EXECUTIVE SUMMARY

1 Introduction

The title of this Project is ***"Cadangan Membina Sebuah Stesen Janakuasa Elektrik (Turbin Gas Kitar Padu) Berkapasiti 1800MW Hingga 2400MW Di Atas Hakmilik Tanah Lot 14803, 4695, 4640, 4702, 4703, 14770 Dan Sebahagian PM774 (Dahulunya Dikenali Sebagai Lot 350) PT4676, Mukim Kuala Sungei Baru Dan Lot 20263 Dan 9323, Mukim Kuala Sungei Baru Ilir, Daerah Alor Gajah, Melaka Untuk Tetuan Edra Energy Sdn Bhd"***. Throughout this report, the Project will be referred to as the 'Proposed Project' or 'Proposed Plant'.

2 Project Proponent, EIA Consultant and Engineering Consultant

2.1 Details of the Project Proponent

Project Proponent	:	EDRA ENERGY SDN BHD
Address	:	Level 43, Menara Maxis, Kuala Lumpur City Centre, 50088 Kuala Lumpur
Contact Person	:	Dato' Mohd Nazri Shahruddin (Director)
Telephone	:	+603 – 2302 0600
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2.2 Details of EIA Consultant

EIA Consultant	:	CHEMSAIN KONSULTANT SDN BHD
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Email	:	marina.roland@chemsain.com

2.3 Details of Engineering Consultant

EngineeringConsultant	:	JACOBS ENGINEERING GROUP MALAYSIA SDN. BHD.
Address	:	Suite E-17-P2, Level 17 (Penthouse) Block E, Plaza Mont' Kiara No. 2, Jalan Kiara, Mont' Kiara 50480, Kuala Lumpur
Contact person	:	Sam Hill (Engineering Consultant)
Telephone	:	+603 – 6204 6740
Fax	:	+603 – 6204 6699
Email	:	sam.hill@jacobs.com

3 Legal Requirement

The Proposed Project is categorized as a prescribed activity under Schedule 1, item 11(b) of the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015, under Section 34A of the Environmental Quality Act, 1974:

11. Power Generation and Transmission

(b) Construction of combined cycle power station, with or without transmission line

Under this requirement, an EIA Report is required to be undertaken and submitted to the Department of Environment (DOE), Melaka for its approval before the Project implementation.

4 Statement of Need

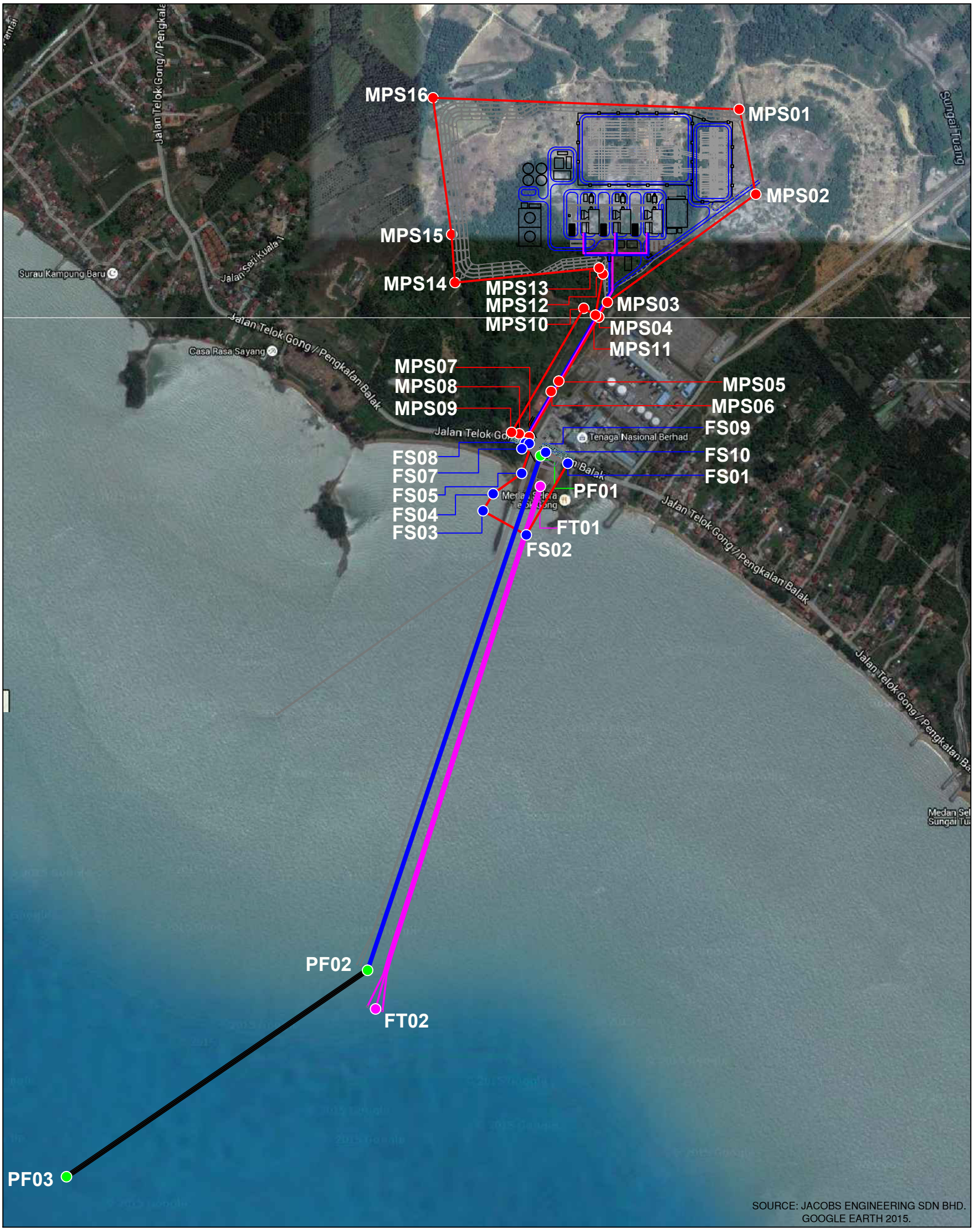
The primary goal of the Proposed Project is to provide electricity to the Malaysian transmission network to contribute to the overall demand in Peninsular Malaysia. The Project is to meet Energy Commission's Generation Development Plan which stated a requirement for a new Combined Cycle Gas Turbine (CCGT) power plant to be commissioned in 2021.

