operation for machine is 10hours
j) Hence , 60m3 x 10hr = 600m^3/day/line
k) Assuming 65% are the reusable material to be reused for surcharging at reclamation area = 65% x 600m^3/day/line = 400m^3/day/line
l) Daily production based on 2 sorting lines, = 2 x 400 = **800m3/day**
m) The initial area (WP1) described and shown in the subsequent section would be near to the existing weigh-bridge office and current site office area.
n) It is envisaged that during the process of rehabilitating the 90 acres JDS dumpsite, there will be ongoing waste dumping activities, therefore, coordination between all relevant parties involved is needed so that both activities can go on concurrently and smoothly until a point in time when the waste dumping activities can be relocated to another site.

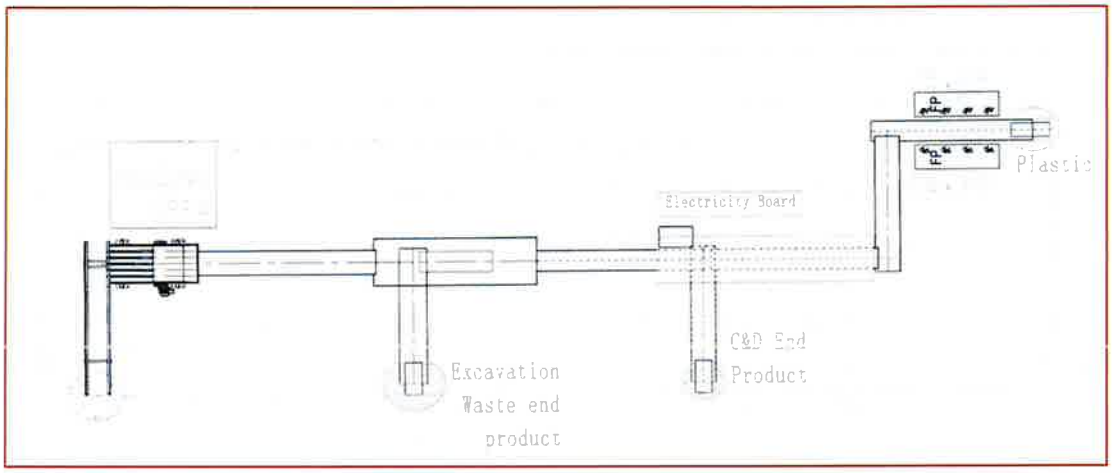


Figure 4: Layout of the Waste Bulk Construction Material Recycling Machines.

5.0 PROJECT METHOD STATEMENT

The overall workflow of the rehabilitation and reclamation plan is shown in the following **Figure 6**. At the existing dumpsite area (JDS), the excavation to be carried out by excavators will start from the highest elevation area and will be lowered layer by layer, each layer being 2m height up to the platform level of +3.35m NGVD. The excavated material will be transported to Working Platform Area (WP1-WP7) via lorries. The dump site materials at respective WP1-WP7 will be processed and separated into two categories; not suitable or suitable for surcharge material. Suitable material will be reused as surcharge material and transported via lorries from Working Platform to WP2 to WP7. Unsuitable material will be disposed to an approved dumping site.

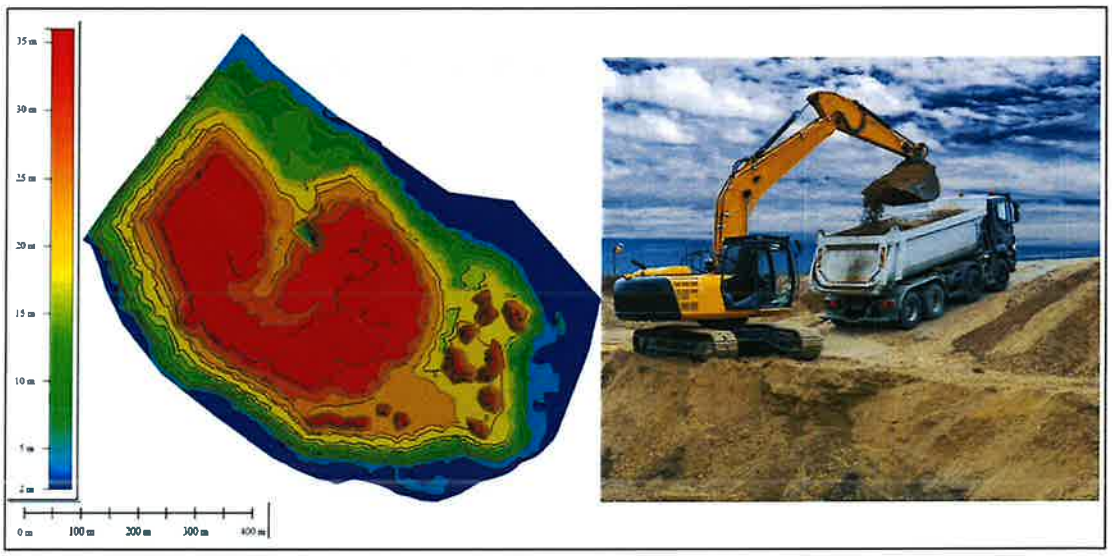


Figure 5: Layout of Rehabilitation Area to be excavated layer by layer with each layer 2m in height up to platform level +3.35m NGVD.

At the same time the reclamation works will be installed with double layer silt curtains around the Project Site to control sediment dispersion and protect the surrounding environment. Following that, the construction of a perimeter bund will takes place, which shall serve as a barrier for the reclamation work. To reinforce the perimeter bund, a slope protection rock mattress will be laid along its slope. Once the perimeter bunds are almost complete, the reclamation phase will begin, involving the filling with imported sand from existing seabed levelsto the designated platform level. The sand will be sourced from an approved sand source concession area and filled, raising the seabed level to a height of 0.5 m above MHWS. To enhance the ground's stability, prefabricated vertical drains (PVD) are then installed. The next step involves surcharging the area with suitable materials obtained from the rehabilitation area. Finally, the platform is trimmed to achieve the desired design platform level, set at +4.35 m and +5.00m NGVD respectively.

The rehabilitation and reclamation phases are described in more details in **Section 5.1** while the reclamation construction sequence is detailed in **Section 5.2**.

