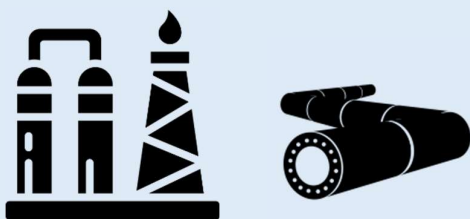


PROJECT BACKGROUND

Proposed development of a crude oil and petrochemical plant designed to refine and process **1.2 million tonne per annum of crude oil**.

Two (2) major Project components:

- **Main Processing Area / Plant** comprising of oil refinery and petrochemical plant with a total land area of **23.96 hectares** (or 59.20 acres)
- A total of **3.5 km pipelines** extended from the Project site to Kuantan Port.



PRODUCTS

Gasoline

Diesel & Kerosene

Heavy Naphtha

Fuel Oil

Sulphur

PROJECT PROPONENT

Petroluxe Refinery (M) Sdn Bhd

8B, Level 8, Tower 2, Etiqa Twins,
No. 11, Jalan Pinang,
50450 Kuala Lumpur.

Tel: 03 – 2181 6435



Contact Person :

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EIA CONSULTANT

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Tel: 03 – 7494 0486



Contact Person :

- Ir. Mazura Mazlan (EIA Team Leader) – CEP-CS0209
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- leong.sook.fong@triecoedge.com

LEGAL REQUIREMENT

Environmental Quality (Prescribed Activity) (Environmental Impact Assessment) Order, 2015: **Second Schedule**

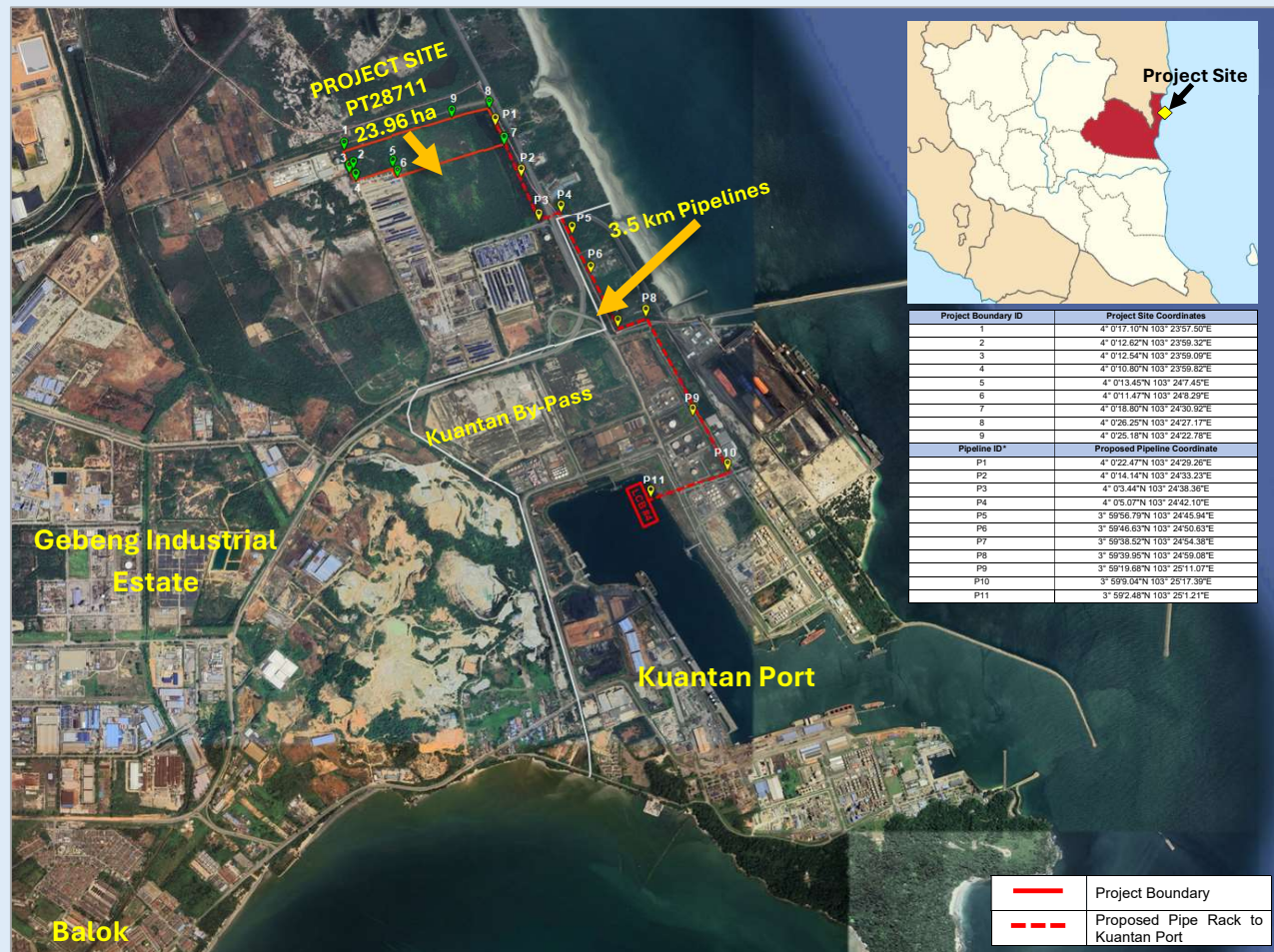
- **Activity 6 d) Industry**

Petrochemicals: Production capacity of each product or combined product of 50 tonnes or more per day.

- **Activity 9 a) Petroleum**

Construction of oil refineries

PROJECT LOCATION



ZONING



Rancangan Tempatan Daerah Kuantan 2035 (Penggantian)

- The Project site is located within **BP 3.0 Sungai Karang**
- PT28711, the Project land lot is in **BPK 3.1Gebeng** whereas the pipelines in **BPK 3.1 Gebeng** and **BPK3.2 Pelabuhan Kuantan**.
- BPK 3.1** is gazetted as heavy industrial estate (**Class C3**) since 1997 and currently houses various heavy industries such as oil & gas, petrochemical, iron & steel mill, plastics plants. Similarly, **BPK 3.2** Pelabuhan Kuantan is gazetted for port and related industrial activities (**Class C**).

STATEMENT OF NEED

Regional Context & Belt and Road Initiative (BRI)



- Malaysia was among the first to establish special economic zones in line with the BRI, including the East Coast Economic Region (ECER).
- ASEAN countries, including Malaysia, have increasingly aligned with the BRI, recognizing its potential to boost regional growth.
- Many have developed special economic zones which provides governmental incentives and infrastructure assistance for industrial development.

Malaysia's Strategic Positioning



- Kuantan Port and the Malaysia-China Kuantan Industrial Park (MCKIP) are key BRI-linked infrastructure developments.
- The 2015 Malaysia-China Port Alliance further strengthened bilateral cooperation in logistics, port development, and trade.
- The Project is well-positioned to capitalise on its strategic location by attracting both local and international private investment.

Economic Benefits



- The Project is expected to generate significant economic and social benefits while advancing industrial development in the region.
- Given its scale, the Project is expected to generate employment opportunities and stimulate economic activity. The resulting spillover effects will benefit surrounding areas, contributing to broader regional prosperity.

TERMS OF REFERENCES

TOR Submission : 17th July 2025
TORAC Meeting : 19th August 2025

Revised TOR Submission : 29th October 2025

TOR Endorsement : 8th December 2025
(JAS.600-2/9/7 Jld 4 (2))

CONFORMANCE WITH DEVELOPMENT PLANS



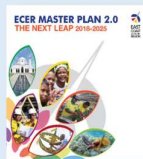
Rancangan Malaysia Ketiga Belas
(RMK13) 2026 – 2030



New Industrial Master Plan 2030



Rancangan Fizikal Negara
Keempat (RFN4)



East Coast Economic Region
(ECER) Master Plan 2.0



Rancangan Struktur Negeri Pahang
2050



Rancangan Tempatan Daerah
Kuantan 2035 (Penggantian)

PROJECT OPTIONS

Site Options			
Alternatives	Option	Description	Selection
Possible Locations	Option 1 Industrial land in Tanjung Langsat Industrial Estate, Johor	- Located within gazetted industrial zone and proximity to Tanjung Langsat Port offering excellent logistics. - Compatible with existing industrial activities. Drawback: <u>Insufficient land area for whole Project size.</u>	 Not selected due to land size.
	Option 2 Industrial land in Teluk Kalong Industrial Estate, Kemaman, Terengganu	- Located in a gazetted industrial zone. Compatible with existing industrial activities. Drawback: <u>Land available is next to existing human receptors (minimal buffer 50m only). Located further in distance from Kemaman Port requiring more than 10km pipeline length and lacking available berth.</u>	 Not selected due to lack of buffer towards human receptors, port limitation, infrastructure.
	Option 3 PT 28711, Gebeng Industrial Estate	- Located in a gazetted industrial zone. Compatible with existing industrial activities. - Nearest port is Kuantan Port, deep seaport. Pipeline length required about 5km. - Land is already available, aligning with project timeline.	 Selected. Ideal for project execution with minimal delays.
Technology Options			
Technology		Selection	Justification
Flaring System		Enclosed Ground Flare	- Low light heat radiation and noise levels. - Presence of sensitive receptors near the site
Sulphur Recovery & Process Gas Reheating		Indirect Heating: Uses medium-pressure steam heating, electric heating, or gas-to-gas heat exchange to transfer energy efficiently	Simple operation and temperature control, with a large turndown ratio.
Sulphur Recovery & Tail Gas Treatment Technologies		Sulphur Recovery: - Two-Stage Claus Conversion Method. Tail Gas Treatment: - Hydrogenation Absorption Reduction	Improved conversion efficiency
Sulphur Recovery & Sour Water Stripping Technologies		Single-Tower Low-Pressure Stripping	The single-tower method reduces complexity, capital costs, and footprint, making it more adaptable to Project constraints.