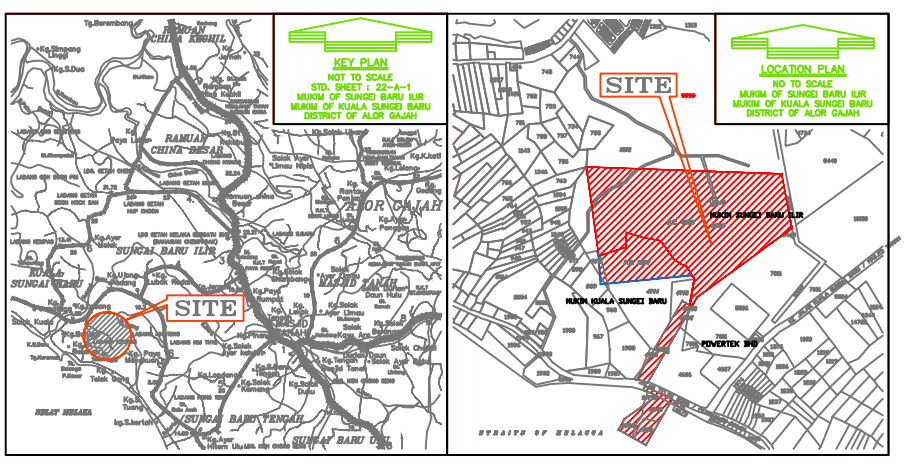
5 Project Location

The Proposed Project site is located at on Lot 14803, 4695, 4640, 4702, 4703, 14770 and part of PM774 (formally known as Lot 350) PT4676, Mukim Kuala Sungei Baru and Lot 20263 and 9323, Mukim Kuala Sungei Baru Ilir, Daerah Alor Gajah, Melaka. The site covers an area of approximately 112.24 acres, 36 km northwest from Melaka town. The Proposed site is located on a vacant land; adjacent to the existing Panglima Combined Cycle Gas (CCGT) power station and Powertek Open Cycle Gas Turbines (OCGT) power station. **Table ES-1** presents the approximate coordinates of the Proposed Plant. **Figure ES-1** shows the location of the Proposed Project.

Table ES-1: Approximate Coordinates of the Proposed Plant

Site Boundary	Reference	Latitude (N)	Longitude (E)
Main PowerStation Point 1	MPS01	2.354731	102.0546
Main PowerStation Point 2	MPS02	2.352518	102.055
Main PowerStation Point 3	MPS03	2.34971	102.0511
Main PowerStation Point 4	MPS04	2.349324	102.0509
Main PowerStation Point 5	MPS05	2.347712	102.05
Main PowerStation Point 6	MPS06	2.347438	102.0498
Main PowerStation Point 7	MPS07	2.346206	102.0491
Main PowerStation Point 8	MPS08	2.346288	102.0489
Main PowerStation Point 9	MPS09	2.346325	102.0487
Main PowerStation Point 10	MPS10	2.349551	102.0505





LEGEND:

- SITE BOUNDARY
- MAIN POWER STATION POINT (MPS01-MPS16)
- FORESHORE POINT (FS01-FS10)
- PROPOSED OUTFALL POINT (PF01-PF03)
- PROPOSED INTAKE POINT (PT01-PT02)

N

0 100 200 300 400 500M

SCALE IN METRES – A3 MEDIUM

ENVIRONMENTAL IMPACT ASSESSMENT

FOR "CADANGAN MEMBINA SEBUAH STESEN JANAKUASA ELEKTRIK (TURBIN GAS KITAR PADU) BERKAPASITI 1800MW HINGGA 2400MW DI ATAS HAK MILIK TANAH LOT 14803, 4695, 4640, 4702, 4703, 14770 DAN SEBAHAGIAN PM774 (DAHULUNYA DIKENALI SEBAGAI LOT 350) PT4676, MUKIM KUALA SUNGEI BARU DAN LOT 20263 DAN 9323, MUKIM KUALA SUNGEI BARU ILIR, DAERAH ALOR GAJAH, MELAKA UNTUK TETUAN EDRA ENERGY SDN BHD"

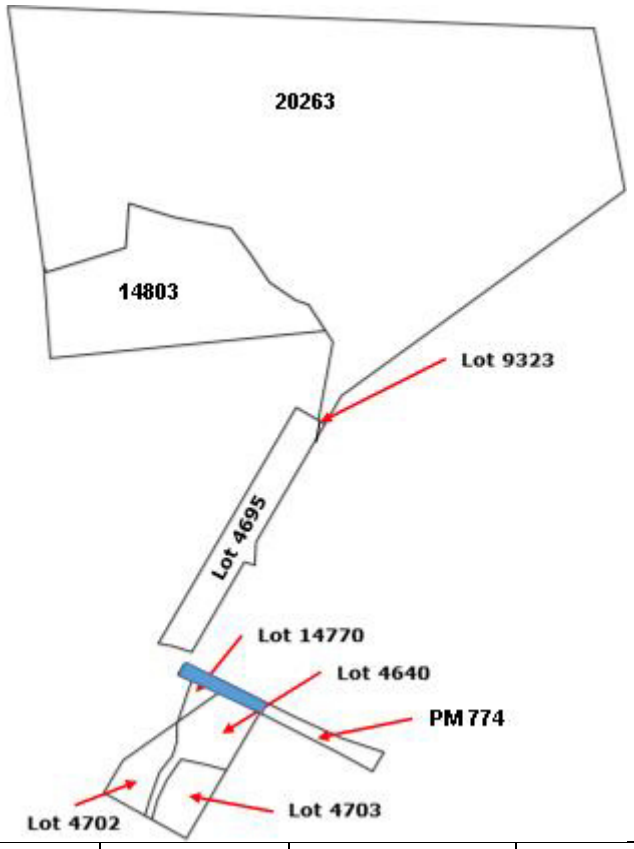
PROJECT LOCATION

Site Boundary	Reference	Latitude (N)	Longitude (E)
Main PowerStation Point 11	MPS11	2.349375	102.0508
Main PowerStation Point 12	MPS12	2.350445	102.051
Main PowerStation Point 13	MPS13	2.350598	102.0509
Main PowerStation Point 14	MPS14	2.350224	102.0472
Main PowerStation Point 15	MPS15	2.351471	102.0471
Main PowerStation Point 16	MPS16	2.35503	102.0466
Foreshore Point 1	FS01	2.34552	102.0501
Foreshore Point 2	FS02	2.343659	102.049
Foreshore Point 3	FS03	2.344285	102.0479
Foreshore Point 4	FS04	2.344728	102.0482
Foreshore Point 5	FS05	2.345256	102.0489
Foreshore Point 6	FS06	2.345828	102.0491
Foreshore Point 7	FS07	2.3459	102.0489
Foreshore Point 8	FS08	2.346048	102.049
Foreshore Point 9	FS09	2.346037	102.0491
Foreshore Point 10	FS10	2.345807	102.0496
Proposed Intake Point 1	PT01	2.344946	102.0494
Proposed Intake Point 2	PT02	2.331349	102.0452
Proposed Outfall Point 1	PF01	2.345731	102.0494
Proposed Outfall Point 2	PF02	2.332331	102.0449
Proposed Outfall Point 3	PF03	2.326973	102.0372

Source: Jacobs Engineering Group Malaysia Sdn. Bhd (September, 2015)

Details of land status for each lot are as described in **Table ES-2**.

