ATTACHMENT THIRTY-ONE

Biosecurity Management Plan (“BMP”)

McCALLUM BROS LTD

Established 1904

Te Ākau Bream Bay Sand Extraction Project

Biosecurity Management Plan (BMP)

July 2025

In accordance with Appendix I of MEPC Resolution MEPC.207 (62) of 2011:
'Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species'
Any management action undertaken should be recorded in the Biofouling Record Book

Revision history

Title: Te Ākau Bream Bay Sand Extraction Project – Biosecurity Management Plan.				
Date	**Version**	**Description**	**Prepared by**	**Date certified**
15/07/2025	1	Final draft for consultation	N.McCallum L.Davis	

Glossary of Terms

AC	Auckland Council
BMP	Biosecurity Management Plan
BOPRC	Bay of Plenty Regional Council
BWMP	Ballast Water Management Plan
CRMS-BIOFOUL	Craft Risk Management Standard for Biofouling on Vessels Arriving to New Zealand
IMO	International Maritime Organisation
MBL	McCallum Bros Limited
MMSI	Maritime Mobile Service Identity
MNZ	Maritime New Zealand
MPI	Ministry for Primary Industries
NRC	Northland Regional Council
NZDS	New Zealand Diving & Salvage
STD-ABTRT	Standard for the Approval of Treatments for Craft

Limitations

The report has been prepared to a specific scope of work. The report cannot be relied upon by a third party for any use without written consent of MBL (the disclosing party). This report may not be reproduced or copies in any form without the permission of the disclosing party. **This document must always be displayed onboard the *William Fraser* at all times.**

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1.0 Introduction

McCallum Bros Limited (MBL) has been granted resource consent (*reference TBC*) for sand extraction at the Te Ākau Bream Bay Sand Extraction Site. This consent was given effect to on (*date TBC*) and expires on (*date TBC*).

1.1 Purpose

The purpose of this Biosecurity Management Plan (BMP) is to outline the measures MBL will implement to prevent the spread of harmful aquatic organisms during sand extraction activities at the Te Ākau Bream Bay Sand Extraction Site. This plan ensures vessel operations, including ballast water use and hull maintenance, are carried out in compliance with New Zealand biosecurity regulations and best practice standards.

1.2 Scope

This plan applies to all biosecurity-related aspects of the vessel *William Fraser* used in the sand extraction project, including:

- Ballast water intake and discharge (seawater and freshwater)
- Hull biofouling management during domestic operations
- Compliance with relevant regional and national biosecurity controls
- Procedures for both domestic and potential international voyages

It includes operational protocols while transiting through and working within designated Controlled Areas such as the Hauraki Gulf.

1.3 Objective

The objective of this BMP is to prevent the introduction and spread of marine pests through effective ballast water management and vessel maintenance practices.

This will be achieved by:

1. Compliance with all applicable national and regional biosecurity regulations, including those of Maritime New Zealand (MNZ), Ministry for Primary Industries (MPI), Auckland Council (AC), Northland Regional Council (NRC), and the Bay of Plenty Regional Council (BOPRC).
2. Minimising the risk of transporting harmful aquatic organisms between operational locations.
3. Ensuring vessel hulls meet “clean hull” or “light fouling” standards through regular inspections and maintenance.
4. Establishing clear procedures for identifying and reporting suspected marine pest organisms during operations.

1.4 The Vessel

The vessel used to carry out the sand extraction activities is the trailing suction dredger *William Fraser*.

Figure 1: Sand Extraction Vessel "William Fraser"

Table 1: William Fraser Vessel Particulars

Ship Name	MV WILLIAM FRASER
Flag State	NEW ZEALAND
Port of Registry	AUCKLAND
IMO Number	9864605
Gross Tonnage	1540
Type (BV Classified)	DECK SHIP
Regulation Length	68m
Beam	14m
International Call Sign and MMSI	ZMG 3728
Current Ship Owner	McCallum Bros Ltd

Table 2: Specification Particulars / Operating Profile

Operating Speed	9.5Kts
Period Underway / Activity (%)	50% of the time when at full extraction rate.
Expected lay up periods (Anchored / Moored Location)	~2 days per week on average. Berthed at Ports of Auckland.
Typical operating region or routes	Auckland / Northland Restricted /Bay of Plenty Restricted
Planned duration between dry docking	2½ years on average.
Expected Dry docking country	New Zealand
Dry docking and maintenance history	- Hull Cleaned by MPI Biosecurity Approved Divers - NZDS Dec 2022 and June 2023 - End of term survey, dry dock hull clean, high pressure water blasted and re-painted September/October 2024

2.0 Ballast Water Management

2.1 Regulatory Context

New Zealand is a signatory to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (2004), implemented domestically via the Maritime Transport Act 1994 and Marine Protection Rules Part 300. This convention was the international response to managing biosecurity risks from ballast water undertaking international voyages, but does not apply to vessels operating domestically.

While the *William Fraser* operates domestically, it is capable of international travel and complies with the relevant standards when applicable. These standards require a Ballast Water Management Plan (BWMP) which is shown in Appendix 1 of this document.

2.2 Seawater Ballast

The water at the Ports of Auckland is considered to be of the same regional water body as Te Ākau Bream Bay. Therefore, there are no restrictions on the transfer of ballast water between these two locations. However, the intake or discharge of seawater ballast does not occur when the vessel is docked at the Ports of Auckland.

Seawater ballast is only taken on and discharged while the vessel is actively engaged in sand extraction at the Te Ākau Bream Bay Sand Extraction Site. The Master manages ballast water to assist with vessel stability during operations offshore. As all ballast water operations occur within the same water body, there is no risk of transporting unwanted marine organisms between distinct marine environments.

2.3 Freshwater Ballast

Freshwater Ballast is taken on board the *William Fraser* while docked at the Ports of Auckland. This water is sourced from the reticulated metropolitan water supply managed by Watercare Services Limited and is AA-grade drinking water.

Fresh water ballast will also be taken on board the *William Fraser* while docked at the Port of Tauranga. This is also to an AA-grade drinking grade water standard and is supplied by the Port from Tauranga City Council.

During return voyages from the Te Ākau Bream Bay Sand Extraction Site, this freshwater is sprayed over the dredged sand in the vessel's hopper. The hopper is designed to allow free drainage, and the freshwater rinse helps flush salt from the sand. This process ensures the landed sand is suitable for use in manufacturing concrete products without requiring further freshwater treatment.

The discharge of this freshwater is minimal and occurs gradually during transit. As it is clean potable water and released in offshore marine environments, it poses no environmental risk. This practice is consistent with standard maritime operations and does not breach any current discharge or marine pollution regulations under the Maritime Transport Act 1994 or Marine Protection Rules.

3.0 Biofouling Management

3.1 International Travel

The *Craft Risk Management Standard for Biofouling on Vessels Arriving to New Zealand* (CRMS-BIOFOUL), issued by the Ministry for Primary Industries (MPI) under section 24G of the Biosecurity Act 1993, regulates the entry of vessels into New Zealand from international waters.

If the *William Fraser* undertakes international voyages, it must comply with the requirements of CRMS-BIOFOUL. The key standard is that vessels must arrive in New Zealand with a *"clean hull."* To meet this requirement, vessel operators must implement one of the following approved biofouling management strategies:

1. **Clean prior to arrival:** Undertake hull cleaning immediately before entering New Zealand territorial waters
2. **Out Of Water**: Slip vessel at an MPI approved site & cleaned within 24hrs of arrival
3. **Continual maintenance**: Use best-practice hull maintenance such as antifouling coatings.
4. **Approved treatments**: Apply treatments in line with MPI's *Standard for the Approval of Treatments for Craft* (STD-ABTRT).

Compliance with these standards ensures that international voyages do not introduce harmful marine organisms into New Zealand waters.

3.2 Domestic Travel & Maintenance Requirements

The *William Fraser* will operate in the AC, NRC, and BOPRC regions during transits and while carrying out sand extraction activities at Te Ākau Bream Bay. To ensure compliance with biosecurity regulations in these regions, MBL adheres to the requirements of the *Hauraki Gulf Controlled Area Notice 2020* (issued under section 131(2) of the Biosecurity Act 1993) for Auckland waters and the *Northland Regional Pest and Marine Pathway Management Plan 2017–2027, and the Bay of Plenty Regional Council's Regional Pest Management Plan 2020-2030* for Te Akau Bream Bay sand extraction and transiting operations.

3.2.1 Auckland Region Requirements

Under the *Hauraki Gulf Controlled Area Notice 2020*, issued pursuant to section 131(2) of the Biosecurity Act 1993, AC has declared specific marine areas as controlled zones for the management of pest species. These controls form part of the Auckland Regional Pest Management Plan.

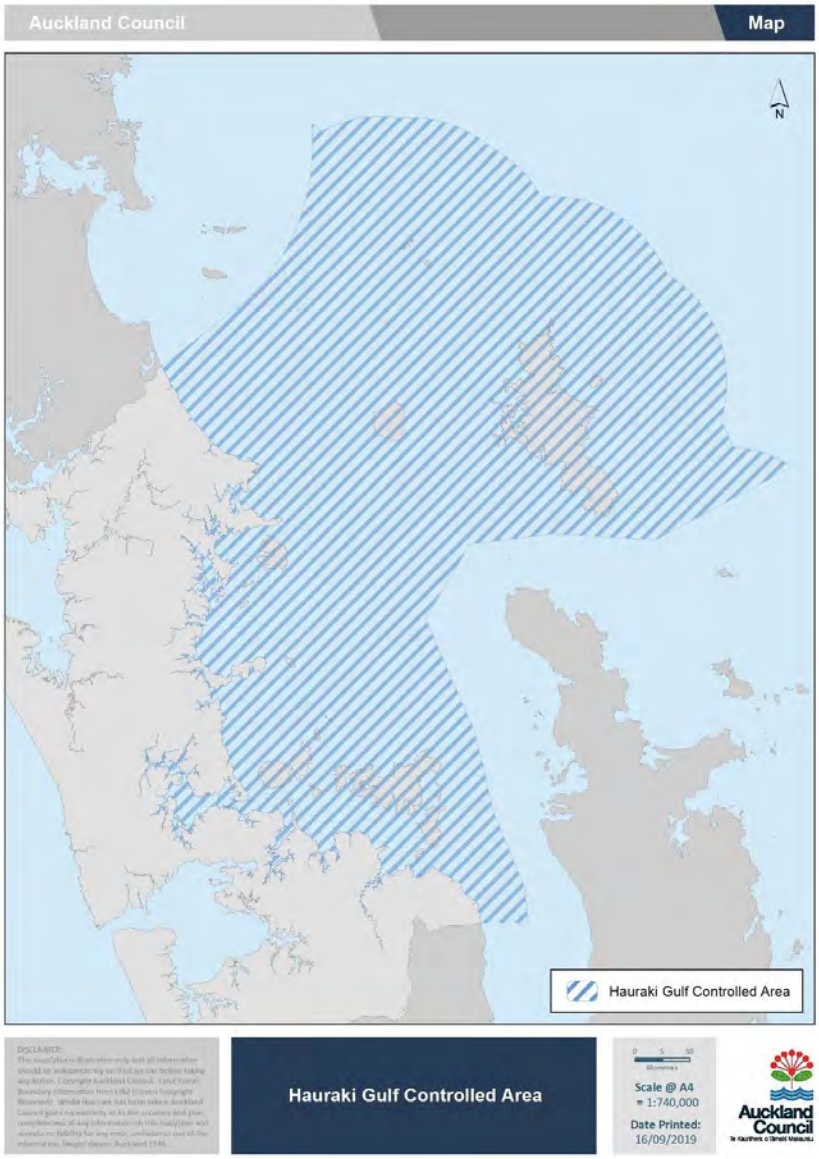

Figure 2 Hauraki Gulf Controlled Area (from Hauraki Gulf Controlled Area Notice 2020, p 3)

The *William Fraser* transits through these controlled areas when departing from or returning to the Ports of Auckland. Key applicable requirements under Section 5 of the Notice include:

1. **Hull Fouling Limits:** All craft owners or persons in charge must ensure the level of hull fouling does not exceed *"light fouling,"* defined as no more than a slime layer and scattered barnacles.
2. **Water Management:** Any craft entering a marine water body in the Auckland region from land must be free of all ballast water, bilge water, holding tank water, or sea water held in any container.
3. **Compliance for Movement:** No person may move a craft into or within the Controlled Area without complying with the above requirements.

These conditions apply to all transits undertaken by the *William Fraser* within the Auckland marine region and are strictly adhered to by McCallum Bros Limited to ensure compliance and to reduce biosecurity risk.

3.2.2 Northland Regional Council Requirements

Te Ākau Bream Bay falls under the jurisdiction of the NRC, which enforces the *Northland Regional Pest and Marine Pathway Management Plan 2017–2027*. This plan aims to prevent and manage the spread of marine pests, such as *Sabella spallanzanii* (Mediterranean fanworm) and *Caulerpa brachypus*, through vessel biofouling management. Key requirements include:

1. **Hull Cleanliness**: Vessels operating in Northland waters must maintain hull cleanliness to minimize the risk of spreading marine pests. The NRC conducts underwater hull surveys from October to May annually to monitor for pests, with vessel owners required to take remedial action if pests are detected.

