Appendix II

Barging Operation Plan

Barging Operation Plan for S16 Planning Application of Proposed Temporary Concrete Batching Plant for a Period of 5 Years at Tsing Yi Town Lots 14 and 15 and Adjoining Government Land, Tam Kon Shan Road, Tsing Yi

BARGING OPERATION PLAN

Reference: 31048-R02-02e
Date: April 2025

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Contents

1 Introduction

1.1 Background

The Applicant seeks approval under Section 16 of the Town Planning Ordinance (Cap. 131) to establish a Temporary Concrete Batching Plant (CBP) for a period of 5 years at Tsing Yi Town Lot Nos. 14 and 15 and adjoining Government Land (GL) along Tam Kon Shan Road, Tsing Yi, New Territories (the Site). The application site occupied an area of 4,335 m. sq, including 1,057 m. sq (about) of G.L., and partially falls within an area zoned “Other Specified Uses” annotated “Boatyard and Marine-oriented Industrial Uses” (“OU(BMIU)”) under the Approved Tsing Yi Outline Zoning Plan (OZP) No. S/TY/32 and partly outside the OZP boundary.

The CBP aims to address the increasing demand for ready-mixed concrete driven by infrastructure projects and residential developments in Hong Kong, particularly in the New Development Areas (NDAs) of the Northern Metropolis. The Site’s strategic location near established industrial activities and marine facilities ensures compatibility with surrounding land uses and supports the sustainable development of the construction industry.

AXON Consultancy Limited has been commissioned to prepare a Barging Operation Plan (BOP) to support the Section 16 application by ensuring safe, efficient, and environmentally compliant marine logistics for the proposed development.

1.2 Scope of Work

This Barging Operation Plan (BOP) outlines the operational framework for the proposed CBP, focusing on marine logistics and ensuring compliance with environmental, safety, and operational standards. Key components include:

- Marine Logistics Assessment: Evaluation of marine traffic patterns, metocean conditions, and potential impacts.
- Operational Planning: Development of frameworks for safe and efficient barge delivery, mooring, and unloading operations.
- Risk Mitigation Measures: Identification of risks and proposal of mitigation strategies to comply with safety and environmental standards.

- Emergency and Contingency Planning: Establishment of protocols for adverse weather conditions and emergency scenarios.

1.3 Objective

The primary objectives of this study are:

- To ensure the safe and efficient handling of CBP unloading and marine delivery operations while minimizing disruption to adjacent marine traffic and activities.
- To identify and address potential marine operational risks through comprehensive mitigation strategies.
- To demonstrate the Applicant's commitment to safety, environmental compliance, and responsible management of marine operations, ensuring the highest standards of operation.

2 Project Overview

2.1 Site Location and Characteristics

The proposed Temporary Concrete Batching Plant (CBP) is strategically located at Tsing Yi Town Lot (TYTL) Nos. 14 and 15, together with an adjoining parcel of Government Land held under Short Term Tenancy (STT), situated along Tam Kon Shan Road in the New Territories. The site occupies an area of approximately 4,335 square metres and benefits from direct marine frontage, offering a practical setting for barge-based material delivery and handling.

The red dotted line shown in the figure represents the boundary of the land currently leased by the applicant. To facilitate safe barge approach, berthing, and unloading of aggregates and cement, a proposed marine operation area has been identified in the waters beyond the land lot. This area is outlined in blue dotted line in Figure 2.1 and reflects the required space to accommodate the Pelican Aggregate Barge and the Cement Barge during routine delivery and unloading.

As land matters fall under the purview of the Development Bureau and the Lands Department (LandsD), the applicant is coordinating with its appointed lands consultant to review and follow up on any administrative arrangements necessary to support the proposed marine activity area. Ongoing engagement with relevant authorities will ensure alignment with lease conditions and prevailing statutory requirements.

Figure 2.1 illustrates the site location, the extent of the existing lease area (covering TYTL No. 14, TYTL No. 15, and the STT area), as well as the proposed marine operation zone, which is defined within the polygon bounded by Points A, B, C, and D, as listed in **Table 2.1.**

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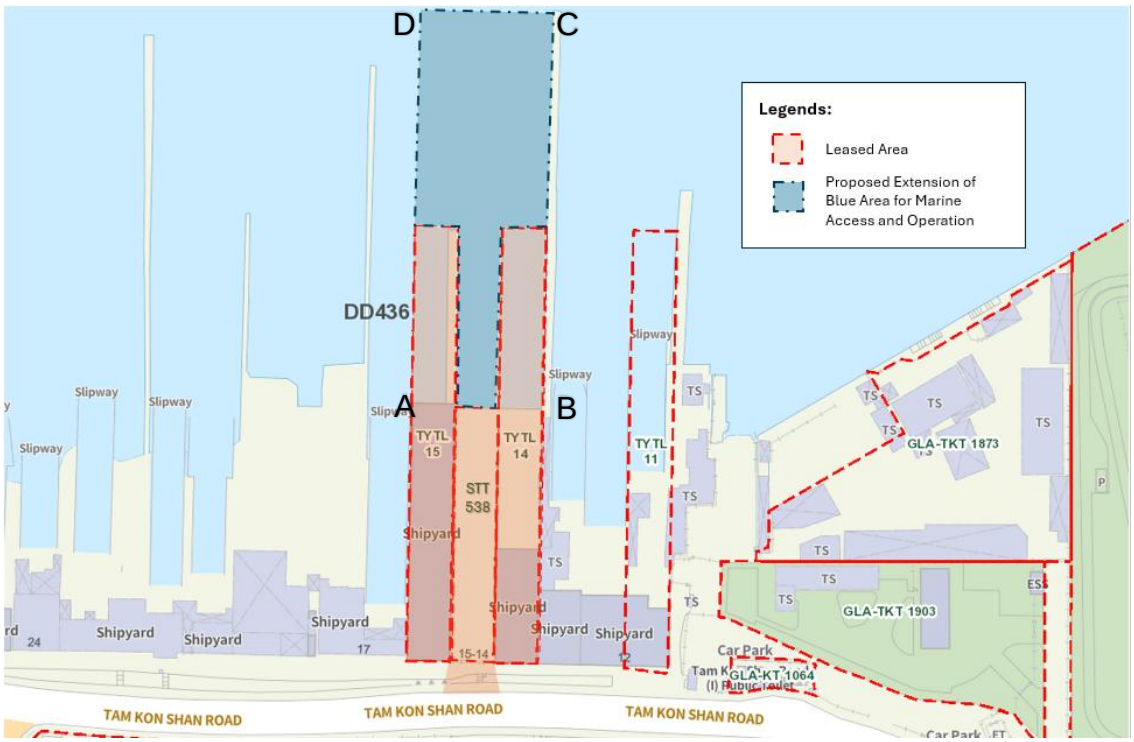
Table 2.1 Operation Area

Point No.	Latitude	Longitude
A	22º 21.7077’	114º 5.7155’
B	22º 21.7069’	114º 5.7371’
C	22º 21.7604’	114º 5.7387’
D	22º 21.7619’	114º 5.7163’

Figure 2.1 Site Location and Proposed Operational Boundary



2.2 Description of the Proposed CBP

The proposed CBP will operate for five years, offering a sustainable and efficient solution to meet the demand for concrete in Hong Kong’s ongoing infrastructure development.

The construction phase of the proposed concrete batching plant is projected to require approximately 9 to 12 months. During this period, no marine deliveries of construction materials are anticipated.

Full-scale operations are scheduled to commence by Q1 2026, following the completion of construction and the necessary regulatory approvals.

The CBP will have three batching lines, each with a capacity of 100 m^3 per hour, allowing for a maximum daily output of 3,800 m^3 of concrete under normal operating conditions. The normal operating hours will be from 07:00 to 21:00.

Minimal night-time operations may be undertaken between 21:00 and 07:00, particularly for public interest or to accommodate specific project needs. During night operations, batching capacity will be limited to 100 m^3 per hour, ensuring reduced activity levels to minimize potential disruptions

The concrete batching process at the CBP will consist of the following stages:

- **Delivery of Raw Materials**: Aggregates and cement will be transported to the site using self-propelled barges, which are readily available in the market and suitable for the project's operational needs. Limited quantities of raw materials may also be delivered to the site by trucks.
- **Conveyance to the Plant:** Raw materials will be efficiently transferred from barges to the batching plant using pipelines or conveyor systems.
- **Weighing and Mixing**: The materials will undergo precise weighing and controlled mixing to produce high-quality concrete in compliance with industry standards.
- **Distribution:** Batched concrete will be loaded onto mixer trucks for delivery to construction sites.

The site's strategic location ensures direct marine accessibility, enabling delivery operations while reducing cross-district road traffic and its associated environmental impacts.

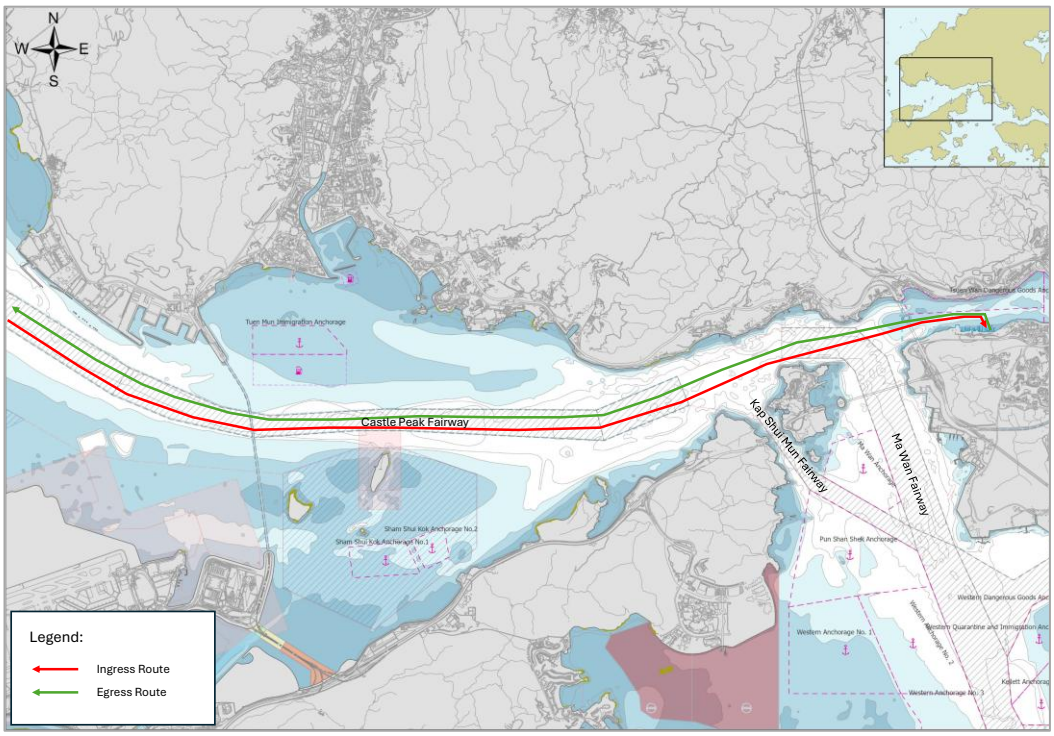
3 Delivery and Routing

3.1 Barge Delivery Route

The raw materials required for concrete batching, including aggregates and cement, will be transported using self-propelled rivertrade vessels. These vessels will follow established marine routes within Hong Kong waters to ensure safe and efficient transit.

The delivery routes, utilizing Castle Peak Fairway and Ma Wan Fairway, have been carefully selected to comply with Hong Kong maritime safety regulations and minimize navigational risks. The proposed delivery routes are illustrated in Figure 3.1.

Figure 3.1 Proposed Delivery Routes



3.2 General Navigational Guideline

The route planning for the proposed barge operations adheres to the International Regulations for Preventing Collisions at Sea (COLREGs) and Hong Kong Marine Department regulations.

Key guidelines include:

- Navigating along the starboard side of the fairway to maintain orderly traffic flow.
- Following COLREGs for overtaking, including appropriate signaling and maintaining safe distances.
- Making fairway crossings at right angles to minimize disruption and collision risk.
- Prohibiting anchoring and fishing within designated fairway limits to avoid navigational hazards.
- Prioritizing larger vessels, with smaller vessels required to avoid impeding their passage.