PROJECT CONCEPT

**MAIN PROCESSES :
PLANTS OVERALL
CAPACITY 1.2 MILLION
TPA OR 3,600 TPD**



Atmospheric and Vacuum
Distillation Unit:
1,200 KTPA

Hydrogen Production Unit:
a) Steam Methane Reforming
(8000 Nm³/h)
b) Methanol to Hydrogen
(800 Nm³/h)

Diesel Hydrotreating Unit:
400 KTPA

Naphtha Hydrotreating and
Isomerization Unit:
a) Naphtha Hydrotreating
Unit: **250 KTPA**
b) Isomerisation Unit:
80 KTPA

Sour Water Stripping and Sulphur
Recovery Complex:
a) Sour Water Stripping Unit:
50 KTPA
b) Solvent Regeneration Unit:
200 KTPA
c) Sulphur Recovery Unit:
3 KTPA

PRODUCTS



Gasoline : **559.42 KTPA**



Diesel & Kerosene :
390.6 KTPA



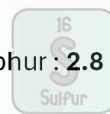
Heavy Naphtha :
99.33 KTPA



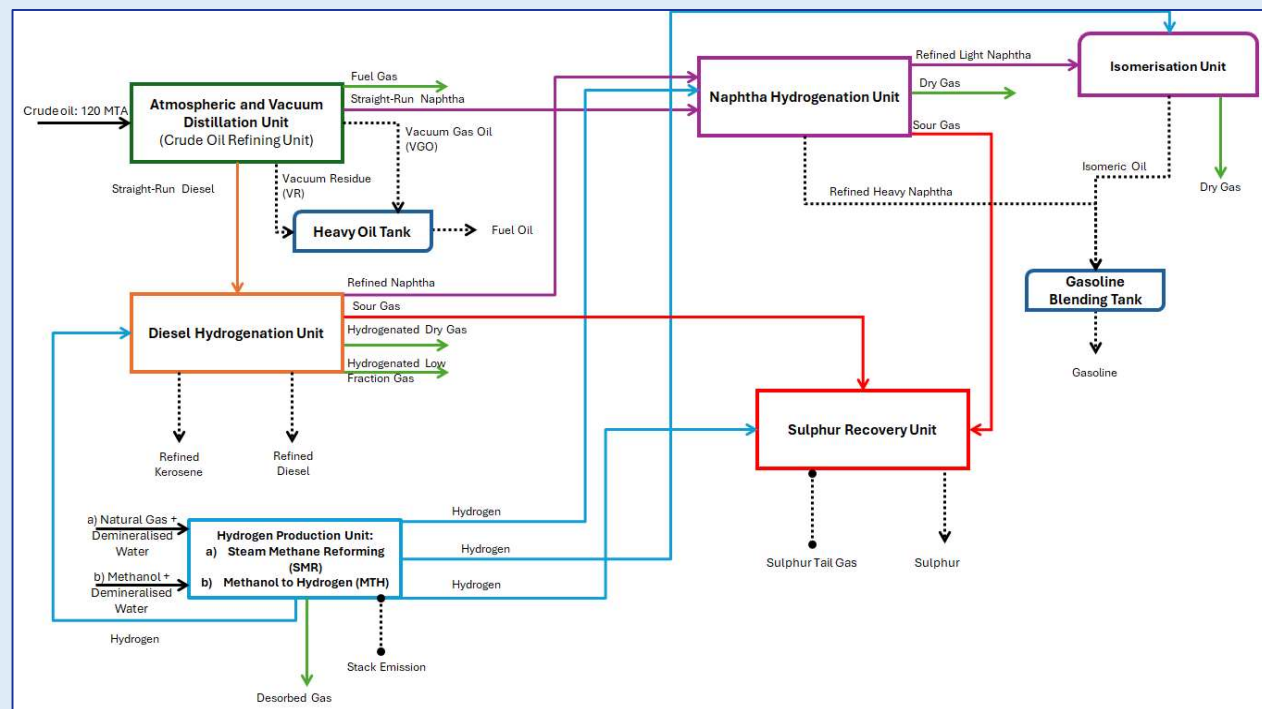
Fuel Oil : **598.4 KTPA**



Sulphur : **2.8 KTPA**



OVERALL PROCESS FLOWCHART



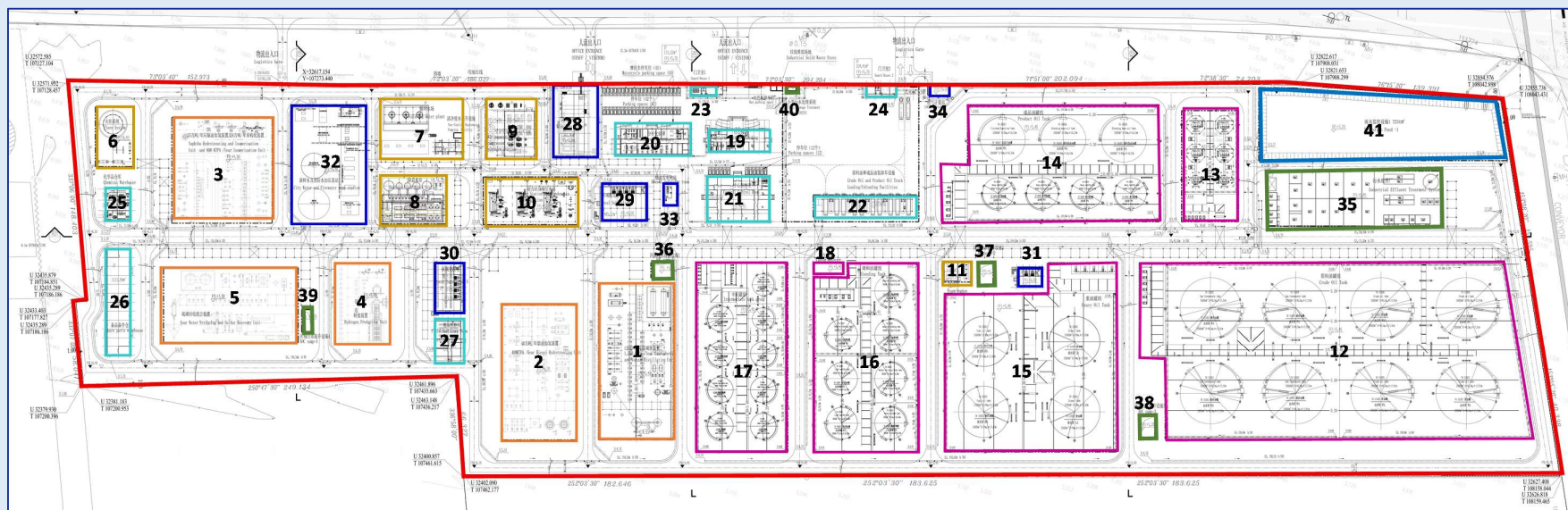
RAW MATERIALS/FEEDSTOCK AND PRODUCTS SUMMARY

Processing Units	Raw Materials / Feedstock	Products From Process Units
Atmospheric and Vacuum Distillation Unit	Crude Oil	- Fuel Gas (Reused) - Straight run naphtha - Straight run diesel - Vacuum Gas Oil - Vacuum residue
Diesel Hydrotreating Unit	Straight run diesel	- Diesel - Kerosene - Hydrotreated naphtha - Hydrotreated dry gas and low-pressure gas. (Reused)
Naphtha Hydrotreating and Isomerisation Unit	- Straight run naphtha - Hydrotreated naphtha - Hydrogen gas (H²)	- Refined heavy naphtha - Isomeric oil - Dry gas (Reused)
Hydrogen Production Unit	Natural gas	Industrial hydrogen to be sent to the naphtha hydrotreating unit and diesel hydrotreating unit
Sour Water Stripping and Sulfur Recovery Complex	- Receives feed from the distillation unit, where sour water is treated to generate sour gas. - Sour gas is then sent to the sulfur recovery unit as feedstock	- Sulphur - Purified water (Reused)

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT FOR CADANGAN MEMBINA KILANG PENAPIS MINYAK BERKAPASITI 1.2 JUTA TAN SETAHUN DI ATAS PT 28711, MUKIM SUNGAI KARANG, DAERAH KUANTAN, PAHANG DARUL MAKMUR UNTUK PETROLUXE REFINERY (M) SDN. BHD.

PROJECT COMPONENTS LAYOUT

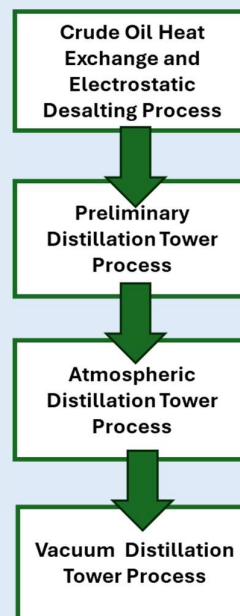


Main Processing Units	9) Compressor Plant (Air Compressor and Nitrogen Production Station)	18) Vapour Recovery Unit	27) Field Auxiliary Room	35) Industrial Effluent Treatment System (IETS)
1) Atmospheric and Vacuum Distillation Unit	10) Boiler House	Facilities	Utilities	36) Accidentally Oil – Contaminated (AOC) Sump 1
2) Diesel Hydrotreating Unit	11) Foam Station (Firefighting Facility)	19) Office Building	28) Main Substation	37) AOC Sump 2
3) Naphtha Hydrotreating and Isomerisation Unit	Storage Tanks (Tank Farms)	20) Analysis Laboratory	29) Local Substation	38) AOC Sump 3
4) Hydrogen Production Unit	12) Crude Oil Tank	21) Central Control Room (CCR)	30) Local Substation	39) AOC Sump 4
5) Sour Water Stripping and Sulphur Recovery Unit	13) Liquefied Gas Tank (LPG)	22) Truck Loading and Unloading Facility	31) Local Substation	40) Small Sewage Treatment System (SSTS)
Supporting Facilities	14) Product Oil Tank	23) Guardhouse 1	32) City Water and Firewater Pump Station	Pond
6) Enclosed Ground Flare System	15) Heavy Oil Tank	24) Guardhouse 2	33) Diesel Generator Room	41) Detention Pond
7) Circulating Water Plant	16) Blending Tank	25) Chemical Warehouse & Scheduled Waste Storage Area	34) Liquefied Natural Gas (LNG) Station	
8) Demineralised Water Station	17) Intermediate Tank	26) Spare Parts Warehouse	IETS & Sewage	

MAIN PROJECT COMPONENT

a) Atmospheric and Vacuum Distillation Unit

- The Project's distillation system is designed to process crude oil.
- The Atmospheric and Vacuum Distillation Unit yields five key products: atmospheric top fuel gas, straight-run naphtha, straight-run diesel, vacuum gas oil (VGO), and vacuum residue.
- Dry gas from the overhead streams of the initial, atmospheric, and vacuum distillation columns—is routed to the fuel gas system for internal energy use.
- Straight-run diesel and naphtha are transferred to the hydrotreating unit for further processing, while vacuum residue and vacuum gas oil are stored in the heavy oil storage tank farm as final products.



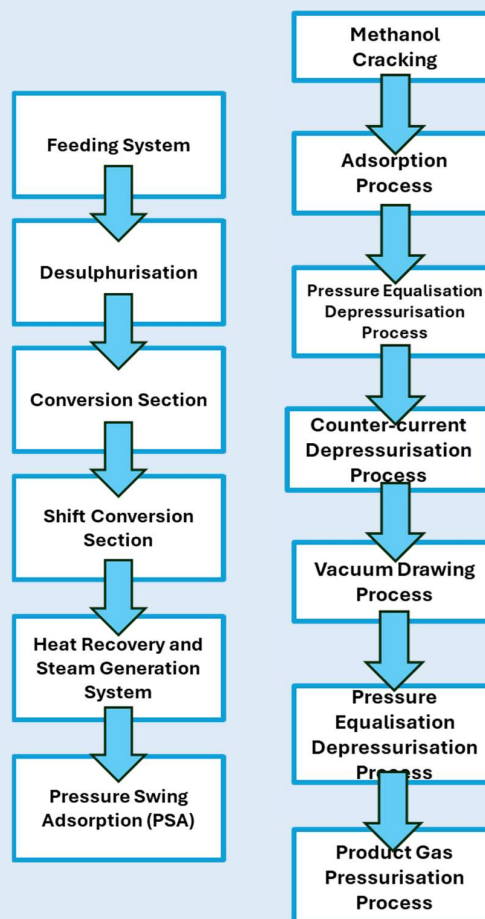
b) Hydrogen Production Unit

Steam Methane Reforming Unit

- A common method for producing hydrogen from natural gas is steam methane reforming (SMR). This process involves reacting natural gas (primarily methane) with steam at high temperatures (700°C-1,000°C) in the presence of a catalyst. The reaction produces hydrogen and carbon monoxide, along with a small amount of carbon dioxide. The feedstock for this process unit is natural gas (NG) supplied by Gas Malaysia, and the main product produced is industrial hydrogen with a required purity of $\geq 99.9\%$ (mol).

