5.0 PROJECT DESCRIPTION

This chapter provides a description of the proposed project including the overall project concept, implementation schedule and the main project activities based on the information provided by the Project Proponent.

5.1 Project Concept

Development of the project involves two major components, which are:

- A 120 acres coastal reclamation along the seafront of Klebang Beach; and
- Construction of 155 units floating water chalets within 50 acres of seafront land (without reclamation)

No top side will be developed on the proposed 120 acres reclaimed land at the time of this EIA preparation and thereby it is not covered under this EIA study.

The proposed Project site is located along the coast line off Pekan Klebang at Lot 152, PT 149 and PT 50 of Mukim Klebang Besar, District of Melaka Tengah, State of Melaka. The proposed site is accessible from Melaka town via Jalan Klebang Besar.

The acreage of the proposed reclamation site is presented in **Table 5-1**. Location and areas of the proposed Project site are illustrated in **Figure 5-1**, **Figure 5-2** and **Figure 5-3**.

Table 5-1 Acreage of Proposed Project Development

Proposed Development	Area		Percentage (%)
	m^2	Acres	
Development			
• Proposed reclamation area	485,623	120.00	70.59
• Water chalets area (no reclamation)	202,343	50.00	29.41
Total	**687,966**	**170.00**	**100**

N

OVERVIEW

LEGEND

- Proposed Site
- Forest
- Water Bodies
- Other Reclaimed Area

0 500 1000 1500

Meters

PROJECTION PARAMETERS

Notes

1. Projection parameters are in Geographical/WGS84
2. Image source : Google

Rev	#	Drawing by	Date
00	1	MAF	1/8/2016

ENVIRONMENTAL IMPACT ASSESSMENT FOR PROPOSED MIXED DEVELOPMENT AT PEKAN KLEBANG, OFF LOT 152, PT 149, PT 50 OVER 120 ACRES RECLAIMED LAND AND 50 ACRES SEABED IN MUKIM KLEBANG BESAR, DAERAH MELAKA TENGAH, MELAKA

Figure 5.1 Project Location Map

INTEGRATED ENVIROTECH

A3

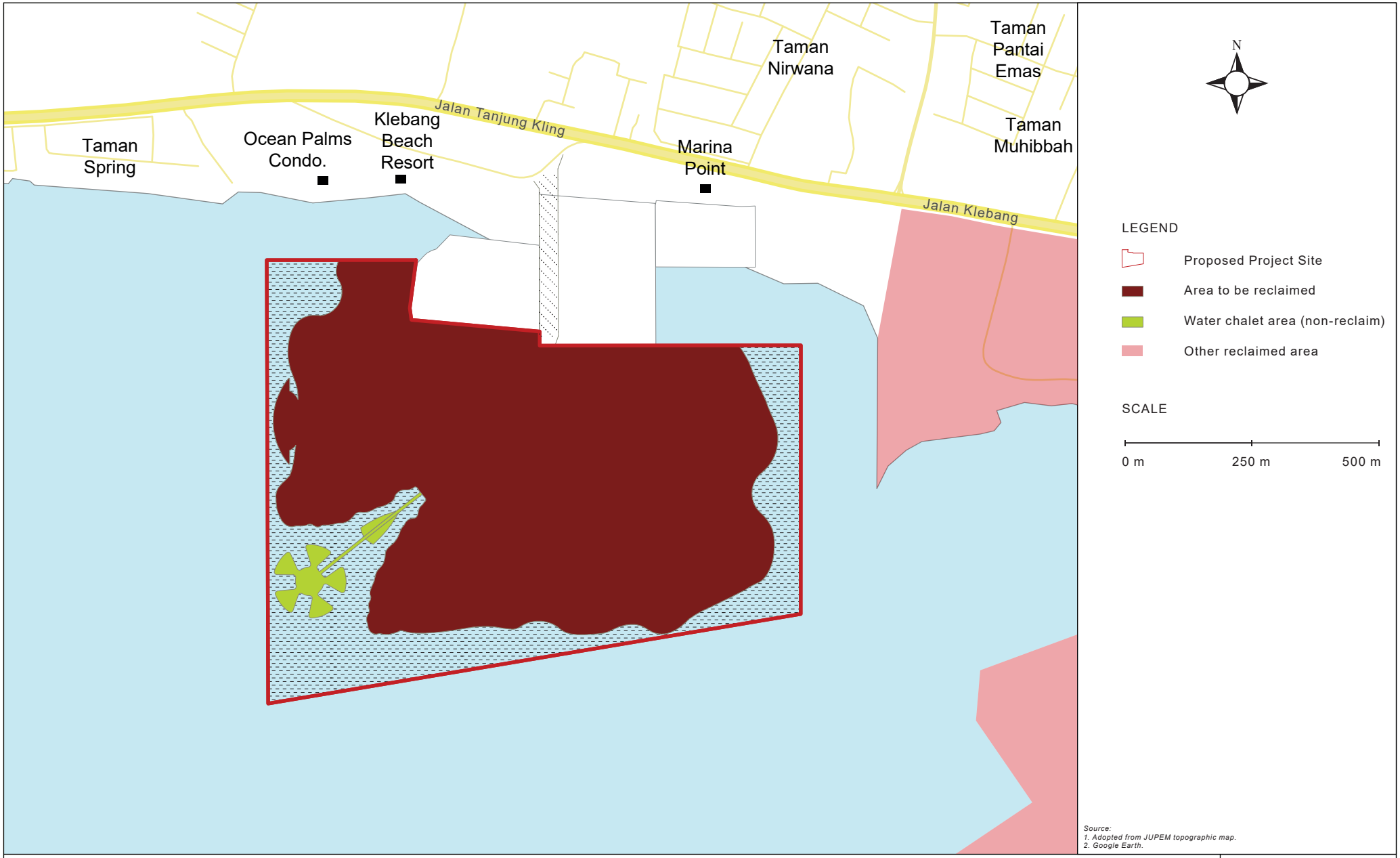

Figure 5.2 Area To Be Reclaimed

INTEGRATED ENVIROTECH

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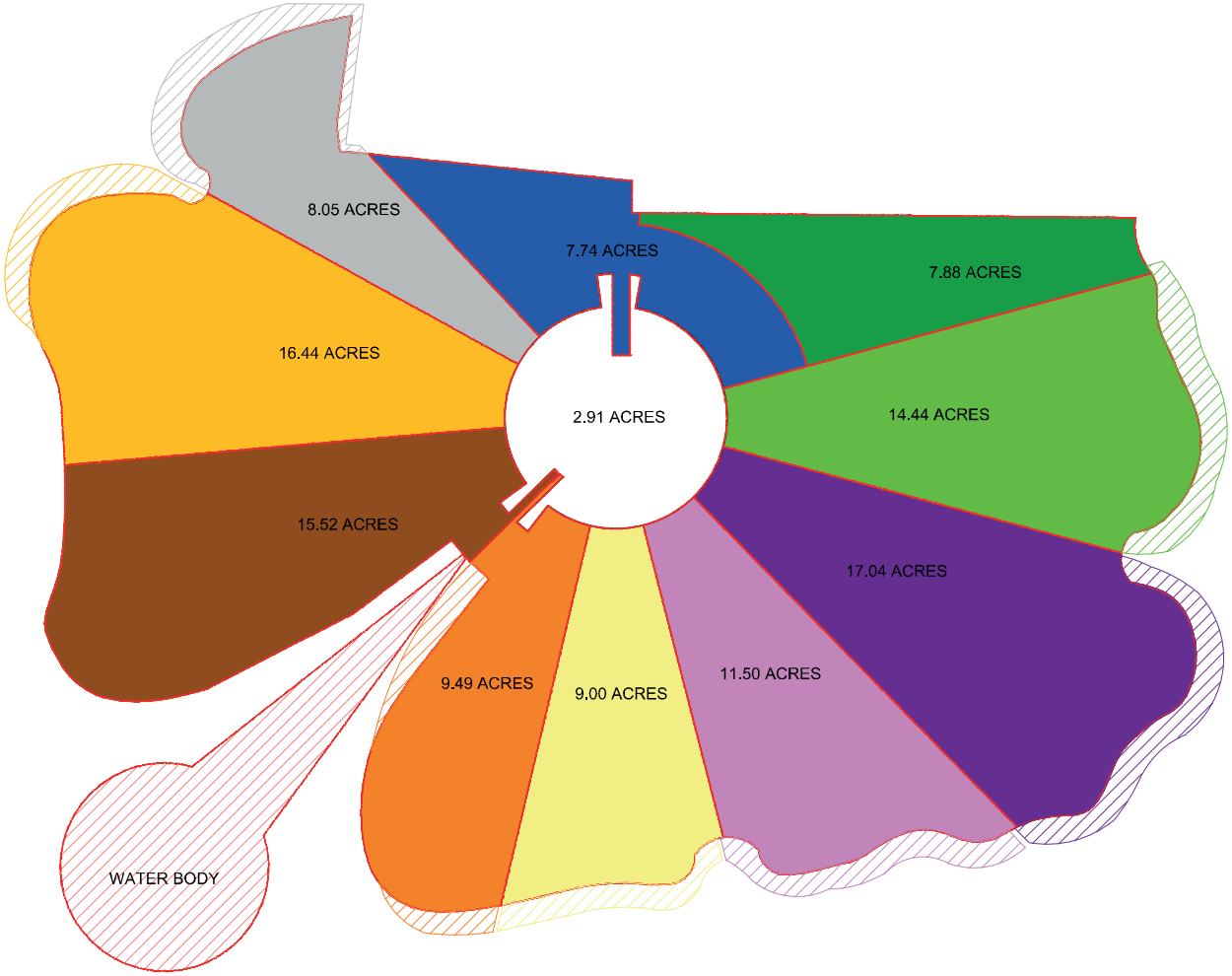


Area Tabulation
(Reclaimed Land & Floating Villa)

Reclaimed Land Area	Floating Villa Area
Parcel 1: 7.74 Acres	
Parcel 2: 7.88 Acres	
Parcel 3: 14.44 Acres	Parcel 3: 1.69 Acres
Parcel 4: 8.05 Acres	Parcel 4: 1.62 Acres
Parcel 5: 16.44 Acres	Parcel 5: 0.98 Acres
Parcel 6: 15.52 Acres	
Parcel 7: 17.04 Acres	Parcel 7: 1.66 Acres
Parcel 8: 11.50 Acres	Parcel 8: 1.05 Acres
Parcel 9: 9.00 Acres	Parcel 9: 0.61 Acres
Parcel 10: 9.49 Acres	Parcel 10: 0.94 Acres
Parcel 11: 2.91 Acres	
	Parcel 12: Water Body

Figure 5.3: Total Area Tabulation Reclaimed Land And Floating Villa

5.2 Project Development Phases

The proposed project development phases include the followings:

- Site Preparation Phase
- Reclamation Phase
- Construction of Water Chalet
- Abandonment Phase

5.2.1 Site Preparation Phase

This phase mainly involves project kick-off, mobilization of project team and machineries, establishment of temporary facilities on-site as well as the clearance and removal of debris and rubbish, if necessary.