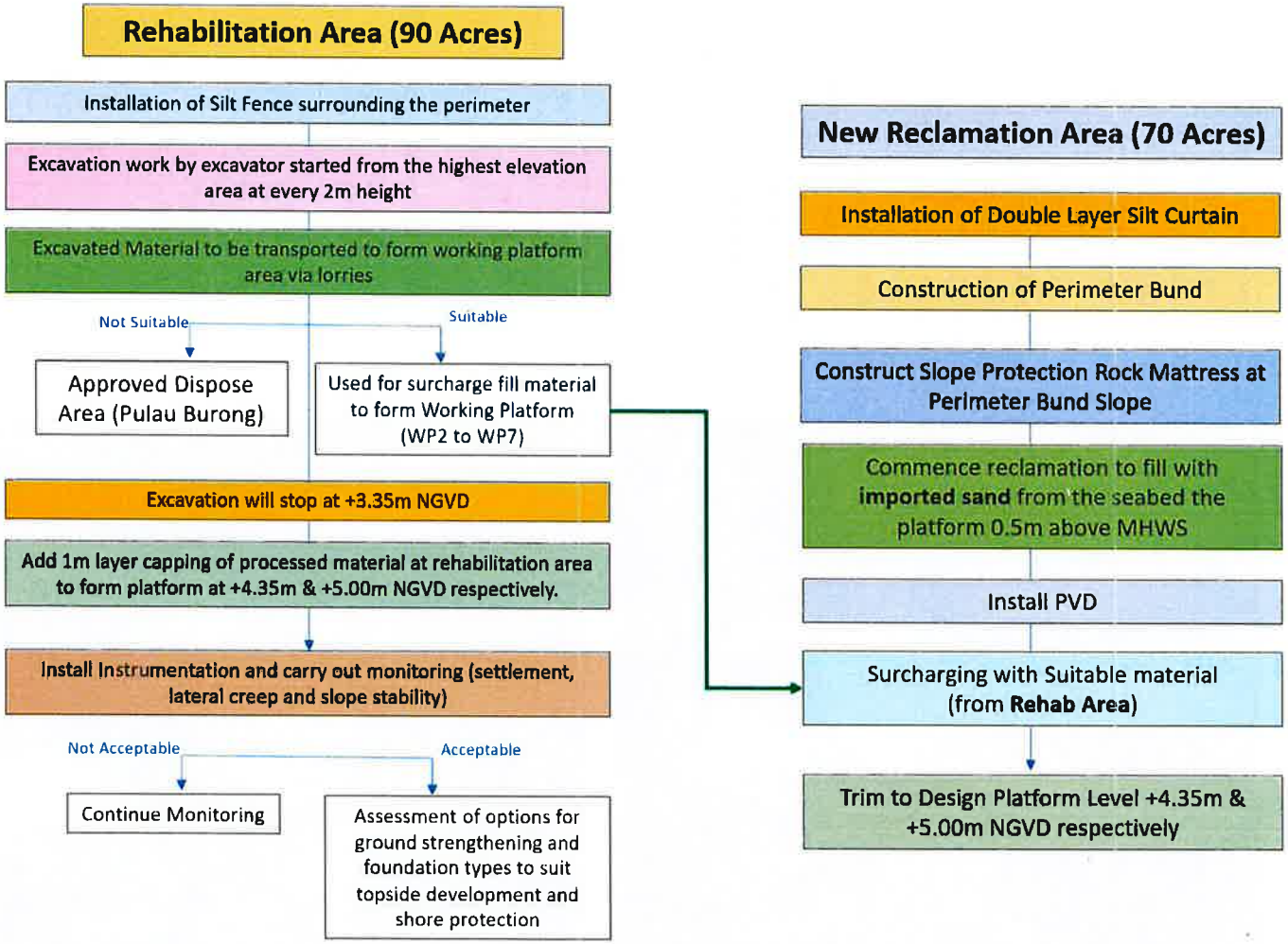


Figure 6: Overall Work Flow of the Rehabilitation and Reclamation Plan.

5.1 Rehabilitation and Reclamation Phases

The rehabilitation and reclamation are proposed to be carried in phases as follows:

Year 0-1

a) Setting up Rehab Working Platform (WP1) and install 2 nos. of recycling machines ∆ at WP1:
   WP1 = 2 Nos
   Total = 2 x 400 m^3/day
   = 800 m^3/day
   (Suitable materials)
b) Excavation at Rehabilitation Area via excavators and transport the material to WP1 via lorries.
c) Process dumpsite materials for WP2 – 800 m^3/day.
d) Reclamation Phase 1
   - Construction of perimeter bund.
   - Lay rock mattress at slope of perimeter bund.
   - Sand filling up to 0.5 m above mean high water spring (MHWS).

Year 1-2

a) Excavation at Rehabilitation Area via excavators and transport the material to WP1 via lorries.
b) Process dumpsite materials (800 m^3/day).
c) PVD Installation at Working Platform 2 (WP2).
d) Subsequent surcharge filling for WP2.
e) Setting out 4 recycling machines ∆ at WP2:
   WP1 = 2 Nos
   WP2 = 4 Nos
   Total = 6 x 400 m^3/day
   = 2,400 m^3/day
   (Suitable materials)
f) Excavation at Rehabilitation Area via excavators and transport the material to WP1 & WP2 via lorries.
g) Reclamation Phase 2
   - Construction of perimeter bund.
   - Lay rock mattress at slope of perimeter bund.
   - Sand filling up to 0.5 m above mean high water spring (MHWS).

YEAR 1-2 (Cont'd)

a) Excavation at Rehabilitation Area via excavators and transport the material to WP1 & WP2 via lorries.
b) Process dumpsite materials at WP1 and WP2 (2,400 m^3/day).
c) PVD installation & surcharge filling for Working Platform 3 (WP3).
d) Setting out 4 recycling machines △ at WP3:

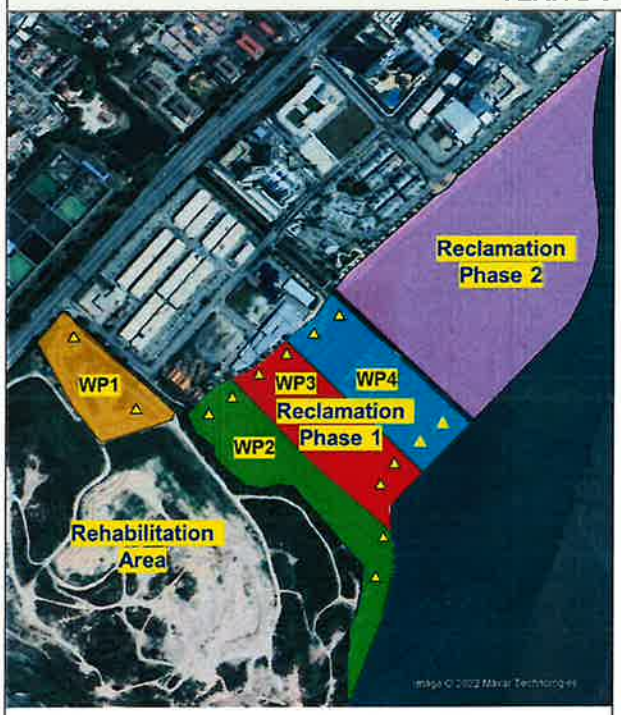
WP1	= 2 Nos
WP2	= 4 Nos
WP3	= 4 Nos
Total	= 10 x 400 m^3/day
	= 4,000 m^3/day

(Suitable materials)

Excavation at Rehabilitation Area via excavators and transport the material to WP1, WP2 & WP3 via lorries.

e) Reclamation Phase 2
- Construction of perimeter bund.
- Lay rock mattress at slope of perimeter bund.
- Sand filling up to 0.5 m above mean high water spring (MHWS).

YEAR 2-3



a) Excavation at Rehabilitation Area via excavators and transport the material to WP1, WP2 & WP3 via lorries.
b) Process Dumpsite Materials at WP1, WP2 and WP3 (4,000 m^3/day).
c) PVD installation & surcharge filling for Working Platform 4 (WP4).
d) Setting out 4 recycling machines △ at WP4:

WP1	= 2 Nos
WP2	= 4 Nos
WP3	= 4 Nos
WP4	= 4 Nos
Total	= 14 x 400 m^3/day
	= 5,600 m^3/day

(Suitable materials)

e) Excavation at Rehabilitation Area via excavators and transport the material to WP1, WP2, WP3 & WP4 via lorries.

YEAR 2-3 (Cont'd)

a) Excavation at Rehabilitation Area via excavators and transport the material to WP1, WP2, WP3 & WP4 via lorries.

b) Process dumpsite materials (5,600 m^3/day).

c) Installation of PVD & surcharge filling for Working Platform 5 (WP5).

d) Setting out 4 recycling machines △ each at WP5:

WP1	= 2 Nos
WP2	= 4 Nos
WP3	= 4 Nos
WP4	= 4 Nos
WP5	= 4 Nos
Total	= 18 x 400 m^3/day
	= 7,200 m^3/day
	(Suitable materials)

e) Excavation at Rehabilitation Area via excavators and transport the material to WP1, WP2, WP3, WP4 & WP5 via lorries.

f) Installation of PVD & surcharge filling for Working Platform 6 (WP6).

g) Setting out 4 recycling machines △ at WP6 (2 nos moved from WP1 to WP6):

WP1	= 0 Nos
WP2	= 4 Nos
WP3	= 4 Nos
WP4	= 4 Nos
WP5	= 4 Nos
WP6	= 4 Nos
Total	= 20 x 400 m^3/day
	= 8,000 m^3/day
	(Suitable materials)

h) Excavation at Rehabilitation Area via excavators and transport the material to WP1, WP2, WP3, WP4, WP5 & WP6 via lorries.