Methanol Cracking (Methanol to Hydrogen)

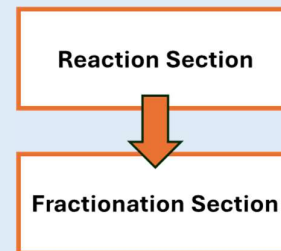
- Methanol cracking involves heating methanol with water (typically steam) and a catalyst to produce hydrogen gas and carbon dioxide. This reaction typically occurs at relatively low temperatures (around 200–300°C) and pressures making it more efficient and compact than other hydrogen production methods.



MAIN PROJECT COMPONENT

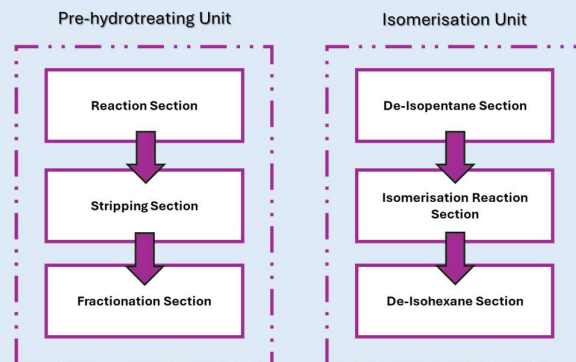
c) Diesel Hydrotreating Unit

- The feedstock for this unit consists of straight-run diesel from the atmospheric and vacuum distillation unit and hydrogen produced from the Hydrogen Production Unit.
- These two intermediate products will be further refined through the diesel hydrotreating unit to produce hydrotreated dry gas, low-pressure gas from hydrotreating, refined kerosene/jet fuel, refined diesel, and hydrotreated naphtha. The hydrotreated naphtha is used as feedstock for the naphtha hydrotreating unit to produce refined light and heavy naphtha. Catalyst and chemicals will be used in this process unit.
- The main products of this unit are hydrotreated naphtha, refined jet fuel (kerosene), refined diesel, and low-pressure gas from hydrotreating.



d) Naphtha Hydrotreating and Isomerisation Unit

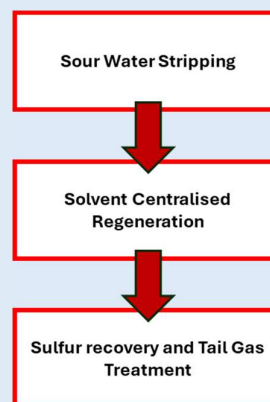
- This processing unit utilises straight-run naphtha, hydrotreated naphtha, and hydrogen (H₂) as feedstocks to produce hydrotreated heavy naphtha, dry gas, and isomerisation oil.
- This enhances product quality and yields premium feedstocks for subsequent downstream units.



MAIN PROJECT COMPONENT

e) Sour Water Stripping and Sulphur Recovery Complex

- The sour water stripping unit processes acidic water primarily sourced from distillation and hydrotreating units. This water contains hydrogen sulphide (H₂S) and ammonia (NH₃), which must be removed before reuse or disposal.
- The primary product of the process is purified water, which is partially reused for upstream unit injection and tank cleaning. The remaining purified water is sent to the IETS, where it undergoes further processing to meet environmental standards before being discharged safely.
- The byproduct is ammonia gas and will be sent to the sulphur recovery unit for sulphur production.



PORT PLANNING

The **LCB #4 at Kuantan Port** will be designed to accommodate vessels up to **50,000-tonnes**. To ensure optimal utilisation of the designated berth, a proposed shipment plan outlining the anticipated quantities of imported raw materials and exported products will be developed. The materials will be conveyed through a series of **pipeline (approximately 3.5km)** that has been stated to be develop for the purpose of this Project.

Materials	Quantity (Tonnes / Year)	Ships / Month		Monthly Usage of LCB#4 (Days)
Imports (Raw Materials)				
a) Crude oil	1,200,000	2		6
b) Methyl Tert-butyl Ether (MTBE)	44,754	1		3
c) Methyl Acetate	16,783	1		3
d) Blending base oil	369,217	2		7
Total	1,630,754	6		19
Exports (Products)				
a) Heavy naphtha	99,333	1		3
b) Diesel / Kerosene	390,600	3		8
c) Fuel oil	598,400	2		5
d) Gasoline	559,420	4		11
Total	1,647,753	10		27

POLLUTION CONTROL SYSTEMS**a) Air & Odour**

- Boiler system and Heating Furnace will be using natural gas as cleaned fuel and low NOx burner
- Waste Oil Recovery System will be using air pollution control system consisting of Adsorption, Activated Carbon and Scrubbing technique.
- Air pollutants will be treated in the sour gas treatment system. Desulphurisation Tower is place in the Sour Water Complex. In case of system failure, tail gas will be flared off via Acid Gas Flare System.
- Vapour Recovery System will be installed at Tank Farm to captured and recover waste oil from the fume.
- VOC Removal System will treat the VOCs and Odour at the IETS.
- Process off gas will be flared. Also, in event of any upset from the distillation process, flue gas will be diverted to a ground flare stack for emergency flaring.

b) Wastewater

- Wastewater from refinery operations which may contain petroleum hydrocarbons, heavy metals, phenolic compounds, sulphides and ammonia will be treated at IETS prior to discharge.
- Surface run-off, water that accumulates at the tank farm bunds, truck loading shed, etc will also undergoes treatment at IETS prior to discharge.
- Sewage from the office building will be directed to Small Sewage Treatment System (SSTS) prior to discharge.

c) Waste & Scheduled Waste

- Solid waste consisting of domestic type of waste and general office waste, which is produced mainly from administration building and canteen. The solid waste is disposed at the nearest landfill area by appointed contractor.
- Biomass waste generated during site clearing activities will be disposed at an approved disposal location by appointed contractor.
- Scheduled waste generated from Project operation includes used chemical and oil containers, sludge from the IETS, contaminated gloves, spent catalyst, spent porcelain ball, etc. Generated scheduled waste are stored in scheduled waste store located in the next to the spare part warehouse prior disposal.

d) Noise

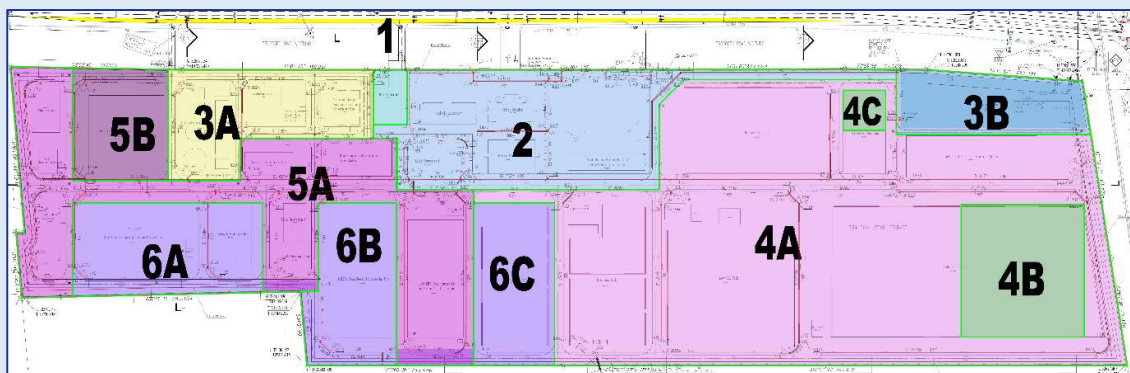
- Noise emission from the Project operations is from sources such as pumps, compressor, etc. Noise emission from these noise sources equipment is controlled by application of silencers and noise barriers; whereby the noise sources were designed following requirements of Factories and Machinery (Noise Exposure) Regulations, 1989.
- All on-site workers that are working in exposure to this equipment are equipped with adequate and appropriate personal protective equipment (PPE). Operational and boundary noise shall comply with the stipulated levels recommended under Occupational Safety and Health (Noise Exposure) Regulations 2019 and Planning Guidelines for Environmental Noise Limits and Control (DOE, 2021).

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT FOR CADANGAN MEMBINA KILANG PENAPIS MINYAK BERKAPASITI 1.2 JUTA TAN SETAHUN DI ATAS PT 28711, MUKIM SUNGAI KARANG, DAERAH KUANTAN, PAHANG DARUL MAKMUR UNTUK PETROLUXE REFINERY (M) SDN. BHD.

PROJECT PHASING AND DEVELOPMENT SCHEDULE

The Project will be implemented in several phases over a five-year period. The operational phase is scheduled to commence in late 2027 and continue through 2030, at which point the Project is expected to operate at full capacity.



Item	Years									
	Q1 2025 (Mar 2025)	Q2 2025 (Jun 2025)	Q3 2025 (Sept 2025)	Q4 2025 (Dec 2025)	Q1 2026 (Mar 2026)	Q2 2026 (Jun 2026)	Q3 2026 (Sept 2026)	Q4 2026 (Dec 2026)	Q1 2027 (Mar 2027)	Q2 2027 (Jun 2027)
Pre-Construction										
Design Preparation Phase										
Engineering Design										
Earthwork										
Engineering Construction										
Project Handover										

The schedule above denotes the expected timeline for the Project to be in operation, not the overall development phases of the Project.

Project's physical development will take approximately **16 months**, comprising of minor site clearing and preparation, followed by construction of building, installation of equipment and machinery, testing and commissioning and lastly **plant operation by the end of 2027**.