5.2.1.1 Clearance and Authorities Approval

All available information will be reviewed, approval for all necessary licenses, permits and other requirements will be sought and local authorities will be visited and informed on planned reclamation operation. Various supporting documentation and plans required for execution of works will be prepared.

5.2.1.2 Setting Up Storage and Base Camp

Temporary facilities for the office consist of basic services (water, electricity, toilets) and operational services (telephone, fax, radio). If necessary, a temporary site-office will be erected as well as a temporary jetty. The project involve of soil improvement operations, a power supply will be arranged either from TNB's main power supply or generator.

5.2.1.3 Mobilization

The survey equipment will be the first equipment to arrive on site to perform the baseline survey of the reclamation area. The echo sounding system will be installed on board the survey vessel together with the other survey system.

The operational project team will prepare the mobilization of the sand carrier vessels and auxiliary equipment and make a detailed execution plan based on various factors.

5.2.2 Reclamation Phases

Fill material for the reclamation will be sourced from the nearest licensed sea sand source concession site in Melaka namely Extrorish Sdn Bhd. The selected sand source concession site is located at 10.4 km southwest of the proposed project site. It covers an area of approximately 1,114 hectares with water depths ranging from 20-30 meters CD. The sand source concession site is located within the jurisdiction of the State of Melaka with approximately 946.9 hectares (85% of the total area) dredging area. The coordinates of this sand source concession site is tabulated in **Table 5-2** below while the location of the concession site is depicted in **Figure 5-4**. The EIA for Sand Mining activities of Extrorish Sdn Bhd has been approved by DOE Melaka on 4 August 2009 and has been renewed until 31st December 2017. Application of license renewal after December 2017 has been submitted by Extrorish Sdn Bhd and now pending the approval from the Minister of Natural Resources and Environment.

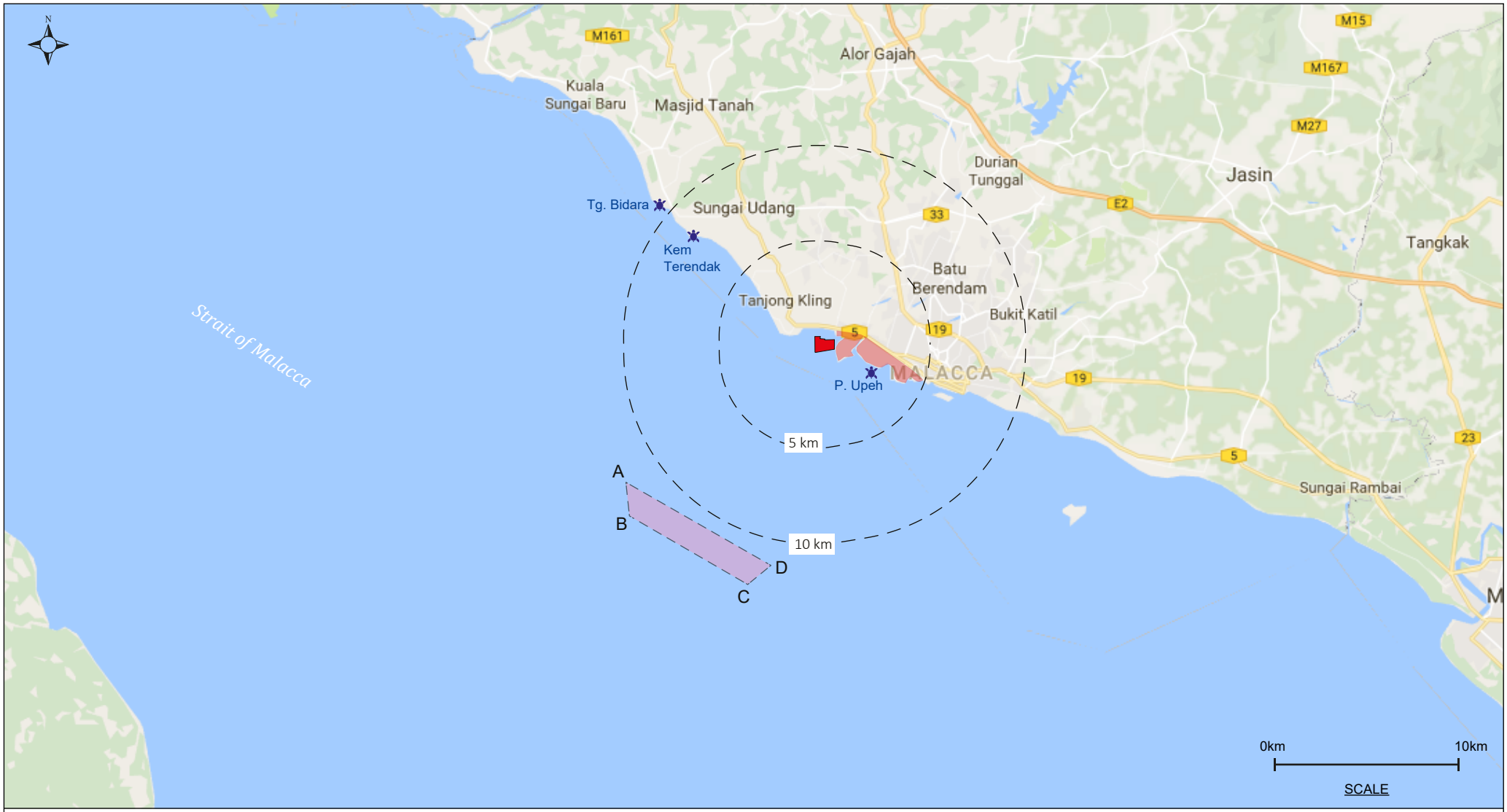
Table 5-2 Sand Source Coordinates

Point	Latitude	Longitude
A	2°08'18.0"N	102°06'00.0"E
B	2°07'25.0"N	102°06'00.0"E
C	2°05'00.0"N	102°09'30.0"E
D	2°05'30.0"N	102°10'00.0"E

The estimated volume of fill material needed for the proposed project is about 2 million cubic metres. According to the EIA for Sand Mining activities of Extrorish Sdn Bhd, the sand source concession site selected for the proposed project contains about 100 million cubic metres of dredged material. From the total of this volume, 78% is sand and the deposits of sand are found at most of the concession area from the surface of seabed until about 4m below the seabed. At the mid region of the concession site, the sand deposit even settled until 6m to 9m below the surface of the seabed.

The fill material from the sand concession will be deposited to the project site using the right vessels which vessels' water draft are suite to the water level at the reclaim areas. For the proposed project site, vessels full laden's maximum water draft 3.5 m upon high tide is most ideal and appropriate. A sand carrier with capacity 1000 m^3 to 2000 m^3 has been selected for the reclamation.

The sand carrier is designed to operate in 3 in 1 method, i.e. self- sand suction, self-propel & self- sand discharging. It is normally accommodated with a standby sand dredger without self -suction function. The main function of the sand carrier is to obtain dredged materials from the selected sand concession site and deposited them to the reclamation area. Only suitable fill material will be transported to the proposed project site. Thereby, there will be no disposal of unsuitable material (USM) involved for the proposed project. It is estimated that 3 trips per day will be carried out to attain sand from the selected sand concession site.

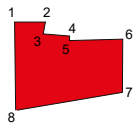


LEGEND

- Sand source
- Water bodies
- Forest
- Other reclaimed area
- Roads
- Turtle landing site
- Proposed project site

SAND SOURCE COORDINATES

A -	2°08'18.0"N 102°06'00.0"E	C -	2°05'00.0"N 102°09'30.0"E
B -	2°07'25.0"N 102°06'00.0"E	D -	2°05'30.0"N 102°10'00.0"E



PROJECT BOUNDARY COORDINATES

1) 2° 13' 9.47"N, 102° 10' 34.11"E	5) 2° 13' 4.07"N, 102° 10' 51.33"E
2) 2° 13' 9.47"N, 102° 10' 43.53"E	6) 2° 13' 4.09"N, 102° 11' 7.82"E
3) 2° 13' 5.70"N, 102° 10' 43.23"E	7) 2° 12' 47.14"N, 102° 11' 7.81"E
4) 2° 13' 4.96"N, 102° 10' 61.33"E	8) 2° 12' 41.49"N, 102° 10' 34.20"E

Figure 5.4: Location of Sand Source at Klebang, Malacca

INTEGRATED ENVIROTECH

The reclamation works involve activities as below:

5.2.2.1 Pre-Survey

Joint for pre-survey to determine the exact area and volume.

5.2.2.2 Sandkey trenching and Construction of perimeter bund

This process involves the removal of existing revetment and excavation of the underlying soft clay and mud for seabed stabilization purpose. The excavated materials will form part of the fill material, where no dumping is required.

In term of the perimeter bund, it will be constructed using sand, which is barged to the site and with truck and excavator onsite to distribute the material into the swallower areas of the reclamation's footprint. This stage will include the installation of the storm water outfalls, which run through the perimeter of the reclamation bund as well as a layer of geotextile to the inside of the core material.

5.2.2.3 Sand Transportation and Filling Works

The fill material from the sand concession will be deposited to the project site using a sand carrier with capacity 1000 m^3 to 2000 m^3. As the estimated volume of fill material needed for the reclamation is about 2 million cubic metres, 3 trips per day is estimated to be carried out to attain sand from the nearest sand source.

Filling works involve unloading and delivering of the fill material. A few suitable 'temporary landing' points will be identified within the proposed project site according to the progress of work. The sand on board of the vessel will be unloaded and delivered to the reclamation area by vacuum pump, which has the capacity of 1000m^3 per hour. Basically, it would require about 1 to 2 hours to unload a fully loaded vessel.

Due to reclamation project for sand transportation is through sea base, as such there have no any issue for the access road to site for reclamation material transportation.

5.2.2.4 Soil Treatment

Prefabricated Vertical Drains (PVD), also called Wick Drains, are prefabricated drain strips consisting of a polypropylene core extruded into a configuration to transmit a maximum water flow on both sides of the core. The core is wrapped in a non-woven filter, ultrasonically welded at the edges. The filter fabric made usually with needle punched or thermally bonded geotextile.

Ground improvement using PVD is applied in areas with compressible water-saturated soils such as peat, clay and silty clays, where significant settlement may occur. Installation of PVD is used as a method to accelerate the consolidation of

soft soil. It is part of the treatment of fill materials and the treatment process is to be carried out after the completion of the filling activities

Typically, the PVD will be installed into the soil to create shorter drainage path with a regular spacing in order to enabling the excess water to flow horizontally through the longitudinal grooves on both sides of the core. It shall be located, numbered and pegged out using baseline and benchmark indicated and designed by the Project Engineer.