2. **Marine Pest Reporting**: Operators must immediately report suspected marine pests to the NRC's Marine Biosecurity Team (contact: biosecurity@nrc.govt.nz or 0800 002 004), providing photographs or samples to aid identification.

3. **Controlled Area Notices**: The NRC may issue Controlled Area Notices restricting activities (e.g., anchoring, dredging) in areas with identified marine pests. Operators must monitor and comply with these notices.

3.2.3 Bay of Plenty Regional Council Requirements:

Under the *Bay of Plenty Regional Pest Management Plan*, the plan contains rules that apply specifically to craft and equipment moving into or within Bay of Plenty waters to protect the region's coast from unwanted marine pests:

When in the Bay of Plenty, MBL must ensure:

1. **Rule 1:** The hull is sufficiently cleaned and antifouled, so that the hull has no more than a slime layer and/or barnacles.
2. **Rule 2:** All high-risk areas on the craft are free of marine pests (this includes the anchor, chain, anchor wells and live bait tanks).
3. **Rule 3**: All boating equipment (including fishing and diving equipment) is free of marine pests.

3.2.4 Biofouling Compliance Methodology

To meet NRC, AC, and BOPRC requirements, MBL implements the following measures for the *William Fraser*:

- **Dry Dock Cleaning:** Scheduled every three years at MPI-approved facilities equipped to capture runoff and debris, preventing the release of invasive species into the marine environment.
- **Regular Hull Inspections**: Partake in an underwater hull inspections that are conducted at least annually during the NRC's surveillance period (October–May), with additional inspections triggered by operational risks (e.g., prolonged mooring or visits to high-risk ports like Whangārei). Inspections are performed by MPI-approved contractors to ensure compliance with NRC standards.
- **Antifouling Maintenance**: The *William Fraser* maintains MPI-approved antifouling coatings, applied and inspected during triennial dry dock cleaning, to prevent biofouling accumulation. Coating condition is monitored during underwater inspections to ensure effectiveness.
- **Pest Response Protocol**: If suspected marine pests or organisms listed in the *Auckland Regional Pest Management Plan*, the *Northland Regional Pest and Marine Pathway Management Plan and*

the Bay of Plenty Regional Council's Regional Pest Management Plan 2020-2030 are detected during inspections, MBL will:
    - Immediately cease all cleaning and dredging activities;
    - Notify the NRC's Marine Biosecurity Team and, if applicable, AC and BOPRC (for transits within Auckland and Bay of Plenty waters) without delay;
    - Await formal clearance from the relevant authority before resuming operations.
- **Monitoring Controlled Area Notices**: MBL will regularly check NRC's website (www.nrc.govt.nz) and subscribe to biosecurity alerts to ensure compliance with any Controlled Area Notices in Bream Bay or nearby Whangārei waters. Dredging operations will be paused or adjusted as required to adhere to these notices.

4.0 Training

All crew members involved in the operation of the *William Fraser* receive mandatory biofouling and marine biosecurity training to minimize the risk of introducing or spreading marine pests in Auckland, Northland and Bay of Plenty waters. The training program includes:

- **Marine Pest Identification**: Crew are trained to recognize high-risk marine pests listed in the *Northland Regional Pest and Marine Pathway Management Plan* (e.g., *Sabella spallanzanii*, *Caulerpa brachypus*) and the *Auckland Regional Pest Management Plan*, using resources such as the NRC's "Marine Pests" guide (available at www.nrc.govt.nz) and MPI's *Marine Pest ID Guide*.

- **Biofouling Management Protocols**: Training covers MBL's procedures for hull maintenance, antifouling coating checks, and response to detected pests, including ceasing operations, notifying the NRC's Marine Biosecurity Team (biosecurity@nrc.govt.nz or 0800 002 004) and AC or BOPRC (if applicable), and awaiting clearance.

- **Operational Compliance**: Crew are instructed on compliance with the *Hauraki Gulf Controlled Area Notice 2020* (e.g., maintaining "light fouling" levels, managing ballast and bilge water) and NRC requirements for hull cleanliness and Controlled Area Notices in Bream Bay.

- **Frequency and Documentation**: Training is conducted annually for all crew, with additional sessions for new staff or following updates to regional biosecurity regulations. As part of this training, all crew will be familiar with the Ministry for Primary Industries – New Zealand Marine Pest ID Guide (Appendix 4). Records are maintained in the business office. Staff meetings are held regularly to discuss any ongoing training requirements.

5.0 Management Plan Review

MBL commits to regularly reviewing and updating the Biofouling Management Plan to ensure ongoing compliance and alignment with best practices:

- **Review Schedule**: The plan is reviewed annually or following significant changes to biosecurity regulations, operational practices, or the identification of new marine pests in Auckland, Northland and Bay of Plenty waters.

- **Stakeholder Engagement**: MBL engages with the NRC's Marine Biosecurity Team and AC prior to major reviews to incorporate updated guidance, such as changes to the *Northland Regional Pest and Marine Pathway Management Plan*, *Hauraki Gulf Controlled Area Notice or the Bay of Plenty Regional Council's Regional Pest Management Plan 2020-2030*.

- **Updates and Communication**: Any updates to the plan are documented, communicated to all crew, and incorporated into training sessions. Revised plans are submitted to relevant authorities (NRC, AC, BOPRC, and MPI) for approval if required.

Appendix 1: Ballast Water Management Plan

Bureau Veritas Marine & Offshore
Section 35837F.....
Examined in order to check the compliance with the applicable requirements of .....
.....
IMO Resolution MEPC.127(53).....
.....
On behalf of the administration of
NEW ZEALAND.....
and subject to comments.
All particulars not shown on this document are assumed to be as per the requirements of the aforesaid texts.

Singapore, 25-Sep-2019

[Electronic document]
The plan approval office
See Technical Comment Sheet No.SPO/19/03850

FOR APPROVAL

DATE	MODIFICATION	REV	BY

UNITED SHIP DESIGN
(NAVAL ARCHITECTS)

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PROJECT

M.V.: WILLIAM FRASER
68M LANDING CRAFT

UNITED SHIP DESIGN SDN. BHD. 541859-X

TITLE

BALLAST WATER MANAGEMENT PLAN

OWNER	MCCALLUM BROS LIMITED				
BUILDER	BERJAYA DOCKYARD SDN BHD				
CLASS	BV		HULL NO.	BJ98	
PREPARED	HONG	23.08.2019	SCALE	DWG. NO.	REV.
CHECKED	T.K.WONG	10.09.2019	N.T.S.	US/786-BWMP	0
APPROVED				TOTAL : 53 PAGES (INCL. COVER)	

10 SEPTEMBER 2019

BALLAST WATER MANAGEMENT PLAN

For compliance with Regulation B-1 of the International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004 and the IMO 'Guidelines for Ballast Water Management and Development of Ballast Water Management Plans' Resolution MEPC 127(53).

SHIP NAME: M.V." WILLIAM FRASER"

IMO NO: 9864605

BV Note:
1. For Type D-1 Flow through method, Master is to consider the free surface moment that is present in a partially filled tank (during ballast and de-ballasting) and the free surface effect is to be accounted for when preparing the loading condition to ensure that the stability requirement is satisfied throughout the exchange process.
2. The ballast water exchange must be performed in favourable weather conditions, and favourable course minimizing the roll effect, under the responsibility of the Master.

SHIP PARTICULARS

Ship's Name	:	M.V. : "WILLIAM FRASER"
Type	:	Steel Landing Craft
Call Sign	:	ZMG3728
IMO No.	:	9864605
Port Of Registry	:	Auckland
Flag	:	New Zealand
Classification Society	:	BV
Owner's Name & Address	:	MCCALLUM BROS LIMITED 747 Rosebank Road, Avondale P.O.Box 71031, Rosebank, Auckland 1348, New Zealand.
Date of Keel Laid	:	18 September 2018
Gross Tonnage	:	1540 Tonnes
Length Overall	:	68.000 Metres
Length BP	:	63.253 Metres
Breadth Moulded	:	16.000 Metres
Depth Moulded	:	5.300 Metres
Deepest Ballast Drafts	:	2.409/2.535/2.660 Metres (F/M/A)
Total Ballast Capacity	:	424.5 CU.M.
Ballast Water Management Method(s) Used	:	**Flow through**
Identification (Rank) of Ballast Water Management Officer	:	Chief Officer

This plan should be kept available for inspection on request by a port state control officer or by a port state quarantine officer.

INTRODUCTION

1. This Manual is written in accordance with the requirements of Regulation B-1 of the International Convention for the Control and Management of Ship's Ballast Water and Sediments, 2004 (the convention) and the associated Guidelines.

2. The purpose of the Manual is to meet the requirements for the control and management of ship's ballast water and sediments in accordance with the Guidelines for Ballast Water Management and the Development of Ballast Water Management Plans resolution MEPC 127(53) (The Guidelines). It provides standard operational guidance for the planning and management of ship's ballast water and sediments and describes safe procedures to be followed.

3. This Manual has been examined by BV and no alteration or revision shall be made to any part of it without the prior approval of BUREAU VERITAS.

4. This plan may be inspected on request by an authorized authority.

5. Changes to non mandatory information in Appendix 5 will not be required to be approved.

6. It is the owners/operators or master's responsibility to regularly review the plan and ensure that the information contained therein is accurate and updated.

7. Section 1 to 12 are mandatory and any changes / amendments are to be submitted to BUREAU VERITAS for approval.

Note: The Plan is to be written in the working language of the crew, if the test is not in English, French, or Spanish, the plan is to include a translation into one of these languages.

RECORD OF CIRCULATION

This document to be circulated to ships staff that will be responsible for Ballast Water Management. After reading, the Ballast Water Management Plan it is to be signed and returned to the Ballast Water Management Officer.

Name	Rank	Date Joined	Signature and Date

RECORD OF AMENDMENTS

When any change/ amendment is made to chapter, a new "Table of Contents" page shall also be sent together with relevant amended chapter.
The holder of the controlled copy shall enter all amendments made to this document and register such changes in those pages.

No.	Date	Revised Part	Revision detail/ description	Signature	Master of Signature

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APPENDICES

SECTION 1 - PURPOSE

Ballast water is essential to control trim, list, draft, stability, or stresses of the ship. However, Ballast water may contain aquatic organisms or pathogens, which, if introduced into the sea including estuaries, or into fresh water courses, may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of such areas.

The selected methods of ballast water management take into account the need ensure that Ballast Water Management practices used to comply with this Convention do not cause greater harm than they prevent to the environment, human health, property of resources of any State and the safety of the ship.

It is estimated that at least 7,000 different species are being carried in ship's ballast tanks around the world. Studies carried out in several countries indicated that many species of bacteria, plants, and animals can survive in a viable form in the ballast water and sediment carried in ships, even after journeys of several months' duration.

Subsequent discharge of ballast water or sediment into the waters of port States may result in the establishment of harmful aquatic organisms and pathogens which may pose threats to indigenous human, animal and Plant life, and the marine environment. When all factors are favorable, an introduced species by survive to establish a reproductive population in the host environment, it may even become invasive, out-competing native species and multiplying into pest proportions. Although other media have been indentified as being responsible for transferring organisms between geographically separated water bodies, ballast water discharge from ship appears to Have been among the most prominent.

As a result IMO has developed guidelines for the development and implementation of a Ballast Water Management on board ship aiming to assist Governments, appropriate authorities, ships masters, operators, owners and port authorities, as well as other interested parties, in the preventing, minimizing and ultimately eliminating the risk of introducing harmful aquatic organisms and pathogens from ship's ballast water and Associated sediment while protecting ship's safety.

Good record keeping is critical to the success of a sound ballast water management program. The appointed ballast water management officer is responsible for ensuring the maintenance of appropriate records and that ballast water management and / or treatment procedures are followed and recorded.

The function of the Ballast Water Management Plan is to assist in complying with IMO Guidelines and quarantine measures intend to minimize the risk of transplanting Harmful aquatic organisms and pathogens from ship's ballast water and associated sediments, while maintaining ship safety.

As part of this function the plan provides information to port state control and other authorized officers about a ship's ballast handling system, sampling points and ballast water management system.

The plan should not be used or regarded as a guide to ballasting.

SECTION 2

PLANS/DRAWINGS OF THE BALLAST SYSTEM

The following plans are located in Appendix 1:

1. General Arrangement Plan
2. Capacity Plan
3. Bilge, Ballast and Fire-Main System
4. Position of Tank Vents, Sounding and Filling Pipes
5. Manhole Arrangement

SECTION 3

DESCRIPTION OF THE BALLAST SYSTEM

The following is a description of the ballast system used on board. Reference plans can be found in Appendix 1.

Filling and discharging of ballast water for all Ballast Water tanks to be carried out by the Bilge and Ballast Pump in engine room.