3.3 Delivery Frequency

A maximum of 3 round-trip barge movements per day will be scheduled at North Tsing Yi to deliver both aggregates and cement via self-propelled barges from the mainland. This includes three inbound trips (*one for cement and two for aggregates using the Pelican Aggregate Barge*) and three corresponding outbound trips. The delivery frequency has been carefully planned to optimize operational efficiency while minimizing potential impacts. Adjustments to the schedule may be made as needed to accommodate project demands, weather conditions, or other operational factors, ensuring flexibility and consistency in the delivery process.

3.4 Deployed Vessels and Unloading Process

The delivery operations will utilize two existing self-propelled barges designed to meet project demands and adhere to environmental and safety standards. Their key specifications and unloading processes are summarized in Table 3.1.

Table 3.1 Typical Specification of Deployed Vessels

Vessel Type	Length Overall (LOA)	Beam	Draft (Fully Loaded)	Capacity per Trip	Special Features
Pelican Aggregate Barge	50 m	15.2 m	3.4 m	1,500 tonnes	Self-propelled
Cement Barge	52 m	10.5 m	2.4 m	800 tonnes	Self-propelled

Pelican Aggregate Barge: Featuring a 1500-ton class stone aggregate belt self-discharging design, this vessel utilizes a built-in conveyor system to transfer aggregates directly to the batching plant's hopper on the quay. Its fully enclosed structure minimizes dust emissions and ensures environmental compliance. Operating at an unloading rate of 400 tons per hour, the vessel can fully unload in just 4 hours. Additionally, the vessel measures 50 meters in length and 15.2 meters in width, has a full-load draft of 3.4 meters, and is equipped with a 22-meter-long belt, ensuring efficient and precise aggregate handling.

Cement Barge: Featuring a self-discharging pumping system with portable pipelines to transfer cement directly to the batching plant silos, this controlled system effectively prevents spillage while ensuring efficient operations. With an unloading rate of 200 tons per hour, the entire load is discharged in just 4 hours. The 800-ton cement ship measures 52 meters in length, 10.5 meters in width, and has a full-load draft of 2.4 meters.

3.5 Delivery of Product

The proposed concrete batching plant is designed to produce high-quality ready-mix concrete that is delivered exclusively by concrete mixing trucks. In this system, once the concrete is batched at the plant, it is loaded into mixer trucks and transported via the road network directly to the construction sites.

This truck-based delivery system eliminates the need for any marine or barge delivery, streamlining logistics and reducing potential risks associated with marine transport. The approach also offers greater scheduling flexibility and ensures that the concrete maintains its integrity from the batching plant to its final placement.

4 Dredging Requirements

4.1 Existing Situation

At the application site, sedimentation has reduced the nearshore water depth at the barging point to below the level required for safe batching operations. To remedy this, maintenance dredging is necessary to remove the accumulated sediment and restore adequate water depth for vessel navigation.

4.2 Water Depth Requirement

According to the Table 3.1, to cater for the maximum draft of the pelican barge with a draft of 3.4m, a typical safe navigation requirement is to have an under-keel clearance of at least 10% of the draft. In this case, 10% of 3.4 m is approximately 0.34 m, so the minimum water depth required would be about 3.4 m + 0.34 m, roughly 3.74 m.

However, in practice, to accommodate tidal variations and provide a safety margin, a water depth of around 3.8 m (at Chart Datum) is generally maintained for operations involving a Pelican Aggregate Barge. This ensures that even under varying conditions, there is adequate clearance for safe navigation.

4.3 Extent of Dredging

The targeted dredging area is shown in Figure A1. Preliminary estimates suggest that approximately 3,000 – 5,000 square meters of the seabed would need to be dredged, subject to further detailed analysis.

Under the EIAO, a project qualifies as a designated project requiring a full Environmental Impact Assessment if the dredging volume exceeds 500,000 m^3. In this case, the proposed maintenance dredging operation involves less than 5,000 m^3, which is significantly below the threshold and thus considered insignificant. Consequently, it does not trigger the designated project requirements under the EIAO, although all other regulatory and administrative procedures must still be followed to ensure safe navigation and proper environmental management.

4.4 Dredging Administration

All administrative works related to the dredging operation will be carried out in strict compliance with the Project Administration Handbook for Civil Engineering Works, 2024 Edition. This means that every aspect, from the initial justification for dredging, sediment sampling and testing, through to the permit application and disposal procedures, will adhere to the detailed guidelines and requirements stipulated in Chapter 4 of the handbook. This ensures that all regulatory, environmental, and technical criteria are met during the dredging process.

For instance, the handbook outlines the proper procedures for submitting a Sediment Sampling and Testing Plan, preparing a Preliminary Sediment Quality Report (PSQR), and obtaining the necessary dumping permits under the Foreshore and Seabed (Reclamation) Ordinance. By following these established procedures, the project will maintain full accountability and control over the dredged materials, ensuring both safety and environmental compliance throughout the dredging and disposal phases.

Director of Environmental Protection (DEP) may waive the sediment sampling and testing requirements in specific circumstances to expedite critical dredging operations. This waiver applies in cases of emergency dredging when immediate action is needed to avert safety risks or environmental hazards, and for small-scale maintenance dredging projects involving volumes of less than 5,000 m^3 in situ. In such cases, the project proponent must submit any previously obtained data or historical information regarding the sediment quality in the vicinity, allowing DEP to assess the situation and determine the most appropriate handling arrangements without necessitating a full sampling and testing program.

4.5 Conclusion

The client will proceed with a maintenance dredge to restore the necessary water depth for safe navigation. The client is committed to following the administrative procedures outlined in the Project Administration Handbook for Civil Engineering Works, 2024 Edition, including the proper application for a dredging permit and compliance with all regulatory requirements for sediment disposal.

5 Mooring Stability

5.1 Introduction

Mooring stability is critical for both the Pelican Aggregate Barge and the Cement Barge to ensure safe and efficient delivery operations.

For the aggregate barge, stable mooring guarantees that the vessel remains securely in position during loading and unloading, preventing spillage and collisions while accommodating tidal fluctuations and currents.

Similarly, the cement barge requires a stable mooring arrangement to maintain precise alignment with the discharge point, thereby avoiding disruptions during cement transfer and ensuring that operations proceed without unintended material loss.

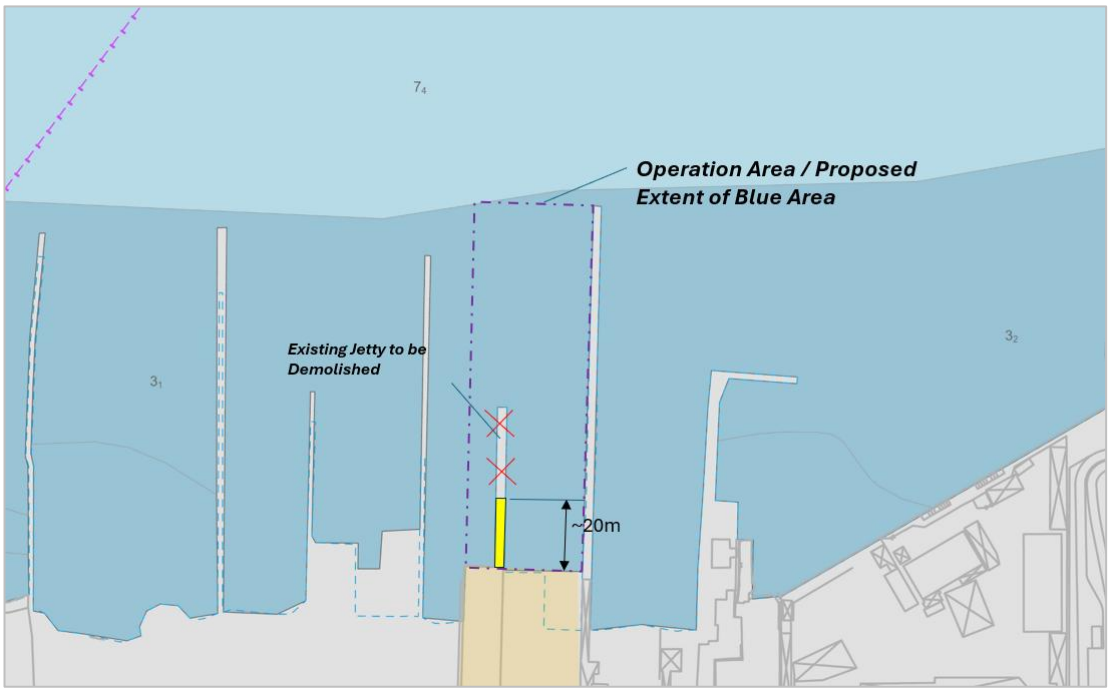
In both cases, effective mooring stability not only supports operational safety and efficiency but also minimizes environmental risks and interference with adjacent marine traffic.

5.2 Safety and Stability Improvement

The safety platform is part of the overall improvement measures (Figure 5.1). With this approach, and in combination with the planned dredging operations, vessels will be able to approach closer to the quay.

This proximity allows for a better arrangement of the new fenders, bollards, and anchoring systems, thereby enhancing the mooring facilities and ensuring increased stability for both the Pelican Aggregate Barge and the Cement Barge during loading and unloading operations.

Figure 5.1 Proposed Improvement of Safety Platform

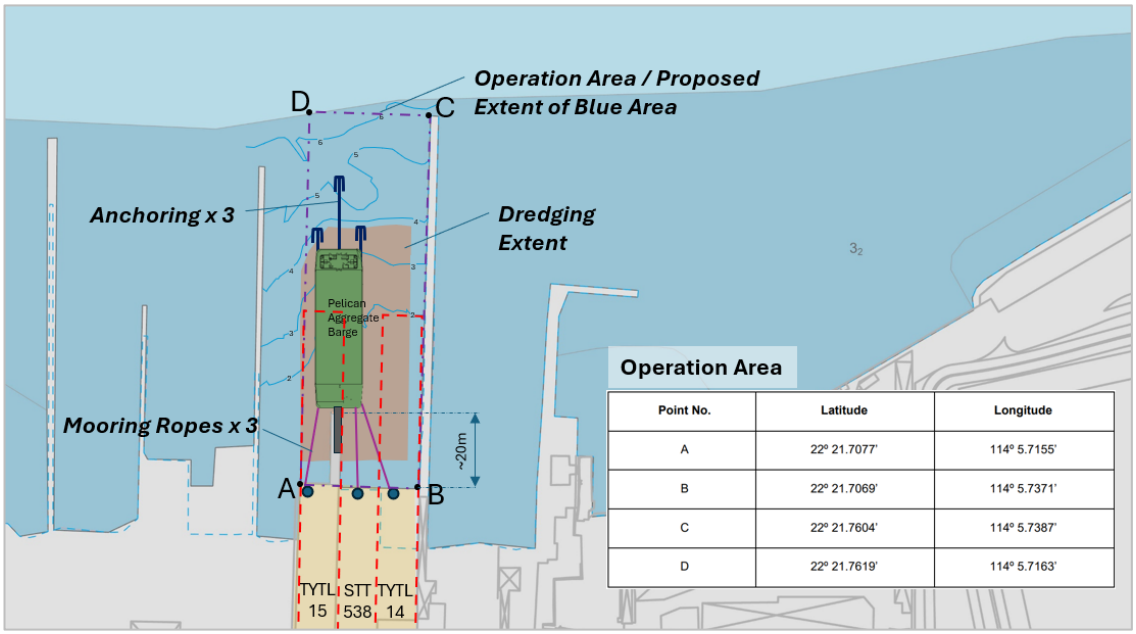


5.3 Mooring Arrangements

Pelican Aggregate Barge

As shown in Figure 5.2, the Pelican Aggregate Barge will positioned approximately 20 meters off the quay, secured by an anchor and two mooring ropes at the bow and three anchor lines at stern. This dual approach, mooring ropes plus anchoring, ensures the vessel remains stable and correctly aligned during aggregate loading and unloading. The anchors provide lateral and longitudinal restraint against tidal currents, while the mooring ropes maintain a firm connection to the quay. Combined, these measures minimize vessel movement and protect both the barge and the safety platform infrastructure throughout operations.