The installation of PVD is usually done by penetrating the soft soil with a hollow steel mandrel. It is usually done with the aid of special PVD stitcher. A drainage filter or drainage blanket (sand or small aggregate or any other permeable material) should be provided directly above the installed PVD for easy flow of pore water expelled from the PVD during the clay consolidation. While a non-woven geotextile is usually used as a separator between the drainage filter and soil fill above.

Advantage of using of PVD is the reduced construction time and the elimination of the risk of slip plane failure due to maximum efficiency in discharging pore water, whereby the jacket provides the optimum filtration and permeability.

5.2.2.5 Sand Spreading and Surface Compaction Works

After sand discharged to shoreline by sand carriers, sand is required to be transported, dumped and bulldozed to designate reclaim areas to required platform level (3 m). Sand surface must then be compacted in order for sand ground fully settled to the required level. Treatment of top layer subgrade for final platform to optimum density will be achieved by using vibratory drum rollers, with a capacity of approximately 10 tonnes. Next, levelling the reclamation area to the desired finished grades and slopes using earthmoving equipment.

5.2.2.6 Excess sand fill surcharge removal

Sand surcharge will be used to render the sand ground to achieve maximum settlement of sand ground. The recommended surcharge duration usually up to 4 -6 months. After surcharge duration mentioned, sand can be removed for other designated reclaim areas.

5.2.2.7 Water quality & geotechnical monitoring

This plan concerns the proposed execution of geotechnical investigation and monitoring for the project development. Proper installation, monitoring and processing of the result of instrumentation is essential to the success of the sand fill reclamation works.

5.2.2.8 Silt curtain installation

Single layer silt curtain will be installed at the early stage of the Reclamation Phase to minimize sediment transport from the reclamation area to adjacent water body. This barrier aims to prevent fine grained suspended materials from migrating by advection and diffusion from the point generation at work site to the wider water environment. The typical specification of the proposed silt curtain is provided in **Table 5-3**.

Table 5-3 Typical Specification of the Proposed Silt Curtain

Properties	Test Method	Unit	SC100
Wide Width Tensile Strength			
Wrap	ASTM* D 4595-86	kN/m	100
Left			100
Elongation at Max Tensile Strength			
Wrap	ASTM D 4595-86	%	15
Left			15

*Note: * American Society for Testing and Materials*

The fine grained materials generated during the reclamation activities may reduce water quality and impact upon sensitive receivers in the vicinity of the works site area. By installing single layer silt curtain, the sediment dispersion plume is restricted within reclamation area. The proposed position of the silt curtain is shown in **Figure 5-5** while the installation procedures are as below:

- The silt curtain should be oriented parallel to the directions of flow. It should extend the entire depth of the watercourse during calm-water situation.
- During wave conditions, the curtains should extend to within 0.3 m (1 ft) of the bottom of the watercourse. In that case, the curtains will 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 0.3 m (1 ft).
- 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 a brightly colored impervious mesh.
- The curtain shall be held in place by anchors placed at not more than 30m (100 ft) apart on both sides.
- First place 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.
- Sediment that has been deflected and settled out by the curtain should be removed. 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 turbidity curtain.

Figure 5.5: Proposed Position of Silt Curtain

5.2.3 Construction of Coastal Protection Structure

After completion of the reclamation works, the edge works can commence. Rock revetment is a form of coastal defense made by placing the rock inland so that the land may be protected against powerful waves. The scope of these activities is the supply and installation of rock revetment protection works along or around of the reclamation areas, including installation of geotextile underneath the rock works. The proposed location of rock bund and typical cross-section of the revetment are shown in **Figure 5-6** and **Figure 5-7**. In general, the selection of proposed rock revetment structure is based on several considerations as follows:

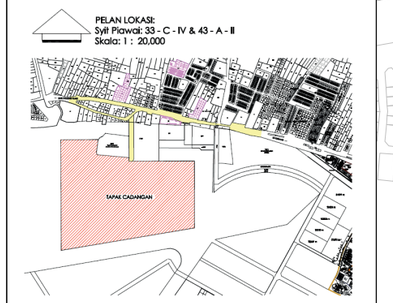
- Structural stability
- Life-cycle cost
- Foundation or soil conditions
- Exposure to wave action
- Availability of construction material
- Functional performance

Table 5-4 Proposed Coastal Protection Structure

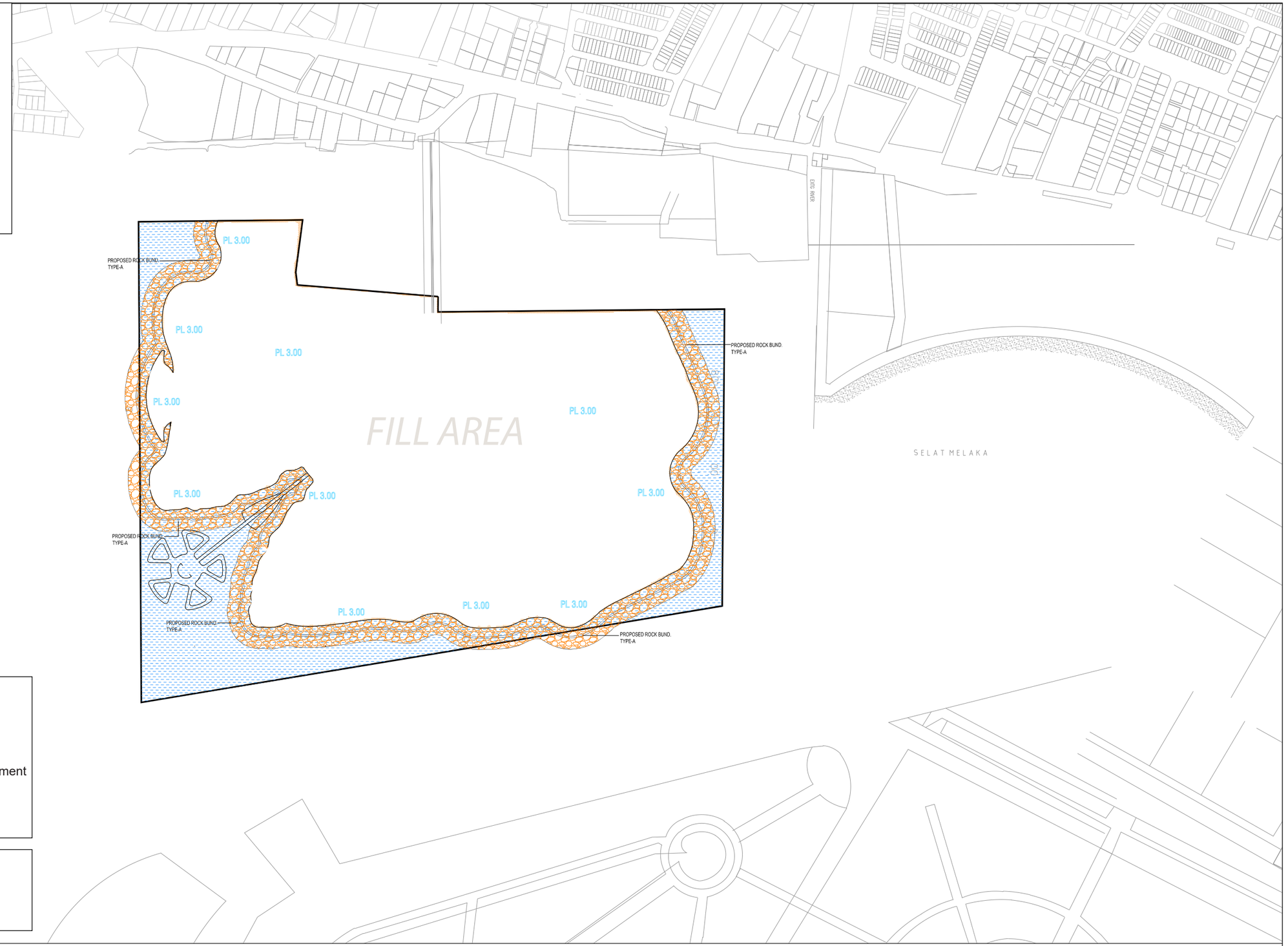
Type	Length (m)	Primary Rock		Secondary Rock	
		Weight (tonne)	Volume (m^3)	Weight (tonne)	Volume (m^3)
Rock Revetment	3520	146,362	54,208	61,523	26,752

General construction of revetment work is detailed are as below:

- Carry out localized excavation where to permit construction of rock revetment work.
- Trim the areas on which rock revetment is to be positioned to the shapes specified. Trim surfaces shall be free of roots, stumps, brush, rocks and like protrusions.
- Place geotextile on prepared surface as specified.
- Place revetment rock in such a manner to avoid displacement or tearing of geotextile and to produce a dense evenly distributed revetment.
- Hand place revetment rock adjacent to walls and structures unless otherwise specified.



