FIRST SCHEDULE

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

for

Proposed Nangka Field Development at Block SK417, Offshore Sarawak



November 2026
CK/EV103/0121/2026

Project Proponent

PTTEP

PTTEP HK OFFSHORE LIMITED

Level 22, 23, 28-2, 33 – 35,
Menara Prestige, No.1, Jalan Pinang,
50450 Kuala Lumpur, Malaysia

Prepared by

CHEMSAIN

CHEMSAIN KONSULTANT SDN BHD

172 Rock Road,
93200 Kuching, Sarawak, Malaysia

EXECUTIVE SUMMARY

Environmental Impact Assessment (EIA) for Proposed Nangka Field Development at Block SK417, Offshore Sarawak

Project Proponent

PTTEP HK OFFSHORE LIMITED
Levels 22, 23, 28-2, 33-35, Menara Prestige, No.1, Jalan Pinang, 50450 Kuala Lumpur, Malaysia
Contact Person: Chan Shiao Wei(ShiaoWeiC@pttep.com)/ Mazura Murat (MazuraM@pttep.com)

Qualified Persons

CHEMSAIN KONSULTANT SDN BHD
No. 172, Rock Road, 93200 Kuching Sarawak.
Contact Person: Ngu Hsiao Fei (consult@chemsain.com)

INTRODUCTION

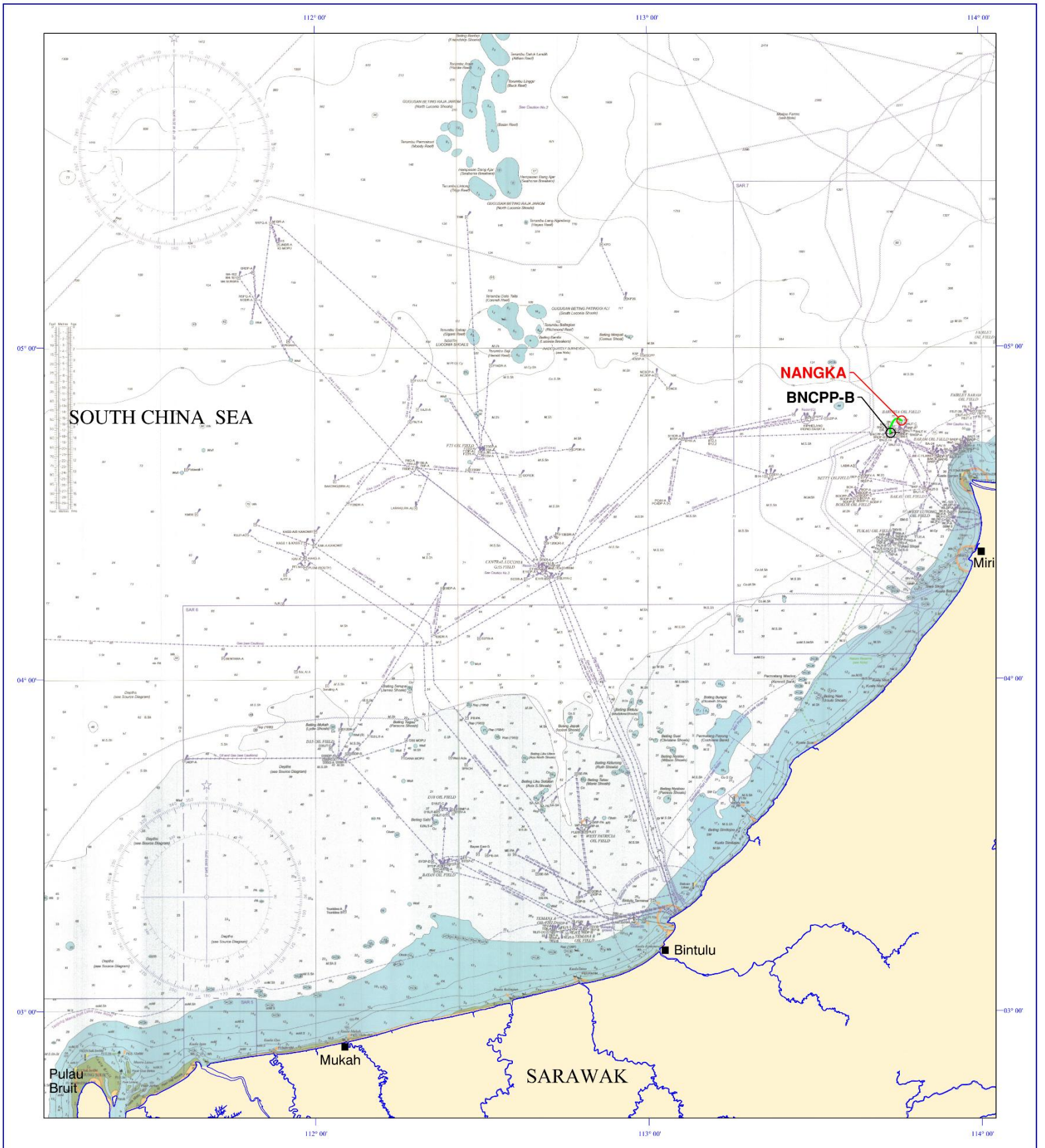
- The Nangka field is located in Block SK417.
- The SK417 Production Sharing Contract (PSC) is operated by PTTEP with participation interest held jointly by PTTEP and PETRONAS Carigali Sdn. Bhd.
- The Nangka Field located approximately 31 km offshore of Miri, Sarawak with a water depth of 77.5 m.
- EIA Scope covers:
  - One (1) Nangka WHP
  - One (1) 8 km pipeline to existing Baronia Central Processing Platform Complex B (BNCPP-B)

Table ES-1: Coordinates of Platforms

Platforms	Latitude	Longitude
Proposed Nangka WHP	04° 46' 35.0604"N	113° 45' 42.4936" E
Existing BNCPP-B	04° 44' 23.68"N	113° 43' 42.59"E

Datum: WGS 84

PROJECT LOCATION



LEGEND:

- PROPOSED NANGKA WHP
- EXISTING BNCPP-B
- PROPOSED FWS PIPELINE
- RIVERS / COAST

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR PROPOSED NANGKA FIELD DEVELOPMENT AT BLOCK SK417, OFFSHORE SARAWAK

N

0 20 40 60 80 100Km

SCALE IN KILOMETRES (1:1,225,000) – A3 MEDIUM

SOURCE : Adapted from

SERIES 8 EDITION 8 SCALE 1:500,000	ADMIRALTY CHART SAR 4 TANJUNG SIRIK TO TANJUNG BARAM SCALE 1:500,000 EDITION NO.: 4 EDITION DATE: 21-12-23

GEODETIC PARAMETERS:

2D projected CRS : WGS84 / UTM zone 49N
[EPSG : 32649]

PROJECT LOCATION

CHEMSAIN KONSULTANT SDN. BHD.

LEGISLATIVE REQUIREMENT



Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015

First Schedule -Item 9 Petroleum
(a) Development of –
(iii) Oil and Gas field

STATEMENT OF NEED



(I) Proponent

- Fulfilling PSC commitments, monetising undeveloped reserves, while maximizing the value of existing upstream infrastructure

