Proposed Integrated Lobster Aquaculture Park (iLAP) in Semporna, Sabah

Environmental Impact Assessment

Terms of Reference




Lobster Aqua Technologies Sdn Bhd

6280086-RPT-01 Rev. 3
February 2014

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Environmental Impact Assessment

Terms of Reference

Prepared for Lobster Aqua Technologies Sdn Bhd

Represented by Shahridan Faiez, Phd

Lobster aquaculture activities

Current Revision Approvals

	Name / Title	Signature	Date
Prepared by	Melissa Mathews/Evelyn Teh		Feb 20, 2014
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Approved by	Tania Golingi		Feb 21, 2014

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1 Introduction

The present Terms of Reference (TOR) is for the preparation of an Environmental Impact Assessment (EIA) study for the proposed **Integrated Lobster Aquaculture Park (iLAP) in Semporna** ("the project").

The objective of this TOR is to serve as a basis for conducting the EIA study and producing the EIA documentation for the iLAP that will comply with Sabah's environmental legislation, and the guidelines and requirements of the Environment Protection Department (EPD). This TOR has been prepared specifically for the iLAP project off Pulau Timbun Mata, Semporna, and is tailored to the potential environmental impacts arising from the project activities and the receiving environment at the project site.

This TOR describes the requirements of the EIA for the project and provides details of the methodologies to be used in the study. These have been determined based on a scoping process to ensure that the environmental impact assessment is at the appropriate level of detail, corresponding to the scale of the project activities and the sensitivities of the receiving environment at the project site as well as the guidelines of the Environment Protection Department (EPD), Sabah.

1.1 Project Title

The project is titled "Proposed Integrated Lobster Aquaculture Park (iLAP) in Semporna".

1.2 Project Proponent

The project proponent is **Lobster Aqua Technologies Sdn Bhd**. (hereinafter referred to as LATSB). LATSB is a special purpose vehicle to develop and manage the Integrated Lobster Aquaculture Park (iLAP) in Semporna, Sabah and is a partnership between Darden Aquafarm Inc (a subsidiary of Darden Restaurants Inc, USA), Yayasan Sabah and Ever Nexus Sdn Bhd. (Figure 1.1).

Key components of the partnership include:

- Yayasan Sabah is a Sabah State entity that will play a pivotal role in obtaining sea and land space for the ILAP, legal approvals, Temporary Occupation Licenses (TOL) and resolving land matters.
- Darden will be the foreign investor that provides investment, technology input, R&D and will be the guaranteed market of the product. Darden is listed as a Fortune 500 company with a turnover of USD 8 billion in 2012 and the largest buyer of lobsters in the world.
- Ever Nexus, a Malaysian aquaculture specialist management company will provide management expertise through LATSB to manage the iLAP.

In addition, the Department of Fisheries (DoF) will be the key agency that manages the 15,000 ha Aquaculture Industry Zone (AIZ) linked to the iLAP.

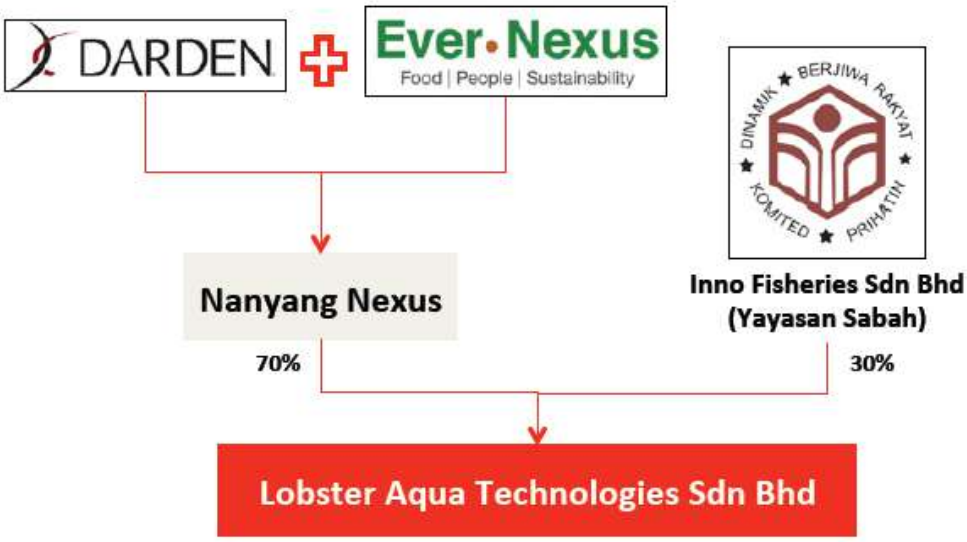

Figure 1.1 Partners of the iLAP project.

Details pertaining to the Project Proponent are as follows:

Lobster Aqua Technologies Sdn. Bhd.

C19-2, First Floor, Block C
Kepayan Perdana Commercial Centre
88300 Kota Kinabalu, Sabah.

Contact Person : Shahridan Faiez, PhD
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1.3 Legal Requirements

The proposed project requires an EIA under the Second Schedule of the Environment Protection (Prescribed Activities) Order 2012, Item 6 (i):

> *Establishment of fisheries or aquaculture within wetland forests, in the river or sea involving an area of 50 hectares or more.*

The objective of the EIA is to identify and assess potential environmental impacts arising from the construction and operations of the iLAP and to propose environmental management measures (mitigation and monitoring) to reduce these impacts to acceptable levels. The EIA will be submitted to the Sabah Environment Protection Department (EPD) for approval. As part of the procedural process, a TOR must also be submitted to EPD for approval prior to the commencement of the EIA study.

1.4 EIA Consultants

The main Consultant for the EIA study is DHI Water & Environment with the following registered address:

DHI Water and Environment (M) Sdn. Bhd. (535484-V)

(EPD Reg. No. F008 – Exp. 30/09/2014)
11th Floor, Hill View side, Wisma Perindustrian
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Contact Persons: Tania Golingi (EIA Team Leader)
Email: tag@dhi.com.my

Melissa Mary Mathews (Project Coordinator)
Email: mmm@dhi.com.my

1.5 TOR Outline

The TOR details the purpose of the assessment and aims to identify the key potential environmental impacts of the proposed project in order to focus the EIA study on the significant issues related to the development of the project As such, this TOR includes the following:

- Project description: background information, brief statement of need, including an assessment of the Development Proposal with respect to policies and plans of the Government of Malaysia and a description of the project location, concept, construction and operational activities (Section 2).
- A description of the environmental setting of the Project (Section 3).
- Key issues identified during the scoping exercise (Section 4).
- Proposed approach and scope of work for the DEIA study including details of the methodology for the baseline data collection and situation analysis, impact prediction and evaluation, identification and assessment of mitigation measures and monitoring programmes (Section 5).
- The EIA timeframe and Study team are presented in Sections 6 and 7 respectively.

2 Project Description

2.1 Statement of Need

Aquaculture is developing, expanding and intensifying in almost all regions of the world, as the global population demand for aquatic food products is expected to increase. Globally, production from capture fisheries has levelled off and most of the main fishing areas have reached their maximum potential. Sustaining fish supplies from capture fisheries will therefore not be able to meet the growing global demand for aquatic food /1/.

According to FAO projections, in order to maintain the current level of per capita consumption, it is estimated that global aquaculture production will need to reach 80 million tonnes by 2050 /2/.

The Sabah government through its economic development corridor managed by SEDIA fully support sustainable aquaculture growth to meet the demands of the global community /3/. In return, opportunities of technology transfer, job opportunities and significant GNI and foreign direct investment will pour into Sabah. Hence to encourage this growth, the government offers lucrative incentives to aquaculture companies to invest within the industry /4/.

Among the policies supporting the growth of aquaculture in the Federal and State level are the Third National Agricultural Policy, the Sabah Outline Perspective Plan 1995-2010, Second Sabah Agricultural Policy (1999-2010), Sabah's Agriculture Master Plan /5/ and the Master Plan for Aquaculture Development in Sabah /6/.

The Sabah government supports the iLAP project by declaring the iLAP project as a type of smart partnership between the government and private sectors that Sabah is keen to support during the signing ceremony between Darden Inc. and Yayasan Sabah on the 5th of November 2012.

The iLAP project is expected to bring in benefits such as:

- GNI of RM 3.3 billion annually
- Investment of RM2.96 billion over 3 phases
- Jobs to 20,000 employees and contract farmers
- Higher wages
- Darden International Asia will make Kuala Lumpur as its Regional Restaurant Management Hub and Purchasing and Distribution Hub
- Develop Growth Strategy in Malaysia by May 2014
- The total investment for the iLAP Operations Base is estimated at RM 2.23 billion
- World's First Integrated Lobster Aquaculture Park
- Local Development Support Program: high income jobs for local communities support a Bumiputera industry transition program towards high value aquaculture.
- Implementation of a Synergy Farm concept will enable target local villagers to participate in this industry
- Grant will be provided by NKEA to finance the Synergy Farm (RM 50 million) and Training Program (RM 18.5 million)

The iLAP project will clearly establish Malaysia as a global leader in sustainable aquaculture production and the country will reap the rewards for many decades in monetary, trade, social, ecological and technical/scientific areas.

2.2 Project Location

iLAP is located near Semporna with an Operations Base located at Pulau Bait (

Figure 2.1 and Table 2.1). A lobster grow out (aquaculture zone) area will occupy the sea space around P. Timbun Mata and P. Bait.

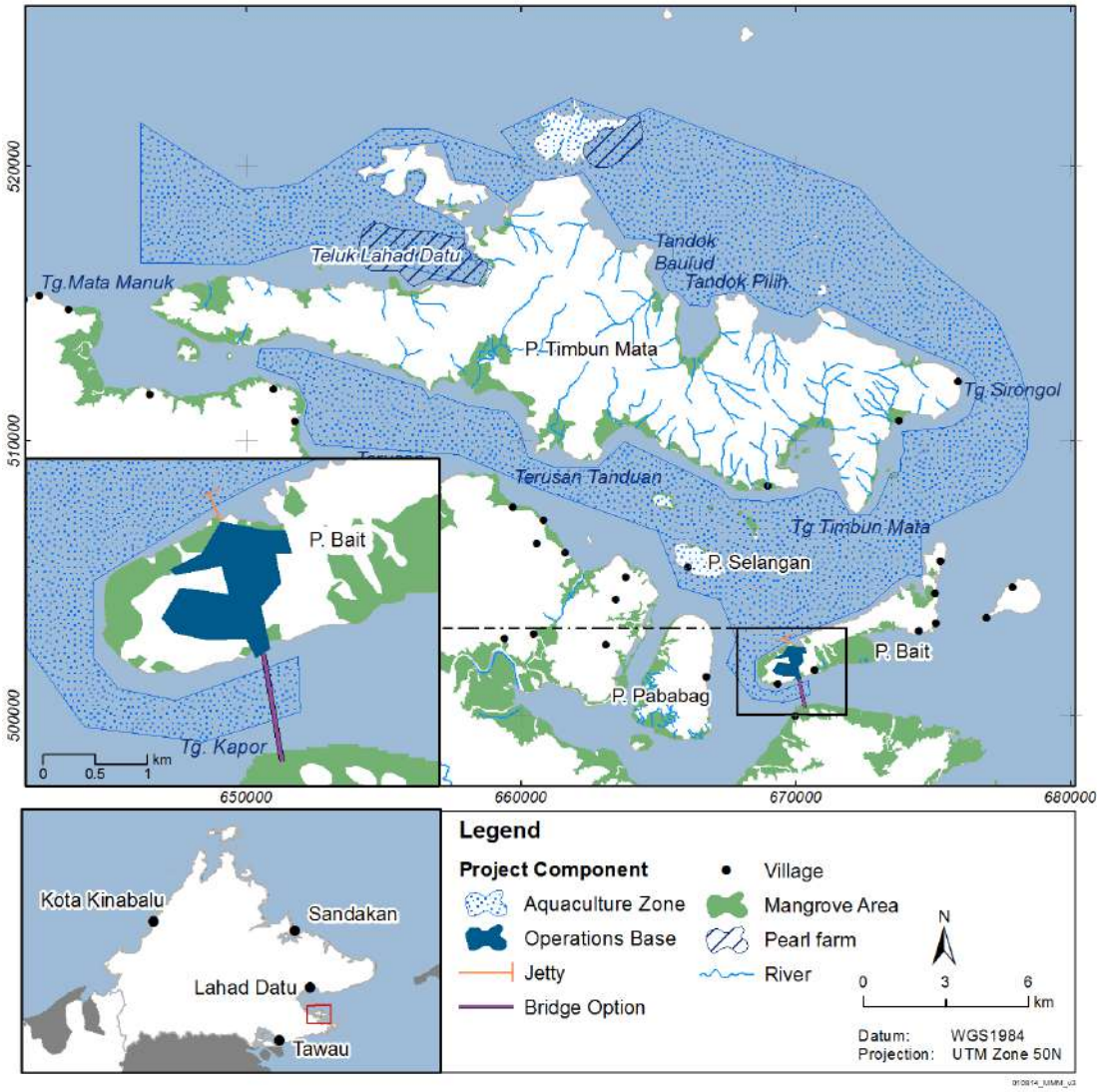


Figure 2.1 Project location at Semporna.

Table 2.1 Project geographic coordinates in decimal degrees. Datum: WGS1984.

	Land Sites	WGS84	
		Longitude (E°)	Latitude (N°)
1	Operations base	118.533	4.541
2.	Jetty	118.529	4.547
3.	Bridge	118.534	4.531
4	Grow Out Area (Northern limit)	118.483	4.714
5	Grow Out Area (Southern limit)	118.476	4.602

	Land Sites	WGS84	
		Longitude (E°)	Latitude (N°)
6	Grow Out Area (Eastern limit)	118.598	4.630
7	Grow Out Area (Western limit)	118.342	4.682

2.3 Project Concept

The project design has been shaped by the requirements for scaling up a sustainable lobster production operation over a 15 year period based on a fully integrated closed production cycle and an understanding of local economic development and the hydrodynamics of the project site.

The iLAP will produce in progressive phases more than 18,000 metric tonnes of *Panulirus ornatus* lobsters annually by 2030 with an annual value in the vicinity of USD 1 billion. It will operate using a contract farming concept, also referred to as the "Synergy Farm" concept (Figure 2.2).

The Synergy Farm will operate on a contract grower system involving the local communities of Semporna. A transfer of technological know-how plus a ready market (Darden Restaurants) will be among the benefits gained from this Synergy Farm by the local employees.

Local Small and Medium Enterprises (SME) that meet the criteria will be favoured as contract growers and implementation of a certificate-based training program will enhance skills capabilities of the employees and enhance their job opportunities.

The employees will undergo new certified lobster programs conducted by Ever Nexus and partner Global Aquaculture Alliance. Among the programs are lobster aquaculture management, food safety, HACCP and farm certification. These 4 program levels which will be certified on the job leads to a recognized Diploma.

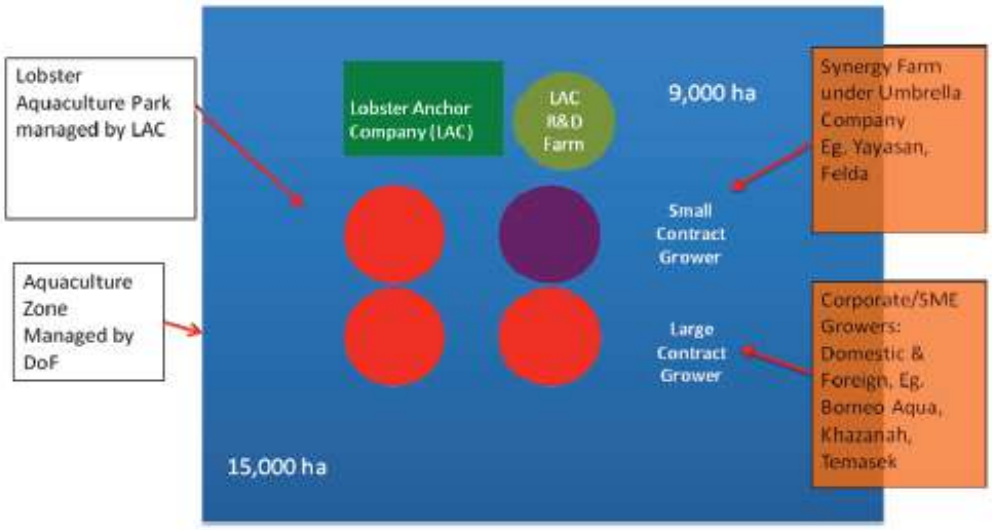


Figure 2.2 Synergy Farm project concept and key actors.

2.3.1 Project Components and Scope

The iLAP concept encompasses the entire production chain of lobster aquaculture beginning from juvenile production in a breeding centre, lobster grow-out to commercial size, processing and final shipment to the end consumer. The proposed project includes the following components (Figure 2.3):

- Lobster grow-out Production Units (PU) within the Semporna Aquaculture Industrial Zone (AIZ)
- Operations Base in Pulau Bait, Semporna
- Supporting infrastructure including access roads, jetty or bridge from Tg. Kapor to P. Bait
- Workers' Quarters
- Broodstock Breeding Centre (BBC) at Kg. Indarasan, Kudat
- Lobster Processing Plant in Kota Kinabalu.

The Lobster Grow-Out PUs is located within the Semporna Aquaculture Industry Zone (AIZ) which has been gazetted by the Sabah State Government and covers an area of approximately 20,000 ha. Out of this 20,000 ha, 9,300 ha has been allocated for the iLAP project.

The EIA scope is limited to the development components in Semporna; i.e. the broodstock breeding centre in Kudat and processing plant development in Kota Kinabalu will **not** be assessed in the EIA.

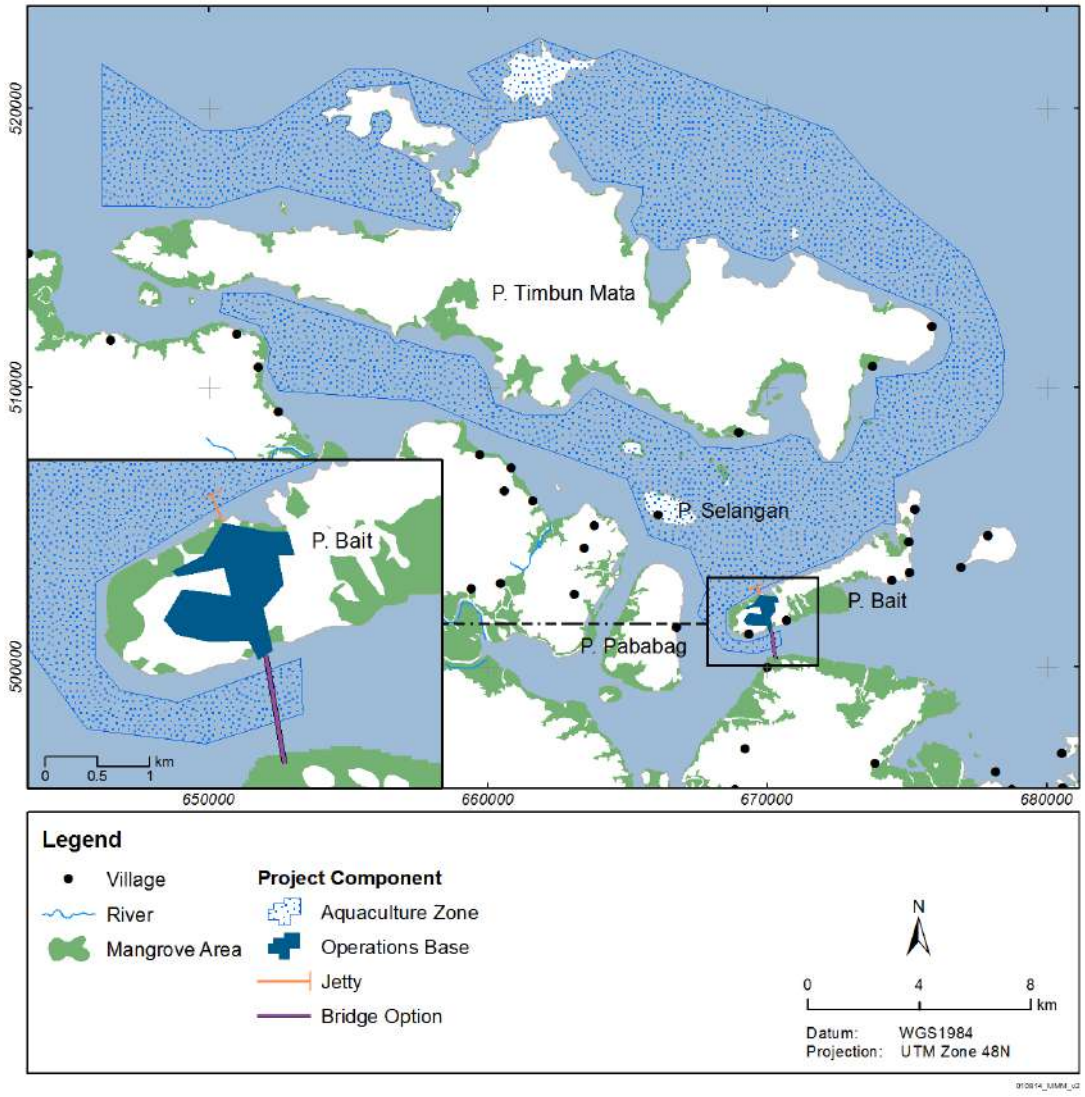


Figure 2.3 Proposed iLAP project components.

2.3.1.1 Aquaculture Zone

The proposed iLAP farming seaspace ("Aquaculture Zone") is also the designated AIZ gazetted by the DoF. The core components of this zone are:

- Juvenile Lobster Grow Out Areas (PU)
- Mussel Farming Area (Feed)
- Area for lobster research, development, training and a demonstration farm

A total of 9,300 ha will be developed for the project; 6,000 ha for commercial lobster farming, 700 ha for research, development, training and a demonstration farm, and 2,600 ha for the production of mussels. The final development or layout of the commercial grow out areas will be subject to detailed planning which is currently on-going.

2.3.1.2 Operations Base

The iLAP Operations Base covering 57 ha is located on P. Bait. Two options are currently being considered for access from the mainland: (i) a 2.2km bridge at Tanjung Kapor to Pulau Bait, with Kampung P. Bait approximately 500 m away from southern boundary of the project

site (Figure 2.4). Within the development, the facilities will be connected with an internal tarmac road with a total length of 30 km.

The iLAP Operations Base will provide all the necessary support structures to the grow out areas including a warehouse for feed storage, juvenile holding centre, fuel depot, lobster collection centre, research laboratory for R&D, engineering workshop, land base and sea base workshops, preparation area, general office, documentation control office and operation office support facilities as shown in Figure 2.5. Vital infrastructure related to accessibility to the site, power and potable water supply will also be supplied.

A total of 780 units of staff quarters will be built on Pulau Bait. This will consist of dormitory, terrace housing and semi-detached dwellings adjacent to the bridge for ease of connectivity to the community of Kampung Pulau Bait to the mainland. A clinic, football field, surau and other recreational facilities will be provided for staff and personnel.

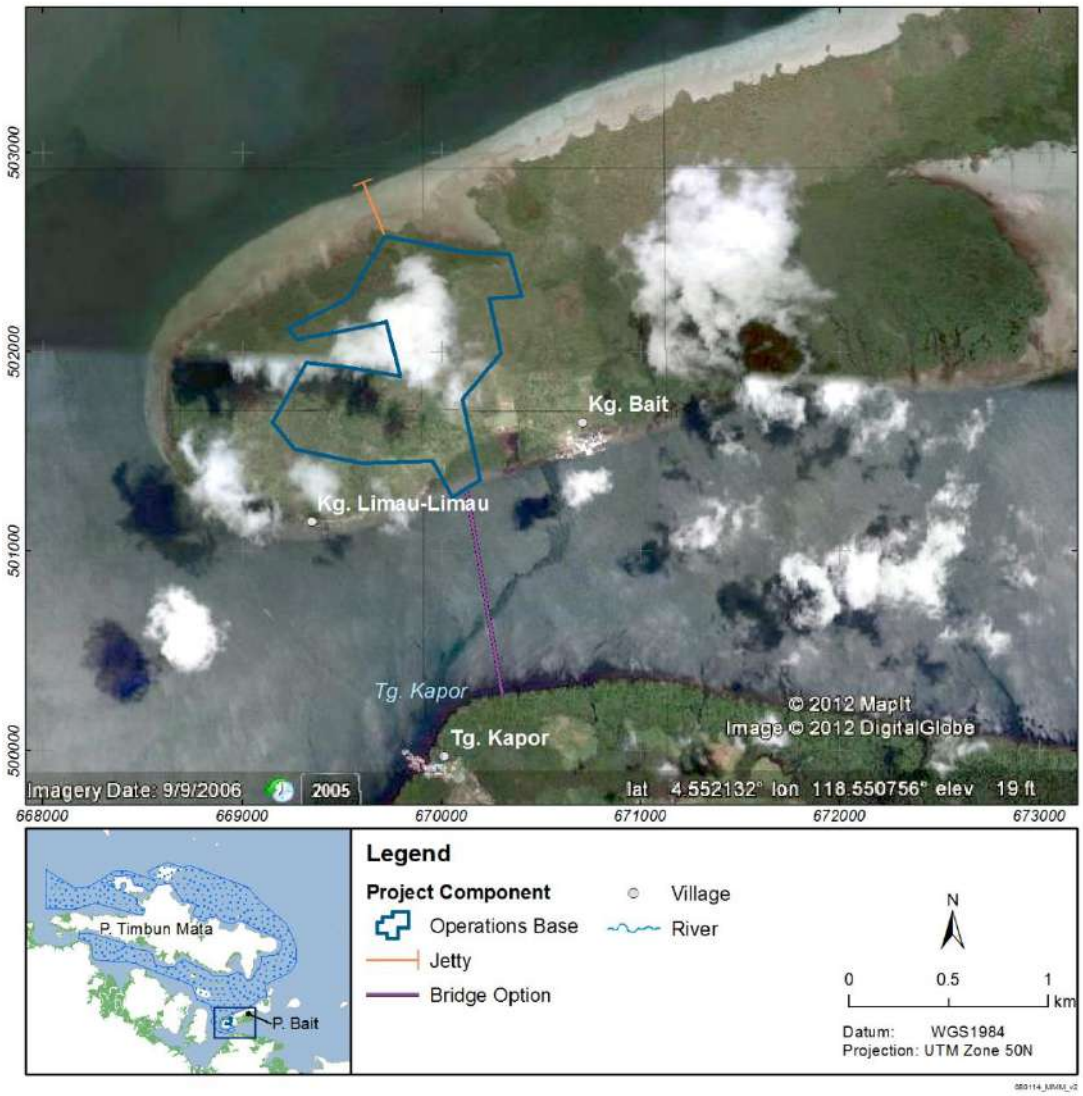


Figure 2.4 Operations Base on P. Bait.

Figure 2.5 iLAP operations base conceptual design.

2.3.1.3 Infrastructure

The critical infrastructure that will be built is:

- Electricity power upgrading on the mainland
- Electricity substation on P. Bait and generator plant room for uninterrupted power supply
- Sewage treatment
- Paved roads
- Potable water
- Telecommunications

2.3.2 Site Selection Criteria

To ensure sustainability criteria are complied with, the detailed site selection for the actual locations of the PUs within the iLAP area will consider the following environmental criteria:

- No siting over coral reefs
- No clearing of mangroves
- No adverse impact on local artisanal fisheries
- No adverse impact on navigation lanes
- No adverse impact on seaweed culture activities

The project proponent is committed to comply with the following environmental sustainability requirements:

- All applicable environmental legal and other requirements
- Global Aquaculture Alliance Marine Aquaculture Guidelines
- Global GAP Aquaculture Guidelines
- Malaysian Good Agriculture Practice Scheme - Aquaculture

2.4 Project Status

Project is in planning phase; baseline surveys have been initiated as key data requirements in the project planning and development.

2.4.1 Land Status (Sea Space)

The Aquaculture Integrated Zone (AIZ) is gazetted by the Sabah State Government which covers an area of about 20,000 ha of seaspace (Appendix A). Within this AIZ, approximately 9,300 ha will be considered for the iLAP project subject to a site suitability assessment.

2.4.2 Land status (onshore supporting facilities)

The project land areas have been granted conditional approval by the Economic Council chaired by the Prime Minister pending National Key Economic Areas (NKEA) Grant /7/ conceptual design quantum approval.

The decision of the Economic Council has been brought to the attention of the Sabah Chief Minister who has subsequently brought this matter to the Director of Sabah Land and Survey Department's attention via a series of letters which are attached within the appendix to this TOR.

A formal land application has been submitted to the Lands & Survey Department by Inno Fisheries Sdn Bhd, a subsidiary of Yayasan Sabah (conveyed verbally by the project proponent. The formal land application document will be attached within the SEIA together with other land documents).

2.4.3 Zoning Status

A number of spatial policies are applicable for the sea and land areas of the project site, including:

- Sabah Shoreline Management Plan
- Semporna District Plan
- Aquaculture Industrial Zone (AIZ)

These are described further below.

2.4.3.1 Sabah Shoreline Management Plan

The Sabah Shoreline Management Plan (2006) has identified P. Timbun Mata as a conservation area due to its Forest Reserve status (Figure 2.6 and Table 2.2).

P. Bait Central is zoned as an agricultural area while P. Bait North and West are zoned as Restricted Development (Traditional Kampung Zones) at the village areas located at the edges of the island. Other surrounding islands are zoned for agricultural and village land uses.