LOCATION PLAN



LEGEND

Proposed Rock Revetment

Sea Area

Earthwork Volume

Cut Volume = 0.0 m^3
Fill Volume = 2,760,000.00 m^3

Figure 5.6: Proposed Location of Rock Bund

INTEGRATED ENVIROTECH

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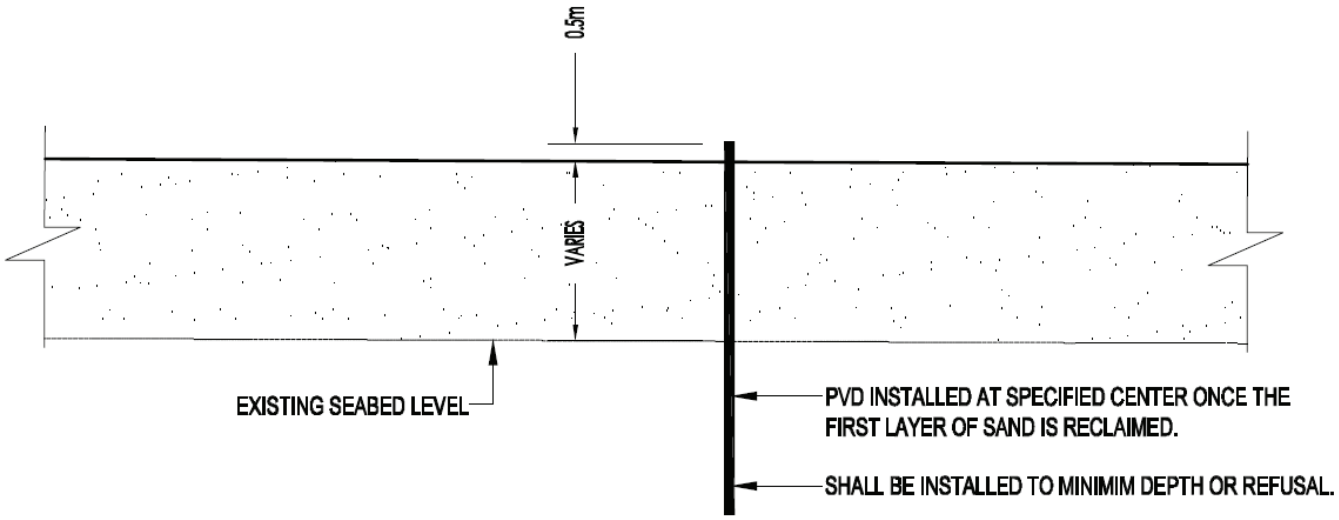
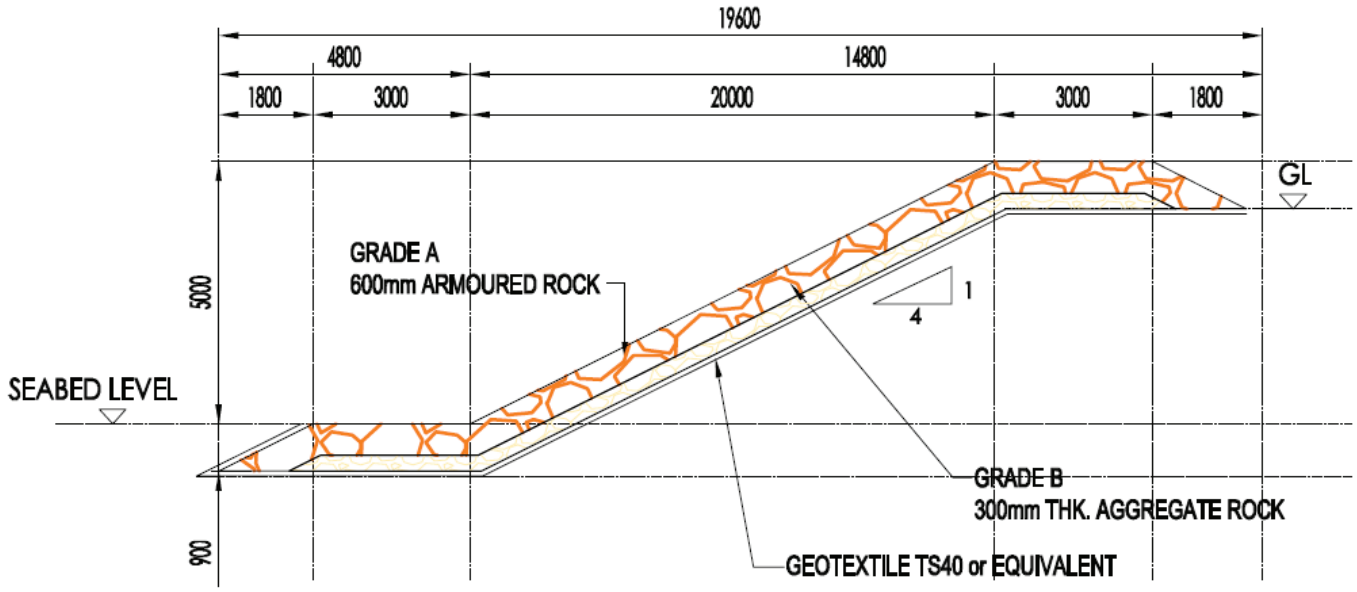


TYPICAL DETAIL OF PVD
(SUBJECT TO SI RESULTS)



TYPE - B
TYPICAL SECTION REVETMENT
NOT TO SCALE

Figure 5.7: Typical Cross Section of Revetment

5.2.4 Construction of Floating Water Chalets

5.2.4.1 Project Component

The component consist of two types of floating residential which is Floating Villa (Type A) which has 85 units whereas The Wharf Villa (Type B) that comprises of total 70 units of accommodation. On top of that, this development also comes with a clubhouse, centralize parking and a boat deck. The concept layout of the proposed water chalet development as shown in **Figure 5-8** to **Figure 5-10**.

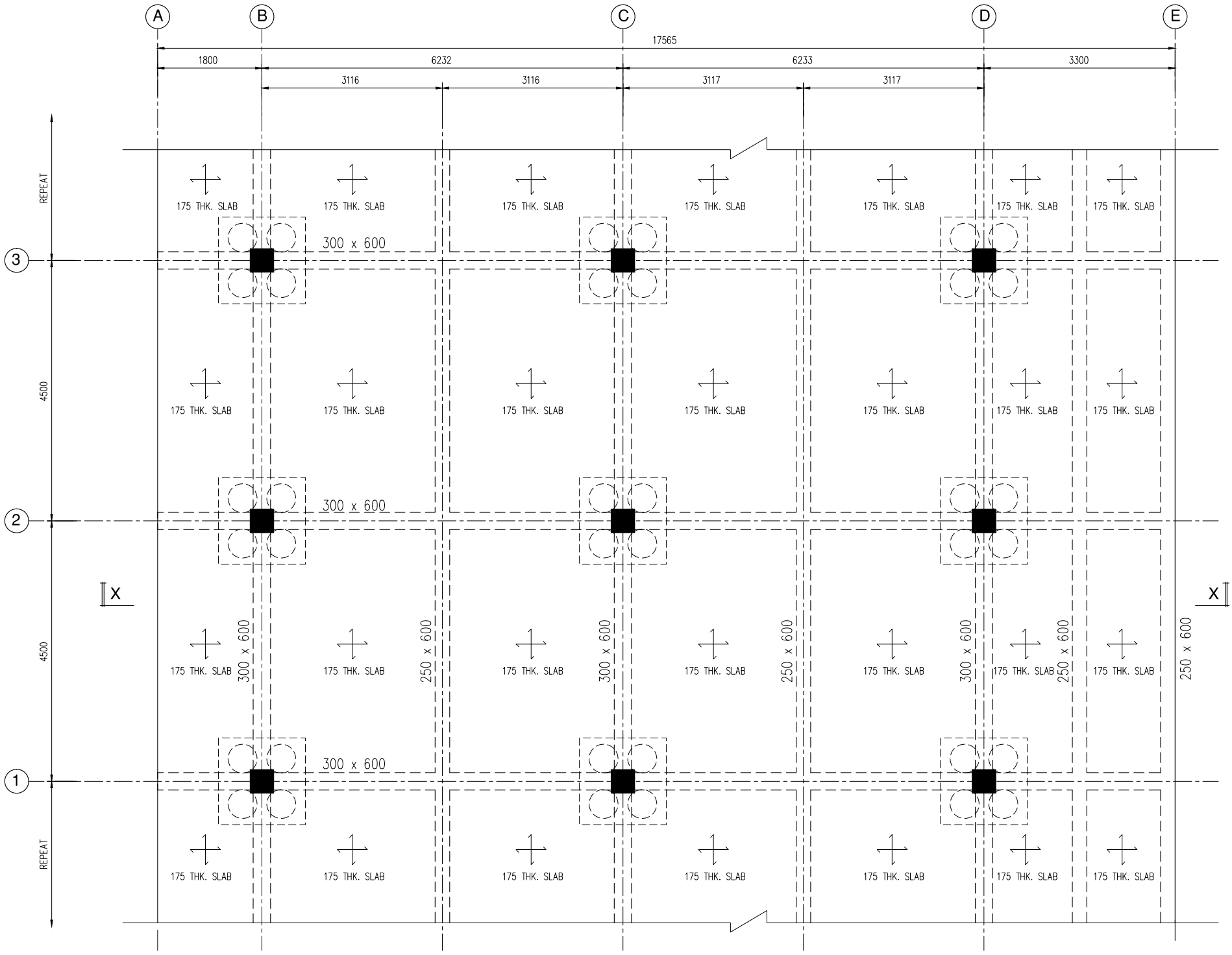
Parcel	Type	Component	Unit	No. of Floor	Gross Floor Area (SQM)	
					Per unit	Total
Parcel 12	A	Floating Villa	85	1	100	8500
		Clubhouse and Centralized Parking	1	2	2100	2520
Parcel 3	B	Wharf Villa	13	1	100	1300
Parcel 4			8	1	100	800
Parcel 5			6	1	100	600
Parcel 7			17	1	100	1700
Parcel 8			12	1	100	1200
Parcel 9			10	1	100	1000
Parcel 10			4	1	100	400
Total Units (Type A+ Type B)			**155**	-	-	-

The water chalet consists of a single-storey structural, where the main building will be constructed using reinforced concrete framing, which is supported by driven piled foundation. Pitched roof trusses structure, a lightweight structure, will be designed and built by roof specialist.

Construction of water chalets will be commenced right after the reclamation activities. It is expected to be started in May 2019 for 31 months. Main project activities during this phase are described in **Table 5-5** below:

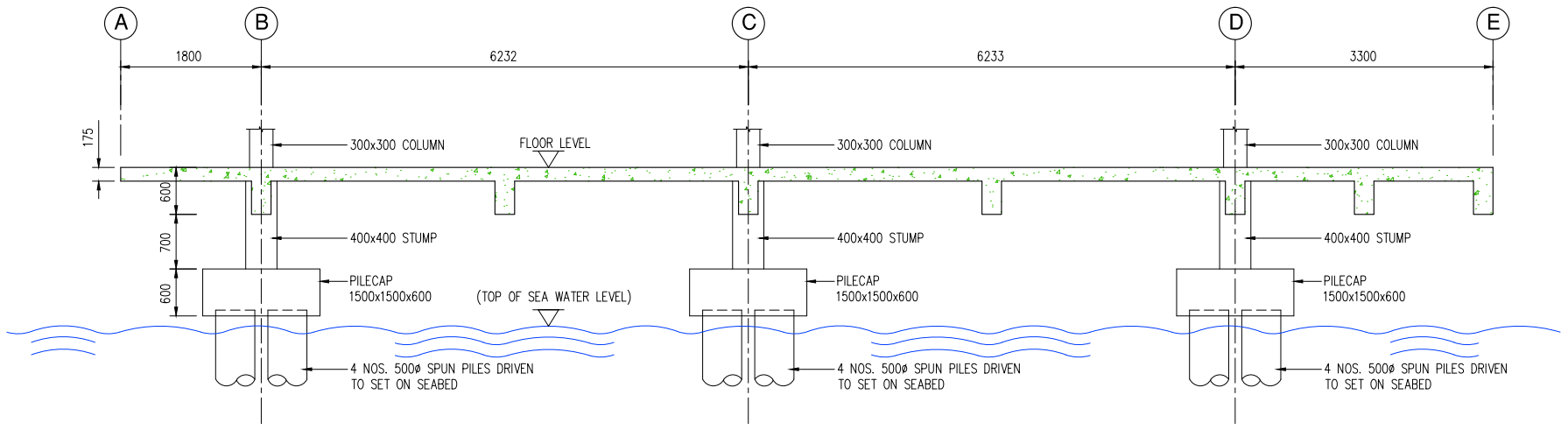
Table 5-5 Main Project Activities during Construction of Water Chalets

Main Project Activities	Description
Sub-structure Work/Site Foundation Work	• Proposed spun pile with 500 diameter in size of g60 is chosen to support the structural and to minimise earthwork at site. • The pile cap will be constructed above the top of seawater with g50 (serve exposed condition) • Spun pile machinery to be mobilised to specific location and spun pile to be driven in at the location. Before pile cap works, all driven pile to be cut to levels and the pile cap will be constructed after all piles were driven into the seabed.
Main Building Work	• After the pile cap to be constructed, reinforced concrete column/pier to be cast from the top of the pile cap until to the roof level in stage. • At the same time, all mechanical and electrical services works will be commenced. • Meanwhile, reinforced concrete ground beams and ground slabs will also be cast accordingly. • It is then followed by the construction of column to roof level and the casting of roof beam with anchorage steel bolts. • The final step will be installation of roof structure, closing up with metal or ceramic roofing sheet or tiles and architectural finishes.
Exterior Finishes and Interior Trim	Final work necessary for the completion of water chalets, which includes decoration, door and window trimmings, paneled jams, finishing coat, painting, plastering, etc.