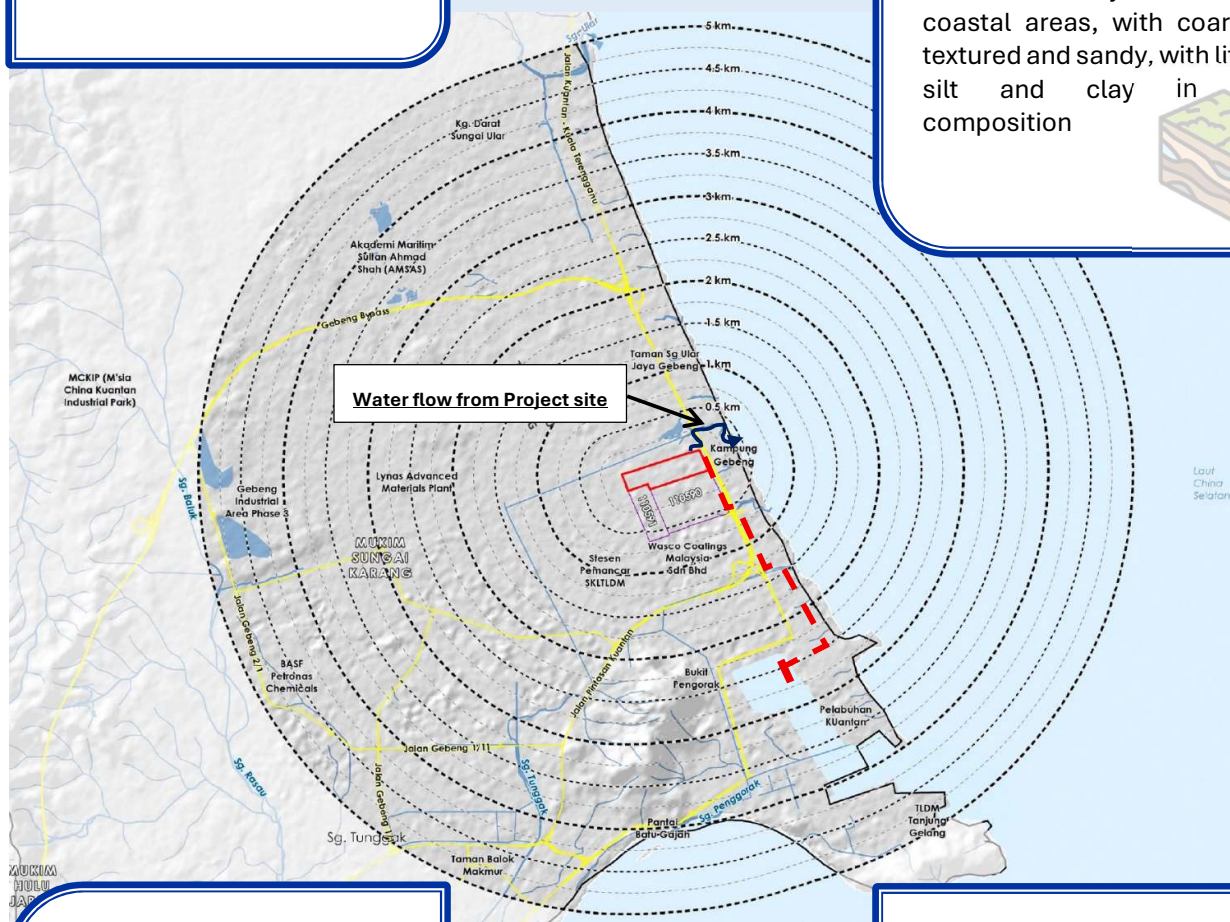
Phase	Components	Development Year
1	Main Substation	2025 – 2027
2	i. Office Building ii. Analysis Laboratory iii. Central Control Room iv. Local Substation 1 v. Diesel Generator Room vi. Crude Oil and Product Oil Truck Loading / Unloading Facilities vii. Guard House viii. LNG Gas Station	2025 – 2027
3A	i. Air Compressor / Nitrogen Station ii. Circulating Water Plant iii. City Water and Firewater Pump Station	2025 – 2027
3B	i. Detention Pond	2025 – 2027
4A	i. Blending Tank ii. Foam Station iii. Local Substation 2 iv. Heavy Oil Tank v. IETS vi. Piperack	2025 – 2027
4A/4B	i. Crude Oil Tank	Phase 4A (2025 – 2027) Phase 4B (2028 – 2030)
4A/4C	i. Liquefied Gas Tank	Phase 4A (2025 – 2027) Phase 4C (2028 – 2030)
5A	i. Local Substation 3 ii. Demineralised Water Station iii. Power station and Condensate Power Station iv. Flare System v. Chemical Material Warehouse vi. Spare Parts Warehouse vii. Field Auxiliary Room viii. 1,200 KTPA/Year Atmospheric and Vacuum Distillation Unit	2028 – 2030
5B	i. Naphtha Hydrotreating and Isomerisation Unit	2028 – 2030
6A	i. Sour Water Stripping and Sulphur Recovery Unit	2028 – 2030
6B	i. Hydrogen Production Unit ii. Diesel Hydrotreating Unit	2028 – 2030
6C	i. Intermediate Tank Group	2028 – 2030

Topography:

Project site is generally flat to gently undulating terrain, which lies near the coastal area of the South China Sea.

Project site is underlain predominantly by sediments composed of clay, silt, and sandy materials.

Soil commonly found in coastal areas, with coarse-textured and sandy, with little silt and clay in its composition



Project site is within the Merabang Tok Lembik basin, a small stream where the outlet located towards the east of coastal area.

Project site is characterised within a very high groundwater potential which is common to coastal areas.

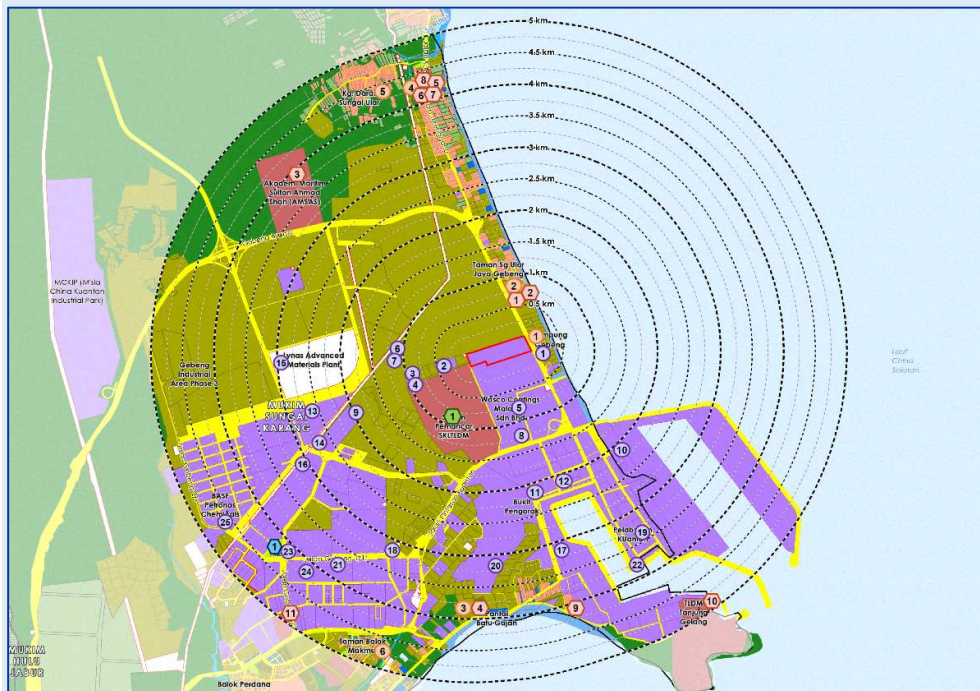
Project site is connected to East Coast Expressway and Kuantan Port. Also accessible through Federal route 3.

EXECUTIVE SUMMARY

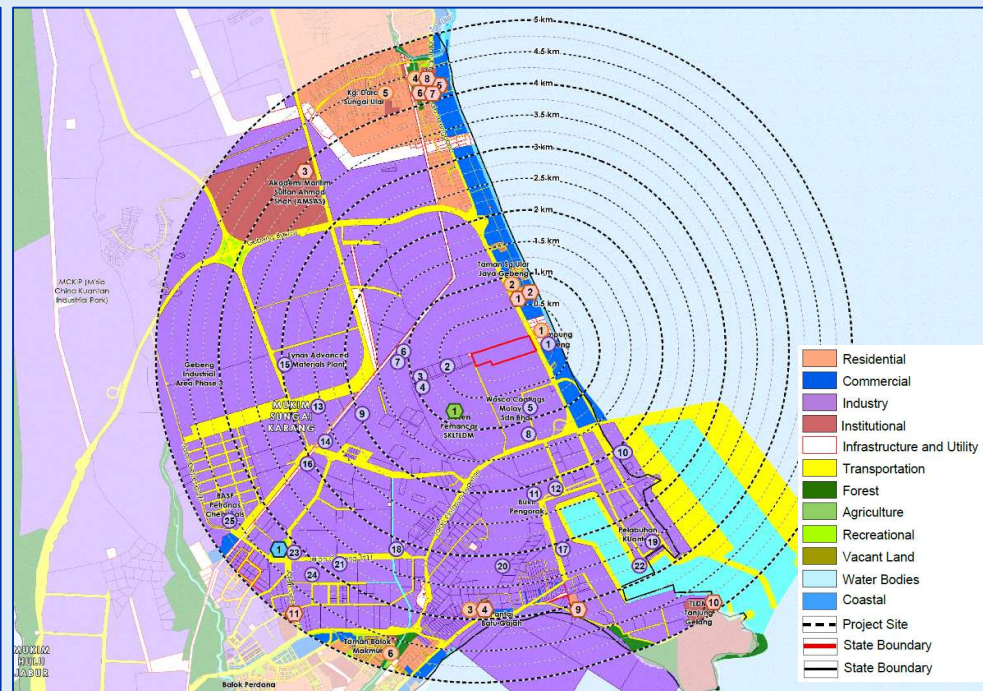
SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT FOR CADANGAN MEMBINA KILANG PENAPIS MINYAK BERKAPASITI 1.2 JUTA TAN SETAHUN DI ATAS PT 28711, MUKIM SUNGAI KARANG, DAERAH KUANTAN, PAHANG DARUL MAKMUR UNTUK PETROLUXE REFINERY (M) SDN. BHD.

LAND USE

Existing Land Use 0 -5 km from Project site



Future Land Use 0 -5 km from Project site



Nearest Sensitive Receptors:

- Kampung Gebeng ①
- Taman Sg. Ular Jaya Gebeng ②
- Community at Ternakan Lembu dan Tanaman Kontan, TLDM Padang Hangus ①

Source: RTD Kuantan 2035 (Penggantian)

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT FOR CADANGAN MEMBINA KILANG PENAPIS MINYAK BERKAPASITI 1.2 JUTA TAN SETAHUN DI ATAS PT 28711, MUKIM SUNGAI KARANG, DAERAH KUANTAN, PAHANG DARUL MAKMUR UNTUK PETROLUXE REFINERY (M) SDN. BHD.

BASELINE ENVIRONMENTAL MONITORING



BASELINE ENVIRONMENTAL MONITORING**a) Ambient Air Quality**

- Baseline ambient air quality monitoring was carried out at six (6) selected locations.
- The monitoring result are compared with the **Malaysian Ambient Air Quality Standards** (2020 Standard value) (MAAQS 2020).
- In general, the monitoring results showed that all the monitored parameters complied with MAAQS 2020. SO₂, NO₂, O₃, H₂S, and VOC were below detection limits at all the monitoring locations
- Traces of **Lead (Pb)** were detected at A1 (0.103 µg/m³) and A5 (0.069 µg/m³). Most probably the presence of Pb was due to the current traffic passing by this industrial area to the port.
- **CO** and **Ammonia** were detected at all monitoring locations, ranging between 1.4 – 2.9 mg/m³ and between 6.1 – 23 µg/m³, respectively. The recorded CO level was within the typical range for industrial estate in Malaysia, while the Ammonia may contribute by the agricultural activities (including cattle breeding) in this area, as well as the fertiliser plant near port area.

b) Odour

- Baseline odour monitoring exercise was carried out at seven (7) locations.
- In summary, no smell was detected at Project Site, while at sensitive receptors, odour from fertiliser plant near O5 and earthy smell at O3 were detected, though not always.

c) Noise Level

- Baseline noise level has been conducted at five (5) locations
- Results were compared to the DOE Guidelines for Environmental Noise Limits and Control (3rd Edition 2019, Reprint 2021): **2nd Schedule (Recommended Permissible Sound Level by Receiving Land Use for Existing Built-Up Areas)**.
- The average L_{Aeq} noise level during the daytime at all locations were ranging from 54.7 dBA – 68.5 dBA. Similarly, during the night-time monitoring, the average L_{Aeq} noise levels were ranging from 49.8 dBA – 63.5 dBA.
- Both of which were complied with the recommended permissible sound level limit **75 dBA** in the Guidelines for Environmental Noise Limits and Control, 3rd Edition, 2019.
- Based on site observations, noise sources at these monitoring locations were mainly related to vehicular movements along the main road and noises from nearby residential and mosque activities.

d) Ground Vibration Level

- Baseline ground vibration level monitoring was carried out at five (5) monitoring locations.
- Measurement is compared to the DOE Guidelines for **Ninth Schedule: Guidance on Perception is extracted from Guidelines for Environmental Vibration Limits and Control, 3rd Edition (2021)**.
- The maximum Peak Particle Velocity (PPV) for V1 – V5 during day and nighttime was recorded and compiled with the limit of 1.0 mm/s except for y-axis and z-axis during daytime at location V1 which is likely affected by the vehicular movements near the Project site.