BALLAST TANKS DATA

TANK CAPACITIES

Tank	Location (Frame Nos.)	Capacity (cu.m)	Pumps Available
No.1 F.W./S.W.B.TK.-(C)	Fr.57~FE	135.2	Bilge and Ballast Pump
No.2 F.W./S.W.B.TK.-(W-P)	Fr.49~53	112.4	Bilge and Ballast Pump
No.2 F.W./S.W.B.TK.-(W-S)	Fr.49~53	112.4	Bilge and Ballast Pump
No.3 F.W./S.W.B.TK.-(P)	Fr.0~6	35.7	Bilge and Ballast Pump
No.3 F.W./S.W.B.TK.-(S)	Fr.0~6	28.8	Bilge and Ballast Pump

PUMP DATA

Pump	Rated Capacity (m3/hr)	Location
Bilge and Ballast Pump	45	Engine Room

Overflow and Filling line data (for flow through)

Tank	Note 1	Note 2	Note 3	Note 4	Note 5	Note 6
No.1 F.W./S.W.B.TK.-(C)	1	97.10	7406	73.66	4262	1.74
No.2 F.W./S.W.B.TK.-(W-P)	1	97.10	7406	73.66	4262	1.74
No.2 F.W./S.W.B.TK.-(W-S)	1	97.10	7406	73.66	4262	1.74
No.3 F.W./S.W.B.TK.-(P)	1	97.10	7406	73.66	4262	1.74
No.3 F.W./S.W.B.TK.-(S)	1	97.10	7406	73.66	4262	1.74

Note 1: No. of Overflow lines per tank (air vents or overflow lines per tank)
Note 2: Overflow line nominal diameter (mm).
Note 3: Overflow lines total cross sectional area (sq.mm)
Note 4: Filling line nominal diameter (mm)
Note 5: Filling line total cross sectional area (sq.mm)
Note 6: Ratio of Overflow / Filling line total cross sectional area.

TIME-TABLE FOR FLOW-THROUGH METHOD

SAMPLE

Tank	Capacity (cu.m)	Pump	Time for 3 Exchanges
No.1 F.W./S.W.B.TK.-(C)	135.2	Bilge and Ballast Pump	9Hrs.-1Min.
No.2 F.W./S.W.B.TK.-(W-P)	112.4	Bilge and Ballast Pump	7Hrs.-30Min.
No.2 F.W./S.W.B.TK.-(W-S)	112.4	Bilge and Ballast Pump	7Hrs.-30Min.
No.3 F.W./S.W.B.TK.-(P)	35.7	Bilge and Ballast Pump	2Hrs.-23Min.
No.3 F.W./S.W.B.TK.-(S)	28.8	Bilge and Ballast Pump	1Hrs.-55Min.

Note: The vent head bonnet of corresponding tank shall be removed prior to commencement of Flow-Through Method.

SECTION 4

BALLAST WATER SAMPLING POINTS

This section is confirmed to identifying ballast water and sediment sampling points.
There is unlikely to be any need for crew members to take samples except at the express request, and under the supervision, of a quarantine officer.
The plans below indicate ballast water and sediment sampling and access points in the ballast water tank, so that crew members can quickly assist quarantine offices who wish to obtain ballast water and sediment samples.
Quarantine officers must be advised of all safety procedure to be observed when entering enclosed spaces.

1. SAMPLING POINTS
   REFERENCE DATA
   *X: LONGITUDINAL DIRECTION (+: FOREWARD, -: AFTWARD)
   *Y: TRANSVERSE DIRECTION (+: STARBOARD, -: PORT)

NO	TANK NAME	SAMPLING POINTS				ACCESS FOR SEDIMENT
		FR.	X (Fr.0)	Y	TYPE	
1	No.1 F.W./S.W.B.TK.-(C)	Fr.57~FE	60.700m	+0.200m	Sounding Pipe	Water Tight Manhole
2	No.2 F.W./S.W.B.TK.-(W-P)	Fr.49~53	48.700m	-5.200m	Sounding Pipe	Water Tight Manhole
3	No.2 F.W./S.W.B.TK.-(W-S)	Fr.49~53	48.700m	+5.200m	Sounding Pipe	Water Tight Manhole
4	No.3 F.W./S.W.B.TK.-(P)	Fr.0~6	2.850m	-3.650m	Sounding Pipe	Water Tight Manhole
5	No.3 F.W./S.W.B.TK.-(S)	Fr.0~6	2.850m	+3.650m	Sounding Pipe	Water Tight Manhole

3. Precautionary Practices

a. Minimizing uptake of harmful aquatic organisms, pathogens and sediments

When loading ballast, every effort should be made to avoid the uptake of potentially harmful aquatic organisms, pathogens and sediment that may contain such organisms.
The uptake of ballast water should be minimized or, where practicable, avoid in areas and situations such as:

* area identified by the Port State in connection with advice relating to:
* area with outbreaks, infestations or known populations of harmful organisms and pathogens.
* areas with current phytoplankton bloom (algal blooms, such as red tides) :
* nearby sewage outfalls :
* nearby dredging operations :
* when a tidal stream is known to be more turbid : and
* areas where tidal flushing is known to be poor.
* In darkness when bottom-dwelling organisms may rise up in the water column;
* in every shallow water; or
* where propellers may stir up sediments.
* If it is necessary to take on and discharge ballast water in the same part to facilitate safe cargo operations, care should be taken to avoid unnecessary discharge of ballast water that has been taken up in another port.
* Minimize departure and arrive ballast quantities but always within Constraints of safe navigation.

b. Non-release or minimal release of ballast water

In case where ballast exchange or other treatment options are not possible, ballast water may be retained in tanks or holds, should this not be possible, the ship should only discharge the minimum essential amount of ballast water in accordance with Port State's contingency strategies.

c. Discharge to reception facilities

If reception facilities for ballast water and / or sediment are provided by a Port Sate, they should, where appropriate, be utilized.

SECTION 5

OPERATION OF THE BALLAST WATER MANAGEMENT SYSTEM

The necessity of pre-planning is to ensure that all safety considerations as addressed in sections 6 and 7 are in compliance with ballast exchange, ballast water treatment or other control options.

Ballast Water Exchange
Ballast water exchange in open water and the need to exchange should be carefully examined and prepared in advance, in a similar manner to the preparation of a cargo plan for a loaded voyage, and with the same degree of thoroughness.

The convention requires that vessels should conduct ballast water exchange:

- At least 200nm from the nearest land and in water at least 200m in depth;
  If this is not possible:
  1. As far from the nearest land as possible, and in all cases at least 50nm from the nearest land and in water at least 200m in depth or
  2. In sea areas designated by the Port State

All local and/or national regulations should be taken into consideration as they may specify other depths and distances from land.

A ship will not be required to deviate from its intended voyage or delay the voyage in order to comply with any particular requirement as stated above. In addition if the master decides reasonably that an exchange would threaten the safety or stability of the ship, its crew or its passengers because of adverse weather, ship design or stress, equipment failure, or any other extraordinary condition, he is not required to comply with above paragraphs.

There are three methods of Ballast Water Exchange which have been evaluated and accepted by the organization. The three methods are the sequential method, the flow-through method and the dilution method. The flow-through method and the dilution method are considered as "pump through" methods.

1. Flow through method

The flow-through method is process wherein the replacement ballast water is pumped in at the bottom of the ballasted tank, allowing for the water to flow through an overflow or other arrangements to achieve at least a 95% volumetric exchange of ballast water. Pumping through three times the volume of each ballast water tank is considered to meet the 95% volumetric exchange. In some cases, pumping through less than three times the volume of the ballast tank may be acceptable, provided the vessel can demonstrate that at least 95% volumetric exchange has been met.

The flow-through method has the advantage that it can be used in weather conditions which would be marginal for use of the sequential method, since there is little change to the condition of the ship and is relatively easy to follow by ships staff. However, the flow-through method introduces certain other risks and problems which must be considered before using this procedure. Refer also to Section 6, "safety procedures for the ship and the crew".

The disadvantages are that not all tanks are designed with a head to the top of the overflow. Moreover, some tank configurations can be difficult to flush through effectively, in particular cellular double bottom spaces and peak tanks. There is a danger of over pressurization of tanks and there can be an accumulation of water on deck, which in sub zero temperature conditions make the method impractical and dangerous for crew. In addition pumps and piping will experience an increase in work load.

The above in addition to the safety aspects addressed in section 6 & 7 should be carefully consulted and followed where applicable.

Where peak tanks are partially filled, the flow through method should be avoided unless any inadvertent exceedance of the design partial filling levels will not result in hull girder bending moments and shear forces exceeding the permissible values.

2. Precautionary Practises

a. Minimizing uptake of harmful aquatic organisms, pathogens and sediments.
When loading ballast, every effort should be made to avoid the uptake of potentially harmful aquatic organisms, pathogens and sediment that may contain such organisms. The uptake of ballast water should be minimized or, where practicable, avoided in areas and situations such as:

- Areas identified by the port state in connection with advice relating to:
- Areas with outbreaks, infestations or known populations of harmful organisms and pathogens;
- Nearby sewage outfalls;
- Nearby dredging operations;
- When a tidal stream is known to be the more turbid; and areas where tidal flushing is known to be poor
- In darkness when bottom-dwelling organisms may rise up in the water column;
- In very shallow water; or where propellers may stir up sediment.

If it is necessary to take on and discharge ballast water in the same port to facilitate safe cargo operations, care should be taken to avoid unnecessary discharge of ballast water that has been taken up in another port.

Minimise departure and arrival ballast quantities but always within the constraints of safe navigation.

b. Non-release or minimal release of ballast water
In cases where ballast exchange or other treatment options are not possible, ballast water may be retained in tanks or holds. Should this not be possible, the ship should only discharge the minimum essential amount of ballast water in accordance with port State's contingency strategies.

c. Discharge to reception facilities
If reception facilities for ballast water and / or sediments are provided by a port State, they should, where appropriate, be utilized.

SECTION 6

SAFETY PROCEDURES FOR THE SHIP AND THE CREW

1. Exchange at Sea

The exchange of ballast water in open sea has to be distinguished from ballast operations carried out in ports or in sheltered waters.

Ballast water operation at sea has the potential to be more hazardous than ballast water operations carried out in port.

A decision should be made at the completion of each sequence, taking account factors such as the ship's position, weather forecast, machinery performance, stability, strength, degree of crew fatigue, before proceeding to the next sequence. If any factors are considered unfavourable the ballast exchange a decision should be made if exchange operations should be suspended until conditions become more favourable or halted.
Contingency procedures for situations which may affect ballast water exchange at sea, including deteriorating weather conditions, pump failure and loss of power; time to complete the ballast water exchange for each tank or an appropriate sequence thereof; continual monitoring of the ballast water operation; monitoring should include pumps, levels in tanks, line and pump pressures, stability and stresses;

2. Safety considerations

Ballast water exchange has a number of safety considerations these include but are not limited to:-

- Avoidance of over and under-pressurization of ballast tanks;
- Sloshing loads in tanks that may be slack at any one time;
- Maintain adequate intact stability in accordance with an approved trim and stability booklet taking into account the free surface effects in stability;
- Permissible seagoing strength limits of shear forces and bending moments in accordance with an approved loading manual;
- Torsional forces;
- Forward and aft draughts and trim, with particular reference to bridge visibility,
- Propeller immersion;
- Minimum forward draft
- Wave-induced hull vibrations when performing ballast water exchange;
- Watertight closures (e.g. manholes) which may have to be opened during ballast exchange must be re-secured; crew safety is paramount during this operation. Provision of discharging pipe head on the manhole cover is suggested.
- Maximum pumping/flow rates-to ensure the tank is not subjected to a pressure greater than that for which it has been designed;
- Internal transfers of ballast;
- Admissible weather conditions;
- Weather routeing in areas seasonably affected by cyclones, typhoons, hurricanes, or heavy icing conditions;

Flow through Method

- Accumulation of water on decks which can cause a safety hazards to crew working on deck. (Effects on the stability may be negligible.)

3. Conditions under which ballast water exchange at sea should not be undertaken

These circumstances may result from critical situations of an exceptional nature or force majeure due to stress of weather, known equipment failures or defects, or any other circumstances in which human life or safety of the ship is threatened.

Ballast water exchange at sea should be avoided in freezing weather conditions.

However, when it is deemed absolutely necessary, particular attention should be paid to the hazards associated with the freezing of overboard discharge arrangements, air pipes, ballast system valves together with their means of control, and the build up of ice on deck.

Consideration must always be given to personnel safety, including precautions which may be required when personnel area required to work on deck at night, in heavy weather, when ballast water overflows the deck, and in freezing conditions. These concerns may be related to the risks to the personnel of falling and injury, due to the slippery wet surface of the deck plate, when water is overflowing on deck, and to the direct contact with the ballast water, in terms of occupational health and safety.

4. Precautionary Advice to Masters When Undertaking Ballast Water Exchange Operations.
Master should take all necessary precautions when undertaking Ballast Water Exchange sequences that involve periods when the criteria for propeller immersion, minimum forward draft and bridge visibility cannot be met:

- During ballast water exchange sequences there may be times when, for a transitory period, one or more of the following criteria cannot be fully met or are found to be difficult to maintain:
- Bridge visibility standards (SOLAS V/22)
- Propeller immersion; and
- Minimum draft forward.
- Emergency fire pump suction;

- In planning a Ballast Water Exchange operation that includes sequences which involve periods when the criteria for propeller immersion, minimum draft and or trim the following should be taken into consideration:

- The duration(s) and time(s) during the operation that any of the criteria will criteria will not be met;
- The effect(s) on the navigational and manoeuvring capabilities of the ship; and
- The time to complete the operation.