TYP. FLOOR LAYOUT PLAN

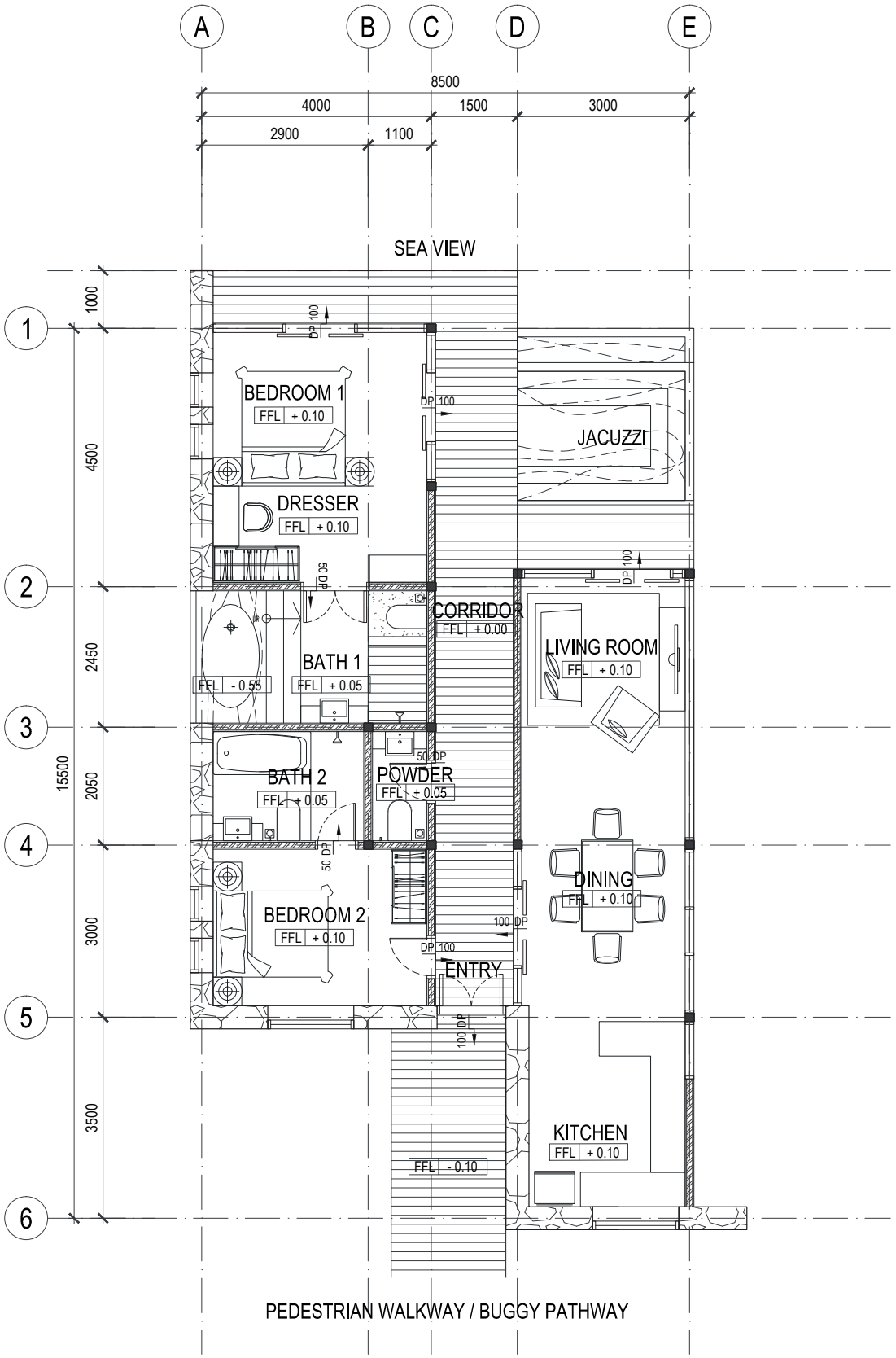
SCALE 1:50



SECTION X - X

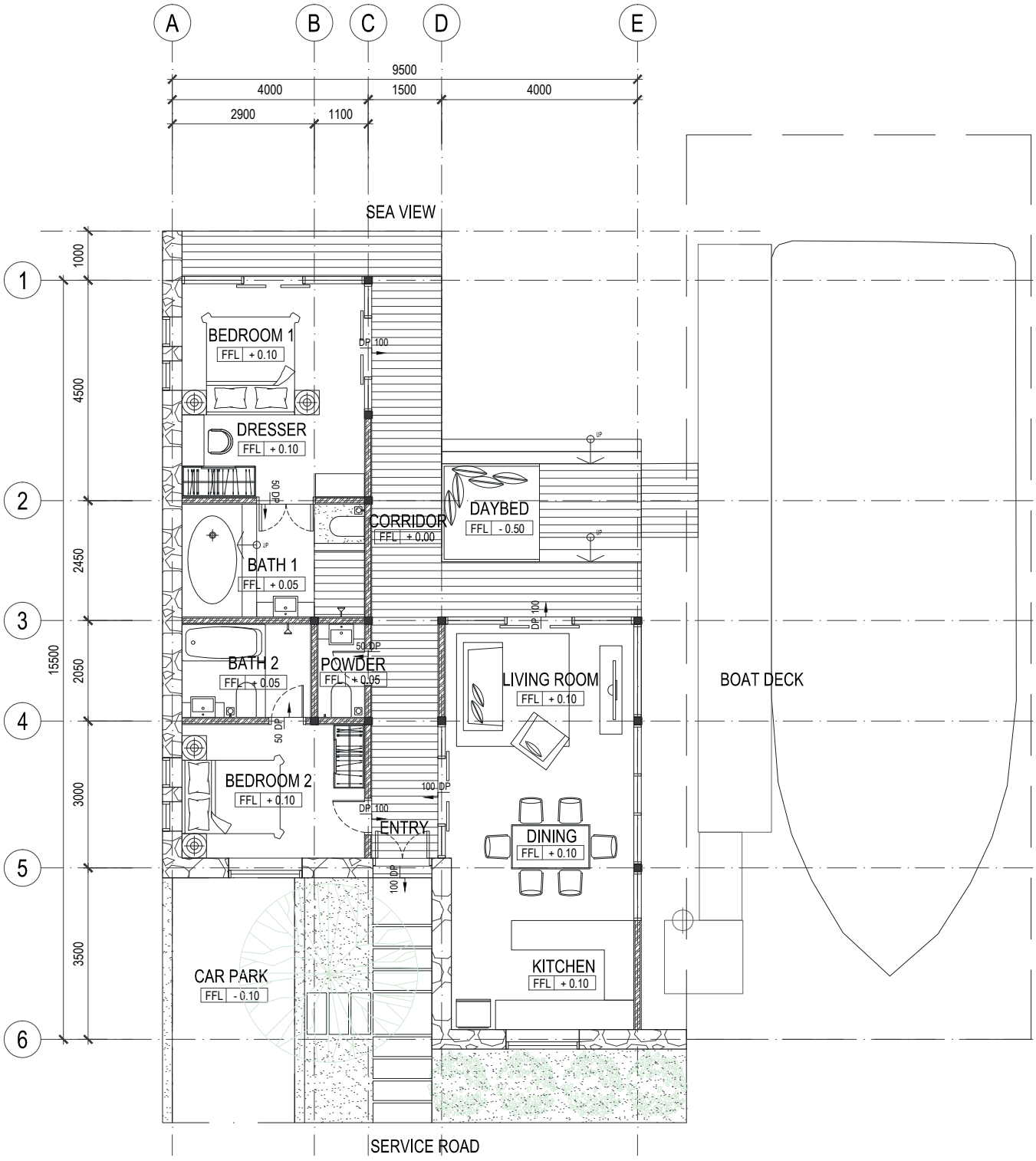
SCALE 1:50

Figure 5.8: Chalet Structure Layout



Area : 100sqm / 1050 sqft
Scale : 1:100

Figure 5.9: Floating Villa (Type A) Floor Plan



Area : 100sqm / 1050 sqft
Scale : 1:100

Figure 5.10: The Wharf Villa (Type B) Floor Plan

Figure 5-11 Proposed Reclamation Area with Floating Piles

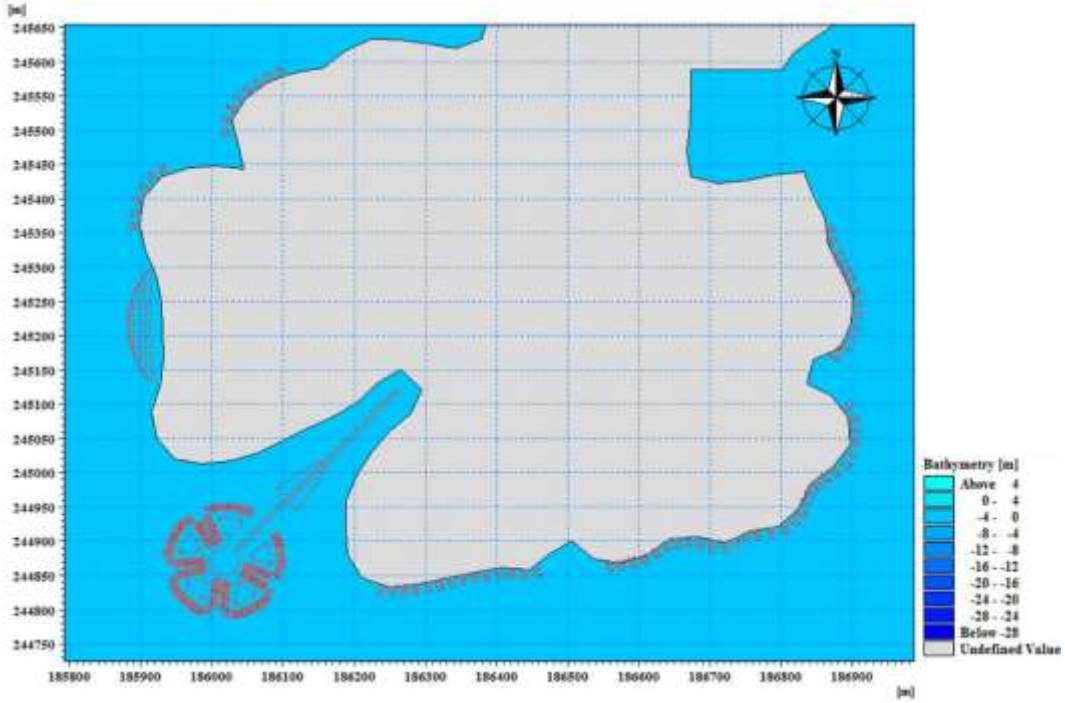


Figure 5-12 View of Floating Piles at Project Site (Left Side)

