Executive Summary

1 Introduction

Sand concession has been given to Permerbadanan Menteri Besar Negeri Sembilan or Menteri Besar, Negeri Sembilan (Incorporated) (MBI) which is a strategic development company wholly owned by the State Government of Negeri Sembilan, Malaysia. The agent appointed by MBI in charge of buying and selling the sand is Plenitude Vista Sdn Bhd. The mined sand will be sold for fill at reclamation site intended forJimah East Power 2 x 1,000 MW Coal Fired Power Plant Project, Negeri Sembilan

Taisei Corporation is the contractor in charge of the sand mining planning and operation while Van Oord (Malaysia) Sdn Bhd has been appointed as the Trailer Suction Hopper Dredger (TSHD) provider to extract sand.

2 Purpose of Environmental Impact Assessment (EIA)

The proposed project falls within the list of prescribed activity under Item 8(b) of the Environment Quality (Prescribed Activities) (Environmental Impact Assessment) Order, 2015 which requires an EIA to be carried out and submitted to Department of Environment (DOE) for approval before project commencement.

3 Statement of Need

The project is required as to provide suitable sand for the reclamation of land footprint for project Jimah 3B, Proposed 2 x 1000 MW Supercritical Coal-Fired Power Plant at Mukim Jimah, Daerah Port Dickson in Negeri Sembilan. The volume of sand expected to be dredged is estimated at 3.0 million m^3.

4 Project Location

The location of the sand source area is shown in **ES/RE1** and coordinates of the approved sand source area summarized below. The distance between the Point 6 (the nearest point to the border of federal water) of the proposed site and the border of the state/federal waters is approximately 330 m.

Coordinates of the Sand Source Area

Point	Latitude	Longitude
1	2° 32' 06"	101° 44' 17"
2	2° 32' 18"	101° 44' 30"
3	2° 31' 30"	101° 45' 00"
4	2° 31' 22"	101° 45' 10"
5	2° 30' 24"	101° 44' 42"
6	2° 31' 00"	101° 44' 30"
7	2° 31' 18"	101° 44' 44"