BASELINE ENVIRONMENTAL MONITORING

e) Groundwater Quality

- A total of four (4) groundwater samples were collected to establish existing groundwater quality. GW4 was collected at a well located at Ladang Padang Hangus TLDM.
- Groundwater quality monitoring results were compared with the **Malaysian Recommended Site Screening Levels (SSL)** under Contaminated Land as described in the Contaminated Land Management and Control Guidelines (CLMCG) No. 1 and the **DOE Groundwater Quality Standards**, with the Industrial Use standard applied for GW1-GW3, and the Agriculture Use standard for GW4.
- Heavy metals were detected in groundwater samples GW1-GW4. For GW1-GW3, all concentrations were below SSLs except arsenic, lead, and manganese, which were present but within typical natural groundwater ranges. In GW4, aluminium, manganese, zinc, and boron were detected at low concentrations, all well below guideline limits.

f) Soil Quality

- Three (3) boreholes were drilled, to collect soil samples for assessing soil characteristics and baseline quality.
- Soil quality monitoring results are compared with limits under the **Malaysian Recommended Site Screening Levels (SSL)** for Contaminated Land as described in the Contaminated Land Management and Control Guidelines (CLMCG) No. 1 published by DOE.
- In general, heavy metals were detected in the soil samples, however their concentrations were below the SSLs for industrial soil.

g) Water Quality

- Baseline water quality was conducted at five (5) water monitoring stations.
- The monitoring results were compared with the **Standard B of the Environmental Quality (Industrial Effluent) Regulations 2009** for location W1, meanwhile from W2 – W5 were compared with the **Class III limits in the National Water Quality Standard for Malaysia (NWQS)**. Sampling at W4 and W5 was conducted during neap tide and spring tide conditions.
- The water quality for the monitoring at W1 location shows there is no discharge at this upstream point. The water quality at W2 – W5 was found within the Class III limit of the NWQS.
- Furthermore, W4 – W5 were monitored during both neap tide and spring tide, showing slight variations in parameters due to tidal influence.

h) Marine Water Quality

- Baseline marine water quality was conducted at three (3) monitoring stations. The monitoring results were compared with the Malaysian Marine Water Quality Standards (MMWQS) by the DOE Guidelines.
- The monitoring results were compared with the **Malaysian Marine Water Quality Standards (MMWQS)**.
- The marine water quality at MW1 – MW3 was found within the Class III limit of the MMWQS.

BASELINE ENVIRONMENTAL MONITORING**i) Terrestrial Ecology**

- The biodiversity survey was conducted at two (2) phases for four (4) sampling days.
- Generally, the survey of terrestrial flora and fauna was conducted using two (2) different methods, direct observation and camera trap installation.
- The survey outcomes were in terms of habitat assessment, biomass estimation and checklist of recorded terrestrial flora and fauna conducted using two (2) methods, General Habitat Assessments and Biodiversity Assessment.
- The main Project site is predominantly characterised by open land comprising grasses and shrubs, reflecting previous land use modification and disturbance. Vegetation structure within this area is generally simple, with limited canopy cover and low habitat complexity.
- The area supports mainly common and disturbance-tolerant species, particularly small mammals, birds, and reptiles adapted to open or modified environments.
- On the other hand, the riparian coastal area exhibits relatively higher ecological value, functioning as a transitional habitat between inland terrestrial ecosystems and the coastal environment. This area supports more structurally diverse vegetation and provides ecological functions such as foraging, shelter, and movement corridors for wildlife.

j) Aquatic Ecology

- The assessment of marine biological resources covered sampling of phytoplankton, zooplankton, macrobenthos, and fish fauna, while the coastal habitat assessment focused on mangrove appraisal at the lower reaches of Sg. Merabang Tok Lembik.
- Sampling was undertaken for two (2) days at four (4) sampling stations.
- A total of 26 species were recorded i.e., 23 finfish species from 12 families, and three (3) crab species from two (2) families.
- Based on the IUCN Red List of Threatened Species, most species were categorised as Least Concern whereas the crab species caught at the study area were categorised as Not Evaluated in the IUCN Red List of Threatened Species.
- For food tainting assessment, sampling points were coincided with the fish fauna assessment, and the fish specimens collected were used for the analysis.
- With respect to the study area, a total of six (6) heavy metals i.e. arsenic, cadmium, chromium, copper, lead and aluminium as well as Polycyclic Aromatic Hydrocarbons (PAHs) were tested. The analysis of the data indicated that most parameters were well within the permissible limits set by the Malaysian Food Act 1983 and Food Regulations Organization and World Health Organization, European Commission Regulation, Thailand Food Act, Singapore Food Agency, and China National Food Safety Standard, except for arsenic, which exceeded the limits.

EVALUATION OF IMPACTS

a) Air Quality & Odour

Pollution Source:

- Short term: Fugitive air emissions from construction activities.
- Long term: Emission from the Project operations (e.g. stacks and flaring system)

Air Dispersion Modelling (AERMOD):

- Modelled Parameters: PM₁₀, PM_{2.5}, Lead (Pb), NO₂, SO₂, CO, CO₂, VOCs and Odour
- **Construction:**
 - With BMPs Control Measures
 - Without BMPs Control Measures
- **Operation:**
 - Normal Operation (With Control Measures)
 - Abnormal Operation (Safety Control Emission during the Emergency)

Findings:

Construction Phase:

- Predicted maximum average incremental concentration (MAIC) for dust (PM₁₀ & PM_{2.5}) is mainly concentrated at the Project site.
- For the long-term assessment results, the long term annual averaging time for both PM₁₀ and PM_{2.5} are predicted to be minimal.
- If there is no dust control measure in place, it is expected that dust emissions (PM₁₀ & PM_{2.5}) will result in higher concentrations at the site and gradually spread toward the surrounding areas

Operational Phase:

- The predicted 24-hour MAIC PM₁₀ and PM_{2.5} dispersion concentration are predicted to be minimal and will be reduced gradually from the site.
- Similarly, for the combustion gases (SO₂, NO₂ & CO), and VOC. The predicted MAICs at the off-site receptors are minimal, and the projected ambient levels for these gases are anticipated to be well below the limits.
- In the unlikely event of a one-hour failure (**Worst-case scenario**), short-term emergency flaring may cause a temporary rise in emissions. Such incidents would be brief and quickly controlled. Modern facilities are equipped with advanced safety systems, including enclosed ground and acid gas flares, to safely burn off excess hydrocarbons during emergencies.

Pollution Prevention & Mitigation Measures (P2M2):

- Implementing BMPs during construction which includes, but are not limited to, erection of 3 m height hoarding at the Project boundary, covering stockpiles, regular water spraying within Project site and no open burning.
- Provision of a Standard Operating Procedure (SOP) for crude oil and products sampling.
- A structured leak detection and repair (LDAR) program should be implemented.
- Using low leakage control valves and low leak pumps
- Blinding, plugging or capping open-ended vent and drain valves.
- Minimised flaring.
- Continuous monitoring and maintenance
- Good housekeeping shall be practiced.
- Implementing source gas reduction measures to the maximum extent possible.



EVALUATION OF IMPACTS

b) Soil Erosion & Sedimentation

Pollution Source:

- Land clearing and earthworks activities
- Material stockpiling
- Drainage construction and excavation work.

Soil Erosion Modelling:

- For this study, ArcGIS version 10.5 was utilised
- Scenario:
 - **Pre Construction**
 - **During Construction** (With Mitigation Measures)
 - **During Construction** (Without Mitigation Measures)
 - **Post Construction**

Findings:

Pre-Construction:

- The average soil loss at the Project Site is **0.72 ton/ha/year**, which is categorised as a Low Risk.

Construction (Without Mitigation Measures):

- The soil loss rate will increase greatly to **68.08 ton/ha/year** (Moderately High Risk) if there are no mitigation measures implemented.

Construction (With Mitigation Measures):

- With proper BMPs and mitigation measures, the soil loss rate can be reduced to **0.37 ton/ha/year** (Low Risk)

Post Construction:

- The soil loss falls to the Low-Risk category (**0.20 ton/ha/year**) as the building and road is established

Soil Erosion Risk Class	Potential Soil Loss (tonnes/ha/yr)
Low	Less than 10
Moderate	Between 10 - 50
Moderately High	Between 50 - 100
High	Between 100 - 150
Very High	Above 150

Pollution Prevention & Mitigation Measures (P2M2):

- Avoid or minimise site clearing and earthworks during the rainy season to reduce the risk of erosion and sediment runoff.
- Excavated topsoil shall be stockpiled, protected from erosion and later used for re-vegetation.
- All the disturbed areas shall be stabilized with vegetation cover or pavement.
- Silt fence installed at the perimeter of work area.
- Sediment basin / silt trap to be constructed before commencement of earthworks.
- Inspection of LD-P2M2 shall be carried out on a weekly basis and after rain event (if necessary)
- BMPs shall be maintained at all times.



EVALUATION OF IMPACTS

c) Water Quality

Pollution Source:

- Land clearing and earthworks activities
- Effluent discharge from the Project.

Water Quality Modelling:

- The water quality model used for the simulation was the Water Quality Analysis Simulation Program (WASP8).
- **During Construction:**
 - a) Scenario 1 (Baseline)
 - b) Scenario 2 (With mitigation measures, Normal flow)
 - c) Scenario 3 (No mitigation measures, Normal flow)
- **During Operation:**
 - a) Scenario 1 (Baseline)
 - b) Scenario 2a (Normal flow)
 - c) Scenario 2b (Low flow)
 - d) Scenario 3a (Worst case, Normal flow)
 - e) Scenario 3b (Worst case, Low flow)

Findings:

Construction:

- When treated effluent discharge complies with regulation at 50 mg/L, the results closely align with baseline conditions.
- Under the worst-case scenario, TSS concentrations showed a slightly increment however remain close to the baseline.

Operation:

- The IETS adherence to the prescribed thresholds of Standard B in the Environmental Quality (Industrial Effluent) Regulations, 2009 demonstrated an adequate level of effectiveness in preserving the overall water quality across most of the simulated parameters.
- In the event of a failure in the treatment system, specifically referring to Scenario 3, there was an observable escalation in the concentrations of pollutants.

Pollution Prevention & Mitigation Measures (P2M2):

- Incorporating an adequate margin of safety in the IETS design is essential to ensure that its treatment performance remains reliable under fluctuating influent conditions.
- A monthly sampling exercise is required to assess all parameters that are pertinent to the Environmental Quality (Industrial Effluent) Regulations of 2009 at the selected location.



EVALUATION OF IMPACTS

d) Oil Spillage

Pollution Source:

- Oil spill resulting from uncontrolled discharge or accident event from the Project site.

Oil Spill Modelling:

- The potential oil spill impacts can be assessed by using MIKE water quality model such as Ecolab/Oil Spill Model, Particle Tracking model.
- Oil Spill Model Setup:
 - P1:** Potential for oil spill at loading / unloading points at Kuantan Port
 - P2:** River stream (Sg Merabang Tok Lembik)
 - P3:** Pipeline Transfer between project site to Kuantan Port

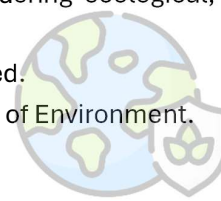
The simulation of potential oil spill events was simulated for Northeast (NE), Southwest (SW) and Inter Monsoon seasons with correspond to weather conditions.