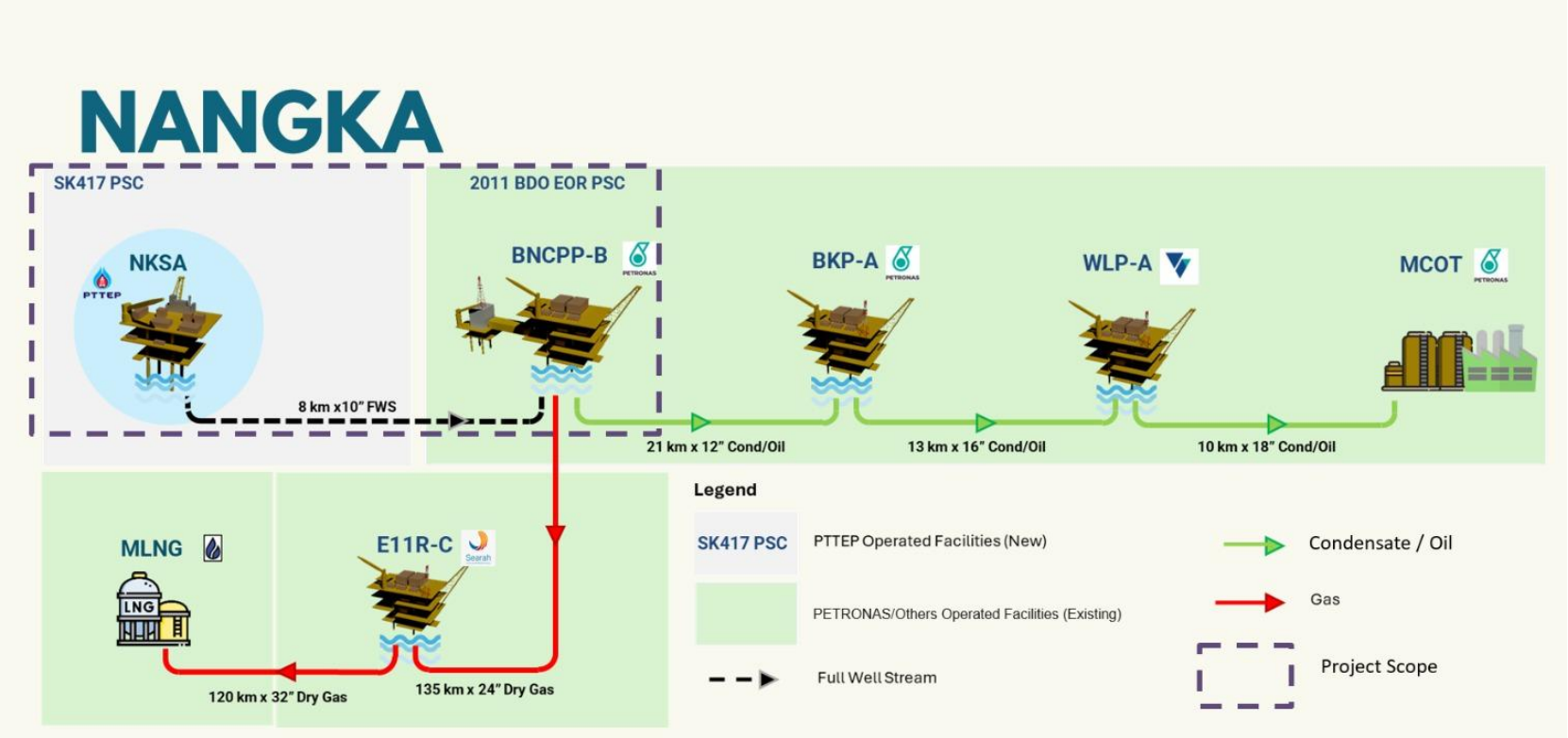
(II) Economy

- Supporting national energy security, creating jobs, and aligning with Sarawak's strategic and sustainability goals

PROJECT DESCRIPTION

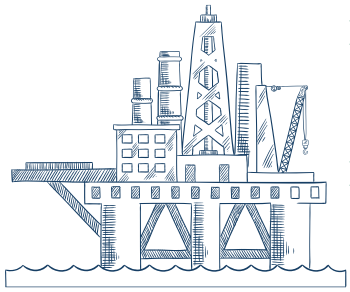
- **Wellhead Platform (WHP):** One (1) unmanned WHP at Nangka field with design capacities of 70 MMscf/D of gas, 2,800 B/D of condensate and oil and 200 B/D of produced water.
- **Pipeline**: One (1) 8 km x 10" multiphase pipeline from Nangka WHP to existing platform, BNCPP-B.
- **Modification**: Modification for host tie-in at BNCPP-B.
- **Gas Production:** peak production of about **61 Mmscf/D** in 2029.
- **Condensate and Oil Production**: peak production of about 2,302.83 B/D.
- **Produced water**: peak at about 185.19 B/D and will be treated at BNCPP-B produced water treatment system with design capacity of about 60,000 B/D. Current capacity is not more than 17,000 B/D.
- Gas, condensate, oil and produced water from Nangka will be channelled to existing BNCPP-B for initial processing and produced water treatment.
- Gas will be evacuated to E11R-C and onward to the Malaysia LNG Plant (MLNG), Bintulu, while condensate and oil will be routed via the existing platforms (BKP-A and WLP-A) to Miri Crude Oil Terminal (MCOT), Miri for final treatment and sales.

PROJECT OVERVIEW



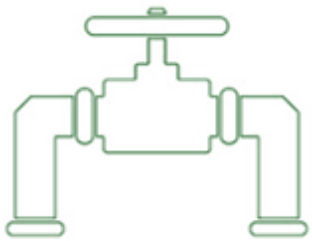
- Project Scope:
  - One (1) Nangka WHP
  - One (1) 8 km pipeline to existing BNCPP-B platform (BNCPP-B)

WELLHEAD PLATFORM (WHP)

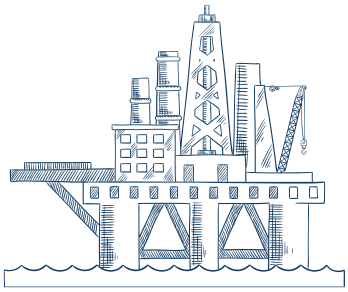


- **Structure & Design**: Four-legged and eight well slots (four will be used) platform for not normally manned operations with a 15 years design life.
- **Equipment and system**: wellhead and hydraulic operated wellhead valves, production flowlines and associated system, production and test manifold, 2-phase test separator, production separator, export riser, pig launcher, gas and liquid export allocation flow meter, vent system, open drain system, closed drain system, knock out drum, Corrosion and Scale Inhibitor System, diesel fuel system, wash water, and pedestal crane.
- **Power source**: solar system and wind turbine
- **Control & monitoring**: all systems are remotely controlled and monitored at existing central control room (CCR) at Bintulu Onshore Receiving Facilities (BORF). Remote monitoring at BNQ-B CCR will be made available.
- **Visit frequency**: 1-2 times per month depending on operational needs (e.g., replenishing consumables, planned maintenance, etc.)

PIPELINE



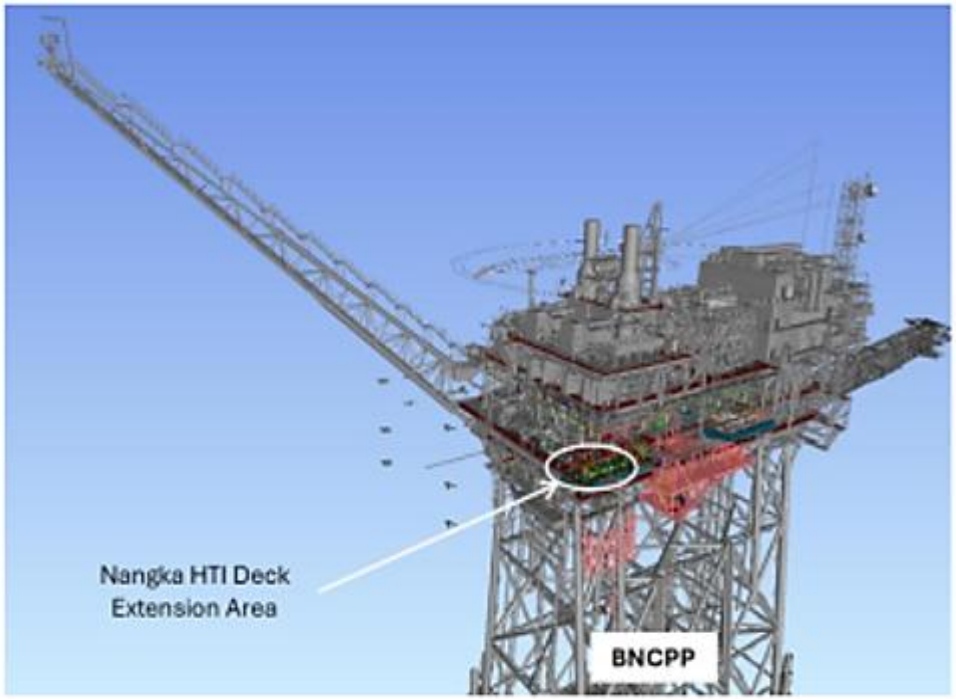
- **Service**: Multiphase pipeline
- **Design specification**: has a design life of 15 years, 10” x 8 km long with corrosion allowance of min. 4 mm. Pipeline material grade is API 5L X65.
- **Pipeline crossing**: three (3) pipeline crossings; protection measures such as concrete mattresses and concrete sleepers will be carried out. Coordination with respective asset owners will be conducted.