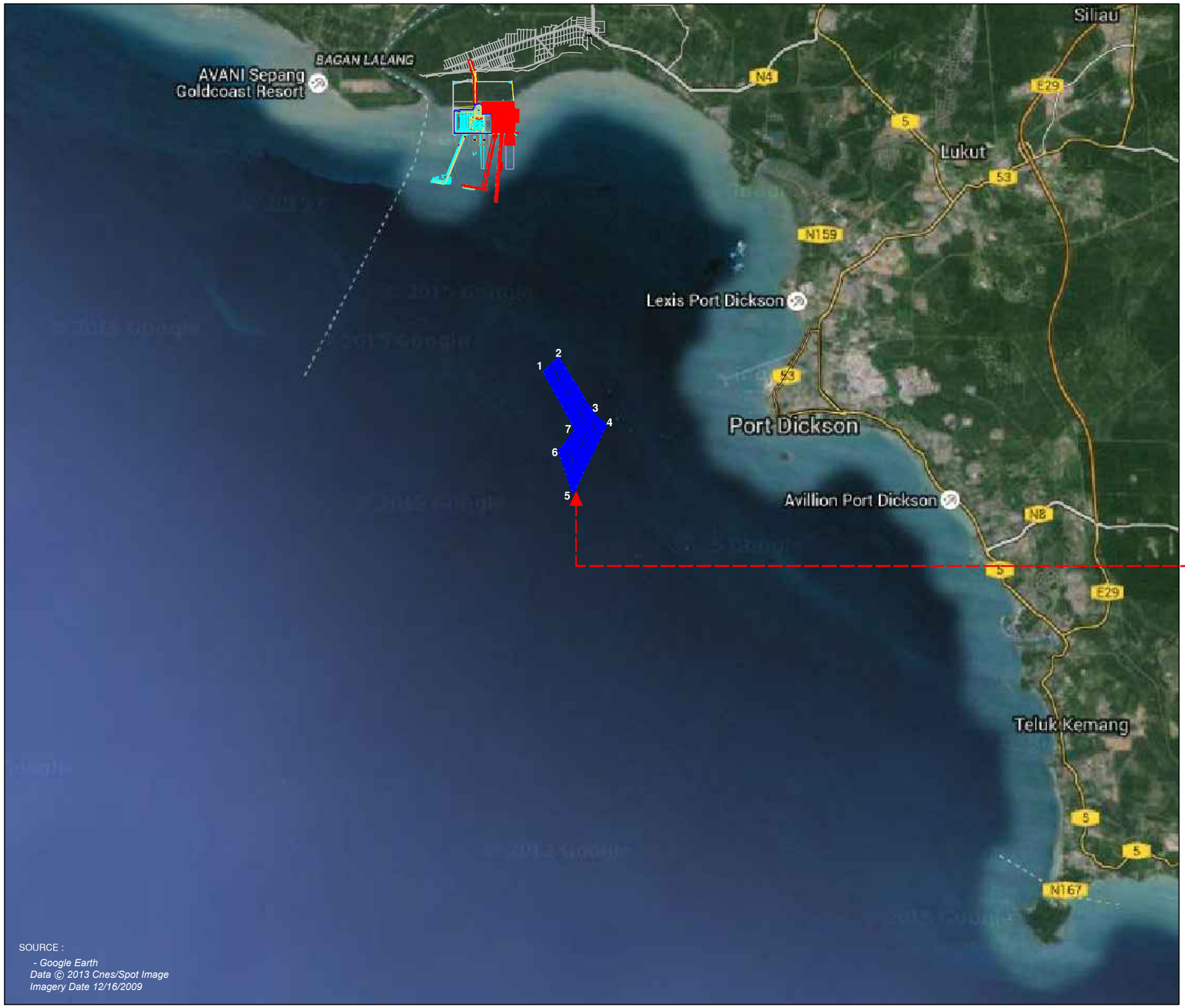
5 Project Description

For this project, the scope is mainly on sand mining. Sand dredged from the sand bank will be fully deposited at the reclamation area of Jimah 3B footprint. No unsuitable material is expected from sand mining activities.

The sand extraction activity will involve dredging of about 3.0 million m^3 of marine sand at the sand borrow area using one unit of dedicated TSHD. The marine sand will be contained in the hopper of the TSHD and then be transported to the proposed power plant site for hydraulic filling of the reclamation area. The typical TSHD to be used has a holding capacity of about 32,000 m^3. The seabed will be dredged to the average depth of 1.5 m.

A certain degree of overflowing will be allowed where necessary which means that when the sand in the dredged sand / water mixture settle in the hopper due to gravity forces, excess water is discharged via an adjustable overflow system.

The extraction of sand, transportation to the reclamation location, discharging of sand from the dredge and the vessel returning to the sand mine site will occur in a six hour cycle, 24 hours per day over a period of 70 days. Continuous operation of the vessel will depend on weather conditions and other storm event.



SOURCE :

- *Google Earth*
  Data © 2013 Cnes/Spot Image
  Imagery Date 12/16/2009

LEGEND:

PROPOSED SAND BORROW

PROPOSED SAND SOURCE LOCATION

	Y = Latitud (N)	X = Longitud (E)
1	2° 32' 06"	101° 44' 17"
2	2° 32' 18"	101° 44' 30"
3	2° 31' 30"	101° 45' 00"
4	2° 31' 22"	101° 45' 10"
5	2° 30' 24"	101° 44' 42"
6	2° 31' 00"	101° 44' 30"
7	2° 31' 18"	101° 44' 44"