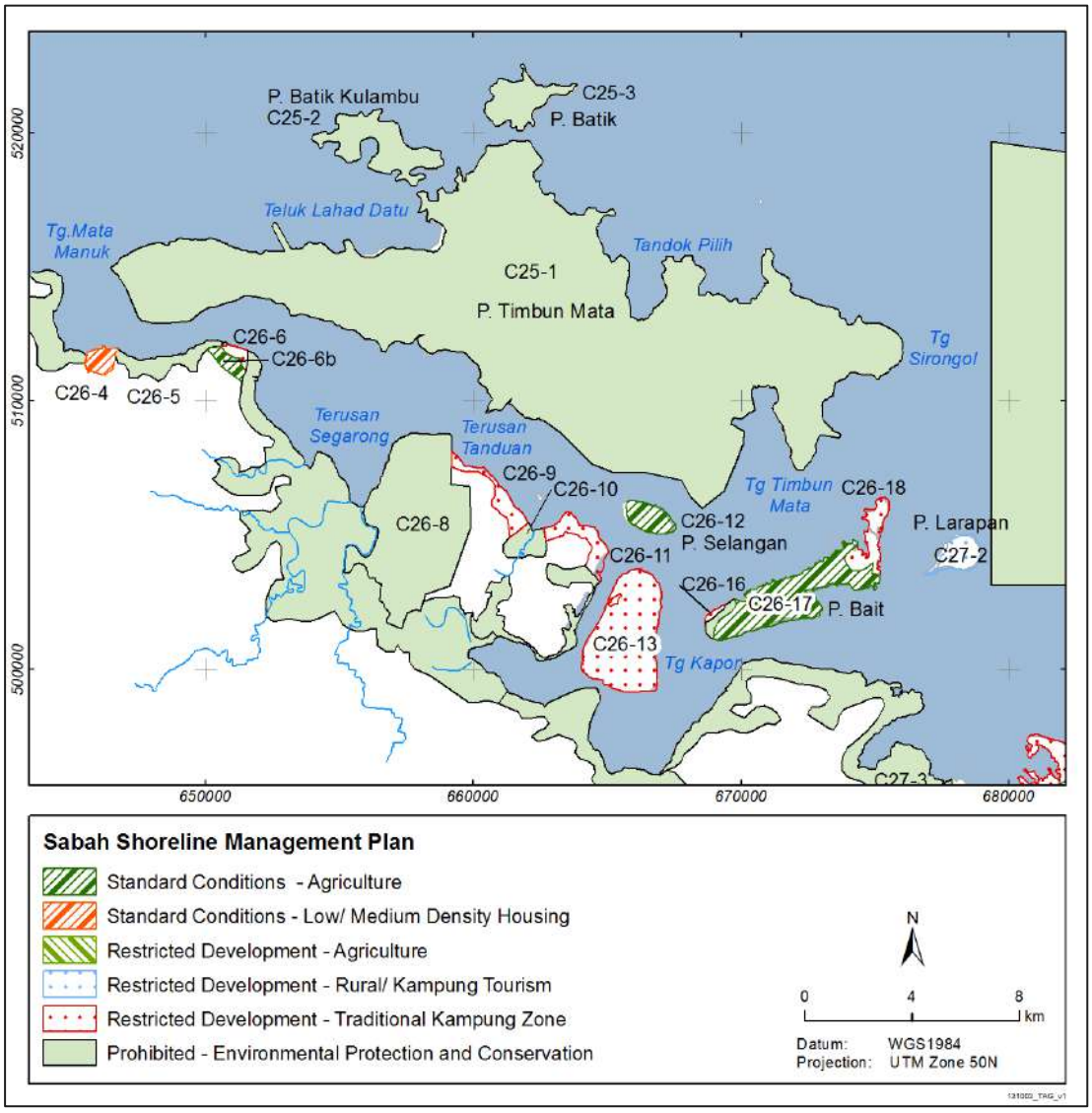


Figure 2.6 SMP strategies within and around the Project Area.

Table 2.2 Management strategies for management units within the project area.

MU	Management Unit	Management Strategy	Description
C25-1	Pulau Timbun Mata	Prohibited [Environmental Protection and Conservation]	• Class I Protection Forest Reserve • Class V Mangrove Forest Reserve (only certain areas around the island
C25-2	Pulau Batik Kulambu	Prohibited [Environmental Protection and Conservation]	• Island yet to be classified as forest reserve[Class I] • Uninhabited
C25-3	Pulau Batik	Prohibited [Environmental Protection and Conservation]	• Class VI Virgin Jungle Forest Reserve under jurisdiction of Sabah Forestry Department • Uninhabited
C26-12	Pulau Selangan	Standard Conditions [Agriculture]	• One village on the island, Kg. Selangan • Island designated to be an agricultural development area with a coastal setback of 60 m.
C26-16	Pulau Bait West	Restricted Development [Traditional Kampung Zone]	• Human settlements scattered around the island • Locals depend on mangrove forests and the vicinity of the area for livelihood.
C26-17	Pulau Bait Central	Standard Conditions [Agriculture]	• Consideration given to local villages to direct agricultural activity within the unit, with setback of at least 100 m.
C26-18	Pulau Bait North	Restricted Development [Traditional Kampung Zone]	• Two villages situated at this unit

2.4.3.2 Semporna District Plan

P. Timbun Mata is zoned as a *Forest Reserve* in the Semporna District Plan, while along its shorelines it is zoned as a *Swamp Conservation Area*. Meanwhile, the northern and middle parts of P. Bait have been mainly zoned as a *Countryside* area while the south of P. Bait zoned as a *Swamp Conservation Area*. The inner part of Pababag Island is also zoned as *Forest Reserve*, while the eastern part is *Countryside Area*. The southern part of Pababag is a *Swamp Conservation Area*. The eastern part of Salakan has been zoned as a *Park, Recreation and Tourism Area*.

2.4.3.3 Aquaculture Industry Zone

The Department of Fisheries of Sabah has gazetted the iLAP area of 20,000 ha as an Aquaculture Industry Zone.

2.5 Project Options

2.5.1 Alternative Project Locations

Prior to the selection of the Semporna site in Sabah, the project proponent considered several locations within five different countries, namely Singapore, Thailand, Brunei and Indonesia.

At the end of their study, the project proponent selected Semporna as the best fit area for the iLAP. Lobsters are a tropical species and Semporna being in the tropical zone makes it a logical choice. Semporna also has excellent water quality conditions for a large scale aquaculture grow-out. This is very important for the successful growth of the lobsters especially those in the juvenile stages.

Besides water quality, logistics and infrastructure facilities are in existence or easily upgraded to match the requirements of iLAP. Semporna's location is also ideal as it is not prone to natural disasters and has political stability.

In addition, Semporna is located in South East Asia where the cost of running a business is lower compared to other regions in the world, thus providing a competitive advantage businesswise.

To verify this, the project proponent had conducted pilot tests (trial sea cages) since 2009 within Semporna waters with favourable results for lobster grow-outs.

2.6 Project Activities

The Project activities are divided into three stages, namely a Pre-Construction Stage, a Construction Stage, and an Operations Stage. In case of any unforeseen eventuality, an Abandonment Stage is also considered.

2.6.1 Pre-construction Stage

Preliminary environmental studies were undertaken in order to determine the suitability of the project design and project location. Among the studies are:

- Hydrodynamic and depositional modelling for the prediction of lobster aquaculture environmental impact (DHI, May 2012)
- Research on Lobster Faecal Output and Dissolved Nutrients (Lee, Soxi., 2012)
- Marine Habitat Mapping using Hyper Spectral Imaging Analysis (Faiez, 2012; ongoing)
- Environmental Scoping Study (ESS) for iLAP (Malaysian EHS Consultants Sdn Bhd, 2012)

In addition, environmental studies for the present EIA will be conducted at this phase and will involve sediment and benthic surveys, mangrove, hydraulic study and impact assessment.

2.6.2 Construction Phase

The anticipated construction activities for the project are described below:

- Clearing and Earthwork:
  - Survey and setting out works for boundary and layout (Operations Base, bridge and access roads).
  - Site clearing within boundary area
  - Temporary drainage works.

- Production Units Construction:
  - Survey and setting out works for floating cages and floating houses.
  - Construction of floating houses using ecologically friendly methods and materials.
  - Installation of the nets and lobster cages including anchors
- Operations Base Building Construction:
  - Survey and setting out works for building layout and piling points
  - Piling works for building foundation
  - Building construction
  - Construct external infrastructure such as perimeter drains, water tank, sewage pipe and septic tanks, car parks and road driveway
- Bridge Construction:
  - Survey and setting out works for bridge alignment level
  - Piling works
  - Excavate trench foundation for abutment structures and cut pile to level

- Road Works:
  - Survey and setting out works for boundary and road alignment
  - Site clearing and excavation
  - Construct road and road shoulders according to NKEA requirements to JKR R3 standard with utilities reserve

2.6.3 Operational Phase

The species of lobster cultured is the Tropical Rock Lobster (*Panulirus ornatus*). The source of juveniles for initial grow out will be from local lobster sources which later will be replaced by juveniles from the proposed Broodstock Breeding Centre at Kudat.

Both the Breeding Centre and the iLAP will have stringent biosecurity regime in place to ensure that disease is not introduced to the site, or spread throughout the site if accidentally introduced. All external shipments into the iLAP site will have health certification as per Minister of Health requirements, and will be quarantined in a closed land-based system to check for signs of disease before releasing the animals to the grow-out cages. Biosecurity is critical to the sustainable operation of a lobster aquaculture facility so appropriate regimes will be put in place for the movement of animals and equipment.

The Tropical Rock Lobster will grow-out to commercial size in floating cages in the sea with a minimum seabed depth of 10 m. Detailed design of the Production Units (PU) and cages is currently underway and a tentative design and description of the operations is given in Table 2.3 below and shown in Figure 2.7 and Figure 2.8.

Table 2.3 Preliminary details on the lobster farm design (subject to change).

Item	Description
PU footprint	375 m^2
PU density	3/ ha
Cages per PU, see Figure 2.6	15
Operations platform per PU	1 (floating house)
Cage dimensions, see Figure 2.8	5 m x 5 m x 5m
Cage materials	Nylon net on wood and steel frame
Anchoring	Cages will be anchored to the seabed using concrete blocks

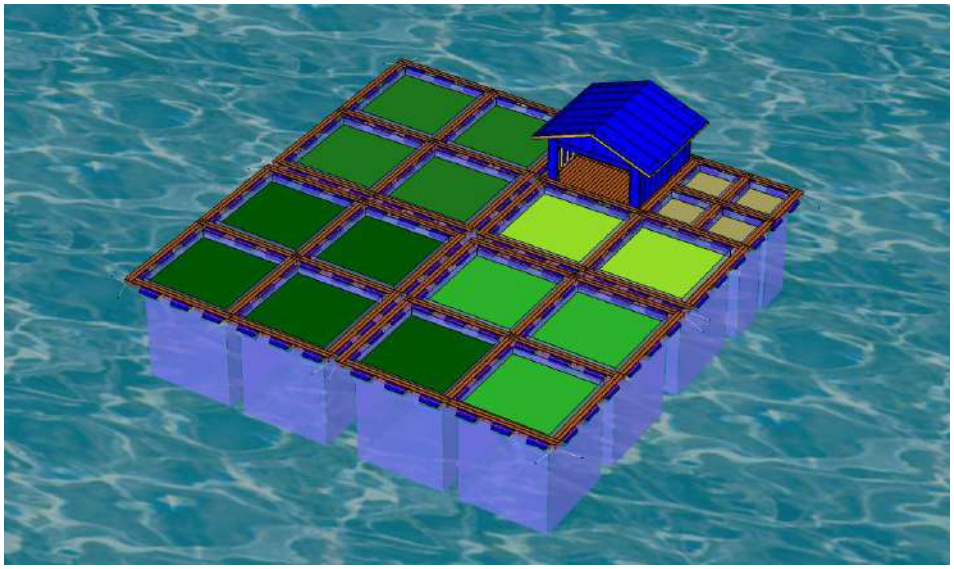


Figure 2.7 Production Unit design.

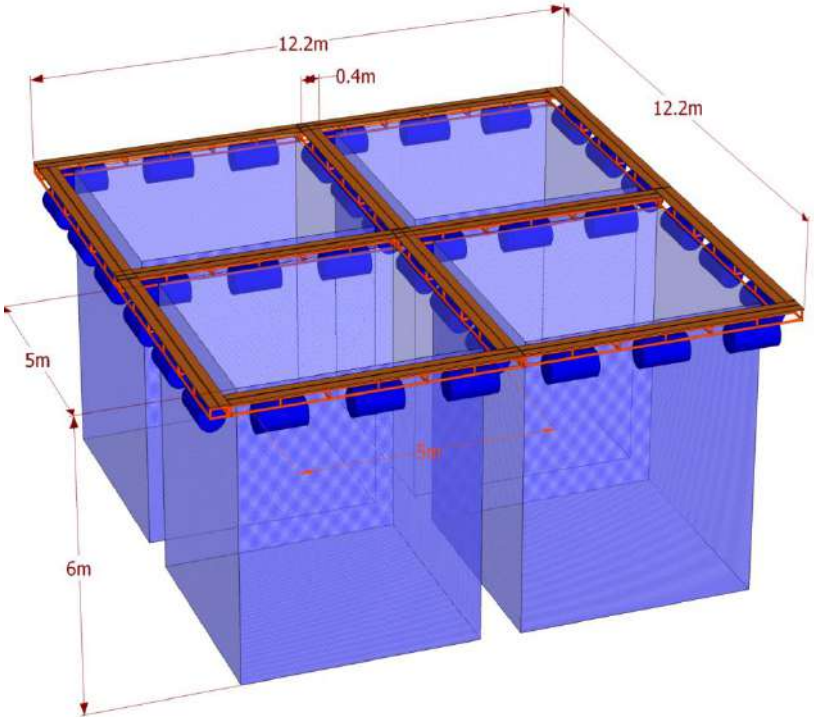


Figure 2.8 Raft design of the Production Unit

The grow-out cycle of *Panulirus ornatus* to a commercial size is about 18 months (800-1000 g). To achieve this, feed is an essential component of the aquaculture design. The project proponent plans to use mussels (*Perna veridis*) as the primary grow-out feed, with 2,600 ha within iLAP allocated for mussel grow-out.

Alternative feed in the event of mussel disease outbreak or any other supply challenges will be formulated pellet feed. Permitted Pharmaceutical products may be used when necessary to ensure the lobsters stay healthy.

Due to biofouling, where algae and other microorganisms attach to cages and cage nets, regular cleaning will need to take place to ensure optimum water quality conditions within the cage. If left uncleaned, dissolved oxygen will reduce as well flushing due to the drag created by these organisms. Cage nets will need to be cleaned and replaced on a 1-2 monthly basis depending on season. This will involve placing a clean net around the outside of the existing net then removing the existing net. Nets will either be cleaned with a high pressure hose in-situ or taken back to the supply base for cleaning and drying.

At present, the quantities of organic net fouling going into the water column from in situ net cleaning are unknown. Amounts will vary depending on the season, farm sites and the experience of the farm's net cleaning operators; however, in some circumstances, the volume of organic fouling from cleaning activities can be almost as much as from the farmed organisms themselves.

Depending on trials, a copper biocide may also be used on the cage nets to reduce fouling. This will be applied in the form of paint at the supply base.

Cage fallowing will also be undertaken and will occur at the end of each production cycle for a period of 3-6 months depending on the location. This will allow for the seabed beneath the farm to recover.

2.7 Development Schedule

The project will be implemented according to a carefully phased schedule so as to increase the grow-out capacity in a controlled and structured manner. The planned proposed commencement starts in 2014 and will be rolled out in stages until 2028 as shown in Figure 2.9.

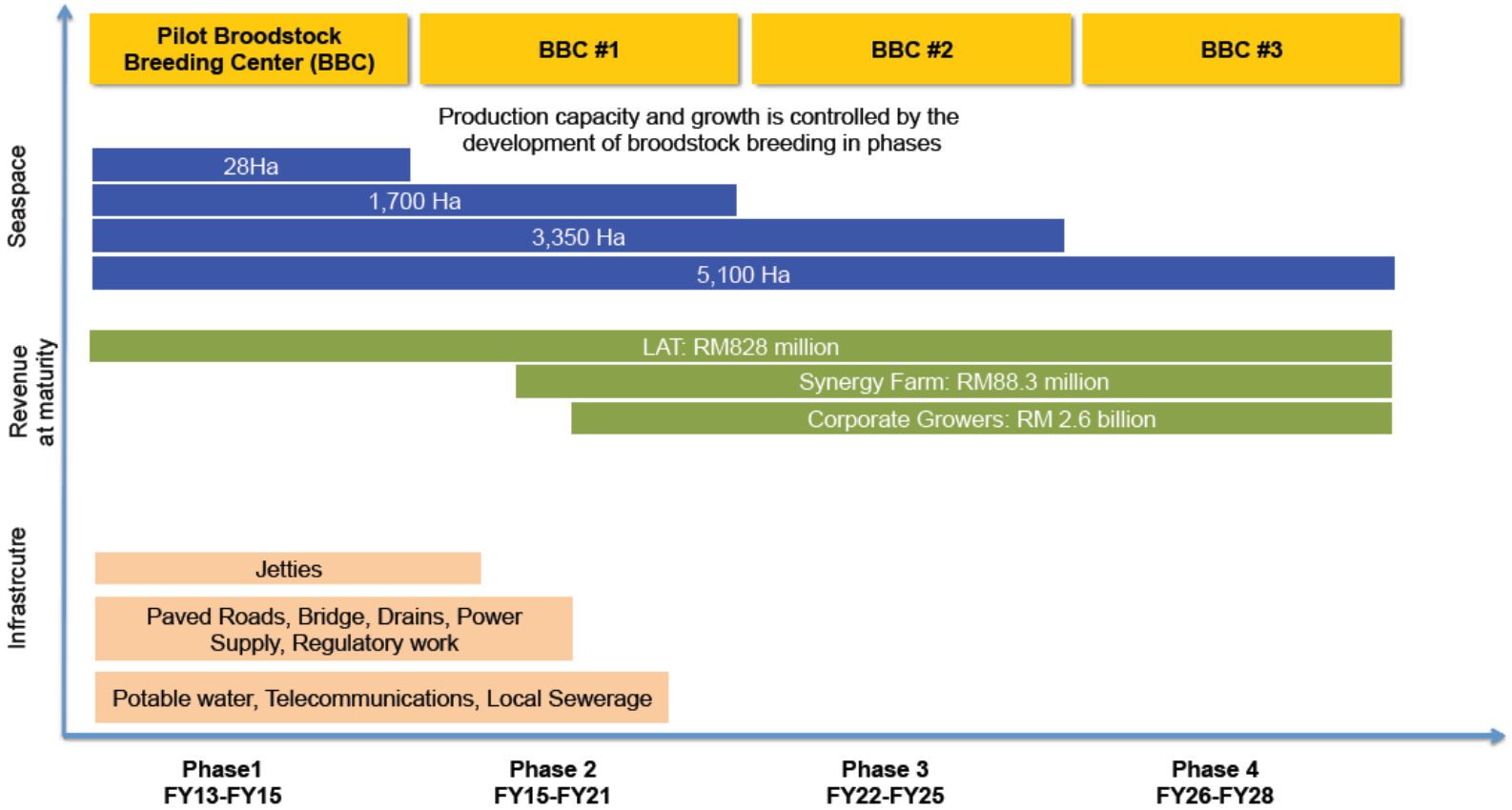


Figure 2.9 Development Schedule for the Proposed iLAP project.

3 Description of Existing Environment

This section will highlight the key features of the physical, biological and socio-economic environment relevant to the proposed project and associated infrastructure. The study area encompasses land areas of P. Timbun Mata, Pulau Bait, P. Selangan, P. Pababag and the coastal areas of Semporna facing these islands, including the sea space around these islands. Figure 3.1 introduces the project location and key land marks or features that will be referred to in the subsequent sections.

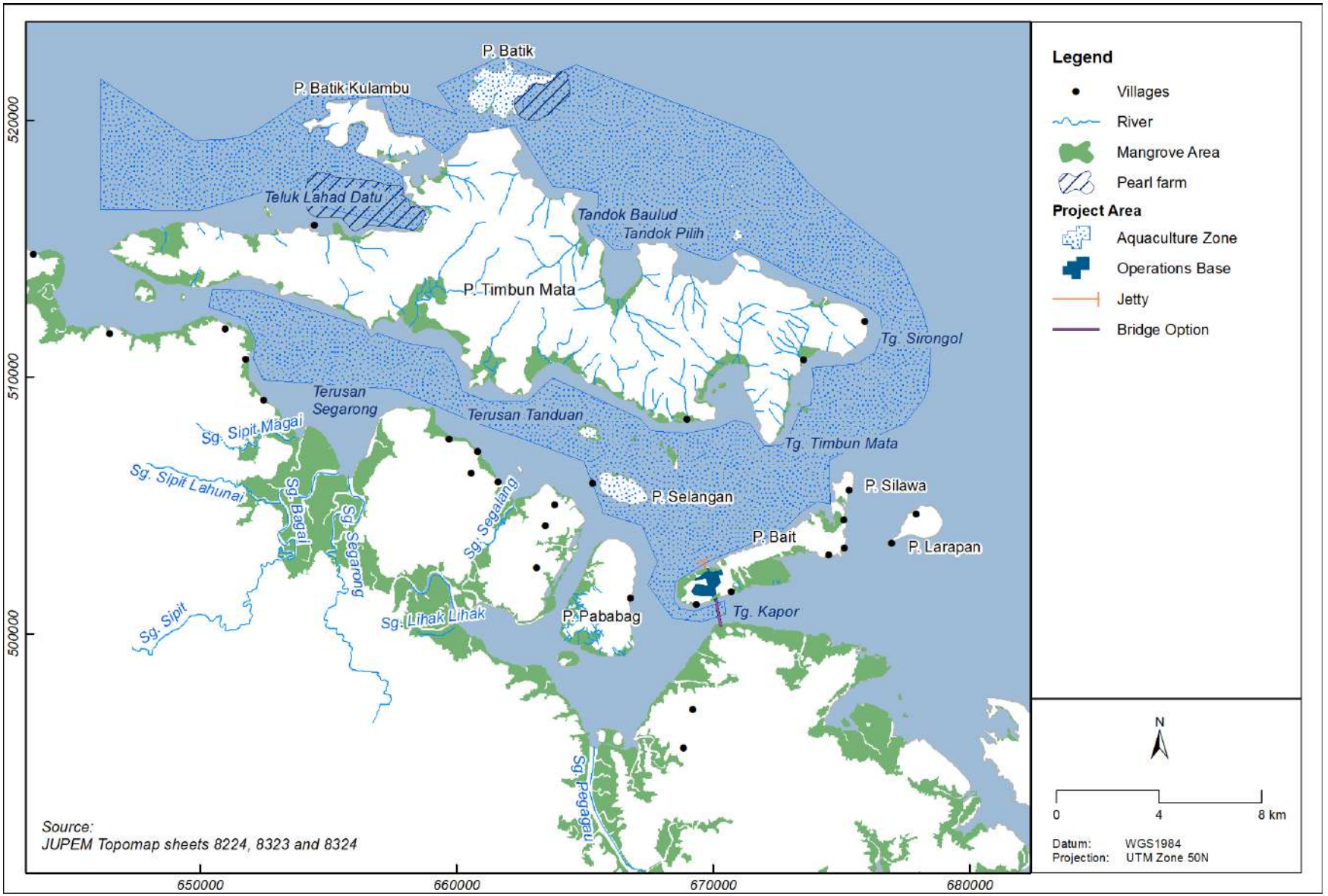


Figure 3.1 Existing environment within the impact zone

3.1 Physical-Chemical Environment

3.1.1 Topography

Pulau Timbun Mata has an area of approximately 11,497 ha. It is very hilly with many slopes steeper than 25° (Photo 3.1). The highest peak within the island is Mt. Tannabalu (596 m) located in the north central portion of the island /14/.

South east of P. Timbun Mata lies Pulau Bait (site of the proposed operations base), which is a relatively flat and sheltered island that is 8.3 km long and 1.6 km wide at the widest point. The shoreline is fringed with a narrow strip of mangroves and hinterland is agricultural land, including coconut palms and oil palm plantations /14/.

Photo 3.1 Steep topography on P. Timbun Mata's northern coastline.

3.1.2 Coastal Morphology

Excluding the western tip of the island, which is relatively low and has areas of mangrove along the shoreline, Pulau Timbun Mata has steep hills, which along the northern coast extend right to the beach. Most of the northern shoreline has narrow, rocky beaches with fringing coral reefs, but there are several more sheltered bays with wider coral flats and sandy pocket beaches.

The south western coastline of Pulau Timbun Mata is less exposed to waves compared to the northern coast due to the limited fetch, and there are areas of mangroves established along the southern coastline. Apart from this, the coastal features of the southern side of Pulau Timbun Mata are very similar to the northern side with steep hills extending down to narrow beaches flanked by fringing coral reefs.

3.1.3 Rivers/Catchments

There are four main rivers affecting the project area which are (Figure 3.2):

- Sungai Sipit Lahunai
- Sungai Sipit
- Sungai Segarong
- Sungai Pegagau

Three of the rivers, Sg. Sipit Lahunai, Sg. Sipit and Sg. Segarong, are located within the Segarong Catchment while Sg Pegagau is within the Pegagau Water Catchment as indicated in Figure 3.2.

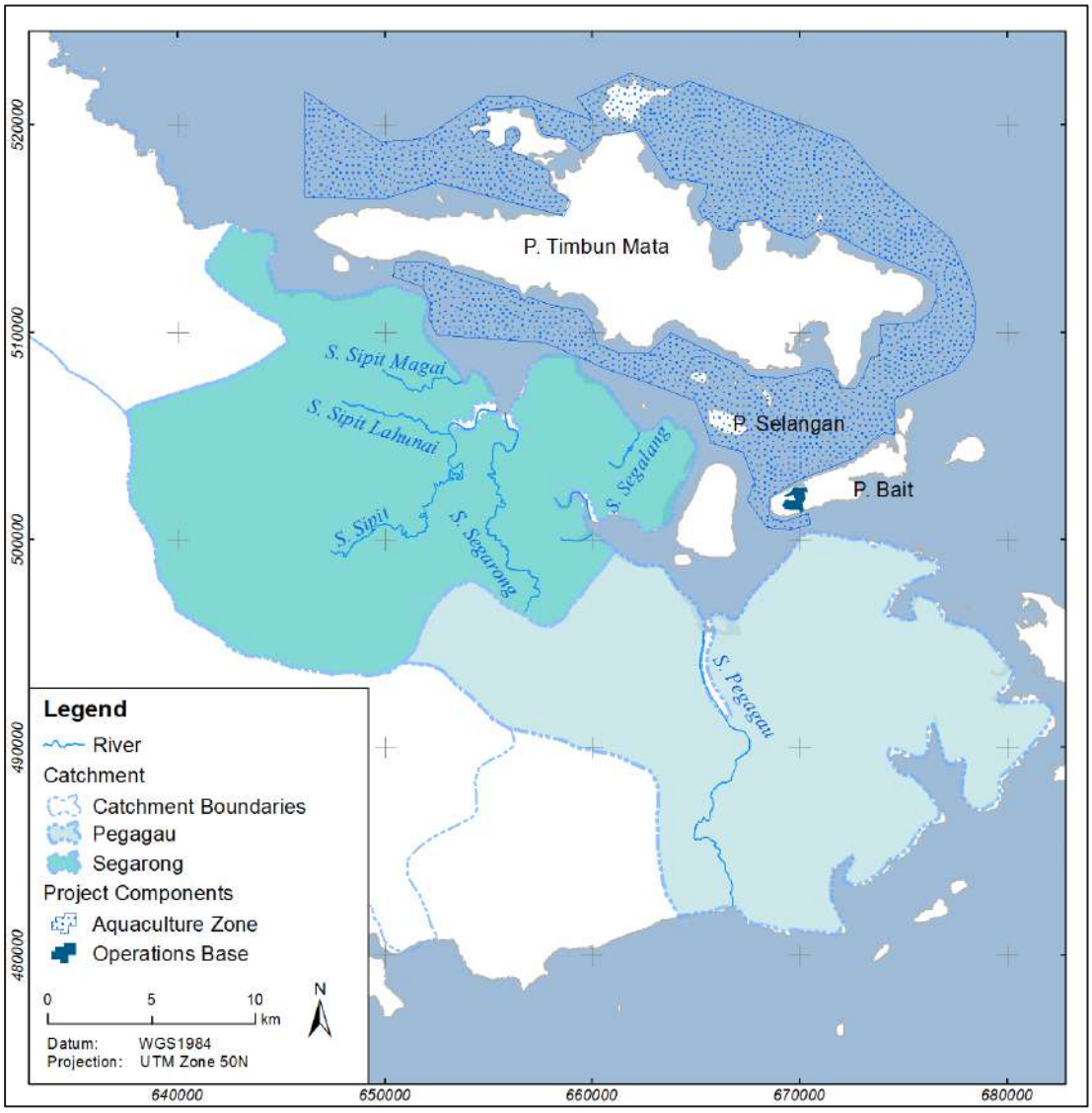


Figure 3.2 Rivers and catchments in the study area (Source: DID).

3.1.4 Bathymetry

The northern side of the island has shallow water depth immediately off the coastline and gets deeper with distance from the shoreline to more than 60 m seawards (Figure 3.3). The southern side facing the mainland is mainly shallow with depths generally less than 10 m.