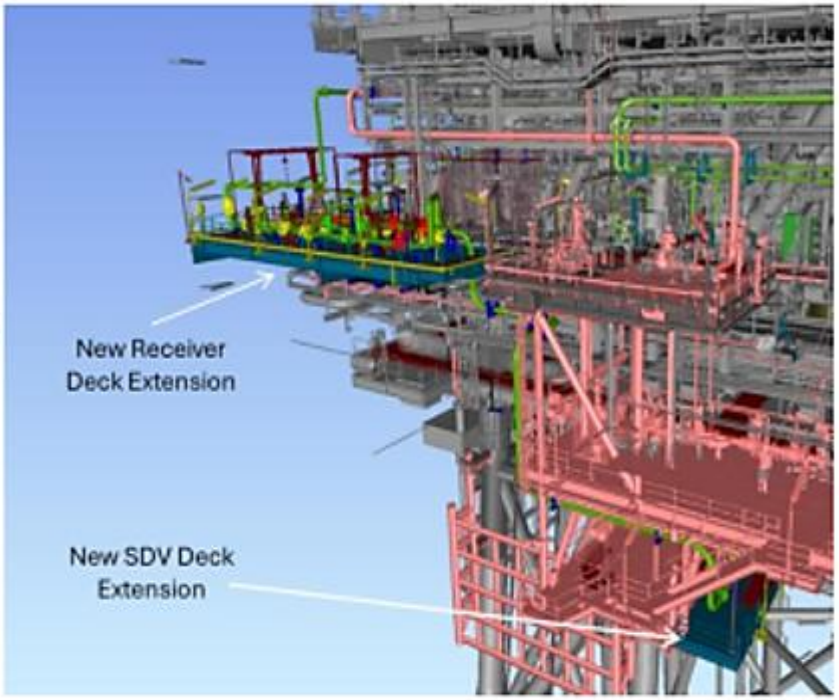


- **Existing processing facilities:** gas and condensate separation system, Triethylene Glycol (TEG) dehydration unit, produced water treatment system, gas and condensate export facilities.

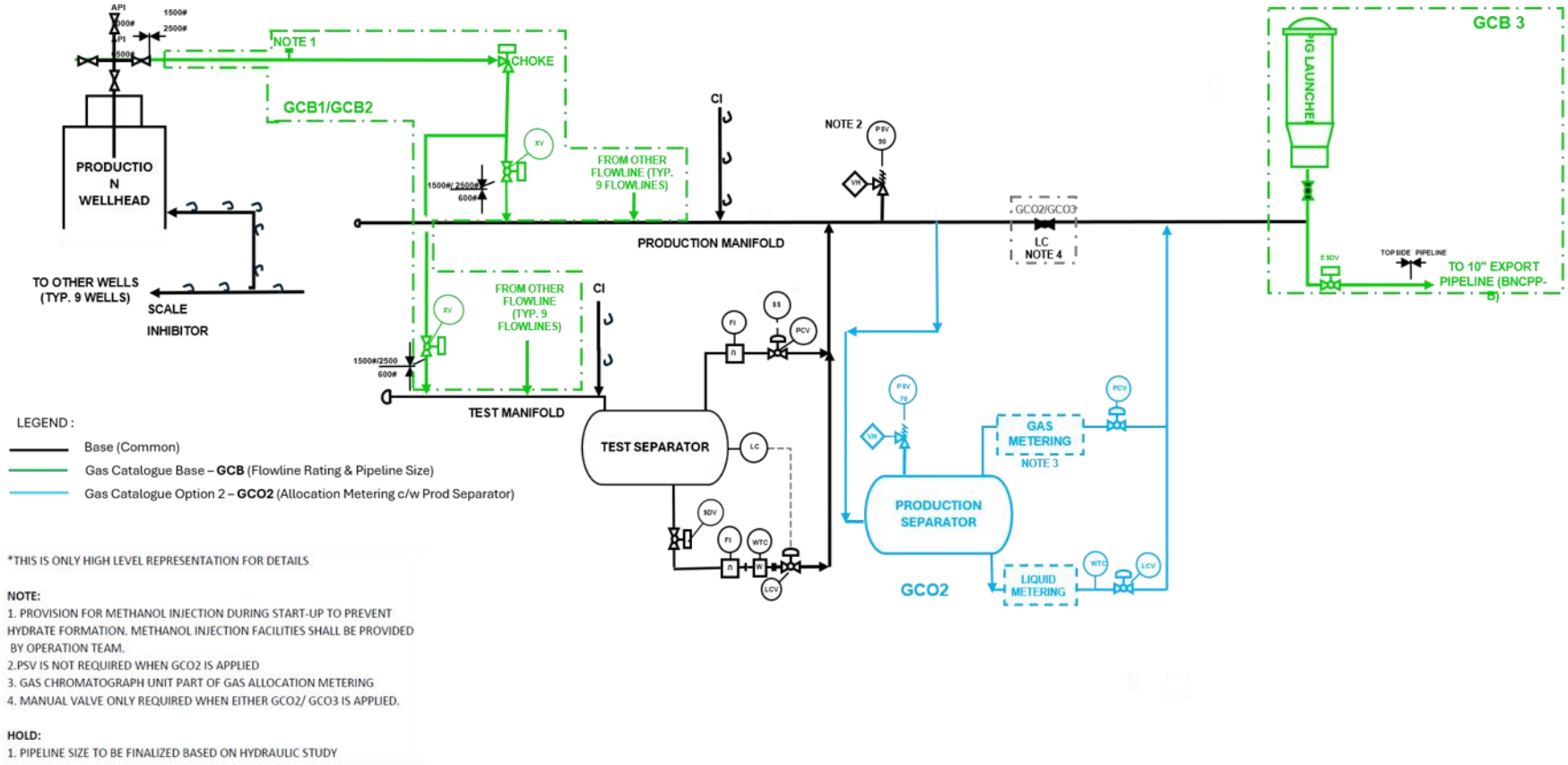
- **Modification for tie-in**:
  - New pig receiver
  - New emergency shutdown valve (ESDV)
  - Three (3) motor operated valves
  - Two (2) control valves
  - Extension deck at mezzanine deck
  - Pipeline tie-in
  - Utility tie-in