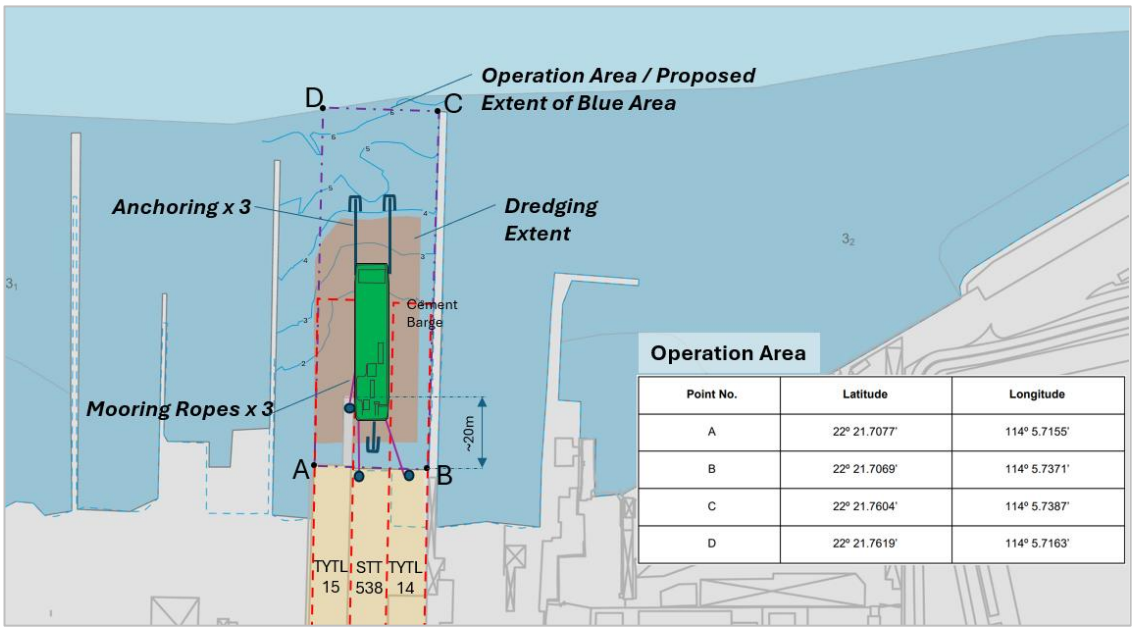
Figure 5.2 Mooring Arrangement of Pelican Aggregate Barge



Cement Barge

As shown in Figure 5.3, the Cement Barge will be stationed approximately 15 meters from the quay, with at least 5 meters of the safety platform stabilizing its starboard side. It is secured by three mooring ropes attached to both the safety platform and the quay, plus a single bow anchor and two stern anchors. This arrangement provides lateral and longitudinal balance, minimizing the barge's movement due to tidal currents or wave action. The mooring ropes ensure a firm connection to the shore infrastructure, while the forward and stern anchors contribute additional stability, keeping the barge properly aligned for efficient cement pumping operations.

Figure 5.3 Mooring Arrangement of Cement Barge

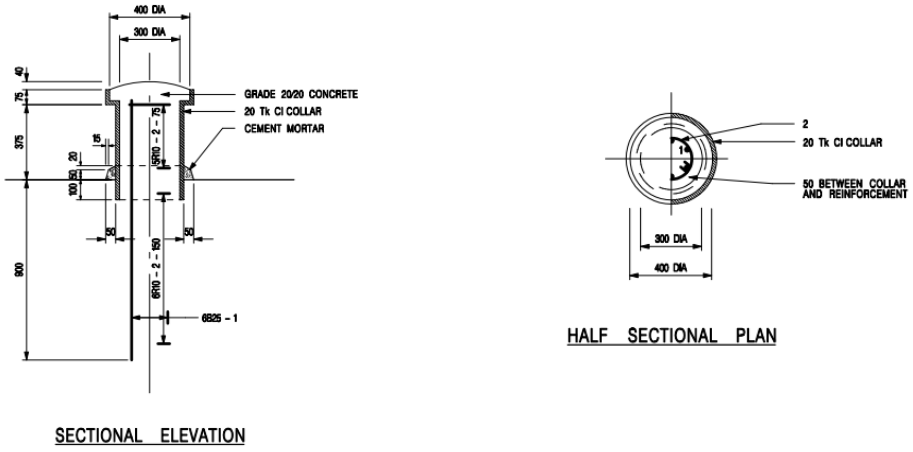


5.4 Mooring Facilities

New fenders and mooring bollards (*typical design as shown in* Figure 5.4) will be installed on the quay and safety platform to provide robust mooring facilities. These installations are essential for securing both the Pelican Aggregate Barge and the Cement Barge during loading and unloading operations, ensuring that the vessels remain stable and correctly aligned.

By enhancing the mooring infrastructure, the risk of vessel movement due to tidal fluctuations or currents is significantly reduced, thereby protecting both the marine equipment and the quay/safety platform structures while facilitating safe and efficient marine operations.

Figure 5.4 Typical Arrangements of Mooring Bollard



Source: CEDD Standard Drawing No. C3015B

5.5 Anchoring

In addition to installing new fenders and bollards on the quay and safety platform to secure the vessels, anchoring will also be employed as an extra measure to enhance stability. This anchoring system will work in tandem with the improved mooring infrastructure to firmly secure both the Pelican Aggregate Barge and the Cement Barge during loading and unloading operations.

By providing additional resistance against tidal fluctuations and adverse weather conditions, anchoring helps to prevent unwanted vessel movement, ensuring safe alignment and reducing the risk of operational hazards such as spillage or collision.

5.6 Conclusion

In conclusion, the enhanced mooring system, comprising new fenders, bollards, anchoring, and updated rope arrangements, combined with maintenance dredging, offers significant benefits. The maintenance dredging will restore adequate water depth, allowing vessels to approach the quay more closely and securely. This proximity facilitates improved mooring arrangements that stabilize both the Pelican Aggregate Barge and the Cement Barge, ensuring precise alignment and safe loading/unloading operations. Together, these measures not only boost operational efficiency and safety but also help to protect both the vessels and the surrounding infrastructure from the effects of tidal currents and environmental disturbances.

6 Unloading

6.1 General

The unloading operations at the site are designed to support the temporary concrete batching plant's efficient and safe delivery of materials. The Pelican Aggregate Barge and the Cement Barge unload aggregate and cement respectively via specialized transfer mechanisms at the safety platform. This process is optimized to ensure rapid material transfer, maintain environmental compliance, and minimize disruption to surrounding marine traffic, thereby supporting seamless construction operations.

6.2 Pelican Aggregate Barge Unloading

The Pelican Aggregate Barge is equipped with a built-in conveyor belt system that transfers aggregates directly from the barge to the safety platform and onward to the batching plant, ensuring a continuous and controlled material flow.

The enclosed design of the hopper and conveyor system provides environmental containment during the unloading process. This setup minimizes the release of dust and prevents debris or runoff from entering the surrounding waters. The enclosure also serves to reduce noise and vibration levels, supporting compliance with environmental standards and minimizing disruption to the nearby community and marine users.

The typical arrangement of aggregate unloading operations, including anchoring positions and equipment layout, is shown in **Figure 6.2.**

6.3 Cement Barge Unloading

On the other hand, the Cement Barge employs a self-discharging pumping system with pipelines that extend to the batching plant silos, allowing for smooth and precise cement delivery.

The cement barge employs a hot plug system to connect its self-discharging pumping system to the receiving pump line of the concrete batching plant. This hot plug mechanism facilitates a rapid, secure, and leak-free connection, allowing for continuous cement flow with minimal downtime.

Designed to handle high pressures and the corrosive nature of cement slurry, the hot plug ensures that the connection is both durable and reliable, reducing the risk of spillage and environmental contamination. By streamlining the transfer process, it enhances operational efficiency and maintains safety standards during cement delivery.

The concrete batching plant is equipped with an advanced suction system that enables cement to be pumped directly from the cement barge into the plant without needing to activate the vessel's onboard pump. This design not only streamlines the cement transfer process by using a dedicated suction line at the plant but also significantly improves air quality. By avoiding the operation of the vessel pump, which typically generates exhaust emissions and noise, the system reduces airborne pollutants and minimizes environmental disruption, thereby contributing to a cleaner and safer working environment.

The proposed mooring and cement transfer setup is illustrated in **Figure 6.3**

Figure 6.1 Illustration of Aggregate Unloading from Pelican Barge

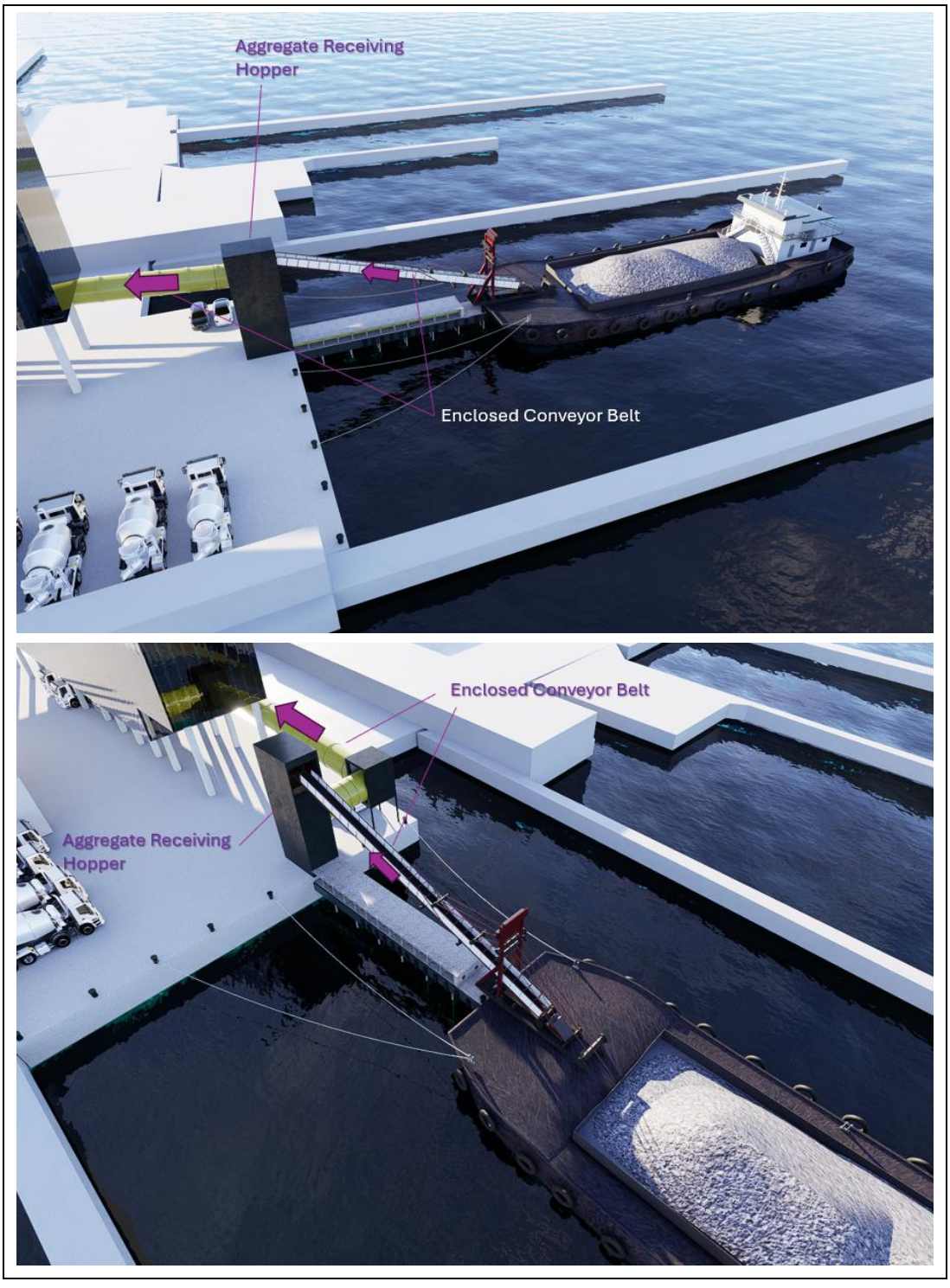
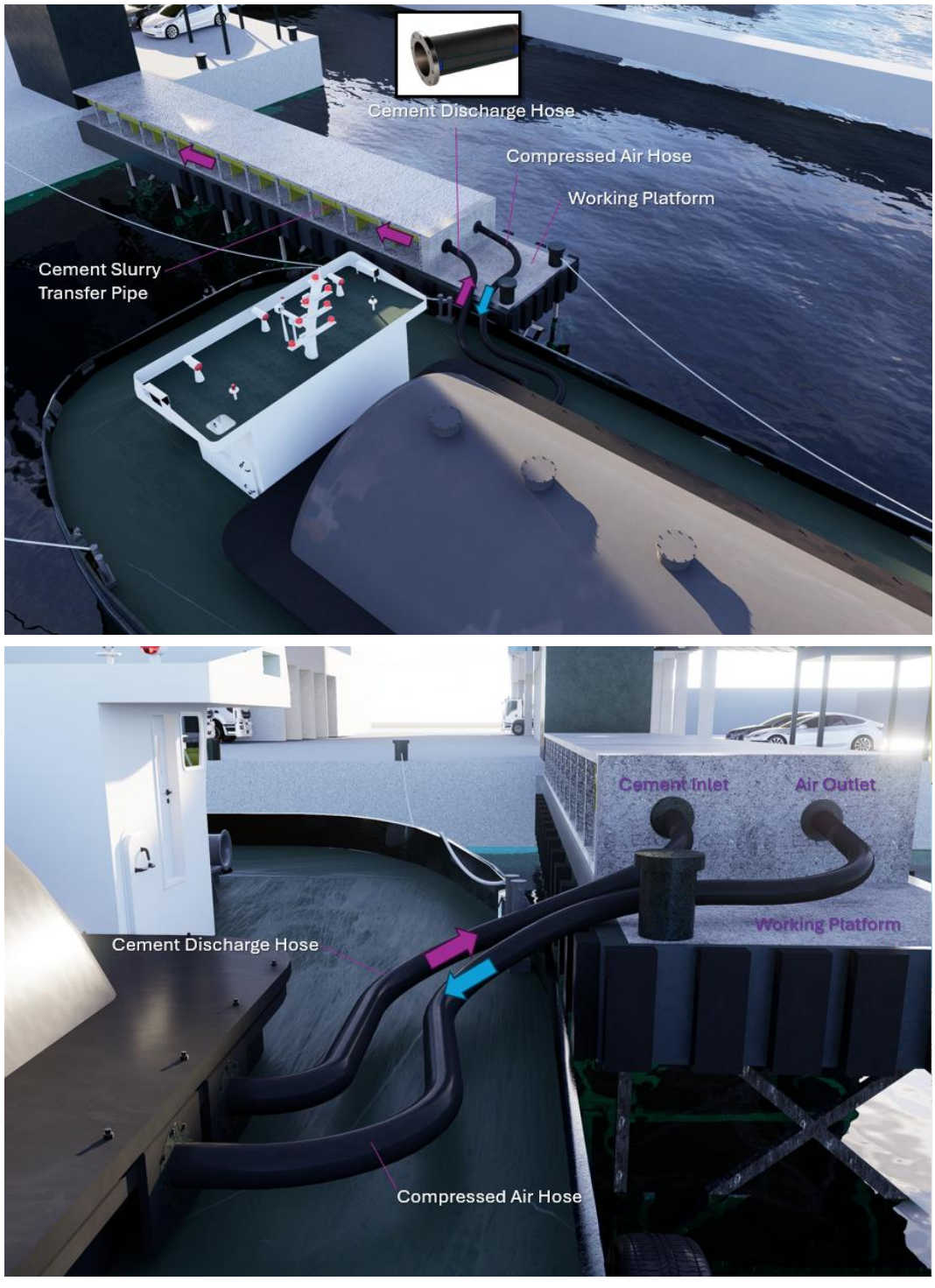