N

0 1 2 3 4 5KM

SCALE IN KILOMETRES (1:100,000) – A3 MEDIUM

SAND SOURCE LOCATION

ES/RE : 1

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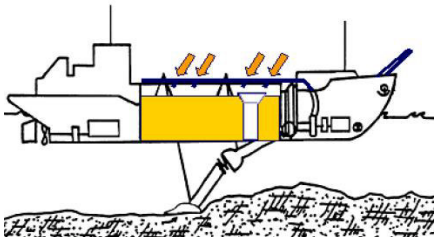
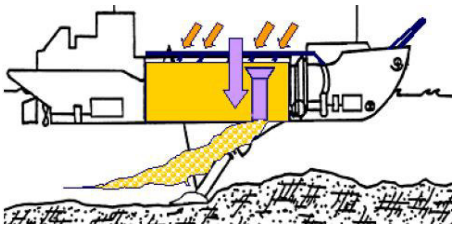
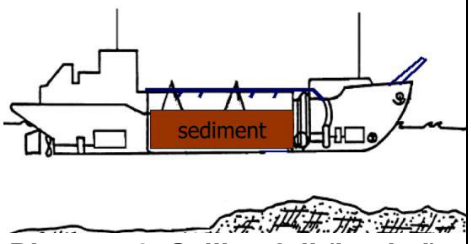
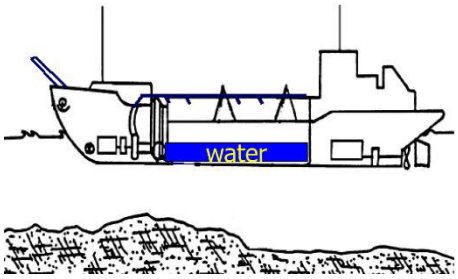
5.1 Project Activities

5.1.1 Sand Sourcing Cycle

Phase	Activity	Description	Diagram
I	Loading	• Loading takes place during sand sourcing. The mined materials will contain a mixture of sand and water, which is pumped into the hopper (refer **Diagram 1**). • When mixture reaches the overflow stage demarcated at a certain level, the majority of sand will settle in hopper, while the fine particles together with the water will leave the hopper via overflow (refer **Diagram 2**). • TSHD will load until it reaches it dredge mark (a fixed allowed draught). • When the hopper is filled, mining is stopped and the suction tubes placed on the deck of the ship, TSHD is ready to sail to the unloading area. • The estimated time required to fill up the hopper is 2.5 hour.	 **Diagram 1: Loading hopper with sand**  **Diagram 2: Loading (overflow)**
II	Sailing Full	• When the draghead is out of the water, TSHD velocity is increased to sail to the reclamation area (refer **Diagram 3**). • The estimated time required to sail to the reclamation area is 0.5 hour.	 **Diagram 3: Sailing full (loaded)**
III	Discharging	• Upon arrival at the designated reclamation area, the speed of TSHD will be reduced. • TSHD will then be carefully positioned at a location within a certain distance from the reclamation area. • At this location a floating	

Phase	Activity	Description	Diagram
		pipeline will be connected to the bow coupling of the vessel prior to unloading (refer **Diagram 4**). • The floating pipeline is connected to a system of land-based pipelines. • These pipelines will be extended and repositioned in such a way that the sand can be placed at desired location. • The estimated time required to discharge the loading is 2.5 hour.	**Diagram 4: TSHD discharging using floating pipeline**
IV	Sailing Empty	• When the load is pumped ashore, TSHD will return to its sand borrow area and a new cycle starts. • In general TSHD sails empty, back to the sand borrow section. There is only some residual water and/or load left in the hopper (refer **Diagram 5**). • The estimated time required to sail empty back to the sand borrow area is 0.5 hour.	 **Diagram 5:** Sailing empty

Source: G&P Water & Maritime Sdn Bhd, 2015

5.2 Manpower

The number of working crew on board the TSHD at any one time is 20 in 2 shifts of 12 hours per shift. The TSHD will be able to accommodate a maximum of 46 crews.

5.3 Project Implementation Schedule

The sand extraction activity at this sand borrow area will commence from first week of November to last week of December 2015. In order to ensure maximum performance of the TSHD, the sand extraction activity will conducted on a 24-hour basis.