OVERVIEW OF NANGKA HOST TIE-IN FACILITIES ON BNCPP-B



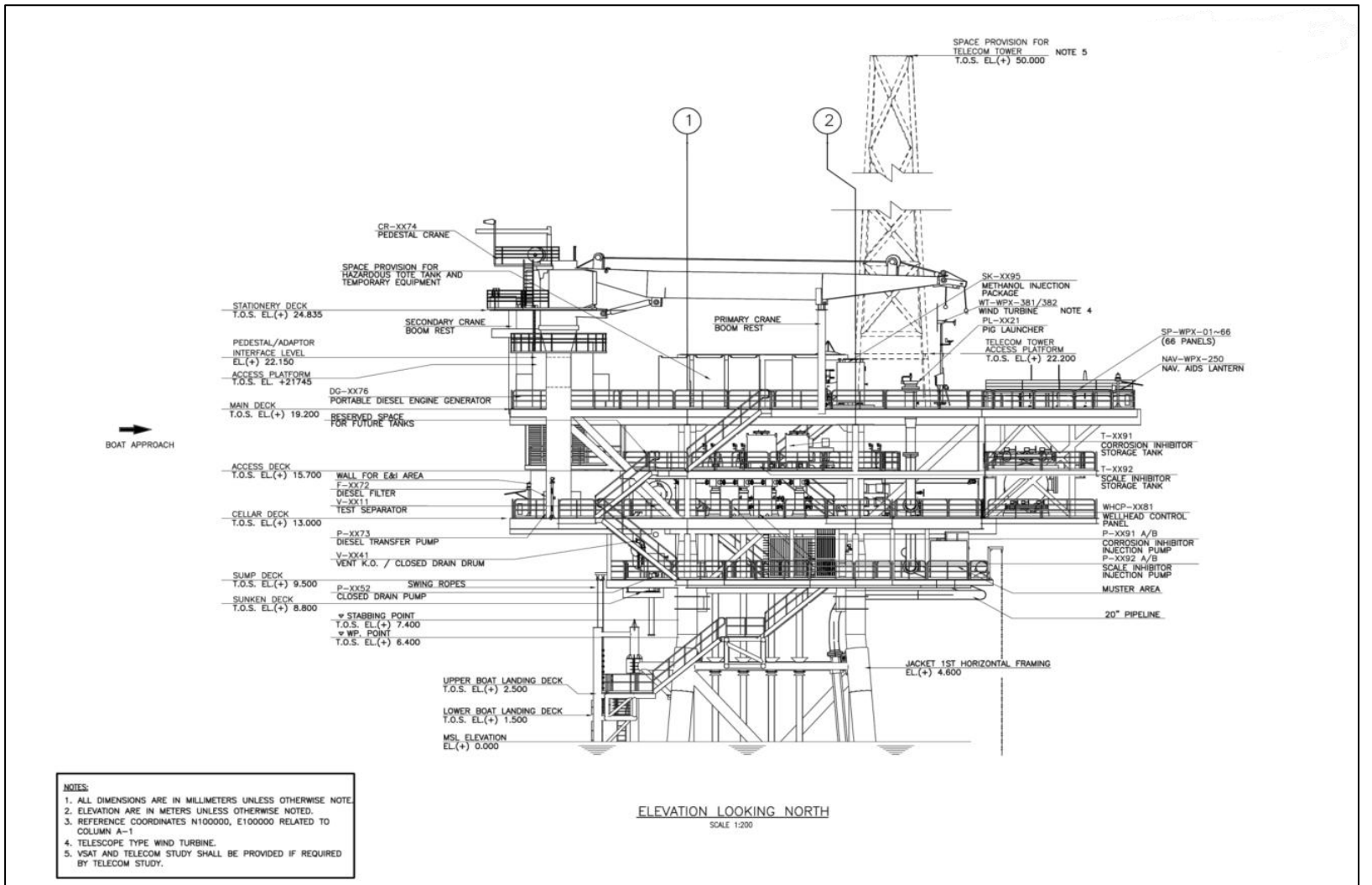


PROCESS SCHEMATIC DIAGRAM



Note: The MFDP design comprises a base design (GCB), which applies to all fields, and optional catalogue items (GCO1, GCO2 and GCO3), which may be activated depending on field-specific requirements. For the Nangka field, GCO2 (additional allocation metering scope with a production separator) is activated because Nangka's hydrocarbons are evacuated to a different operator and PSC. The combined GCB + GCO2 configuration is therefore the final design for the execution stage.

PLATFORM EQUIPMENT LAYOUT



PROJECT ACTIVITIES

Transportation and Offshore Installation	Jackets, piles, boat landings, topsides and associated components will be fabricated onshore in Malaysia and transported by barge to site. Offshore installation of WHP will be carried out using a Heavy Lift Vessel (HLV), followed by pile driving, boat landing installation and topside placement. Subsea pipeline and riser will be installed using pipelay barge.
Drilling and Well Clean-up	Jack-up drilling rig will be mobilized to drill four (4) production wells. Well clean-up and completion will be carried out to prepare the well for safe production and ensure its performance is satisfactory.
Commissioning and Start-up	Non-hydrocarbon system will be commissioned first, followed by hydrocarbon systems to confirm readiness. After start-up checks and testing, hydrocarbon will be introduced in a controlled manner and production will begin once operations are stable.
Operation and Maintenance	Remote monitoring and control of the Nangka WHP will be from BORF central control room. Remote monitoring from BNQ-B central control room will also be made available. Maintenance will be carried out quarterly.
Decommissioning and Abandonment	Decommissioning and abandonment shall be carried out at the end of economic field life of the facility with PETRONAS approval in accordance to the Governing Standard and DOE Guideline on Decommissioning of Oil and Gas Facilities in Malaysia.

Fabrication
Q1, 2027 to Q1,2028

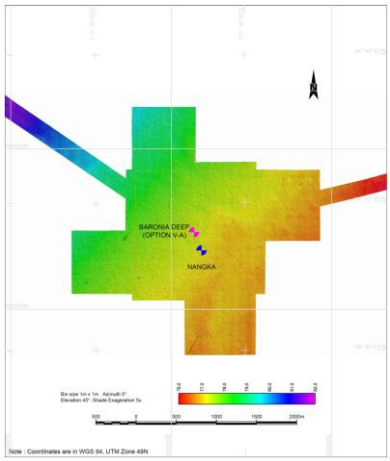
Transportation and Installation
Q2, 2028 to Q4,2028

Drilling
Q3 to Early Q4, 2028

Hook-up and Commissioning
Q4,2028 to Q1, 2029

First Gas Date(FGD)
Q1, 2029





Bathymetry and Seabed Features

Nangka – BNCPP-B route (8 km)

- Based on available pipeline route survey report for nearby Project, the water depth of the surveyed corridor ranged from 76.6– 81.3 m below MSL, with gentle slope gradient, typically less than 2°.

- Seabed features found include existing platform, pipelines, mooring buoy, sonar contact, magnetic field anomalies, possible metallic debris areas, debris area, pipeline supported mattress, isolated pockmarks, clustered pockmark, pitted seabed, jack-up footprint and seabed scars.

Oceanography

- **Wind**: The Nangka Project location experiences generally moderate wind conditions, with 1-hour mean extreme wind speeds below 15 m/s for shorter return periods and increasing to 16.5 m/s for the 50-year return period.

- **Waves**: The offshore field experiences a moderately energetic wave climate, with significant wave heights of 3.4 m to 7.6 m across the assessed return periods.

- **Currents**: The offshore field experiences a dynamic current regime, with near-surface current velocities ranging from 0.82 m/s to 1.32 m/s and decreasing to 0.28-0.46 m/s near the seabed.

- **Tides**: The Nangka field experiences mixed diurnal tides.

Environmental Baseline Sampling



- **Date**:6th to 12th May 2026
- **Sampling Activities**: Marine water, seabed sediment, planktons and macrobenthos

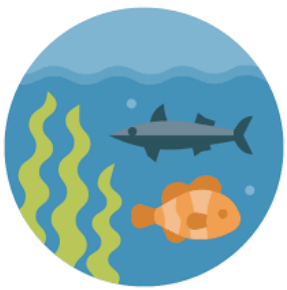
Sampling Points:

- **Nangka WHP**: Four (4) sampling stations at 600 m radius from the WHP
- **Control Point**: One (1) sampling station at 5 km northwest of the Nangka WHP
- **Pipeline**: One (1) sampling station at 500 m away and mid-point of the proposed 8 km pipeline

Sampling Results:

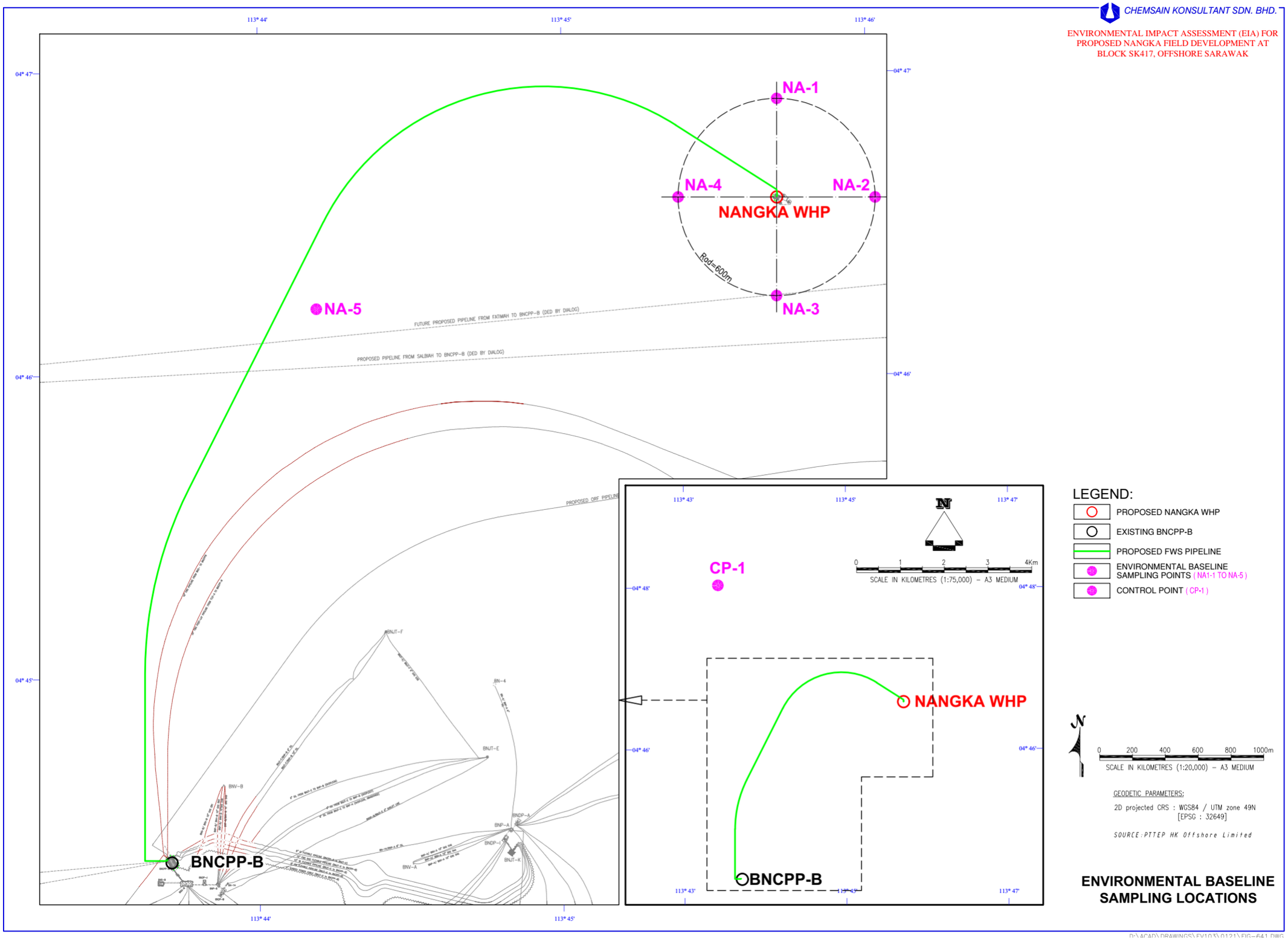
- **Marine Water**: All tested parameters complied with the Class 3 limits of the MMWQS.
- **Seabed Sediment**: The concentrations of metals in all the seabed sediment samples are well below the stipulated ERL and ERM of the NOAA Guidelines.
- **Macrobenthos**: The macrobenthic communities within the proposed Project area were moderately diverse and dominated by polychaetes, particularly members of the Paraonidae, Hesionidae and Spionidae families.
- **Phytoplankton**: The phytoplankton community within the proposed Project area exhibited low to moderate diversity and species richness, and was dominated by diatoms, particularly *Chaetoceros sp., Rhizosolenia sp.* and *Thalassionema sp.*
- **Zooplankton**: The zooplankton community exhibited moderate diversity and was dominated by copepods, which formed the majority of individuals recorded across all sampling stations.

Environmentally Sensitive Area

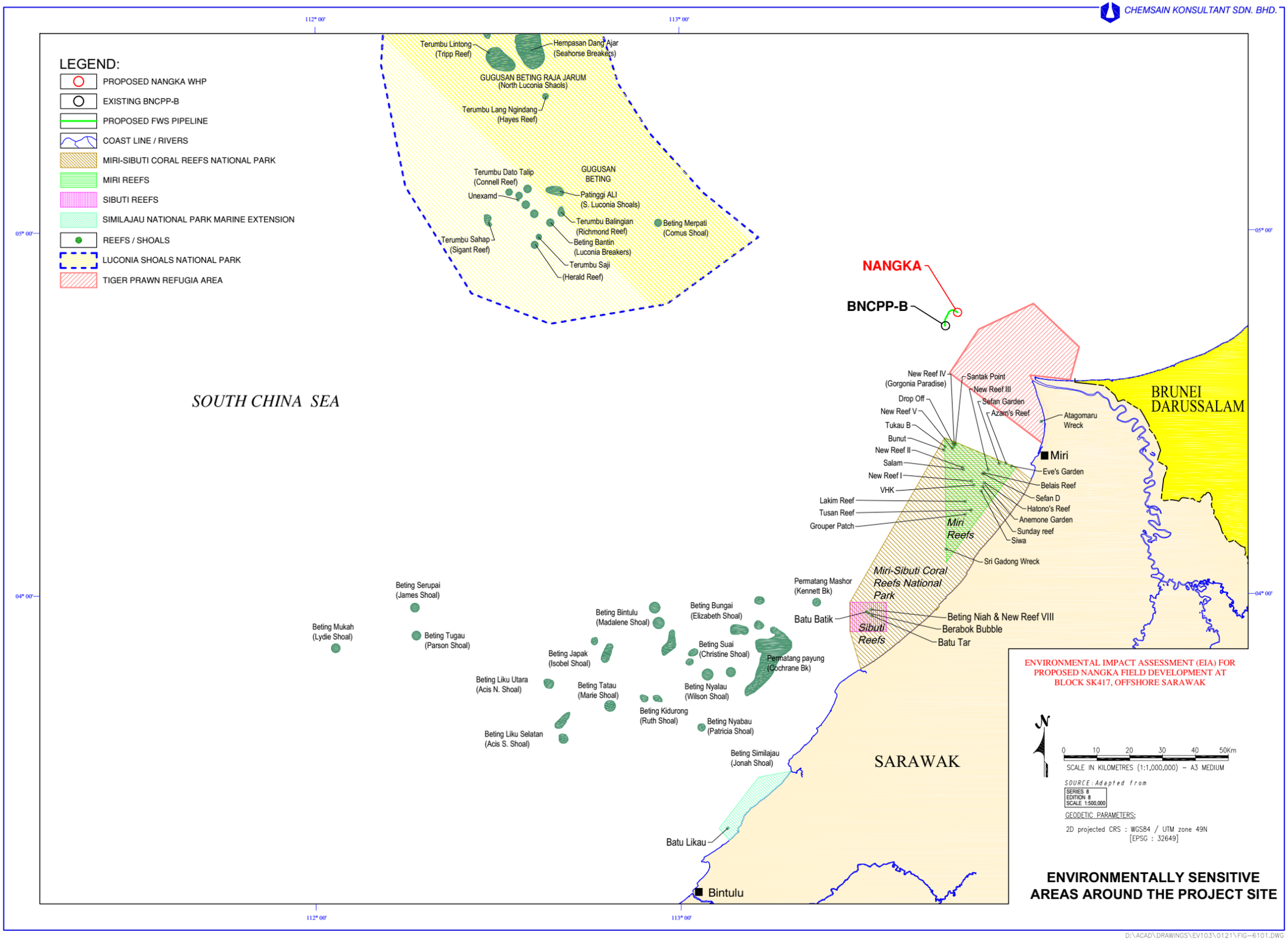


- **Shoreline**: About 31 km from the Miri shoreline.
- **Tiger Prawn Refugia Area**: 8.3 km away from Project site
- **National Park**: Nangka WHP is located at least 38 km away from Similajau National Park, Luconia Shoals National Park and Miri-Sibuti National Park.