Figure 6.2 Illustration of Cement Unloading Using Pump System



6.4 Approach and Departure

The barges, being self-propelled, autonomously navigate to their designated positions without requiring tug assistance, which ensures precise alignment and efficient manoeuvrability. The approach and departure routes have been carefully planned, illustrated in Figure 6.3 and Figure 6.4, to facilitate safe navigation.

Figure 6.3 Example of Arrival and Departure Path of Pelican Aggregate Barge

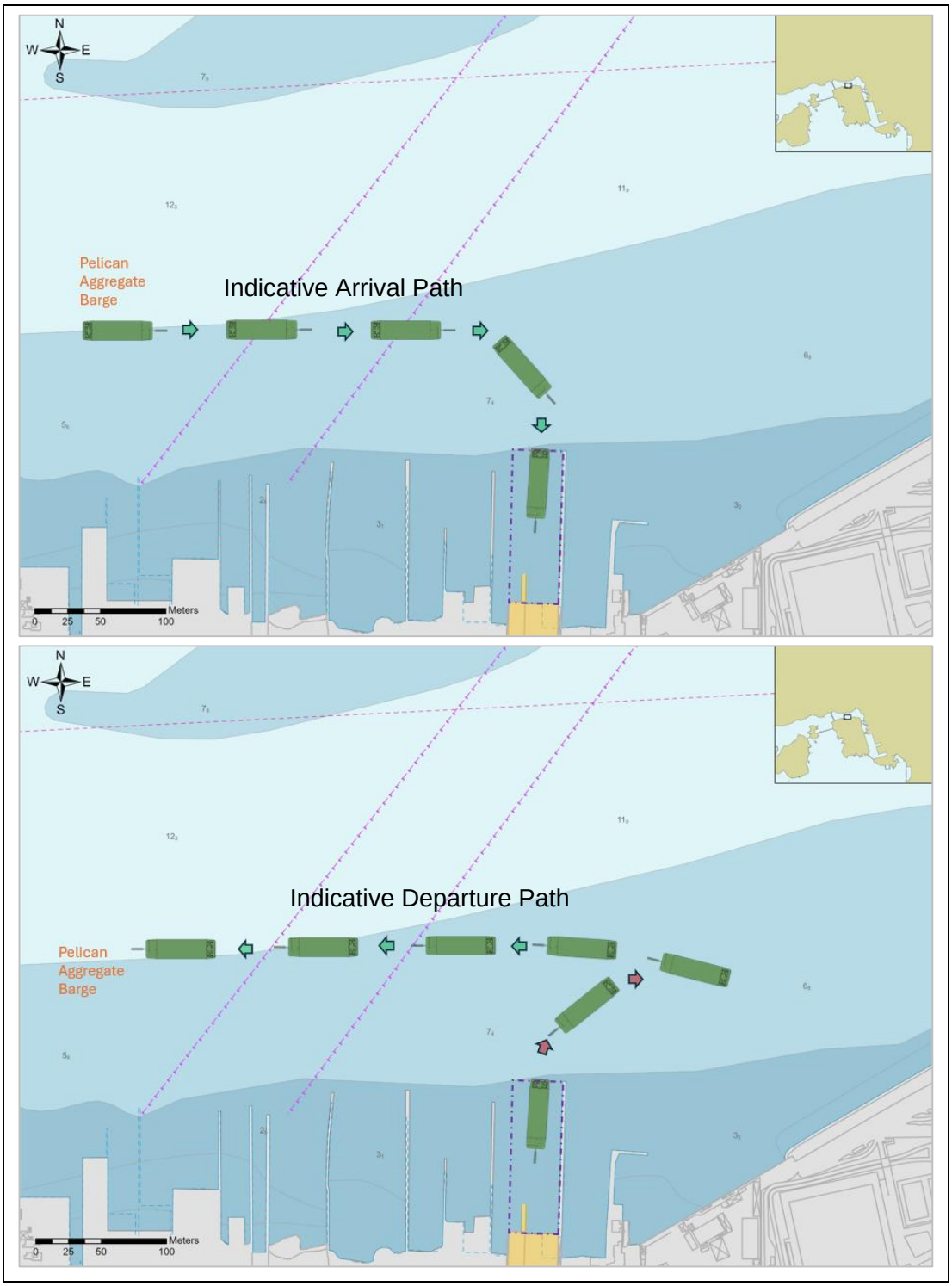
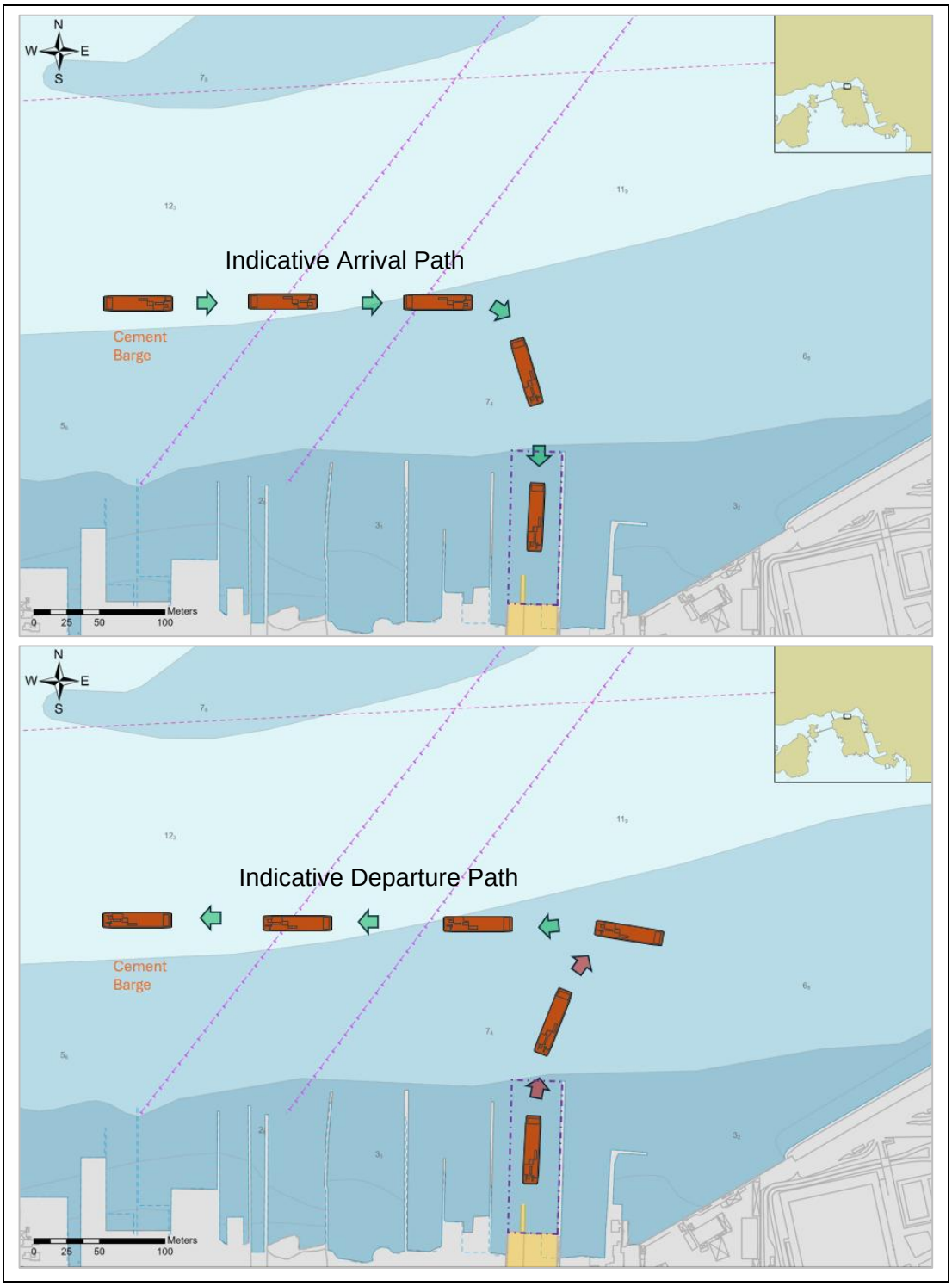


Figure 6.4 Example of Arrival and Departure Path of Cement Barge



7 Marine Logistic Assessment

This section evaluates the feasibility and potential impacts of the proposed barging operations at the Cement Barging Plant (CBP). The assessment encompasses existing marine facilities, metocean conditions, and marine traffic patterns to ensure the operations are conducted safely and efficiently while minimizing any potential impacts on the surrounding marine environment.