6 Project Option

An area off Kuala Lukut of Port Dickson (Option 2) has been proposed by sand concession World Task Sdn Bhd. The site (Option 2) was not chosen as the layer of silt and sand present

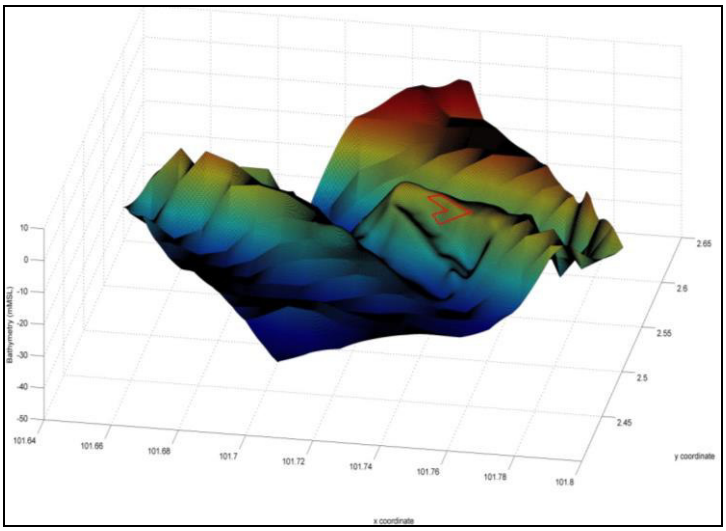
is not suitable for project use having higher silt composition than sand. The sand volume at the area is estimated at 1.6 million m^3 which is insufficient for project use requiring a fill volume of 3.0 million m^3.

The Cutter Suction Dredger (CSD) is used mainly for capital dredging in harder soil which has to be removed in thick layers. The TSHD is often used for where a limited thickness of softer material has to be removed and reclamation and disposal sites are available at variable distances. Therefore, it is considered that a TSHD will be the most efficient dredge for this type and scale of project.

7 Existing Environment

7.1 Bathymetry

The minimum depth sounded within survey is 6.2 m while the maximum is at 37.0 m. From the survey, there is no bathymetry survey hazard except for fishing net and rock dumping found throughout the survey area.



7.2 Seabed Sediments

A total of 10 offshore boreholes were initiated and major composition found within the soil layer based on the corresponding depth is as summarized below.

Sample	Depth Range (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Max Diameter (mm)
PBH-1	2.80 - 3.00	0	99	1	1	3.35
PBH-2	3.40 - 3.60	0	15	57	28	1.18
PBH-3	0.90 - 4.30	0	1 - 99	1 - 73	1 - 26	0.425 - 1.18
PBH-4	0.90 - 5.80	0 - 21	71 - 97	1 - 7	1 - 3	2.00 - 6.70
PBH-5	1.80 - 5.10	2 - 24	64 - 92	6 - 12	6 - 12	4.75 - 9.50
PBH-6	0.90 - 2.80	1 - 2	95 - 97	1 - 4	1 - 4	3.35
PBH-7	0.40 - 2.60	0 - 3	97 - 100	0	0	2.00 - 4.75

PBH-8	0.60 - 3.30	0 - 7	92 - 98	1 - 2	1 - 2	2.00 - 6.70
PBH-9	0.60 - 3.30	1 - 29	70 - 94	1 - 5	1 - 5	3.35 - 9.50
PBH-10	0.00 - 3.50	0 - 2	71 - 96	2 - 19	2 - 10	3.35 - 4.75

7.3 Meteorology

The Malacca Strait lies within the equatorial region of low atmospheric pressure and has a typical tropical climate. Typhoons are not experienced and gale is infrequent. The predominant winds over the Malacca Strait are monsoon winds. The Northeast (NE) Monsoon blows from November to March, reaching maximum strength and steadiness in January. Normal wind strength is 2.5 m/s to 5 m/s, but may reach 10 m/s to 12.5 m/s for short periods in northern part of the Strait. The southern sea area of the Strait tends to be less pronounced with light and more variable winds. The Southwest (SW) Monsoon blows from May to September and reaches maximum strength and steadiness in July and August. Normal wind strength is about 5 m/s, reaching 7.5 m/s to 10 m/s in the Northern approaches. Squalls are common in the Malacca Strait, the most significant of which occur between April and November and are referred to as Sumatras. These squalls are usually accompanied by thunderstorms and torrential rain.