- A decision to proceed with the operation should only be taken when it is anticipated that;
- The ship will be in open water;
- The traffic density will be low;
- An enhanced navigation watch will be maintained including if necessary an additional look out forward with adequate communications with the navigation bridge;
- The manoeuvrability of the vessel will not be unduly impaired by the draft and trim and or propeller immersion during the transitory period; and
- The general weather and sea state conditions will be suitable and unlikely to deteriorate.

SECTION 7

OPERATIONAL OR SAFETY RESTRICTIONS

A ballast plan for a ballast voyage should be prepared in advance, in a similar manner to the preparation of a cargo plan for a loaded voyage, and with the same degree of thoroughness. This pre-planning is necessary in order to maintain safety in case compliance with ballast exchange or other ballast water treatment or control options is required.

The safety information in section 6 should be taken into account when preparing the voyage plan.

This section gives guidance on additional operational and safety ballast handling procedures to be followed at sea.

Additionally, operational limits defined for specific ballast exchange conditions must be adhered to during operation.

Ballast exchange operations are complex procedures and may last from several hours to days. All personnel engaged in ballast exchange should be trained to respond to routine and emergency procedures.

It should always be considered that while performing a ballast exchange at sea, failure or power system or any part of ballast pumping and piping system can take place, such incidents should be brought immediately to the attention of the bring the ship back to her ballast seagoing condition as soon as possible. Such emergency procedures could be ballasting by gravity and even utilization of the general service pump. Ships enrolled with the Ship Emergency Response Service (SERS) could, if necessary, activate the service.

Procedures for Safe Tank Entry

The procedure should comply with the requirement of the safety management system.

And the company's procedures for safe tank entry to be attached on next page.

SECTION 8

PROCEDURES FOR THE DISPOSAL OF SEDIMENTS

Where practicable, routine cleaning of the ballast tank to remove sediments should be carried out in mid-ocean or under controlled arrangements in port or dry dock.

When sediment has accumulated consideration should be given to flushing tank bottoms and other surfaces when in suitable areas, i.e. outside 200 nautical miles from land and in water depths of over 200 meters.

The volume of sediment in a ballast tank should be monitored on a regular basis.

Sediment in ballast tanks should be removed in a timely basis and as found necessary always taking into account safety and operational considerations addressed in this manual. The frequency and timing of removal will also depend on factors such as sediment build up, ship's trading pattern, availability of reception facilities, work load of the ship's personnel and safety considerations.

Removal of sediment from ballast tank should preferably be undertaken under controlled conditions in port, at a repair facility or in dry dock. The removed sediment should be preferably be disposed of in a sediment reception facility if available, reasonable and practicable.

Flushing by using water movement within a tank to bring sediment into suspension, will only remove a part of the mud, depending on the configuration of an individual tank and its piping arrangement. Removal may be more appropriate on a routine basis during scheduled dry dockings. This is often needed for other reasons anyway.

However, flushing at sea may be a useful tool on some occasions such as when a ship changed its trading area.

When sediment is removed from the ship's ballast tanks and is to be disposed of by that ship at sea such disposal should only take place in areas outside 200 nautical miles from land and in water depths of over 200 meters.

SECTION 9

METHODS OF COMMUCICATION

This section contains information to assist the Master in the procedures for co-ordinating the discharge of ballast water of a Coastal State, Local government or other involved parties.

The quick and effective communication between the ship and Coastal State or other involved parties becomes vital in mitigating the effects of an unnecessary delay for ships seeking entry to Port States.

The requirements and roles of the various national and local authorities involved vary widely from state and even from port to port. Approached to the responsibility for ballast water exchange also vary. In majority of coastal states responsibility for compliance with port state requirements is placed on the ship owner and the ship.

Generic reports and information can be found in Appendix, to assist the Master with organizing a communication to ballast water exchange and treatment plan to a port state not having issued any specific requirements.

THE COASTAL STATE SHOULD BE CONTRACTED FOR SPECIFIC BALLAST WATER DISCHARGE REQUIREMENT AND REPORTING PRIOR TO VESSEL'S ARRIVAL IN PORTS STATES TERRITORIAL WATERS.

Therefore the master with the responsible officer should timely obtain all necessary information and prepare the vessel accordingly taking into consideration the safety and operational restriction as described in this plan and relevant sections. Information on specific port state procedures can be obtained either by referring to the appendix of this plan, consulting the company and / or local agent for latest information / requirements.

A. Action to be taken by the vessel where coastal state has specific procedures for discharge of ballast water;
   1. Follow agreed reporting procedures
   2. Contact ship's agent to ascertain the latest information / requirements on ballast discharge in the water of respective state
   3. Advise/ communicate with the company and request any other information they might hold on ballast water discharge.
   4. Ensure that you timely plan for all above actions and that safety and operational restrictions are consulted.

B. Actions to be taken by the vessel where the coastal state has no specific
   1. Contact ships agent and / or company to obtain latest information on the discharge requirements at port state territory.
   2. Carry out discharge of ballast water as per approved ballast exchange sequence.
   3. Take into consideration safety and operational procedures related to respective discharge
   4. Keep proper records and have them readily available for possible inspection.

SECTION 10

DUTIES OF THE BALLAST WATER MANAGEMENT OFFICER

Duties of the appointed officer in charge of ballast water management;

- Ensure that ballast water management and / or treatment procedures are followed and recorded.
- Where ballast exchange is required, follow the applicable Ballast Exchange Sequence (BES), or develop a new BES on the basis of ship's assessment criteria, condition of hull, equipment and weather forecast.
- Ensure adequate and enough personnel and equipment are available for the execution of the BES and / or treatment.
- Ensure that the steps / sequences of the BES are followed in the prepared order.
- Inform the shore management on commencement/interruption/completion of ballast water exchange, using the Notification Form.
- Maintain the Ballast Water Record Book and all other relevant/applicable documentation.
- Prepare the appropriate national or port Ballast Water Declaration Form prior to arrival at destination.
- Assist the port state control or quarantine officers for any sampling that may need to be undertaken.
- Undertake familiarization and training of crew in ballast water management requirements and applicable shipboard systems and procedures.
- Other duties specified by the company.

The master must ensure that the Ballast Water Management Plan is clearly understood by the appointed Officer and by any other ships staff that may be involved.

The duty officer must keep the Master advised on the progress of the plan from time to time. Should there be any doubt, or if the management plan does not keep to the schedule, Master shall be advised accordingly.

SECTION 11

RECORDING REQUIREMENTS

The ballast water management officer is to ensure that the ballast water record book and any other necessary documentation / forms are completed and kept up-to-date.

Ballast Water Record Book
The Ballast Water Record Book may be an electronic record system or it may be intergraded into another record book or system and which shall at least contain the information as specified in this Section, in ***Appendix 2*** and as per the Convention Requirements.

The Ballast Water Record Book is to be maintained on board for a minimum of two years in order to provide port state control or other authorized officers with information they may require concerning the ballast water on board the ship.

Thereafter the manual should be maintained in the company's control for a minimum period of 3 years.

SECTION 12

CREW TRAINING AND FAMILIARIZATION

It is of imperative priority to ensure that both Master, Ship's officer and crew have an understanding of the need for ballast water management with proper training.

If crew members understand the reasons for the exchange or treatment of ballast water and associated sediments, they are more likely to ensure that it is carried out effectively and efficiently.

Owners, managers, operators and other involved in officer and crew training for ballast water management should consider the following;

Training for ships' masters and crews as appropriate should include instructions on the requirements of the convention, the ballast water and sediment management procedures and the ballast water record book particularly having regard to matters of ship safety, maintenance of records and reporting requirement in accordance with the information contained in IMO convention.

Ship's officers and ratings engaged in ballast water exchanged at sea must be aware of what is expected of them and why should be trained in and familiarized with the following:

- The ship's pumping arrangements including ballast arrangements.
- The locations of air and sounding pipes of all ballast tanks.
- The positions of all ballast tank suctions and pipelines.
- The overboard discharge arrangements and openings for release of water on deck.
- Inspection and maintenance for ensuring that sounding pipes are clear and non-return devices and air pipes are in good order.
- The times and circumstances required to undertake the various ballast water exchange operations.
- The methods for ballast water exchange at sea used, the related safety precautions and associated hazards.
- The method of on-board ballast water record keeping, reporting and recording of routine soundings.
- The location and suitable access points for sampling purposes.

The Master and Ballast Water Management Officer should ensure that the personnel assigned KEY Responsibilities in any ballast exchange procedures are suitable and well trained according to the above. Special attention should be given to the safety aspects related with the subject procedures.

Provisions for crew training and familiarization include the following:

1. Requirements of a general nature regarding Ballast Water Management;
2. Training and information on ballast water management practices;
3. Ballast water exchange;
4. Ballast water treatment systems;
5. General safety considerations;
6. The Ballast Water Record Book and maintenance of records;
7. The operation and maintenance of installed ballast water treatment system;
8. Safety aspects associated with the particular systems and procedures used onboard the ship which affect the safety or human health of crew and passengers and/or the safety of the ship;
9. Precautions for entering tanks for sediment removal;
10. Procedures for the safe handling and packaging of sediment; and
11. Storage of sediment

Training Record for Ballast Water Management Manual

Date	Name	Rank	Signature	Remarks	Verified by

APPENDIX 1

PLANS:

- General Arrangement Plan
- Capacity Plan
- Bilge, Ballast and Fire-Main System
- Position of Tank Vents, Sounding and Filling Pipes
- Manhole Arrangement

NOTE: Above Drawing (or Diagram) should be attached in this Appendix.

PRINCIPAL PARTICULAR

L.O.A.	68.000M (223.10FT)
L.W.L.	64.753M (212.44FT)
L.B.P.	63.253M (207.52FT)
BREADTH (MLD)	16.000M (52.49FT)
DEPTH (MLD)	5.300M (17.39FT)
DESIGN DRAFT (MLD)	4.200M (13.78FT)
DESIGN SPEED	10 KNOTS
COMPLEMENT	8 MEN
F.O. CAPACITY	299 cu.m (approx.)
F.W. CAPACITY	230 cu.m (approx.)
F.W. STORAGE CAPACITY	91 cu.m (approx.)
B.W. (F.W/S.W) CAPACITY	435 cu.m (approx.)
MAIN ENGINE	CAT C32 1000HP@1800RPM X 2 UNITS
GEAR BOX	WAF 562L, RATIO 5.05:1
GENERATOR	78KW x 2 UNITS
FLAG	NEW ZEALAND
PORT OF REGISTRY	AUCKLAND
NAVIGATION AREA	INTERNATIONAL

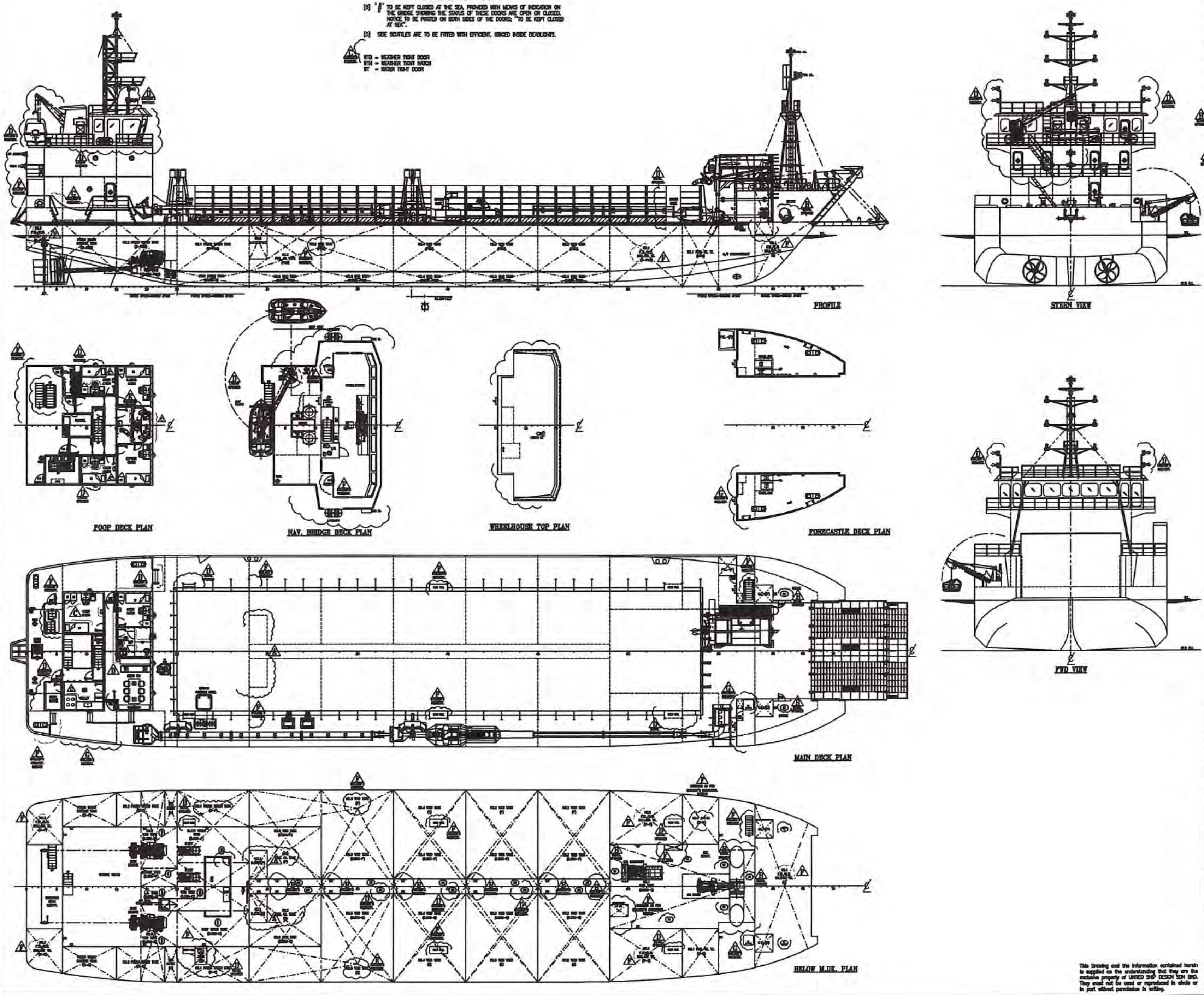
NOTES:-

[A] '*' TO BE KEPT CLOSED AT THE SEA AND A PERMANENT NOTICE TO THIS EFFECT SHALL BE POSTED ON EITHER SIDE OF THE DOOR.