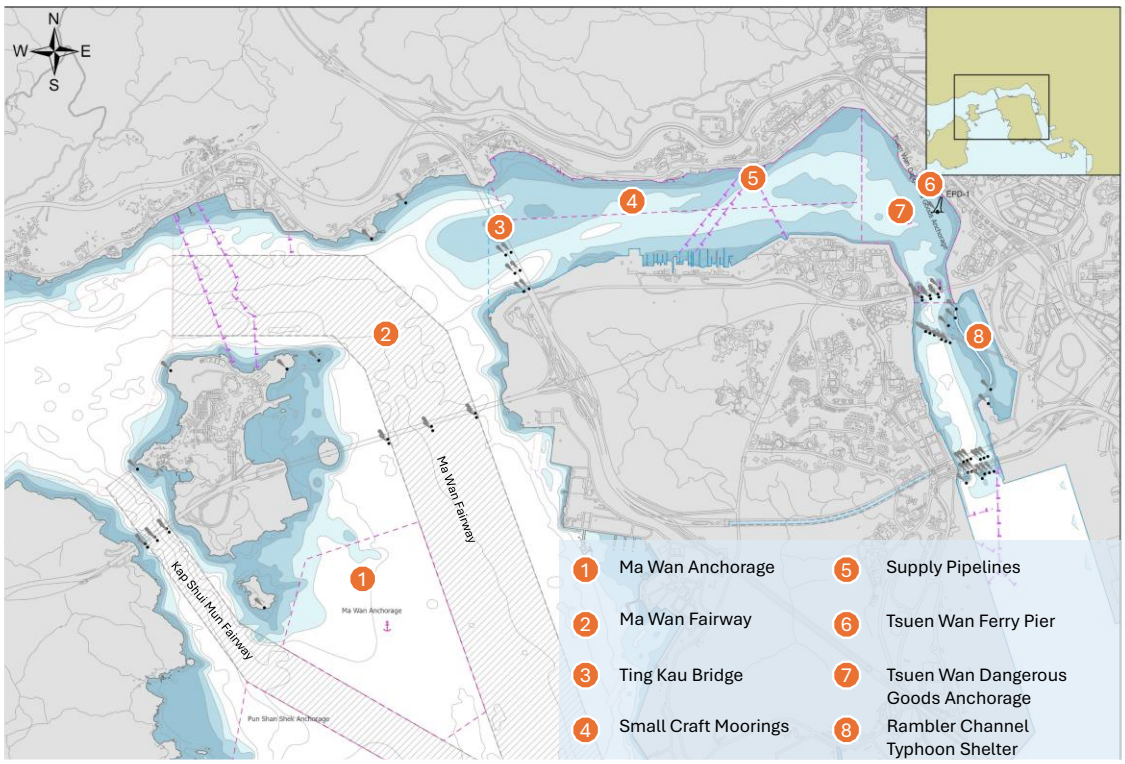
7.1 The Existing Marine Facilities

The vicinity of the project site features key marine facilities that influence navigational activities in the area. These facilities, as shown in Figure 7.1, include:

- **Ma Wan Anchorage:** The Ma Wan Anchorage is a designated area in the waters surrounding Ma Wan Island, primarily used for the safe mooring of vessels. This anchorage is part of the broader marine traffic management system in Hong Kong, which includes various fairways and traffic separation schemes designed to enhance navigational safety in busy maritime areas.
- **Man Wan Fairway:** The Ma Wan Fairway is a crucial maritime route that facilitates navigation between various channels in Hong Kong's busy waters. It connects to several other channels, including the Kap Shui Mun Channel and Tsing Yi Channel.
- **Ting Kau Bridge**: This bridge spans from the northwest of Tsing Yi Island to Tuen Mun Road. It has an air draft restriction of 53 meters above sea level, which must be considered for vessel navigation. feet in length, and a 100-meter-long repair berth for alongside repair services.
- **Small Craft Moorings**: Located north of Tsing Yi Island, these moorings consist of pairs of bow and stern buoys within the waterspace. Mooring requires a request to the Marine Department, and dues are applied.
- **Supply Pipeline**: Three submarine water supply pipelines are identified north and east of the proposed sites.
- **Tsuen Wan Ferry Pier**: Situated south of Tsuen Wan, adjacent to the MTR Tsuen Wan West Station, it provides ferry services connecting to Park Island Ferry Pier at Ma Wan.

- **Tsuen Wan Dangerous Goods Anchorage:** Located northeast of Tsing Yi Island, this anchorage has depths around 10 to 10.4 meters, with a shoal patch at the southeast corner. It primarily serves to provide adequate waterspace for mooring dangerous goods vessels.
- **Rambler Channel Typhoon Shelter**: Located near Kwai Chung in Rambler Channel, it provides 14 hectares of sheltered waterspace for vessels up to 50 meters in length.

Figure 7.1 Existing Marine Facilities near the Application Area



The Site is well-positioned within an area predominantly utilized for industrial purposes, including barge operations, shipyards, and cement storage, ensuring compatibility with existing marine activities.

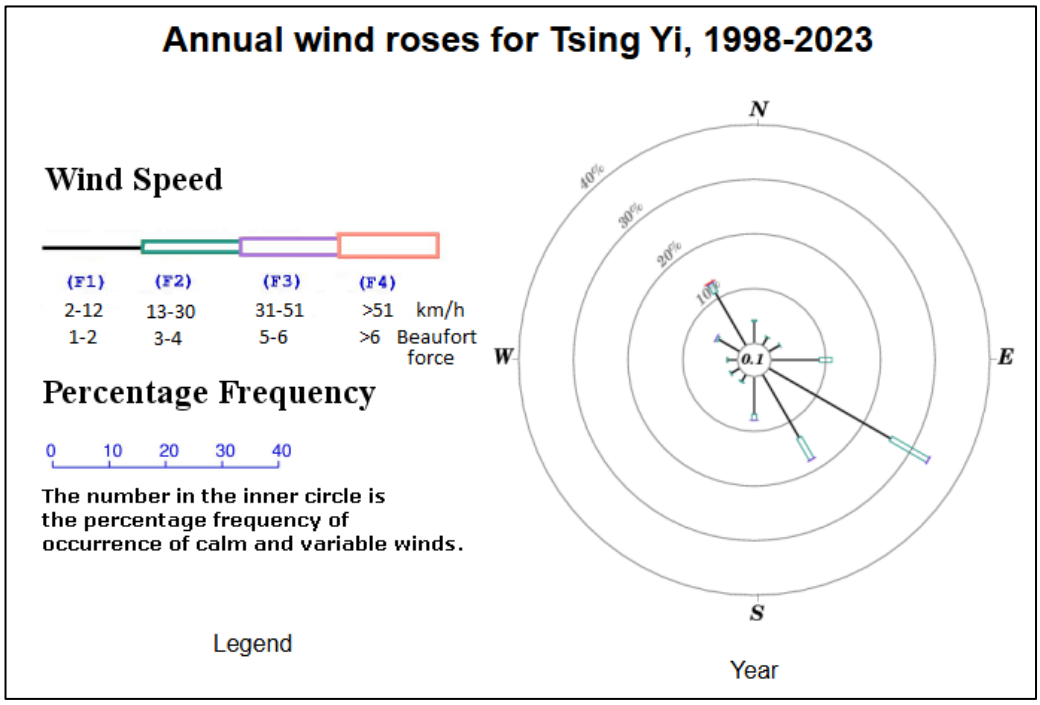
7.2 Metocean Environment

The metocean environment has been analysed to evaluate conditions that could affect marine operations, including wind, tidal levels, and currents.

Wind Environment

The wind environment at the study site was analyzed using historical wind data (1998–2023) from the Tsing Yi wind station, located at Shell Oil Depot on western Tsing Yi. The prevailing winds predominantly originate from the southeast, with typical wind speeds in the range of Beaufort Scale 1–4 (up to 16 knots) as illustrated in Figure 7.2.

Figure 7.2 Annual Wind Rose for Tsing Yi, 1998-2023



Source: Hong Kong Observatory

Due to the site's sheltered position north of Tsing Yi, wind effects are expected to be lighter, reducing potential operational disruptions. However, operations remain subject to temporary constraints under Typhoon Signals.

Tidal Levels

Tides in Hong Kong are mixed and mainly semi-diurnal. On most of the days in a month, there are two high tides and two low tides. Large tidal range occurs twice a month during spring tides when the moon is new or full. On days around neap tides when the moon is in its first or last quarter, however, tidal ranges become small and sometimes only one high and one low tide are observed. In general, the two high tides which occur each day are unequal in height with the higher high tide occurring mostly overnight in winter and during the day in summer.

Tidal data at Ma Wan has been chosen to demonstrate the typical tidal patterns, as they are the closest tidal stations to the Study Area. Tidal details are shown in Table 7.1.

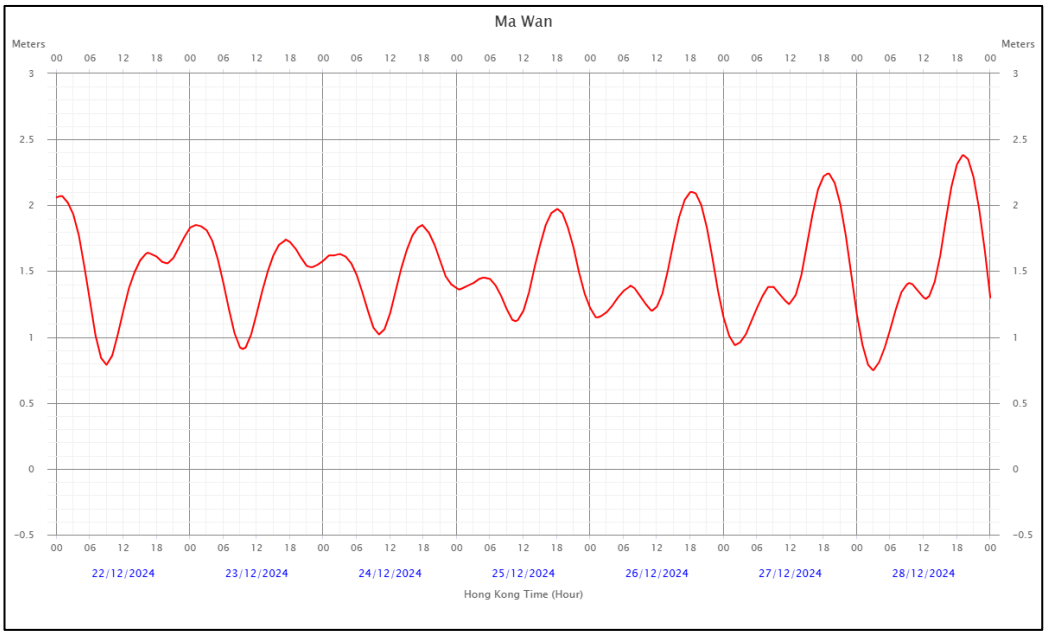
Table 7.1 Tidal Levels at Ma Wan

Location	Level (m) above Chart Datum		
	Mean Sea Level (mCD)	Mean Higher High Water Level (mCD)	Mean Lower Low Water Level (mCD)
Ma Wan	1.48	2.24	0.67

Source: Hydrographic Office Charts for Local Vessels 2018

For the berthing of barges, the actual tidal levels would significantly affect the water depth. In the light of this, the predicted tides for Ma Wan provided by the Hong Kong Observatory are used. A sample of the predicted tides is shown in Figure 7.3

Figure 7.3 Sample of Predicted Tides for Ma Wan



Source: Hong Kong Observatory

The Site's water depth of at least 5 meters (Chart Datum) is sufficient to support the draft requirements of the proposed delivery barges, maintaining safe under-keel clearance during standard tidal conditions.