YEAR 3-4	
	a) Excavation at Rehabilitation Area via excavators and transport the material to WP1, WP2, WP3, WP4, WP5 & WP6 via lorries. b) Process dumpsite materials (8,000 m^3/day). c) Surcharge filling for Working Platform 7 (WP7). d) Continue to process dumpsite materials until level +3.35 mNGVD. e) 1 m capping filling at rehabilitation area to level +4.35 mNGVD using processed materials. f) Install Instrumentation and carry out monitoring (settlement, lateral creep and slope stability)

5.2 Reclamation Construction Stages

For the reclamation, the following construction stages are proposed (as illustrated in **Figure 7**):

- Stage 1 – Sand containment bund to be filled to 0.5 m above Mean Sea Level (MSL) (+0.65 mNGVD) and to form slope gradient of not steeper than 1V:7H on both sides.
- Stage 2 – To continue the reclamation filling works at inner area to 0.5 m above Mean High Water Spring (MHWS) (+1.63 mNGVD).
- Stage 3 – Install Prefabricated Vertical Drains (PVD) with 1.1 m c/c spacing as soon as fill has reached 0.5m above MHWS.
- Stage 4 – Install settlement gauges and fill 1.0m thick surcharge as drainage blanket.
- Stage 5 – Fill 1.0m thick surcharge as additional top up fill and rest for 3 months. The sand fill gradient shall not be steeper than 1V:4H.
- Stage 6 – After 3 months rest period, carry out subsequent filling of 4.3 to 6.85 m thick surcharge to reach final surcharge level and install settlement markers. Rest another 5 months.
- Stage 7 – Temporary surcharge shall be removed after resting period or as per Engineer's instruction to the proposed platform level (+4.35 mNGVD) and settlement markers are to be repositioned to the final platform level.
- Stage 8 – Sand containment bund shall be trimmed to construct permanent rip-rap revetment with slope gradient not steeper than 1V:5H.

During the reclamation works, double layer silt curtains shall be provided to minimise the advection and dispersion of sediment plumes; and as there may be some construction works to be carried out from the landside, site access for heavy construction works vehicles and wash trough are proposed.

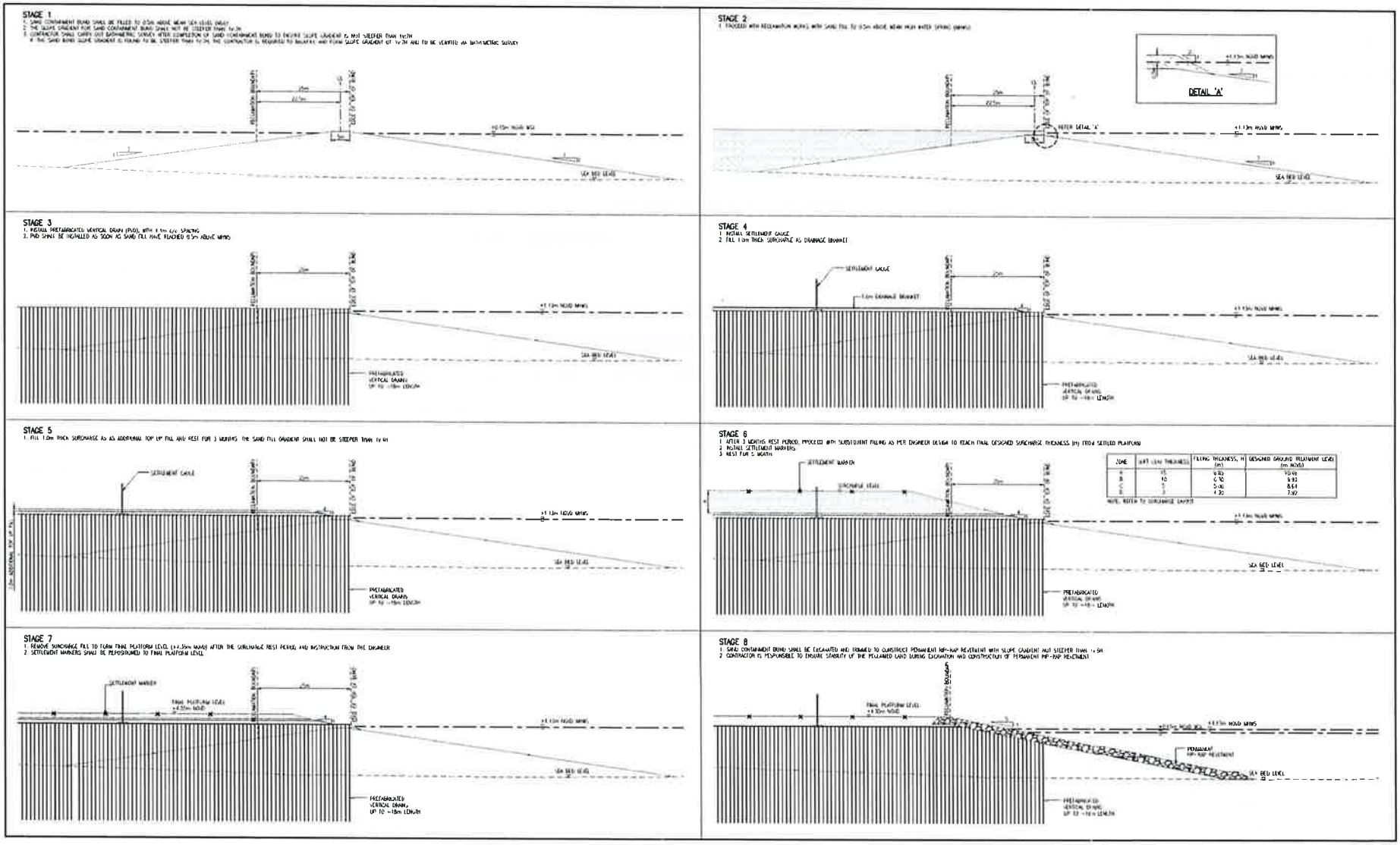


Figure 7: Reclamation Construction Stages.

6.0 PROJECT WORK PROGRAMME

The estimated project flow and duration as shown in the following work programme.

Table 2: The Proposed Work Programme for the Rehabilitation and Reclamation.

Task	Duration (Months)	Year 1												Year 2												Year 3												Year 4											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Rehabilitation Material Production																																																	
Site Preparation & Machine Installation at WP1	3																																																
Reusable Material Production for WP2	17																																																
Reusable Material Production for WP3	5																																																
Reusable Material Production for WP4	3																																																
Reusable Material Production for WP5	3																																																
Reusable Material Production for WP6	3																																																
Reusable Material Production for WP7	3																																																
Reclamation Phase 1																																																	
Mobilisation & Perimeter Bund	4																																																
Sandfilling up to 0.5 m MHWS	5																																																
Installation of PVD + 2 m (1+1) Surcharge	19																																																
Rest for 3 Months	3																																																
Surcharge Filling at Phase 1 Reclamation	19																																																
Reclamation Phase 2																																																	
Perimeter Bund	6																																																
Sandfilling up to 0.5m MHWS	10																																																
Installation of PVD + 2 m (1+1) Surcharge	6																																																
Rest for 3 Months	3																																																
Surcharge Filling at Phase 2 Reclamation	10																																																
Remove Surcharge	10																																																
Construction of Revetment	10																																																

7.0 EROSION AND SEDIMENT CONTROL PLAN (ESCP)

7.1 Introduction

Construction works will disturb the existing land surface and condition that may contribute to increase in surface run-off and high concentration of Total Suspended Solids (TSS) in the stormwater discharge especially during rain events. Therefore, the erosion and sediment control plan shall be provided prior to construction works. The ESC Plan is crucial to manage the surface runoff and stormwater discharge from the construction site. Suitable erosion and sediment control measures shall be provided during the construction stage to minimise the impact resulting from construction works to the neighbouring area. The proposed detailed ESCP cover the construction works of the reclamation works which only cater for sandfilling works up to design platform level and rock revetment works.