7.4 Oceanography

At the vicinity of the Project Site, semi-diurnal tides are more dominant where there are occurrence of two high waters and two low waters of almost similar heights within a tidal day.

Observed Tidal Levels and Tidal Range at ST1 and ST2

Description	**Observed Tidal Levels (mCD)**		**Observed Tidal Levels (mMSL)**	
	ST1	**ST2**	**ST1**	**ST2**
High Water Spring (HWS)	3.25	3.12	1.70	1.57
High Water Neap (HWN)	2.84	2.57	1.29	1.02
Low Water Neap (LWN)	0.50	0.54	-1.05	-1.01
Low Water Spring (LWS)	0.31	0.22	-1.24	-1.33
Description	**Observed Tidal Range (m)**			
	ST1		**ST2**	
Spring Tidal Range	2.94		2.90	
Neap Tidal Range	2.34		2.03	

The current speed in the study domain generally varies between 0.00 m/s and 1.24 m/s. Station 1, the highest current speed (1.00 m/s) and the lowest (0.02 m/s) were recorded. The observed measurements shows dominant current direction is around 310º - 350º during flood tide and 120º – 150º during ebb tide. Tidal range varied at station 1 is -1.24 m to 1.70 m which in total is 2.94 m. Station 2, the maximum current speed recorded at 1.24 m/s and the minimum is recorded at 0.00 m/s. The observed measurements shows dominant current direction is around 300º during flood tide and 110º to 150º during ebb tide. Tidal range varies between -1.33 m and 1.57 m which in total is 2.90 m.

7.5 Water Quality

Baseline for water quality was established at 15 locations; station MW1 – MW15 (**ES**/**RE2**). Station MW1 – MW10 were taken at one depth while MW11 – MW15 were taken at three different depths i.e. surface (0.2D), middle (0.5D) and bottom (0.8D). MW9 and MW10 are also named ESA1 and ESA2 respectively as these areas are environmentally protected areas. MW10/ESA2 serves as a control point (CP) for this baseline monitoring exercise.

Based on the results of analysis, majority of the tested parameters of the marine water properties are majority below the standard limit of Malaysia Marine Water Quality Criteria and Standard (MMWQCS). Total Suspended Solid (TSS) at MW1 slightly exceeded the standard value of MMWQCS Class 2. Nitrite and nitrate level were at low level except MW11 (surface) showed nitrate level higher than MMWQCS Class 2.

Description of Water Sampling Location

Station	Approximate Coordinates and Description	Description
MW1	E 101°42'44.52" N 2°35'29.93"	Near the river mouth of Sg Sepang Besar
MW2	E 101°43'37.86" N 2°34'48.29"	Near to Jimah Power Plant
MW3	E 101°45'30.63" N 2°35'36.62"	Near to an existing Kelong and the shoreline of Jeti Pengkalan Nelayan Bakar Arang
MW4	E 101°47'18.29" N 2°34'20.95"	Near to the river mouth of Sg Lukut
MW5	E 101°47'28.88" N 2°33'4.84"	Near to the forested shoreline of residential Taman Tanjung
MW6	E 101°46'42.94" N 2°31'53.26"	Shell Refining Company (Federation of Malaya) Berhad
MW7	E 101°47'51.54" N 2°31'1.87"	Between an unidentified small island and the shoreline of Port Dickson Water Front
MW8	E 101°49'43.72" N 2°30'10.94"	Near to the shoreline of Avillion Hotel Port Dickson
MW9 (ESA 9)	E 101°50'45.06" N 2°27'48.86"	Near to Teluk Kemang beach
MW10 / CP (ESA 10)	E 101°51'8.46" N 2°25'0.51"	Near to the shoreline of Tanjung Tuan
MW11	E 101°44'58.86" N 2°30'38.59"	South east of the site boundary
MW12	E 101°44'36.03" N 2°31'47.10"	In the middle of site.
MW13	E 101°44'15.19" N 2°32'39.23"	North west of the site boundary
MW14	E101°45'8.95" N 2°32'13.32"	East of the site boundary
MW15	E 101°43'54.25" N 2°31'26.42"	West of the site boundary