Table ES-2: Land Status



Lot No.	Area as per the land title	Land Owner	Land use zoning based on *RTD Alor Gajah (2020)*	Status	Proposed Project Area
14803 (formerly known as 1597)	5.898 hectares	1MDB	Industry	Under the process of acquisition from 1MDB	Main power plant area
20263 (formerly known as 4359)	34.53 hectares	1MDB	Industry	Under the process of acquisition from 1MDB	Main power plant area
4640	10799m^2	Powertek Berhad	Institution and Public Amenities	Lands will be leased to Project Proponent	Utilities/ Pipelines
4695	2.036 hectares	Panglima Power Sdn Bhd	Industry	Lands will be leased to Project Proponent	Pipelines
4702	6799m^2	Powertek Berhad	Institution and Public Amenities	Lands will be leased to Project Proponent	Utilities/ Pipelines
4703	7417m^2	Powertek Berhad	Institution and Public Amenities	Lands will be leased to Project Proponent	Utilities/ Pipelines

Lot No.	Area as per the land title	Land Owner	Land use zoning based on *RTD Alor Gajah (2020)*	Status	Proposed Project Area
9323	172m^2	Panglima Power Sdn Bhd	Industry	Lands will be leased to Project Proponent	Utilities/ Pipelines
14770	1543m^2	Panglima Power Sdn Bhd	Institution and Public Amenities	Lands will be leased to Project Proponent	Utilities/ Pipelines
Part of PM774 (formerly known as Lot 350), PT4676	1.65 acres	Yayasan Melaka	Institution and Public Amenities	Project Proponent will purchase part of the 1.65 acres land (to purchase 26140ft^2)	Utilities/ Pipelines

Lot 4695, Lot 9323 and part of PM774 will undergo rezoning process. The Project Proponent and their appointed Planner will consult with *Majlis Perbandaran Alor Gajah* and *Jabatan Perancangan Bandar dan Desa (JPBD) Negeri Melaka* regarding the rezoning matters. Application for rezoning will be made during *Kebenaran Merancang* stage prior commencement of the Project prior commencement of the Project.

6 Project Description

The Proposed Plant will consist of a combined cycle gas turbine power station with a net output of up to 2400 MW. It will include a 500 kV substation and 275 kV substation which will provide the connection to the electricity network.

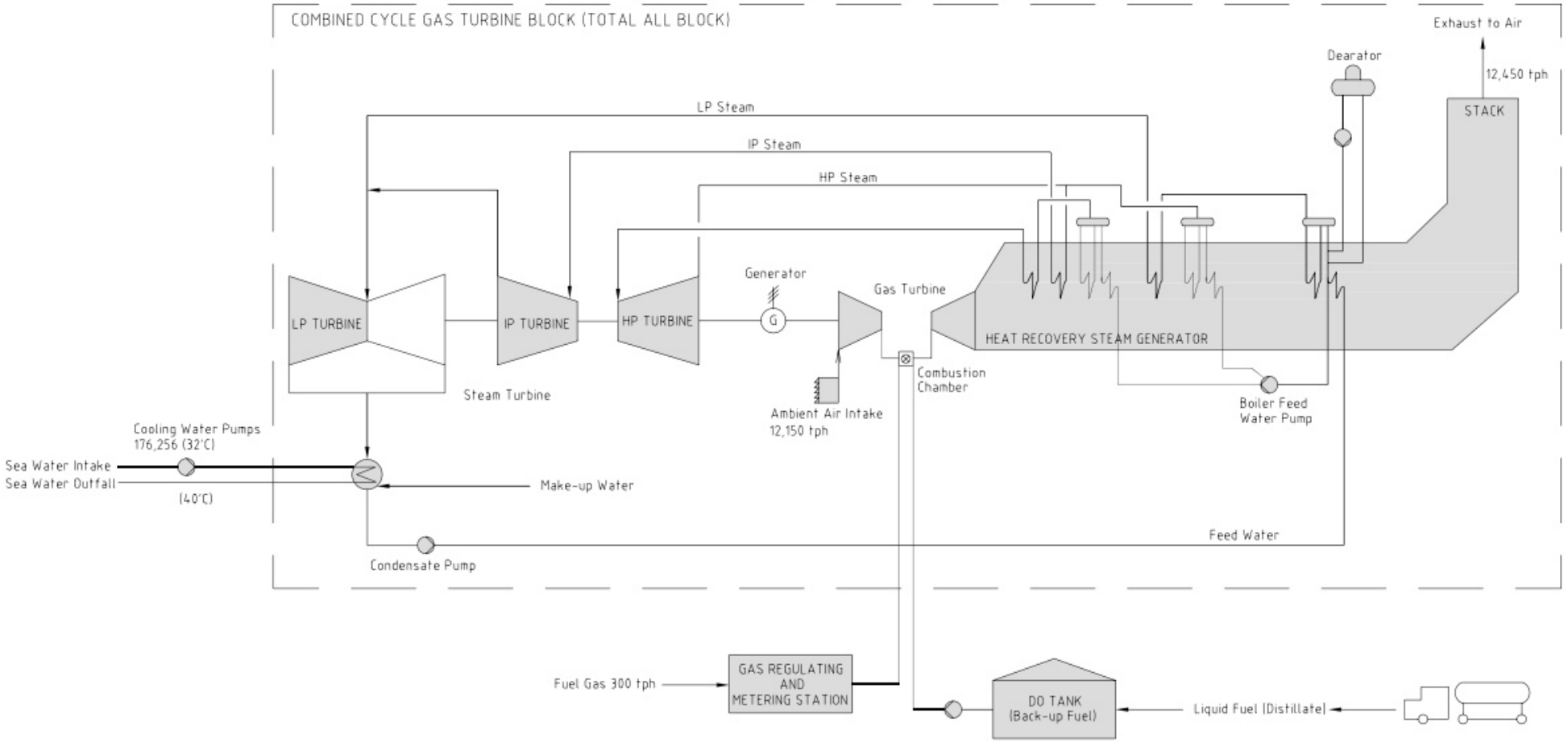
The process of the Proposed Plant is to convert energy in the gas or liquid fuel into electrical energy. The primary fuel will be natural gas. Natural gas will be delivered to the site via a buried gas transmission pipeline.

Main components of the Proposed Plant are summarised in **Table ES-3**. Process Flow Diagram is shown in **Figure ES-2**.

Table ES-3: Main Components of the Proposed Plant

Component	Summary of Description
Gas Turbines	Produce thermal energy through combustion of natural gas or distillate fuel oil and convert that thermal energy into mechanical energy driving the generator. Generally comprises a turbine compartment, accessory compartment and inlet and exhaust systems.
Heat Recovery Steam Generators (HRSGs)	Un-fired boilers, connected to the exhaust duct of each gas turbine. The exhaust gases from the gas turbines pass through the HRSGs where heat is extracted to raise and superheat steam. Each of the HRSGs comprises separate steam circuits, complete with all necessary integral pipework, equipment and instrumentation required for the safe and efficient operation of the plant.