7.2 General Construction Condition

(i) The Erosion and sediment control Plan shall be read in conjunction with the engineering plans or written instructions that may be issued in relation with this project

(ii) Contractor shall ensure that erosion and sediment control works are undertaken in accordance with the Urban Stormwater Management Manual for Malaysia, 2012 (MSMA 2nd Edition).

(iii) All contractors shall be informed of their responsibilities in minimizing the potential for soil erosion and pollution of down slope areas.

(iv) Contractor is required to carry out earthwork in accordance with recommendations contained in CP 2003 Code of Practice for Earthworks.

7.3 Proposed Control Measures

The erosion and sediment control measure proposed for this reclamation works is shown in **Appendix A**: **Layout of Proposed Erosion and Sediment Control Plan (ESCP)**. The detailed descriptions of proposed erosion and sediment control measures are as follows and not limited to;

(1) Hoarding
(2) Silt curtains
(3) Silt Fence
(4) Site Access and Wash Trough
(5) Temporary Earth Drain

7.3.1 Hoarding

Despite no construction works is being carried out from the landside, hoarding shall be used to barricade the construction area. The proposed hoarding location is along the land boundary of the Project Site (as depicted in **Appendix B: Proposed Hoarding Details**.) The hoarding shall be erected prior to start of construction works to prevent any interference or entry from unauthorised personnel to the site. Hoarding is important to barricade the active construction area and control access to the site via one access point. It is also able to minimise noise from the Project Site.

7.3.2 Silt Curtain for Filling Works

The construction method involves sand filling works from sea-going barges and no major land disturbance works will be carried out outside of the Project Boundary. Silt curtain is proposed to be installed along the Project Boundary as shown in **Appendix C: Proposed Silt Curtain Details** to minimise plume dispersion. The silt curtain shall be installed prior to commencement of filling works. The silt curtain will function as a barrier to control the sediment plume spreading towards the sensitive receptors adjacent to the Project Site. The silt curtain will minimise sediment pollutants flowing across the curtain while allowing water volume exchange through and under the curtains.

The recommended silt curtain specification shall be as follows:

Table 3: Specification of Silt Curtain.

Item	Details
Silt Curtain Type	III (Heavy Duty to be used at area with current speed up to 1.5 m/s with presence wind or wave with tidal action)
Curtain Depth	Up to 7.3 m allowing at least 0.5 m clearance between skirt and seabed bottom during low tide
Fabric Strength	150 kN/m
Float Size	300 mm
Chain Weight	5 kg/m
Span length	20 m

Figure 8: Example of Silt Curtain

7.3.3 Silt Fence

The silt fence consists of filter fabric stretched across and attached to series of supporting posts. The silt fence shall be installed around the reclaimed area as shown in **Appendix D: Proposed Silt Fence, Wash Trough and Temporary Earth Drain Details** to ensure that the silt from the surface run-off from the dumpsite area does not silt up inside any drain or directly flow to the sea.

Figure 9: Example of Silt Fence

7.3.4 Site Access and Wash Trough

The site access should be constructed with heavy duty interlocking paver block. Vehicle access to site shall be limited to only essential vehicles for construction work and all vehicles shall enter and exit the site through the established site access point. Wash trough as shown in **Appendix D: Proposed Silt Fence, Wash Trough and Temporary Earth Drain Details** shall be provided at the site access to remove excessive sediment from out bound vehicles prior to leaving the site. The discharge from wash trough shall be diverted to the temporary earth drain and no direct discharge to existing drain is allowed.

The photo below shows an example of a wash trough located at the entrance of a construction site.

Figure 10: Proposed Wash trough at site entrance

7.3.5 Temporary Earth Drain

The purpose of the temporary earth drain is to divert discharges from the wash trough and along the perimeter of rehabilitation area. The details of the proposed temporary earth drain is enclosed in **Appendix D: Proposed Silt Fence, Wash Trough and Temporary Earth Drain Details** The drain is proposed to have a longitudinal slope of V:H 1:1000 with a minimum bottom width of 1.5 and side slope of V:H 1:2. The overall length of the temporary drain at its longest is approximately 720 m.

The photo below shows an example of a temporary earth drain within the perimeter of rehabilitation area.

Figure 11: Example of Temporary Earth Drain

7.4 Best Management Practices

The following best management practices shall also be carried out by the Contractor during the construction phase to ensure the effectiveness of the proposed control measures.

7.4.1 Silt Curtain and Filling Works

a. Filling works from the barges shall not be carried out outside of the silt curtain area.
b. Excavators or bulldozers shall only be used once the filling works have reached above water level.
c. Any material which is deposited outside the boundary of the works or any debris which falls or is deposited into tidal waters during the filling works shall be removed by the Contractor at its cost and expenses prior to the practical completion of the works.
d. If at any time during the course of filling works, an environmental incident occurs or an environmental risk is identified, all measures must be taken immediately and informed to the relevant authority.
e. All floating plant and associated moorings will be kept clear of navigational channels when working or moored.
f. Navigational lights, buoys, marks or any warning signs shall be supplied, installed and maintained.
g. All filling works or any associated works shall stop during storm or dangerous weather conditions.
h. Discharge of ballast water (including bilge water) to the sea/lagoon shall not be allowed. Temporary storage facilities shall be provided inside the vessel.
i. Proper drainage of the site shall be maintained. Drains shall be checked that they are in good operational condition.
j. Recently stabilised lands shall be checked to ensure that erosion hazards have been effectively reduced and any repair works conducted properly.
k. All erosion and sediment control measures shall be kept in good conditions until all earthworks activities are completed and the site has stabilised.
l. Additional erosion and sediment control works shall be constructed as necessary to ensure the desired protection is given to the site and areas downstream.

7.4.2 Silt Fence

a. Settled soil or sediment built-up behind the silt fence shall be removed periodically.
b. Damaged or torn silt fence shall be replaced immediately to ensure effectiveness of the system.
c. Damaged fence post shall be placed and secured immediately.

7.4.3 Wash Trough

a. Accumulated sediment and dirt inside washing area shall be removed periodically to prevent blockage or overspill
b. The outflow from wash trough outlet must be drained to nearest temporary drain
c. Site supervisor or environmental officer shall ensure that there is no overflow of discharged water into existing drain

7.4.4 Temporary Earth Drain

a. The temporary earth drain shall be stabilised and compacted properly if there is any sign of slope failure or bed erosion
b. Earth drain shall be free from any rubbish or excessive sedimentation built-up in the drain

7.4.5 Laydown Area

a. All waste shall be stored at designated area before disposing to authority's approved disposal area
b. If skid tank is provided inside the laydown area to store diesel or fuel, the tank shall be placed in a containment tray to prevent and minimise possibility of direct spillage at the project site. The tank shall be checked periodically to ensure no leakage at the containment tray
c. All construction materials shall be stored properly within the laydown area. Any materials that are highly erosive of dissolve when in contact with water shall be stored in closed container.