7.6 Land Use

The project site consists of open sea with water depth between 6.2 m to 37.0 m sounding CD. Land along the shoreline comprise of different uses such as infrastructure, tourism, commercial and mangroves. There is no immediate shoreline in the vicinity of west, southwest and south which is facing the open sea of Straits of Malacca. Land use along the

LEGEND:

- PROPOSED SAND BORROW
- WATER MONITORING (MW1-MW15)
- MARINE ECOLOGY MONITORING (E1 - E5 & CP)

N

0 1 2 3 4 5KM

SCALE IN KILOMETRES (1:100,000) – A3 MEDIUM

SOURCE :

- *Google Earth 2015*

BASELINE SAMPLING LOCATIONS

ES/RE : 2

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shoreline of Negeri Sembilan from the project site started from the north direction to the southeast interspersed with patches of mangroves.

7.7 Ports

Ports serve the numerous vessels sailing, in this case the Straits of Malacca by supplying bunker fuel and fresh water supplies besides provision services of scheduled waste treatment facilities, including bilge / slop collection and processing and sludge treatment. There are numerous ports located nearby the project site. The smaller ports are Port Dickson Port and Sungai Udang Port while larger sized port in Malaysia is Port Klang. Van Oord's dredger heads to Port Klang in the event of emergency or for supply replenishment.

7.8 Populations and Socio-Economics

Negeri Sembilan is located in the central region of Peninsular Malaysia, is bordered in the north by Selangor, in the east by Pahang and in south by Melaka and Johor. The state's location is very strategic and next door to Kuala Lumpur, Port Klang, Kuala Lumpur International Airport (KLIA), Multimedia Super Corridor (MSC), Cyberjaya and Putrajaya.

The State of Negeri Sembilan consist 7 districts; Seremban, Port Dickson, Rembau, Tampin, Jelebu, Jempol and Kuala Pilah. The capital city of Negeri Sembilan is Seremban. The population in the state is more than one million people. The ethnic composition of the population is consisting of Malays (56%), Chinese (24.2%), Indian (15.3%), and other races (4.5%).

Negeri Sembilan has a popular beach, Port Dickson (also known as PD), about 33 kilometres west of Seremban. Seremban is the city centre of Negeri Sembilan. PD lies on the shores of the Straits of Malacca with eighteen kilometer white sandy beach extending from Tanjung Gemuk in the north to Tanjung Tuan in the south

Manufacturing is Negeri Sembilan's largest sector division followed by other business services, agriculture, construction and mining and quarrying. From the year 2009-2010, construction sector has the highest growth at 7%. Narrowing down the economy activity to the district level, the main economic contribution is agriculture and farming (2015) with a land usage of 43,131.48 ha within Port Dickson. Land use for industry or manufacturing sector only involves land size of 670.63 ha.

The fishery industry is one of the main economic activities in Negeri Sembilan with its state long coast line. Based on information referred to Annual Fishery Statistic 2013 produced by Department of Fishery there were a total of 527 fishermen working on licensed fishing vessels in Port Dickson for the year 2013.

During the socio-economic study which was conducted in the month of August 2015, the fishing area in Negeri Sembilan is limited and they utilize the entire sea area within the boundary of Negeri Sembilan. Based on the social survey and discussion with the 31 respondents, no artificial reef was placed within or the vicinity of the project site. However, fish traps and purse drift was placed within and surrounding the site by some fishermen.