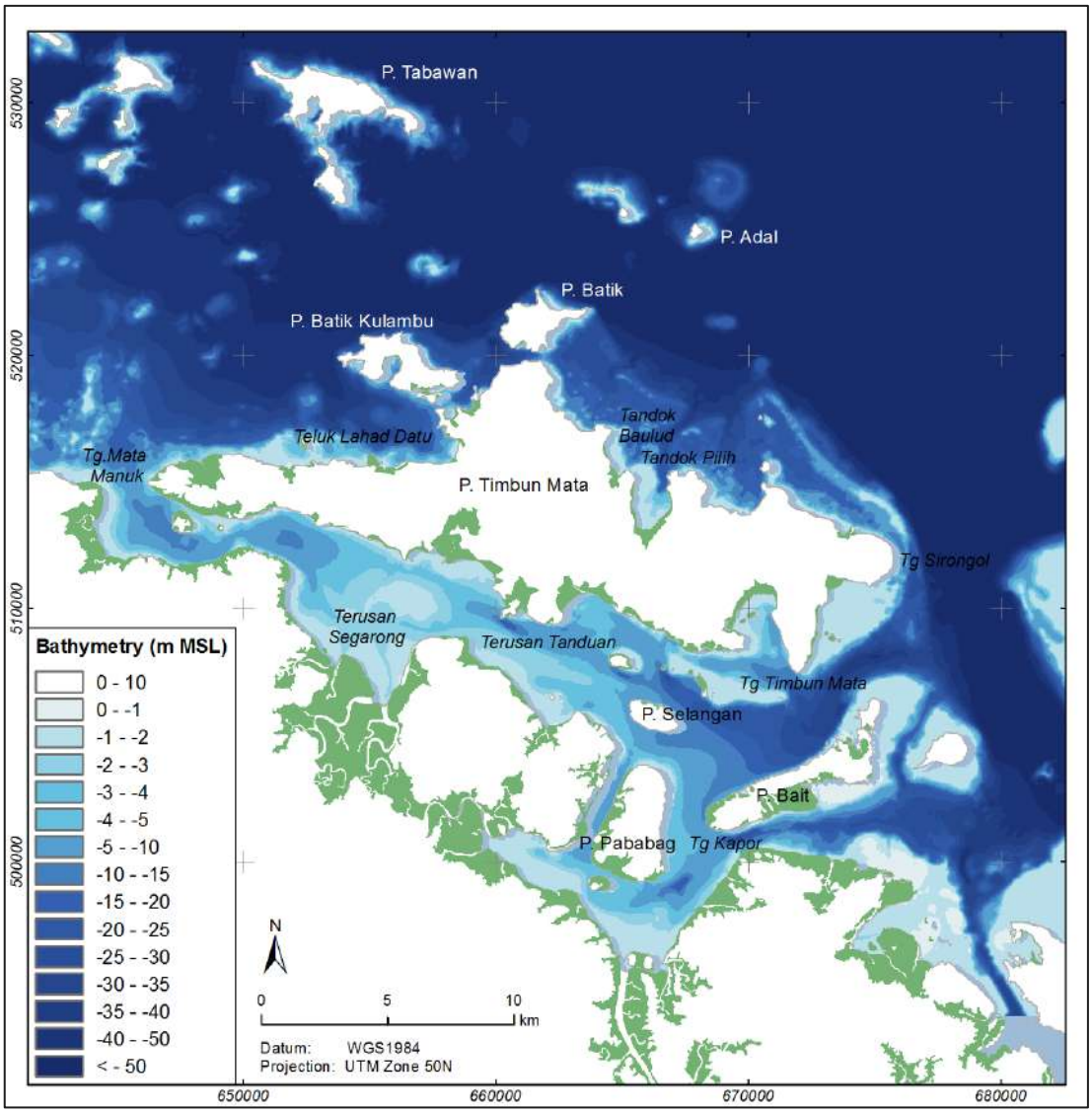


Figure 3.3 Bathymetry around the project area.

3.1.5 Currents and Waves

Generally, currents are thought to be low with initial measurements indicating average flows of less than 10 cm/s within the study area. Wave exposure is limited in the southern parts of Pualu Timbun Mata due to the limited fetch. Northern areas are more exposed and subsequently will experience larger waves of more than 1 m in height.

3.1.6 Water and Sediment Quality

With the natural vegetation generally well-preserved, the soil erosion and sediment runoff from Pulau Timbun Mata is limited, and the water generally appears clear with excellent water quality observed on the north side of the island (Photo 3.2).

Photo 3.2 Water quality appears excellent on the northern side of P. Timbun Mata (October 2013).

Small volumes of "black water" are discharged from the wetlands at the western end of Pulau Timbun Mata, but this has only a local effect on the clarity of the water.

There has been significant hinterland development on the mainland side of the Sigalong Strait, and this has an impact on the sediment runoff and discharge of nutrients and potentially pesticides from the agriculture as well as aquaculture projects.

A sediment plume extending from Kuala Sipit on the mainland is clearly visible in satellite images and impacts the southern sections of Pulau Timbun Mata and Pulau Bait. There is also some discharge of domestic waste from the villages in the area, in particular on the section close to Kunak.

3.2 Biological-Ecological Environment

3.2.1 Protected Areas/Reserves

3.2.1.1 Coral Triangle / Sulu-Sulawesi Marine Ecoregion

The proposed project site is located within the Semporna AIZ which lies at the apex of the Coral Triangle, a roughly triangular area of the tropical marine waters of Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste that contain at least 500 species of reef-building corals (Figure 3.4). The Coral Triangle is recognized as the global centre of marine biodiversity and a global priority for conservation. The Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) is a multilateral partnership of the six countries in the Coral Triangle, formed in 2007 to address the urgent threats facing the coastal and marine resources of Coral Triangle.

Malaysia's obligations under the CTI-CFF are to adopt the regional plan of action to conserve and sustainably manage coastal and marine resources within the Coral Triangle region; establish national plans of action addressing poverty and improvement of livelihoods

of coastal communities, safeguarding marine, coastal and small island ecosystems through cooperative arrangements to sustainably manage these ecosystems; and to ensure that these efforts contribute effectively to strengthening food security, increasing resiliency and adapting to climate change /8/.

At the centre of the Coral Triangle is the Sulu-Sulawesi Marine Ecoregion (SSME), a large 900,000 km^2 marine ecosystem composed of two large seas, the Sulu and Sulawesi Seas and smaller inland seas in the Philippines, which is the world's most biologically diverse marine environment. The SSME Programme is another multi-stakeholder ecoregional-based conservation programme, initiated and developed by WWF in collaboration with stakeholders from Indonesia, Malaysia and the Philippines. The three countries signed a Memorandum of Understanding in 2004, formalising a Stakeholder Conservation Plan and the SSME programme and framework for cooperation.

The Conservation Plan identifies Priority Conservation Areas (PCAs) for the SSME, of which three are located in Sabah: (i) Semporna-Darvel Bay area; (ii) Sandakan; and (iii) Kudat-Banggi.

Figure 3.4 The iLAP project location within the Coral Triangle.

3.2.1.2 Tun Sakaran Marine Park

The proposed iLAP is located less than 1 km from the Tun Sakaran Marine Park boundary (nearest distance) as shown in Figure 3.5. The Tun Sakaran Marine Park is a state park under the jurisdiction of Sabah state government rather than the Malaysian federal government. The management is under the Sabah Parks Board.

There are about 2,000 people on the eight islands of Tun Sakaran Marine Park which covers 350 km^2, most of whom are fishermen and seaweed farmers /9/.

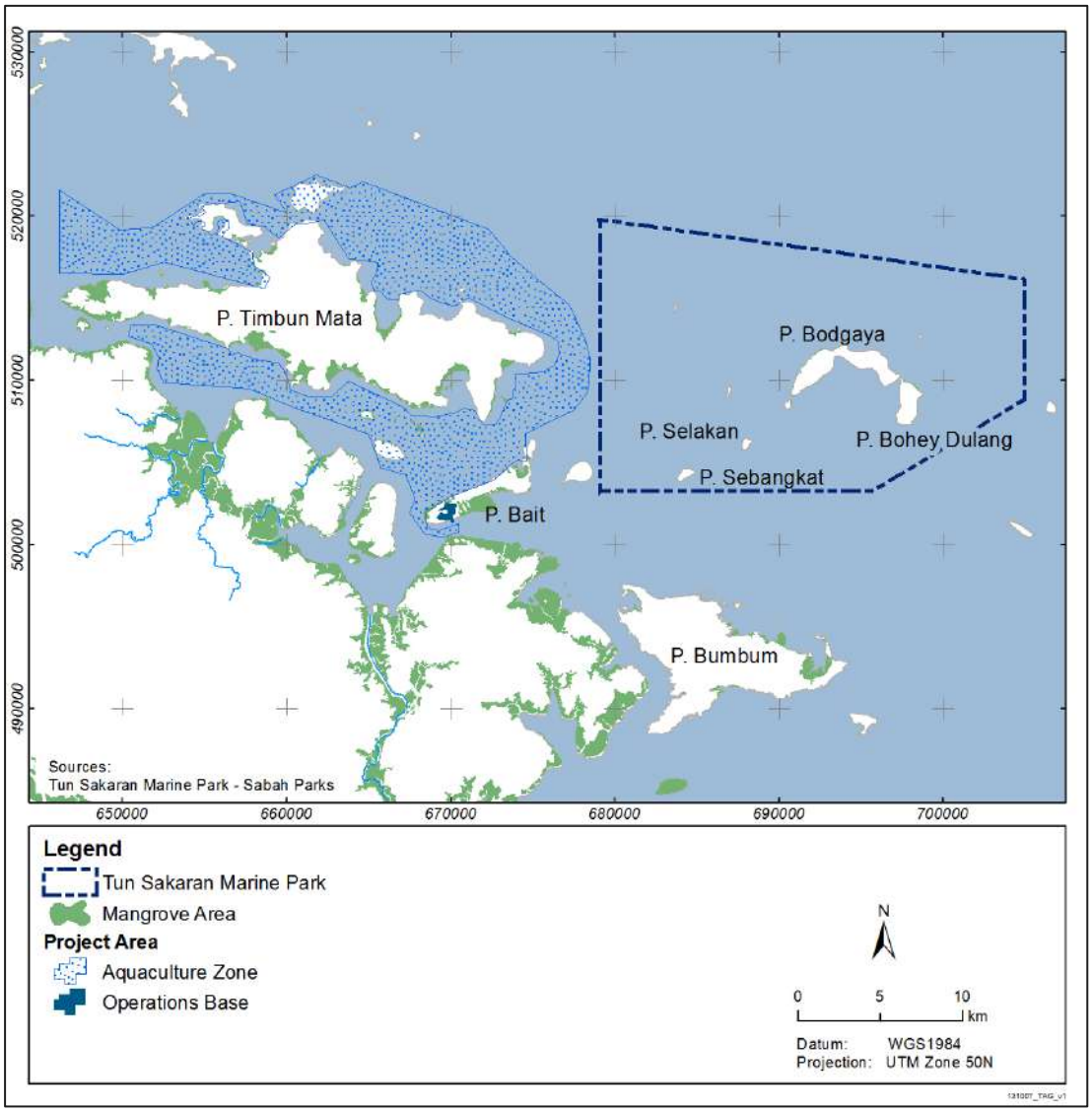


Figure 3.5 Tun Sakaran Marine Park.

3.2.2 Marine Habitats

Located in the Coral Triangle, Pulau Timbun Mata and Pulau Bait is characterised by its marine biodiversity ranging from coral reefs, to mangrove and seagrass along its coastal zones. However, the distribution of live corals is more prominent at the northeast coastlines of Pulau Timbun Mata compared to other parts of its coastlines, followed by the west coast of Pulau Bait. The seagrass meadows are present mainly at the sheltered southeast coastal zone of Pulau Timbun Mata, which is concentrated around the smaller island of Pulau Mata Pahi. The following sub-sections will discuss the respective marine habitats components in greater detail.

Coral Reefs

Pulau Timbun Mata and P. Bait are fringed by coral reefs (Figure 3.6). Observations during initial site visits indicate that much of the reef flat areas are dead coral/ seaweed, while good live coral cover occurs on the reef slopes (Photo 3.3 until Photo 3.6).

At the south eastern end of the strait, south of Mt. Sirongol and extending to Tg. Timbun Mata, there are extensive reef flats along the coastline and in the bay. There are further reef

flats and sand bars to the west of Tg. Timbun Mata around Pulau Mata Pahi and to the south along the northern shore of Pulau Langas.

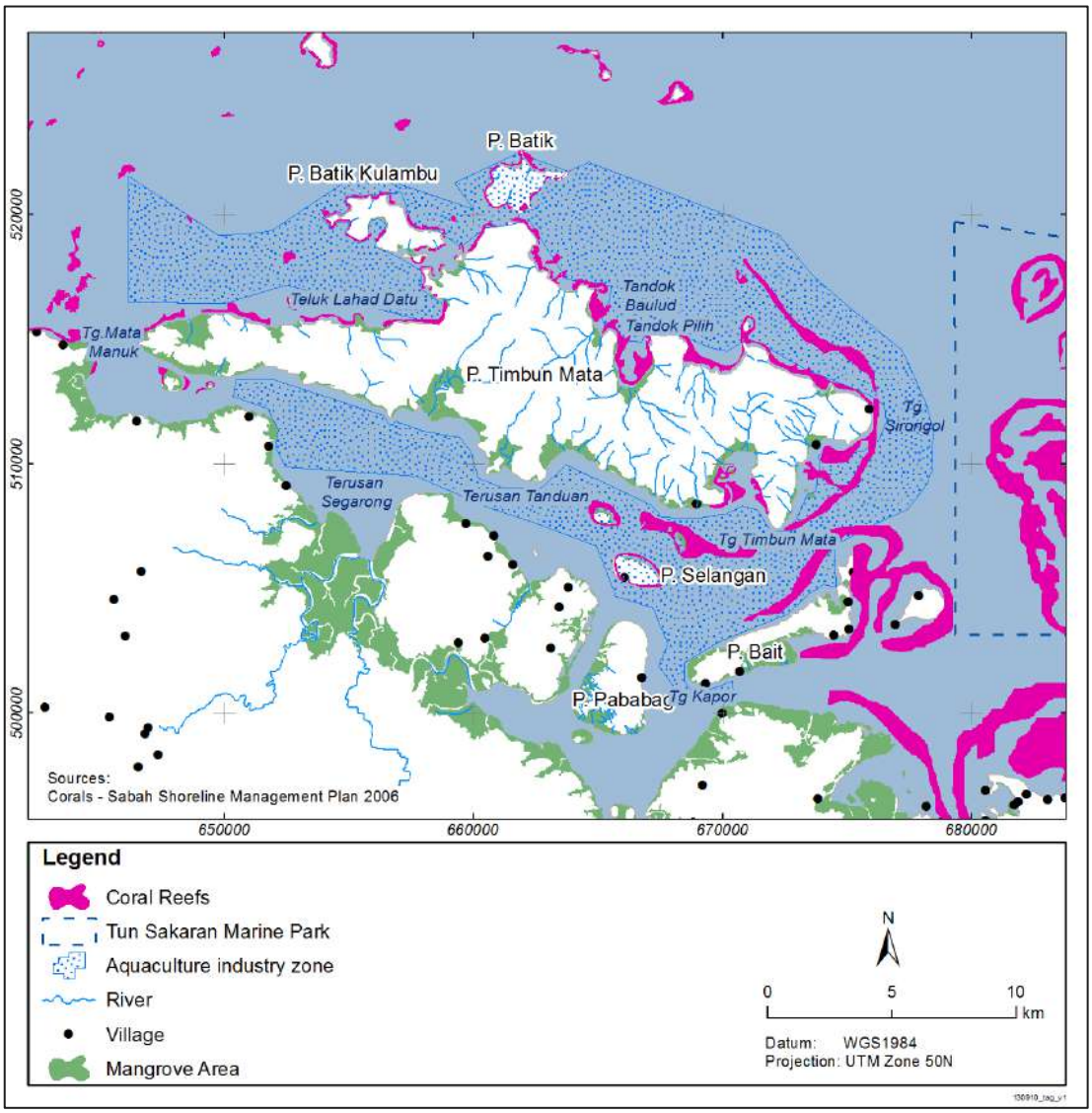


Figure 3.6 Coral reefs around Pulau Timbun Mata.

Photo 3.3 Dead corals off P. Bait (© Prof. Steve Oakley 2013).

Photo 3.4 Unhealthy reef at P. Batik (© Prof. Steve Oakley 2013).

Photo 3.5 Reef conditions around Pulau Timbun Mata (© Prof. Steve Oakley 2013).

Photo 3.6 Areas of healthy fringing coral off the north of Pulau Bait (© Prof. Steve Oakley 2013).

Seagrass

Seagrass areas have been observed along the eastern coastlines of Pulau Timbun Mata and off the northern part of P. Bait (Photo 3.7 and Photo 3.8). Sparse seagrass beds were also reported around Kg. Tengol Tengol. Little or no other seagrass has been previously observed in other parts of the study area.

Photo 3.7 Seagrass observed southeast of P. Timbun Mata (July 2013)

Photo 3.8 Seagrass off P. Bait (July 2013).

Mangroves

On P. Timbun Mata, fringing mangroves along the coastline are classified as Class V Mangrove Forest Reserve and mostly comprised of medium dense low lying mangroves (Photo 3.9 and Photo 3.10). These fringing mangroves provide spawning and feeding areas for many marine and inter-tidal species.

Photo 3.9 Healthy mangroves fringing the shoreline at Tg. Timbun Mata (October 2013)

Photo 3.10 *Rhizophora spp*. is the dominant mangrove species within the study area (October 2013).

3.2.3 Marine Endangered Species

The area being close to the Tun Sakaran Marine Park is home to many different species of fish fauna, benthic invertebrates (sea cucumbers), lobsters, crabs, The range of species found at one time during population studies are between 77 species to 104 species of fish and benthic species /9/.

Among the endangered species recorded by a study undertaken by WWF within the areas are the giant grouper, Giant Clams, Napolean Wrasse (Humphead Wrasse), Barramundi Cod (*Cromileptes altivelis*). It was reported by villagers during the Sabah Island Management Plan /10/ that dugongs were historically sighted in the area; however this species has not been seen for quite some time.

Records of turtle nesting have been reported by local villagers however, the numbers cannot be determined in the absence of detailed studies. Pulau Timbun Mata and its surroundings waters are within the migratory pathway of these sea turtles. The two common sea turtles to these areas are the green sea turtle (*Chelonia mydas*) and the hawksbill turtle (*Eretmochelys imbricata*). Occasionally, the Olive Ridley sea turtle is recorded to be present within the area.

There are seven species of Giant Clams found within Semporna waters. The biggest of them all is *Tridacna gigas*. However, this Giant Clam has been declared as locally extinct. Other species includes *Tridacna derasa, Tridacna squamosa, Tridacna gigas, Tridacna maxima, Tridacna crocea, Hippopus hippopus* and *Hippopus porcellanus*.

3.2.4 Terrestrial Habitat

3.2.4.1 Flora

The entire island of P. Timbun Mata is a Class I Protection Forest Reserve comprised of Upland and Lowland Mixed Dipterocarp Forest, Lowland Freshwater Swamp Forest, Secondary Forest and some mangrove (Figure 3.7). Up to 95% of the island is covered with forest. However, a number of grassland areas can be seen on the south and northern coast, where some of the mangrove fringe has also been cleared for jetties, while other clearings may be due to subsistence agriculture, burn scars or natural features (Photo 3.11).

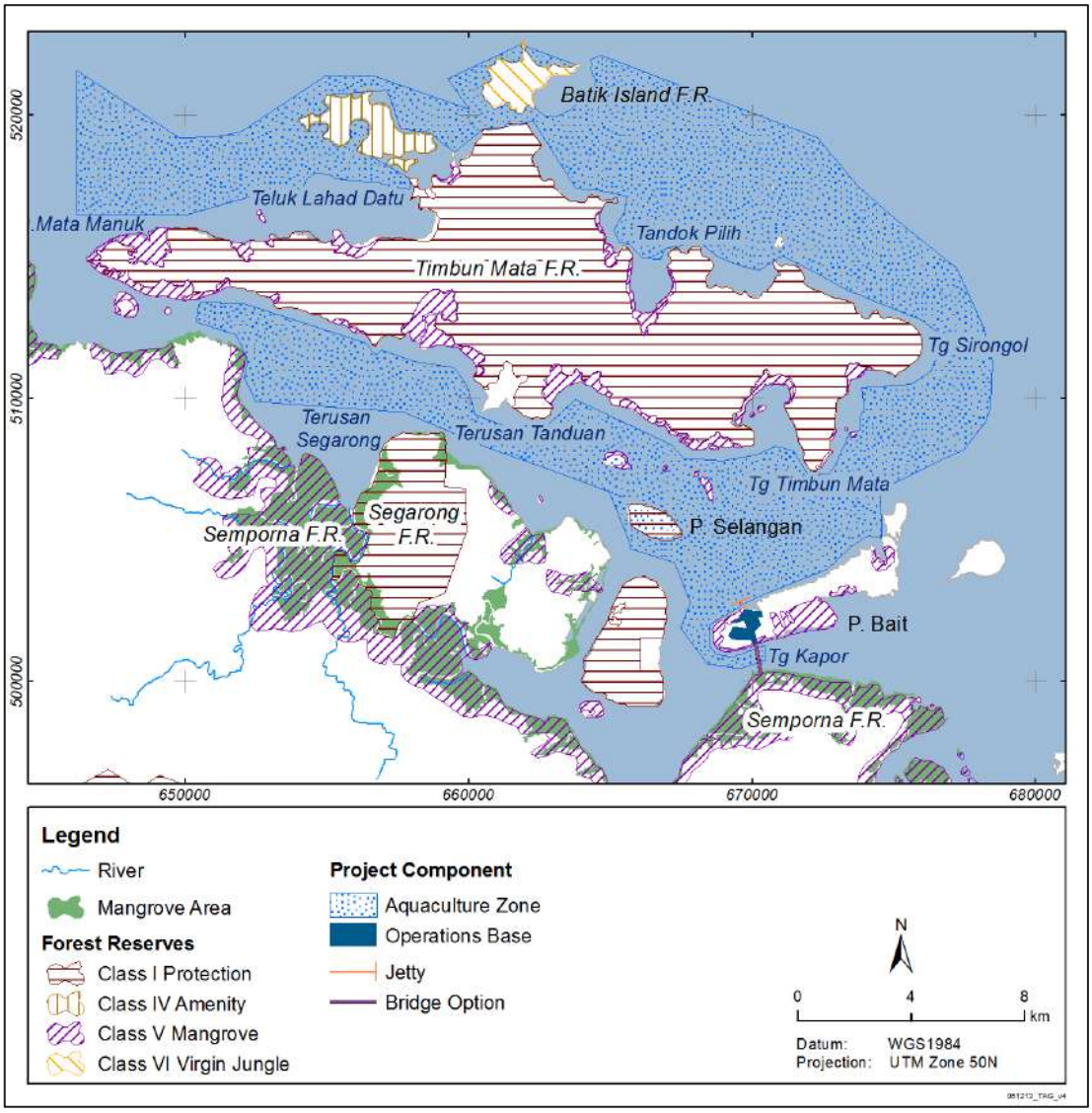


Figure 3.7 Forest reserves around the project site.

Pulau Selangan and P. Pababag are also both Class I Protection Forest Reserves. A survey by the Forestry Department in 2002 revealed that due to historical and present settlement on the island, agricultural crops (tapioca, coconut, banana, fruit trees, etc.) in addition to secondary forest cover much of the island (Photo 3.12). There are also barren or cleared areas and grassland, colonised by *lalang* and other shrubs. Around Sg. Lihak-Lihak, mangroves are also present with a high diversity of floral species.

Photo 3.11 Grassland areas on the south-eastern tip of Timbun Mata (September 2013).

Photo 3.12 Coconut trees dominating the shoreline vegetation (September 2013)

3.2.4.2 Fauna

Pelagic and coastal birds use the island for nesting, feeding and breeding ground. There has not been any concrete research on the species of birds available within the site. It is possible that it is home to endangered bird species /10/.

P. Timbun Mata is known for its deer, monkeys (Photo 3.13), wild boar and bat populations /11/. Proboscis monkeys have been sighted along the Semporna mainland coast opposite P. Timbun Mata.

Photo 3.13 Long-tailed Macaque observed within the village area (© Dr. Paul Porodong 2013).

3.3 Human Environment

3.3.1 Settlements

The island of Pulau Timbun Mata has been inhabited for several hundreds of years. The main community within mainland and P. Timbun Mata are the Sea Bajau community. The earliest villages established on the island were Mantandak (in the west), Lakai Lakai (north), Dap Dap (northeast) and Kubor (east).

Figure 3.8 below shows villages within the surrounding study area based on JUPEM's topographic maps. Villages are concentrated along the shoreline as shown in Photo 3.14 to Photo 3.16.

According to Statistics Department, there are over 8,000 individuals above 20 years old in the study area, in around 2,500 households.

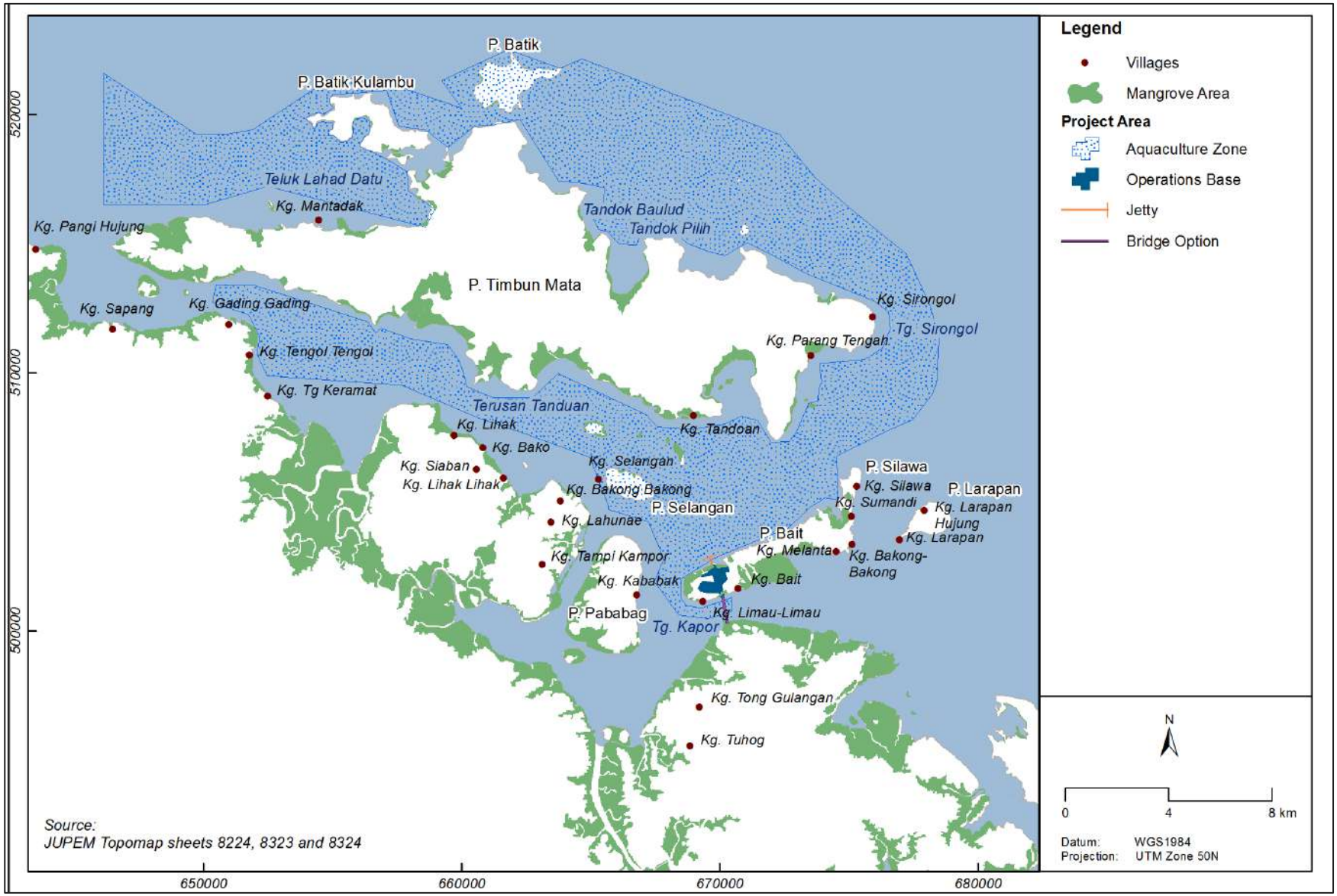


Figure 3.8 Settlements around the project area.

Photo 3.14 Kg. Parang Tengah at Pulau Timbun Mata (September 2013)

Photo 3.15 Kg. Tg. Kapor (May 2012)

Photo 3.16 Kg Bait on Pulau Bait with Timbun Mata in the background from May 2012

3.3.2 Heritage Areas

There are no publicly known cultural or historical heritage sites around the potential impact area.

3.3.3 Socioeconomics

The primary socioeconomic activity is fishing and agriculture (Photo 3.17) /10/. Many fishermen practise farming simultaneously. However, most fishermen supplement their income with other sources such as farming and working as labourers in oil palm estates /10/.

On the mainland, Kg. Tengol Tengol and Kg. Gading Gading, for example, are surrounded by oil palm plantations. Aquaculture development and fish cage farming was also observed around Kg. Pangi and Kg. Pangi Hujung /10/.

3.3.3.1 Fisheries

The nearshore area, especially around the reefs, is an important artisanal fishing ground for many fishermen in the area given that most islanders are traditional fishermen utilising low capacity boats that are either on-powered or with outboard engines. Ethnic groups settled within the area are traditionally fully dependent on income from these sources for their survival.

Fishing gear that is used include ‘bubuh’, hook & line, and nets while in Kg Pangi some practice compressor diving. This method is normally associated in the use of spearfishing and cyanide. Fish catch is sold to a buyer who visits each village to collect the fish /10/.

In Kg. Tengol Tengol and Kg. Tg Keramat, the usage of trammel net was reported. Lobster and white prawns are normally sold while fish and crabs are kept for consumption /10/.

More specifically fisheries carried out include but may not be limited to:

- Seaweed culture
- Kelong (lift net)
- Fish cage culture
- Subsistence fisheries using gill nets and cast nets, hook and line, spear fishing
- Crab traps/ fish pots
- Sea cucumber culture
- Harvesting cockles from the mangroves

Photo 3.17 Fishermen at work around P. Timbun Mata (© Dr. Paul Porodong 2013)

3.3.3.2 Navigation

The Project Site is not within or immediately adjacent to the navigation routes for ocean going and coastal vessels to the port of Lahad Datu through the Alice and Sibutu channels (Figure 3.9). Marine traffic routes to the Kunak Port however, taken primarily by Crude Palm Oil barges, do pass near the northwestern boundary of the site as shown in Figure 3.10. There are also several near shore navigation channels used by the local community.

There are many types of boats cruising along the waters of Semporna. Among the boat types are fishing boats (large trawlers), merchant ships, cargo ships, local village boats (dapang) and dive boats /12/.