Findings:

- The impact of oil spill incident generally subjected to weather condition where the worst scenario can be expected during NE Monsoon Season.
- The possibility oil spill incident that occurs during NE monsoon was predicted to travel more than 60km southward, while the incident during SW and Inter Monsoon season tends to travel to northward direction beyond 35km in 2 weeks.
- The possibility of spillage at P1 (Kuantan Port) shows the least impact compared to P2 and P3 as the existing breakwater restricts the dispersion of oil from travel far. Almost all oil spill particles were concentrated within port and breakwater area for all monsoon seasons. Only a smaller concentration of oil may reach about 55km from the point source after 2 weeks incident during NE monsoon.
- During NE monsoon, the potential oil spill at P2 and P3 can reach more than 60km southward beyond Kuala Pahang after 2 weeks of incident. The spillage during SW and Inter monsoon would travel more than 30km to the north.
- The spillage at P1 might disturb the activity within Kuantan port as very high oil spill concentration will remain event after 1 day spillage incident. The possibility of the risk of oil spill to reach nearest sensitive area (Teluk Cempedak at south and Cherating at north) is within 3 days.

Pollution Prevention & Mitigation Measures (P2M2):

- Appropriate remedial action must be executed in not more than 3 days to prevent bigger spillage.
- The Project Proponent must put extra caution if the spillage happens during NE monsoon season particularly if the spillage occurs at P2 and P3.
- Each oil spill incident will require the use of several clean up and recovery techniques.
- Decision on the use of each technique shall be based on fit purpose, considering ecological, recreational, industrial and commercial concerns.
- Nonetheless, mechanical clean up and recovery technique is highly recommended.
- Each technique used in combating oil spill have prior approval by the Department of Environment.



EVALUATION OF IMPACTS

e) Noise Assessment

Pollution Source:

- Earthworks and land development and followed with construction of Project components.
- Operation of process units and machineries.

Noise Modelling:

- Noise modelling is accomplished using CadnaA Ver. 2026 (by DataKustik GmbH).
- **Construction:**
 - Typical sound power levels (SPL) produced by individual machine or equipment.
- **Operation:**
 - Scenario 1: All equipment and machines operating duration for 24-hour, exhibiting high noise condition.
 - Scenario 2: Operation of Acid Gas Flare, elevated at 80m
 - Scenario 3: Operation of Ground Flare (enclosed, 40m height) and Acid Gas Flare (elevated, 80m)

Findings:

Construction Phase:

- Noise from Project construction is insignificant at nearby receptors since most of the receptors are currently highly influenced by the noise from vehicular movements along the road and local community activities.

Operational Phase:

- Scenario 1: From the modelling, the nearest receptors will not be affected by the operational noise impacts. Concerns related to high-level noise exposure are particularly significant for on-site workers who work close to these noise sources.
- Scenario 2: Result of noise levels anticipated from Acid Gas Flare operation is observed to be confined within the Project area. Anticipated noise levels at boundary meets with Recommended Limits of 75dB.
- Scenario 3: Result of noise levels anticipated from Acid Gas Flare and Ground Flare operations is observed to be confined within the Project area. Anticipated noise levels at boundary meets with Recommended Limits of 75dB.

Pollution Prevention & Mitigation Measures (P2M2):

- Provide proper PPE to the workers that are expose to high noise area or machineries. If unavoidable, adhere to time limit as per the Occupational Safety and Health (Noise Exposure) Regulations 2019.
- Encasing localised and stationary noise sources.
- Periodic noise monitoring shall be carried out at the site boundary to ensure the construction noise within the acceptable level.
- Warning signage shall be displayed at the entrance to noisy work areas to alert workers.
- Periodic maintenance and checking of equipment are implemented per standard operating procedure.



EVALUATION OF IMPACTS

f) Waste Management

Pollution Source:

- Construction activities
- Plant day to day operations
- Machineries / Plant maintenance

Type of Waste Generated:

- Biomass waste
 - Vegetation from site clearing works
- Construction waste
 - Used formwork, packaging, concrete / soil debris and wood / metal pieces
- Domestic waste
 - Food waste, packaging and water bottles
- Scheduled waste
 - Expected scheduled waste to be generated are SW202, SW204, SW305, SW306, SW314, SW325, SW408, SW409, SW410, SW411, and SW430

Findings:

Construction Phase:

- Domestic solid waste shall be collected and sent to Jabor-Jerangau Landfill (TPJJ) for disposal.
- Following implementation of management procedures for construction waste and domestic waste, anticipated impacts resulting from their generations are minimal.
- All trees cutting residue (biomass) resulting from site clearing activities will be disposed from Plot 1 to Plot 2 on Lot 110590 with PASDEC's requirements.

Operational Phase:

- The Project operation will generate variety of domestic and administrative solid wastes requiring disposals such as papers, cardboards, plastics, packaging materials, aluminium cans and food waste etc with an estimated average rate of 15.3 MT/month. Minimal impact is expected from solid waste generation during operational stage.
- Scheduled waste generated from Project operation includes used chemical and oil containers, sludge from the IETS, contaminated gloves, spent catalyst, spent porcelain ball, etc.
- By implementing these proper management procedures, the potential impact to the environment is expected to be insignificant.

Pollution Prevention & Mitigation Measures (P2M2):

- Storage areas for construction waste, domestic waste and scheduled waste shall be allocated at the site. Storage areas for solid waste and scheduled waste shall be separated.
- For solid waste, it shall be segregated for recyclable and non-recyclable materials; and stored in different containers. Recyclable waste will be sent to a recycling centre while non-recyclable materials are to be disposed at approved landfill.
- Management and disposal of the scheduled waste shall be carried out in accordance with the Environmental Quality (Scheduled Wastes) Regulations 2005.



EVALUATION OF IMPACTS

g) Socio Economic

Objective:

To assess the probable impact of the project, with particular attention to demographic, socio-cultural issues, and land use, including the recent history of change in land use.

Social Survey:

- A social survey was conducted within the study area to collect representative data regarding the local community a specially designed questionnaire.

Formal Conversation and Written Feedback:

- A formal conversation with the local community representative has been conducted to assess their views regarding the Project development.

Focus Group Discussion (FGD):

- Two separate FGD sessions were conducted on 29th October 2025:
 - Mukim Sg. Karang community within study area
 - Persatuan Veteran TLDM Padang Hangus.

Findings:

Construction Phase:

- The construction phase is expected to have impacts on the local community due to the site clearing and earthworks.
- The Influx of foreign workers may create an uncomfortable feeling among the locals due to fear of disease and an increase in crime rates
- The construction phase of the proposed Project provides a wide range of opportunities for local businesses and employment.

Operational Phase:

- The proposed Project may contribute to sustainable economic growth from revenue generation and the creation of business and employment opportunities due to its long operational phase.
- The operation of the Project poses a risk to the well-being of the surrounding community due to potential air, water, and noise pollution.
- The fishing community is particularly vulnerable to operational risks such as potential oil spills and the discharge of industrial waste into the sea.

Pollution Prevention & Mitigation Measures (P2M2):

- The Project Proponent is advised to prioritise the locals in filling any business and job opportunities created throughout the Project development.
- A community management unit is to be established before the start of construction and will continue to operate throughout the Project's operation. This unit is responsible for receiving and responding to grievances and expectations from the surrounding communities.
- Regular monitoring and adherence to all environmental commitments, measures, and procedures outlined in the approved EMP, as well as to all relevant environmental laws and regulations. Continuous compliance could show the project proponent's commitment to safeguarding the surrounding environment and building trust with the community.

EVALUATION OF IMPACTS**h) Terrestrial Ecology****Findings:**Construction Phase:

- Site clearing and earthworks within the Project footprint will result in the removal of existing vegetation, which predominantly consists of limited bushes, shrubs and few small trees.
- No threatened, rare, or protected flora were recorded on site. Impacts on vegetation are therefore considered localised and of low significance due to the low ecological sensitivity and limited structural complexity of the affected vegetation.
- Fauna observed on site are predominantly common and disturbance tolerant.
- The adjacent coastal riparian forest, which supports higher plant diversity including mangroves, lies outside the project boundary. Potential impacts to this habitat are expected to be indirect, primarily through alterations to surface runoff, sediment transport, and water quality.
- The coastal riparian forest serves as a critical movement corridor and foraging area; however, as no direct disturbance is proposed, impacts on fauna are expected to be temporary and of low to moderate significance.

Operational Phase:

- Impacts on terrestrial flora are expected to be minimal, as no further vegetation clearing is anticipated.
- Indirect impacts to the coastal riparian forest could occur in the event of accidental discharges, inadequate stormwater management, or long-term alterations to drainage patterns.
- Increased traffic, artificial lighting, and ongoing human activity may continue to influence wildlife movement, particularly in areas adjacent to riparian habitats.
- Considering the availability of surrounding habitats and the disturbance-tolerant nature of the species recorded, long-term impacts on fauna are expected to be low.

Pollution Prevention & Mitigation Measures (P2M2):

- Site clearing shall be strictly confined to the approved project boundary to prevent encroachment into the coastal riparian forest.
- Prohibit hunting, trapping or harassment of wildlife by construction personnel.
- Install wildlife awareness signage and conduct toolbox briefings for workers.
- Landscaping or re-vegetation efforts shall prioritise native species suitable for the local ecosystem to support biodiversity.
- Any accidental disturbance to plants during operational activities shall be promptly mitigated through restoration or replacement with appropriate species.
- Implement controlled lighting design to minimise light spill into adjacent vegetated and riparian areas.
- Implement proper waste management to avoid attracting opportunistic wildlife.

EVALUATION OF IMPACTS

i) Aquatic Ecology & Fisheries

Findings:

Construction Phase:

- During this phase, surface runoff is expected to carry mobilised sediment into the river systems.
- Decaying biomass, if not properly disposed of, could affect the water quality if it is disposed too close to the water body.

Operational Phase:

- Some parameters such as BOD, DO, and AN indicates the existing level were already high and exceeded the acceptable limits.
- Thus, any additional inputs to the current levels could cause further detrimental effects on the aquatic biological resources, especially at the immediate discharge point area.
- Any degradation of water quality due to failure of the wastewater/effluent treatment system during the operational phase would affect fisheries resources along the immediate coastal area.
- This can potentially lead to decrease in fish landings thus affect the income and livelihood of the fishermen, specifically for those undertake fishing activity along the coastline and nearshore areas.

Pollution Prevention & Mitigation Measures (P2M2):

- LD-P2M2 components such as earth drains and silt trap basins (2 units) should be installed. Earth drains should be constructed to capture runoff from the construction area and channel into the silt trap basins.
- It is also recommended to consider the application of phytoremediation system, which can act as a final polishing and environmental buffer before the treated effluent enters existing water body.
- Conduct periodical monitoring of aquatic biological resources (plankton, macrobenthos and fish fauna) throughout the construction and operational phase.
- Periodical monitoring of capture fisheries activities throughout the operational phase shall be conducted to assess any major changes or trends in fish landings, significant shift in species profile, fisheries resources and extent of impacts on fishermen livelihood.
- Suitable compensation/ex-gratia should be provided to the fishermen if any losses or disruptions occur due to the operation of the proposed crude oil refinery project.