7.9 Ecology

Overall, phytoplankton found falls under main three phyla, consists of 70 species from 16 different families. This total number consisted of 62 species of Bacillariophyta, five from Dinophyta and three from Cyanophyta, with overall density of 4.18x107 cells/m^3. The highest densities were recorded at E3 (1.11x107 cells/m^3) while the lowest density was recorded at CP with 1.89x106 cells/m^3. Diversity Index (H') were recorded between 1.93 and 3.01.

Total of eight different phyla, consist of 18 families from 43 species of zooplankton were identified around the proposed Project area. The eight major phyla comprised of Arthropoda, Protozoa, Mollusca, Chaetognatha, Brachiopoda, Chordata, Chidaria and Bryzoa. Zooplankton density recorded around all the three proposed Project area is 22,509 ind/m^3.

A total of 45 species of macrobenthos organisms belonging to four major groups i.e. Annelida, Arthropoda, Mollusca and Echinodermata were found. Macrobenthos densities ranged from 170 – 338 ind/m^2, with total density of 1620 ind/m^2. The highest density of macrobenthos (338 ind/m^2) was found at CP, followed by E1 with 325 ind/m^2.

8 Environmental Impacts and Mitigation Measures

8.1 Hydraulic Study

The sediments derived from the mining activities (overflow and draghead losses) are considered in order to analyze the dispersion of dredged material and to determine the effect on the turbidity of the area. The only source of sediments is therefore the discharge of dredge material. The Delft3D modelling system includes wind, pressure, tide and wave forcing, currents, stratification, sediment transport and water quality descriptions and is capable of using irregular, rectilinear or curvilinear coordinates.

<u>Hydrodynamic</u>

- In general, changes at receiving receptors in mean current speed were found to be less than 0.02 m/s, which is a relatively small change.
- Mean current speed decreased slightly by 0.016 m/s at the Project Site and increased by 0.012 m/s at the North boundary of the Project Site, which is negligible for the offshore area.
- Maximum current speed decreased slightly by 0.03 m/s at the Project Site and increased by 0.04 m/s at the North boundary of the Project Site, which is also negligible for the offshore area.
- Instantaneous slight increase of 0.03 m/s in the maximum current speed at the Mangrove area located east of Jimah Power Plant while mean current speed change less than 0.004 m/s.
- The results of the current speed analysis show that no significant changes in mean and maximum current speeds at the receiving receptors. Therefore, the flushing characteristics of the receptors are not greatly affected by the inclusion of the mining activity.

Waves

- The difference in wave heights before and after the project is very small, generally less than ± 0.002 m (± 0.2 cm) during the NE Monsoon. The wave height differences are practically indiscernible.
- During SW Monsoon, wave heights will be reduced by up to 0.01m (1cm) along the east boundary of the Project Site. However, such changes are insignificant for the offshore areas.
- The wave height differences are due to the bathymetry changes at the Project Site after mining activity. This is probably because of the wave propagation process over shallow water.

Sediment Spills (Applicable to Marine Ecology & Water Quality Impacts)

- The contour of the exceedance maps show that the spill is aligned around the centre of the mining area in the direction of the main tidal currents
- The concentrations do not exceed 50 mg/l outside the Project Site.
- Sediment concentrations of 20 mg/l are only observed in the 2 km radius from the discharge point up to 20% of the time.
- Outside the approximately 3.5 km wide from project boundary, the 10 mg/l concentrations do not exceed 10% of the time.
- Low concentrations of the suspended sediment, i.e. 10 mg/l appear to remain for a relatively long time within 500 m from the discharge point (40% of the time during the simulation period).

Mitigation Measures

Carry out the mining activity during mid-tide where strong ebb and flood current took place. It is also recommended to focus the mining around the southern deeper part of the Project Site with depth more than 20 m.

9 Conclusion

This EIA has demonstrated that, with proper incorporation of the recommended environmental protection measures by the Project Sponsor, the Project can be implemented with acceptable environmental risks and impacts.