Component	Summary of Description
	Exhaust gases are subsequently discharged to atmosphere exiting from the top of an exhaust stack.
Steam Turbines	Steam from the HRSG is conveyed to the steam turbine. This steam turbine drives an electrical generator similar to those driven by the gas turbines. The steam discharged from the steam turbine is condensed in the condenser which transfers heat to the cooling water. The condensed steam is returned via a de-aerator and feed system, back to the HRSG in a closed loop steam cycle and reconverted back to steam.
Generators and Transformers	Generators are driven by the steam and gas turbines and convert rotational energy into electrically energy. Generators are connected to the step up transformers which increase the voltage of the electricity for more efficient transportation.
Switchyard	The Proposed Plant will be connected to the electricity network via a 500 kV switchyard and 275 kV switchyard. These switchyards will consist of electrical switching equipment including to connect and isolate the units form the grid.
Fuel Systems	The primary fuel of the power plant will be natural gas. Natural gas will delivered to the site via a buried pipeline. Fuel oil (Distillate oil) will be used as a back-up fuel. Fuel oil will be delivered to the site via road tanker and will be unloaded and stored in bulk fuel storage tanks for emergency situations.
Cooling Water System	Cooling for the steam turbine condensers will be provided by seawater. The power station will draw water via offshore submerged intake heads. The location of the inlet is adjacent to that of the existing power station located approximately 1.6 km offshore. Floating markers will be used to mark the location of the submerged intake heads. The seawater outfall will consist of a seal pit, and buried outfall pipes. The outfall pipes will be buried adjacent to the intake pipes. The outfall pipes will extend some 2.6 km offshore where diffusers will promote mixing of the warm water with the ambient water.
Water Systems	Syarikat Air Melaka Berhad (SAMB) will supply town water to the Proposed Plant. Raw water will be stored on site for the purposes of buffer storage and for firefighting purposes. Town's water will be supply water to domestic users in the power plant. Process waste water, sanitary waste water, oily waste water should be collected and treated on site prior to discharge to the sea.
Pollution Control Systems	The pollution control systems which will be installed include: - Low NOx burners to minimize NOx in the flue gas emissions. - Continuous Emissions Monitoring system for the exhaust. - Waste water streams will be treated prior discharge via water treatment plant and oil water separator.



Source: Jacobs Engineering Group Malaysia Sdn. Bhd (September, 2015)

Figure ES-2: Process Flow Diagram

7 Project Activities

7.1 Pre-Construction Stage

Pre-construction works will include site investigation such as geotechnical surveys. This will include onshore and over water surveys, to be undertaken by contractors specializing in this type of work.

7.2 Site Preparation Works

Site preparation works will comprise site clearance and remediation of the site areas. This will involve levelling and preparing site area for the main power plant and also the installation of necessary roads, power, water, drainage and other infrastructure.

Initial works would also likely include the construction of a Materials Offloading Facility (MOF). To avoid road transport of heavy or over-sized loads, it is expected that barges will be used to maximize delivery of heavy equipment to the Project site. The MOF will be capable of supporting heavy cranes and wheel loads due to steerable trailers and low loaders unloading heavy equipment and process modules.

A temporary construction office, plant and material laydown and car parking areas will be constructed as part of the initial works. The laydown area will be for storage, fabrication, temporary site facilities (including contractor's temporary site offices) and welfare facilities (canteen, toilets, washrooms and medical centre).

Workers quarters and laydown area will be established nearby the Project site. Location of the workers quarters and laydown area will be finalised by the Engineering, Procurement and Construction (EPC) contractor during detailed design stage.

7.3 Construction Stage

Main activities involved during the construction stage are:

Cooling Water System

Installation of the offshore cooling water pipes will be completed by trenching of the seafloor. Pipes would be installed in the trench and then covered with backfill and rocks. The trenching works is anticipated to be carried out with grab or clamshell type dredger of 8m^3. Daily dredging rates are estimated at 2,500 m^3, based on 24 hours operation. The duration of the trenching works will extend for a period of approximately 165 days (5.5 months). Trenched materials shall be sent to dumping ground approved by Marine Department which is located about 11 km southwest from the Project site, about 10.7 km offshore of Sg Udang.

Power Plant

The main works will follow a straightforward sequence beginning with excavation for civil foundation and structural development. The final stages will be the installation of the CCGT equipment followed by commissioning activities and the handover period.

Delivery of the main power plant equipment, comprising gas turbines, transformers, generators and large pre-fabricated modules, will be by sea and barge to the site MOF jetty. Alternatively, equipment may be unloaded at existing ports and transported to the site using a heavy road transport. A detailed transport plan will be conducted.

All construction surplus and waste materials will be regularly removed from the site and transferred to an approved waste management site. All hazardous wastes and waste containers will be stored in an appropriate manner before removal by a licensed Contractor for disposal through an approved method.

Electrical (HV) Switchyard

Activities include construction of civil foundations, for siting electrical equipment and switchgear and erection of HV switchyard by experienced contractor.

7.4 Commissioning

Commissioning of the Proposed Plant will take about four to six months, depending on the commissioning program and will comprise final erection checks, pre-commissioning and setting to work of individual component parts including the overall testing to prove the technical acceptance of the Proposed Plant. Tests on completion will demonstrate the fitness for purpose of the plant prior to commercial operation.

7.5 Operation Stage

The operation stage of the Proposed Plant will involve generation of electricity using the combined cycle gas turbine (CCGT) with a net output of up 2400 MW. Under normal condition, the Proposed Plant will operate continuously 24-hours per day 7 days per week. Maintenance activities will be executed during normal operation.

8 Project Options

8.1 Project Siting

The Proposed Project will be located on Lot 14803, 4695, 4640, 4702, 4703, 14770 and part of PM774 (formally known as Lot 350) PT4676, Mukim Kuala Sungei Baru Dan Lot 20263 Dan 9323, Mukim Kuala Sungei Baru Ilir, Daerah Alor Gajah, Melaka.

The selected site has a number of distinct advantages over alternatives sites for large scale gas fired power generation. In particular the location close to gas and electricity networks, as well as a source of cooling water makes the site well suited to a CCGT power station development.

8.2 Technology Options

The choice of a combined cycle gas turbine (CCGT) power plant is consistent with the generation development plan of the Energy Commission. The choice is well justified as CCGT power plants are widely recognized as amongst the cleanest and most cost effective of thermal power generation technologies.

8.3 No Project Option

"No Project Option" may result in an acute shortage of electricity thus creating a negative impact on the nation's economic growth. At the same time, the communities will also be affected if repeated power failures at the scale once experienced in the past, were to recur.

9 Existing Environment

The existing environment of the surrounding area of the Project site is summarised in the following **Table ES–4**.