[B] '#' TO BE KEPT CLOSED AT THE SEA, PROVIDED WITH MEANS OF INDICATION ON THE BRIDGE SHOWING THE STATUS OF THESE DOORS ARE OPEN OR CLOSED. NOTICE TO BE POSTED ON BOTH SIDES OF THE DOORS; "TO BE KEPT CLOSED AT SEA".

[D] SIDE SCUTTLES ARE TO BE FITTED WITH EFFICIENT, HINGED INSIDE DEADLIGHTS.

WTD = WEATHER TIGHT DOOR
WTH = WEATHER TIGHT HATCH
WT = WATER TIGHT DOOR



DATE	MODIFICATION	REV	BY
21.08.19	AMENDED AS PER BUILDER'S REQUEST. (PI-082119)	G	WONG
17.08.19	UPDATE DRAWING.	F	T.K.WONG
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12.10.18	UPDATE DRAWING LAYOUT AND REF TO BUILDER'S COMMENTS.	D	HONG
13.09.18	AMENDED AS PER BUILDER'S REQUEST. (PI-091318) AND UPDATE DRAWING.	C	HONG
11.09.18	DETAIL UPDATED	B	T.K.WONG
21.08.18	AMENDED AND RELOCATED MOON POOL AND TANK ARRANGEMENT BASED ON THE BUILDER'S REQUEST.	A	T.K.WONG

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SHIP: 68M LANDING CRAFT

TITLE: GENERAL ARRANGEMENT

OWNER					
BUILDER	BERJAYA DOCKYARD SDN BHD				
CLASS	BV		HULL NO.	BJ98	
DRAWN	CHECKED	APPROVED	SCALE	DRAWING NO.	REV.
WONG 12.12.17	T.K.WONG 25.06.18		1 : 150 (A1)	US/786-G1	G

Tank Status

FUEL OIL (SpGr 0.870)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm	Volume (m^3)	Max FSM (MT-m)
DO1.P	100.00%	39.18	54.438f	5.244p	3.231	0.980	45.0	13.24
DO2.P	100.00%	9.36	17.750f	1.800p	3.775	0.980	10.8	1.47
DO2.S	100.00%	9.36	17.750f	1.800s	3.775	0.980	10.8	1.47
FO1.S	100.00%	39.18	54.438f	5.244s	3.231	0.980	45.0	13.24
FO2.P	100.00%	81.80	20.257f	2.914p	3.218	0.980	94.0	36.32
FO2.S	100.00%	81.80	20.257f	2.914s	3.218	0.980	94.0	36.32
Subtotals:	**100.00%**	**260.69**	**30.353f**	**0.000**	**3.262**		**299.6**	**102.06**

FRESH WATER (SpGr 1.000)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm	Volume (m^3)	Max FSM (MT-m)
FWSTORAGE.P	100.00%	48.46	3.922f	6.255p	4.332	0.980	48.5	6.25
FWSTORAGE.S	100.00%	34.94	3.959f	6.245s	3.726	0.980	34.9	6.25
FWW1.P	100.00%	69.00	14.071f	6.542p	3.275	0.980	69.0	12.31
FWW1.S	100.00%	65.99	14.120f	6.578s	3.229	0.980	66.0	12.31
FWW2.P	100.00%	48.48	7.794f	6.432p	4.061	0.980	48.5	8.09
FWW2.S	100.00%	38.27	7.868f	6.428s	3.570	0.980	38.3	8.09
Subtotals:	**100.00%**	**305.14**	**9.537f**	**0.551p**	**3.647**		**305.1**	**53.31**

GREY (SpGr 1.013)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm	Volume (m^3)	Max FSM (MT-m)
GREY.S	100.00%	34.34	14.071f	4.656s	0.730	0.980	33.9	106.24
Subtotals:	**100.00%**	**34.34**	**14.071f**	**4.656s**	**0.730**		**33.9**	**106.24**

BLACK (SpGr 0.900)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm	Volume (m^3)	Max FSM (MT-m)
BLACK.P	100.00%	30.53	14.071f	4.656p	0.730	0.980	33.9	94.43
Subtotals:	**100.00%**	**30.53**	**14.071f**	**4.656p**	**0.730**		**33.9**	**94.43**

SLUDGE (SpGr 0.870)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm	Volume (m^3)	Max FSM (MT-m)
SLUDGE.P	100.00%	4.16	9.593f	0.749p	0.906	0.980	4.8	0.72
Subtotals:	**100.00%**	**4.16**	**9.593f**	**0.749p**	**0.906**		**4.8**	**0.72**

LUBE OIL (SpGr 0.900)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm	Volume (m^3)	Max FSM (MT-m)
LO.S	100.00%	4.30	9.593f	0.749s	0.906	0.980	4.8	0.74
Subtotals:	**100.00%**	**4.30**	**9.593f**	**0.749s**	**0.906**		**4.8**	**0.74**

Tank Status

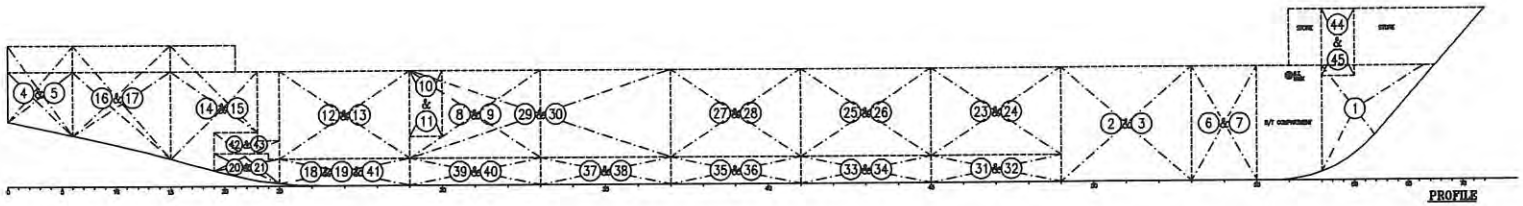
SALT WATER (SpGr 1.025)

Tank Name	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm	Volume (m^3)	Max FSM (MT-m)
CL.P	100.00%	7.01	59.750f	4.750p	6.350	0.980	6.8	0.42
CL.S	100.00%	7.01	59.750f	4.750s	6.350	0.980	6.8	0.42
FWSWB1.C	100.00%	138.55	60.847f	0.000	3.805	0.980	135.2	620.56
FWSWB2.P	100.00%	115.22	49.795f	5.545p	2.943	0.980	112.4	40.24
FWSWB2.S	100.00%	115.22	49.795f	5.545s	2.943	0.980	112.4	40.24
FWSWB3.P	100.00%	36.58	0.108f	5.197p	4.730	0.980	35.7	10.66
FWSWB3.S	100.00%	29.53	0.108f	5.007s	4.451	0.980	28.8	10.66
VOID2.P	100.00%	180.19	43.995f	4.291p	3.276	0.980	175.8	202.63
VOID2.S	100.00%	180.19	43.995f	4.291s	3.276	0.980	175.8	202.63
VOID3.P	100.00%	180.63	38.000f	4.300p	3.275	0.980	176.2	203.54
VOID3.S	100.00%	180.63	38.000f	4.300s	3.275	0.980	176.2	203.54
VOID4.P	100.00%	176.89	31.984f	4.279p	3.275	0.980	172.6	202.57
VOID4.S	100.00%	176.89	31.984f	4.279s	3.275	0.980	172.6	202.57
VOID5.P	100.00%	253.83	24.269f	4.935p	3.275	0.980	247.6	279.31
VOID5.S	100.00%	253.83	24.269f	4.935s	3.275	0.980	247.6	279.31
VOID7.S	100.00%	3.09	13.000f	5.750s	4.275	0.980	3.0	0.28
VOIDDB1.C	100.00%	77.54	52.258f	0.017p	0.692	0.980	75.6	290.62
VOIDDB2.P	100.00%	50.32	43.979f	3.562p	0.699	0.980	49.1	252.95
VOIDDB2.S	100.00%	50.32	43.979f	3.562s	0.699	0.980	49.1	252.95
VOIDDB3.P	100.00%	50.87	38.000f	3.590p	0.696	0.980	49.6	256.90
VOIDDB3.S	100.00%	50.87	38.000f	3.590s	0.696	0.980	49.6	256.90
VOIDDB4.P	100.00%	49.91	31.985f	3.557p	0.696	0.980	48.7	255.27
VOIDDB4.S	100.00%	49.91	31.985f	3.557s	0.696	0.980	48.7	255.27
VOIDDB5.P	100.00%	50.87	26.000f	3.590p	0.696	0.980	49.6	256.89
VOIDDB5.S	100.00%	50.87	26.000f	3.590s	0.696	0.980	49.6	256.89
VOIDDB6.P	100.00%	50.87	20.000f	3.590p	0.696	0.980	49.6	256.90
VOIDDB6.S	100.00%	50.87	20.000f	3.590s	0.696	0.980	49.6	256.90
VOIDDB7.C	100.00%	29.60	14.027f	0.000	0.636	0.980	28.9	32.15
VOIDDB8.P	100.00%	19.99	9.362f	4.744p	1.294	0.980	19.5	44.39
VOIDDB8.S	100.00%	19.99	9.362f	4.744s	1.294	0.980	19.5	44.39
Subtotals:	**100.00%**	**2,688.09**	**35.347f**	**0.010p**	**2.706**		**2,622.5**	**5,468.97**

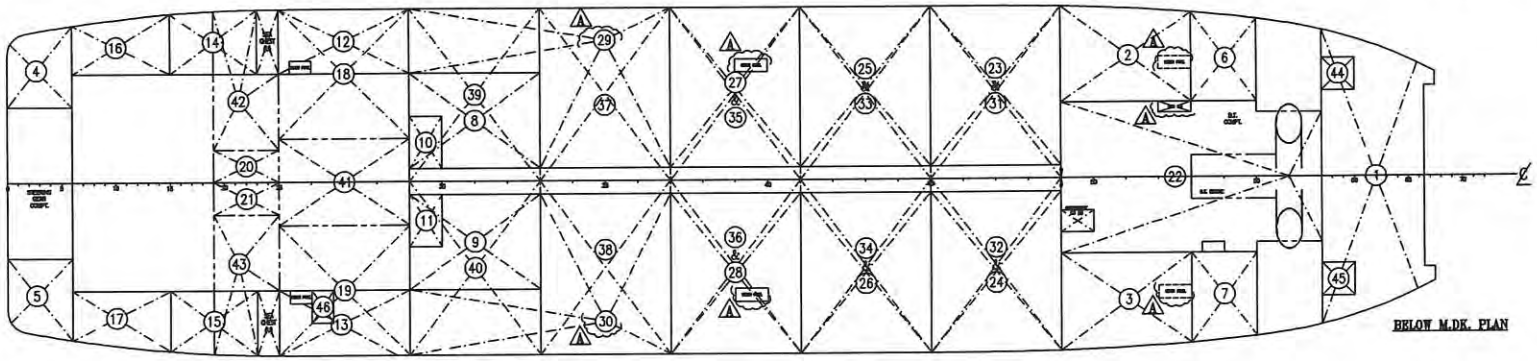
All Tanks

	Load (%)	Weight (MT)	LCG (m)	TCG (m)	VCG (m)	Perm	Volume (m^3)	Max FSM (MT-m)
Totals:		**3,327.25**	**32.108f**	**0.053p**	**2.792**		**3,304.7**	**5,826.48**

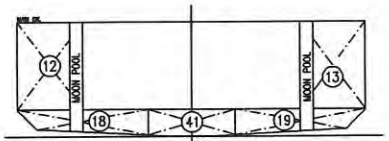
* FSM Notes
Max. FSM is the Maximum Free Surface Moment of any load at the present heel and trim.
It may not be the current FSM.