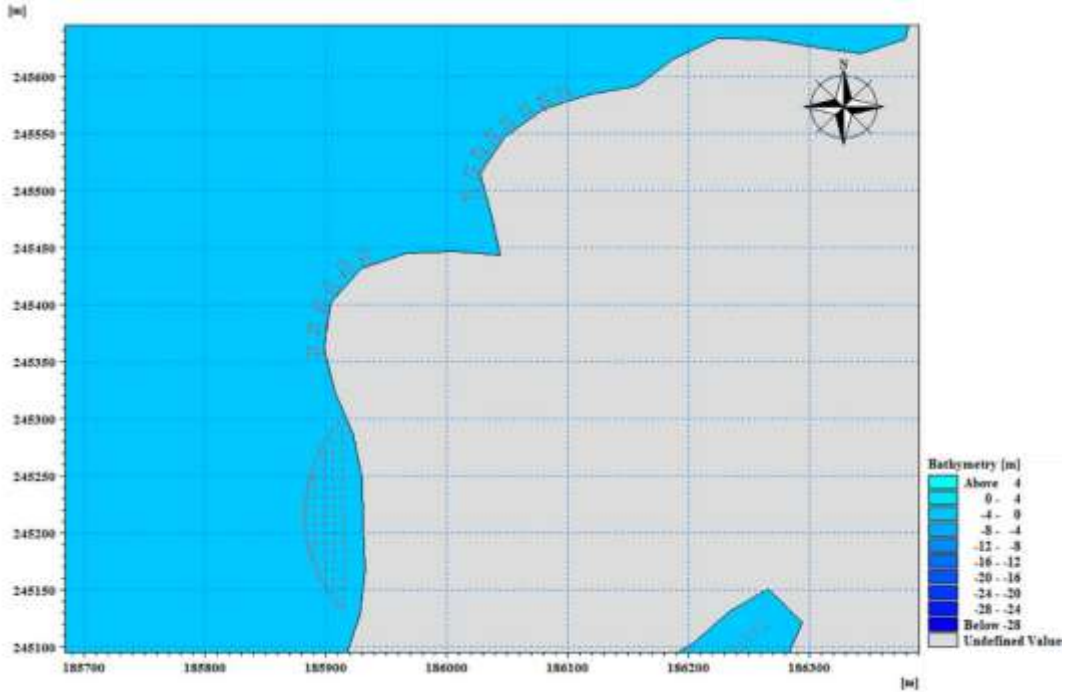


Figure 5-13 View of Floating Piles at Project Site (Centre)

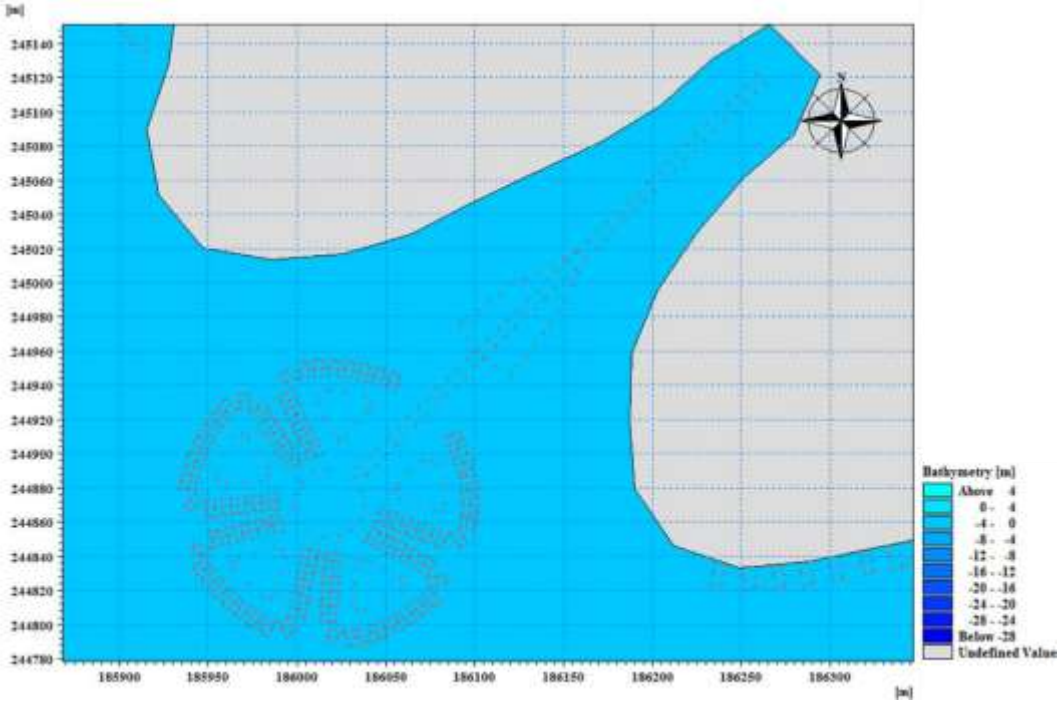
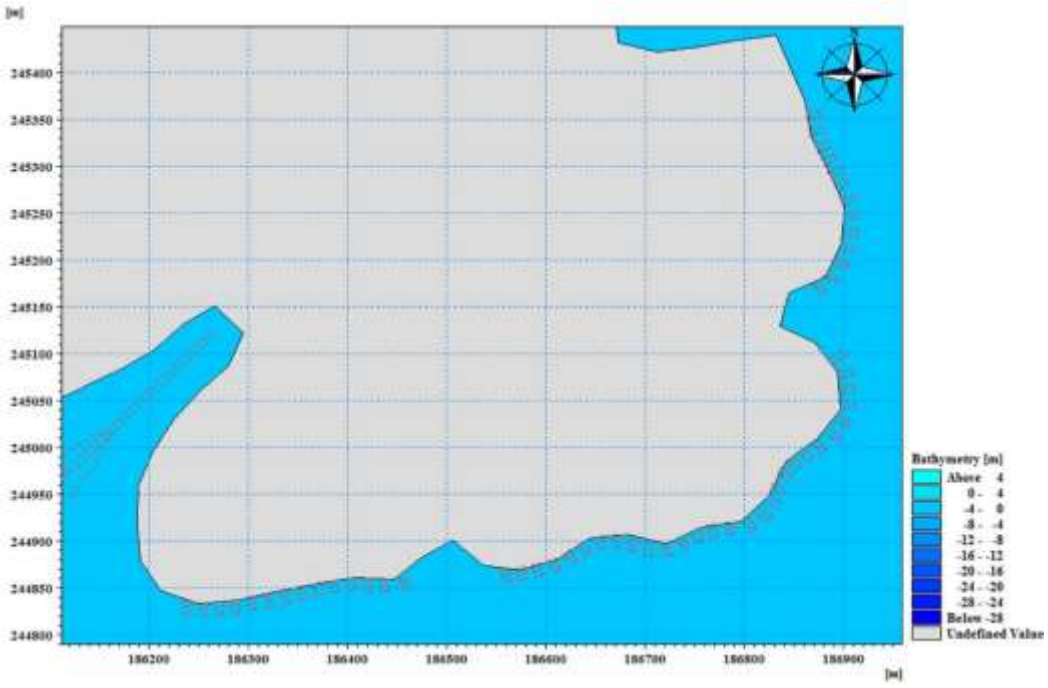


Figure 5-14 View of Floating Piles at Project Site (Right Side)



5.2.4.2 Utilities Development

5.2.4.2.1 Road

An access road which connects the reclamation area and the mainland will be constructed. The cross section of the access road is provided in **Figure 5-15**. There will be no road upgrading activities proposed for the project.

5.2.4.2.2 Water Supply

The estimated total water demand for the proposed development is 52,800 gallons per day (refer **Table 5-6**). There will be no elevated water tanks (EWT) on site. The water will be supplied by Syarikat Air Melaka Berhad (SAMB).

Table 5-6 Water demand of the Proposed Development

Building Type	Unit		Demand Litre/day	Total Demand (gal/d)
Floating Villa	85	House	1,500	127,500
Wharf Villa	70	House	1,500	112,500
Total Water Demand, Litre/day				**240,000**
Total Water Demand, Gal/day				**52,800**

Source: Awan Plasma Sdn Bhd, 2017

5.2.4.2.3 Electricity

The estimated total electricity supply demand for the proposed project is 640kW (**Table 5-7**).

Table 5-7 Estimated Electricity Supply Demand

Building Type	Unit		Demand, kW	Total Demand Required, kW
Floating Villa	85	House	4.0	340.0
Wharf Villa	70	House	4.0	300.0
Total Electricity Demand, kW				**640.0**

Source: Awan Plasma Sdn Bhd, 2017

5.2.4.2.4 Telecommunication Services

All telecommunication services will be provided by Telekom Malaysia Berhad (TM).

5.2.4.2.5 Drainage System

The proposed drainage layout is designed in accordance with "Urban Stormwater Management Manual for Malaysia" (USMMM) 2002 Second Edition, published by the Department of Irrigation and Drainage, Malaysia.