Table ES–4: **Summary of the Existing Environment**

Parameters	Description
Physical Environment	
Topography	The topography of the area for the Proposed Plant is generally hilly, ranging from 6 m (west boundary) to 73 m (east boundary) with shrubs and bushes.
Geology	Based on reference made to Geotechnical Interpretative Report dated 22 April 2015 prepared by CSG Consultant, the Proposed site is located at the northwest of Melaka which displays metamorphics that developed in Palaeozoic era during the period of Ordovician to Silurian. It consists of Gnesis plagioclase-Hornblende Actinolite Amphibolite which largely decomposed bauxite.
Soil	Based oil soil investigation done by Strata Drill Sdn Bhd, soil types of the Proposed Project site include Stiff to very stiff clayed sandy SILT and Hard clayey sandy SILT.
Hydrology	From the site survey, no stream is found at the site; however there is old one water tank observed at the middle of the Project site that will be removed.
Bathymetry	Bathymetric survey conducted by a lisenced surveyor indicated that the near shore sea beds are shallow between 0 mCD to -6 mCD. Meanwhile areas with depth of -10 mCD to -16 mCD are observed along the proposed cooling water discharge area
Oceanography	Highest Astronomical Tide (HAT) are 2.65 (Tg Keling Station) and 2.91 (Kuala Linggi Station), Lowest Astronomical Tide (LAT) are 0 for both stations. Mean Sea Level (MSL) are 1.19 (Tg Keling Station) and 1.29 (Kuala Linggi Station). The maximum and minimum temperatures at the surface layer are observed at 30.7 °C and 29.4 °C respectively. While for the bottom layer, the maximum and minimum temperatures are observed at 30.1 °C and 29.6 °C respectively. Mean temperatures of the surface and bottom layer are 29.9 °C and 29.8 °C respectively. It is observed that the seabed materials are consists of mostly fines (clay and silt).
Meteorology	Based on the wind profile, it is noted that the most prevailing wind flow is from the northeast (26.9% of the time) followed by from the north (13.5% of the time). The average mean temperature varied from 26.2 °C to 27.5 °C. The highest 24-hour mean temperatures were observed in May. The 24-hour mean annual temperature is averaged at 26.8 °C. Throughout the years, the 24-hour monthly relative humidity ranges between 68.6% and 90.5%. The mean annual rainfall recorded over the period of 1951 to 2014 is 1996.4 mm with an average of 174 rainy days per year.
Marine Water Quality	In general, all relevant tested parameters comparable to the Malaysian Marine Water Quality Criteria and Standard (MMWQCS) are well below the respective limits during both neap and spring tides except for Total Suspended Solid. Total Suspended Solid

Parameters	Description
	levels ranges from below detection limit of 5 mg/L (during neap tide) to 230 mg/L (during spring tide).
Ambient Air Quality	Overall, all parameters were in compliance with the limits stipulated in the Malaysia Ambient Air Quality Standard 2020 (MAAQS).
Ambient Noise Level	It is noted that the L_{eq} levels during day time at station N1 and N2 were within the limit of 60 dB(A) however the L_{eq} levels during night time at both stations exceeded the limit of 50 dBA. The L_{eq} level during day time and night time at N3 are well below the limit of 70 dBA (day time) and 60 dBA (night time).
Biological Environment	
Terrestrial Ecology	Since the Proposed Project area is a disturbed area, no flora and fauna species of significant value was observed within the Project area. Only lalang (*Imperata cylindrical*) and small bushes are observed.
Marine Ecology	Phytoplankton composition around the Proposed Project area consisted of three major groups i.e. Bacillariophytes, Cyanophyta and Dinophyta. In terms of species diversity, the Shannon Weiner Diversity Index (H') ranged from 1.32 – 2.31. There were eight main phyla of zooplankton were Arthropoda, Protozoa, Mollusca, Annelida, Chaetognatha, Brachiopoda, Chordata and Cnidaria. The Shannon Weiner Diversity Index (H') ranged from 1.47 – 2.35. Total macrobenthos density recorded was 1,385 ind/m^2, of five phyla and of 52 species belonging to 31 families. The Shannon–Wiener Diversity Index was recorded ranging from 2.27 – 3.05 About 64 species of fish, 13 species of shrimp, three species of crabs and two species of squids are caught in around the Proposed Project site. Melaka is identified as one of the turtle landing area which recorded the highest hawksbill turtles (*Eretmochelys imbricate*) landing in Southeast Asia. The turtle landing and nesting areas at Teluk Belanga and Telok Gong are adjacent to the Project site area.
Land Use and Human Environment	
Land Use	The Project site is currently a vacant land with small shrubs around the area. The immediate neighbours of the Proposed Plant are a new housing scheme for fishermen in Melaka which is still under construction located about 220 m northwest of the Project boundary; and existing Panglima CCGT power plant and Powertek OCGT power plant. **Figure ES-3** shows the 3 km radius land uses surrounding the Proposed Project. Based on reference made to the *Rancangan Tempatan Daerah Alor Gajah (2020),* the Project site is located within *Blok Perancangan Kecil (BPK) 7.7 Paya Mengkuang of Blok Perancangan (BP) 7: Kuala Linggi – Pengkalan Balak – Tg Tuan.* The major land use within BPK 7.7 is industry. Other land uses include residential, infrastructure utility, agriculture and water bodies

EXECUTIVE SUMMARY

Parameters	Description
Human Environment	The Project site is located in Mukim Kuala Sungei Baru and Mukim Kuala Sungei Baru Hilir of Alor Gajah District. The District has a total population of 173, 712. **Socioeconomic Survey** Feedbacks from a total of 26 registered fishermen from three selected areas which are adjacent to the Project site were managed to be gathered. All respondents were Malays. The surveyed fishermen have highlighted the fishing areas along the shore and adjacent to the Proposed Project site as their important fishing areas. 53.3% of the respondents claimed that their catch volume is decreasing over the years due several reasons which include water discharge from existing power plant and tank vessels, competition with other fishermen and lack of fish breeding area. 46% of the surveyed fishermen do not agree with the Project implementation. Some of the fishermen strongly agree with the Project implementation if the Project will not give bad effects to the surrounding fishermen communities. Feedbacks from 69 respondents from settlements adjacent to the Proposed Project site were also gathered. Majority of the respondents were Malays. Majority of the respondents were male (62.3%). Most of the respondents are private sectors workers (24.6%). Majority (50.7%) of the respondents perceived that the Project would definitely affect their area. Majority of the respondents viewed that the major potential impacts are community's health and safety risks, change to fishery resources, and change to fish catching area. **Dialogue Session** A dialogue session was carried out in the presence of the Project Proponent and consultants and *Persatuan Nelayan Kawasan Melaka Barat*. The main objectives of the dialogue session were to provide some briefing about the Proposed Project as well as the purpose of the EIA study. The dialogue session also helps to gauge the awareness and acceptance about the Project as well as to clarify any unclear or lack of information on the Project. Issues of concerns during the dialogue session mainly focused on fishermen's constraints during both construction and operation of the Proposed Project. **Public Health** The health survey results indicate reasonably high standards of environmental health related infrastructure and services provided to identified sensitive receptors surrounding the Proposed Project. This is indicated by high percentage responses to questions relating to water supply, solid and liquid waste management. Clinical prevalence outcomes demonstrated by the health survey showed that hypertension and stroke were most prevalent diagnosed by medical practitioner. Meanwhile, cold/cough and fever were most prevalent based on hospital visitation. Statistical data from Klinik Kesihatan Kuala Sungai Baru displayed that respiratory case shows an increasing trend.