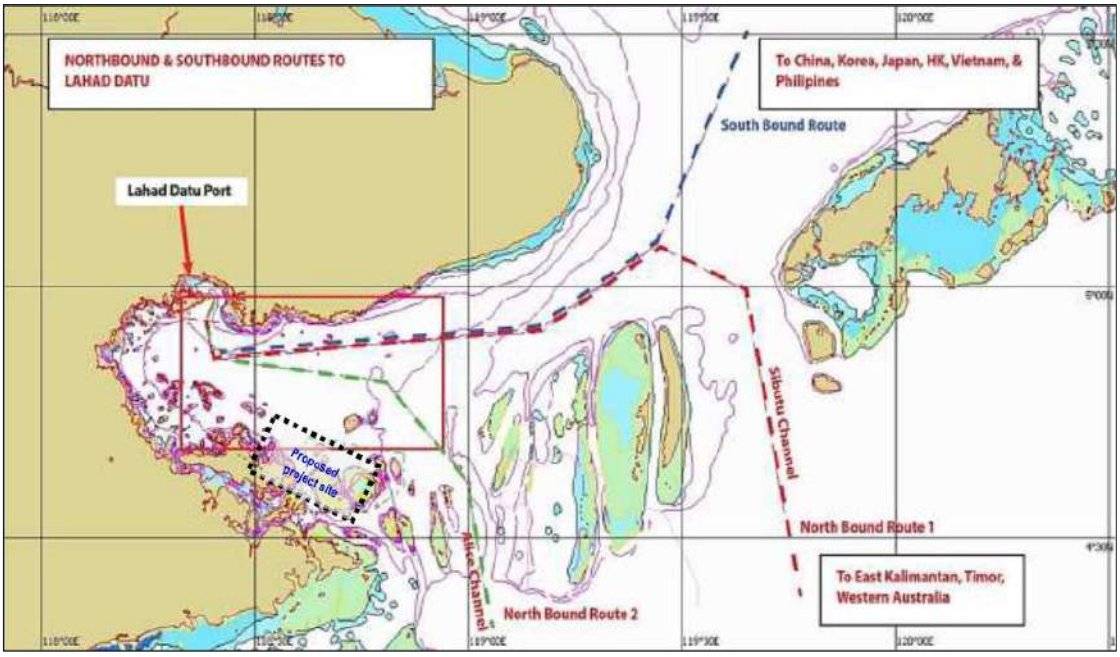


Figure 3.9 Shipping navigation routes to the Port of Lahad Datu in relation to the Semporna AIZ / iLAP site.

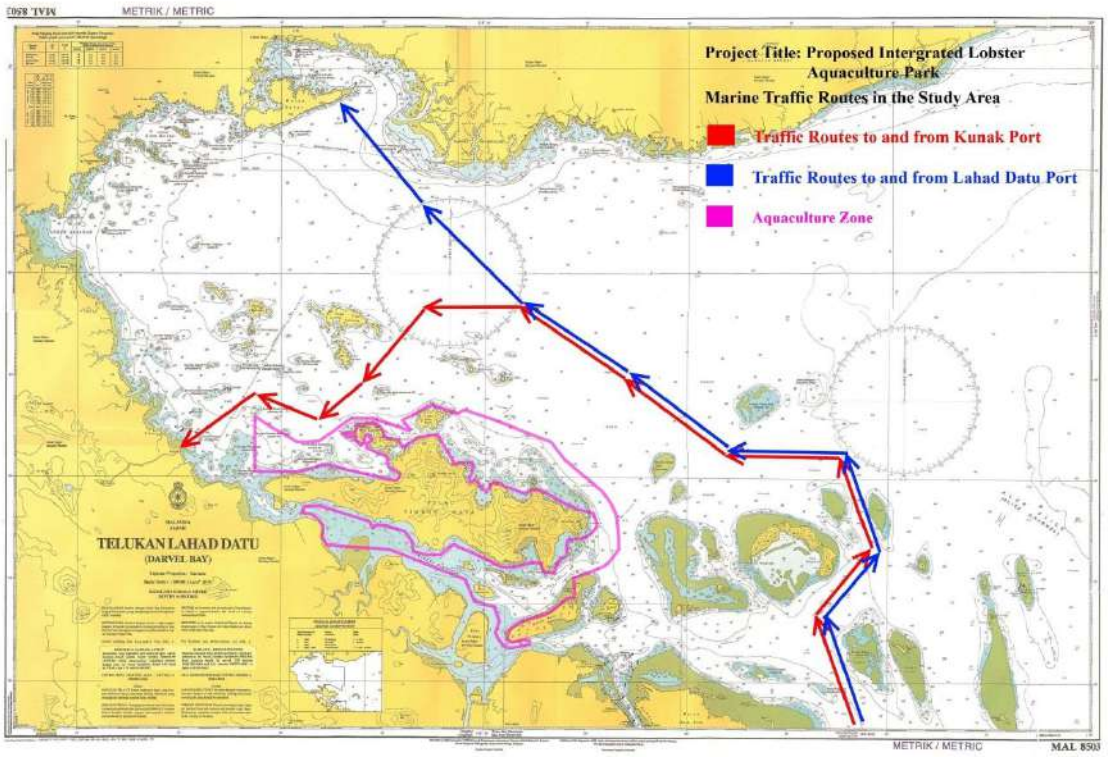


Figure 3.10 Main traffic routes by CPO barges around the Project.

There are several small jetties for fishermen and small passenger boats along the Semporna mainland coast, but also several larger “earth” jetties for more industrial purposes, which have been constructed on top of reef flats in some cases close to Kunak /10/. The islanders of P. Timbun Mata rely on boat traffic. Few villages have small wooden jetties. Due to the pirate and terrorist attacks in recent years, the Royal Malaysian Navy and Sabah Marine Police conduct patrols along Semporna waters to secure the Sabah borders (Photo 3.18).

Photo 3.18 Malaysian Royal Navy stationed within Semporna /13/

3.3.3.3 Agriculture

Subsistence farming is noted nearby the settlers on the northwest coastline of Timbun Mata. The soil within this island has been noted to be suitable for agriculture by the Department of Agriculture /10/.

Due to historical and present settlement on the P. Bait there are agricultural crops (tapioca, coconut, banana, fruit trees, etc.) in addition to secondary forest. There are also barren or cleared areas and grassland, colonised by lalang and other shrubs /14/.

On the mainland, the coastline from Kunak to Kg. Gading Gading is relatively developed, mainly for agriculture (oil palm plantations) and aquaculture. East of Kg. Gading Gading, the level of large scale development drops, with areas of mangroves and grassland in some of the hills around the Segarong Forest Reserve.

Photo 3.19 Oil Palm Plantation on P. Bait (© Johnny Gisil 2013)

3.3.3.4 Tourism

There is currently no tourism infrastructure available on P. Timbun Mata and P. Bait /10/. The reefs around Timbun Mata are utilised for scuba diving activities and are advertised as packages which include other dive attractions in the area.

3.3.3.5 Mariculture

A significant portion of the waters around Pulau Timbun Mata has been reserved by Sabah Fisheries Department as an Aquaculture Industrial Zone /10/. Pearl culture is currently undertaken on the north-northwestern part of the island, seaweed farming is concentrated to the south (Figure 3.11 and Photo 3.20).

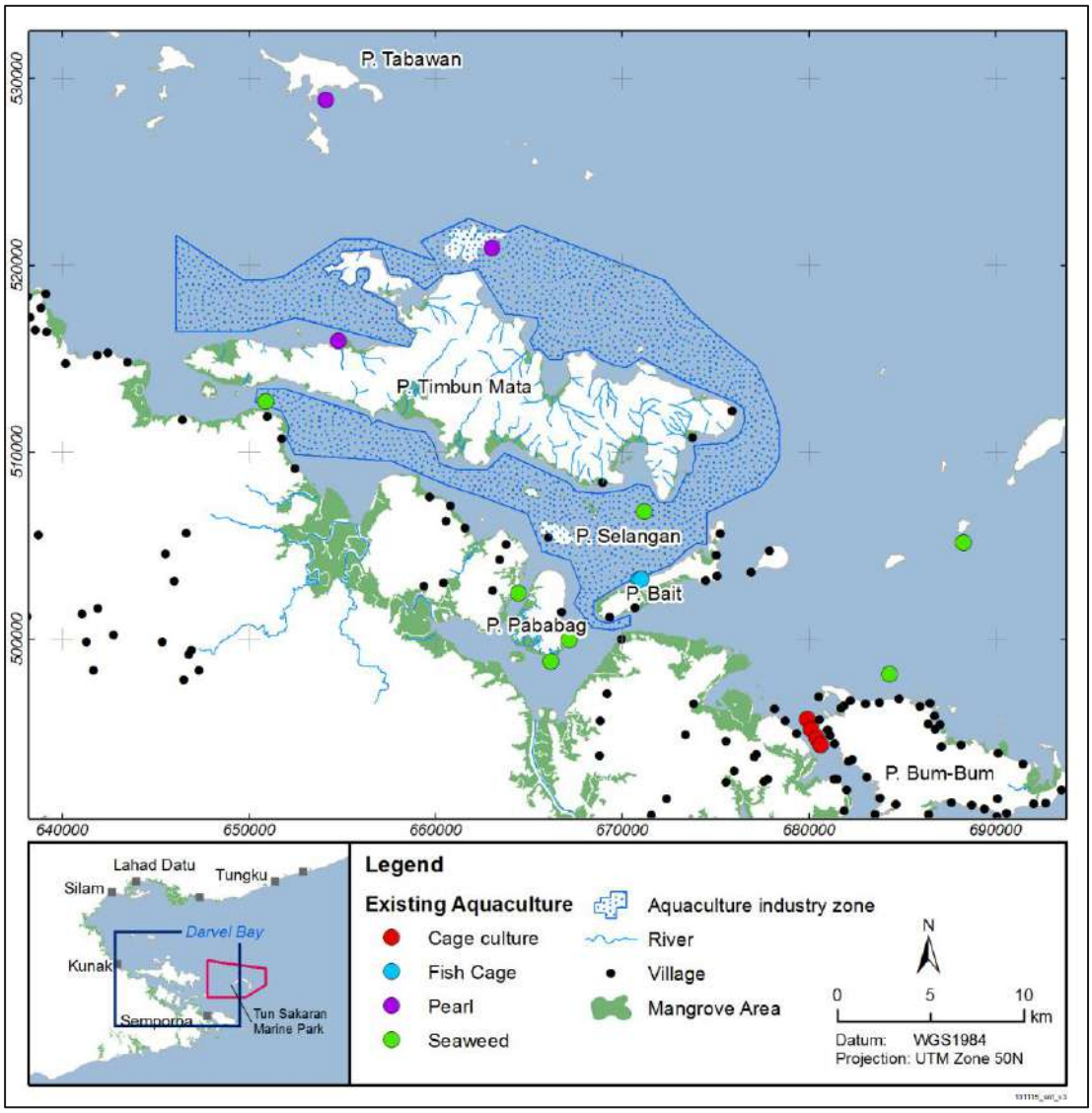


Figure 3.11 Pearl and seaweed mariculture within the study area.

Photo 3.20 Seaweed farm site around the project area (© Prof. Steve Oakley 2013).

4 Scoping of Environmental Issues

4.1 Proposed Priority Environmental Issues

Based on the scoping exercise, the priority issues are listed below. The subsequent sections describe the methods and tools in developing this priority list and also describe other issues of potentially less significance, classified as *Issues of Note* and *Remaining Issues.*

1. Impacts to water quality and seabed due to lobster feed, faeces and nutrient release and impacts to marine habitats

During feeding, not all the feed will be taken up by the lobsters. The residual feed (also known as feed waste) will be dispersed in the water column and eventually deposited on the seabed, contributing organic loads (faeces and feed waste) to these environments. The lobsters also secrete a significant amount of ammonium directly into the water column. Additional ammonium is also mineralised back into the water column over time as bacteria break down fallen faeces and feed waste.

Organic inputs from the farming activity will eventually deposit on the seabed, below and some distance away from the cages as the faecal material is dispersed by the currents before settling on the seabed.

The combined releases and deposition of nutrients/ organic matter from lobster secretion, excretion (faeces) and feed waste into the water column may result in eutrophication and algal blooms. This can in turn have adverse effects on coral reefs, which are adapted to oligotrophic (nutrient-poor) environments. In poorly flushed environments, levels of ammonium can increase, which may, under worst-case scenarios, lead to a phase shift, whereby healthy living corals, soft corals or sponges are replaced by macro algae communities. Eutrophication can also adversely affect seagrass communities, for example where high nutrient levels stimulate uncontrolled growth of epiphytic algae on the seagrass blades, which act to shade the plant from the sunlight.

Although additional nutrient inputs would cease upon project abandonment or decommissioning, the elevated nutrient and organic matter levels would persist for some time, with residual effects to marine habitats and communities.

2. Release of suspended sediments, heavy metals and other waste materials from cage maintenance

The cages like other marine structures offer substrate for marine organisms to colonise. These will need to be cleaned in order to allow for optimum water exchange in the cage. Due to the sheer number of cages it is likely that at least some of the maintenance activities will need to be carried out in-situ. The cleaning products and anti-foulant application will contribute to potential water pollution, in particular in the form of heavy metals (often found in anti-foulants e.g. copper), while the organic material that is removed from the nets may be deposited onto the seabed and also affect the seabed habitats.

There will also inevitably be other solid wastes in the course of the farm operations, including damaged nets, biological wastes, etc. which can impact public health and aesthetics, terrestrial and marine habitats and organisms if not appropriately managed.

3. Loss of mangrove within Forest Reserve due to jetty / bridge footprint

Approximately 13 ha of mangrove around the Tg. Kapor area will need to be cleared for the jetty/ bridge construction, and a limited area of mangroves on P. Bait. The mangroves at Tg. Kapor are part of the Semporna Mangrove Forest Reserve.

4. **Increased hunting/ harvesting pressure by farm workers targeting endangered or locally rare species such as giant clams, sea cucumber, etc.**

With the large number of farm workers concentrated around P. Timbun Mata waters, even casual or subsistence hunting or harvesting of marine resources could prove unsustainable, in particular for target or high value species.

5. **Socio-cultural conflicts due to workers' population, in particular if not local to the Semporna region.**

Preliminary observations in the field indicate that the locals of Semporna and the villages within the study area have a very strong local identity and the definition of 'outsiders' is a wide and multi-faceted one, including people of differing geographic and/ or ethnic origins.

Given this socio-cultural backdrop and the large workforce required, the potential for socio-cultural conflicts, in particular during the operational stage, is high.

Upon Project abandonment or decommission, a large labour force will become redundant. If the majority are not local to the area and are not appropriately repatriated, socio-cultural and socioeconomic impacts would be widely felt in the small communities around Timbun Mata/ Semporna.

6. **Impact of Project on existing and potential tourism activities around P. Timbun Mata**

Tourism on and around P. Timbun Mata is currently limited to a relatively small number of dive sites with low to moderate use. However, given its location near Semporna town, the gateway to the internationally renowned Sipadan dive site and the coral reefs, clear water quality and scenic beauty of the island, there is currently a high potential for tourism. There is hence a very high opportunity cost should the area be developed for aquaculture which would exclude or at best severely limit tourism development.

7. **Removal of cages/ waste management during abandonment phase**

Upon abandonment or decommissioning (depending on phase), a very large volume of cages (200,000 at full capacity) would need to be dismantled and removed. These comprise anchors, frames, nets, floats, workers' quarters, etc.; i.e. a wide range of waste types. **Improper / incomplete removal or disposal** of these farm structures and other solid wastes upon Project abandonment can have potential knock-on impacts on public health, aesthetics, navigation safety (in particular if safety lights are non-operational), terrestrial and marine habitats and organisms and hydrodynamics.

4.2 Issue Identification

The identification of all potential environmental impacts arising from the project has been undertaken through a review of the main project activities and the assessment of the receiving environment as outlined in Section 3.

4.2.1 Main Project Activities

As detailed in Section 2.3.1 (*Project Components and Scope*), the components of the iLAP project assessed in this study will include the following:

- Lobster Farming Area on Pulau Timbun Mata
  - Juvenile lobster grow-out Production Units **(PU)**
    - Placement and anchoring of cages
    - Maintenance of cages including removal of marine growth, repair or replacement of damaged structures
    - Daily feeding, including transportation of feed from the Operations Base to the Production Units.

        - Treatment of lobsters as needed, including use of pharmaceuticals if necessary at either a cage or PU scale. Treatments will general be in the form of baths.
    - Area for lobster research, development, training and a demonstration farm
- iLAP Operation Base **(OB)** on Pulau Bait
    - Bridge connecting to Tanjung Kapur Water Village or jetty option
    - Tarmac road
    - Warehouses
    - Staff housing
- Supporting infrastructure including access roads, jetty and worker quarters in Semporna

4.2.2 Identified Environmental Issues

Based on the above project activities, a long list of potential issues has been developed. The issues are categorised according to the **Environmental Component** and the type of impact. These categories are elaborated as follows:

A. Environmental Component

i) **Physical-chemical component:** covering all physical and chemical aspects of the environment, including finite resources (non-biological), and degradation and pollution of the physical environment;

ii) **Biological-ecological component**: covering all ecological aspects of the environment, including renewable natural resources, conservation of biodiversity, habitat-species interactions and pollution of the biosphere;

iii) **Socio-economic component**: covering all human aspects of the environment, including social issues affecting individuals and communities, cultural and aesthetic aspects, conservation of heritage sites, temporary and permanent economic consequences of environmental change.

B. Impact Category

i) **Process Impacts –** impacts relating to exploration and construction activities, i.e temporary, "process" impacts. These can generally be minimised by monitoring and pro-active management

ii) **Project Impacts** – impacts related to the operational activities as well as any permanent impacts arising from the developer's choice of project location and layout ("project impacts"). Project impacts are related to the Project design, and result in long-term impacts after the end of construction, although the impacts may be incurred or initiated during the construction stage. Project impacts in general can be minimised by planning and mitigation before the implementation of the project.

iii) **Abandonment stage** – the abandonment stage scenario considered in this scoping assessment is that the farm ceases operations after a period of operations (e.g. Phase 1 operations for around five years).

The potential environmental issues are listed in Table 4.1, Table 4.2 and Table 4.3 for the physical-chemical, biological and socioeconomic environment respectively.

Table 4.1 Long list of potential impacts – Physical–chemical environment.

Environmental Component		Process (Construction) impacts	Project (Operations /Permanent) impacts	Abandonment
1	Noise	Construction machinery, vehicles and activities	Generated by boats and vessels during operation	NA
2	Dust and fumes	Dust from earthworks, machinery emissions.	Fumes from boat and vessel engines	NA
3	Solid wastes generation	Generated by construction materials and wastes, workers quarters.	Wastes from cage maintenance activity, biological wastes from lobster/ mussel farms, office and workers areas	NA
4	Fuel oil spills and leaks	Vessels, construction plant	Operations vessels - feed barges, ferry, workshop areas	NA
5	Heavy metal contamination	NA	Heavy metals from biofoulants	Residual heavy metals in the system; no new loads (recovery phase)
6	Nutrient loading on seabed	NA	Nutrient loading from feed, faecal matter and lobsters	Residual loads in seabed. Recovery phase.
7	Nutrient loading on water column	Minimal nutrient loading from vegetation clearing and earthworks	Nutrient loading from feed, faecal matter and lobsters	Recovery phase
8	Suspended sediment	Sediment runoff from site clearing; piling for bridge/ jetty; anchoring of PUs	Suspended solids from cage cleaning and faeces	NA
9	Sewage and domestic waste water discharges	Discharges from workers quarters	Water pollution due to discharge from workers quarters on operations base and on PUs.	NA
10	Underwater noise	During piling, construction vessels	Boat traffic, maintenance activity	NA
11	Effects on current flow	NA	Effect of submerged cages; jetties and bridge on current flow.	Effect of submerged cages; jetties and bridge on current flow
12	Effects on wave climate	Minimal impact until towards the almost completion stage of the coastal structure construction	Cages; jetty/ bridge structures may reduce wave penetration in leeward zones	Cages; jetty/ bridge structures may reduce wave penetration in leeward zones

Environmental Component		Process (Construction) impacts	Project (Operations /Permanent) impacts	Abandonment
13	Effects on sediment transport	NA	Changes in waves and current patterns may result in erosion or sedimentation	Changes in waves and current patterns may result in erosion or sedimentation

Table 4.2 Long list of potential impacts – Biological-ecological components

Environmental Component		Construction / Process impacts	Operations /Permanent, project impacts	Abandonment
1	Air quality impacts on terrestrial flora and fauna	Dust and other air pollution can affect plants and fauna.	Air emissions, primarily from OB affecting terrestrial flora and fauna	NA
2	Aerial noise	Construction noise impacts on terrestrial fauna	Operational noise impacts on terrestrial fauna, including traffic on access road/ bridge, activities at OB.	NA
3	Underwater noise	Potential sound from generators or piling activities may disturb the marine organisms; high intermittent noise	Noise from increased marine traffic may disturb the marine organisms	NA
4	Lighting at night	Lighting at construction sites, on vessels, may disrupt circadian rhythms; influence fish behaviour, etc.	Lighting on PUs, from OB at night may disrupt circadian rhythms; influence fish behaviour, etc.	In the even OB facilities are utilised, e.g. by squatters, impacts of lighting may continue.
5	Impact of solid wastes generation on terrestrial fauna	The accumulation of solid waste may breed pests such as rodents, flies, etc, and spread diseases.	The accumulation of solid waste may breed pests such as rodents, flies, etc, and spread diseases. In addition, megafauna may ingest some solid waste causing choking or poisoning	Abandonment may lead to large amounts of waste (e.g. cage structures, nets) if not disposed properly.
6	Impact of solid wastes generation on marine fauna	Rubbish, plastics etc. may be eaten by marine turtles and other fauna; large construction wastes may damage the seabed	Rubbish, plastics etc. may be eaten by marine turtles and other fauna; discarded nets, cages etc. could damage seabed habitats if disposed of at sea, however could also provide fish aggregating habitat	Discarded nets, cages etc. could damage seabed habitats; however could also provide fish aggregating habitat
7	Terrestrial habitat loss	Clearing for access roads, workers' camps and other temporary structures	Loss of vegetation and mangroves in project footprint. This effect is permanent although incurred during the construction	No additional impact from operations/ permanent

Environmental Component		Construction / Process impacts	Operations /Permanent, project impacts	Abandonment
			stage.	
8	Impact of fuel spills and leaks on flora and fauna	Fuel spills and leaks from construction machinery and vessels.	Fuel spills and leaks from boats, work shop areas.	NA
9	Impact of sewage and waste water contamination on marine flora and fauna	Nutrient overloading and untreated wastewater will deteriorate the water quality and harm the marine organisms	Nutrient overloading and untreated wastewater will deteriorate the water quality and harm marine life	NA
10	Heavy metal effects on marine ecology	NA	High metal concentrations may have toxic effects on marine organisms	Residual heavy metals may persist in sediments; Recovery phase
11	Nutrient loading/ water quality deterioration impacts on marine environments	Minimal nutrient loading due to vegetation clearing and earthworks	As lobsters digest feed they release organic nutrients into the water column that may potentially cause eutrophication which in turn could result in algal blooms or a phase shifts from coral to algal communities.	Residual nutrient loads may persist in sediments. Recovery phase
12	Introduction of alien species and/or diseases to wild species	NA	Introduction of alien or invasive species to P. Bait due to road link; or the transportation of lobster from other locations during which other species i.e. algae are accidently released from the water used to transport the lobster from one location to another. Risk of disease introduction from farmed lobster; particularly those transported to the farm from outside of Semporna. (Also applies to escapees section below). Development of resistant pathogens due to use of pharmaceuticals e.g. antivirals and antibiotics. Changed response to disease due to use of pharmaceuticals affect wild marine fauna populations	NA

Environmental Component		Construction / Process impacts	Operations /Permanent, project impacts	Abandonment
13	Escapees	NA	Farmed lobster can escape and breed with wild populations. This potentially alters genetic traits like resistance to specific diseases.	NA
14	Direct, physical destruction or removal of aquatic habitat	NA (permanent, project-related impacts are considered in the Operations / Project impacts)	The construction of jetty, anchoring of cages impacts on seabed habitat, e.g. corals, seagrass.	NA/ recovery
15	Creation of habitat due to marine structures - cages; jetty piles, etc.	NA	Fish aggregation (positive) – adult fish associated with cages; these will grow and eventually migrate out from the caged area.	Fish aggregation (positive)
16	Increased hunting/ harvesting pressure due to workers	Construction workers based on Tg. Kapor or P.Bait – hunting of terrestrial fauna e.g. on Timbun Mata and potentially marine resources e.g. clams, sea cucumber	Aquaculture workers on the PUs and workers on P. Bait OB - hunting of terrestrial fauna and marine resources e.g. clams, sea cucumber	NA
17	Suspended sediment impacts on marine habitats	From anchoring of PUs, piling for bridge/ jetty.	From cage cleaning, increased runoff from built up areas (OB)	Runoff from built up areas (OB)
18	Hydraulic impacts (changes in current and wave conditions) affecting marine habitats	NA	Changes in currents and wave exposure may alter bottom habitats such as seagrass beds.	NA
19	Sediment transport/ morphological impacts affect benthic habitats	Na	Erosion/ sedimentation may affect seagrass/ mangrove areas.	NA

Table 4.3 Long list of potential impacts – **Socioeconomic components**

Environmental Impact		Construction / Process impacts	Operations /Permanent, project impacts	Abandonment
1	Compatibility with adjacent land uses (existing and planned)	NA (project-related)	OB vs agricultural/ traditional village land uses on Bat; integrated lobster farming vs. seaweed and other types of aquaculture; opportunity cost for tourism	NA
2	Solid waste impacts on public health, aesthetics	Construction wastes	Farm wastes	NA
3	Increase in land traffic	Increased construction traffic	Increased traffic from project and also public users of created infrastructure.	NA
4	Cultural conflicts owing to increased population/ foreign workers	Construction workforce	Operational workforce	NA
5	Impact on natural aesthetics of the islands	Construction activity	OB, Cages	OB, cages
6	Impact of ambient noise levels on public health and well-being	Increase due to construction and operation of project base and PUs	Minimal noise generating activities from day to day operations	NA
7	Impacts due to loss of land/ sea space	NA (considered permanent, project related impact although may be incurred during construction phase)	Loss of traditional use land, heritage areas.	NA
8	Increased employment and entrepreneurial opportunities	Construction labour, contracts, supply of materials, services	Employment and contract farming, supply of operational equipment and consumables	NA
9	Training opportunities	Minimal	Training for employees and contract farmers, R&D.	NA
10	Obstruction to navigation	Due to construction vessels, machinery	Due to PUs, bridge/ jetty	Bridge/ jetty
11	Increased marine traffic impacts on marine navigation safety	Due to construction vessels, machinery	Due to PUs and operational boat traffic	NA

Environmental Impact		Construction / Process impacts	Operations /Permanent, project impacts	Abandonment
12	Impact on existing and potential tourism activities	Aesthetic impacts of construction works	Development of large scale farm will exclude existing and potential tourism/ diving around P. Timbun Mata.	Potential for rehabilitation
13	Impact on existing seaweed production	Suspended sediments may affect seaweed farms.	Loss of seaspace for seaweed expansion; on the other hand potential benefit from increased nutrient levels	NA
14	Water quality impacts on existing aquaculture farms (fish cage, pearl farms)	Suspended sediments and oil spills or leaks may affect aquaculture	Loss of seaspace, water quality (eutrophication) impacts	Residual water quality; seabed habitat impacts
15	Impact on existing fishing areas / fisheries resources and activities	Construction machinery, disturbance, water quality impacts etc impact on fishing activities	Loss of fishing grounds to farm area; Potentially increased fish numbers owing to cages providing habitat for fish	Residual benefits from cages as fish aggregation structures
16	Shoreline erosion impacts on properties and land uses	NA	Potential impacts on land ownership/ income (e.g. agriculture)	Potential impacts on land ownership/ income (e.g. agriculture)

4.3 Environmental Scoping Matrix

A preliminary evaluation of the potential environmental impacts was carried out in order to prioritise the issues. The Rapid Impact Assessment Matrix (RIAM) was utilised as a framework for the assessment, which structures the assessment based on consideration of the importance, magnitude or severity, permanence, reversibility and cumulatively for each potential environmental impact.

The assessment describes the worst potential impacts of improper design, construction and operations. While the impacts identified do not include mitigation measures, the availability of mitigation measures is considered when assigning the severity or magnitude of the impact.

The RIAM methodology is described further in Section 4.3.1, while the results are presented in Section 4.3.2.

4.3.1 Methodology

4.3.1.1 Evaluation Criteria

The RIAM framework structures the assessment on five criteria which are grouped into two categories as detailed below.

Group A Criteria

There are two criteria within Group A:

A1: **Importance** of the condition, which is assessed against the spatial boundaries, or human interests it will affect (Table 4.4); and

A2: **Magnitude**, which is defined as a measure of the scale or severity of benefits/dis-benefit of an impact (Table 4.5). At this scoping stage (i.e. prior to the impact prediction studies), the evaluation of impact magnitude/ severity has been based on the expert judgement of the consultants.

Table 4.4 Importance of the condition – scoring, generic and project-specific definitions.

Score	Definition	Project-Specific Description
4	Important to national/international interests	Malaysia as a whole and a cross-border effects to Philippines and Indonesia/ Coral Triangle
3	Important to State / national interests	Tun Sakaran Marine Park/ Semporna district / Sabah / Malaysia
2	Important to areas immediately outside the local condition	Southern Darvel Bay/ adjacent mainland shorelines
1	Important only to the local condition	Pulau Timbun Mata and Pulau Bait and waters within Project site
0	No importance	No importance/ not relevant

Table 4.5 Magnitude of the impact

Score	Definition
+3	Major positive benefit
+2	Significant improvement in status quo
+1	Improvement in status quo
0	No change/status quo
-1	Negative change to status quo
-2	Significant negative dis-benefit or change
-3	Major dis-benefit or change

Group B Criteria

Group B criteria are:

- **Permanence (B1)**

This defines whether a condition is temporary or permanent and should be seen only as a measure of the temporal status of the condition.

- **Reversibility (B2)**

This defines whether the condition can be changed and is a measure of the control over the effect of the condition. It should not be confused or equated with permanence.

- **Cumulativity (B3)**

This is a measure of whether the effect will have a single direct impact or whether there will be a cumulative effect over time, or a synergistic effect with other conditions.

The scale of each Group B criterion is shown in Table 4.6 below.

Table 4.6 Scale for Group B criteria.

Score	Permanence (B1)	Reversibility (B2)	Cumulativity (B3)
1	No change/Not applicable		
2	Temporary	Reversible	Non-cumulative/Single
3	Permanent	Irreversible	Cumulative/Synergistic

4.3.1.2 Score and Range System

For each potential impact/ issue, an environmental score (ES) is calculated based on the following formula:

$$ES = A1*A2\ (B1+B2+B3)$$

The ES scores are then banded together into ranges as detailed in Table 4.7. The range values span from major positive impact +E to major negative impacts -E.