ENVIRONMENTAL BASELINE SAMPLING LOCATIONS



ENVIRONMENTALLY SENSITIVE AREA



Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
	Marine Water Quality ➢ Discharges such as sewage, food waste, ballast water from vessels, bilge water from machinery space, deck drainage, improper discharge of wastewater from vessels and rig operations, discharge of drilling fluids and cuttings, resuspension of seabed sediment during drilling and installation activities, and improper disposal of solids and scheduled wastes may lead to temporary degradation of marine water quality in the vicinity of work area.	Low	<u>All Phases</u> ➢ Develop and implement Waste Management Plan for all Project activities. ➢ Third-party supply and support vessels shall comply with PTTEP environmental and SSHE policies, MARPOL requirements, and applicable regulations. ➢ Provide mandatory training on waste management, discharge controls, spill response, and housekeeping, and maintain good housekeeping practices. ➢ Ensure sewage discharge comply with MARPOL requirements and maintain sewage treatment systems through regular servicing and monitoring. ➢ Equip all vessels and rigs with oil-water separators (OWS) and 15 ppm oil content monitoring devices as per MARPOL Annex I. ➢ Treat oily bilge water to below 15 ppm oil content before discharge. ➢ Segregate and record solid wastes, provide designated waste bins, control maintenance-related spills and debris, and dispose of wastes at licensed onshore facilities. ➢ Collect and retain all hazardous/scheduled wastes onboard for disposal at licensed onshore reception facilities. ➢ Macerate food waste to less than 25 mm before discharge and discharge only beyond 12 nm from shore in compliance with MARPOL Annex V. ➢ Prohibit overboard discharge of spent Synthetic-Based Mud (SBM) overboard. It shall be returned to Asian Supply Base (ASB), Labuan, for recycling or disposal in accordance with the Environmental Quality (Scheduled Wastes) Regulations 2005. ➢ Solids control system on the rig shall be designed and operated to ensure synthetic base oil retention on	Section 7.3.1.3, Page C7-10 to C7-11 Section 7.3.2.3, Page C7-12 to C7-13 Section 7.3.3.3, Page C7-17 Section 8.2.1, Page C8-1 to C8-5

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
			cuttings is less than 6.9% wet weight, in compliance with PETRONAS Guidelines on MES Rev. 6. ➢ Use only water-based mud (WBM) for riserless drilling sections. ➢ Minimise chemical use during hydrotesting by reducing water holding time. ➢ Select chemical additives with low toxicity, high biodegradability, and minimal bioaccumulation potential ➢ Manage pigging chemical residues and sludge in accordance with Environmental Quality (Scheduled Wastes) Regulations 2005 and prohibit any discharge of pigging wastes into the marine environment. ➢ Produced sand accumulated in the Production Separator vessel shall be manually removed during maintenance stage in accordance with PTTEP Waste Management Procedure and PETRONAS MES rev.6. ➢ Provide spill prevention kits on all vessels, rigs, and platform, with trained crew ready for immediate deployment. ➢ Conduct periodic environmental performance audits of contractors and vessels to verify compliance with applicable waste and discharge management requirements.	
	**Waste Management** ➢ Improper handling, storage and disposal of non-hazardous and scheduled wastes.	Low	<u>All Phases</u> ➢ Implement a comprehensive Waste Management Plan. ➢ Manage all scheduled waste as per EQ (Scheduled Wastes) Regulations, 2005. ➢ Comply with MARPOL Annex V for garbage management. ➢ Segregate, contain, and offload waste to licensed onshore facilities. ➢ Prohibit overboard disposal of plastics, hazardous waste, or untreated food waste.	Section 7.3.2.4, Page C7-13 to C7-14 Section 7.3.3.4, Page C7-17 Section 8.2.2, Page C8-5 to C8-7

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
	**Ambient Air Quality** ➢ Emission of air pollutants, including CO_2, NO_x, SO_x, CO, VOCs, N_2O and CH_4. ➢ Temporary deterioration of ambient air quality in the vicinity of emission sources. ➢ Contribution to greenhouse gas emissions and climate change.	Low	<u>Offshore transportation, Installation and Drilling Phase</u> ➢ Plan and optimise installation and drilling schedules to reduce vessel and equipment time. ➢ Conduct non-routine venting activities only when operationally necessary. ➢ Include contractual requirements for third-party vessels to maintain engines regularly and comply with MARPOL Annex VI fuel quality standards to minimize emissions. ➢ Obtain the necessary regulatory approvals prior to any flaring or venting activities. <u>Operation and Maintenance Phase</u> ➢ No routine flaring during normal operations. ➢ Conduct non-routine venting activities only when operationally necessary. ➢ Obtain all required regulatory approvals prior to flaring or venting activities ➢ Install high-integrity seals and closed drainage systems to minimise hydrocarbon vapour releases. ➢ Route hydrocarbon-containing fluids to appropriate treatment systems prior to reuse or disposal. ➢ Conduct regular inspection and preventive maintenance of equipment and vessel engines to minimise air emissions. ➢ Maintain maintenance records for compliance verification. ➢ Use low-sulphur fuel where practicable to reduce SO_x emissions.	Section 7.3.1.1, Page C7-9 Section 7.3.2.1, Page C7-11 Section 7.3.3.1, Page C7-15 Section 8.2.3, Page C8-7 to C8-9
	**Noise Impact** ➢ Underwater and airborne noise from vessels, drilling and construction disturbing marine fauna (e.g. mammals, fish) and	Low	<u>Offshore Transportation, Installation and Drilling Phase</u> ➢ Implement noise management in accordance with applicable occupational safety and health requirement. ➢ Build up power slowly (soft-start) over at least 20 minutes to allow adequate time for any cetaceans to move away from the area before full power is reached.	Section 7.3.1.2, Page C7-9 to C7-10 Section 7.3.2.2, Page C7-12

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
	posing occupational noise exposure risks.		➢ Avoid sudden loud noises, such as those generated by the moving and putting down of heavy equipment. ➢ Maintain the vessel and all noise generating equipment in good working order. ➢ A Marine Mammal Observer (MMO) shall be stationed to monitor the presence of marine mammals within the proximity of the work area during piling and drilling activities. The appointed MMO shall be suitably trained and competent in the identification of marine mammals.	Section 7.3.3.2, Page C7-16 Section 8.2.4, Page C8-9 to C8-10
	**Impact on the Seabed and Sediment Quality** ➢ Subsea pipeline and drilling activities may disturb seabed, causing sediment resuspension. ➢ Jack up rig's leg placement and anchoring may cause localized seabed disturbance, causing surface scarring. ➢ Discharge of drilling fluids and cutting may lead to sediment resuspension and possible residual contamination.	Low	<u>Installation and Commissioning Phase</u> ➢ Plan and execute installation efficiently to minimise seabed disturbance and allow faster natural recovery. ➢ Deploy anchors only at pre-determined, surveyed locations to avoid unnecessary seabed damage. ➢ Implement anchor handling procedures to prevent dragging. ➢ Use low-toxicity, biodegradable, and low-bioaccumulation chemicals for pipeline cleaning, conditioning, and hydrotesting. ➢ Maintain and submit Safety Data Sheets (SDS) for all chemicals used to the Department of Environment (DOE) prior to offshore application. ➢ Treat hydrotest water prior to discharge and ensure the discharge meets DOE effluent quality standards. ➢ Select discharge points and use diffusers or controlled release methods to ensure sufficient dilution and dispersion of treated hydrotest water. ➢ Optimise the location during the design stage to minimise permanent seabed coverage and associated habitat loss. <u>Drilling Phase</u> ➢ Use WBM where feasible, especially for top-hole and riserless sections, and if SBM is needed, choose low-	Section 7.3.2.8, Page C7-15 Section 7.3.3.5, Page C7-18 to C7-22 Section 8.2.4, Page C8-9 to C8-10