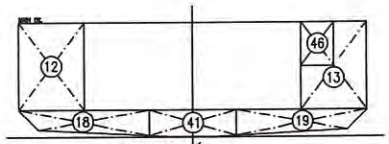
PROFILE



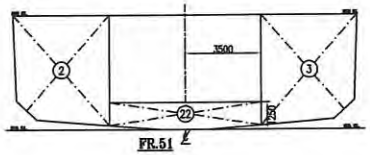
BELOW M.DK. PLAN



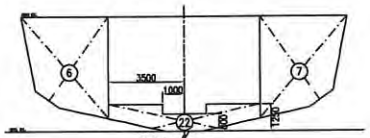
FR.26-100MM



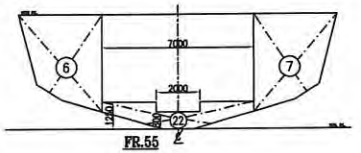
FR.26+500MM



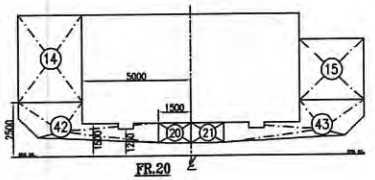
FR.51



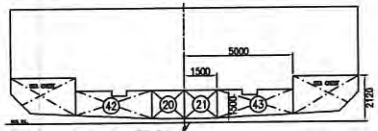
FR.54



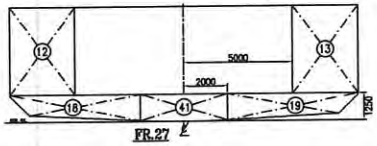
FR.55



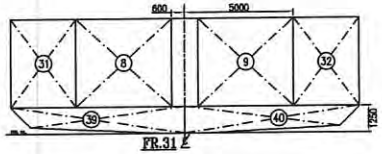
FR.20



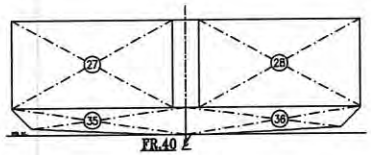
FR.24



FR.27



FR.31



FR.40

NO.	TANK NAME	REF. CODE	NO.	TANK NAME	REF. CODE	NO.	TANK NAME	REF. CODE
1	NO.1 FRESH WATER/SEA WATER BALLAST TANK (C)	FWSWB1.C	18	BLACK WATER TANK (D.BTM-P)	BLACK.P	35	NO.4 VOID TANK (D.BTM-P)	VOIDDB4.P
2	NO.2 FRESH WATER/SEA WATER BALLAST TANK (P)	FWSWB2.P	19	GREY WATER TANK (D.BTM-S)	GREY.S	36	NO.4 VOID TANK (D.BTM-S)	VOIDDB4.S
3	NO.2 FRESH WATER/SEA WATER BALLAST TANK (S)	FWSWB2.S	20	SLUDGE TANK (D.BTM-P)	SLUDGE.P	37	NO.5 VOID TANK (D.BTM-P)	VOIDDB5.P
4	NO.3 FRESH WATER/SEA WATER BALLAST TANK (P)	FWSWB3.P	21	LUBE OIL TANK (D.BTM-S)	LO.S	38	NO.5 VOID TANK (D.BTM-S)	VOIDDB5.S
5	NO.3 FRESH WATER/SEA WATER BALLAST TANK (S)	FWSWB3.S	22	NO.1 VOID TANK (D.BTM-C)	VOIDDB1.C	39	NO.6 VOID TANK (D.BTM-P)	VOIDDB6.P
6	NO.1 DAILY OIL TANK (W-P)	DO1.P	23	NO.2 VOID TANK (P)	VOID2.P	40	NO.6 VOID TANK (D.BTM-S)	VOIDDB6.S
7	NO.1 FUEL OIL TANK (W-S)	FOW1.S	24	NO.2 VOID TANK (S)	VOID2.S	41	NO.7 VOID TANK (D.BTM-C)	VOIDDB7.C
8	NO.2 FUEL OIL TANK (P)	FO2.P	25	NO.3 VOID TANK (P)	VOID3.P	42	NO.8 VOID TANK (D.BTM-P)	VOIDDB8.P
9	NO.2 FUEL OIL TANK (S)	FO2.S	26	NO.3 VOID TANK (S)	VOID3.S	43	NO.8 VOID TANK (D.BTM-S)	VOIDDB8.S
10	NO.2 DAILY OIL TANK (P)	DO2.P	27	NO.4 VOID TANK (P)	VOID4.P	44	CHAIN LOCKER (P)	CL.P
11	NO.2 DAILY OIL TANK (S)	DO2.S	28	NO.4 VOID TANK (S)	VOID4.S	45	CHAIN LOCKER (S)	CL.S
12	NO.1 FRESH WATER TANK (W-P)	FWW1.P	29	NO.5 VOID TANK (P)	VOID5.P	46	NO.7 VOID TANK (S)	VOID7.S
13	NO.1 FRESH WATER TANK (W-S)	FWW1.S	30	NO.5 VOID TANK (S)	VOID5.S			
14	NO.2 FRESH WATER TANK (W-P)	FWW2.P	31	NO.2 VOID TANK (D.BTM-P)	VOIDDB2.P			
15	NO.2 FRESH WATER TANK (W-S)	FWW2.S	32	NO.2 VOID TANK (D.BTM-S)	VOIDDB2.S			
16	FRESH WATER STORAGE TANK (W-P)	FWSTORAGE.P	33	NO.3 VOID TANK (D.BTM-P)	VOIDDB3.P			
17	FRESH WATER STORAGE TANK (W-S)	FWSTORAGE.S	34	NO.3 VOID TANK (D.BTM-S)	VOIDDB3.S			

DATE	MODIFICATION	REV	BY
06.05.19	AMENDED AS PER BUILDER COMMENT	B	YU
05.03.19	AMENDED AS PER BUILDER COMMENT	A	YU

UNITED SHIP DESIGN
(NAVAL ARCHITECTS)
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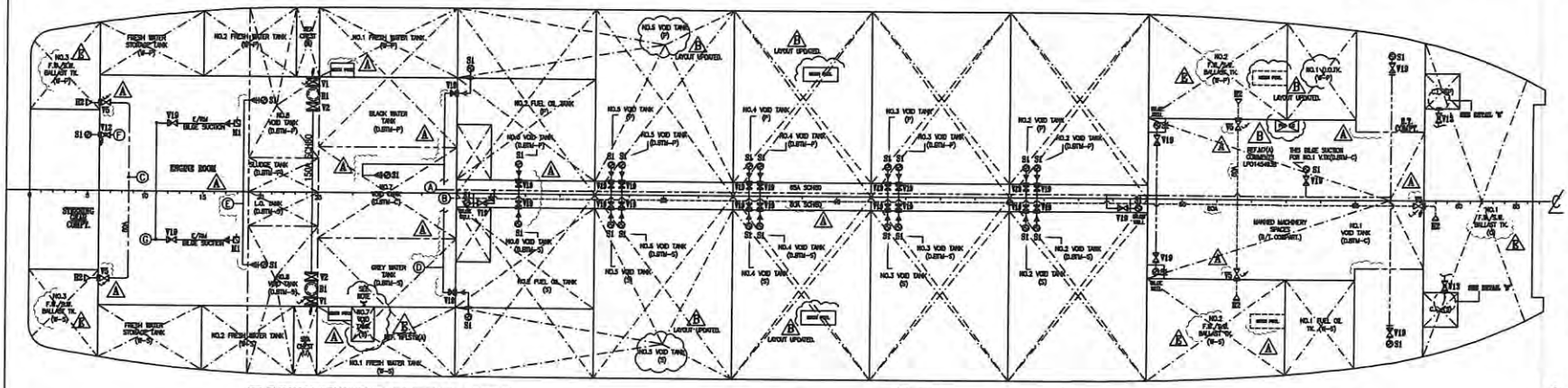
EMAIL : usdesign@usdesign.com.my
WEBSITE : www.usdesign.com.my

SHIP: 68M LANDING CRAFT

TITLE: TANK ARRANGEMENT

OWNER					
BUILDER	BERJAYA DOCKYARD S/B				
CLASS	BV		HULL NO.	8J88	
DRAWN	CHECKED	APPROVED	SCALE	DRAWING NO.	REV.
YU	T.K.WONG		N.T.S.	US/786-TA	B
13.09.18	13.09.18				

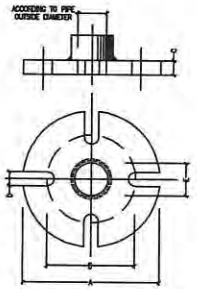


NOTE: 'A' NO.7 VOID TANK (S) HAS CONNECTING DRAIN PIPE, TO DIRECT DRAIN WATER TO ENGINE ROOM.

NOTES:
1. SYSTEMS TO COMPLY WITH RULES & REGULATIONS OF CLASSIFICATION SOCIETY & STATUTORY AUTHORITIES. SYSTEM IS TO BE TESTED TO 1.5 TIMES THE WORKING PRESSURE.
2. MANIFOLDS ARE TO BE LOCATED IN THE VICINITY OF THE PUMPS.
3. FOR SCHEMATIC AIR VENT, FILLING AND SOUNDING PIPES, SEE SEPARATE SUBMISSION.
4. VALVES OR CONN. MARKED 'V' ARE TO BE FITTED NEAR TOP OF SIDE SHELL.
5. VALVES OR CONN. MARKED 'S' ARE TO BE FITTED AT WALL/BHD.
6. SHIP'S SIDE VALVES, VALVES FITTED ON SEA CHEST, BHD AND SHORT DISTANCE PIECES FITTED ON SHIP SHELL SHALL BE PROVIDED WITH RELEVANT MATERIAL TEST CERTIFICATE AND PRESSURE TESTED IN THE PRESENCE OF SURVEYOR.
7. DETAILS OF SEA CHEST, PLEASE REFER SEPARATE DRAWING.
8. THICKNESS OF PIPE PENETRATION (t) IS TO BE AT LEAST 7mm.
9. VALVES CONNECTED TO DIRECT BILGE SUCTION AND EMERGENCY BILGE SUCTION ARE TO BE FITTED AS CLOSE AS POSSIBLE TO THE MAIN PIPE LINE CONNECTED TO BILGE / BALLAST PUMP AND FIRE / G.S. PUMP.
10. HAND-WHEELS OF VALVES CONTROLLING EMERGENCY BILGE SUCTIONS ARE TO BE FIXED AT LEAST 0.45m ABOVE THE MANOEUVRING FLOOR.
11. MANOMETER SHALL BE PROVIDED AT DISCHARGE SIDE OF THE TRANSFER PUMP (MARK 'M').
12. THE EMERGENCY FIRE PUMP MUST BE AN INDEPENDENTLY DRIVEN POWER-OPERATED PUMP WITH ITS SOURCE OF POWER AND SEA CONNECTION OUT OF MACHINERY SPACE.
13. FIRE HOSES WITH COUPLING AND NOZZLES ARE TO BE PROVIDED.
14. ALL PIPES TO BE M.S. GALV'D SCH40 UNLESS WHERE OTHERWISE STATED.
15. FOR PIPING PENETRATING W.T.BHD, DECK OR TANK TOP, AN ADEQUATE PENETRATION FITTING IS TO BE PROVIDED TO ENSURE THE WATERTIGHTNESS OF THE STRUCTURE.
16. THERE SHALL BE AT LEAST TWO FIRE HYDRANTS EACH EQUIPPED WITH FIRE HOSE AND COMBINED JET AND SPRAY NOZZLE, ONE OF THE HYDRANTS SHALL BE LOCATED NEAR ENGINE ROOM. AT LEAST ONE POWERFUL WATER JET TO REACH FREQUENTLY-ACCESSIBLE PART OF SHIP.
17. FIRE PUMP IS TO BE CAPABLE OF SUPPLYING THE HYDRANTS AT REQUIRED PRESSURE OF AT LEAST 2.5 BAR.
18. POSITION OF FIRE HYDRANT PLEASE REFER TO FIRE CONTROL & SAFETY PLAN.
19. OWNER SHALL APPLY FOR EXEMPTION FOR BWMP FROM FLAG AUTHORITY.