Table 4.7 Range bands used for RIAM

RIAM Environmental Score (ES)	Range Value (RV)	Description of RV
72 to 108	E	Major positive impact

RIAM Environmental Score (ES)	Range Value (RV)	Description of RV
36 to 71	D	Significant positive impact
19 to 35	C	Moderate positive impact
10 to 18	B	Minor positive impact
1 to 9	A	Slight positive impact
0	N	No change/Status quo/Not applicable
-1 to -9	-A	Slight negative impact
-10 to -18	-B	Minor negative impact
-19 to -35	-C	Moderate negative impact
-36 to -71	-D	Significant negative impact
-72 to -108	-E	Major negative impact

4.3.2 Scoping Matrix Results

Each potential environmental issue listed in Table 4.1, Table 4.2 and Table 4.3 above has been scored using the RIAM for the three major Project components:

- Operation Base (OB);
- Production Unit (PU); and
- Jetty/ Bridge and Access Roads (Jetty-Road).

The number of environmental issues falling within each range band is shown in Figure 4.1 for Process, (construction), Project (operations) and Abandonment impacts, with the contribution from each of the above Project components also indicated. The figure shows that the highest significant impacts are Operations or Project-related impacts, and arise from the Production Unit operations. Impacts from the Jetty/Bridge and Road development are more evident during the Construction Stage.

As also illustrated in the figure, a number of significant impacts (-D) could potentially occur upon Project abandonment, again primarily arising from the Production Unit component.

The impacts that have been determined to be potentially significant are discussed further below according to the impact categories.

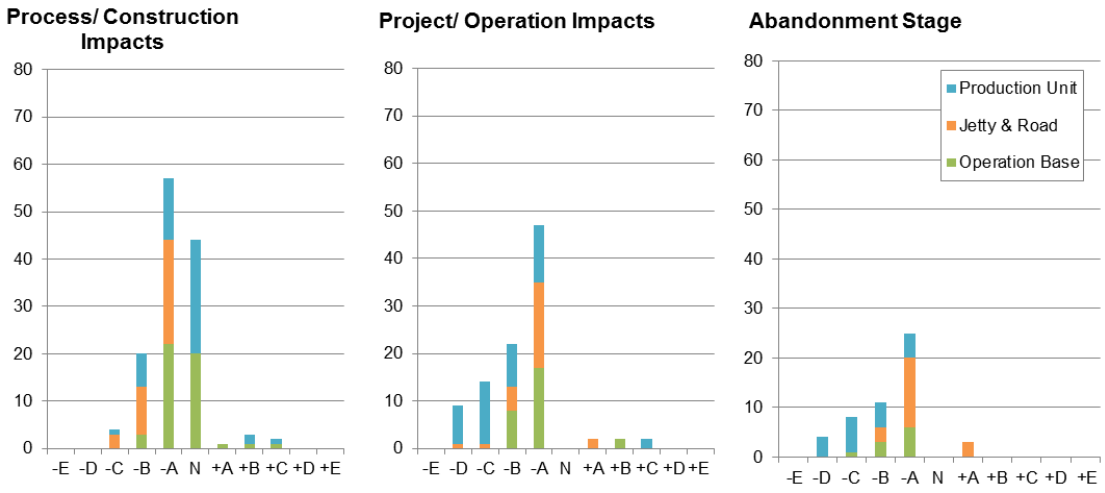


Figure 4.1 Overview of RIAM results for all project components and stages.

4.3.2.1 Process Impacts

Process, or Construction stage impacts fall primarily within the *Slight negative impact* (-A) and *Negative impact* (-B) categories for all the main project components as shown in Figure 4.2. A number of *Moderate negative* and *positive impacts* are predicted for the Jetty/ Bridge and PU construction activities as listed below:

- Jetty / Bridge:
  - Underwater noise, especially during piling
  - Impact of underwater noise on marine fauna
  - Clearing of vegetation for workers' camps and other temporary activities, in particular if mangrove forest reserve is affected
- Production Units:
  - Impact of improper solid wastes disposal on marine fauna
  - Increased employment and entrepreneurial opportunities (Positive)
  - Increased training opportunities (Positive)

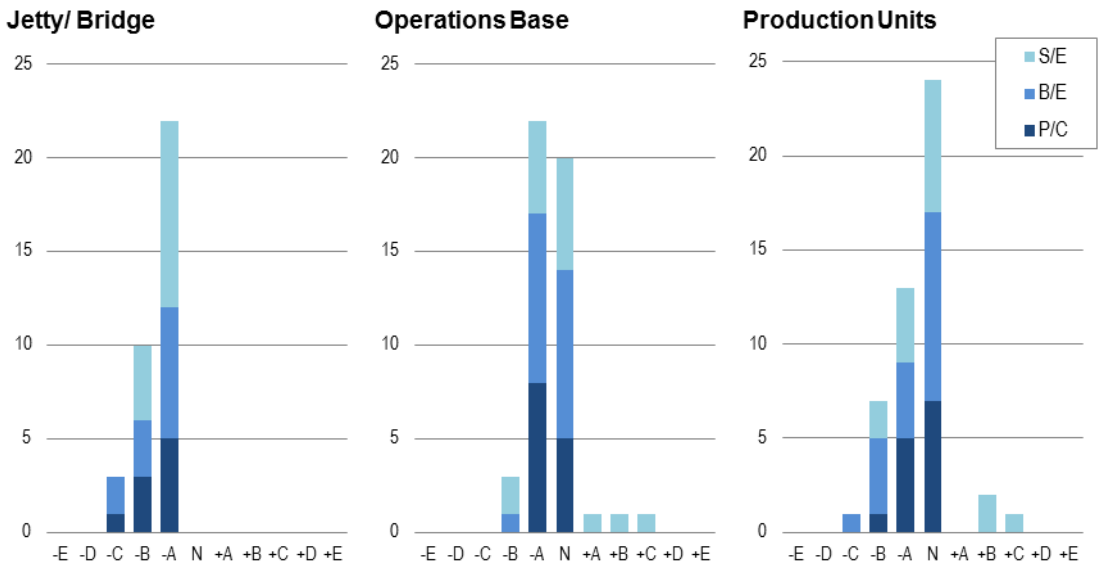


Figure 4.2 Assessment results for the **Process Impacts/Construction Stage**

4.3.2.2 Project Impacts

Project impacts – i.e. permanent or operational stage impacts, *Significant negative impacts* are incurred primarily from activities associated with the Production Units, although one significant issue was also identified for the Jetty/ Bridge component (see Figure 4.3). These *Significant* issues are:

- Jetty – loss of vegetation and mangroves in project footprint. Approximately 13 ha of mangroves within a Mangrove Forest Reserve will be affected.
- Production units:
  - Solid wastes generated from cage maintenance activities, biological wastes from the lobster/ mussels, workers areas.
  - Nutrient loading into the water column from feed, faecal matter and lobsters
  - Nutrient loading onto the seabed from feed, faecal matter and lobsters
  - Impact of eutrophication on marine habitats, e.g. coral reefs and seagrasses.
  - Increased hunting/ harvesting pressure due to aquaculture workers, which may target species, e.g. giant clams, sea cucumber, etc.
  - Impacts of solid wastes generated on public health, aesthetics
  - Impact on existing and potential tourism around P. Timbun Mata

A large number of *Moderate negative* impacts were also identified for the PU component:

- Water quality pollution due to heavy metals release from antifoulants used on cages and consequent impacts on marine ecology
- Release of suspende1qd sediments from cage cleaning and consequent impacts on marine ecology
- Noise, lighting disturbance to marine fauna
- Impact of solid wastes on marine organisims
- Direct impacts to the seabed and benthic habitats from PU anchor footprints
- Loss of fishing grounds within Project area
- Loss of sea space which may be utilised or have heritage value to the local population, regardless of ownership.
- Conflicts with adjacent land users, e.g. pearl farms, seaweed farms and other aquaculture, including water quality impacts
- Cultural conflicts due to workforce population, in particular if a large number are not local to the area.
- Aesthetic impacts of PUs
- Obstruction to navigation

Positive impacts were also identified, related to the increased economic opportunities the Project will bring.

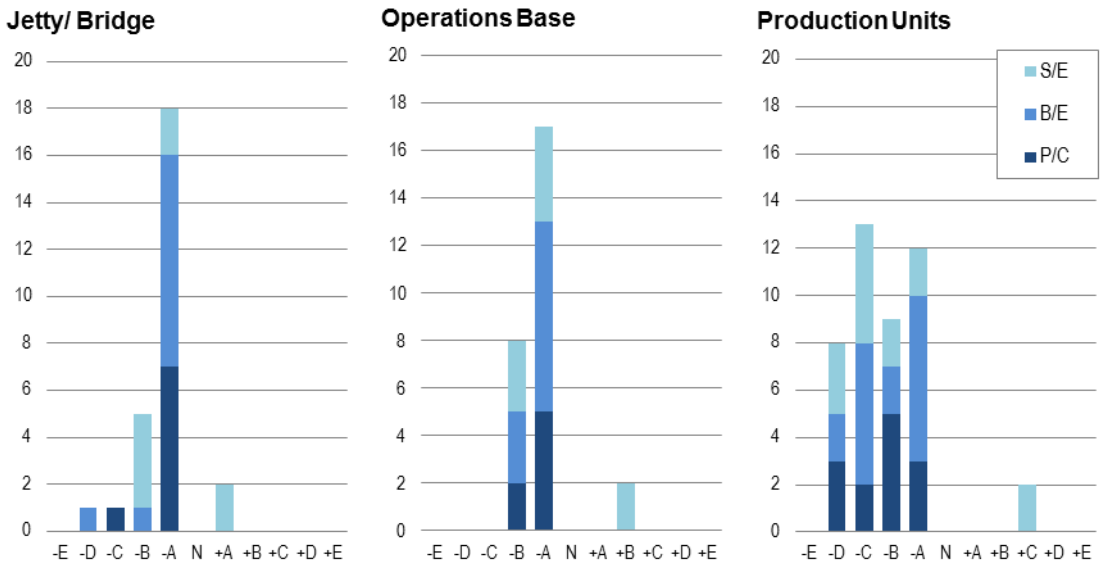


Figure 4.3 RIAM assessment results for the **Project Impacts / Operational Stage**.

4.3.2.3 Abandonment Stage

During the Abandonment Stage, most of the impacts fall into the neutral (N) category (Figure 4.4) because the cessation of the project operation will essentially remove negative environmental impacts such as water quality, air and noise pollution. There will however be a period of time where residual impacts will remain, in particular for issues such as organic and nutrient loading to the seabed, where it may take up to five years for the seabed to return to its original stage.

The abandoned and unattended Operation Base buildings could potentially be occupied by illegal settlers, which may result in sewage and waste management issues, however, the jetty/ bridge and access road would continue to benefit the villages in the area and on P. Bait.

In summary, the key *Significant* negative impacts are as follows:

- Solid wastes – if cages, nets, etc. are not properly disposed of upon abandonment of Project – this may potentially impact human health, marine and terrestrial fauna
- Social impacts – if a large workforce is left jobless upon Project abandonment, particularly if non-local.
- Risk to navigation safety if cage structures are not removed and safety lighting no longer utilised or maintained.

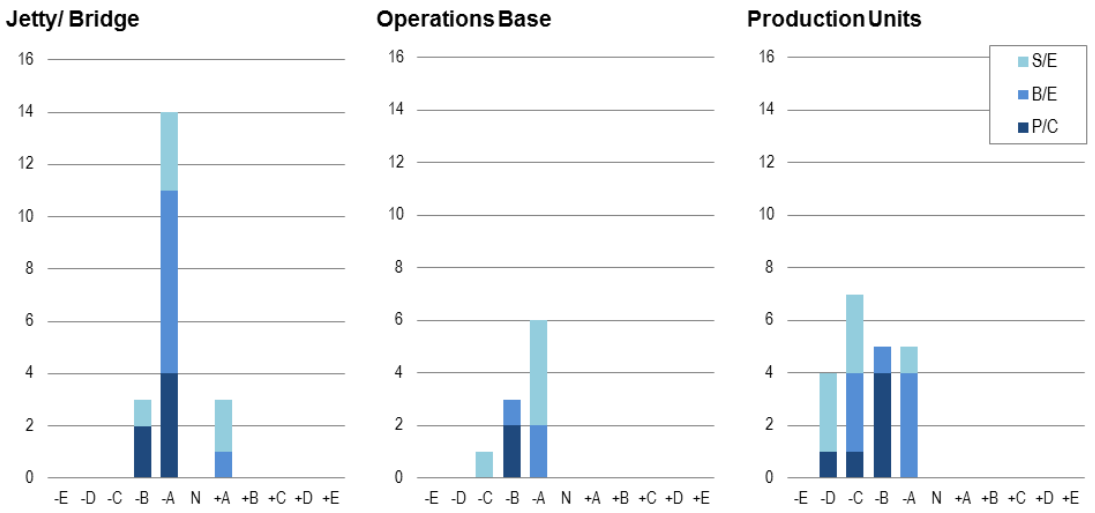


Figure 4.4 Summary RIAM assessment results for **Abandonment Stage**.

4.4 Summary of Impact Prioritisation

Based on the RIAM findings above, the potential environmental impacts of the project have been categorised into the following:

- **Priority Issues**: These are topics of greatest concern that require the most attention during the EIA study with the most rigorous analysis and detail in the EIA. *Significant* and *Major* impacts from the RIAM analysis (Category D and E), and root-cause issues of such impacts fall within this category.
- **Issues of Note**: These issues do not have the same focus as the Priority Issues described above, but nevertheless require serious consideration and a substantive analysis. *Negative* and *Moderate* impacts from the RIAM analysis (Category –B and –C) are grouped in this category.
- **Remaining Issues**: These issues are not considered to require in-depth analysis beyond showing that significant impacts can be prevented with standard mitigation or regulatory conditions. All *Slight* impacts (A) and remaining impacts not within the above-mentioned categories fall within this group.

Based on the above categories, the Priority issues, Issues of Note and Remaining issues are listed in Table 4.8, Table 4.9 and Table 4.10 respectively.

Table 4.8 **Priority** issues

Operation Stage or Permanent Project related issues	**1.** Impact to **water quality** and **seabed** chemical composition from release and deposition of nutrients/ organic matter from lobster secretion, excretion (faeces) and feed wastes. Consequent impacts to corals and seagrasses and other marine flora and fauna. **2.** Impact of **solid wastes** from cage maintenance (e.g. suspended sediment, heavy metals and other wastes), biological wastes and workers areas at the PUs. Consequent impacts on public health and aesthetics, terrestrial and marine habitats and organisms. **3.** **Loss of mangrove** within Forest Reserve due to jetty / bridge footprint **4.** **Increased hunting/ harvesting pressure** by farm workers targeting endangered or locally rare species such as giant clams, sea cucumber, etc. **5.** **Socio-cultural conflicts** due to workers' population, in particular if not local to the Semporna region **6.** Impact of Project on **existing and potential tourism** activities around P. Timbun Mata
Construction Stage or Temporary Process-related issues	-
Project Closure/ Abandonment Issues	**7.** Impacts of **improper removal or disposal of farm structures** and other solid wastes upon Project abandonment on public health and aesthetics, navigation safety, terrestrial and marine habitats and organisms and hydrodynamics. **8.** **Socioeconomic and cultural impacts** if the large worker population are left jobless upon Project abandonment, particularly if the majority are not local to the area. **9.** Residual impacts to **water quality** and **seabed** from nutrient and organic matter enrichment

Table 4.9 Issues of **Note**

Operation Stage or Permanent Project related issues	**1.** **Solid wastes generation** at *OB* and impact on terrestrial and marine fauna. **2.** **Sewage and domestic waste water discharges** from *OB* and workers quarters on *PUs* and impact on marine life. **3.** **Noise** impacts from marine and land traffic at *jetty/ bridge* and *OB* **4.** **Underwater noise** impacts on marine megafauna during *PU* operations **5.** **Oil spills and leaks** from *PU* operations and impact on water quality, marine organisms **6.** Impact of **lighting** along *PUs* on marine fauna **7.** **Heavy metal pollution** in water and sediments from antifoulants on cages. **8.** **Suspended sediments** released from cage cleaning and impacts on marine flora and fauna **9.** Effect of *PUs* on **hydrodynamics and sediment transport** and consequent effects on marine habitats and communities. **10.** **Loss of land / sea space** within project area – socio-economic, heritage impacts **11.** **Increased marine traffic** around *PUs, jetty* option. **12.** **Increased employment and entrepreneurial opportunities** (Positive impact) **13.** **Skills training opportunities** for local population (Positive impact) **14.** **Removal of seabed habitat** within cage anchoring areas at *PUs* **15.** **Aesthetic impact** during project operations **16.** **Compatibility** with adjacent **land uses** **17.** **Impacts to seaweed, pearl farms** due to water quality impacts, noise, etc. **18.** **Impact to fisheries** due to water quality impacts, noise, obstruction of fishing grounds and navigation routes, etc.
Construction Stage or Temporary Process-related issues	**19.** **Air quality** impacts and consequent impacts to terrestrial flora and fauna. **20.** **Solid wastes generation** during *PU* construction with consequent impacts to human and biological environments. **21.** Impact of **construction noise** on villages at Tg. Kapor and on P. Bait **22.** **Underwater noise** impacts on marine megafauna, in particular piling for *jetty / bridge*. **23.** **Suspended sediments** from piling for jetty/ bridge and consequent impacts on marine ecology **24.** **Habitat loss** for temporary facilities and access (jetty and operations base). **25.** Impact of **oil spills and leaks** on water quality and marine organisms during construction **26.** Disturbance to terrestrial and marine fauna from construction site **lighting** at night; in particular around the *PUs* **27.** **Increased hunting/ harvesting pressure** on terrestrial and marine wildlife due to construction workers **28.** **Socio-cultural conflicts** due to construction workers' population, in particular if not local to the Semporna region **29.** **Obstruction to navigation** from construction vessels and machinery **30.** Increased **marine traffic** during construction of *bridge/ jetty* and *PUs*, with

	increased safety risk **31.** Construction vessels and machinery posing **obstruction to existing fishing areas and fishing activities.** **32.** **Impact to fisheries** (fishing grounds, resources and activities) from sediment runoff and other construction-related water pollution. **33.** **Impacts to seaweed, pearl farms** from sediment runoff and other construction-related water pollution **34.** Impact of construction activities on existing **tourism** activities. **35.** **Increased employment and entrepreneurial opportunities** (positive impact) **36.** **Skills training opportunities** for local population (Positive impact)
Project Closure/ Abandonment Issues	**37.** **Sewage and domestic waste water** discharges from *OB* and workers quarters on *PUs* post-operations, depending on usage (e.g. if taken over by squatters upon abandonment). **38.** **Residual heavy metal pollution** in water and sediments and impacts on marine flora and fauna **39.** **Aesthetic impact** of *OB, PUs* upon abandonment

Table 4.10 **Remaining** Issues

Operation Stage or Permanent Project related issues	**1.** **Noise** from *OB* and *PUs* operations and impacts to villagers, terrestrial flora and fauna **2.** **Air quality** impacts due to *jetty/ bridge* (land traffic) and *OB* operations, with consequent impacts to human & biological receptors. **3.** Impact of **lighting** on *jetty/bridge, OB* during operations on wildlife **4.** **Oil spills and leaks** from *jetty/bridge* and *OB* during operations **5.** **Underwater noise** impacts on marine fauna during jetty operations (due to marine traffic) **6.** Effect of *bridge/ jetty* structure on **hydrodynamics and sediment transport** with consequent impacts on marine habitats and communities **7.** **Removal of seabed habitat** due to *jetty/ bridge* piles/ footprint. **8.** **Creation of habitat** due to cages, piles, etc. for colonisation of marine organisms. **9.** *PU*/ cages providing **fish aggregation** areas (positive) **10.** **Introduction of alien species** (terrestrial) during operations through *bridge* link option from mainland to P. Bait **11.** **Introduction of diseases** to the marine environment during operations **12.** **Improved connectivity** for villagers to P. Bait with bridge/ jetty construction (positive) **13.** Economic loss from **shoreline erosion** due to jetty/ bridge structures or presence of cages.
Construction Stage or Temporary Process-related issues	**14.** Impact of increased **land traffic** during construction **15.** **Runoff and sediment /nutrient loading** during vegetation clearing and earthworks (*jetty/ bridge, OB*), resulting in eutrophication and impacts to marine environment. **16.** **Sewage and domestic waste water discharges** from construction workers' quarters (*Jetty / bridge, OB, PU*) **17.** **Solid wastes generated** during *jetty/ OB* construction with impacts to human & biological environment. **18.** Construction **noise** impacts on terrestrial fauna. **19.** **Aesthetic** impacts **20.** Impacts of construction activities (noise, aesthetics, runoff, etc.) on existing **tourism activities**
Project Closure/ Abandonment Issues	**21.** Residual **noise** impact post-operations due to presence of access road and jetty/ bridge and consequent impacts to human environment and terrestrial and marine fauna. **22.** Residual **air quality** impacts during abandonment stage due to land traffic along access road, bridge/ jetty. **23.** **Solid waste impacts** on public health if *OB* is used (e.g. squatters) but not maintained upon project abandonment. **24.** **Introduction of alien species** post-operations through bridge link option from mainland to P. Bait **25.** **Residual** effects due to **introduction of diseases** during operations

5 EIA Scope of Works

5.1 EIA Scope and Approach

The EIA spatial scope is limited to the development components in Semporna; i.e. excluding the broodstock breeding centre in Kudat and processing plant development in Kota Kinabalu. Hence the main project components covered within the EIA shall be:

- iLAP Operations Base
- iLAP Grow Out Areas
- Bridge or Jetty option

5.1.1 EIA Study Components

Per the scoping exercise in the previous section, the main focus of the EIA is on the environmental features of the study area outlined in Table 5.1.

Table 5.1 EIA study components

Component	Sub-Component
Physical-chemical Environment *Physical processes have a direct influence on the ecology of the area and an understanding of these processes is required to understand the potential impact of the Project.*	• Topography and Landuse • Bathymetry • General Climate and Meteorology • Coastal Hydraulics • Marine Water Quality • River Water Quality • Marine Sediment Quality and Characteristics • Air Quality • Noise Level
Biological Environment	• Macrobenthos • Plankton • Mangrove • Seagrass • Corals • Fish fauna • Marine megafauna • Terrestrial flora and fauna
Human Environment	• Population Distribution • Socioeconomic Profile • Fishing and Aquaculture • Agriculture • Awareness and Perception towards Project • Land use

Component	Sub-Component
	• Public Amenities • Marine Traffic and Navigation

5.1.2 Spatial Boundary

The EIA shall cover the spatial boundaries as detailed below and shown in Figure 5.1 to address the potential impacts of iLAP:

- Socioeconomic Study & Biological-ecological environment: 5 km from the iLAP project boundary.
- Hydraulic study: local model covers coastal processes in detail around P. Timbun Mata, P. Bait and the channels between the islands as well as the mainland (Trusan Sigalong).

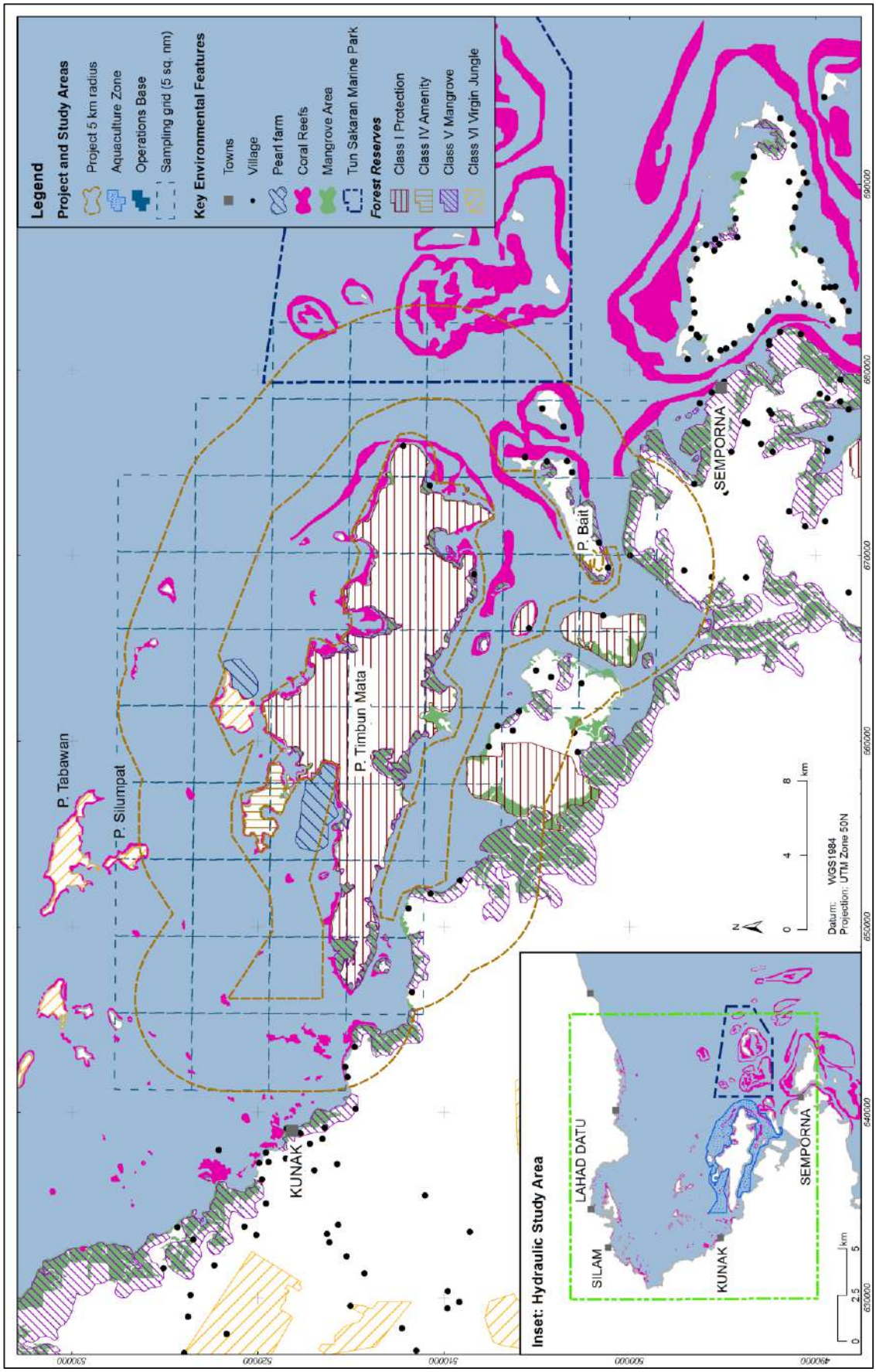


Figure 5.1 EIA Study Boundaries that include potential land based pollution sources.

Table 5.2 Potential zones of impact (ZOI)

Component	Zone of Impact (ZOI)	Remarks/ Potential Impact Associated with the Project
Physical-Chemical Environment		
Hydraulic impacts	Affected areas: • Tg. Kapor – within project site • P. Bait – within project site • P. Timbun Mata – ~ 100 m from project site Impacts can extend up to 1-2 km from project site	• Changes in currents, wave exposure and sediment transport • Local model boundary extends over 25 km from project site
Water quality	5 km radius – primary data collection Modelling to capture impacts over 25 km from project site	• Suspended sediments • Eutrophication • Heavy metals
Sediment quality	Up to 2 km from project site	• Organic/ nutrient enrichment • Heavy metals • Solid wastes
Air & Noise quality	Affected areas (Within 1 km): • Tg. Kapor • P. Pababag • P. Timbun Mata • P. Bait	• Changes in noise levels and air pollutants • Changes in quality of life of villagers
Biological-Ecological Environment		
Coral reef	Within project site	• Eutrophication and deposition impacts
Seagrass	Within 3 km of project site	• Eutrophication and deposition impacts
Benthos	Within project site and up to 1 km from project site Study area within 5 km radius of Project	• Seabed deposition impacts • Changes to habitat
Fish Fauna	Study area within 5 km radius of Project	• Changes in migration routes • Changes in habitat
Turtles	Within Project site, P. Timbun Mata beaches	• Disturbance to navigation to nesting areas • Disturbance to foraging activity
Marine Megafauna	Within Project site	• Disturbance to navigation • Disturbance to foraging activity

Component	Zone of Impact (ZOI)	Remarks/ Potential Impact Associated with the Project
Terrestrial Flora	Within Project site: • Tg. Kapor • P. Bait (location of the operations Base)	• Clearing
Terrestrial Fauna	Within Project site: • Tg. Kapor • P. Bait (location of the operations Base)	• Habitat loss • Disturbance
Forest Reserve	• Semporna Forest Reserve (Mangrove) – within project site (Tg. Kapor)	• ROW for access road to bridge/ jetty
Mangrove	Within project site – P. Bait, Tg. Kapor P. Timbun Mata – 100 – 200 m.	• Deforestation
Tun Sakaran Marine Park	~ 900 m east	• Water quality and deposition impacts to corals.
Human Environment		
Villages on P. Timbun Mata (4 villages)	0.5 km to 1 km of iLAP	• Air and noise impacts; • Socio-cultural impacts; • Navigation routes • Fishing grounds. • Employment pool
Villages on P. Bait (5 villages)	Within project area (Operations Base) and up to 2 km from iLAP	• Air and noise impacts; • Socio-cultural impacts; • Navigation routes • Fishing grounds. • Employment pool
Villages on P. Pababag (1 village)	0.9 km radius from iLAP	• Air and noise impacts; • Socio-cultural impacts; • Navigation routes • Fishing grounds. • Employment pool
Villages on mainland (16 villages)	Within 0.4 km to 5 km radius from iLAP	• Air and noise impacts; • Socio-cultural impacts; • Navigation routes • Fishing grounds. • Employment pool

Component	Zone of Impact (ZOI)	Remarks/ Potential Impact Associated with the Project
Pearl farm	Adjacent to project site/ within 0.5 km of iLAP	• Potential changes to water quality affecting the health of the oysters
Seaweed farm	Within the ILAP zone extending to a 5 km radius	• Potential changes to water quality potentially affecting the seaweed health.
Cage Culture	0.3 km to 5 km radius from the ILAP zone	• Potential changes to water quality potentially affecting the growth of the fauna within the cage culture.
Marine Navigation	Project site and within 2-5 km radius (CPO route to Kunak Port)	• Increased marine traffic and obstruction caused by PUs leading to increased accident risk

5.1.3 Assessment Scenarios

The EIA will assess a phased development as outlined in Section 2.7, with the following assumptions:

- Phase 1 – 2 yrs; 28 Ha seaspace and <100 metric tonnes/ yr production
- Phase 2 – 6 yrs; 1,700 Ha seaspace and 3000-4000 metric tonnes/ yr production
- Phase 3 – 3 yrs; 3,350 Ha seaspace and 10,000-12,000 metric tonnes/ yr production
- Full development – 2 yrs; 5,100 Ha seaspace and 18,000 metric tonnes/ yr production

5.2 Guidelines and Plans

The EIA study and report shall be undertaken in accordance to the guidelines issued by the Environment Protection Department (EPD) and Department of Environment (DOE). These include:

- Handbook of EIA in Sabah (2005) (2nd Edition) published by EPD
- Guidelines on Erosion Control for Development in Coastal Zone (JPS 1/97) published by DID
- Guidelines for Preparation of Coastal Engineering Hydraulic Study & Impact Evaluation (Dec 2011) published by DID and updated requirements via circular June 2013.
- Sabah Shoreline Management Plan (2006)
- Guidance Document for Addressing Soil Erosion and Sediment Control Aspects in Environmental Impact Assessment (EIA) Reports (DOE, 2011)

5.3 Baseline Data Collection

5.3.1 Water Quality

A water-sampling program within the project area is required to establish baseline water quality conditions, such that the impact assessment can be based upon relative changes rather than absolute values. Marine water quality sampling will be based on a 5 square nautical mile grid, with one (1) sample for each grid point and four river mouth water quality stations. As shown in Figure 5.2, there are a total of 27 marine stations. Four (4) of these

stations are within the border of the Tun Sakaran Park (nearest to P. Sibuan and P. Sebangkat). This is to characterise baseline conditions at this key sensitive receptor.