8.0 SITE INSPECTION, MAINTENANCE AND MONITORING

8.1 Site Inspection and Maintenance

The following site inspection and maintenance shall be carried out on a regular basis to ensure the proposed control measures are in good conditions:

1. On-board supervisors will be assigned to check the condition of the silt curtain before commencement of works on a regular basis.
2. Water quality monitoring and regular inspection need to be carried out to ensure no suspended solids are passing through the silt curtain system and maintain proper functioning of the silt curtain during the entire filling works period.
3. Filling works will stop immediately if silt curtain is found damaged. Lift up the silt curtain from the water and sew (double-line sew) a new piece of screen to the existing screen to cover the damaged area. A sufficient overlapping length is needed (at least 1 m).
4. Rubbish around the silt curtains will be collected at regular intervals on a daily basis to ensure water behind the silt curtain will be kept free from floating debris.
5. Sufficient spare screens will be kept on site for replacing damaged curtains. The screens need to be stored properly to avoid direct contact with water and sunlight.
6. All blinkers or reflective strips need to be inspected regularly to ensure they are in good working condition.
7. Sediment build up behind silt fence shall be removed regularly.
8. Condition of fence fabric, fence post and joints shall be inspected monthly or within 24 hours after a rain event that exceeds 12.5 mm.
9. Wash trough shall be inspected monthly or within 24 hours after a rain event that exceeds 12.5 mm to ensure no debris or minimal sediment is accumulated inside the wash trough.

9.0 SUMMARY

The rehabilitation and filling works for the reclamation shall adhere to the proposed method statement and construction sequences. Prior to commencing construction, the recommended ESCP measures shall be installed and implemented at the site. These control measures and Best Management Practices (BMPs) are to meet the minimum requirements specified to safeguard the surrounding environment and prevent any adverse impacts from the construction activities. The proposed BMPs cover both preventive and mitigation measures, ensuring comprehensive environmental protection.

During the construction stage, it is the responsibility of the contractor to monitor and maintain the recommended BMPs. Any damages or issues that arise must be promptly repaired or reinstated as necessary. To ensure compliance and evaluate the effectiveness of the BMPs, a monthly site inspection shall be conducted by an appointed environmental officer. This inspection will provide valuable feedback, allowing for the modification or addition of BMPs if required to further enhance environmental protection measures.

By following the proposed method statement, implementing the recommended ESCP measures, and conducting regular inspections, the project will ensure compliance with environmental standards, minimise impacts on the surroundings, and uphold the principles of sustainable construction practices.

10.0 ENGINEER'S DECLARATION

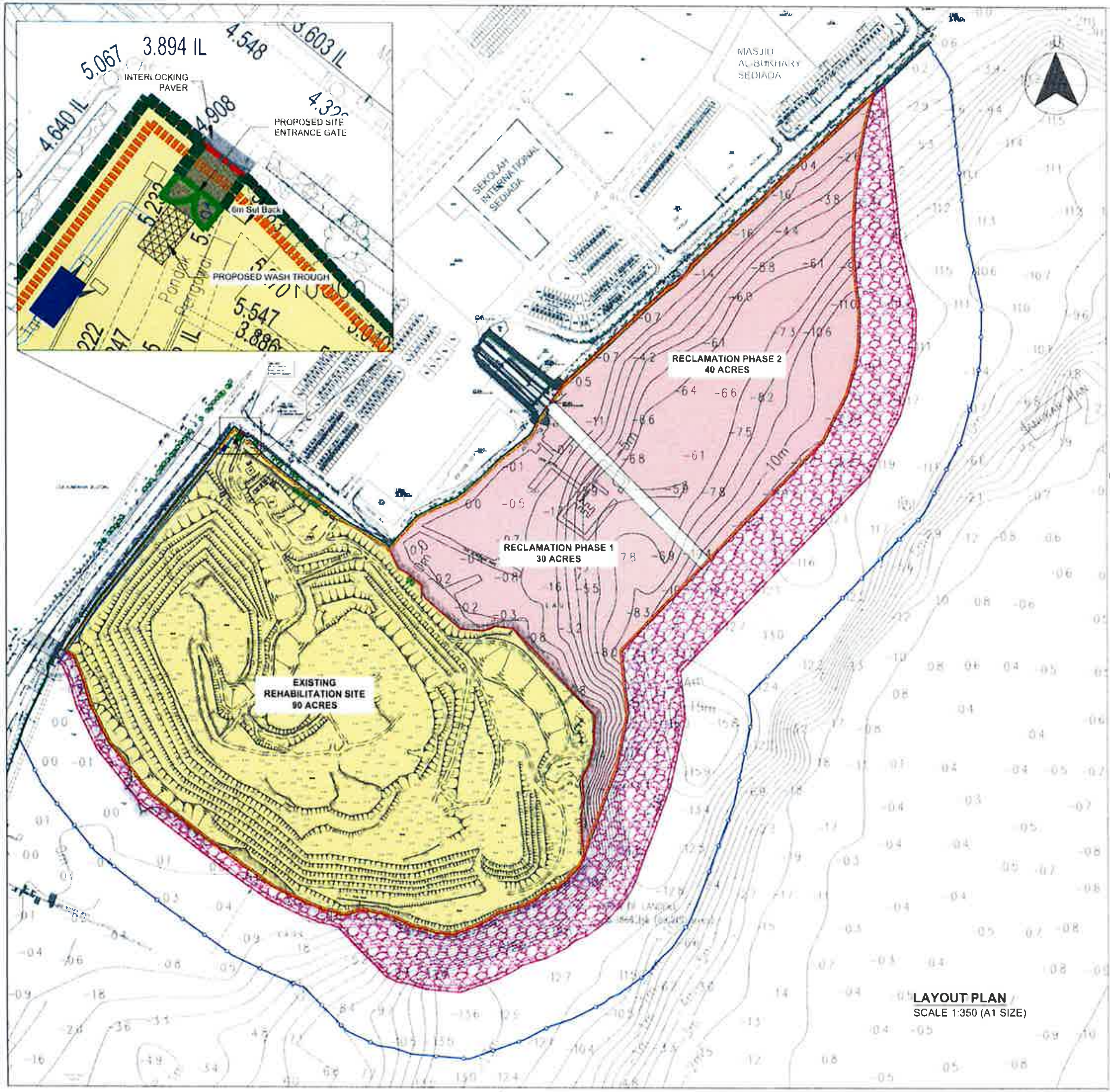
I hereby certify that these works have been designed by me in accordance with sound engineering practice and that I take full responsibility for the design, and proper performance of the same.

Professional Engineer Endorsement

Name: Ir. Lim Choon Lin

Company: Global Water Consultants Sdn. Bhd.

Appendix A
Erosion and Sediment Control Plan (ESCP) Layout



LAYOUT PLAN
SCALE 1:350 (A1 SIZE)

LEGEND

- PROJECT BOUNDARY
- REHABILITATION AREA
- PROPOSED RECLAMATION AREA
- ROCK REVETMENT
- SILT CURTAIN
- PROPOSED ENTRANCE
- HOARDING
- SILT FENCE
- WASH TROUGH
- INTERLOCKING PAVER
- SEDIMENT BASIN
- TEMPORARY EARTH DRAIN / FUTURE PERMANENT DRAIN (TO BE CONFIRMED BY INFRA ENGINEER)

NOTES

1. All levels are in metre National Geodetic Vertical Datum (or NGVD) unless otherwise stated
2. The topographic and bathymetric survey level is based on survey carried out by Jurukur Perunding Services Sdn. Bhd in June 2020
3. The position of silt curtain is indicatives and contractor may proposed alternative silt position to suit their construction method statement. The alternative silt curtain position shall be reviewed and approved by the Engineer
4. Silt curtain shall be installed prior to start of filling works for sand containment bund
5. All silt curtain accessories including concrete sinkers shall be removed after the completion of the works
6. All discharged from the wash trough shall be diverted to the temporary earth drain that will be routed to the sediment basin
7. The maintenance works for the sediment basin shall be carried out regularly during construction period