CHEMSAIN KONSULTANT SDN. BHD.

ENVIRONMENTAL IMPACT ASSESSMENT

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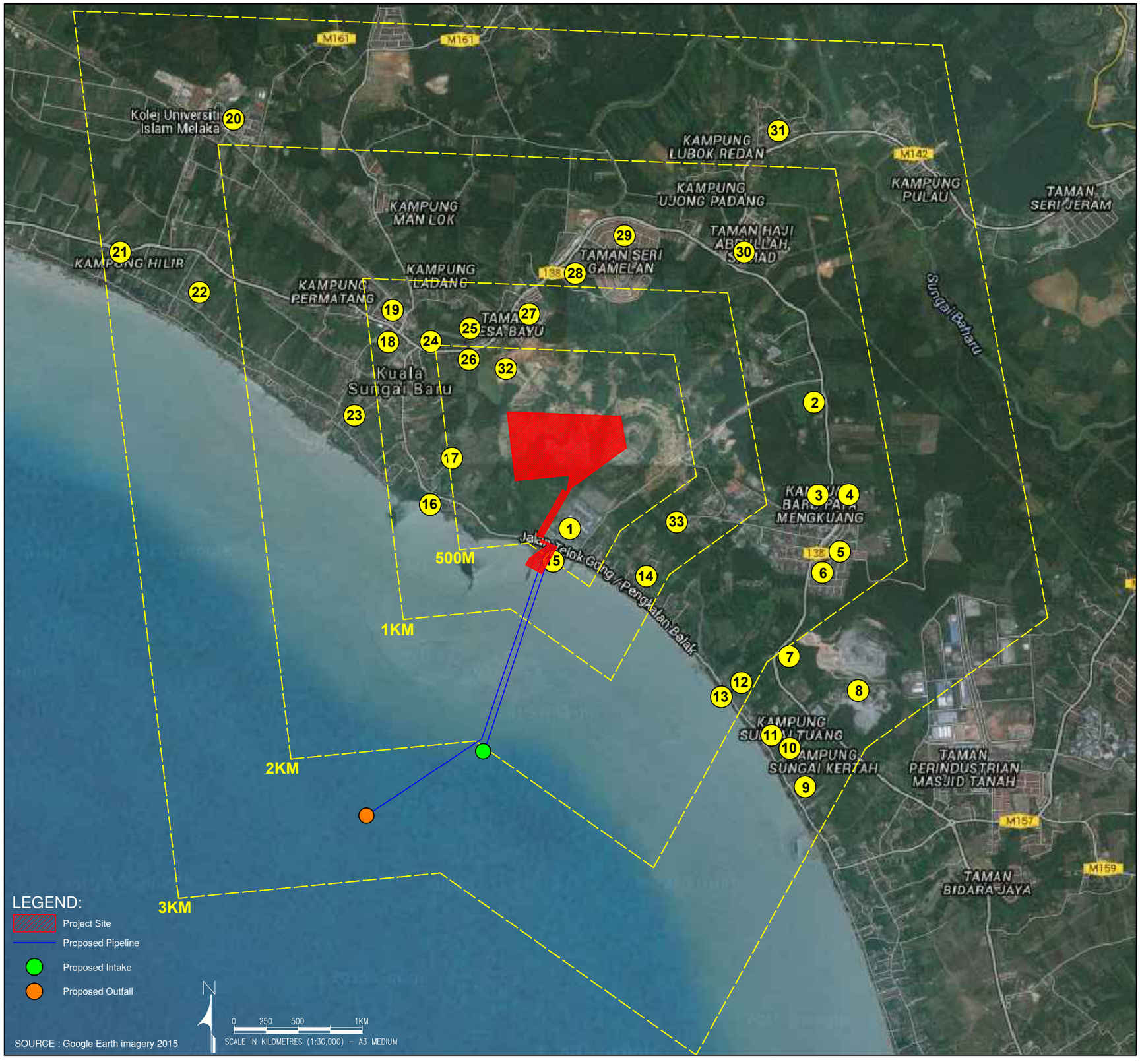

Existing Land Use Map (3KM)

NO	NAME	COORDINATE
1	Powerteck Berhad	N 2° 20' 42.62" E 102° 03' 04.13"
2	House	N 2° 21' 19.75" E 102° 04' 05.04"
3	Palm Oil - Harta Koperasi Paya Mengkuang Berhad	N 2° 20' 56.32" E 102° 04' 08.81"
4	Perniagaan Logam Sin Tat Sing	N 2° 20' 55.08" E 102° 04' 11.75"
5	Taman Paya Mengkuang	N 2° 20' 47.32" E 102° 04' 10.92"
6	Pondok Polis Paya Mengkuang	N 2° 20' 42.35" E 102° 04' 06.75"
7	Tanah Perkuburan Islam Kampung Sungai Tuang	N 2° 20' 18.52" E 102° 03' 58.21"
8	Goh & Sons Quarry	N 2° 19' 59.23" E 102° 04' 08.86"
9	Kampung Sungai Kertah	N 2° 19' 42.83" E 102° 04' 03.22"
10	Kampung Sungai Tuang	N 2° 19' 51.82" E 102° 03' 58.11"
11	Sekolah Rendah Agama Sungai Tuang	N 2° 19' 54.86" E 102° 03' 54.93"
12	Sekolah Kebangsaan Sungai Tuang	N 2° 20' 08.98" E 102° 03' 44.95"
13	Medan Selera Sungai Tuang	N 2° 20' 07.46" E 102° 03' 42.03"
14	Masjid Telok Gong	N 2° 20' 33.06" E 102° 03' 22.62"
15	Jeti Nelayan Kg. Telok Gong	N 2° 20' 41.11" E 102° 03' 02.38"
16	Casa Rasa Sayang	N 2° 20' 54.50" E 102° 02' 31.04"
17	Taman Seri Kuala	N 2° 21' 06.10" E 102° 02' 34.70"
18	Pasar Kuala Sungai Baru	N 2° 21' 35.88" E 102° 02' 18.15"
19	Pekan Kuala Sungai Baru	N 2° 21' 43.06" E 102° 02' 18.57"
20	Kolej Universiti Islam Melaka	N 2° 22' 31.64" E 102° 01' 37.81"
21	Kampung Permatang Hilir Pantai, Kuala Sungai Baru	N 2° 21' 56.39" E 102° 01' 11.84"
22	Sekolah Menengah Arab Darul Falah	N 2° 21' 48.63" E 102° 01' 27.71"
23	Tokong Cina	N 2° 21' 17.13" E 102° 02' 08.23"
24	Balai Polis Kuala Sungai Baru	N 2° 21' 34.39" E 102° 02' 29.82"
25	Klinik Kesihatan Kuala Sungai Baru	N 2° 21' 36.74" E 102° 02' 43.31"
26	Klinik Kesihatan Ibu & Anak	N 2° 21' 34.61" E 102° 02' 43.48"
27	Taman Desa Bayu	N 2° 21' 35.69" E 102° 02' 51.30"
28	Sek. Men. Keb Rahmat	N 2° 21' 58.57" E 102° 02' 07.57"
29	Taman Seri Gamelan	N 2° 21' 56.81" E 102° 03' 16.98"
30	Taman Hj. Abdullah Samad	N 2° 22' 03.54" E 102° 03' 45.34"
31	Kampung Lubuk Redan	N 2° 22' 27.84" E 102° 03' 55.14"
32	New Fishing Village	N 2° 21' 28.93" E 102° 02' 47.12"
33	Kg. Teluk Gong	N 2° 20' 44.06" E 102° 03' 27.68"

FIGURE: ES/RE-3

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10 Impacts Assessment and Mitigation Measures

Chapter 5 details the impact assessments and proposed mitigation measures. For brevity, the impact assessment and mitigation measures summary and monitoring programmes are tabulated in **Table ES-5**. .