B LP01453848

B LP01453839

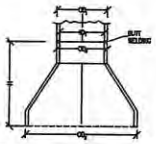


According to pipe outside diameter

MARK	A	B	C	D	E
(mm)	178	122	14.0	18	64
(in)	7.0	5.10	0.57	0.75	2.52

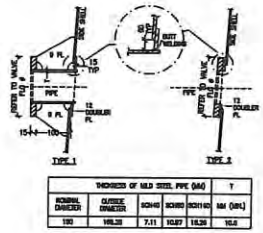
OUTSIDE DIAMETER	178MM
INSIDE DIAMETER	64MM
BOLT CIRCLE DIAMETER	132MM
SLOTS IN FLANGE	4 HOLES, 18MM IN DIAMETER SPACED EQUIDISTANTLY ON A BOLT CIRCLE OF THE ABOVE DIAMETER,SLOTTED TO THE FLANGE PERIPHERY
FLANGE THICKNESS	14.5MM MINIMUM
BOLTS AND NUTS	4, EACH OF 16MM DIAMETER, 50MM IN LENGTH

STANDARD DIMENSIONS FOR INTERNATIONAL SHORE CONNECTIONS
FIRE CODE-INTERNATIONAL CODE FOR FIRE SAFETY SYSTEMS



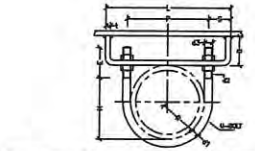
Nominal Diameter	Mild Steel Pipe							
	SCH40		SCH80					
	D_2	D_1	D_3	D_4	D_2	D_3	H	Radius over radius
80	89.33	82.50	80.33	48.38	88	135	139.8	3.70
100	114.30	102.26	114.30	97.18	138	146	182.4	1.35

BELLMOUTH
(STEEL BUTT-WELDING CONCENTRIC WORMS REDUCERS)



NOMINAL DIAMETER	THICKNESS OF MILD STEEL PIPE (MM)			T
	OUTSIDE DIAMETER	SCH40	SCH80	SCH160	MM (MIN.)
100	168.28	7.11	10.97	18.26	10.0

DISTANCE PIECE DETAIL



NOMINAL DIA.	OUTER DIA. OF MILD STEEL PIPE	U-BOLT					SEAT					
		B	d1	MINIMUM SIZE OF THREAD d2	A TYPE H	A TYPE C	B	L	L1	F	S	d3
65	76.3	40	10	M10	–	–	40	5	110	42	22	12
80	89.5	32	10	M10	–	–	40	5	122	74	22	12
65	76.3	40	12	M12	–	–	50	6	132	62	28	15
80	89.1	46	12	M12	–	–	50	6	164	104	28	15

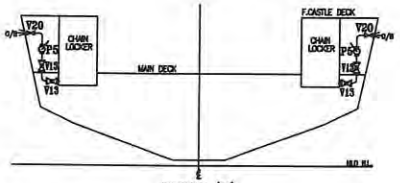
U-BOLT FOR THE STEEL PIPE

BILGE, BALLAST PIPING SYSTEM ENGINE ROOM

✓ - OPEN/ CLOSE INDICATOR MUST BE PROVIDED

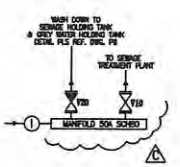
BELOW FREEBOARD DECK PLAN

✓ - OPEN/ CLOSE INDICATOR MUST BE PROVIDED



DETAIL 'B'

FR.57~60



WASH DOWN TO SEWAGE HOLDING TANK & GREY WATER HOLDING TANK DETAIL PLS REF. DWG. P8

TO SEWAGE TREATMENT PLANT

MANIFOLD SCH SCH80

PUMP PARTICULARS

P1 BILGE/BALLAST PUMP
TO BE OF SELF-PRIMING TYPE
CAPACITY : 45 cu.M/HR
TOTAL HEAD : 40M

P2 FIRE/G.S. PUMP
TO BE OF SELF-PRIMING TYPE
CAPACITY : 45 cu.M/HR
TOTAL HEAD : 40M

P3 EMER.-FIRE PUMP
TO BE OF SELF-PRIMING TYPE
CAPACITY : 45 cu.M/HR
TOTAL HEAD : 40M

P4 EMERGENCY BILGE PUMP
TO BE OF SELF-PRIMING TYPE
CAPACITY : 45 cu.M/HR
TOTAL HEAD : 30M

SYMBOL LIST

ITEM	SIZE	DESCRIPTION	QTY	MATERIAL
V1	150A	GATE VALVE	2	CAST STEEL BOLTED BONNET FLG TO JIS 10K OR EQUIVALENT
V2	150A	BUTTERFLY VALVE	2	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V3	100A	GATE VALVE	2	CAST STEEL BOLTED BONNET FLG TO JIS 10K OR EQUIVALENT
V4	80A	GATE VALVE LP01453839	2	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V5	80A	GATE VALVE A	14	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V6	65A	GATE VALVE	1	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V7	50A	GATE VALVE A	2	CAST STEEL BOLTED BONNET FLG TO JIS 10K OR EQUIVALENT
V8	50A	GATE VALVE	2	BRONZE SCR'D BONNET FLG TO JIS 5K OR EQUIVALENT
V9	25A	GATE VALVE	2	BRONZE SCR'D BONNET FLG TO JIS 5K OR EQUIVALENT
V10	40A	GATE VALVE	1	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V11	80A	SWING CHECK VALVE	2	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V12	65A	SWING CHECK VALVE	1	BRONZE SCR'D BONNET FLG TO JIS 5K OR EQUIVALENT
V13	40A	SWING CHECK VALVE	4	BRONZE SCR'D BONNET FLG TO JIS 5K OR EQUIVALENT
V14	100A	S.D.N.R. VALVE	8	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V15	80A	ANGLE S.D.N.R. VALVE	3	CAST STEEL BOLTED BONNET FLG TO JIS 10K OR EQUIVALENT
V16	50A	ANGLE S.D.N.R. VALVE A	2	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V17	65A	S.D.N.R. VALVE F LP01523733	3	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V18	65A	ANGLE S.D.N.R. VALVE A	2	CAST STEEL BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V19	50A	S.D.N.R. VALVE	29	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V20	40A	S.D.N.R. VALVE A	3	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V21	65A	GATE VALVE	1	CAST STEEL BOLTED BONNET FLG TO JIS 10K OR EQUIVALENT
V22	65A	ANGLE S.D.N.R. VALVE	2	CAST IRON BOLTED BONNET FLG TO JIS 5K OR EQUIVALENT
V23	20A	GATE VALVE	3	BRONZE SCR'D BONNET FLG TO JIS 10K OR EQUIVALENT
F1	40A	FIRE HYDRANT	10	BRONZE C/W INSTANTENEOUS HOSE COUPLING FLG TO JIS 5K OR EQUIVALENT
H1	100A	REDUCER	2	CONC. REDUCER BLACK
H2	65A	REDUCER	5	CONC. REDUCER BLACK
B1	300A	SEA WATER STRAINER	2	MILD STEEL GALV. FLG TO JIS 5K OR EQUIVALENT
B2	125A	SEA WATER STRAINER	1	MILD STEEL GALV. FLG TO JIS 5K OR EQUIVALENT
P5	40A	SEMI-ROTARY HAND PUMP	2	CAST IRON BODY
S1	65A	STRUM BOX	30	MILD STEEL GALV.
M1	65A	RT. ANGLE MUD BOX	2	MILD STEEL GALV. FLG TO JIS 5K OR EQUIVALENT
Y1	100A	'Y' STRAINER	2	CAST IRON S.S. SCREEN FLG TO JIS 5K OR EQUIVALENT

24.06.19	AMENDED AS PER CLASS'S COMMENTS. (LP01523733)	F	T.K.WONG
23.04.19	AMENDED AS PER BUILDER'S REQUEST.(PI-042218)	E	HONG
17.04.19	AMENDED AS PER CLASS'S COMMENTS. (LP01453848)	D	T.K.WONG
12.03.19	AMENDED AS PER BUILDER'S REQUEST.	C	T.K.WONG
08.03.19	AMENDED AS PER CLASS'S COMMENTS AND DETAIL UPDATED.	B	T.K.WONG
13.09.18	AMENDED AS PER BUILDER'S REQUEST. (PI-090518) AND UPDATE DRAWING.	A	HONG
DATE	MODIFICATION	REV.	

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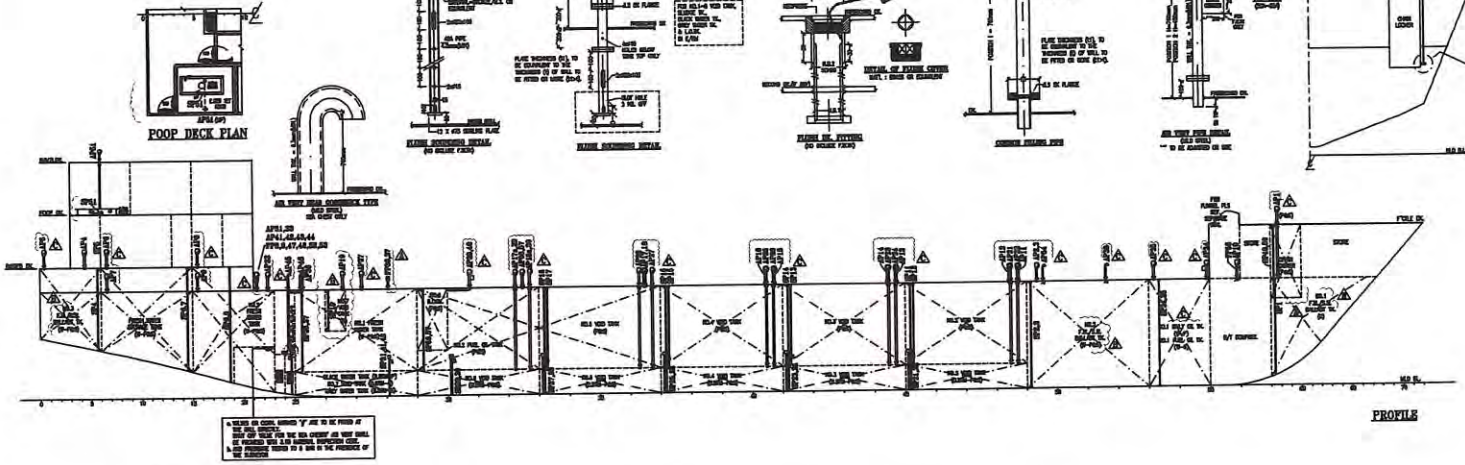
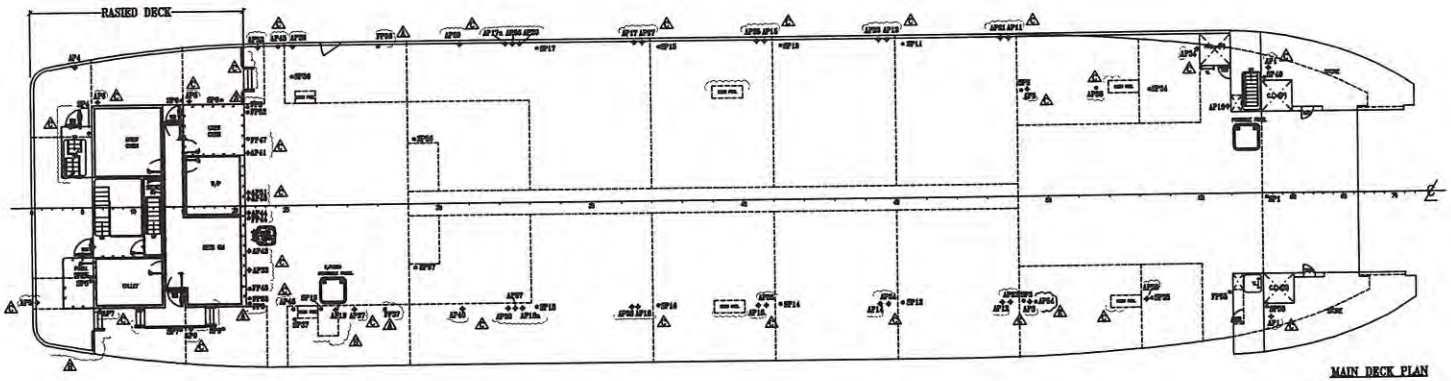
EMAIL : usdesign@usdesign.com.my
WEBSITE : www.usdesign.com.my

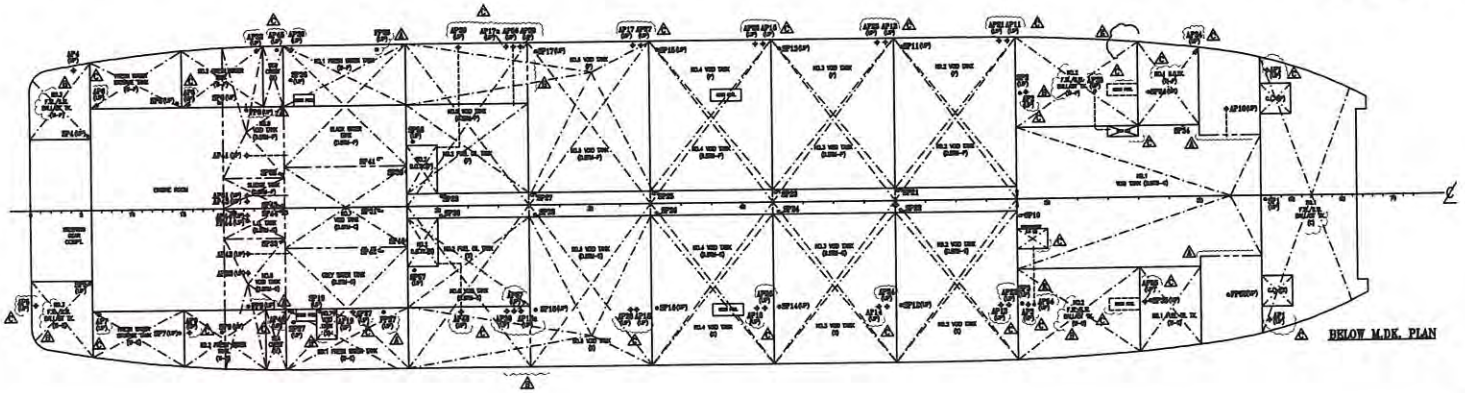
SHIP: 68M LANDING CRAFT

TITLE: SCHEMATIC BILGE, BALLAST AND FIRE-MAIN SYSTEM

OWNER					
BUILDER	BERJAYA DOCKYARD SDN BHD				
CLASS	BV		HULL NO.	BJ88	
DRAWN	CHECKED	APPROVED	SCALE	DRAWING NO.	REV.
HONG	T.K.WONG		1 : 100 (A1)	US/786-P2	F
29.08.18	29.08.18				