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
			toxicity, biodegradable, low-bioaccumulation base fluids and additives. ➢ Choose drilling fluid additives with minimal marine toxicity, high biodegradability, and low bioaccumulation. ➢ Discharge drill cuttings 3-5 m below the sea surface to aid dispersion. ➢ Operate solids control equipment to maximise drilling fluid recovery and minimise the volume of contaminated solids discharged. ➢ Maintain up-to-date SDS for all chemicals used onboard including all drilling fluids and additives. ➢ Ensure all personnel involved in the handling, mixing, and transfer of drilling chemicals receive at least basic training in safe chemical handling, spill prevention, and emergency response. ➢ Provide task-specific training on the correct use, inspection, and maintenance of Personal Protective Equipment (PPE) to prevent occupational exposure. ➢ Equip all chemical storage and transfer areas with secondary containment to prevent accidental release to deck drains or overboard discharge. Maintain spill kits in strategic locations on the drilling rig, and ensure trained crew are available to respond immediately to any accidental releases.	
	**Marine Ecology** ➢ Drilling, piling, substructure placement and pipeline installation may disturb the local seabed habitat and marine fauna. ➢ During operation and maintenance phase, it will have minimal and short-term impact as impact will be confined during the routine maintenance and visit.	Low	<u>Installation, Commissioning and Drilling Phase</u> Besides those mitigation measures addressed for Marine Water Quality, others include: ➢ Optimise pipeline routing to minimise direct seabed disturbance and habitat fragmentation. ➢ Restrict the footprint of seabed-disturbing activities (e.g., anchoring, trenching, pipeline installation) to the smallest practicable area.	Section 7.3.2.5, Page C7-14 Section 7.3.3.6, Page C7-23 Section 8.2.8, Page C8-17

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
	The platform will be normally unmanned, which implies that there are no significant discharges.			
	**Fishing Community** ➢ Project activities may temporarily disrupt local fishing and potential degradation of marine water quality may affect fish abundance and catch near the area.	Low	<u>All Phases</u> ➢ Coordinate with the DOF to issue notices to local fishermen on restricted areas and activity schedules. ➢ Implement a 500 m safety exclusion zone around platform, drilling rigs, and pipelaying vessels during operations. ➢ Register and mark the physical presence of the new platform and pipeline on the Admiralty Chart to ensure visibility to mariners. ➢ Communicate offshore work details, including timelines and exclusion zones, via Notices to Mariners, marine radio, and other standard maritime channels. ➢ Regularly inspect, test, and maintain all navigational and communication equipment on rigs, platform, and support vessels.	Section 7.3.1.4, Page C7-11 Section 7.3.2.6, Page C7-15 Section 7.3.3.7, Page C7-23 Section 7.3.4.2, Page C7-24 Section 8.2.6, Page C8-12 to Page C8-14
	**Marine Navigation** ➢ Increase in marine traffic will create short-term navigational risk and potential disruption to other marine users.	Low	<u>All Phases</u> ➢ Engage with the Marine Department and MMEA to confirm and communicate drilling rig, platform, and subsea pipeline locations. ➢ Implement a 500 m safety exclusion zone around platform, drilling rigs, and pipelaying vessels during operations. ➢ Ensure all necessary consents, permits, and notifications from relevant maritime authorities are obtained prior to commencement of offshore activities. ➢ Obtain all required consents, permits, and approvals from relevant maritime authorities before commencing offshore activities. ➢ Comply with the approved Marine Risk Assessment (MRA) recommendations for marine navigation and	Section 7.3.1.5, Page C7-11 Section 7.3.2.7, Page C7-15 Section 7.3.3.8, Page C7-23 Section 8.2.6, Page C8-12 to Page C8-14

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
			communication; where discrepancies exist, the approved MRA shall prevail over this EIA report. ➢ Register and mark the physical presence of the new platform and pipeline on the Admiralty Chart to ensure visibility to mariners. ➢ Equip all offshore facilities with navigational aids, including radar reflectors, AIS (Automatic Identification System), and approved lighting systems, as required under SOLAS and COLREGs. ➢ Communicate offshore work details, including timelines and exclusion zones, via Notices to Mariners, marine radio, and other standard maritime channels. ➢ Regularly inspect, test, and maintain all navigational and communication equipment on rigs, platform, and support vessels. ➢ Maintain a continuous lookout on the drilling rig bridge during drilling activities and onboard support vessels during installation activities to monitor nearby marine traffic and potential navigation hazards.	
	**Health and Safety** ➢ Personnel involved in offshore activities face health and safety risks from Project activities.	Low	<u>All Phases</u> ➢ Incorporate safety into the design of all offshore facilities, wells, and systems to minimise hazards. ➢ Ensure all offshore personnel pass a PETRONAS AME medical exam before deployment and complete TBOSIET and any role-specific training to maintain competency. ➢ Implement and enforce JSA and PTW systems for all activities to identify hazards and control risks. ➢ Maintain and periodically review an offshore-specific ERP covering fire, explosion, medical emergencies, oil spills, and extreme weather. ➢ Conduct regular emergency drills (e.g., man-overboard, abandon-ship, fire-fighting) followed by debriefing and lessons learned.	Section 7.3.5, Page C7-24 Section 8.2.7, Page C8-14 to C8-17

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
			➢ Conduct regular inspection, testing, and maintenance of process equipment per manufacturer and statutory requirements. ➢ Perform routine inspections and tests of all fire safety equipment, including extinguishers, blankets, detectors, sprinklers, emergency lighting, and fire-rated doors. ➢ Implement a Safety Observation and Intervention Programme to encourage reporting and correction of unsafe acts or conditions.	
	**Accidental/Emergency Events** Hydrocarbon spill (vessel collision) ➢ Accidental hydrocarbon spill due to vessel collision could release significant volumes of hydrocarbon into the marine environment.	Medium	➢ Ensure all equipment complies with applicable international industry standards, PETRONAS Technical Standards, and PTTEP engineering specifications. ➢ Incorporate safety features such as leak detection systems, pressure relief devices, and automatic shut-off valves where applicable. ➢ Maintain inspection and maintenance records for audit and compliance purposes. ➢ Develop and implement a site-specific Oil Spill Contingency Plan (OSCP), Spill Management Plan, and bridging documents for Nangka operation aligned with the National Oil Spill Contingency Plan (NOSCP) and obtain MPM approval. ➢ In the case of an emergency likely to endanger personnel, to pollute the environment or to impair the technical integrity or safety of the operation of any part of the Nangka Receiving Facilities, the host tie-in platform operator shall provide necessary logistics and resources that form part of the Site Emergency Response team. ➢ Include shoreline protection and remediation measures in the OSCP in the event the spill reaches the coastal areas. ➢ Conduct regular OSCP drills and simulations to verify spill response readiness.	Section 7.3.7, Page C7-26 to C7-59 Section 8.2.9, Page C8-18 to C8-23

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
			➢ Maintain readiness to respond to Tier-1 oil spills using in-house resources and equipment. ➢ Subscribe to PIMMAG and NOSCP for coordinated Tier-2 and Tier-3 spill response. ➢ Establish and enforce SOPs for fuel and bulk liquid transfers, including: o Use dry-break couplings and hoses during bunkering. o Monitor transfer activities continuously. o Position spill kits at transfer locations. o Avoid transfers during adverse weather conditions. ➢ Store lubricating and hydraulic oils in designated tanks or sealed drums with secondary containment. ➢ Secure, label, and store hydrocarbon tanks and drums within bunded or drip-tray areas. ➢ Store and manage used lubricating and hydraulic oils in accordance with the Environmental Quality (Scheduled Waste) Regulations 2005.	
	Hydrocarbon, Drilling fluid/chemical spill ➢ Accidental discharge of hydrocarbon, drilling fluids or chemical during installation and drilling may cause short term and localised impacts on marine water quality and marine life.	Medium	<u>Hydrocarbon Spill (vessel)</u> ➢ Ensure hired vessels comply with IMO/MARPOL, PTTEP HSE requirements, and statutory certification. ➢ Conduct pre-mobilisation audits on vessel condition, spill controls, and crew readiness. ➢ Verify vessel spill prevention procedures comply with PTTEP and regulatory requirements. ➢ Maintain inspection and replacement records for hydraulic and transfer hoses. ➢ Keep bilge system maintenance records to demonstrate MARPOL compliance. ➢ Use drip trays and secondary containment during hydrocarbon handling and storage. ➢ Ensure hydrocarbon storage areas are secure, labelled, and protected from damage. ➢ Ensure all vessels carry a valid SOPEP.	