Table ES-5: Summary of Impacts and Recommended Mitigating Measures

Aspect	Impacts	Mitigation Measures	Monitoring
1. Coastal Hydraulics	**Construction stage** ▪ The excess suspended solids plume induced by the trenching works is localised around the proposed trench area and it is expected that the environmental impacts to the marine receptors will be minor. **Operation stage** ▪ Temperature increase of cooling water discharge which does not exceed +2°C and the cumulative impacts are not significant. ▪ The increase in excess chlorine concentration induced by the Proposed Project does not exceeds the 0.04 mg/L tolerance limit for marine life identified as sensitive receptors around the Project site and therefore impacts are not significant. ▪ There are negligible impacts on current flows with the proposed trench. ▪ There are negligible impacts on sediment transport rate with the proposed trench. Due to the refilling in the nearshore areas, no erosion is expected in the nearby areas. No impacts in nearshore areas are predicted either since the pipeline landfall is located within a protected beach area (inside an existing landing areas protected with hard structures).	**Construction stage** ▪ Application of clamshell dredger with water-tight buckets. It is recognized as a good approach to avoid turtle catches/issues as well as it has low spill (primarily from the bucket and no overspill). ▪ Application of silt curtain for trenching in the near shore area (from the shore to 700 m offshore) to minimize the amount of spill of suspended solids during trenching work and subsequently reduce the concentration and dispersion of fines to the environment. ▪ Modelling during trenching works to provide support for sediment spill assessment. **Operation stage** Not applicable.	▪ See monitoring for water quality and marine ecology.

Aspect	Impacts	Mitigation Measures	Monitoring
2. Water quality	**Construction stage** ▪ The suspended solids concentrations at the sensitive receptors (turtles nesting and beaches) are anticipated to be minor. ▪ Discharge of untreated sewage from 1,000 workers during the construction stage will contribute to water pollution. ▪ Handling and storage of oil and chemicals, leaks from machineries, equipment and marine work vessels during both the construction and operational stages of the Proposed Project are potential sources of oil and chemical spills. **Operation stage** ▪ The excess temperature based on dispersal of warm water from the Proposed Project and cumulative impacts (dispersal of warm water from both the Proposed Project and the existing power plant) is less than 2°C. This means the impact of the cooling water discharge into the marine water is expected to be within the acceptable level of the MMWQCS. ▪ Based on the hydraulics study, the increase in excess chlorine concentration due to the Proposed Project as well as cumulative effects (release from both the Proposed project and the existing power plant) does not exceeds 0.04 mg/L tolerance limit for marine life, therefore impacts is deemed not significant.	**Construction stage** ▪ Trenching works shall be carried out in stages to control disturbance of seabed surface. ▪ Ensure operation management is well planned, optimised and executed accordingly ▪ Provision of adequate sanitation facilities for the construction workers. ▪ Stockpiles of construction materials, skid tanks and any fuel or chemical storage, shall be located away from any water bodies. **Operation stage** ▪ Spill kits are to be made available near workshops and on marine vessels as well as part of the site's Emergency Response Tools. ▪ Sewage Treatment Plant shall be adequately designed to cater for the needs of the expected population. The treated sewage shall comply with Standard A of the Environmental Quality (Sewage) Regulation 2009. ▪ Any discharge water from the WWTP and cooling water outfall to be monitored for compliance with Environmental Quality (Industrial Effluent) Regulations 2009.	▪ Monthly marine water quality monitoring (full parameters) during construction stage. ▪ Weekly (2 to 3 times) monitoring of TSS and Turbidity during trenching work. ▪ Monitoring of silt trap effluent to be conducted monthly or after rainfall event of ≥ 12.5mm during construction stage. ▪ Monthly marine water quality monitoring (full parameters) during operation stage. ▪ Continuous monitoring of temperature and free chlorine at the cooling water intake and discharge points
3. Air quality	**Construction stage** ▪ Airborne or windblown dust due to transportation of construction materials as well as during excavation	**Construction stage** ▪ Implementation of dust suppression such as damping of earthen access roads particularly	▪ Monthly ambient air monitoring during construction stage.

Aspect	Impacts	Mitigation Measures	Monitoring
	and emission from exhaust fumes may degrade the air quality in the vicinity of the Project areas. **Operation stage** ▪ In a normal operation situation when natural gas is used to fire the gas turbines under 100% and 50% load, gaseous pollutants emitted that are of concern are NO_2 and CO. ▪ When distillate fuel is used, gaseous pollutants of concern are NO_2, CO and SO_2. ▪ Predicted concentrations of all these gaseous air pollutants are within the Malaysia Ambient Air Quality Standard (MAAQS) limits	during dry spells or in close vicinity to residential areas. ▪ Plant ground cover as soon as possible. ▪ Open burning is prohibited on-site at all time. **Operation stage** ▪ Periodical maintenance of low NOx burner to ensure best performance at all time. ▪ Periodical monitoring of the ambient air quality to be carried out to address the cumulative future impacts of some of the hazardous air pollutants on the public health and surrounding environment.	▪ Quarterly ambient air monitoring during operation stage.
4. Noise	**Construction stage** ▪ Noise impacts from construction activities are temporary in duration and can generally be controlled to within acceptable levels. **Operation stage** ▪ No noise impact is expected at the nearby community areas since the measured baseline noise levels in these areas were already higher than the predicted level to be contributed by the Proposed Project.	▪ Maintain natural vegetation between construction area and nearest residential area to reduce the impact of loud noise. ▪ Establish periodical maintenance schedule for all motorised machineries and equipment as preventive measure to minimise emission of loud noise. ▪ Enclosure or other type of acoustic measures shall be applied on equipment which contribute to noise levels higher than 85 dB(A). ▪ Safety signage shall be installed to inform workers of areas with high noise level. ▪ Provision to workers who work in high noise level areas with adequate protective devices such as earmuffs or earplugs.	▪ Monthly noise monitoring during construction stage. ▪ Quarterly noise monitoring during operation stage.