FOR SUBMISSION ONLY

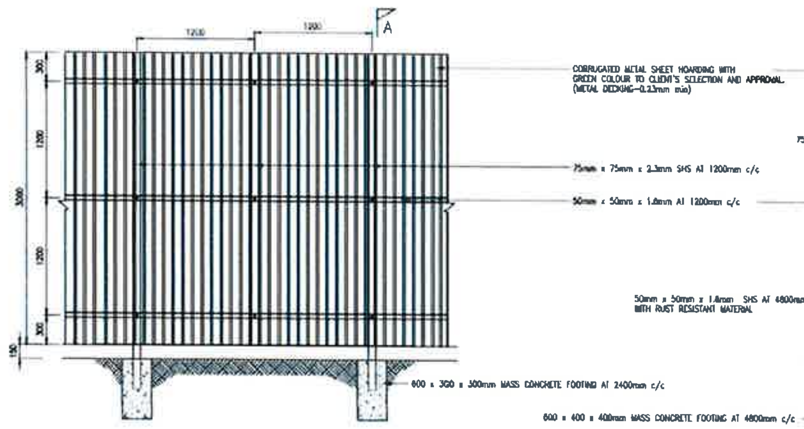
PLB ENGINEERING BERHAD

W.K. Khor Architect Sdn Bhd

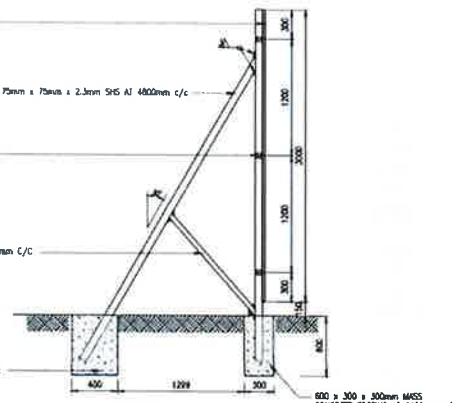
GLOBAL WATER CONSULTANTS SDN. BHD.

IR. LIM CHOON LIN
C15534
JURUTERA PROFESIONAL AWAM MALAYSIA

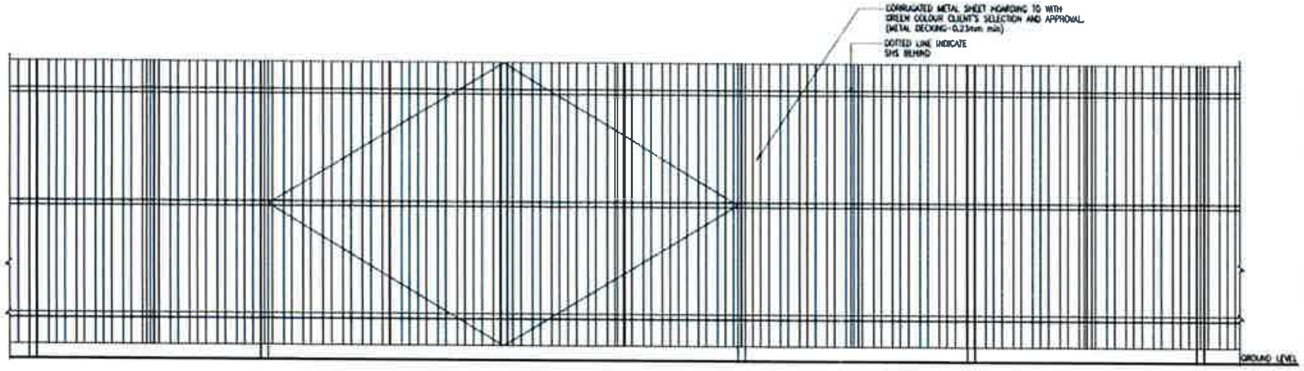
Appendix B
Proposed Hoarding Details


1200
1200
A
300
1200
3000
1200
300
150
CORRUGATED METAL SHEET HOARDING WITH GREEN COLOUR TO CLIENT'S SELECTION AND APPROVAL. (METAL DECKING–0.23mm min)
75mm x 75mm x 2.3mm SHS AT 1200mm c/c
50mm x 50mm x 1.6mm AT 1200mm c/c
600 x 300 x 300mm MASS CONCRETE FOOTING AT 2400mm c/c
600 x 400 x 400mm MASS CONCRETE FOOTING AT 4800mm c/c

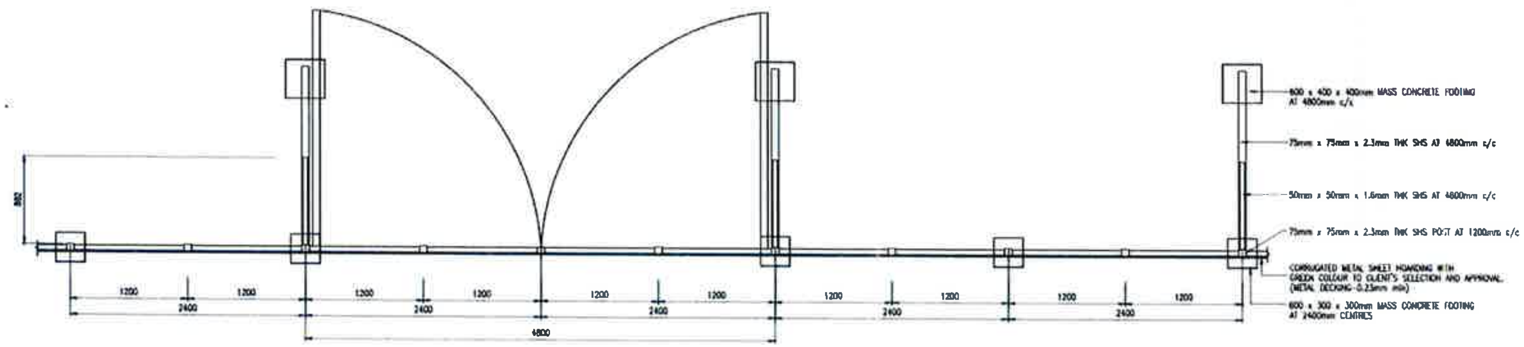
FRONT ELEVATION OF HOARDING
SCALE 1:25 (A1 SIZE)



SECTION A–A
SCALE 1:25 (A1 SIZE)



FRONT ELEVATION OF HOARDING
SCALE 1:25 (A1 SIZE)


600 x 400 x 400mm MASS CONCRETE FOOTING AT 4800mm c/c
75mm x 75mm x 2.3mm THK SHS AT 4800mm c/c
50mm x 50mm x 1.6mm THK SHS AT 4800mm c/c
75mm x 75mm x 2.3mm THK SHS POST AT 1200mm c/c
CORRUGATED METAL SHEET HOARDING WITH GREEN COLOUR TO CLIENT'S SELECTION AND APPROVAL. (METAL DECKING–0.23mm min)
600 x 300 x 300mm MASS CONCRETE FOOTING AT 2400mm CENTRES
1200
2400
4800
880

PLAN OF HOARDING
SCALE 1:25 (A1 SIZE)

NOTES
1. All units are in millimetre (mm) unless otherwise stated

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PERMOHONAN PELAN KERJA TANAH DIBAWAH AKTA 133 BAGI TUJUAN PEMBANGUNAN BERCAMPUR DAN PERDAGANGAN DENGAN NISBAH PLOT 5:1 DI ATAS TANAH KERAJAAN TEBUSGUNA JELUTONG (TAPAK PELUPUSAN SAMPAH SEDIA ADA) SEKSYEN 8, BANDAR JELUTONG, PULAU PINANG UNTUK TETUAN PLB ENGINEERING BERHAD

NAMA: DATO BOW KOK YONG
PLB ENGINEERING BERHAD
Company No: 199701002129 (418224-X)