Temporal data will also be obtained over three additional survey campaigns at selected stations as shown in Figure 5.2.

For all stations, in-situ depth profile measurements will be conducted using the YSI Multiparameter Sonde with the following physical parameters recorded:

- Dissolved Oxygen
- Temperature
- Salinity

For the marine stations, if the in-situ depth profile indicates vertical stratification, samples will be taken below surface and 0.5 m above the seabed of the water sampling stations. However, if there is no stratification shown, samples will be taken at 2 m depth.

As shown in Figure 5.2 and Table 5.3, a full set of water quality parameters will be tested for the samples at 12 marine stations and 4 river mouth stations. Samples from the other 15 marine stations will be analysed for all parameters except pesticides.

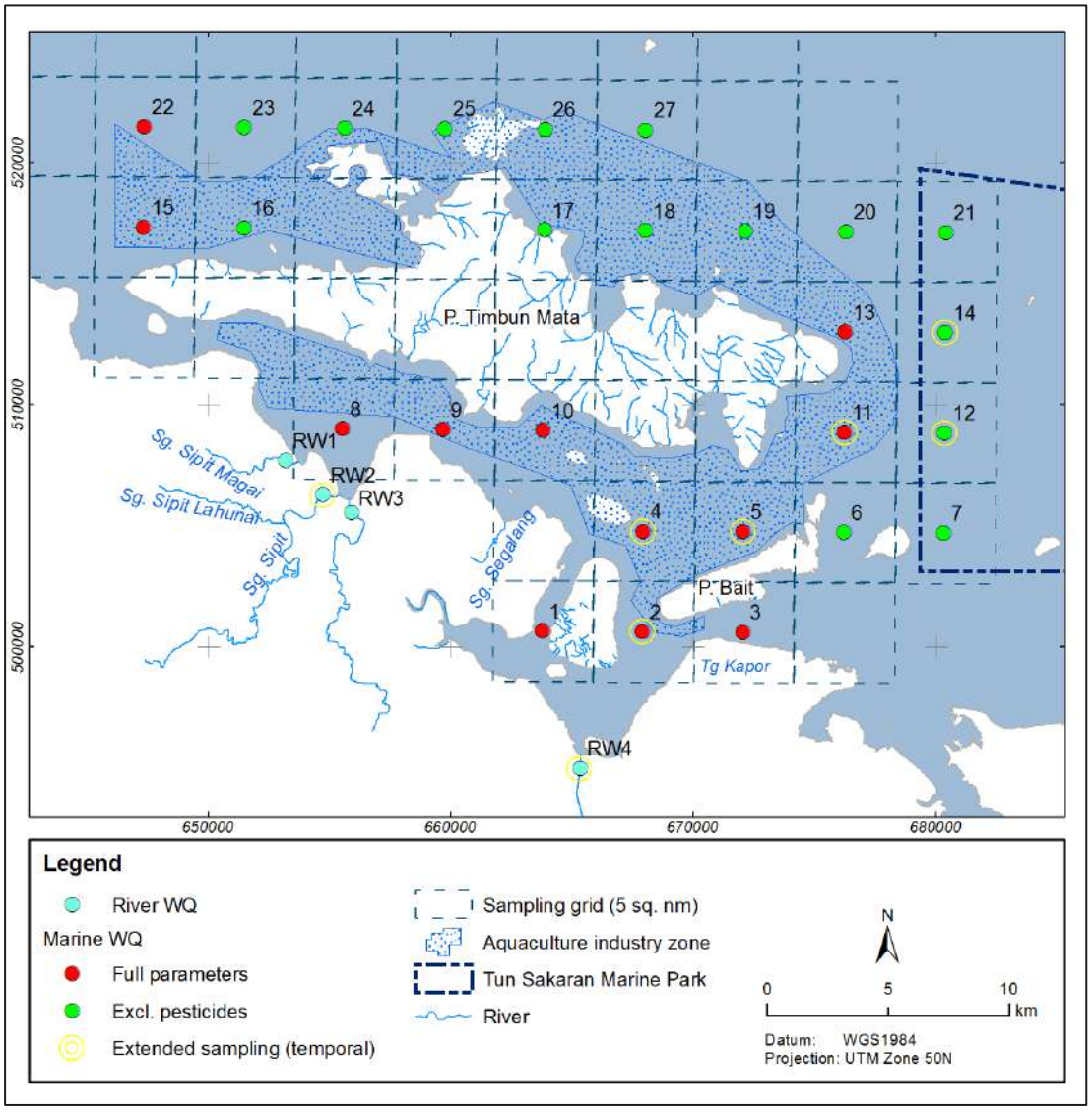


Figure 5.2 Water quality sampling stations within 5 square nautical grid. Stations circled in yellow indicate stations where temporal sampling will be carried out.

Table 5.3 Parameters for analysis of water quality

Parameter		Method
Physical	Total Suspended Solids (TSS)	APHA 2540-D
	Turbidity	APHA 2130-B
Anions	Free Chlorine (Cl_2)	APHA 4500-Cl F
	Sulphide (S^{2-})	APHA 4500-S^{2-} F
	Ammoniacal Nitrogen (NH_3N)	APHA 4500 NH_3-B,C
	Nitrate (NO3)	APHA 4500NO3-H
Hydrocarbons	Phenol	APHA 5530-B,C
Microbial	*Escherichia coli*	APHA 9221
Pesticides	Organochlorine/ Organophosphate Pesticides	USEPA 3510C/ USEPA 8270C
Organics	Biological Oxygen Demand (BOD)	APHA 5210-B/ 4500 O-G
	Chemical Oxygen Demand (COD)	APHA 5220-C
	Oil and Grease	APHA 5520-B
	Chlorophyll a	APHA 10200 H
Heavy Metals	Mercury (Hg)	APHA 3112-B
	Cadmium (Cd)	APHA 3111-B/ 3120-B
	Chromium, Hexavalent (Cr^{6+})	APHA 3500-Cr D
	Chromium, Trivalent (Cr^{3+})	APHA 3500-Cr D
	Arsenic (As)	APHA 3114-C
	Cyanide (CN^-)	OSRMA P.456
	Lead (Pb)	APHA 3111-B/ 3120-B
	Copper (Cu)	APHA 3111-B/ 3120-B
	Manganese (Mn)	APHA 3111-B/ 3120-B
	Nickel (Ni)	APHA 3111-B/ 3120-B
	Tin (Sn)	APHA 3114-C
	Zinc (Zn)	APHA 3111-B/ 3120-B
	Boron (B)	APHA 4500-B. C/3120-B
	Iron (Fe)	APHA 3111-B/ 3120-B

5.3.2 Sediments

Surface sediment sampling using a Van Veen Grab is proposed at eight locations as shown in Figure 5.3. The sediment will be analysed at an accredited local laboratory for organic carbon, nitrogen and phosphate as listed in Table 5.4.

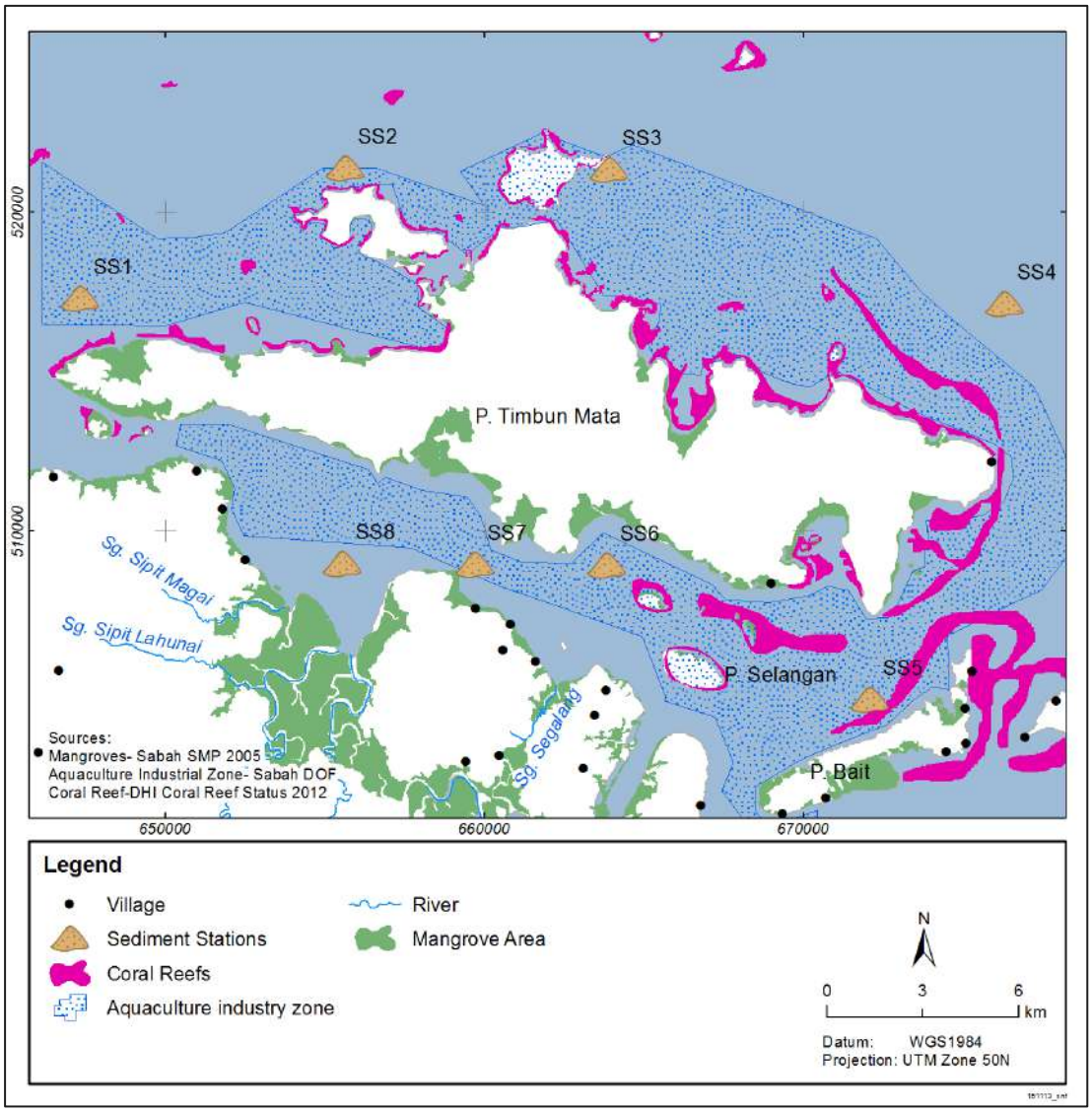


Figure 5.3 Locations of sediment sampling stations

Table 5.4 Parameters for analysis of sediment samples

Parameter	Method
Seabed Organic C (Total Organic Carbon)	USEPA 9060
Seabed Organic N (Total Kjeldahl Nitrogen)	APHA 4500 NORG-B
Seabed P (Phosphorus)	APHA 4500P-F

5.3.3 Air and Noise

Air and noise measurements will be undertaken at the noise sensitive receptors near the project site (Figure 5.4). These include (2) villages on P. Timbun Mata, four (4) villages on P. Bait, one (1) village on Tg. Kapor and one (1) village on P. Pababag (total of **eight** locations).

Parameters will be TSP and PM_{10} measured for 24-hours, and for noise, sound level in dB(A), also 24-hr measurements at each station.

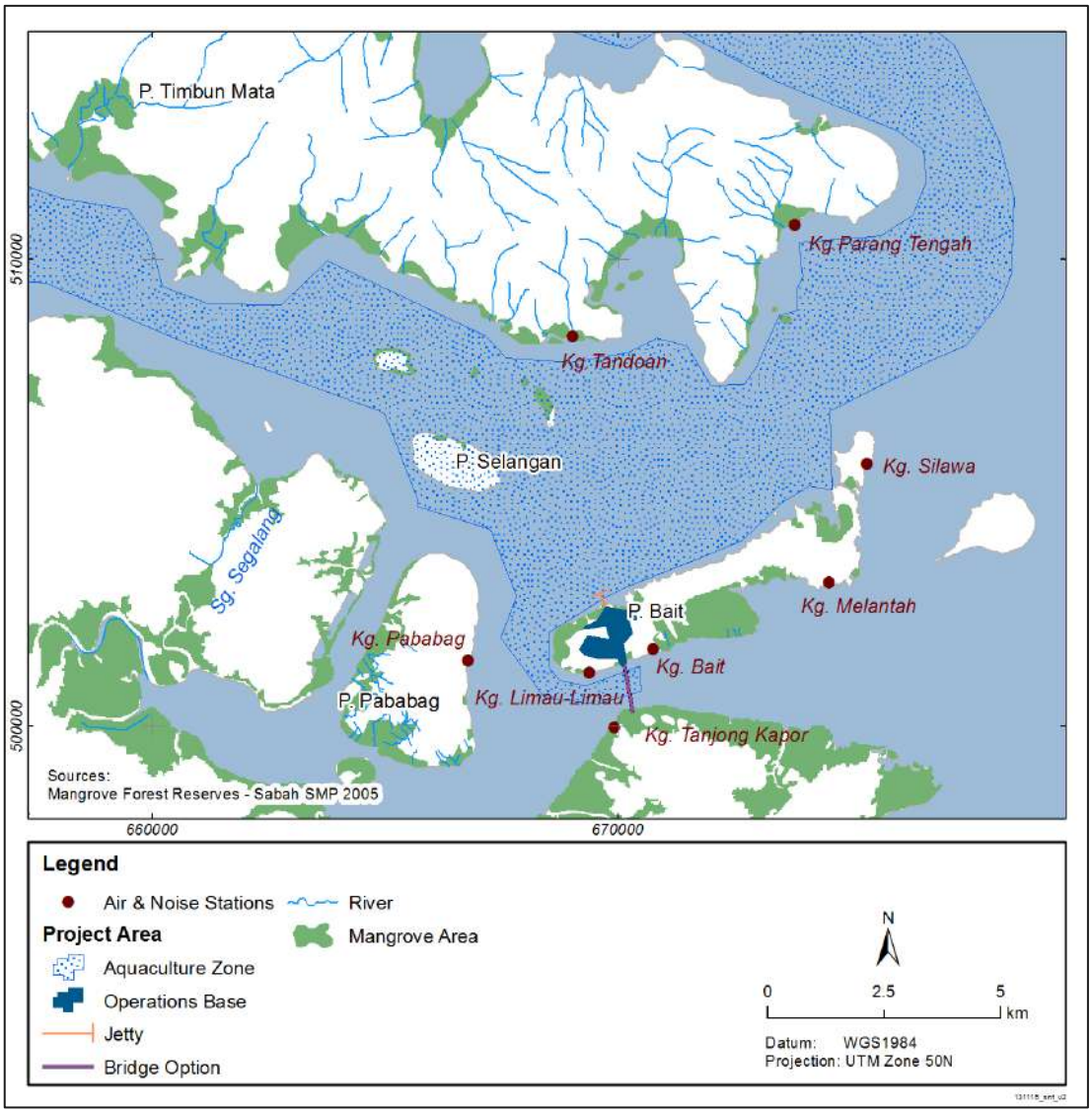


Figure 5.4 Air and noise sampling stations

5.3.4 Bathymetric Survey

Bathymetric survey will be carried out from a vessel covering the proposed project site and its surrounding area as shown in Figure 5.5. The spacing between the survey lines will on the average of 150 m with reduced spacing over reefs and shoals.

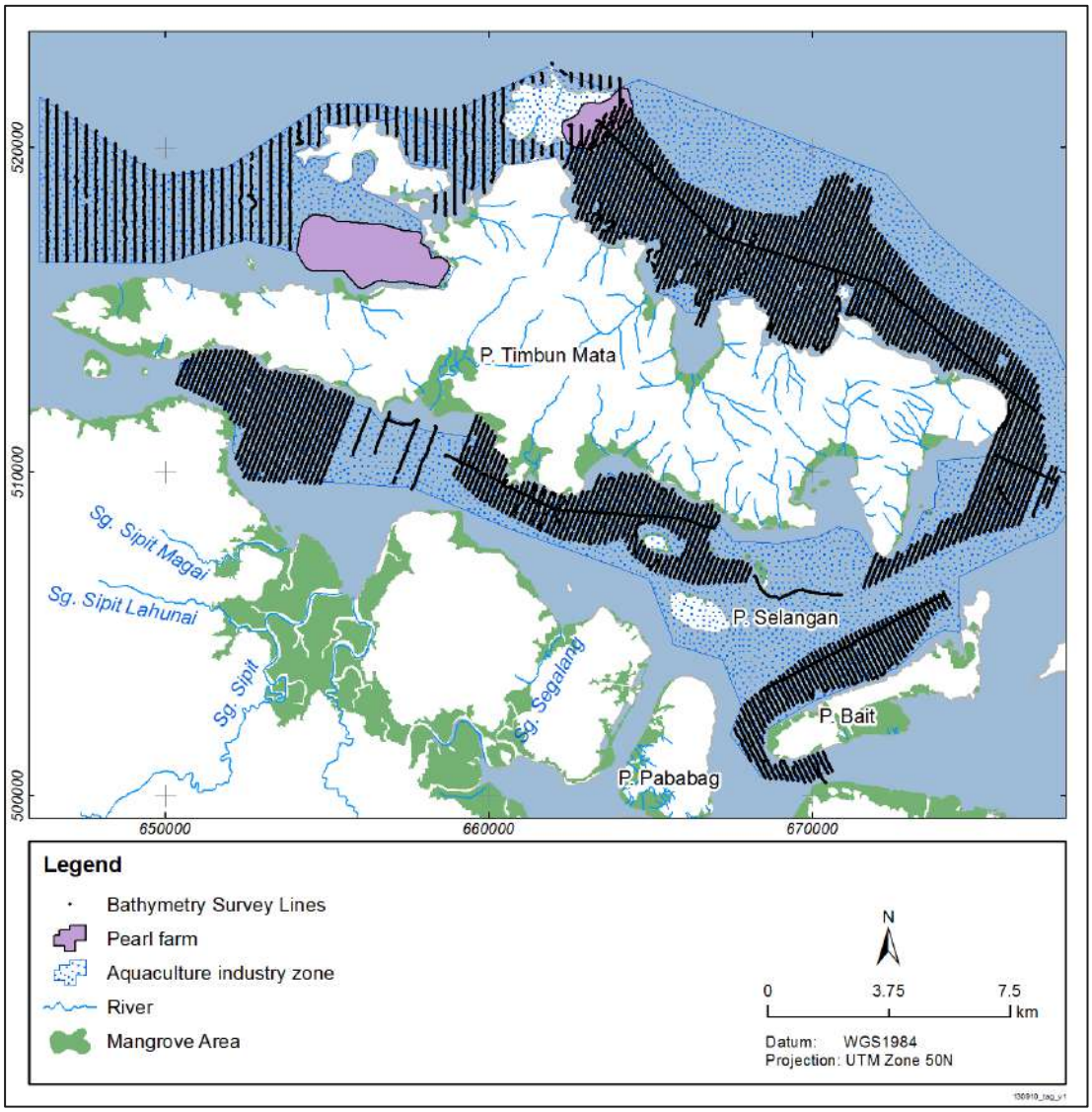


Figure 5.5 Proposed Bathymetry survey lines within the project area

Water depths will be measured using single beam echo sounder with a sounding accuracy of 0.025 metres and depth range of 0.3 to 50 metres.

5.3.5 Current Measurements

Measurement of current speed and direction will be carried out at two (2) locations as presented in Figure 5.6 and Table 5.5. The data is essential for hydrodynamic model calibration and validation and the period of measurement will span over fourteen (14) days covering a spring and neap tidal cycle, in accordance with DID guidelines.

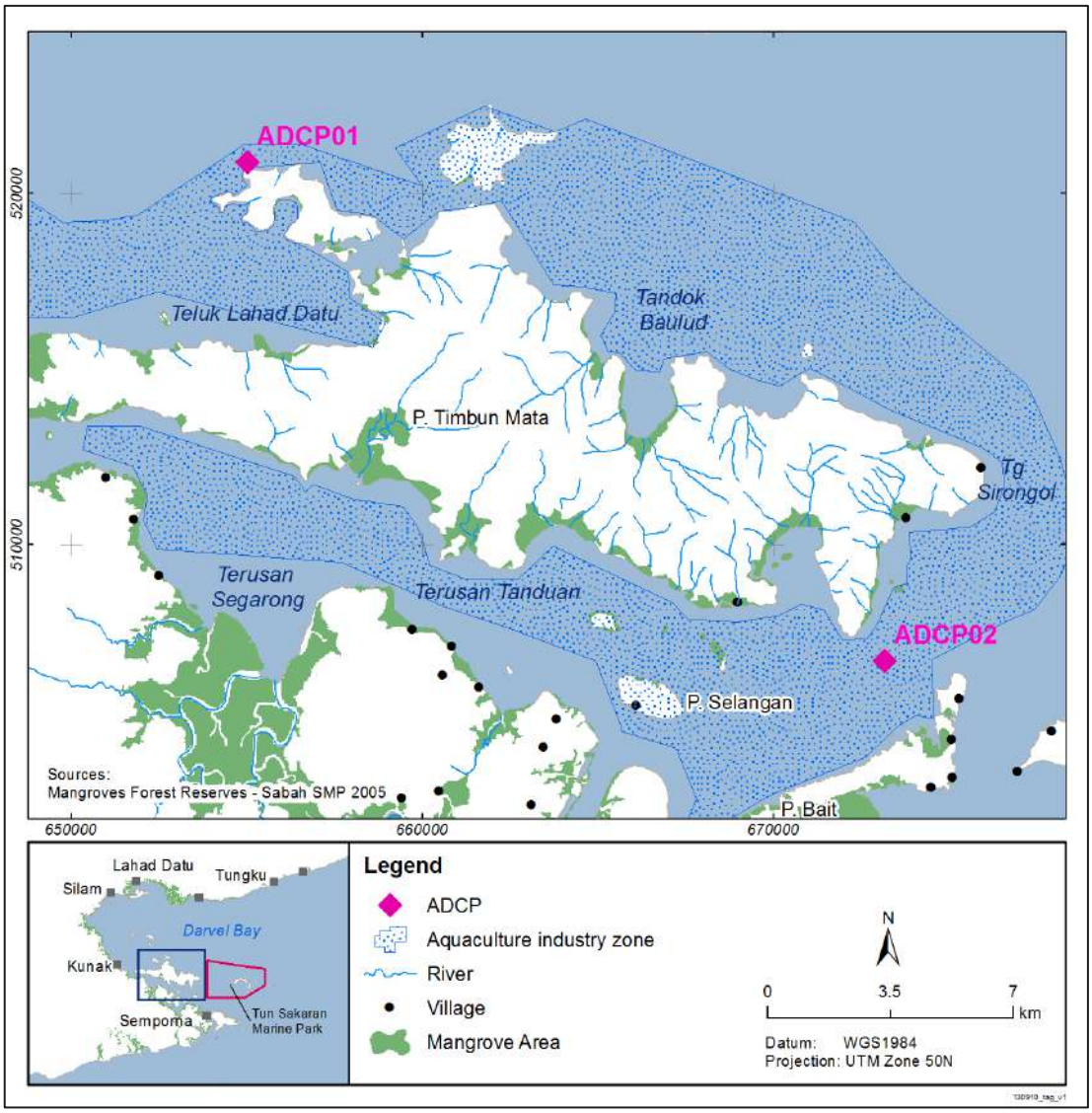


Figure 5.6 Proposed ADCP deployment sites.

Table 5.5 Geographic coordinates for deployment of ADCP 1 and ADCP 2 (in UTM Projection Zone 50N).

ADCP No.	Coordinate		Approximate Depth (mCD)
	Easting (m)	Northing (m)	
ADCP 1	652870	522221	-21.0
ADCP 2	673167	506543	-27.0

Current measurements will be carried out using Acoustic Doppler Current Profiler (ADCP) units that measure the variation of current speed and direction over the water column.

5.3.6 Marine Water Level Measurements

Water level variation will be measured using pressure sensors installed within the ADCP units. Measurements will span over fourteen (14) days covering a spring and neap tidal cycle.

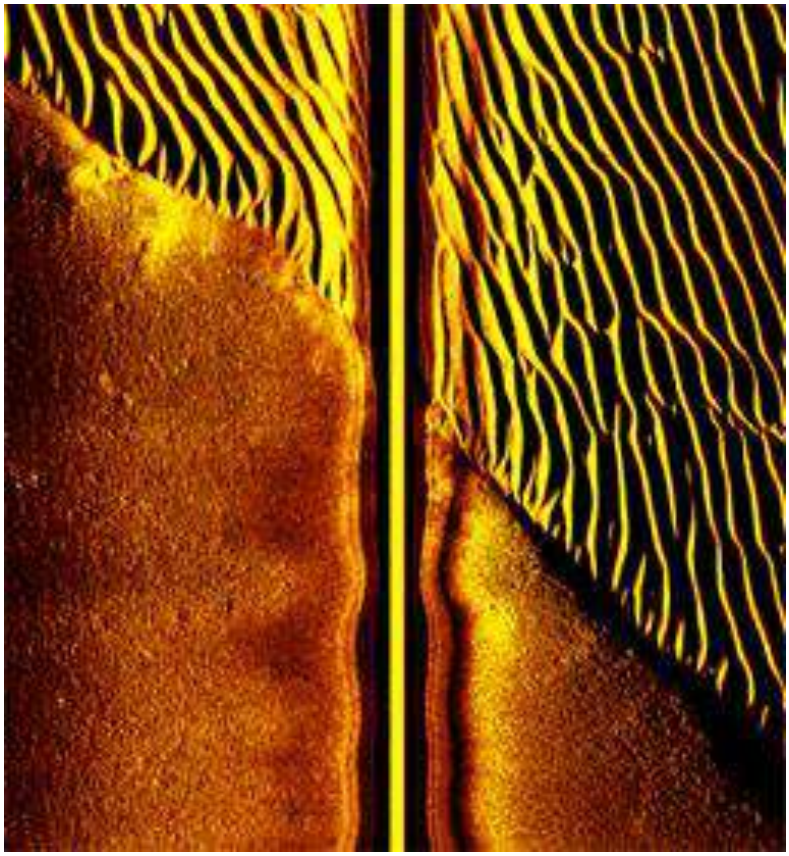
5.3.7 Ecological Environment

Assessment of the marine environment within 3 km radius of the project will be carried through primary and secondary data collection. Relevant authorities such as the Department of Fisheries (DoF) will be consulted to ascertain main fisheries and marine resources.

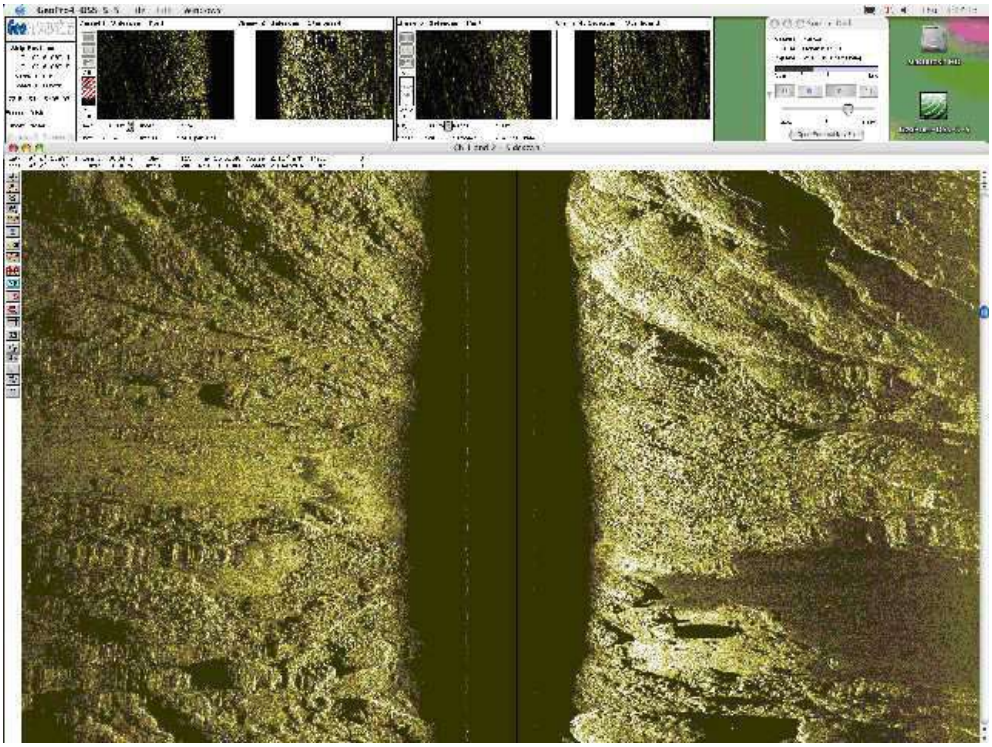
Primary field surveys will focus on plankton, fish fauna, seagrass, soft-bottom benthos and coral reefs as described below.