Aspect	Impacts	Mitigation Measures	Monitoring
5. Marine Ecology	**Construction stage** ▪ Increase of suspended solids and turbidity will alter productivity of phytoplankton, zooplankton, macrobenthos and fishes. ▪ Lights can cause disorientation of nesting turtles, night time human activities can cause nesting turtles to abort nesting attempts. **Operation stage** ▪ Numerous of researchers have reported the impact of elevated temperature from thermal effluent to phytoplankton and zooplankton. ▪ High chlorination level has been known to cause negative impact on phytoplankton abundance. ▪ It is predicted that effect of cooling water discharge on macrobenthic communities will more pronounce at the immediate outfall point, but may be minimal beyond the point.	**Construction stage** ▪ Construct silt trap/sediment trap in order to minimize the silt loading getting into the waters. ▪ Guideline of erosion and sediment control should be adopted by the contractor and implemented at the construction sites. ▪ Construction works for cooling water intake and outfall to be limited to project area only. ▪ Construction works for cooling water intake and outfall near Telok Belanga beach to be limited during turtle nesting period (March-September). **Operation stage** ▪ All waste water from the site should be treated accordingly before being discharged to the adjacent waters. ▪ To record any sign of turtle near the construction area and during operation stage and report to Turtle Conservation and Information Centre, Department of Fisheries Melaka.	▪ Monthly marine ecology monitoring during construction stage. ▪ Quarterly marine ecology during operation stage. ▪ Monthly record of turtles sighting during construction and operation stages.
6. Quantitative Risk Assessment	**Operation stage** ▪ $1x10^{-5}$ per year individual risk contour of the Proposed Project is within the Proposed Project boundary and does not encompass involuntary recipient. ▪ $1x10^{-6}$ per year individual risk contour of the Proposed Project does not encompass involuntary recipients of	**Construction stage** ▪ Prepare an emergency response plan (ERP) to include possible emergency scenarios to include possible emergency scenarios for the construction stage. **Operation stage** ▪ The Project Proponent shall prepare an	-

Aspect	Impacts	Mitigation Measures	Monitoring
	industrial risks.	emergency response plan (ERP) to include possible emergency scenarios for the operation stage. ▪ The Project Proponent to enforce safety procedures to ensure authorized access only to the proposed project site and further restrictions are in place for limiting storage tank area access to approved persons only. ▪ The Project Proponent to ensure that all the protection systems are thoroughly inspected, maintained and tested periodically.	
7. Socio-economy	▪ The communities' major concerns are changes to fishery resources and catching area; marine water quality and communities' health and safety risks.	▪ A mechanism to be established to deal with grievances and expectations from local stakeholders during the construction and operation of the Project ▪ Locals who are qualified should be given the opportunities to seek employment from the Proposed Project. ▪ To establish channel for communication to the local community in order to share their issues of concern and provide further information/ clarification.	-
8. Land and Marine Traffic	**Construction stage** ▪ Transportation of construction machinery and equipment using public road can increase the likelihood of accidents and congestion at the public road area. ▪ Trenched material may be accidentally, or intentionally, dumped in areas other than the designated approved dumping grounds.	**Construction stage** ▪ Avoid transportation of material and use of heavy vehicles during peak periods. ▪ Provision of flag man or traffic management team to control movement of traffic during peak hours. ▪ Provision of adequate warning signage on existing of heavy vehicles along the	-

<table>
<tr><th>Aspect</th><th>Impacts</th><th>Mitigation Measures</th><th>Monitoring</th></tr>
<tr><td></td><td><u>Operation stage</u>
▪ No land and marine traffic issue is anticipated.</td><td>approaching road to the designated entrance.
▪ Frequent security patrols should ensure that fishing activities are not carried out in, or at the approaches to the trenching areas
▪ All relevant authorities such as local Marine Department Officers, the Fisheries Department, etc., must be informed well in advance of any operation starting, and any required approvals, permits, licenses, etc., should be obtained well before any work commences, in addition this will enable Notices to Mariners and Port Circulars to be issued if this is deemed necessary.</td><td></td></tr>
<tr><td>9. Soil Erosion</td><td>Potential long term average annual soil loss of the main power plant area:
<table><tr><th>Zone</th><th colspan="3">Condition</th></tr><tr><th>(ton/ha/yr)</th><th>Existing</th><th>Earthwork-Uncontrolled</th><th>Earthwork - Controlled</th></tr><tr><td>Zone 1</td><td>133.727</td><td>1,619.4</td><td>291.488</td></tr><tr><td>Zone2</td><td>121.261</td><td>1,211.6</td><td>218.089</td></tr><tr><td>Zone 3</td><td>172.561</td><td>5,481.3</td><td>3,014.734</td></tr><tr><td>Zone 4</td><td>204.384</td><td>4,510.0</td><td>2,480.526</td></tr></table></td><td>▪ Clearing of vegetation and felling of trees will be carried out only to the extent essential for any phase of the project development.
▪ Wherever possible, the existing vegetation will be retained or maintained as filters along slopes to reduce runoff velocity.
▪ A detailed erosion and Sediment Control Plan (ESCP) to be prepared and submitted to DID for approval.</td><td>▪ Monitoring of silt trap effluent to be conducted monthly or after rainfall event of ≥ 12.5mm during construction stage.</td></tr>
<tr><td>10. Waste generation and management</td><td><u>Construction stage</u>
▪ Various construction wastes will be generated including biomass, construction wastes, sewage, scheduled wastes and domestic wastes.
<u>Operation stage</u>
▪ Two major types of waste are domestic wastes and scheduled wastes.</td><td><u>Construction stage</u>
▪ No open burning is allowed at all time at the Project site.
▪ Establish waste management system and include effort to reduce wastage, reuse and recycle waste materials, and proper procedures to collect and dispose off the</td><td>-</td></tr>
</table>

Aspect	Impacts	Mitigation Measures	Monitoring
		construction wastes. ▪ Prohibit direct discharge of raw sewage into water bodies. ▪ Repair and maintenance works of construction vehicles and machinery shall be carried out at a designated area. **Operation stage** ▪ Any effluent discharge from the Project site shall comply with Standard A of the Environmental Quality (Sewage) Regulations, 2009. ▪ Scheduled wastes shall be managed and handled in accordance with the Environmental Quality (Scheduled Waste) Regulation 2005. ▪ Collection, recovery or disposal of scheduled wastes shall be by DOE licensed transporters to approved and licensed premises.	

11 Conclusion

This EIA study was conducted based on necessary project's details, design plans and information which were provided by the Project Proponent and his engineers.

Perceived residual impacts are associated with air quality, water quality and marine ecology as well as safety risk during operational stage. It is suggested that while residual impacts will remain, the impacts will be within Malaysian planning and environmental standards and regulations, and will not cause significant adverse effects on the surrounding environment

In order to ensure that the measures implemented are effective at all times and residue impacts remain insignificant, an Environmental Management Plan with associated environmental monitoring and auditing as well as Emergency Response Plan is recommended to the Project Proponent. Other issues outlined in this report, which are less significant, will also need to be addressed as necessary during the undertaking of the Proposed Project.

This EIA study has demonstrated that, with proper incorporation of the recommended mitigating measures, the Project can be implemented with acceptable environmental risk and impacts.