Current

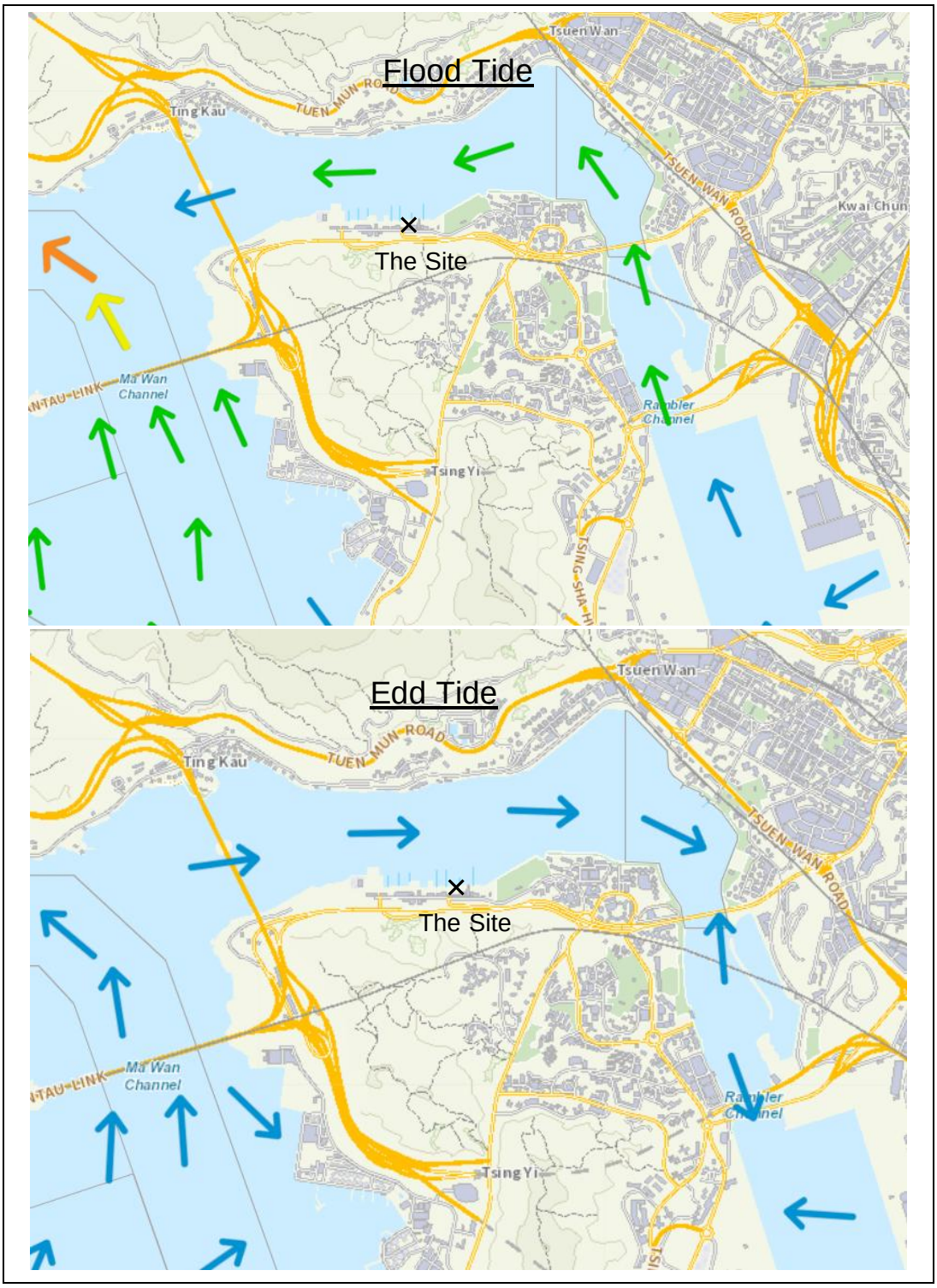
The currents along the project site have been thoroughly analysed using one year of comprehensive data (January 1, 2024, to December 31, 2024) from the Hong Kong Tidal Stream Prediction system (Hong Kong Hydrographic Office). This reliable dataset provides valuable insights into the typical tidal patterns at the site.

The tidal currents at the project site have been analysed using one year of comprehensive data (January 1, 2024, to December 31, 2024) from the Hong Kong Tidal Stream Prediction system (Hong Kong Hydrographic Office). This dataset provides reliable insights into the tidal patterns and flow characteristics in the region.

As illustrated in Figure 7.4, the analysed data point is located in the main tidal stream, where flood tides flow toward the west and ebb tides flow toward the east. Over the one-year period, the tidal current speed in this main stream averaged 0.45 knots, with a maximum recorded speed of 1.68 knots. While these values reflect relatively calm tidal conditions in the main stream, the project site, marked with an "X" on the map, is situated in a sheltered area away from the direct influence of stronger currents.

This sheltered position provides natural protection and calm conditions conducive to barge operations.

Figure 7.4 Illustration of Edd Tide and Flood Tide

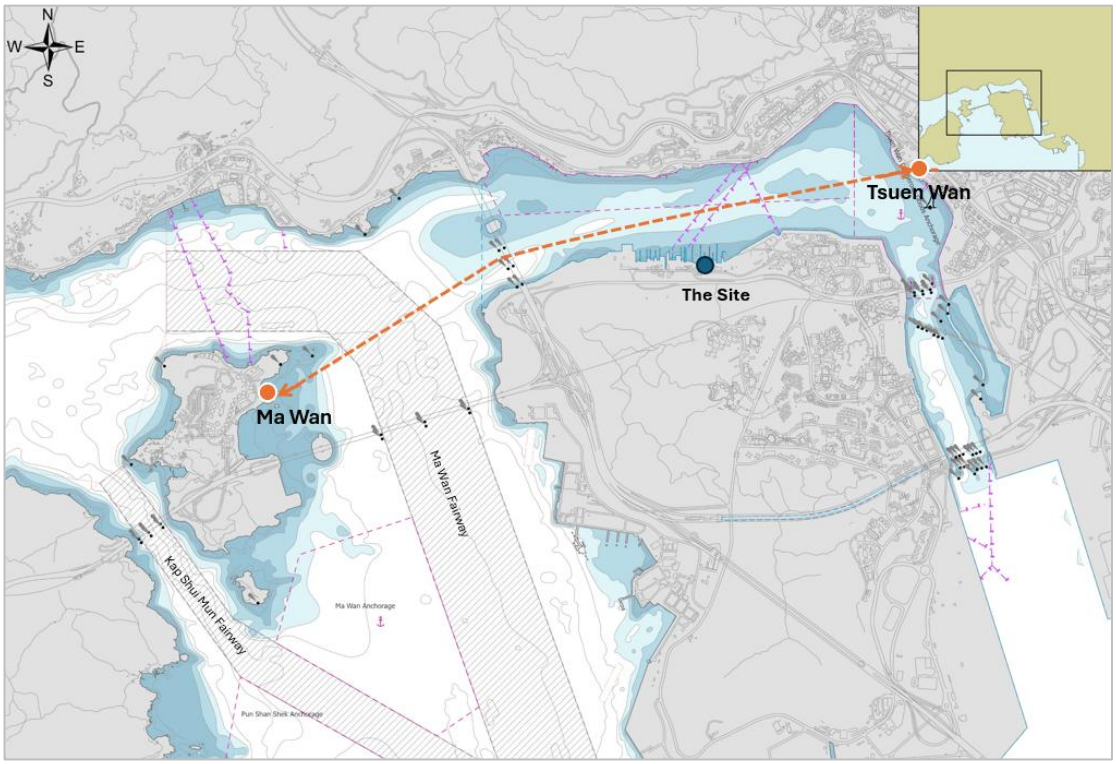


7.3 Local Marine Traffic Environment

Park Island Ferry Services

The ferry services between Ma Wan and Tsuen Wan are operated by Park Island Transport Company Limited. These services serve as transport connection for passengers traveling between the two locations. The ferry route is illustrated in Figure 7.5, showing the indicative vessel movement directions. Operating daily with a total of six trips, the service provides consistent accessibility for residents and visitors.

Figure 7.5 Traffic Gate and Vessels Movement Direction



The service schedule for the ferry operations is detailed in Table 7.2, summarizing the daily departure times.

Table 7.2 Ferry Services Schedule

Route	Scheduled Departure Times (Daily Mon-Sun)
From Ma Wan	10:15, 13:15, 16:15
From Tsuen Wan Pier	10:35, 13:35, 16:35

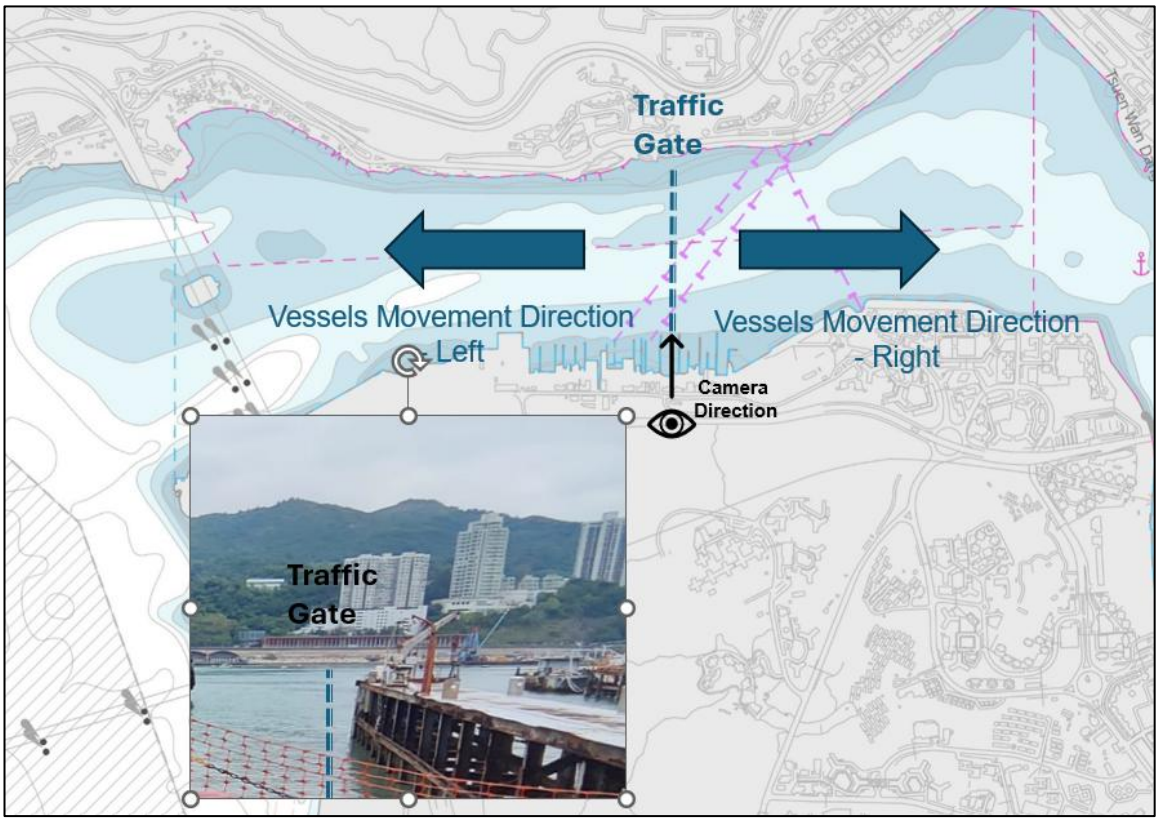
7.4 Daylight Visual Survey Study Methodology

To collect the latest marine traffic pattern in the area, a daylight visual survey was carried out for 30 consecutive calendar days (from November 2024 to December 2024) during daylight hours (0700-1900). Vessel counting was carried out on 12 selected days within the period.

The study area was defined by one imaginary line (Traffic Gates) as shown in Figure 7.5**.** All vessels passing through the traffic gates would be recorded by a video camera set up at the Site.

The cameras recorded the types, the numbers and the movements of the vessels transiting within the study area 24-hour daily. The data were collected to analyse the vessels activities and assess the traffic impact generated by the CBP.

Figure 7.6 Traffic Gate and Vessels Movement Direction



Vessel Type in Survey

The data collection for this study will be based on the classification of vessels to analyse marine traffic within the study area. The vessel types are classified as follows:

- OG-C (Ocean Going - Cargo): Large cargo vessels, including container ships, bulk carriers, and tankers, designed for international trade. These vessels typically exceed 100 meters in length.
- RT (River Trade): Medium-sized vessels, such as container ships, bulk carriers, and tankers, operating in regional and coastal waters. These vessels, with a length overall of 20 to 100 meters.
- T&T (Tug & Tow): Tugboats engaged in towing operations, often paired with barges. The combined length of the tug and tow ranges between 110 and 140 meters, primarily used for cargo transport and ship maneuvering.
- OG-P (Ocean Going - Passenger): Passenger vessels, including cruise ships and large ferries, operating on international routes.
- FF (Fast Ferry/High-Speed Craft): High-speed ferries operating at speeds of at least 20 knots, commonly used for passenger transportation between Hong Kong and neighboring regions.
- LF (Local Ferry): Domestic ferries providing short-distance passenger transport within Hong Kong waters. These vessels typically have a length of up to 22 meters.
- FL (Fast Launch): Small, fast-response government-operated vessels such as patrol boats, fire service speedboats, and pilot boats. These craft, up to 14 meters in length, are used for emergency response and navigation assistance.
- TB (Tugboat): Independent tugboats that assist larger vessels with berthing, docking, and maneuvering in confined waters such as ports and harbors.
- DG (Local Dangerous Goods): Vessels specifically designed to transport hazardous materials, including chemicals and fuel, within local waters. These vessels adhere to strict safety regulations.
- PV (Pleasure Vessel): Recreational vessels, such as yachts, cruisers, and sampans. This category may also include smaller fishing boats used for leisure activities.
- UC (Unclassified): Vessels not fitting into any specific category due to unique designs or operational roles. These may include research vessels or specialized service craft.

Average Daily Pattern of Traffic Gate

Data collected from 7:00 to 19:00 during 12 selected days reveals that an average of 226 vessels was observed daily, as shown in Table 7.3**.** The analysis indicates that the dominant vessel types within the study area are pleasure vessels and tugboats, followed by dangerous goods vessels and river trade vessels.