5.3.7.1 Seabed Mapping

A semi-detailed mapping exercise will be undertaken to identify the areas where benthic marine habitats such as live corals and seagrass are located. This will be mapped using a Side Scan Sonar. Side Scan systems are specifically designed to collect backscatter data and operate from a towed body. A target that provides a high amount of backscatter i.e. hard like a reef area will appear as a dark image. As backscatter decreases (softer objects) the energy decreases and objects will appear increasing greyer i.e. mud and sand (Figure 5.7).



(A)



(B)

Figure 5.7 Backscatter results of side scan survey (A) shows sand ripples while (B) is a fine-detail image of a small section of rocky reef.

The survey approach will comprise:

1. ***Semi detailed mapping*** using a high resolution 325kHz Side Scan Sonar to identify the properties of the seabed, including corals, seagrass, sediment type to a very high resolution i.e. a few centimetres. A seabed classification system will be employed to determine seabed type.

2. The use of an underwater splash camera to ***ground truth*** the high resolution 325 kHz Side Scan Sonar images and provide video footage of the actual aspect of the habitats considered.

Ground truthing is perhaps the most important part of any acoustical survey. Usually done on a small diagnostic data set, it can be used to geologically interpret a larger study region once established for a so-called calibration area.

5.3.7.2 Coral Reef Surveys

Based on the initial reef mapping (side scan sonar survey), 10 transect assessments will be carried out depending on the live hard coral cover.

The survey will employ a variation of the Reef check method (2004, 2006) /15, 16/ and Line Intercept Transect (LIT) method by English et al. /17/.

- A site is randomly selected in the 3-10m depth zone and plotted by GPS.
- One team of divers does a RACE (Rapid Assessment of Coral Ecosystems) survey. The team swims with the current for 40 minutes following the 10 & 15 m contours. The RACE team records reef health every 100 m as well as a range of keystone reef species (Groupers, Sweetlips, Snappers, Emperors, Large Wrasse, Angelfish, Butterflyfish, Giant clams, Lobsters). The GPS position at the end of the transect is recorded when the divers surface.

- One team of two (2) divers lay a transect line 50 m long using a measuring tape at the depth of maximum coral development from 2-10m.
- The divers takes video footage as the transect line is being laid.
- The divers search and photograph an area away from the end of the line for 10 minutes to allow normal fish activity to resume.
- The second diver follows the first diver and completes a line intercept transect by recording the type of seabed directly underneath every 1ft mark on the measuring tape.
- The first or front diver swims slowly along the line and records all fish larger than 4 inches within 5m on either side of the transect line. When the second diver completes the line intercept transect, the first diver returns back along the transect line to check for large invertebrates and count butterflyfish and angelfish.
- The second diver follows the first diver and winds up the measuring tape.
- Key coral and fish species are identified up to species, family or genus level where possible in the field or after the dive using the video record using field guidebooks.

5.3.7.3 Seagrass Survey

A broad brush visual assessment in shallow water will be performed for seagrass and seaweed followed by transect assessments at four identified sites.

The assessment of the seagrass and seaweed would need to be examined on two aspects i.e. the extent of the seagrass/seaweed as well as the health of the beds. Seagrass/seaweed assessments will be carried out using random sampling method or line transect/belt transect method, depending on the characteristics of the seagrass bed.

Random Sampling Method

Sampling will be undertaken at random by selecting points in the study area using a quadrat (1.0 x 1.0 m). Sampling points should be selected in such a manner that every species at the study area has a good chance of being selected.

This type of sampling is usually undertaken in the areas where the intertidal expanse is very narrow with steep gradient and also in the areas where distribution is patchy.

Line Transect / Belt Transect Method

Survey will involve the following:

- Starting at the edge of an exposed seagrass/ seaweed meadow, the first point is marked by a pole.
- A transect tape will be laid until it reaches the other end of the meadow in a straight line, and the end point will also be marked with a pole.
- Quadrats (1.0 X 1.0 m) are marked off along the transect line.
- Major characteristics within the quadrat i.e. sediment type, species of seagrass/seaweed and percent of seagrass/ seaweed cover would need to be recorded.

5.3.7.4 Mangrove Survey

Mangrove assessment will be carried out using line transect method, as follows:

- Starting at the edge of a mangrove forest, a 10 m transect line is placed in the forest at right angles to the forest edge.
- All mangrove trees within 1 m of the transect line ($20m^2$ area) are measured and identified to species level. The measurement is made at chest height (typically 1.5m above the ground but the measurement is moved up or down to avoid branches and be on a clear section of trunk).
- Multiple 10 m transects are positioned 25-50 m apart until over 100 trees have been measured.
- Major characteristics within the line such as sediment type and species of mangrove and epifauna type will be recorded.

Based on in-house mangrove distribution maps, it is estimated that approximately four transect stations will be enumerated.

5.3.7.5 Fish Fauna Survey

Fish survey will be conducted in a single trawl transect per 5 square nautical mile grid. The start and end of the trawl hauls are recorded using GPS. All trawl locations will be checked using a single beam echosounder both before and during the trawl to check for unsuitable hard substrate and obstructions.

Fish sampling will utilise high opening trawl gear with a cod-end mesh size of 38 mm. Trawling speed will need to be maintained at 3.0 knots. Sampling will only be undertaken during daylight, using a standard one-hour towing

- The total catch at each trawl site and the % trash fish will be recorded.
- The fish caught will be measured to record:
  - Length (fork, total or carapace) for each Species and genera
  - Number of individuals and total weight by species
  - Distribution by predetermined cohort size/class intervals

- Analytical outputs from the survey would need to include:
  - Density of commercial fish stocks (kg per square km).
  - Average Biomass estimates within the study areas.

Abundant or Key fish and invertebrate species are identified up to species, family or genus level where possible in the field or after the trawl using the preserved catch samples using field guidebooks.

5.3.7.6 Plankton Survey

Sampling for phytoplankton and zooplankton will involve the collection of surface water samples at the 27 water quality stations (total 27 samples each for phytoplankton and zooplankton), and the samples transferred to sterilised bottles and preserved according to standard protocol before subsequent analysis at the laboratory. Plankton will be identified to genus and species level if possible. Phytoplankton and zooplankton would need to be enumerated in terms of number of cells per millilitres (cells/mL) and species per litre (individual/L), respectively.

Data analysis will provide indices such as species diversity, evenness, dominance and frequency. Plankton known to bloom (Harmful Algal Blooms) will also be highlighted, if any.

5.3.7.7 Benthic Survey

Macrobenthos will be assessed through grab sampling and the analysis of species diversity and abundance. 26 stations are proposed, taking into account the variations in water depths and substrate types following the water quality grid. However, if the proposed location is discovered to be a coralline area, macrobenthos samples will not be taken.

Two replicate grabs will be retrieved per station. Sediment is then sieved through a 1mm sieve and all benthic organisms will be recorded, preserved and stored. Benthos will be identified in the laboratory by marine biologists to genus level. Results will be analysed to provide estimates of benthic density per square metre (individual/m^2), diversity and evenness indices and a description of the dominant species and functional or niche groups.

5.3.7.8 Terrestrial Habitats

Fauna

A desktop study will initially be carried out to compile existing information on existing fauna in the area. Questions on the occurrence and distribution of marine megafauna and terrestrial wildlife will also be included in the socioeconomic survey.

In addition, fauna observation stations will be set up camera traps at five (5) designated locations on P. Bait for photo capture of fauna for three consecutive days. Bait consisting of bananas, sweet potatoes etc, will be placed 2 meters away from the camera trap. These camera traps will be checked once a day and the bait will be replenished. Photo 5.1 shows an example of a photograph of a monitor lizard captured by the trap in a previous study.

Photo 5.1 A shot from the camera trap set up for previous faunal studies.

Flora

Habitat types within the study area shall be mapped using Geographical Information Systems (GIS) and species inventories documented. Habitats within 1km from the shoreline shall be described and mapped. These shall cover but not limited to:

- Coastal hill forest
- Coastal shrub & vegetation
- Mangrove forest
- Secondary forest (belukar) or grassland
- Other forest types

Plant biologists will undertake a flora survey at study areas with direct project impact; P. Bait and Tg. Kapur. The biologists will set up 1 km transects in order to characterise the key community types. There will be 5 stations, 4 stations of 1 km on P. Bait and 2 stations of 0, 5 km at Tg. Kapur as shown in Figure 5.8.

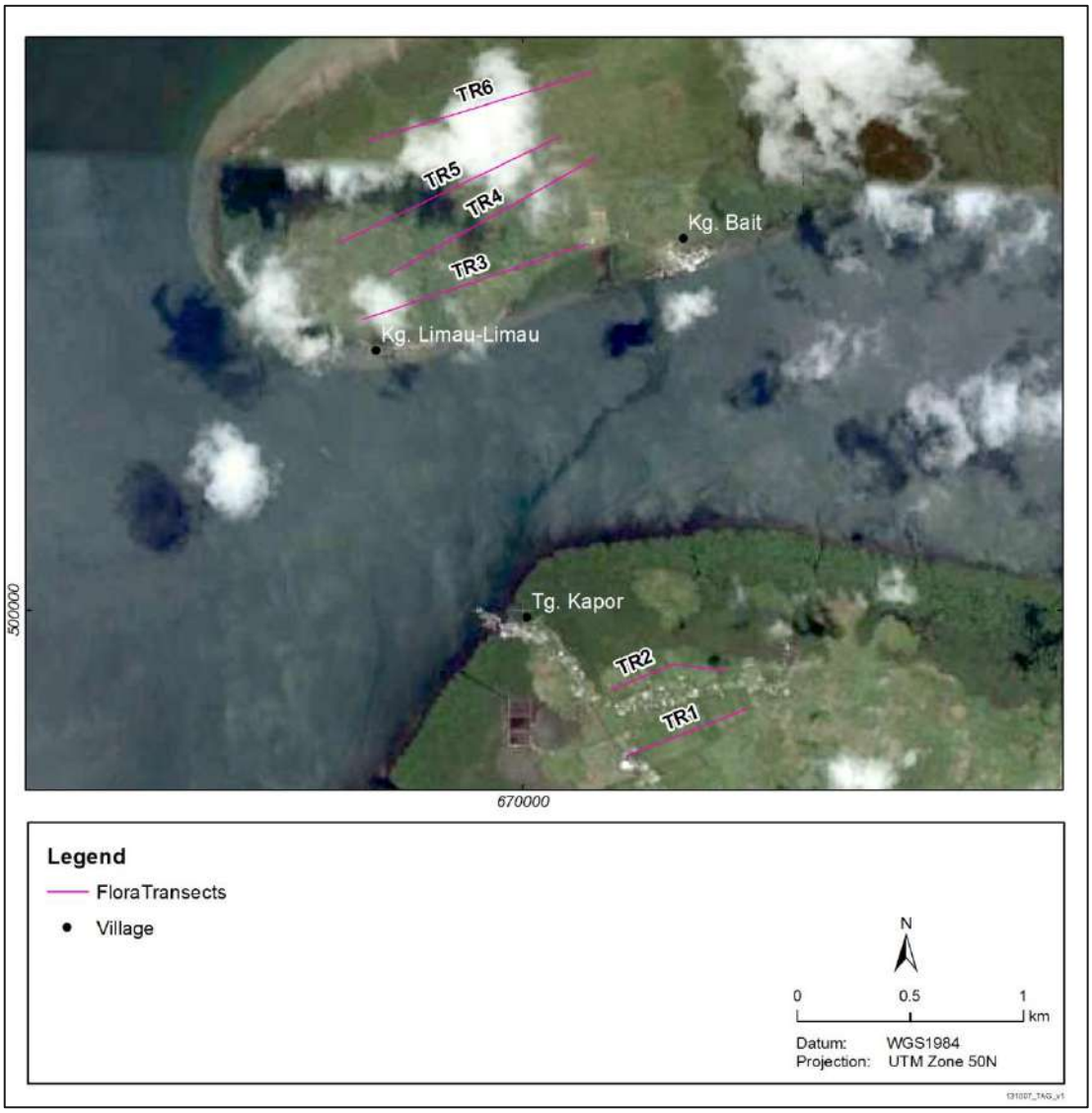


Figure 5.8 Flora Transects.

5.3.7.9 Turtle Landing and Nesting

Turtle nesting has previously been recorded and sighted around the project site. Interviews will be undertaken with local fishermen and relevant personnel from Fisheries Department to determine whether the beach is still in use as a turtle nesting ground. Survey will focus on consultations with local fishermen to identify any reported turtle nesting ground around the project site. Diversity and population assessment of turtles would need to be undertaken entirely by visual observations and census. Two means of assessments would be conducted:

Observations of Turtles on Land

Night surveys will be undertaken for five nights over a period of 1 month or so to observe whether any turtle nesting is currently occurring. Surveyors will walk along potential selected nesting beaches at hourly intervals during the period of 7:00 pm to 12:00 am. Sighting data would need to include species identification, approximate number of turtles, size, general location and direction of travel. Where nesting females are concerned, the number of nests and their location is important.

5.3.7.10 Marine Megafauna

Any sighting of marine megafauna (turtles and marine mammals) in the project area over the course of the baseline surveys will be recorded, including date, time and location of sighting, number of animals, size, species identification where possible, and a description of the behaviour at the time of sighting including the direction of travel.

5.3.8 Human Environment

5.3.8.1 Socioeconomic Survey

The livelihoods and perceptions of the local community toward the project will be the focus of this study. The selected methods are designed to:

- Identify stakeholders – social grouping, gate keepers and power relation of local communities
- Identify access to public amenities – health care, religious buildings, education etc
- Identify existing nature of livelihood – includes use of natural resources such as fisheries and fresh water, space such as transportation routes and ownership of space.
- Identify community concern and perception to the project
- Identify mitigation measures, in particular measures to maximise positive impacts or benefits through employment and other economic benefits to the people.

Four methods are to be used:

1 Secondary data
2 Questionnaire Survey
3 Ethnographic research
4 Stakeholder/ Focus Group Discussions

The above study tasks are described in the following section.

Secondary Data

Written information related to the community and project site will be sought after from the nearby Seaweed Project (by UMS), WWF, Sabah Parks and Forestry Department. Where necessary, information from other agencies will be collected as well.

Questionnaire Survey

A questionnaire survey will be conducted, with an estimated 350 – 400 respondents. The respondents will be limited to individuals 18 years old and above, both male and female. Priority will be given to head of households (both husband and wife).

The questionnaire survey will be carried out using *Convenience sampling*. Convenience sampling is a non-probability sampling technique where subjects are selected because of their convenient accessibility and proximity to the researcher. The main advantages of this sampling strategy is that it is inclusive, meaning respondents that qualify, are available, interested and more importantly willing to be interviewed are not ignored as may be the case with probability sampling. In addition, a higher number of respondents is more likely to be achieved using this method as the selection of respondents is not structured. Finally, convenience sampling is very efficient to build trust and rapport.

However, the most obvious criticism of convenience sampling is sampling bias and that the sample is not representative of the entire population. To take advantage of the strength of convenience sampling and to overcome its limitations, a large number of enumerators (up to 20) will be deployed to conduct simultaneous interviews within a village. The teams will be instructed to move into different directions to ensure most parts of village is covered. The clustered nature of settlements in this area further makes this possible. Having large

numbers of enumerators and strategic movement will significantly reduce sampling bias as well as improve the representation of research population.

The questionnaire focuses on key themes of livelihoods, cultural and land use values, and perceptions towards the project. Responses will be spatially linked, where a locality map will be attached with each questionnaire to enable respondents to pinpoint their location in relation to the project site, their typical transportation routes, important fishing grounds and any other sites of cultural and social importance.

A project brief will accompany the questionnaire while the enumerators will be provided with further details for information if required for discussion during the interview.

Piloting the Questionnaire
The questionnaire has been piloted outside the study area (P. Selakan and surrounding islands), south of the project site. This area has similar socioeconomic/cultural background as the study area.

The objective of the pilot questionnaire survey was to gauge responses to questions, e.g. respondents' understanding of the questions, the flow, language standardisations including local terms, etc. Responses to the project brief provided will also be noted, i.e. whether or not the respondents are `comfortable with the information provided, or seem to need more details on the project.

Ethnographic Research
An ethnographic approach will be utilised to gather data based on observation and in-depth interviews with community leaders and as well as opinion leaders.

Preliminary interviews will be held with the leaders of the Semporna Fishermen's Association and other groups such as the UMS-registered seaweed mini estate owners. From these interviews, leads on other key influential persons to interview will follow.

Stakeholder/ Focus Group Meetings
Two (2) stakeholder or focus group meetings will be held during the course of the study. The target groups will be established following the questionnaire survey to allow for additional information to be collected where necessary.

5.3.9 Secondary Data Collection

Secondary data will be collected from governmental and non-governmental agencies. Among the data collected will be:

- Department of Irrigation and Drainage (Water Resources and Management Division) – for hydrological data (if additional information is required) and water catchment areas;
- Water Department – for any existing use of the river and water supply;
- Forestry Department – for any biomass removal plan;
- Geological Department – relevant geological information (if additional information is required);
- District Office and Lands and Surveys Department – for information on land matters and issuance of the appropriate licence, population and other relevant socio-economic data available;
- Meteorological Department – climatic data;
- Sabah Museum –flora and fauna and any culturally sensitive areas;
- Town and Regional Planning Department- to check/cross-reference district's local plan and zoning;
- Fisheries Department – for information on fish species and fisheries & aquaculture aspects

- Sabah Parks – types and area cover of marine and coastal ecosystems, and the biodiversity of marine animals, especially marine mammals at the project area and its adjacent areas
- Marine Department – types and number of marine and coastal activities, navigation routes, safety and security status
- Sabah Biodiversity Centre – to check all data and information on the flora and fauna found during the field studies
- Statistics Department – Statistics on population and other socioeconomic data within the impacted area

5.4 Impact Assessment

5.4.1 Marine Navigation Study

The marine navigation impact assessment encompasses:

a) Description of marine traffic – including the statistics on size of ships transiting within and on the outskirts of the AIZ;

b) Existing facilities and utilization, future utilization and identification of corresponding alternate routes where such modifications to current traffic patterns are required for the Proposed Project;

c) Local craft including fishing craft and coastal vessels, navigational routes and trading patterns;

d) Existing port operating procedures including:-

   - Safety requirements for towing construction materials or prefabricated structures to the site
   - Siting and installation of navigational safety marine buoys, beacons, signage, life jackets, life buoys & lighting
   - Marine safety and environmental requirements for fuel transportation, storage and bunkering activities as well as contingency plans
   - Barge safety mooring requirements during construction of jetty
   - Communication and reporting requirements for pollution, spillage or accident incidents at sea

e) Accident statistics (sources include Sabah Port Authority, Marine Department and other sources of data)

f) Navigation risks including reefs and navigational hazards

g) Night time navigation compliance to COLREGS

h) Potential environmental impacts covering impact on traffic plying hindrance of local routes and navigational safety during construction and operation stage.

5.4.1.1 Methodology

The marine navigation assessment will comprise the following steps:

1. **Data Collection**

   Data collection will be focusing on the area of interest including specific data such as geographical location (e.g. visual landscape, aids to navigation, the state of coastal lines as per latest British Admiralty nautical chart) and existing environmental data

   Meetings and interviews with statutory authorities, private companies and stakeholders will also be held at this stage.

2. **Collation of baseline data (traffic data)**

   Data collected such as environmental features, marine traffic and other inputs will be reviewed and analysed

3. **Carry out navigation risk / impact analysis**

The risk/ impact analysis will be based on assessment by a navigation expert in consultation with inputs from the Ports and Harbours Department and Marine Department.

5.4.2 Hydraulic Studies

The scope of work for the hydraulic modelling will include the following:

- Setting up hydrodynamic and wave models of the area.
- Assessment of the impact of solids from the proposed aquaculture farming on the seabed.
- Assessment of the impacts of nutrients from lobsters on marine waters.
- Determining the buffer distance for siting PU to safeguard adjacent coral reefs/ seagrass meadows or seaweed culture from adverse impacts from lobster farming.
- Assessment of the impacts on coastal hydraulic process and sediment transport from siting of Production Unit (PU) in different configurations.
- Assessment of the carrying capacity of lobster stocking densities and feeding regimes in PU at the lobster farming areas that will not adversely impact the marine ecosystem.

Details on the methodology are given in the following subsections:

5.4.2.1 Coastal Hydrodynamic Modelling

The purpose of the hydrodynamic modelling is to develop a model that reliably describes the hydrodynamic processes operating in and around the project. This model is to be used to assess the impact of proposed lobster farming to the circulation pattern, sediment transport as well as provide input to the ecological modelling for carrying capacity and the assessment seabed deposition.

DHI will implement a three-dimensional hydrodynamic model using DHI's commercially available software MIKE 3 Flexible Mesh (FM). MIKE 3 FM is a state-of-the-art modelling package for the representation of larger water bodies, primarily lakes and marine areas. MIKE 3 FM employs an unstructured computational mesh which enables the water body to be described in the horizontal plane using a combination of triangles and quadrilaterals of more or less arbitrary resolution (see Figure 5.9). This allows for a varying horizontal resolution such that areas of importance and high spatial variability can be modelled in detail whereas other areas (e.g. more homogeneous areas) are described more coarsely, all within the same model. No nesting of separate models of different resolutions is required and the coastline and bathymetry can be described in as much detail as required.

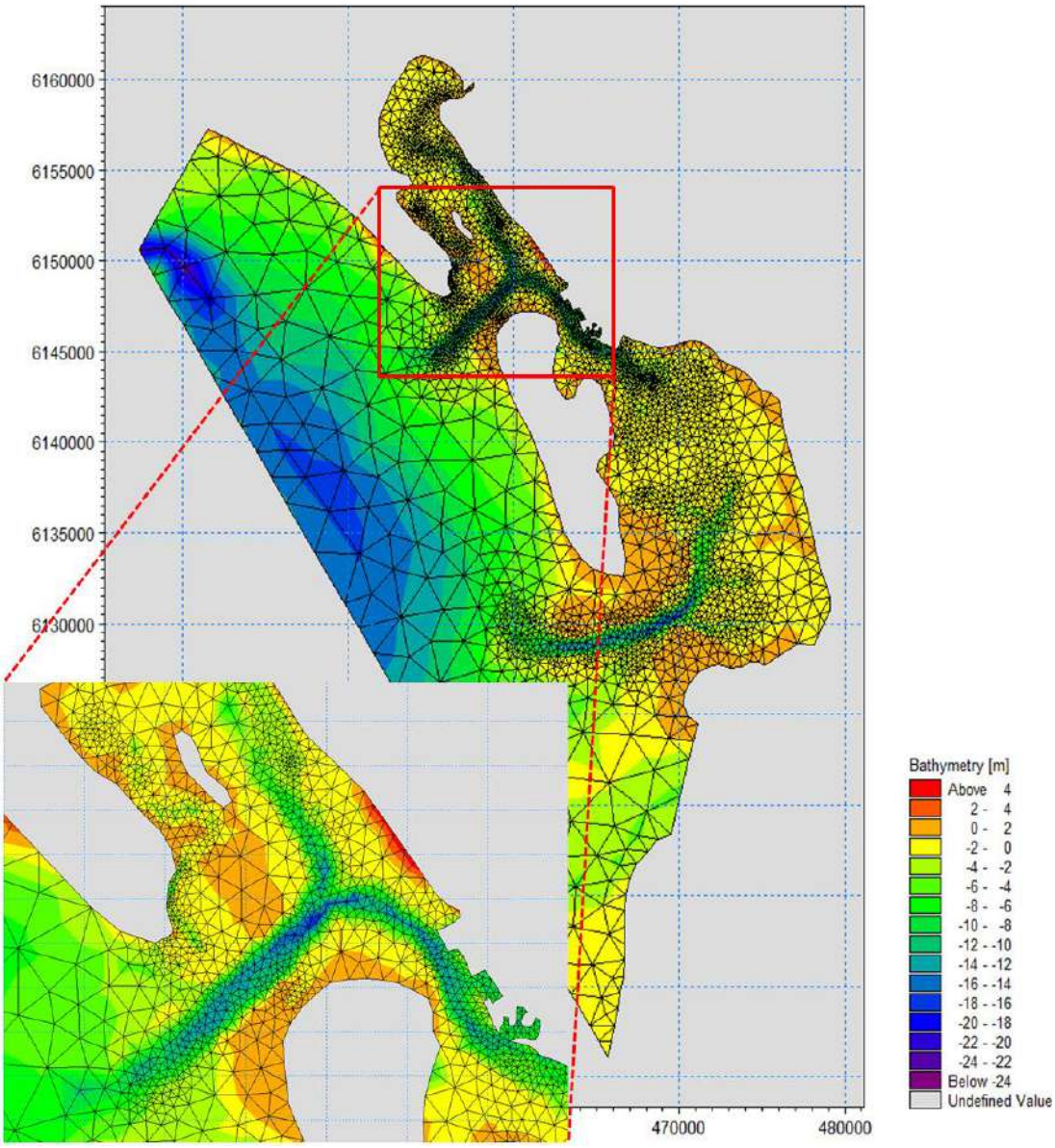


Figure 5.9 Example of a MIKE 3 FM computational mesh

Developing a hydrodynamic model for describing the detailed circulation patterns in the Project area involves a number of activities described in more detail in the following sections.

Model calibration

The Mike 3DFM model proposed is deterministic and physically based in nature. However, this also means that the model needs to be calibrated in order to assess its capacity to portray the characteristics of the area of interest.

The ADCP data collected for this study as described in Section 5.3.5 will be utilised to calibrate the hydrodynamic model. After initial comparison of the model results and measurements, subsequent iterative simulations are run until an adequate match is obtained. The model is then deemed calibrated and suitable for prediction over a range of different scenarios.

5.4.2.2 Wave Model

To assess the wave conditions within the project area, a 2D spectral wind-wave model covering Sulu and Sulawesi Sea will be set up using DHI's MIKE 21 spectral wind-wave model which simulates the wave propagation from deep water to nearshore areas.

Model Coverage and Resolution

A rather large model domain is necessary in order to capture the generation of wind seas and swell penetrating Darvel Bay and Semporna and two (2) models will be used:

- A regional model covering Sulu and Sulawesi Sea and based on a depth-adaptive unstructured mesh that is relatively coarse in deep water, but finer in coastal waters and along in between the string of islands and coral reefs forming the Sulu Archipelago.
- A local model for Darvel Bay with a spatial resolution of about 900 m for the outer and deeper part of the bay and resolution increasing to 300 m resolution at water depths of 60 m. Within iLAP a spatial resolution of between 100 m to 30m will be used.

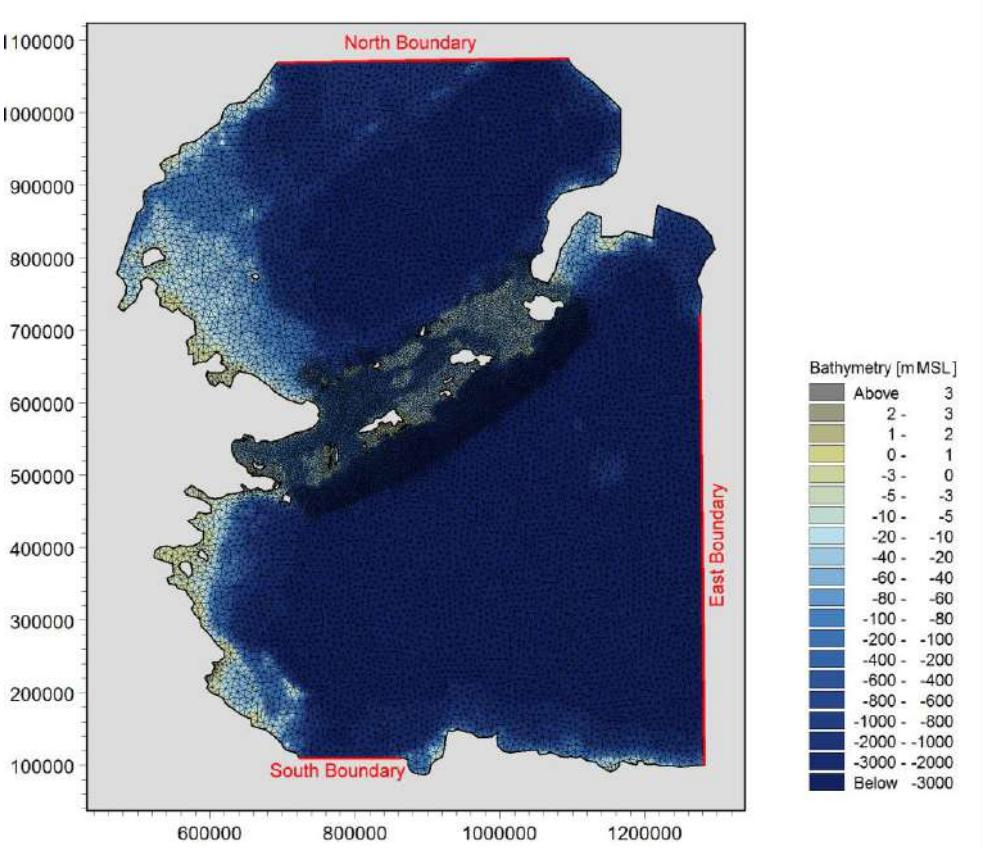


Figure 5.10 Map showing the coverage of regional wave model with open boundaries outlined in red.