W. K. Khor Architect Sdn Bhd

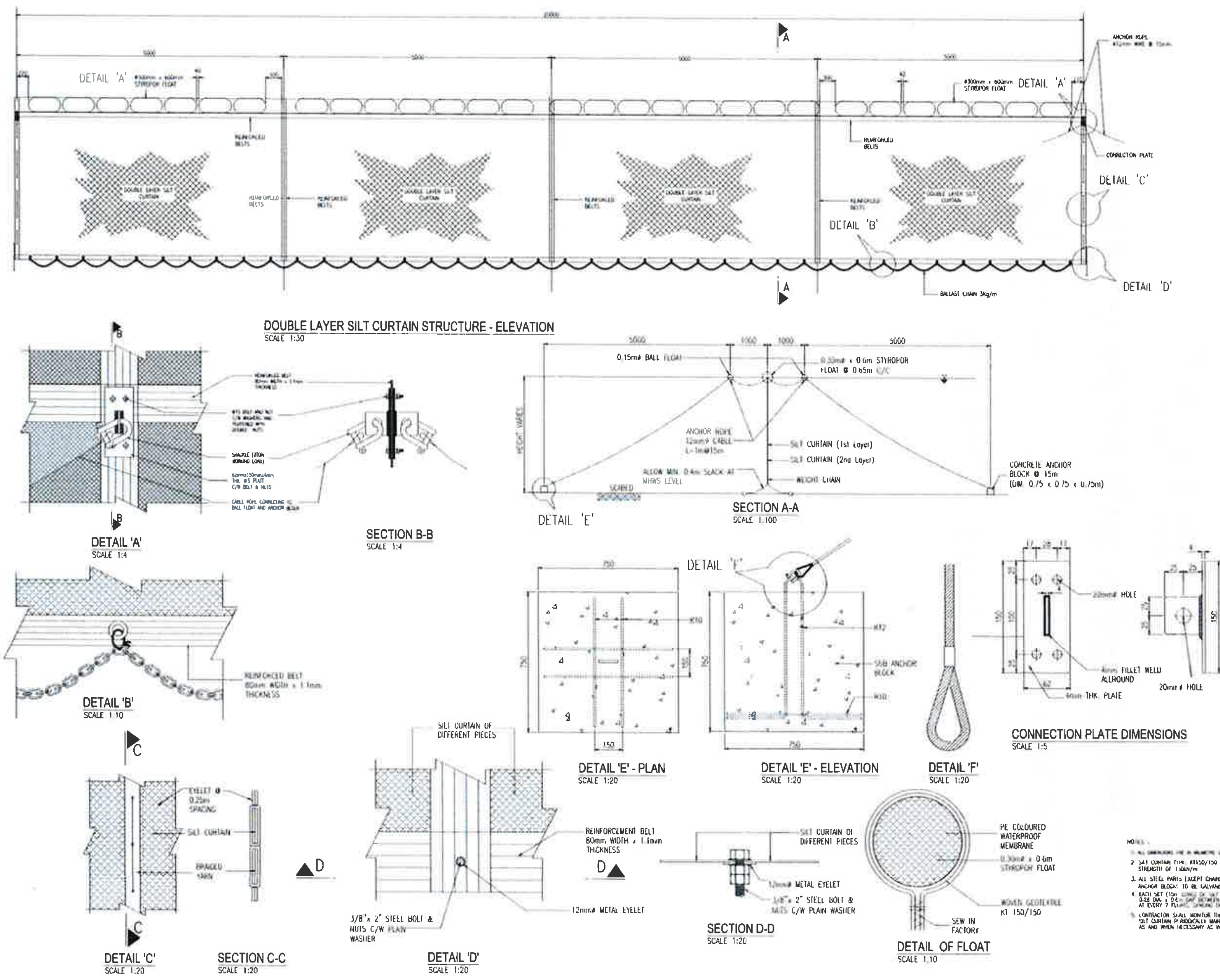
GLOBAL WATER CONSULTANTS SDN. BHD.

JURUTERA PROFESIONAL AWAM Ir. LIM CHOON LIN C15534 MALAYSIA

NAMA: Ir. LIM CHOON LIN

LANTINALAE
HOARDING DETAILS

Appendix C
Proposed Silt Curtain Details



DOUBLE LAYER SILT CURTAIN STRUCTURE - ELEVATION
SCALE 1:30
DETAIL 'A'
DETAIL 'B'
DETAIL 'C'
DETAIL 'D'
ANCHOR ROPE
CONNECTION PLATE
REINFORCED BELTS
DOUBLE LAYER SILT CURTAIN
BALLAST CHAIN 3kg/m
SECTION A-A
SCALE 1:100
0.15m⌀ BALL FLOAT
0.30m⌀ x 0.6m STYROPOR FLOAT @ 0.65m C/C
ANCHOR ROPE 12mm⌀ CABLE
SILT CURTAIN (1st Layer)
SILT CURTAIN (2nd Layer)
WEIGHT CHAIN
ALLOW MIN 0.4m SLACK AT MHWS LEVEL
SEABED
HEIGHT VARIES
CONCRETE ANCHOR BLOCK @ 15m (DIM. 0.75 x 0.75 x 0.75m)
DETAIL 'E'
DETAIL 'A'
SCALE 1:4
SECTION B-B
SCALE 1:4
DETAIL 'B'
SCALE 1:10
REINFORCED BELT 80mm WIDTH x 1.1mm THICKNESS
DETAIL 'E' - PLAN
SCALE 1:20
DETAIL 'E' - ELEVATION
SCALE 1:20
DETAIL 'F'
DETAIL 'F'
SCALE 1:20
CONNECTION PLATE DIMENSIONS
SCALE 1:5
22mm⌀ HOLE
4mm FILLET WELD ALLROUND
4mm THK. PLATE
20mm⌀ HOLE
DETAIL 'C'
SCALE 1:20
SECTION C-C
SCALE 1:20
EYELET @ 0.25m SPACING
SILT CURTAIN
BRAIDED YARN
SILT CURTAIN OF DIFFERENT PIECES
REINFORCEMENT BELT 80mm WIDTH x 1.1mm THICKNESS
12mm⌀ METAL EYELET
3/8" x 2" STEEL BOLT & NUTS C/W PLAIN WASHER
DETAIL 'D'
SCALE 1:20
SECTION D-D
SCALE 1:20
DETAIL OF FLOAT
SCALE 1:10
PE COLOURED WATERPROOF MEMBRANE
0.30m⌀ x 0.6m STYROPOR FLOAT
WOVEN GEOTEXTILE KT 150/150
SEW IN FACTORY

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETRE UNLESS STATED OTHERWISE.
2. SILT CURTAIN TYPE: KT150/150 WITH MIN. ULTIMATE TENSILE STRENGTH OF 150kN/m
3. ALL STEEL PARTS EXCEPT CHAINS, WIRE ROPES & RC-BAR OF ANCHOR BLOCK: TO BE GALVANISED
4. EACH SET (15m LONG) OF SILT CURTAIN HAS 17 FLOATS OF 0.28 DIA. x 0.6m GAP BETWEEN FLOAT IS APPROXIMATELY 40mm AT EVERY 7 FLOATS, SPACING OF ABOUT 300mm IS PROVIDED
5. CONTRACTOR SHALL MONITOR THE CONDITION OF THE TIMBER STAKES, SILT CURTAIN PERIODICALLY MAINTAIN/REPAIR/REPLACE THEM AS AND WHEN NECESSARY AS INSTRUCTED BY THE ENGINEER.