EVALUATION OF IMPACTS

j) Quantitative Risk

Risk Criteria:

- 1 x 10⁻⁶ fatality/person per year individual risk contour should not encompass involuntary recipients of industrial risks such as residential areas, schools, hospitals and places of continuous occupancy.
- 1 x 10⁻⁵ fatality/person per year individual risk contour should not extend beyond industrial development.

Methodology:

- Data collection
- Hazard identification
- Frequency analysis
- Consequence modelling (BREEZE Incident Analyst)
- Risk presentation
- Risk mitigation

Findings:

Individual Risk:

- The 1x10⁻⁵ risk level is within the Project site while the 1x10⁻⁶ fatalities/person per year risk contours extend beyond the Project north and south boundary but remain primarily within the industrial area

Societal Risk:

- Total Cumulative curve lies slightly above the intolerable limit and within the ALARP (As Low As Reasonably Practicable) region. Further risk reduction measures must be implemented to bring the cumulative risk level to below the intolerable level. Among the individual events, the toxic release, fireball and flash fire (LPG storage) show the highest frequencies across most of the fatality range. This indicates that this scenario is the dominant contributors to the overall societal risk. As the number of potential fatalities increases (N > 10), the cumulative frequency decreases steadily.
- Practicable risk-reduction measures must be implemented to achieve further risk reduction.

Pollution Prevention & Mitigation Measures (P2M2):

- Further assessed is recommended for risk reduction to lower as far as is reasonably practicable.
- Strengthen control measures and system design features to reduce the probability of both small- and large-scale fatality events is maintained within acceptable bounds.
- Apply a hierarchy of controls (eliminate hazards, install engineering controls, and enforce administrative procedures) to aggressively reduce consequences and frequencies and further consideration of hardware upgrades (e.g., blast walls, automated shutdown systems), operational changes, and enhanced emergency response plans.
- Safe Equipment Design: use recognised safety design codes, use appropriate materials for specific applications.
- Preventive Maintenance: Implement reliability-based maintenance and regular inspections to ensure mechanical integrity and safe operation.
- HAZOP and CIMA: Conduct HAZOP to identify design and operational hazards, and CIMA.
- Emergency Preparedness: Establish emergency response procedures and conduct regular fire/spill drills to ensure readiness.
- Ignition & Hazard Control: identify and continuously eliminate ignition sources, enforce PPE use, and maintain good housekeeping practices.
- Training & Awareness: Provide regular training and refresher sessions for all plant personnel.
- Safety Signage & Barriers: Install visible safety signs, area demarcations, and physical barriers to guide and protect personnel.
- Fire Protection Systems: Maintain and inspect firefighting and fire suppression equipment regularly.

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT FOR CADANGAN MEMBINA KILANG PENAPIS MINYAK BERKAPASITI 1.2 JUTA TAN SETAHUN DI ATAS PT 28711, MUKIM SUNGAI KARANG, DAERAH KUANTAN, PAHANG DARUL MAKMUR UNTUK PETROLUXE REFINERY (M) SDN. BHD.

PROPOSED ENVIRONMENTAL MONITORING (CONSTRUCTION STAGE)

Ambient Air Quality:

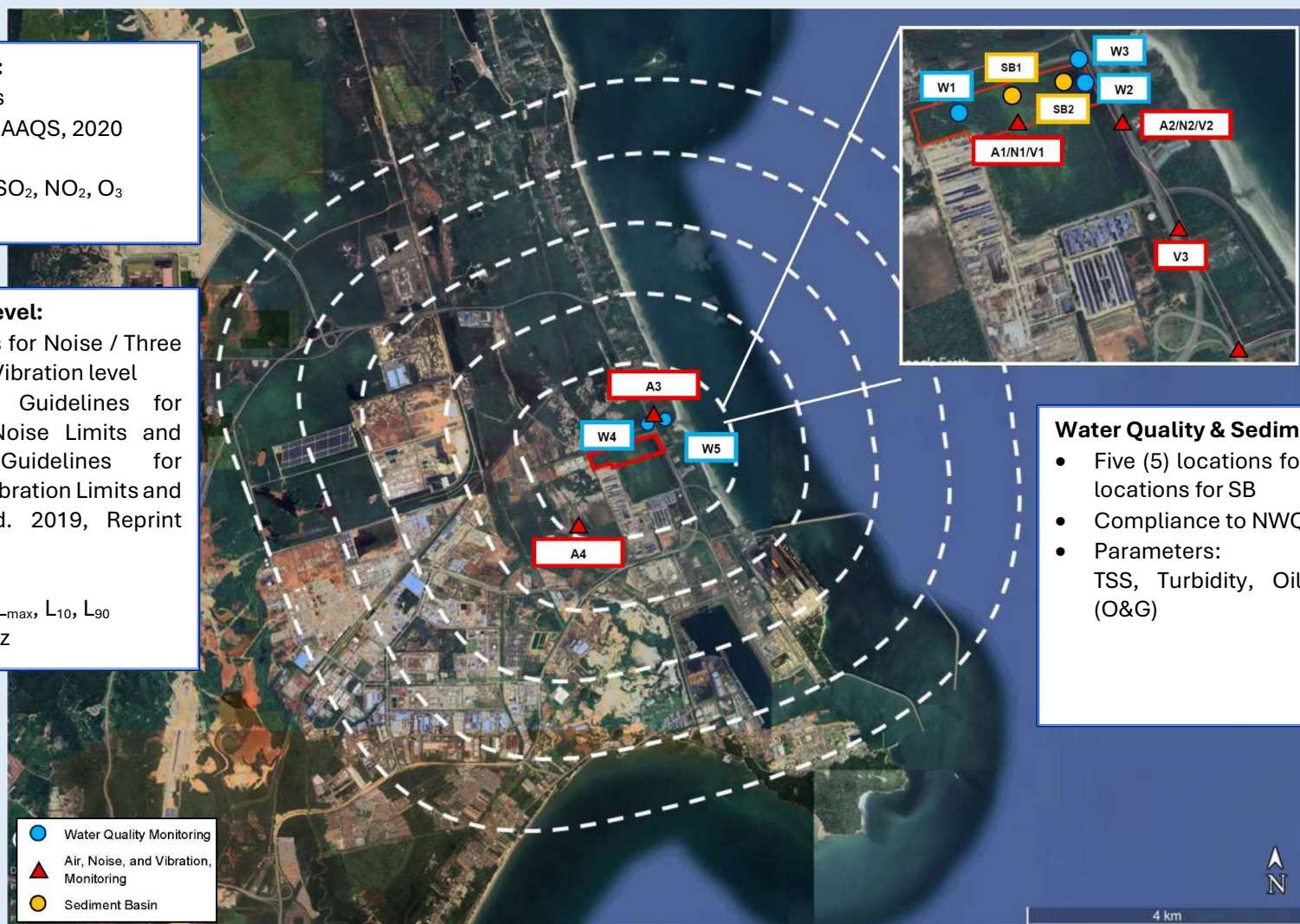
- Four (4) locations
- Compliance to MAAQS, 2020
- Parameters:
PM₁₀, PM_{2.5}, CO, SO₂, NO₂, O₃

Noise & Vibration Level:

- Two (2) locations for Noise / Three (3) locations for Vibration level
- Compliance to Guidelines for Environmental Noise Limits and Control & Guidelines for Environmental Vibration Limits and Control (3rd Ed. 2019, Reprint 2021).
- Parameters:
Noise: L_{Aeq}, L_{min}, L_{max}, L₁₀, L₉₀
Vibration: PPV, Hz

Water Quality & Sediment Basin:

- Five (5) locations for WQ / Two (2) locations for SB
- Compliance to NWQS Class 3
- Parameters:
TSS, Turbidity, Oil and Grease (O&G)



EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT FOR CADANGAN MEMBINA KILANG PENAPIS MINYAK BERKAPASITI 1.2 JUTA TAN SETAHUN DI ATAS PT 28711, MUKIM SUNGAI KARANG, DAERAH KUANTAN, PAHANG DARUL MAKMUR UNTUK PETROLUXE REFINERY (M) SDN. BHD.

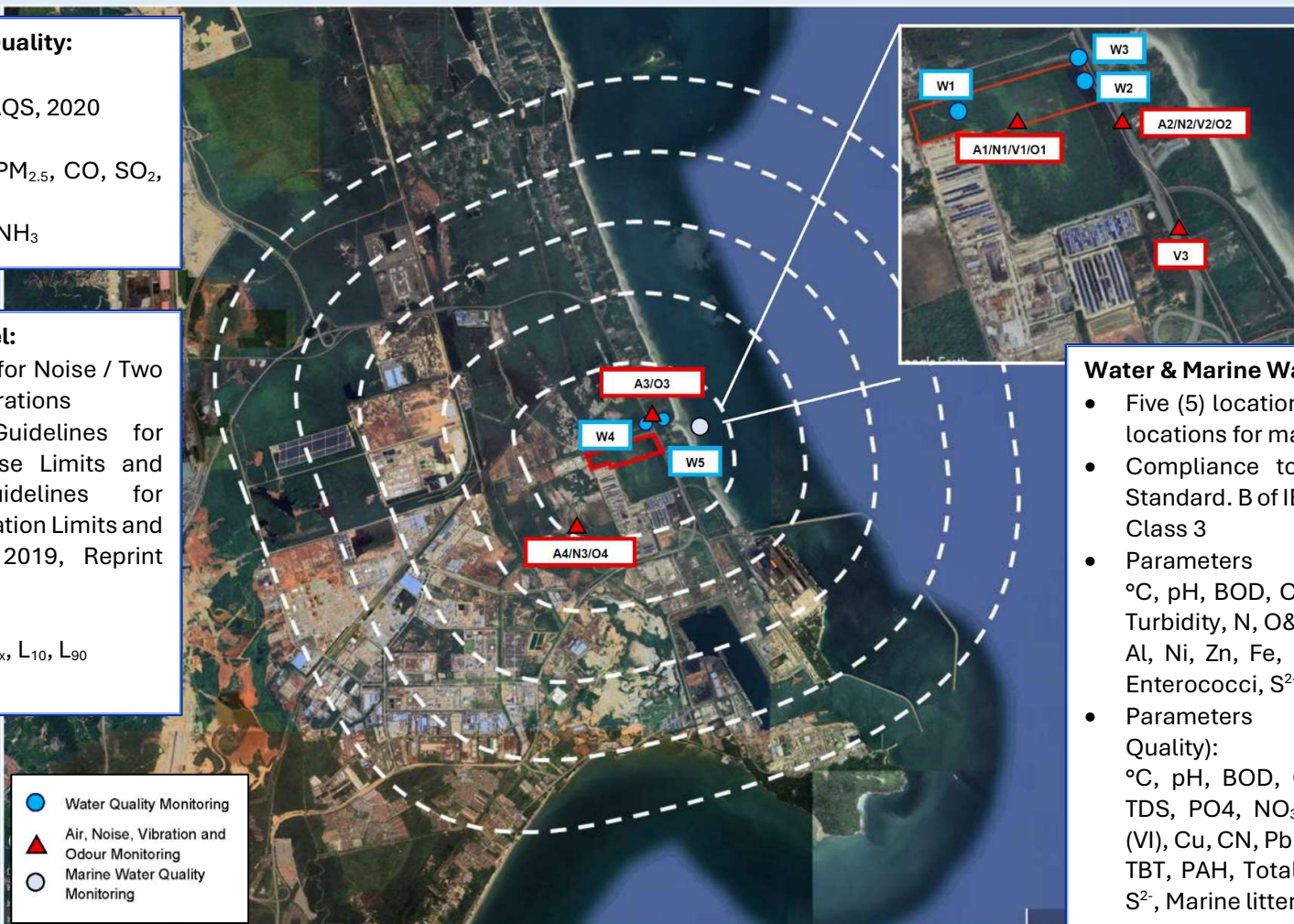
PROPOSED ENVIRONMENTAL MONITORING (OPERATIONAL STAGE – STACK EMISSION & IETS)