The proposed drainage covers the internal roadside drain, which caters for the runoff from the building roofs discharged through rainwater down pipes connected to the drains. The proposed drainage layout is shown in **Figure 5-15.**

The drains specified in this development are drains and reinforced concrete box culvert and half round clay earth drain. The design discharge/runoff and drain capacity are calculated based on USMMM, for small catchments, the Rational Formula may be used and presented below:

a) Design Discharge/Runoff

$$Qy = C\ yIt\ A/\ 360$$

Where Qy = y year ARI (Average Recurrence Interval) peak flow in m3/sec

C = dimensionless runoff coefficient

ylt = year ARI (Average Recurrence Interval) over time concentration, tc, in mm/hr y

A = drainage area in hectares

b) Drain Capacity

Manning's formula for open channel flow is adopted in this report to calculate the capacity of the drain and culvert:-

$$Qy = (A\ R\ 2/3\ S\ 1/2)/n$$

Where Q = drain capacity in m3/sec

A = flow area in m2

R = hydraulic radius in meters = A/P

P = wetted perimeter in meters

S = Longitudinal gradient of drain invert

n = Manning's Constant = 0.015 for concrete drain

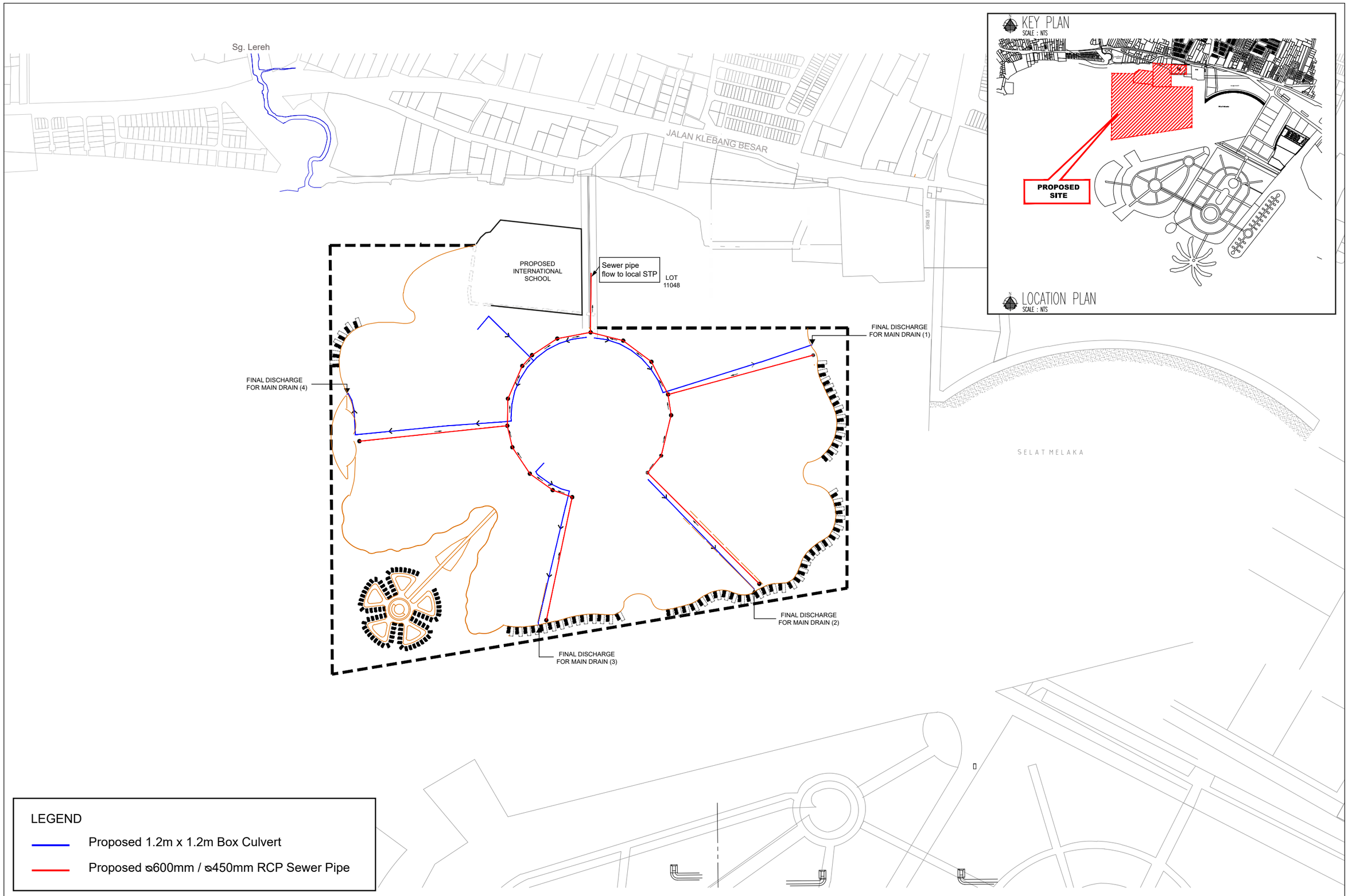


Figure 5.15: Drainage and Sewer System Layout

A3

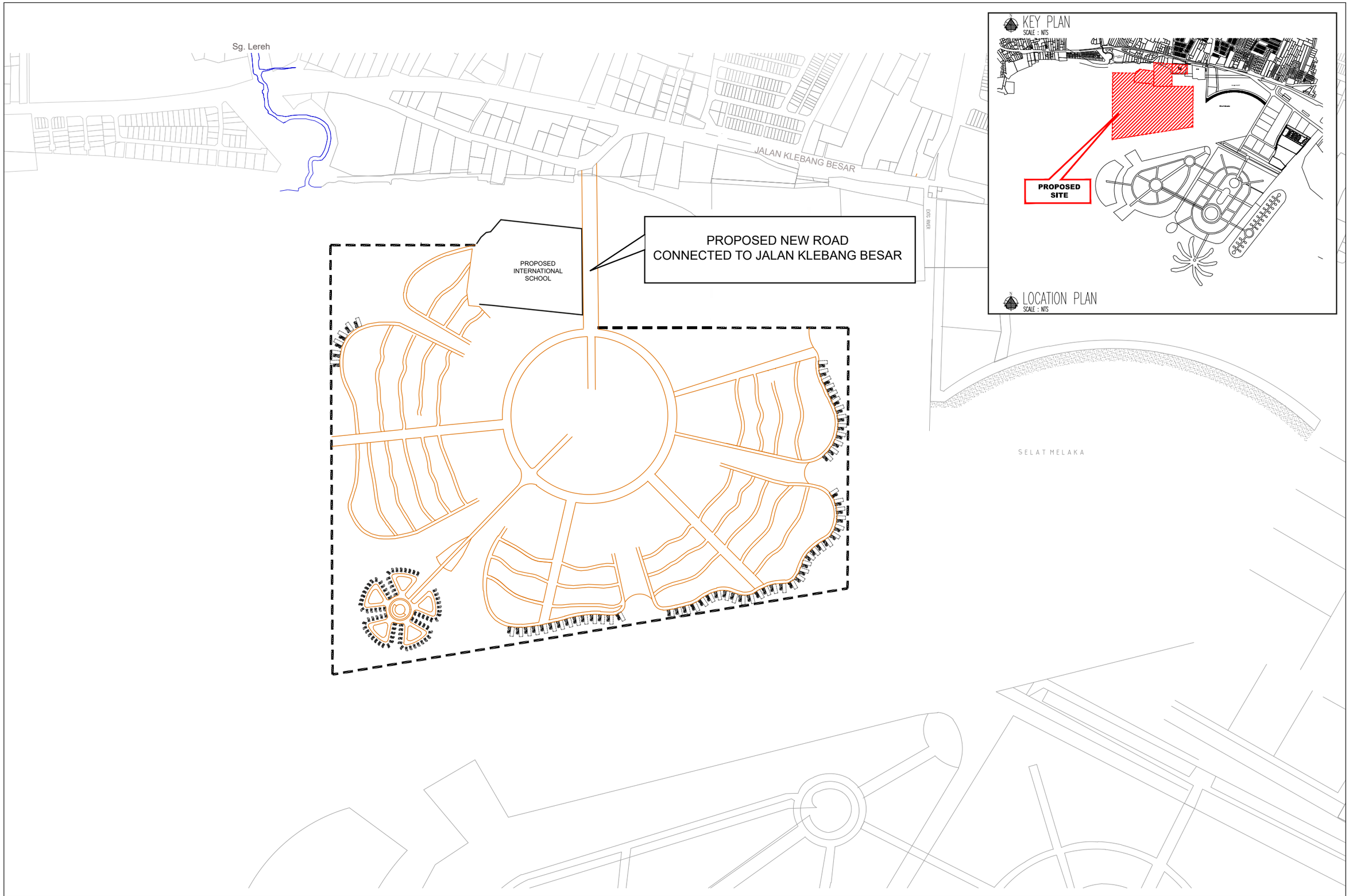
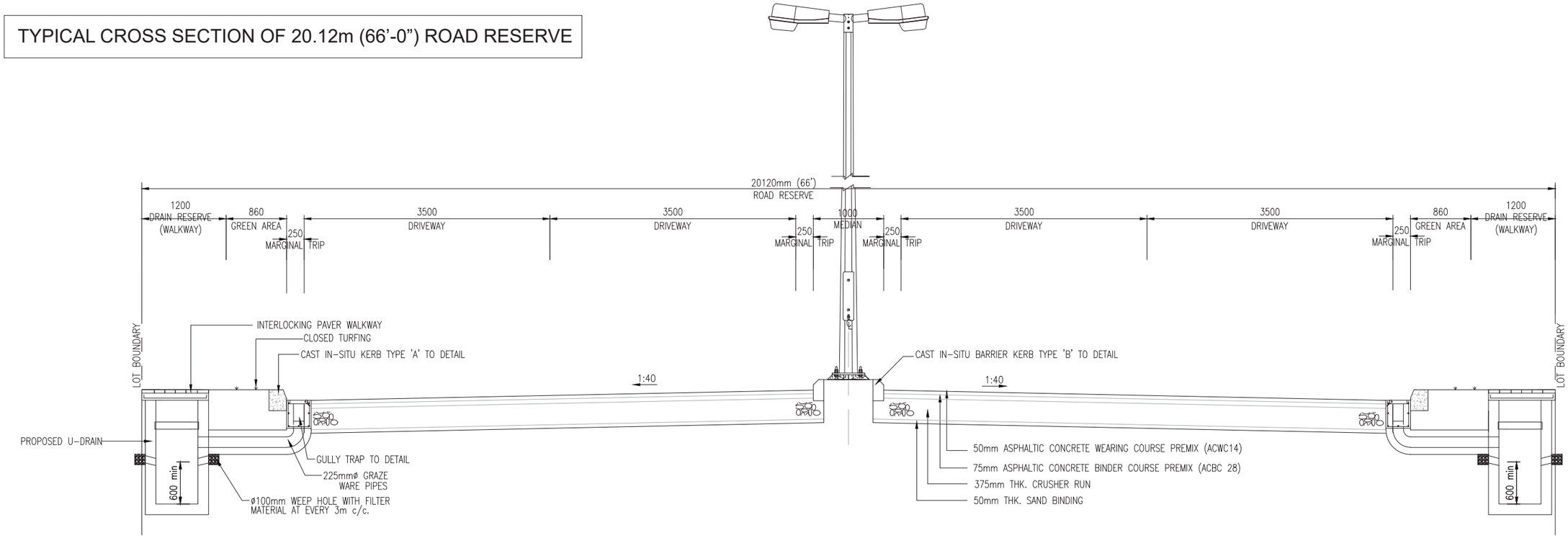