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
			➢ Equip vessels with adequate spill response equipment. ➢ Implement proper waste oil storage and disposal procedures. ➢ Use spill-minimising transfer equipment, including dry-break couplings where practicable. ➢ Inspect hoses and connections before and after each transfer operation. <u>Chemical spill</u> ➢ Develop and implement Chemical Management System (CMS) to monitor and control the procurement, storage, handling, usage, and disposal of chemicals throughout the Project lifecycle. ➢ Prioritise substances with lower toxicity, higher biodegradability, and reduced environmental persistence in accordance with PTTEP environmental requirements. ➢ Conduct regular audits of the CMS to very compliance and document improvement. ➢ Provide chemical spill response equipment (spill kits, absorbent pads, neutralising agents, and containment booms) at strategic locations, including chemical storage areas, injection points, and transfer stations. ➢ Ensure spill kits are clearly marked, readily accessible, and routinely inspected to confirm readiness for deployment. ➢ Provide comprehensive training to all installation and supply vessel personnel in chemical spill prevention, safe handling, and emergency response procedures. ➢ Establish a formal spill reporting system requiring immediate notification of any spills, with follow-up incident investigation and corrective action tracking.	

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
			➢ Equip chemical injection areas with secondary containment and leak detection where practicable. ➢ Provide bunded areas around high-risk chemical storage and handling points, such as chemical injection pumps, tote tanks, and transfer stations. ➢ Bunds shall be: o Sized to contain at least 110% of the capacity of the largest single container stored; o Constructed from materials compatible with the stored chemicals; and o Equipped with removable drain plugs in associated drain boxes to allow for safe collection and transfer of spilled chemicals to shore for treatment or disposal at licensed facilities. ➢ All collected spill residues and contaminated absorbents will be handled in accordance with the Environmental Quality (Scheduled Wastes) Regulations, 2005 and transported to DOE-licensed onshore facilities.	
	Dropped Object ➢ Dropped objects may cause localized seabed disturbance and habitat damage.	Medium	➢ Develop and implement a lifting plan for all critical and non-routine lifts. ➢ Use certified cranes, lifting appliances, lifting accessories and rigging equipment, with inspection and certification maintained. ➢ Ensure lifting operations are conducted only by competent and authorised personnel. ➢ Establish exclusion zones below and around suspended loads and prevent unauthorised personnel from entering these areas. ➢ Use suitable lifting baskets, skips or containers for small items rather than carrying loose objects during lifting. ➢ Ensure cranes and lifting equipment are equipped with appropriate safety devices and are maintained according to manufacturer requirements.	

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
			➢ Use tag lines when deploying equipment into the marine environment to maintain control of the load and minimise the risk of dropped objects. ➢ Implement a permit-to-work and lifting permit system for applicable activities. ➢ Stop lifting operations when environmental conditions exceed specified safe operating limits. ➢ Inspect lifting equipment, rigging and load-securing arrangements before each lift. ➢ Maintain good housekeeping to prevent tools and materials from being inadvertently dropped from elevated areas. ➢ Ensure the Emergency Response Plan (ERP) incorporates appropriate response procedures for dropped-object incidents.	
	Pipeline Rupture and Leakage ➢ Hydrocarbon leaks from pipeline ruptures caused by corrosion or damage from impact may degrade marine water quality.	Medium	➢ Apply corrosion inhibitors within the pipeline system to minimise internal corrosion risk, particularly in areas susceptible to condensate or water accumulation. ➢ Incorporate external corrosion protection measures in the design, such as coating systems and cathodic protection, and monitor their performance regularly. ➢ Conduct routine integrity checks at pipeline connection points, flanges, valves, and other high-risk areas where leaks are more likely to occur. ➢ Install and operate pipeline monitoring systems capable of detecting abnormal pressure drops, flow rate changes, or temperature variations that may indicate a leak. ➢ Continuously monitor pressure profiles along the pipeline. ➢ If an abnormal pressure drop is detected, initiate immediate investigation and corrective action in accordance with the Emergency Response Plan (ERP). ➢ Implement a regular inspection schedule using appropriate methods such as intelligent pigging for internal inspection of wall thickness and corrosion and	

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
			visual and ultrasonic testing for topside and accessible sections. ➢ Develop a preventive maintenance programme to ensure the continued operational safety and reliability of the pipeline system. ➢ Record all inspection, monitoring, and maintenance data in a Pipeline Integrity Management System (PIMS). ➢ Analyse trends to predict potential failure points and schedule proactive interventions before leaks occur.	
	Well blowout ➢ In a well blowout, uncontrolled release of gas from simultaneous failure of primary and secondary barriers. This will pose significant safety and environmental risks.	Medium	➢ All drilling activities shall use a Blowout Preventer (BOP) where well control risks are present. The Blowout Preventer (BOP) shall be in accordance with the PTTEP Technical Standard and maintained in good condition. ➢ Ensure that the BOP stack's minimum pressure rating exceeds the maximum anticipated reservoir pressure for the Nangka development wells. ➢ In the event of a surface blowout, and after exhausting all primary and secondary well control methods, PTTEP may, at its sole discretion, authorise the drilling of a relief well to contain and kill the blowout. ➢ Define and enforce approach procedures and operational restrictions for visiting vessels and transfer operations at the drilling rig, particularly under adverse weather conditions, prior to mobilisation. ➢ The drilling rig shall comply with IMO codes for the prevention of oil pollution and maintain a Shipboard Oil Pollution Emergency Plan (SOPEP) onboard. ➢ Develop and implement an OSCP specifically for the drilling phase, aligned with PIMMAG requirements and the NOSCP. ➢ The OSCP shall include mobilisation steps for Oil Spill Response (OSR) in accordance with PIMMAG protocols for unmanned bases.	

Potential Impacts		Significance of Potential Impacts	Mitigation Measures	Reference in EIA report
			➢ Conduct regular well control and spill response drills to ensure emergency teams are fully prepared for blowout scenarios and hydrocarbon release events. ➢ Maintain oil spill kits, including absorbent pads, booms, and neutralising agents, onboard rigs and support vessels to address minor deck spills or leaks immediately. ➢ Notify PIMMAG promptly in the event of any significant release so that containment and recovery resources can be mobilised.	

Performance Monitoring

Potential Impact	Performance Monitoring Plan	Frequency of Monitoring
Oil or oily mixture discharge from vessels	MARPOL Annex I Compliance: • Maintain Oil Record Book for oily discharges (Regulation 14). • Ensure oil content in drainage from machinery spaces does not exceed 15 ppm (Regulation 15). • Monitor validity of International Oil Pollution Prevention (IOPP) Certificate.	• Ongoing throughout the life of the Project
Drilling fluids and drill cuttings	• Record the volume of drill cuttings for each well. • Monitor treatment to ensure Oil on Cuttings (OOC) remains below 6.9% wet weight basis, in accordance with PETRONAS Guidelines on MES Rev. 6. Include findings in end-of-well reports.	• End of each well operation
Segregation, storage and transport of wastes	• Maintain an inventory of hazardous and non-hazardous waste volumes. • Identify quantities recycled, reused, recovered, or sent to onshore landfill for each waste type. • Monitor waste recycling and disposal consignment notes.	• Ongoing throughout the life of the Project
Spills	• Report and investigate all leaks and spills, including the type and quantities of substances spilled.	• Ongoing throughout the life of the Project

Compliance Monitoring

Segregation, Storage and Transport of Wastes

- **Plan**:
  - Monitor handling, storage and disposal of scheduled wastes in compliance with the Environmental Quality (Scheduled Wastes) Regulations 2005.
  - Maintain updated records of waste categories and quantities
  - Monitor garbage and food waste disposal in accordance with MARPOL 73/78 Annex V.
- **Frequency**: Ongoing throughout Project life.

Spills

- **Plan**:
  - Report and investigate all leaks and spills, record type and quantity of substances released.
- **Frequency**: Ongoing throughout Project life.

Impact Monitoring

Impacts on Marine Water, Seabed Sediment and Biological Components

- **Plan**:
  - Monitor marine water, seabed sediment and biological components (macrobenthos, phytoplankton and zooplankton) to assess potential Project impacts on the marine environment.
- **Frequency**: Once every six (6) months during installation and throughout the operation and maintenance stage of the Project.

The EIA concludes that the Nangka Field Development Project can be implemented in an environmentally responsible manner, with no significant residual impacts anticipated, provided the proposed environmental control are applied throughout all Project phases