Ambient Air & Odour Quality:

- Four (4) locations
- Compliance to MAAQS, 2020
- Parameters:
Ambient air: PM₁₀, PM_{2.5}, CO, SO₂, NO₂, O₃
Odour: VOCs, H₂S, NH₃

Noise & Vibration Level:

- Three (3) locations for Noise / Two (2) locations for Vibrations
- Compliance to Guidelines for Environmental Noise Limits and Control & Guidelines for Environmental Vibration Limits and Control (3rd Ed. 2019, Reprint 2021).
- Parameters:
Noise: L_{Aeq}, L_{min}, L_{max}, L₁₀, L₉₀
Vibration: PPV, Hz

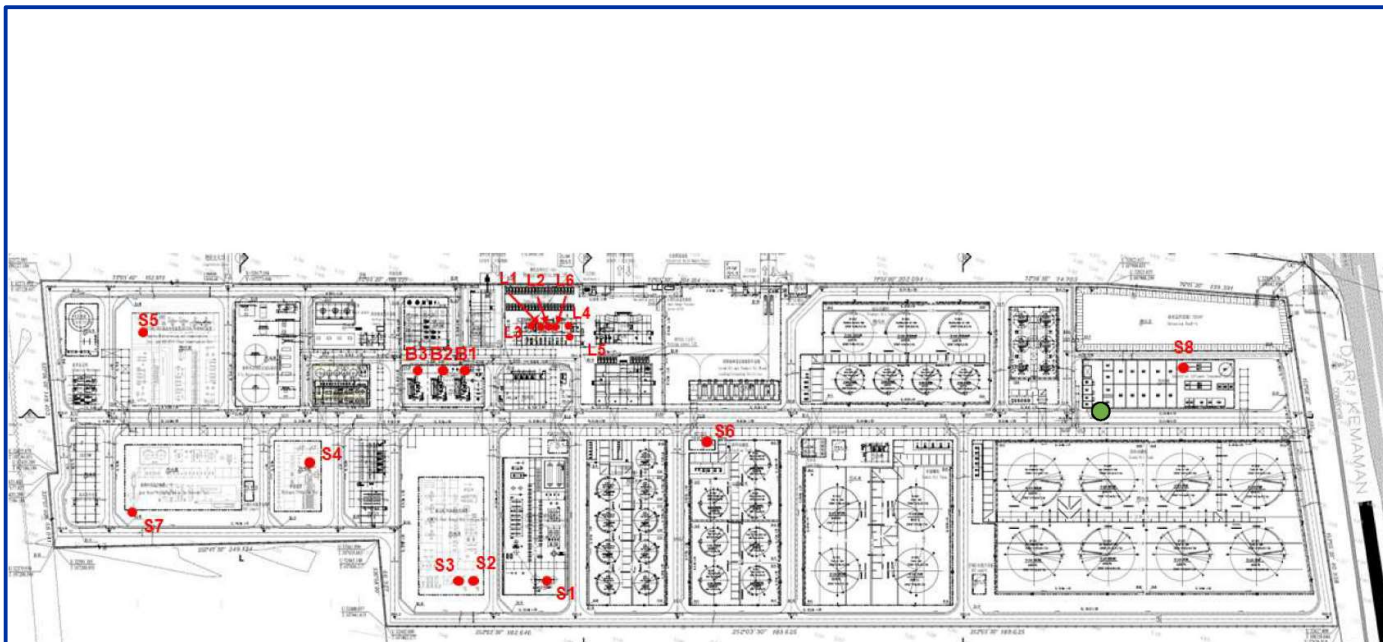


Water & Marine Water Quality:

- Five (5) locations for WQ / One (1) locations for marine water
- Compliance to NWQS Class 3, Standard. B of IER, 2009 & MMWQS Class 3
- Parameters (Water Quality):
°C, pH, BOD, COD, DO, TSS, TDS, Turbidity, N, O&G, NO₃, Hg, As, Pb, Al, Ni, Zn, Fe, FC, TC, TOC, TPH, Enterococci, S²⁻, Phenol
- Parameters (Marine Water Quality):
°C, pH, BOD, COD, DO, N, TSS, TDS, PO₄, NO₃, NH₃, Hg, Cd, Cr (VI), Cu, CN, Pb, Zn, Arsenic (III), Al, TBT, PAH, Total Phenol, O&G, FC, S²⁻, Marine litter

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT FOR CADANGAN MEMBINA KILANG
PENAPIS MINYAK BERKAPASITI 1.2 JUTA TAN SETAHUN DI ATAS PT 28711, MUKIM SUNGAI KARANG,
DAERAH KUANTAN, PAHANG DARUL MAKMUR UNTUK PETROLUXE REFINERY (M) SDN. BHD.



Stack Emission:

- Compliance to Environmental Quality (Clean Air) Regulations 2014
- Parameters:
Total PM, NO₂, CO, NH₃, H₂S, TOC, Pb, Dark smoke

IETS Discharge:

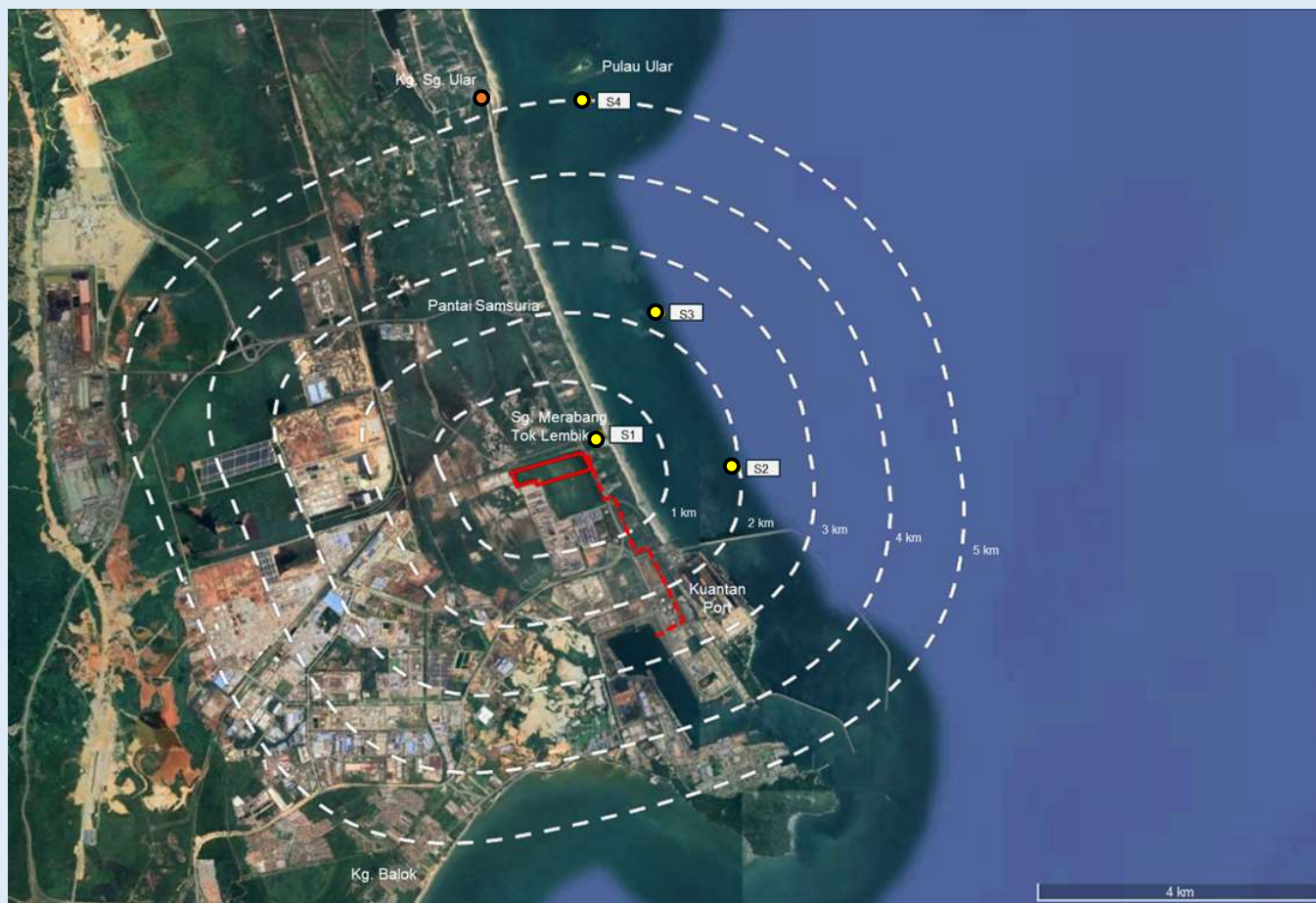
- Compliance to Standard B Limit of Environmental Quality (Industrial Effluent) Regulations 2009
- Parameters:
°C, pH, BOD, TSS, N, Hg, Cd, Cr (VI), Cr (III), As, CN, Pb, Cu, Mn, Ni, Sn, Zn, B, Fe, Ag, Al, Se, Ba, F, Formaldehyde, Phenol, Free chlorine, S²⁻, O&G, Colour

S1	Heating Furnace Stack at Atmospheric Distillation Unit
S2	Heater No.1 Stack at Diesel Hydrotreating Unit
S3	Heater No.2 Stack at Diesel Hydrotreating Unit
S4	Hydrotreating Furnace Stack at Isomerization Unit
S5	Heating Furnace Stack at Naphtharisation Unit
S6	Vapour Recovery System Stack at Blending Tank Farm
S7	Tail Gas Flare Stack at Sour Water Complex
S8	VOC Removal System Stack at IETS
L1-L6	Analytical Laboratory Exhaust Hood
B1	Boiler A Stack
B2	Boiler B Stack
B3	Boiler C Stack
●	IETS Discharge

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT FOR CADANGAN MEMBINA KILANG PENAPIS MINYAK BERKAPASITI 1.2 JUTA TAN SETAHUN DI ATAS PT 28711, MUKIM SUNGAI KARANG, DAERAH KUANTAN, PAHANG DARUL MAKMUR UNTUK PETROLUXE REFINERY (M) SDN. BHD.

PROPOSED ENVIRONMENTAL MONITORING (AQUATIC BIOLOGICAL RESOURCES & FOOD TAINING AND MARINE CAPTURE FISHERIES MONITORING)



Aquatic Biological Resources & Food Tainting:

- Four (4) locations, S1 – S4 ●
- Compliance to:
 - Baseline results, no degradation and drastic changes in species profile and abundance.
 - Food tainting result should comply with standard limits set by the Malaysian Food Act 1983 and Food Regulations 1985 and FAO/WHO.
- Parameters to be monitored:
 - Diversity and density of phytoplankton, zooplankton and macrobenthos
 - Fish fauna diversity, abundance and catch per unit effort (CPUE).
 - Food tainting: As, Cd, Cr, Cu, Pb, Al, & PAHs.

Marine Capture Fisheries:

- One (1) location, F1 ●
- Compliance to:
 - Baseline results, no drastic decline of fish landings and major shift in species profile.
- Parameters to be monitored:
 - Fish landings