Given the prominence of these vessel types, it is essential for crews operating in the vicinity of the CBP (Concrete Batching Plant) to exercise caution. Awareness of the traffic patterns can help minimize encounter risks and maintain operational safety.

As part of the planned CBP operations, the barge delivery schedule includes six barge movements per day: one inbound and one outbound trip for cement, and two inbound and two outbound trips for aggregates via the Pelican Aggregate Barge

When compared to the existing daily marine traffic of 226 vessels, the additional barge movements represent a minor increase.

Table 7.3 Hourly Average Vessel Movement

Hourly Average Vessel Movement for Selected 12 Days Both Directions (Westbound and Eastbound)														
Hour			All	Cargo			Passenger				Others			
				OG-C	RT	T&T	OG-P	FF	LF	FL	TB	DG	PV	UC
7:00	-	8:00	24.9		0.4	0.5		3.6	2.3	11.5	2.1	2.1	2.5	
8:00	-	9:00	22.8		0.9	0.7		2.1	1.7	9.7	0.8	1.8	5.3	
9:00	-	10:00	14.2		1.4	0.3		0.3	1.0	3.5		2.3	5.5	
10:00	-	11:00	18.8		1.4	0.3		2.0		3.5	0.6	2.3	8.7	
11:00	-	12:00	16.9		1.8	0.8				3.7	1.6	3.2	5.9	
12:00	-	13:00	20.9		2.4	0.5				3.2	1.2	3.9	9.3	0.5
13:00	-	14:00	17.7		3.5	0.3		2.0		2.3	0.5	2.8	6.1	0.2
14:00	-	15:00	12.7		1.9	0.4				3.7		1.0	5.6	0.1
15:00	-	16:00	15.1		1.1	0.1				3.8	0.9	1.3	8.0	
16:00	-	17:00	17.3		0.8	0.2		2.0		3.0	0.8	1.3	9.3	
17:00	-	18:00	21.5		0.7	0.2		1.9		6.8	1.3	1.1	9.6	
18:00	-	19:00	23.1		0.7			2.4		13.0	0.6	0.6	5.8	
Total			226		17	4		16	5	68	10	23	81	1

7.5 Minimal Potential Impacts

The marine logistics assessment confirms that the proposed CBP operations will have a minimal impact on the existing marine environment. The additional barge operations, limited to 3 round-trips per day (one inbound and one outbound for cement, and two inbound and two outbound for aggregates via the Pelican Aggregate Barge), represent less than 2% of the typical daily vessel movements in the nearby waterway, constituting a negligible increase in traffic. The site's strategic location, with direct access to established fairways and existing mooring facilities, ensures that delivery operations will not disrupt primary navigational routes or interfere with nearby industrial activities.

Metocean conditions at the Site, including moderate tidal currents (average speed of 0.45 knots) and sufficient water depth (minimum of 5 meters Chart Datum), provide a stable and predictable environment for barge operations. These factors significantly reduce risks associated with manoeuvring and mooring. Additionally, the sheltered location along the northern coast of Tsing Yi minimizes the influence of strong winds, ensuring safe and reliable operations even during peak tidal movements.

8 Implementation and Mitigation Measures

This chapter outlines the comprehensive organizational structure, communication protocols, operational requirements, safety practices, and emergency response measures that govern the operations of the Cement Barging Plant (CBP). These measures aim to ensure safe, efficient, and environmentally compliant operations while mitigating risks associated with marine logistics and plant activities.

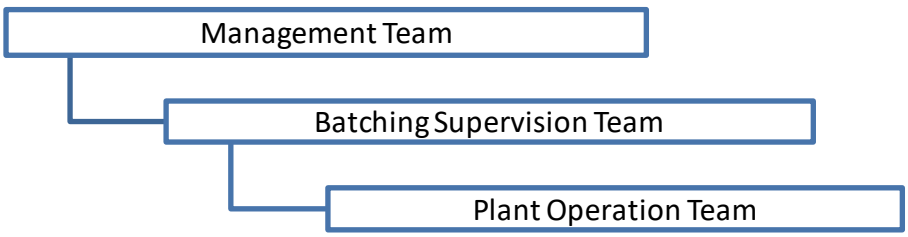
8.1 Organization

The CBP has established a well-trained and experienced team responsible for overseeing daily operations. The team ensures tasks are implemented as planned, takes immediate corrective actions when necessary, and maintains high safety standards.

Organization Chart

The CBP management team is organized to ensure that all precautionary and mitigation measures are effectively implemented. The organizational structure is shown in Figure 8.1 Organization Chart.

Figure 8.1 Organization Chart



Roles and Responsibility

- **Management Team:** Oversees overall CBP operations, coordinates deliveries with suppliers, and ensures compliance with regulations and operational protocols.
- **Batching Supervision Team:** Serves as the primary contact for vessel crews, monitors weather conditions, arranges berthing schedules, and manages unloading operations.

- **Plant Operations Team:** Executes instructions from the Batching Supervisor, liaises with vessel crews, maintains unloading facilities, and ensures smooth and safe unloading operations

8.2 Communications

Effective communication protocols are critical for safe and efficient CBP operations, ensuring seamless coordination among internal teams, vessel crews, and external stakeholders.

Table 8.1 Communications System in CBP

System	Function and Notes
Walkie-talkies	For internal communication among site staff
Mobile Phones	To facilitate contact with key personnel, including supervision and operations teams.
Email	To arrange deliveries, record notifications, and manage operational documentation.
VHF Radio	For direct communication between CBP operators and vessel crews.

Internal Communication

A structured pre-notification system ensures only one barge operates at the designated area at any given time:

- **72 Hours Pre-Notification**: The Batching Team sends delivery requests to the Management Team for coordination with suppliers.
- **12 Hours Prior Notification**: Vessel crews inform the Batching Supervisor of arrival details and seek approval.
- **Operational Updates**: The Batching Supervisor communicates arrangements to the Operations Team for preparation.

External Communication

- **Adjacent Users:** CBP coordinates with neighboring facilities to avoid scheduling conflicts and ensure only one vessel operates at the site simultaneously.

- **Marine Department (Vessel Traffic Service):** Vessel crews report transit information to the Vessel Traffic Service (VTS) using designated VHF channels during their approach and departure.

8.3 Implementation Requirement

Vessel Requirements

All vessels deployed for CBP operations must comply with the Merchant Shipping (Local Vessels) Ordinance (Cap. 548) and meet the following standards:

- Be maintained in a seaworthy condition and equipped with operational propulsion and mooring systems.
- Employ competent, qualified crews.
- Be equipped with Automatic Identification Systems (AIS) and multi-channel VHF radios.

Terminal Requirements

The terminal must maintain all equipment in accordance with Hong Kong regulations and operate it using qualified personnel. Regular certifications and maintenance checks are required to ensure compliance and operational safety.

Safety Equipment

Each vessel shall be equipped with the safety devices which include but not limit to the follows:

- **Personal Protective Equipment (PPE):** Gloves, masks, non-slip shoes, eye/ear protection.
- **First Aid Kits:** Up to required standards and readily accessible.
- **Firefighting Equipment**: Portable fire extinguishers and related equipment.
- **Lifesaving Appliance**s: Life jackets, lifebuoys, and emergency lights.
- **Safety Notice Boards**: Displaying key safety information.

8.4 Safety & Mitigation Measures

Operational Safety Objective

The operator of the proposed CBP is committed carrying out the marine delivery works in a manner that causes minimum harm to our employees and other marine users. This will be achieved through the establishment of clear objectives and the implementation of an effective safety management system which include:

- Prevent accidents and comply with relevant legislation.
- Maintain the highest safety standards and provide ongoing employee training.
- Conduct regular audits of the safety management system.

Training

The adequate safety training for levels of personnel including the skippers, marine crew onboard and crew on CBP, and the profession training for the utilisation of marine plants or system, shall be provided regularly to ensure their understanding and compliance of marine safety issues.

- **Induction Training**: The Plant Supervisor shall provide the site-specific induction training course to the employees including the CBP background, health & safety policy, employees' duties, Hong Kong government legislation &regulations, permit to work, foreseeable hazards, emergency preparedness, personal protective equipment, case studies, etc. The Plant Supervisor shall provide refresher training courses to its employees in every six months.
- **Skipper Training**: Before CBP implementation, the vessel crew from the supplier shall carry out the trial-run training to ensure the marine traffic and relevant safety issues are compiled by all the skippers, which shall be recorded as the housekeeping rules for monitoring and review. The skippers shall be well trained by traveling via the designated routes.

Weather Monitoring

To enhance navigation safety, real-time metocean (tidal, sea level) data and weather forecast from the Hong Kong Observatory and the Marine Department will regularly be reviewed.

The predictions will provide detailed and up-to-date Hong Kong and Guangdong weather forecast for the waters, which provides a sound basis for day-to-day planning and operations. The forecasts include the information of:

- Wave conditions and General weather outlook
- Rainfall
- Significant swell heights
- Wind conditions
- Gust and average speeds
- Wave conditions
- Miscellaneous data on relative humidity, and sea temperature

8.5 Adverse Weather Arrangement

The special arrangement shall be well prepared and implemented in response to typhoon or adverse weather occurrence accordingly, ensuring the safe CBP operation and the vessel and its crew can be evacuated in a safe and efficient manner.

Roles and Responsibilities under Adverse Weather

Batching Supervision Team:

- Closely monitor the weather forecast of Hong Kong and Guangdong;
- Announce the response plan accordingly;
- Monitor the response actions in CBP and ensure the safety of both personnel, equipment and facilities.

Plant Operation Team:

- Post tropical cyclone warning status for information;
- Liaise with Vessel Operation Team of Supplier to prepare specific tropical cyclone response plan and implement accordingly;
- Examine and secure the facilities on site;
- Ensure staff who works outdoor put on PPEs.

Vessel Operation Team of Supplier:

- Liaise with Plant Operation Team;
- Implement the specific tropical cyclone response plan;
- Ensure staff who works outdoor put on PPEs.

- Moor vessels at safe locations.

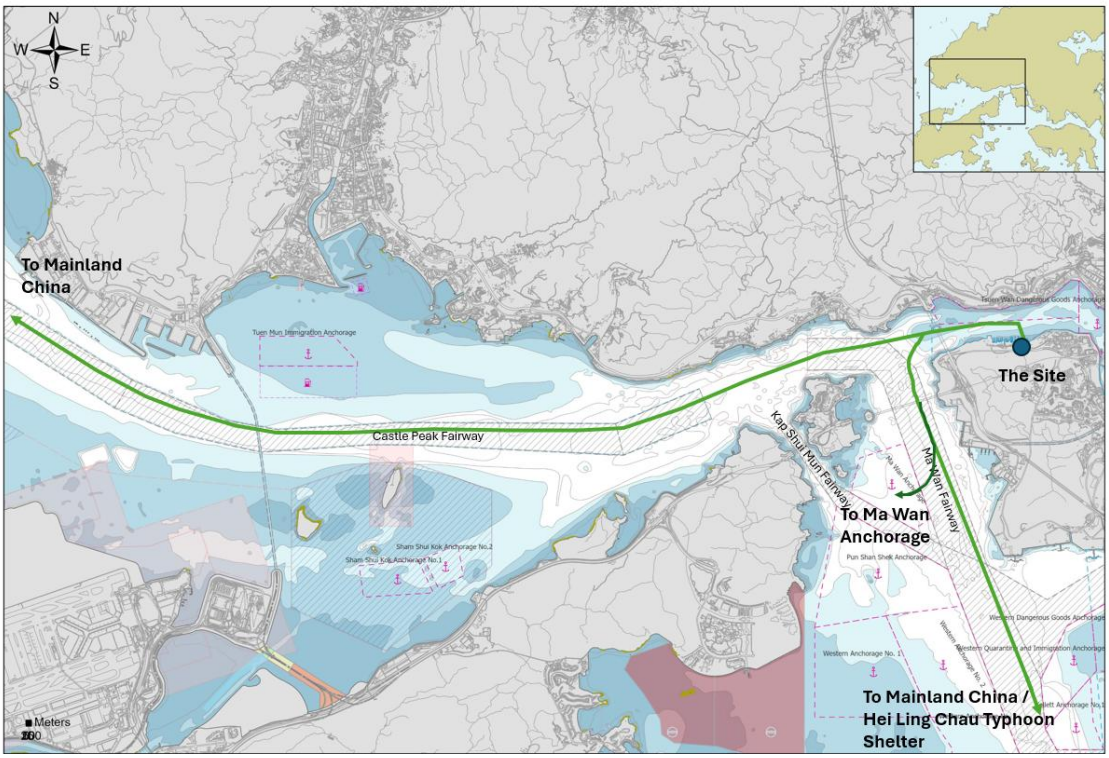
Adverse Weather Procedures

The aggregate delivery to CBP shall only be allowed when weather and sea state will not adversely affect the safe transit and will not create the risk of spillage or loss of materials from the vessels during voyage. The following procedures have been regulated for the CBP barge operation in response to adverse weather conditions:

Typhoon:

- **When Tropical Cyclone Signal No. 1 (TS1)** is Hoisted: The operations will be maintained, but the further typhoon development will be closely monitored by Plant Operators. The Batching Supervisor shall decide whether the material delivery would be arranged based on the weather information from HKO and Guangdong weather forecast.
- **When Tropical Cyclone Signal No. 3 (TS3)** or above is Hoisted: All agents, suppliers, and vessel crews will be notified immediately. Aggregate deliveries will be suspended, and on-site batching may only proceed under favorable weather conditions (e.g., no rainfall, strong winds, or adverse sea conditions) in strict compliance with the BOP protocols, including real-time weather monitoring and readiness to halt operations if conditions deteriorate. Vessels will evacuate work areas to seek safe shelter in Mainland, following Marine Department recommendations for river trade vessels. If Typhoon Signal No. 8 is forecasted and evacuation to Mainland is not possible, vessels will proceed to Hei Ling Chau Typhoon Shelter or alternative anchorages such as Ma Wan Anchorage. A standby tugboat will be deployed, if required, to accelerate the evacuation of barges and ensure the safety of operations.
- **Before TS 3** is issued, if in the case of the delivery barge is approaching HK during adverse weather condition, the vessel shall steer back to Mainland China and not stay in HK water.
- **When TS 3** is lowered and the weather condition is improved, the Plant Operators will consider whether to resume the operation based on the remaining time after TS3 lowering, the time taken to operation resume, etc.
- The applicant shall ensure that all delivery vessels strictly follow the adverse weather procedures set out in this plan. Any unauthorized anchoring or failure to evacuate will be considered non-compliant.
- The evacuation route for typhoon or contingency is depicted in Figure 8.2.

Figure 8.2 Evacuation Routes for Typhoon or Contingency



Rainstorm:

- When a red rainstorm signal is issued, the loading & unloading activities shall be ceased, the crew members should attend bilges and the on-site facilities will be examined and secured properly.
- When a black rainstorm signal is issued, the outdoor activities would be suspended and all crew member shall stay indoor in a safe place.

Low Visibility:

- All operations must cease when visibility is less than 1.5 nautical miles. The Marine Department's Vessel Traffic Centre (VTC) will broadcast visibility reports on VHF channels 12, 14, and 67 when visibility drops below 2 nautical miles. Operators must monitor these channels continuously.
- Barging operators must strictly comply with the "International Regulations for Preventing Collisions at Sea, 1972" (COLREGs), with emphasis on:
    - Rule 5: Maintain a proper lookout.

- Rule 6: Navigate at a safe speed.
- Rule 7: Assess the risk of collision.
- Rule 8: Take timely actions to avoid collisions.
- Rule 19: Use AIS, sound signals, and extreme caution in restricted visibility.

- Operators must reduce speed, maintain clear communication using AIS and sound signals, and coordinate with nearby vessels.
- In the event of an accident, this should be reported immediately to the Vessel Traffic Centre, either on V.H.F. (channel 12, 14 or 67) or by telephone (no. 2233 7801 or 2233 7302).

8.6 Emergency Responses

Once the emergency occurs, the person-in-charge onboard shall contact the Plant Operators. The responsible person shall report the occurrence forthwith to Fire Service Department (FSD) or MD orally about the accident time/position.

The emergency response shall be in accordance with the requirements of Merchant Shipping (Local Vessels) Ordinance Cap 548. The responses for key emergency scenarios are introduced as follows:

Fire on CBP

- Any staff member will activate the warning alarm and report to FSD immediately;
- All persons to evacuate the plant and building and assemble on at the emergency assembly area;
- Notify the fire warden if people are missing at a possible location;
- Report any anomalies to the fire warden and they will arrange search;
- On advice of fire warden, tenants and general public should then return to building or leave premises;
- Assist in securing the site and determine extent of damage, prepare the relevant clean-up plan and strategy to make good afterwards.

Collision

If collision occurs, Coxswain should:

- Cut engine power and inform all crew members on board;

- Inform Operations about vessel's position and time of accident and keep proper log of major events;
- Inform the crew members and keep them calm;
- Send crew member to inspect for damages and check for any oil leakage;
- Check for any injuries onboard and perform first-aid treatment as appropriate;
- If slightly taking on water occurs, send crew members to clear water by using emergency water pump;
- If more than one cabins taking on water and risk of sinking occurs, abandon ship signal has to be sent out by blowing 7 short follow 1 long blast on the whistle. Instruct crew members to prepare all LSA on board, and assist the personnel to put on life jackets for leaving the ship;
- Attract vessels in the vicinity for emergency assistance by blowing 3 short 3 long and follow by 3 short blasts on the whistle and hoist international distress signal;
- If there is no immediate danger of own vessel, assist the other vessel and record the information including vessel name, coxswain name, damage & condition of vessel;
- When abandon ship signals have been sent out, all crew members have to follow the emergency procedure.

Fire onboard

If fire occurs, Coxswain should:

- Stop the barge at a safe place or away from other vessels if circumstance permits;
- Activate fire alarm and instruct crew members to fire fight;
- Inform Operations and Marine Department for assistance;
- Stop engine, cut off power, shut fire damper, start fire pump & fire extinguishers and use all appropriate means on board to fight fire;
- Broadcast to keep the crew calm and if threatened, relocate to a safe area;
- When serious fire occurs, inform the crew to put on life jackets and stand-by for further instruction to leave ship;
- When fire is out of control, abandon ship action has to be taken. Instruct crew members to prepare all LSA on board, and put on life jackets for leaving the ship;
- When crew members have received abandon ship signal, cease fire fighting and immediately report to assigned stations to prepare for abandon ship.

Grounding

If grounding occurs, Coxswain should:

- Stop engine and inform all crew members on board;
- Inform Operations about vessel's position and time of accident and keep proper log of major events;
- Inform the crew and keep them calm;
- Send crew member to inspect damage and check for any oil leakage;
- Take sounding around and check status of seabed;
- Check any injury on board and perform first-aid treatment as appropriate;
- If slightly taking on water is found, prevent further leakage and use water pump as appropriate;
- Prevent the barge from drifting to shore;
- If taking on water is causing the barge to one side, abandon ship action should be taken. Instruct crew members to prepare and put on the LSA /life jackets for leaving the ship;
- Attract vessels in the vicinity for assistance by blowing 3 short and follow by 1 long blast on the whistle and hoist 'V" flag;
- Attract vessels in the vicinity for emergency assistance by blowing 3 short 3 long and follow by 3 short blasts on the whistle and hoist international distress signal;
- Aground signal: Day — by hoisting 3 black balls or shapes vertically on the main mast together with the anchor black ball; Night — by hoisting 2 red lights in a vertical line on the main mast together with the anchor light;
- Take precaution of tidal change;
- When abandon ship signals have been sent out, all crew members have to follow the emergency procedure and report to their assigned boat stations.

Man Overboard

If man overboard occurs, Coxswain should:

- Stop both main engines; blow 3 long blasts on the whistle to indicate man overboard;
- Deploy lifebuoy with buoy light to indicate the overboard position, and the crew member shall keep pointing at the location;
- Operate engines and turn towards the person overboard;

- Proceed back to the position with caution and give a lee side to the person overboard. Keep the person overboard well clear from the propeller;
- Keep clear of surrounding traffic, and take precaution to pick up the person overboard;
- Report to the Plant Operation Team of CBP and Marine Department.

Oil Leakage

If oil leakage occurs, Coxswain should:

- Cease filing, take precaution to avoid oil split overboard;
- Arrange crew members for assistance;
- Empty tank by transferring fuel to other oil tanks;
- If oil split overboard, inform the Plant Operation Team of CBP and Marine Department.

Engine Malfunction

If engine malfunction occurs, Coxswain should:

- Slow down or stop engine;
- Clear of traffic or prevent from obstructing fairway;
- Hoist up engine trouble signal;
- Drop anchor as appropriate;
- Inform Plant Operation Team and Marine Department;
- Check with Engineer whether the engine can be repaired by crewmember and time required;
- Inform the crew and keep them calm;
- If the engine cannot be repaired by crewmembers on board, inform the Plant Operation Team to arrange towage as soon as possible.

8.7 Conclusion

The implementation and mitigation measures outlined in this chapter demonstrate a comprehensive approach to ensuring the safe, efficient, and environmentally responsible operation of the Temporary Concrete Batching Plant. By establishing clear roles and responsibilities, robust communication protocols, and stringent operational and safety standards, the proposed operations mitigate risks to marine traffic, personnel, and the environment. Proactive weather monitoring, detailed emergency response plans, and adherence to international and local regulations further ensure operational resilience under normal and adverse conditions..

9 Summary and Conclusion

9.1 Introduction

The applicant proposes to develop a Temporary Concrete Batching Plant (CBP) at the approved Tsing Yi Outline Zoning Plan No. S/TY/32 for a duration of five years. To support the application, AXON Consultancy Limited has prepared this Barging Operation Plan (BOP), which outlines the marine logistics arrangements, evaluates potential traffic impacts, and proposes mitigation measures to ensure the proposed CBP operates in a safe, efficient, and environmentally sustainable manner.

9.2 Summary

The marine logistics operations for the proposed Concrete Batching Plant (CBP) are designed to ensure safe and efficient functionality. Aggregates and cement will be delivered via self-propelled barges from the mainland, with a maximum of 3 round trips per day— three inbound trips (one for cement delivery and two for aggregates via the Pelican Aggregate Barge) and three corresponding outbound trips.

Maintenance dredging is required to restore adequate water depth at the barging point, where sedimentation has reduced the nearshore depth below safe levels for batching operations; an estimated 4,000 m² of dredging is needed— a minor volume compared to larger project thresholds.

Mooring stability is enhanced through the installation of new fenders, bollards, and a robust anchoring system, which secure both the Pelican Aggregate Barge and the Cement Barge, ensuring precise vessel alignment and safe operations despite tidal fluctuations and currents.

Unloading operations are efficiently executed at the safety platform, with the aggregate barge using an integrated conveyor system to transfer material directly to the batching plant, and the cement barge employing a self-discharging pumping system, complemented by the plant's advanced suction technology, to deliver cement while improving air quality by reducing exhaust emissions. Marine Traffic Review

A review of nearby marine facilities and the Metocean environment affecting CBP operations concluded that potential impacts are minimal. The site benefits from moderate tidal currents averaging 0.45 knots and a minimum water depth of 5 meters (Chart Datum), providing a stable and predictable environment for barge operations. Additionally, the sheltered location along the northern coast of Tsing Yi reduces the impact of strong winds, ensuring safe and reliable operations even during peak tidal conditions.

A daylight visual survey conducted in November–December 2024 (07:00–19:00) collected detailed data on vessel traffic in the area. Over 12 selected survey days, an average of 226 vessel movements were recorded daily, with the most common vessel types being pleasure vessels and tugboats, followed by dangerous goods vessels and river trade vessels. The planned barge operations, limited to six trips per day, account for less than 2% of the typical daily vessel movements, representing a negligible increase in marine traffic.

A comprehensive set of risk control measures has been established in this BOP, ensuring full compliance with safety and operational requirements. Clear roles and responsibilities have been assigned, and communication protocols have been implemented to ensure efficient internal operations and minimize conflicts with adjacent users or stakeholders.

Implementation requirements for vessel deployment, terminal infrastructure, safety equipment, and weather monitoring have been clearly defined to guide precautionary actions. Special arrangements for adverse weather conditions, including typhoons, rainstorms, and low visibility, have been prepared to ensure operational continuity and safety. Emergency response protocols for various scenarios have also been established, providing clear guidance for all responsible personnel.

The CBP operators are committed to maintaining the highest safety standards, treating safety and health as integral aspects of their performance, and mitigating potential hazards to the minimum feasible level.

9.3 Conclusion

The proposed CBP, supported by this barging operation plan, incorporates robust marine traffic arrangements, impact assessments, and implementation of mitigation measures. Although vessel movements associated with the CBP will interact with existing traffic conditions in the vicinity, survey data indicates that the induced marine traffic impact is negligible. Furthermore, any marine risks posed by these operations can be mitigated to an acceptable level, provided the proposed measures outlined in this BOP are implemented effectively.