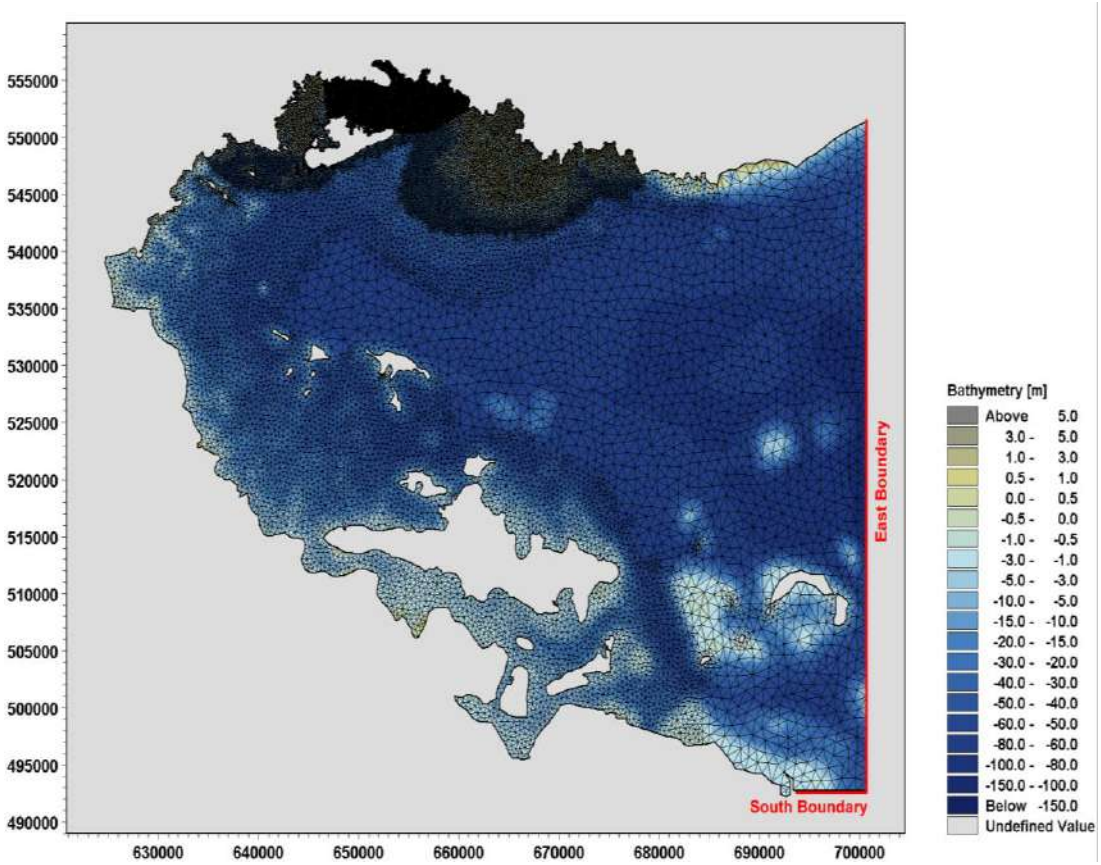


Figure 5.11 Map showing the unstructured mesh for the local wave model with transfer boundaries outlined in red.

5.4.2.3 Deposition Modelling

Arguably the most important component of settling particulate wastes derived from aquaculture operations is organic carbon. Organic carbon settles on the seabed where it is often incorporated into the benthic environment and provides a food source for benthic organisms and bacteria. If waste accumulation is high, bacterial activity will increase accordingly. In fine sediments, where pore water flushing and oxygen exchange with the overlying water column is low, or when sediment loading is extreme, the bacterial oxygen consumption may exceed replenishment rates and lead to anoxic sediments and an increase in sulphur reducing bacteria. Under these conditions, methane and sulphide may be released from the sediments (off-gassing) which are toxic to aquatic organisms. This detrimental effect to animal health is also exacerbated where aquaculture operations occur in shallow waters.

The MIKE 3 FM deposition module will be utilised to simulate the dispersion of aquaculture related wastes through the water column and the settling characteristics on the seabed. Faeces and other wastes are treated as cohesive materials with a specific concentration travelling down the water column and being deposited on the seabed or re-suspended based on local current flow conditions determined by the hydrodynamic prediction.

The MIKE 3 FM deposition module describes the erosion, transport and deposition of cohesive particles such as aquaculture related wastes or any type of mud/sand mixtures under the forcing action of waves and currents.

The settling velocity estimates generated by the deposition module (see Figure 5.12 for schematised processes) can potentially vary according to several parameters including salinity, current flow and waste characteristics.

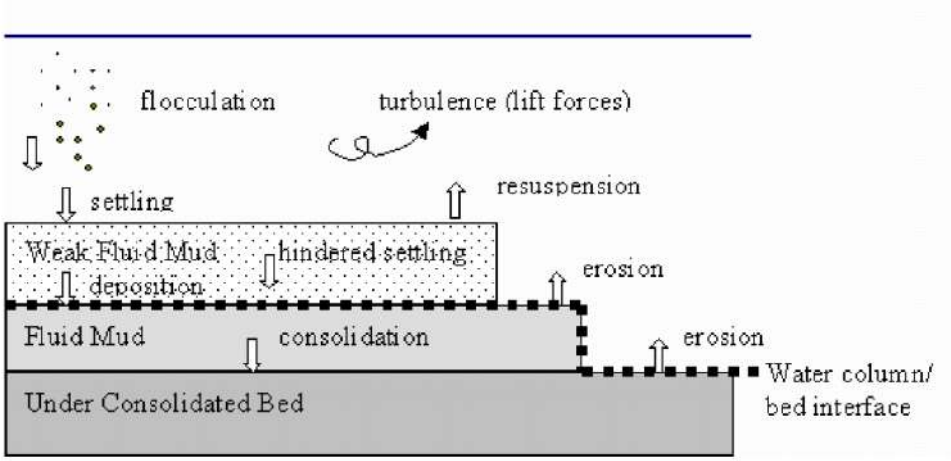


Figure 5.12 Schematic processes included in the depositional module.

5.4.3 Ecological /Water Quality Modelling

The purpose of the ecological/water quality modelling is to describe the ecological processes operating in the Project area and predict the impacts of the aquaculture zone development to relevant ecological triggers used to infer impact to sensitive habitats. The model will be calibrated from the baseline data collected and DHI's previous experience in the study area.

To undertake the water quality, ecological and carrying capacity modelling DHI will use ECOLab an ecological modelling tool contained within the MIKE by DHI. ECOLab is an open, flexible and generic tool for developing aquatic ecosystem models to simulate environmental variation in water quality, eutrophication, heavy metals and ecology. The module to be used for this study describes processes and interactions between chemical and ecosystem state variables with specific focus on the nitrogen processes and interactions.

Figure 5.13 highlights the main interactions to be modelled between the farm (in the form of farm wastes such as ammonium and particulate solids/faeces), water column, phytoplankton (zooplankton are also included as grazers in the model), and seabed interactions (breakdown of nutrients). Finally, the process of denitrification is also included as a mechanism of removing nitrogen from the sediment and water column into the atmosphere.

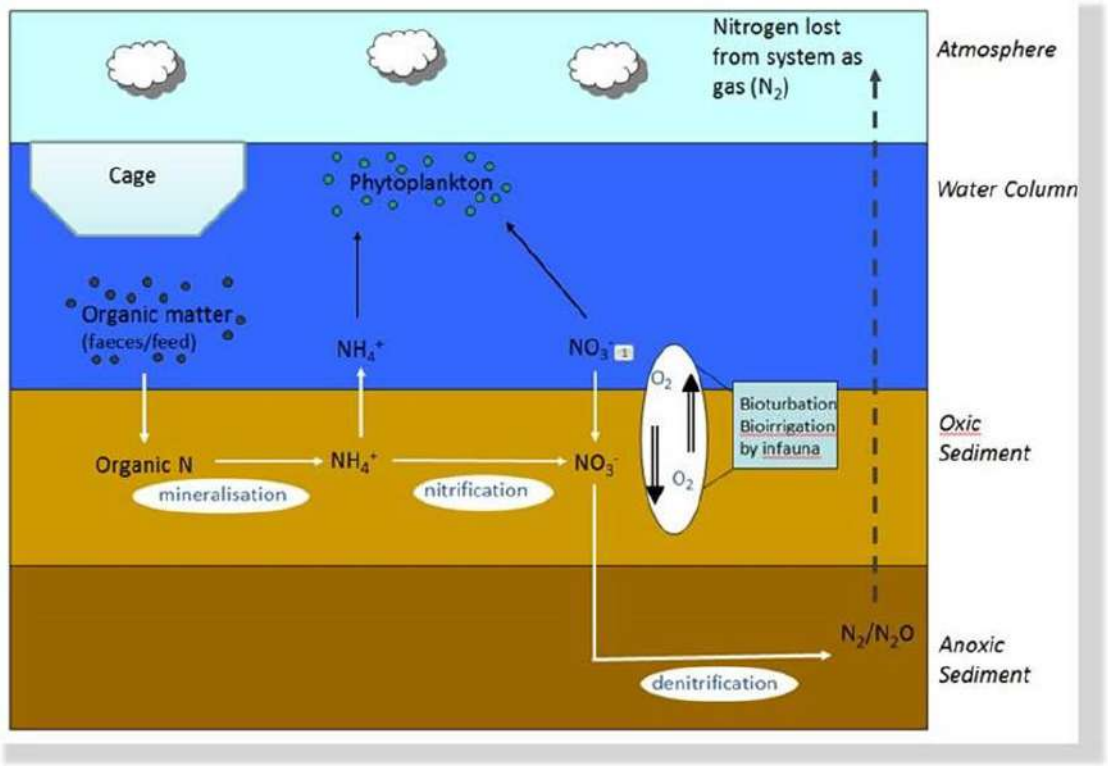


Figure 5.13 Nitrogen processes and interactions captured in the model.

5.4.3.1 Calibration and Validation

Similarly to the hydrodynamics, the ecological model will be calibrated to match the data provided by in-situ sampling, remote sensing where available and relevant literature. This process entails using a calibrated hydrodynamic model and varying the constants of the main biogeochemical processes to obtain the best possible fit of the calibration dataset within the range of the data collected.

5.4.4 Ecological Impacts

Prediction of impacts on marine and terrestrial ecology will be based on a combination of quantitative and semi-quantitative methods. For the following highly significant potential impacts based on the scoping, it is proposed to use quantitative methods, which are linked to comprehensive modelling of specific changes in hydrodynamics, surface sediment and coastal morphology and water quality caused by the proposed project development as outlined in the previous section:

- Impacts on marine ecosystems due to changes in water quality
- Impacts on marine ecosystems due to deposition of organic matter on the seabed
- Impacts on marine ecosystems due to current and wave changes, and coastal morphology

Reliable tolerance limits and effect-characteristics for the parameters that control the habitats and which can be extracted from the modelling are needed. These tolerance limits will be obtained both from reviews of scientific literature.

The assessment of impacts due to underwater noise on marine mammals will be based on experience from acoustic assessments carried out in relation to marine construction works and based on expert judgement. The impact on terrestrial ecosystems due to air pollution and noise emissions, oil spills and leaks will be based on measurements and observations of the existing environment and the predicted extent and magnitude of these impacts.

5.4.5 Air and Noise Impacts

Prediction of air quality impacts will be based on the assessment of project activities and likely emissions against baseline environment and sensitive receptors. The likely emissions would also be compared against ambient air quality standard Malaysia and emission standards.

To analyse the impacts of noise quality, mathematical models for noise prediction at various distances from the project area (source) will be carried out based on the DOE noise exposure guidelines and the type of project activities' equipment utilised. Calculations will be made on:

- Anticipated noise nuisance level during construction and operation.
- Anticipated increase in traffic and related issues

Perception analysis will be conducted amongst the affected stakeholders to discern the concerns of the stakeholders based on the level of predicted impact for noise and air quality.

5.4.6 Integrated Impact Assessment Matrix

The preceding tasks develop sectoral impact assessments, for example, the impact on water quality, the impact upon benthos, etc. The net impact of the project is the weighted sum of these individual sectoral impacts, some positive, some negative. To establish the impact of the project as a whole, these dissimilar sectoral impacts must be combined by considering their importance, magnitude, cumulatively and reversibility.

The Rapid Impact Assessment Matrix (RIAM) approach to integrated impact assessment will be used to present the overall findings of the sectoral impact assessments. RIAM is an analysis and presentation tool for EIA, which allows the results/findings of EIA reports to be completely transparent and easily understood by the authorities and other interested parties. The RIAM system is ideally suited to EIA where a multi-disciplinary team approach is used, as it allows for data from different components to be analysed against common important criteria within a common matrix.

The RIAM system has been created to provide a means by which qualitative analysis can be expressed in a semi-quantitative manner. Although there are quantitative predictive tools and models, such as the hydraulic modelling utilised for the present study, judgements made in an EIA are essentially subjective. Even where quantitative environmental data is available, the overall use of this data requires a subjective judgement of the possible impact, its spatial scale and potential magnitude. Wholly subjective and descriptive systems are not capable of such revision, dependent as they are on the expertise and experience of the original assessors and on the quality of the descriptive record left behind. By the use of the RIAM methodology, all the impacts identified and associated with the project are subjectively judged together with the various mitigating measures and quantitatively recorded, thus providing both an impact evaluation and a record that may be re-assessed in the future.

The RIAM analysis will be performed for the construction and operational phases assuming mitigation measures are implemented.

5.5 Mitigation and Abatement Measures

Mitigation measures to be considered include, but are not necessarily limited to:

- Variations to layout and design of the land-based infrastructure to minimise or avoid impacts to rare or endangered species, etc.
- Variations to layout and design of the PU placements to improve current and wave conditions and water quality
- Best practice aquaculture farm management

- Control and management of wastes during operations.

Evaluation and recommendation of mitigation measures will follow the hierarchy outlined below as far as possible:

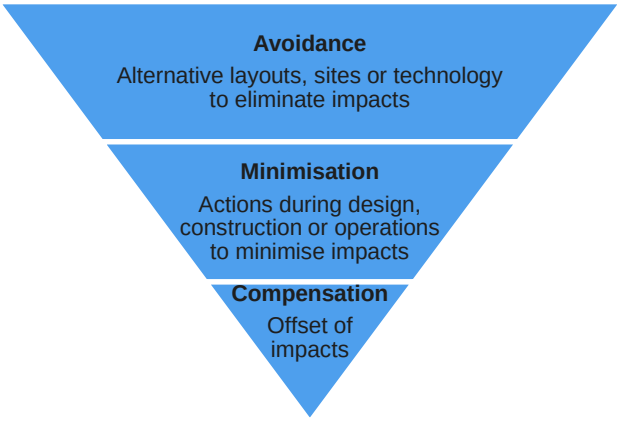


Figure 5.14 Hierarchy of mitigation measures to be considered in the EIA.

5.6 Environmental Management Plan

The majority of the impacts arising from the Project will occur during the construction and post construction or operational stages. It is therefore, essential that these stages are closely monitored and controlled through a well formulated environmental management plan (EMP). Monitoring requirements such as the location of monitoring, frequency of monitoring and the parameters to be measured and analysed will be outlined.

For each mitigation and enhancement management issue, and for each monitoring issue, the measures to be taken will be stated, the duration of the activity will be stated, the responsible agent for the works will be identified and the agency responsible for independent for checking and reporting will be identified.

5.6.1 Environmental Management Plan

The specific Environmental Management Plan (EMP) components will be based upon the assessed significant impacts and the recommended mitigation measures.

5.6.1.1 Management Plan Components

The following environmental monitoring components at the least will be addressed in the EIA study:

- Compliance monitoring – provision of compliance information including adherence to required work procedures or schedules; suspended sediment release prevention and control; management of any liquid, solid and hazardous wastes generated.
- Impact monitoring – to detect unforeseen impacts on water quality, ecology and shoreline morphology and to monitor the effectiveness of the mitigation measures implemented.

Given the varying activities and impacts associated with each stage of the project development, the EMP will be tailored for the construction, operational and abandonment phases.

EMP components for the construction phase for example will likely include:

- Water quality monitoring (suspended solids, oil & grease)
- Compliance monitoring (e.g. sedimentation pond maintenance, appropriate solid wastes management, etc.)
- Noise monitoring
- Dust monitoring

On the other hand, operational phase monitoring will most likely be related to compliance monitoring of operational procedures such as waste management, control of pharmaceuticals, etc. in addition to water quality and benthic habitat monitoring.

A Stakeholder Engagement Plan as part of the management mechanism for handling complaints and grievances within an acceptable timeframe will also be proposed.

5.6.2 Monitoring Specifications

The programme for monitoring will generally identify:

- The scope and type of monitoring required (for example water quality measurement and benthic parameters);
- The locations of monitoring stations (this will be identified on a map with coordinates provided);
- The parameters to be maintained and limits or trigger values to be adopted for management purposes (e.g. dissolved oxygen, ammonium, nitrate, deposition and phytoplankton); and
- The frequency of monitoring.

5.6.3 Abandonment Plan

The EMP will also include outline requirements for a Project Completion and Abandonment plan. This will include recommendations on the procedures for the removal of unwanted and/or hazardous structures including:

- Aquaculture structure including moorings
- Temporary base camps;
- Rehabilitation of coastal marine ecosystems
- Landscaping requirements;
- Appropriate clean-ups
- Disposal of wastes at the operations or construction sites.

5.7 Consultation

Discussions and meetings will be held with relevant government agencies, particularly with authorities involved in the approval of the EIA report, such as (but not limited to) the Environment Protection Department (EPD), Department of Environment (DOE), Fisheries Department, Lands and Surveys Department, District Office, local community leaders, and so on.

Apart from that, consultation will also be carried out with the environmental-based Non-Governmental Organizations (NGOs) such as WWF and SEPA and any local NGOs in Semporna. The main aim of the meetings would be to determine the concerns of these departments/agencies/parties so that these can be addressed adequately in the EIA report.

Information, policies and guidelines will also be sourced from other various Government Agencies.

5.8 Supporting Studies

In addition to the EIA study, a Marine Aquaculture Spatial Plan (MASP) is in progress. This plan will assist the Sabah State Fisheries department in managing the iLAP area in its entirety and will include the current seaweed and pearl farming activities. The plan in particular will highlight which areas are suitable to grow lobsters with the least impact on other users, and will assist in maximising the resource.

6 Work Schedule

The EIA is targeted for completion within a three month time frame, given baseline studies and numerical modelling works have already been initiated to assist with the project planning.

7 EIA Study Team

A multidisciplinary team with extensive experience is proposed for the present study. The key EIA team members are listed in Table 7.1 and supporting study team is given in Table 7.2; curricula vitae can be provided upon request.

Table 7.1 Proposed EIA Team Members and project position.

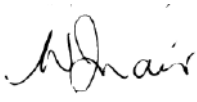
Name/ Qualifications	Area(s) of study in EIA	EPD Registration No. / Expiry Date	Signature
Tania Golingi BSc. Environmental Science	EIA Team Leader Ecology	S0027 30/09/2014	
Dr. Neil Hartstein PhD. Marine and Environmental Science MSc (hons), Earth Science BSc, Geology/Earth Science	Hydraulic modelling team supervisor Fisheries & Aquaculture	S0371 16/02/2014	
Amy Ling Chu Chu B. Eng. (Hons.) in Civil Engineering	Hydraulic	S0143 14/11/2015	
Felix Ku Kok Hu BEng. (Hons) Civil & Environmental Engineering	Hydraulic / GIS	S0150 14/11/2015	
Wong Lie Lie Master of Environment and Business Management	Mapping / GIS	S0083 23/09/2015	
Siti Nurulfirdauz Hashim BSc. (Environment)	Water / Noise / Air Quality	S0189 16/02/2014	
Velerie Siambun B.Sc in Applied Biology Hons. Environmental	Biology	S0029 30/09/2015	
Captain Walter Nair (KASI) Master Mariner	Marine Traffic and Navigational Safety	S0138 10/06/2015	

Table 7.2 Supporting EIA study team.

Name/ Qualifications	Area(s) of study in EIA
Rachel Wong Bachelors of Engineering (Hons.) in Chemical Engineering	Ecolab modeller
Prof. Dr. Stephen Oakley Ph.D. Marine Biology	Technical Advisor, Marine Ecology
Crisanto V. Cayon Master in International Crisis Management	Social Development Expert
Mohd Zambri Mohd Akhir BSc. Aquatic Biology	Marine Ecology
Lance Searle (Sashimi Group Ltd, NZ) B.Sc fisheries	Aquaculture production and planning specialist
Dr. Paul Porodong PhD. Anthropolgy & Sociology	Socioeconomic Expert
Melissa Mathews MSc. Environmental Studies (JEMES-Erasmus Mundus) Bsc. Conservation Biology (Hons)	Marine and Coastal Ecology/ Field Coordinator
Johnny Gisil Flora Survey Team Leader, Institute for Tropical Biology and Conservation, UMS	Flora
Evelyn Teh BSc Marine Biology (Hons)	Environmental Scientist
Noor Atika Binti Abdullah BSc in Marine Science (Hons)	Marine Biologist

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APPENDICES

APPENDIX A

Project Supporting Information

Letter on Economic Council's Decision for iLAP-PEMANDU

Letter to the Chief Minister of Sabah from the Chief Executive Officer of PEMANDU

Letter from the Chief Minister of Sabah's Office to the Director of Land and Survey Department (CONFIDENTIAL LETTER REDACTED FROM THIS COPY)

UNIT PENGURUSAN PRESTASI DAN PELAKSANAAN
Performance Management and Delivery Unit (PEMANDU)
JABATAN PERDANA MENTERI
Prime Minister's Department
ARAS 1, BLOK TIMUR
Level 1, East Block
PUSAT PENTADBIRAN KERAJAAN PERSEKUTUAN
Federal Government Administrative Centre
62502 PUTRAJAYA

PEMANDU
UNIT PENGURUSAN PRESTASI DAN PELAKSANAAN

Telefon : 03-8872 7225
Faks : 03-8889 4428

15 November 2013

SEGERA DENGAN EMEL

Pengarah Urusan
Lobster Aqua Technologies Sdn. Bhd.
C19-2, First Floor, Block C,
Kepayan Perdana Commercial Centre,
88300 Kota Kinabalu, Sabah
(u.p: Dr. Shahridan Faiez)

Dr.,

KEPUTUSAN MESYUARAT MAJLIS EKONOMI BAGI KERTAS 2 19/2013: PROGRESS UPDATE ON LOBSTER AQUA TECHNOLOGIES SDN. BHD. (LATSB – JV OF DARDEN RESTAURANT INC) – iLAP PROJECT IN SABAH

Dengan segala hormatnya saya merujuk kepada perkara di atas.

2. Berdasarkan cabutan minit mesyuarat Majlis Ekonomi (EC) Bil. 19/2013 bertarikh 12hb November 2013 (Ruj: (83) dlm. UPE(R) 10/125/9/5 Jld. 33) bagi keputusan Kertas 2 19/2013: Progress Update on Lobster Aqua, mesyuarat Majlis Ekonomi telah bersetuju seperti berikut:

i. **Pembinaan jambatan yang menghubungkan Semporna dan Pulau Bait serta infrastruktur lain yang diperlukan bagi melaksanakan projek iLAP**

ii. **Peruntukan bagi komponen lain yang diluluskan berkaitan dengan projek iLAP disediakan mengikut prestasi perlaksanaan projek**

iii. **Kos muktamad yang perlu dibiayai oleh Kerajaan akan ditentukan selepas penilaian terperinci BQ serta penyerahan dokumen lain yang berkaitan, tertakluk kepada jumlah pembiayaan Kerajaan tidak melebihi RM992 jutadan bergantung kepada kedudukan kewangan Kerajaan**

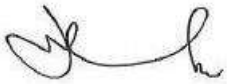
3. Berdasarkan keputusan mesyuarat EC di atas, diminta pihak Dr. menjalankan aktiviti-aktiviti pasca Mesyuarat EC iaitu seperti berikut:

a. Mohon kelulusan kebenaran masuk ke tapak oleh Kerajaan Negeri Sabah
b. Menyediakan dokumen-dokumen seperti *Bill of Quantity, Master Plan Layout* dan lain-lain dan mengemukakan dokumen-dokumen tersebut ke Jabatan Perikanan untuk penentuan kuantum NKEA Pertanian
c. Menyediakan dokumen-dokumen untuk kelulusan EIA bagi projek tersebut

4. Dengan itu, sekiranya terdapat sebarang pertanyaan, pihak Dr. boleh menghubungi En Nik Nazree di talian 017-6645772.

Sekian, terima kasih.

Salam 1Malaysia,



DR FADHLULLAH SUHAIMI ABDUL MALEK
Pengarah, NKEA Pertanian,
Unit Pengurusan Pelaksanaan dan Pemantauan (PEMANDU),
Jabatan Perdana Menteri.

sk:

1. Menteri Besar Sabah
   Pejabat Ketua Menteri,
   Tingkat 17, Wisma Innoprise,
   Jalan Sulaman,
   Teluk Likas,
   88817 Kota Kinabalu,
   Sabah

2. Ketua Pengarah
   Unit Perancang Ekonomi
   Aras 1, Blok B6, Parcel B
   Jabatan Perdana Menteri
   Blok B5
   Pusat Pentadbiran Kerajaan Persekutuan,
   62502, Putrajaya

3. Ketua Setiausaha
   Kementerian Pertanian dan Industri Asas Tani
   Wisma Tani, No. 28 Persiaran Perdana,
   Presint 4, Pusat Pentadbiran Kerajaan Persekutuan,
   62624, Putrajaya

4. Ketua Sekretariat Delivery Management Office (DMO)
   Kementerian Pertanian dan Industri Asas Tani
   Wisma Tani, No. 28 Persiaran Perdana,
   Presint 4, Pusat Pentadbiran Kerajaan Persekutuan,
   626624 Putrajaya

5. Ketua Pengarah
   Jabatan Perikanan Malaysia
   Aras 1-6, Blok Menara 4G2, Presint 4,
   62628, Putrajaya

6. Setiausaha Tetap
   Kementerian Pertanian dan Industri Makanan Sabah
   Tingkat 7&8, Wisma Pertanian Sabah,
   Jalan Tasik Luyang,
   88624 Kota Kinabalu, Sabah

7. Pengarah
   Pejabat Perikanan Negeri Sabah
   Tingkat 4, Blok B,
   Wisma Pertanian Sabah
   Jalan Tasik Luyang
   88624 Kota Kinabalu

8. Ketua Pegawai Eksekutif
   InvestKL
   Tingkat 16, Merana SSM@Sentral
   No.7, Jalan Stesen Sentral 5,
   Kuala Lumpur Sentral,
   50623, Kuala Lumpur

YB SENATOR DATO' SRI IDRIS JALA
MENTERI DI JABATAN PERDANA MENTERI
(Minister in Prime Minister's Department)

SEGERA

JPM.PEMANDU.1700/001/2013 (07)
18 November 2013

YAB Datuk Seri Musa Haji Aman
Ketua Menteri Sabah
Pejabat Ketua Menteri
Tingkat 17, Wisma Innoprise
Jalan Sulaman
Teluk Likas
88817 Kota Kinabalu

YAB Datuk Seri,

KEPUTUSAN MESYUARAT MAJLIS EKONOMI BAGI KERTAS 2 19/2013: PROGRESS UPDATE ON LOBSTER AQUA TECHNOLOGIES SDN. BHD. (LATSB – JV OF DARDEN RESTAURANT INC) – iLAP PROJECT IN SABAH

Dengan segala hormatnya saya merujuk kepada perkara di atas.

Berdasarkan cabutan minit mesyuarat Majlis Ekonomi (EC) Bil. 19/2013 bertarikh 12hb November 2013 (Ruj: (83) dlm. UPE(R) 10/125/9/5 Jld. 33) bagi keputusan Kertas 2 19/2013: Progress Update on Lobster Aqua Technologies Sdn Bhd, mesyuarat Majlis Ekonomi telah bersetuju untuk menyokong projek tersebut di bawah Program Transformasi Ekonomi khususnya NKEA Pertanian.

Berdasarkan keputusan mesyuarat EC di atas, saya ingin memohon kerjasama pihak YAB Datuk Seri dan agensi-agensi terbabit untuk mempercepatkan kelulusan interim bagi kebenaran masuk tapak kepada pihak syarikat. Ini adalah kerana hanya setelah dibenarkan untuk masuk ke tapak, pihak syarikat dapat menjalankan aktiviti-aktiviti penyediaan dokumen-dokumen seperti Master Plan Layout, Bill of Quantity dan lain-lain untuk penentuan kuantum bagi pembiayaan kerajaan di bawah NKEA Pertanian, seterusnya dapat memulakan projek untuk kebaikan ekonomi terutamanya di Sabah dan Malaysia amnya.

Aras 3, Blok Timur, Bangunan Perdana Putra, Pusat Pentadbiran Kerajaan Persekutuan, 62502, PUTRAJAYA
Fax: 603-88887110

Kerjasama pihak YAB Datuk Seri terlebih dahulu saya ucapkan ribuan terima kasih.

Sekian, terima kasih.

SENATOR DATO SRI IDRIS JALA
Menteri di Jabatan Perdana Menteri &
Ketua Pegawai Eksekutif PEMANDU

sk:

1. Ketua Pengarah
   Unit Perancang Ekonomi
   Aras 1, Blok B6, Parcel B
   Jabatan Perdana Menteri
   Blok B5
   Pusat Pentadbiran Kerajaan Persekutuan
   62502 Putrajaya

2. Ketua Setiausaha
   Kementerian Pertanian dan Industri Asas Tani
   Wisma Tani, No. 28 Persiaran Perdana
   Presint 4, Pusat Pentadbiran Kerajaan Persekutuan
   62624 Putrajaya

3. Ketua Sekretariat Delivery Management Office (DMO)
   Kementerian Pertanian dan Industri Asas Tani
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   626624 Putrajaya

4. Ketua Pengarah
   Jabatan Perikanan Malaysia
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   62628 Putrajaya

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5. Setiausaha Tetap
   Kementerian Pertanian dan Industri Makanan Sabah
   Tingkat 7&8, Wisma Pertanian Sabah
   Jalan Tasik Luyang
   88624 Kota Kinabalu

6. Pengarah
   Pejabat Perikanan Negeri Sabah
   Tingkat 4, Blok B,
   Wisma Pertanian Sabah
   Jalan Tasik Luyang
   88624 Kota Kinabalu

7. Ketua Pegawai Eksekutif
   InvestKL
   Tingkat 16, Merana SSM@Sentral
   No.7, Jalan Stesen Sentral 5
   Kuala Lumpur Sentral
   50623 Kuala Lumpur

8. Pengarah Urusan
   Lobster Aqua Technologies Sdn. Bhd.
   C19-2, First Floor, Block C
   Kepayan Perdana Commercial Centre
   88300 Kota Kinabalu

9. Pengarah
   NKEA Pertanian
   Unit Pengurusan Prestasi dan Pelaksanaan (PEMANDU)
   Jabatan Perdana Menteri