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PERMOHONAN PELAN KERJA TANAH DI BAWAH AKTA 133 BAGI TUJUAN PEMBANGUNAN BERCAMPUR DAN PERDAGANGAN DENGAN NISBAH PLOT 5 : 1 DI ATAS TANAH KERAJAAN TEBUSGUNA JELUTONG (TAPAK PELUPUSAN SAMPAH SEDIA ADA), SEKSYEN 6, BANDAR JELUTONG, PULAU PINANG UNTUK TETUAN PLB ENGINEERING BERHAD

NAMA: DATO MOW KOK TONG

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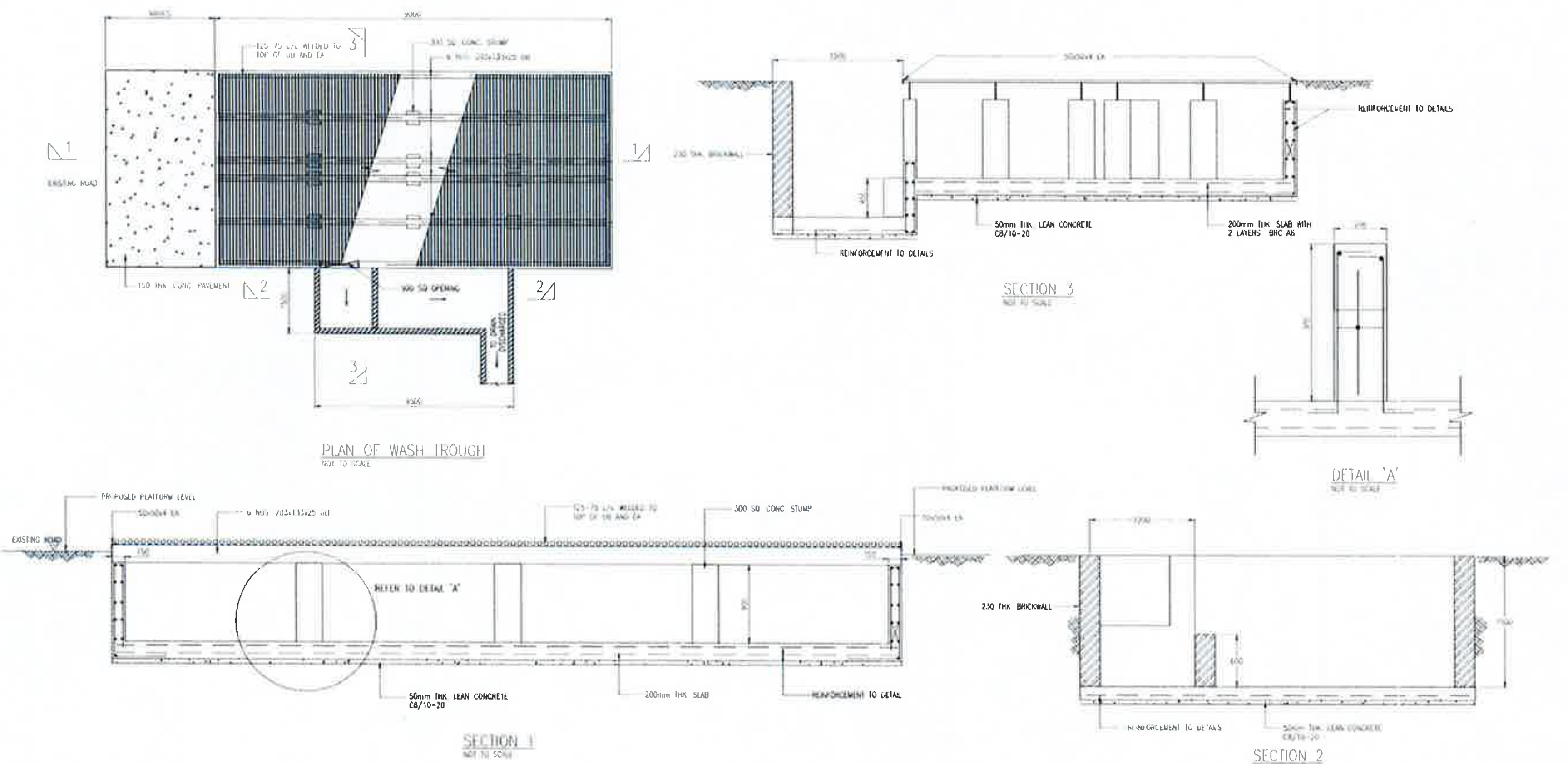
JURUTERA PROFESIONAL AWAM Ir. LIM CHOON LIN C15534 MALAYSIA

NAMA: IR. LIM CHOON LIN

EARTHWORK
SILT CURTAIN DETAILS

Appendix D

Proposed Silt Fence Wash Trough and Temporary Earth Drain Details



EXISTING ROAD
150 THK CONC PAVEMENT
125 75 C/C WELDED TO TOP OF UB AND EA
300 SQ CONC STUMP
100 SQ OPENING
230 THK BRICKWALL
50mm THK LEAN CONCRETE C8/10-20
200mm THK SLAB WITH 2 LAYERS BRC A6
REINFORCEMENT TO DETAILS
PROPOSED PLATFORM LEVEL
EXISTING ROAD
REFER TO DETAIL "A"
300 SQ CONC STUMP
50mm THK LEAN CONCRETE C8/10-20
200mm THK SLAB
REINFORCEMENT TO DETAIL
230 THK BRICKWALL

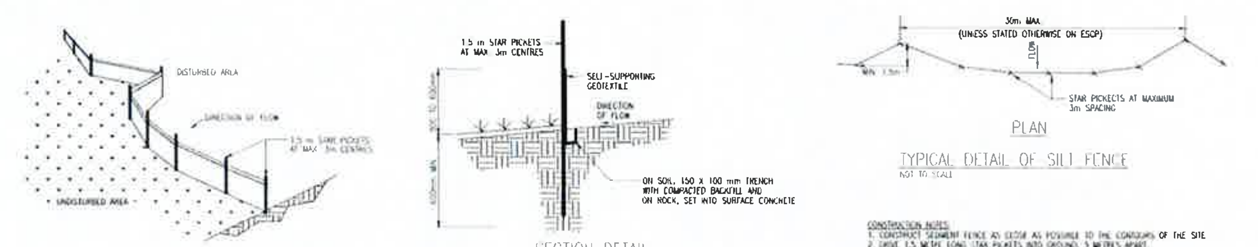
PLAN OF WASH TROUGH
NOT TO SCALE

SECTION 3
NOT TO SCALE

DETAIL 'A'
NOT TO SCALE

SECTION 1
NOT TO SCALE

SECTION 2
NOT TO SCALE



DISTURBED AREA
DIRECTION OF FLOW
1.5 m STAR PICKETS AT MAX 3m CENTRES
UNDISTURBED AREA
1.5 m STAR PICKETS AT MAX 3m CENTRES
SELF-SUPPORTING GEOTEXTILE
DIRECTION OF FLOW
ON SOIL, 150 X 100 mm TRENCH WITH COMPACTED BACKFILL AND ON ROCK, SET INTO SURFACE CONCRETE
3m MAX
(UNLESS STATED OTHERWISE ON ESCP)
FLOW
STAR PICKETS AT MAXIMUM 3m SPACING

SECTION DETAIL

PLAN

TYPICAL DETAIL OF SILT FENCE
NOT TO SCALE

CONSTRUCTION NOTES:
1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO THE CONTOURS OF THE SITE
2. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUND, 3 METRES APART.
3. DIG A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
4. BACKFILL TRENCH OVER BASE OF FABRIC.
5. FIX SELF-SUPPORTING GEOTEXTILE TO UPSLOPE SIDE POSTS WITH WIRE TIES OR AS RECOMMENDED BY GEOTEXTILE MANUFACTURER.
6. JOINT SECTION OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.

TYPICAL EARTH DRAIN SECTION
NOT TO SCALE

NOTES
1. All units are in millimetre (mm) unless otherwise stated

FOR SUBMISSION ONLY

PERMOHONAN PELAN KERJA TANAH DI BAWAH AKTA 133 BAGI TUJUAN PEMBANGUNAN BERCAMPUR DAN PERDAGANGAN DENGAN NISBAH PLOT 5:1 DI ATAS TANAH KERAJAAN TEBUSGUNA JELUTONG (TAPAK PELUPUSAN SAMPAH SEDIA ADA) SEKSYEN 8 BANDAR JELUTONG PULAU PINANG UNTUK TETUAN PLB ENGINEERING BERHAD

PLB ENGINEERING BERHAD
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EARTHWORK
WASH TROUGH, SILT FENCE & TEMPORARY EARTH DRAIN DETAILS