Figure 5.16: Road System Layout

TYPICAL CROSS SECTION OF 20.12m (66'-0") ROAD RESERVE



TYPICAL SECTION OF 12.20m WIDE ROAD RESERVE

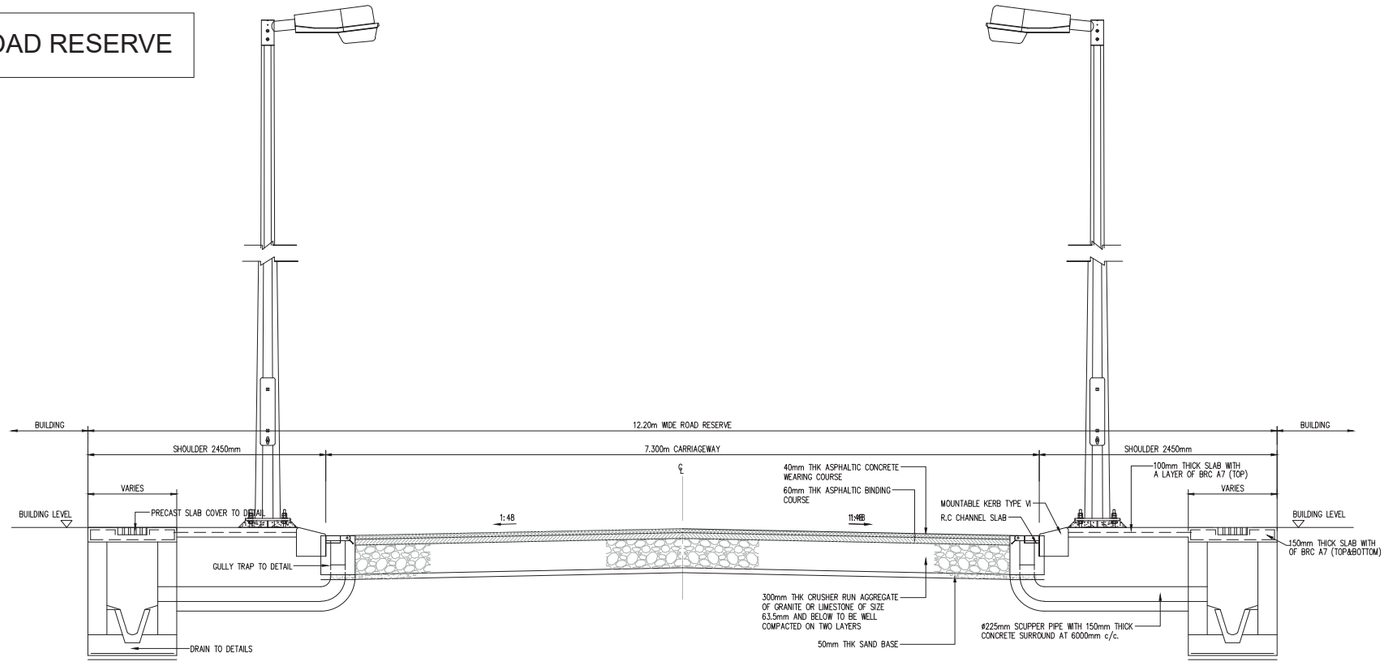


Figure 5.17: Road Cross Section Layout

5.2.4.2.6 Sewerage System

The estimated total population equivalent (PE) of the proposed project during the operational stage is 775 PE (as refer to **Table 5-8**). Sewage generated during the operational stage of the project will be channeled and treated by a centralized Sewage Treatment Plant from Majlis Bandaraya Melaka Bersejarah (MBMB) on Lot PT 1819, Mukim Tambak Laut Tengkera in Melaka Tengah.

Table 5-8 Population Equivalent of Proposed Project

Building Type	Unit		Total PE Required
Floating Villa	85	House	425
Wharf Villa	70	House	350
		Total PE	**775**

Source: Awan Plasma Sdn Bhd, 2017

5.2.5 Operational Phase

Operational of water chalets and maintenance works of waste disposal system, water reticulation system, electricity supply, and etc. are the main activities undertaken during the operational phase of the proposed project.

5.2.6 Abandonment Plan

In the unlikely event that the proposed project, at any stage of construction, cannot proceed and has to be abandoned due to unforeseen circumstances, the project proponent must endeavor to vacant the project site in an environmentally responsible manner and prepare a Project Abandonment Plan.

Abandonment during earthworks will result in serious air and water quality impacts due to failure to implement soil erosion measures or complete turfing. The project site will be an eyesore due to the presence of partially completed structures, construction debris left all around the site and neglected offices, stores and sheds. After a short time of inactivity, lalang and weeds will start to grow and will gradually cover up the work site, aggravating the poor visual appearance of the site. This situation will continue until another Developer/Contractor is called in to take over the site, or the half-completed structures torn down for redevelopment.

The project site should be left in the best shape possible in terms of the environment. It should also be free of any unexpected hazards to the public. The abandonment plan indicates all the necessary actions and steps to be taken to achieve the objective above and ensure that the site is left in a condition that has no environmental implications.

In general, the abandonment plan will include an inventory of materials and equipment and their removal. It will provide details on the demobilization and removal of temporary and semi-built structures, and the closure of work sites. The abandonment plan will also address the need for rehabilitation of cleared areas

through turfing, the restoration of all temporary drainage and completion of permanent drainage channels.

5.3 Project Requirements

5.3.1 List of Equipment

Lists of equipment required for the proposed project is presented below:

Table 5-9 Equipment Requirements

Phase/Activities	Equipment Requirements
Site Preparation	• Survey Equipment • Backhoe • Excavator • Generators
Reclamation and Construction	• Sand carrier vessels and auxiliary equipment • Excavators • Dump trucks • Shovels
Operational	• Excavators • Dump trucks • Shovels

5.4 Personnel Requirements

Personnel/man power required for the proposed project is provided as follows:

Table 5-10 Personnel Requirements

Manpower Requirements	Phase		
	Site Preparation	Reclamation	Construction
Project Director	1	1	1
Project Manager	1	1	1
Project Engineer	1	1	1
Project Supervisor	2	2	2
Land Surveyor	1	1	1
General Workers	3	20	40
Sand Carrier Crew	-	30	-
Machineries Operator	5	10	10

5.5 Waste Generation and Management

Scheduled wastes and construction wastes generated during reclamation and construction of water chalet stages are proposed to be temporary stored at two allocated zone as depicted in **Figure 5-18**. These zones are located on left and right of reclamation site with estimated areas of 7acres and 9 acres, respectively.

The wastes stored within these designated zones will be segregated according to type. For construction wastes, they should be reused and recycled as much as practically possible. The wastes cannot be reused or recycled will be disposed of to the nearby approved landfill, for example Sungai Udang Sanitary Landfill and Dengkil Inert Waste Landfill by licensed contractors. As for the scheduled wastes, they will be managed according to the Environmental Quality (Scheduled Wastes) Regulation, 2005 and to be disposed of by DOE licensed contractor only.

Amount of wastes generated by the proposed development is provided in tables below based on the Project Proponent estimation:

Table 5-11 Expected Waste Volumes Generated during Reclamation Phase per Month

Waste Type		Source	Total (Tonnes)
Solid Waste (Non- Schedule Waste)	Domestic Waste	Base Camp	1
	Gravel/Laterite	Revetment	1
Schedule Waste	Diesel	Machinery Equipment	1
	Oil	Oil Tanker/Vessel	1

Table 5-12 Expected Waste Volumes Generated during Construction of Water Chalets per Month

Waste Type		Source	Total (Tonnes)
Solid Waste (Non- Scheduled Waste)	Domestic Waste	Base Camp	1
	Cement	Foundation and shuttering	15
	Concrete blocks		15
	Wood		5
	Metal		10
	Glass	Finishing Structure	1
	Plastic	Various	1
	PVC Pipe	Various	3
	Electrical cables/wires	Power tools	3
	Gravel/Laterite	Various	1
Scheduled Waste	Diesel	On-site construction machinery	1
	Oil	Oil Tanker/Vessel	1

Table 5-13 Expected Waste Volumes Generated during the Operational Phase per Month

Waste Type	Source	Total (Tonnes)
Municipal Waste-Solid Waste Garbage Kitchen waste Office Waste	Kitchen Restaurants Office Rooms Clubhouse Repair Works	2
Scrap material	Leather Fabric Metal	1

5.6 Project Implementation Schedule

The proposed project is expected to take about 6 years to complete. It is scheduled to commence in March 2018 and end in September 2024. The Overall Project Implementation Schedule is shown in **Figure 5-19** whereas EIA Study timeline are shown in **Figure 5-20.**

Figure 5.18: Temporary Storage Sites

Activity	Duration (Month)	Start Date	Finish Date	2018												2019												2020						
				1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7
Reclamation Phase																																		
Mobilization Phase																																		
Vessels and Machineries	1 month	Mar-18	Apr-18																															
Site office establishment	1 month	May-18	May-18																															
Survey Phase																																		
Pre-dredge survey reclamation area	1 month	1 month	1 month																															
Out-survey reclamation area	1 month	1 month	1 month																															
Reclamation Phase																																		
Imported Sandfill	4 months	Oct-18	Feb-19																															
Soil Improvement Works	3 months	Mar-19	Jun-19																															
Sand Settlement Period	3 months	Jun-19	Sep-19																															
Sand Surcharge Removal	3 months	Sep-19	Dec-19																															
Rock Revertment Work	3 months	Dec-19	Mar-20																															
Demobilisation Phase																																		
Survey equipment/Machineries	1 month	Mar-20	Apr-20																															
Construction of Water Chalet Phase																																		
Sub Structure Work - Site Foundation	6 months	May-20	Dec-20																															
Main Building work	18 months	Jan-21	Jun-22																															
Exterior Finishes	12 months	Jun-22	Jun-23																															
Infrastructure Work	12 months	Jun-22	Jun-23																															
Interior Trim	12 months	Jun-22	Jun-23																															
Exterior Landscapping	6 months	Jul-23	Dec-23																															
Final Building Inspection	3 months	Jan-24	Mar-14																															
First Walk thru	2 months	Apr-24	Jun-24																															
Final Walk thru	2 months	Jul-24	Sep-24																															

continue below:

Activity	2020					2021												2022												2023												2024											
	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Reclamation Phase																																																				
Mobilization Phase																																																			
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Final Building Inspection																																																		
First Walk thru																																																		
Final Walk thru																																																		

Figure 5.19 Overall Project Implementation Schedule

No	Item	Month	Year 2016							Year 2017									
			June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct
1	Contract Award, Project Preparation and Kick-off																		
2	Preparation & Submission of PAT																		
3	Data gathering and information on proposed project																		
4	1st TOR submission to DOE																		
5	2nd TOR submission to DOE (Additional information)																		
6	TOR Processing Period by DOE																		
7	Endorsement of TOR from DOE																		
8	Approval of Hydraulic Study from JPS																		
9	Environmental Baseline Studies and Modelling																		
	- Air and Noise Level quality																		
	- Water and Sediment Quality																		
	- Ecology (Flora and Fauna)																		
	- Marine Biology and Fisheries																		
	- Socio Economic Study and Public Engagement																		
10	Report Preparation																		
	- Study Findings and Analysis of Results																		
	- Prediction of Impact and Analysis																		
11	Report submission for client review and comment																		
12	Final report submission to DOE																		

Figure 5.20: EIA Study Timeline