Summary of Issues and Mitigating Measures

Project Activities and Environmental Issues / Concerns	Impacts	Mitigating Measures Recommended	Monitoring Programme
1. Water Quality	• Vessel movement and dredging works will result in suspension of seabed sediments and increase of turbidity in the water of the affected area. • Sewage/ sanitary effluents – treated sewage discharge is expected to be minimal. • Oil and chemical spillage – potential spillage of diesel fuel, lubricating oils and solvents may result in formation of visible sheen on water. Spill may be toxic to plankton and fish population. • Generation and disposal of solid wastes and hazardous wastes.	• The operation stage shall be carried out in stages to prevent unorganized dredging that leads to excessive disturbance of seabed surface within a short time period. • Use of Dredging and Dumping Management System (DDMS) to control and minimise the footprint of disturbed area. • All discharges shall comply with respective MARPOL guideline requirements. • Emergency response and contingency plan to be activated and followed during accidental spills • Spill kit shall be available on board vessels.	• Monitor TSS level near the sand source boundary. • Frequency: Once every two weeks during sand mining operation or as per DOE requirement. Location: as per recommended in EMP.
2. Solid and Scheduled Waste Management	• Oil spillage may occur during maintenance and operation of engine equipment and machinery. • Floating solid wastes are potential threat to marine animals, particularly when trapped in or mistaken for food and ingested. • Indiscriminate disposal of non-biodegradable and scheduled wastes will have adverse effects on the environment depending on the nature and toxicity of the wastes. • Toxic substances may be dispersed in the water column or settled on the sediment and enter into the food chain, causing bioaccumulation.	• All solid and domestic rubbish to be contained within bins or other appropriate containers on the vessel. • Scheduled wastes shall be properly packed, transported and disposed off as per Environment Quality (Scheduled Wastes) Regulations, 2005 or at approved port disposal facilities outside of Malaysia. • Vessel shall have a waste management system compliant with MARPOL Annex V, with macerators for foodstuffs and segregation of solid wastes.	
3. Ecology	• Disturbance of seabed sediments and discharges or accidental spills. • Migration of fish and free-swimming or mobile	• As per mitigation measures for Water Quality and Solid and Scheduled Waste Management.	

Project Activities and Environmental Issues / Concerns	Impacts	Mitigating Measures Recommended	Monitoring Programme
	marine life to safer or less disturbed areas	• Short term impact of 70 days.	
4. Marine and Navigational Safety	• Collision of vessels	• Strict compliance with Rules and Regulations, both local and international, appertaining to the manning, registration, licensing, operation, routing, equipping and management of marine craft especially the Conventions of the International Maritime Organisation (IMO), International Regulations for Preventing Collisions at Sea, 1972 (COLREGs). • Contractor shall inform port authorities and Marine Department in advance of their intended activities or regarding any unusual marine activities connected with vessel involved with the dredging work, (i.e breakdowns, loss of equipment, etc.) so that Port Circulars and Notices to Mariners could be issued to other vessels. • Working vessel shall be sufficiently lighted up at night as well as poor weather conditions to ensure clear visible from afar.	None
5. Socio-economic	• Short term impact of restricted fishing locations and methods could be affected as the presence of the dredger restricts the fishermen from the use of drift gill net and movement of their boats. • Short term degradation of marine water indirect impact to the nearby tourism operators.	• As per mitigation measures for Water Quality and Solid and Scheduled Waste Management • No mitigation measure for restricted fishing.	None
6. Occupational Health and Safety	• Accidents can have several effects, including death, permanent disability, temporary disability, minor injury and psychological disturbances.	• All necessary safety signs within the dredger should be erected at strategic area with clear visibility • Emergency Response Plan to be established	None.

Project Activities and Environmental Issues / Concerns	Impacts	Mitigating Measures Recommended	Monitoring Programme
		• Every employee shall be provided with the appropriate Personal Protective Equipment (PPE)	