DESCRIPTION	VENT			SOUNDING			FILLING/SUCTION		
	ITEM	SIZE	THK(MM)	ITEM	SIZE	THK(MM)	ITEM	SIZE	THK(MM)
NO.1 F.W./S.W. BALLAST TK. (C)	AP1or2	100A	6.3MM	SP1	40A	●	△	80A	SCH 80
NO.2 F.W./S.W. BALLAST TK. (P-F)	AP3	100A	6.3MM	SP2	40A	●	△	80A	SCH 80
NO.2 F.W./S.W. BALLAST TK. (S-S)	AP5	100A	6.3MM	SP3	40A	●	△	80A	SCH 80
NO.3 F.W./S.W. BALLAST TK. (P-F)	AP4	100A	6.3MM	SP4	40A	●	△	80A	SCH 80
NO.3 F.W./S.W. BALLAST TK. (S-S)	AP5	100A	6.3MM	SP5	40A	●	△	80A	SCH 80
FRESH WATER STORAGE TK. (P-F)	AP8	80A	6.3MM	SP8	40A	●	-	65A	SCH 80
FRESH WATER STORAGE TK. (S-S)	AP7	80A	6.3MM	SP7	40A	●	-	65A	SCH 80
NO.2 FRESH WATER TANK (P-F) @	AP8	80A	6.3MM	SP8	40A	●	△	AP89	SCH 80
NO.2 FRESH WATER TANK (S-S) @	AP9	80A	6.3MM	SP9	40A	●	△	SP89	SCH 80
NO.1 VOID TANK (SJBW-C)	AP10	65A	6.3MM	SP10	40A	●	△	50A	SCH 80
NO.2 VOID TANK (P-F)	AP11	65A	6.3MM	SP11	40A	●	△	50A	SCH 80
NO.2 VOID TANK (S-S)	AP12	65A	6.3MM	SP12	40A	●	△	50A	SCH 80
NO.3 VOID TANK (P-F)	AP13	65A	6.3MM	SP13	40A	●	△	50A	SCH 80
NO.3 VOID TANK (S-S)	AP14	65A	6.3MM	SP14	40A	●	△	50A	SCH 80
NO.4 VOID TANK (P-F)	AP15	65A	6.3MM	SP15	40A	●	△	50A	SCH 40
NO.4 VOID TANK (S-S)	AP16	65A	6.3MM	SP16	40A	●	△	50A	SCH 40
NO.5 VOID TANK (P-F)	AP17	65A	6.3MM	SP17	40A	●	△	50A	SCH 40
NO.5 VOID TANK (S-S)	AP18	65A	6.3MM	SP18	40A	●	△	50A	SCH 40
NO.5 VOID TANK (P-F)	AP17a	65A	6.3MM	-	-	-	△	50A	SCH 40
NO.5 VOID TANK (S-S) ⚠	AP18a	65A	6.3MM	-	-	-	△	50A	SCH 40
NO.7 VOID TANK (S) ⚠	AP19	50A	6.3MM	SP19	40A	●	△	40A	SCH 40
NO.2 VOID TANK (SJBW-P)	AP91	65A	6.3MM	SP91	40A	●	△	50A	SCH 80
NO.2 VOID TANK (SJBW-S)	AP92	65A	6.3MM	SP92	40A	●	△	50A	SCH 80
NO.3 VOID TANK (SJBW-P)	AP93	65A	6.3MM	SP93	40A	●	△	50A	SCH 80
NO.3 VOID TANK (SJBW-S)	AP94	65A	6.3MM	SP94	40A	●	△	50A	SCH 80
NO.4 VOID TANK (SJBW-P)	AP95	65A	6.3MM	SP95	40A	●	△	50A	SCH 80
NO.4 VOID TANK (SJBW-S)	AP96	65A	6.3MM	SP96	40A	●	△	50A	SCH 80
NO.5 VOID TANK (SJBW-P)	AP97	65A	6.3MM	SP97	40A	●	△	50A	SCH 80
NO.5 VOID TANK (SJBW-S)	AP98	65A	6.3MM	SP98	40A	●	△	50A	SCH 80
NO.6 VOID TANK (SJBW-P)	AP99	65A	6.3MM	SP99	40A	●	△	50A	SCH 80
NO.6 VOID TANK (SJBW-S)	AP98	65A	6.3MM	SP98	40A	●	△	50A	SCH 80
NO.7 VOID TANK (SJBW-C)	AP81	65A	6.3MM	SP81	40A	●	△	50A	SCH 80
NO.8 VOID TANK (SJBW-P)	AP83	65A	6.3MM	SP83	40A	●	△	50A	SCH 80
NO.8 VOID TANK (SJBW-S)	AP85	65A	6.3MM	SP85	40A	●	△	50A	SCH 80
NO.1 DAILY OIL TANK (S-F) ⚠	AP84	65A	6.0MM	SP84	40A	●	△	50A	SCH 40
NO.1 DAILY OIL TANK (S-S) ⚠	-	-	-	SP84	SEE NOTE 'A'	-	-	-	-
NO.1 FUEL OIL TK. (P-S)	AP88	65A	6.0MM	SP88	40A	●	•	50A	SCH 40
NO.1 FRESH WATER TANK (S-F) @	AP89	80A	6.0MM	SP89	40A	●	•	AP89	SCH 80
NO.1 FRESH WATER TANK (S-S) @	AP77	65A	6.0MM	SP77	40A	●	•	AP97	SCH 80
FWD SEA CHEST	AP86	65A	6.0MM	-	-	-	-	-	-
NO.2 DAILY OIL TANK (P)	AP90	50A	6.3MM	SP89	SEE NOTE 'A'	•	40A	SCH 40	
NO.2 DAILY OIL TANK (S)	AP40	50A	6.0MM	SP40	SEE NOTE 'A'	•	40A	SCH 80	
BLACK WATER TANK (SJBW-P)	AP41	65A	6.0MM	SP41	40A	●	-	50A	SCH 80
GREY WATER TANK (SJBW-S)	AP42	65A	6.0MM	SP42	40A	●	-	50A	SCH 80
SLUDGE TANK (SJBW-P)	AP43	50A	6.0MM	SP43	40A	●	○	40A	SCH 80
LUB OIL TANK (SJBW-S)	AP44	50A	6.0MM	SP44	40A	●	EP46	40A	SCH 40
SEA CHEST (P)	AP45	65A	6.0MM	-	-	-	-	-	-
SEA CHEST (S)	AP46	65A	6.0MM	-	-	-	-	-	-
FUEL OIL FILLING (P)	-	-	-	-	-	-	EP47	65A	SCH 40
FUEL OIL FILLING (S)	-	-	-	-	-	-	EP48	65A	SCH 40
CHAIN LOCKER (P)	-	-	-	EP49	40A	●	-	-	-
CHAIN LOCKER (S)	-	-	-	EP50	40A	●	-	-	-
C/S.S O.D.TK. (INDEPENDENT)	AP51	50A	6.0MM	SP51	SEE NOTE 'A'	•	40A	SCH 40	
FRESH WATER FILLING (P)	-	-	-	-	-	-	EP52	65A	SCH 80
FRESH WATER FILLING (S)	-	-	-	-	-	-	EP53	65A	SCH 80
INDEPENDENT S.T. (S)	AP54	65A	6.0MM	-	-	-	-	-	-
FWD FUEL OIL FILLING (S)	-	-	-	-	-	-	EP55	65A	SCH 40
NO.2 FUEL OIL TK. (P)	AP56	65A	6.0MM	SP56	40A	●	•	50A	SCH 40
NO.2 FUEL OIL TK. (S)	AP57	65A	6.0MM	SP57	40A	●	•	50A	SCH 40

NOTES : 'A' DAILY OIL TANK SOUNDING PIPE TO BE FITTED WITH CLASS APPROVED TYPE FLAT SIGHT GLASS WITH SELF SEALING VALVE AT TOP & BOTTOM.
MARK '△' SEE SEPARATE DRAWING P2
MARK '•' SEE SEPARATE DRAWING P3
MARK '○' SEE SEPARATE DRAWING P4
MARK '●' SEE NOTE NO.10
MARK '@' SEE NOTE NO.5

GENERAL NOTES:-

1. THIS DRAWING IS ONLY A SCHEMATIC AND ACTUAL POSITION OF TANK VENTS, SOUNDING, FILLING AND VALVE TO BE CONFIRMED & ADJUSTED ON SITE WITH THE BEST ADVANTAGE & LAYOUT.
2. ALL VENT HEIGHTS ARE TO COMPLY WITH RULE AND REGULATION OF THE CLASSIFICATION SOCIETY.
3. ALL FUEL OIL VENT OPENINGS TO BE FITTED WIRE SCREEN OR CORROSION RESISTANT MATERIAL.
4. SOUNDING PIPES ARE TO BE AS STRAIGHT AS POSSIBLE.
5. ALL AIR PIPES, SOUNDING PIPES, FILLING PIPES LOCATED AT EXPOSED DECK ARE TO BE OF THICKNESS 6.3mm (MIN) AND FOR THOSE LOCATED BELOW DECK, PIPE THICKNESS OF 4.5mm (MIN) IS TO BE USED.
   HOWEVER, FOR SOUNDING PIPES LOCATED BELOW DECK, MATERIAL TYPE IS TO BE ADOPTED AS PER FOLLOWING CONDITION:
   A) M.S. BLACK PIPE FOR F.O., LUB OIL AND SLUDGE TANK.
   B) GALVANISED PIPE FOR OTHER TANKS AND COMPT.
6. DETAIL OF FUEL OIL FILLING SEE SEPARATE DRAWING.
7. THE TOTAL SECTIONAL AREA OF AIR PIPES OF EACH PIPE IS NOT TO BE LESS THAN 1.25 TIMES THE TOTAL SECTIONAL AREA OF FILLING PIPES.
8. DAILY OIL TANK IS TO BE PROVIDED WITH FLAT TYPE SIGHT GLASS WHICH ARE TO BE OF MK APPROVED ONES OR AS 7215 FLAT GLASS OIL LEVEL GAUGES OR EQUIVALENT.
9. THE SHORT SOUNDING PIPE FOR THE NO.1-6 VOID TANK/BLACK WATER TK./GREY WATER TK./ SLUDGE TANK/ LUB OIL TANK MUST ALSO BE FITTED WITH A SMALL TEST COCK BELOW THE SELF-CLOSING COCK.
10. AIR PIPES / AIR PIPE HEADS OF DRINKING WATER TANKS ARE TO BE PROTECTED AGAINST ENTRY OF INSECTS BY A FINE MESH SCREEN.
11. ALL VENT HEADS SHALL BE CLASS APPROVED TYPE.
12. DRP-TANKS WITH APPROPRIATE DISCHARGE DEVICES ARE TO TO BE FITTED AROUND ALL THE ACCESSORIES SUBJECT TO OIL FUEL OIL LEAKAGE.
13. ALL OPENINGS OF AIR PIPES LEADING ABOVE THE WEATHER DECK ARE TO BE PROVIDED WITH AUTOMATIC CLOSING DEVICE EXCEPT SEA CHEST AIR PIPES.

LEGEND

	AIR VENT HEAD
	SOUNDING CAP
	SOUNDING CAP C/W KEEP CHAIN
	FILLER CAP C/W KEEP CHAIN
	SOUNDING CAP C/W SELF CLOSING COCK
	AIR VENT HEAD (GOOSENECK TYPE)

REV	DATE	MODIFICATION	BY
	13.09.18	AND UPDATE DRAWING.	A HONG
	02.05.19	AMENDED AS PER BUILDER'S REQUEST. (PI-49851R) & UPDATE DRAWING.	B HONG
	24.06.19	AMENDED AS PER BUILDER'S REQUEST. (PI-04241R) & UPDATE DRAWING.	C HONG
	12.07.19	AMENDED AS PER BUILDER'S REQUEST. (PI-07121R)	D HONG
	26.07.19	DETAIL UPDATED AND REF CLASS'S COMMENTS. (LP01546756)	E T.W.HONG

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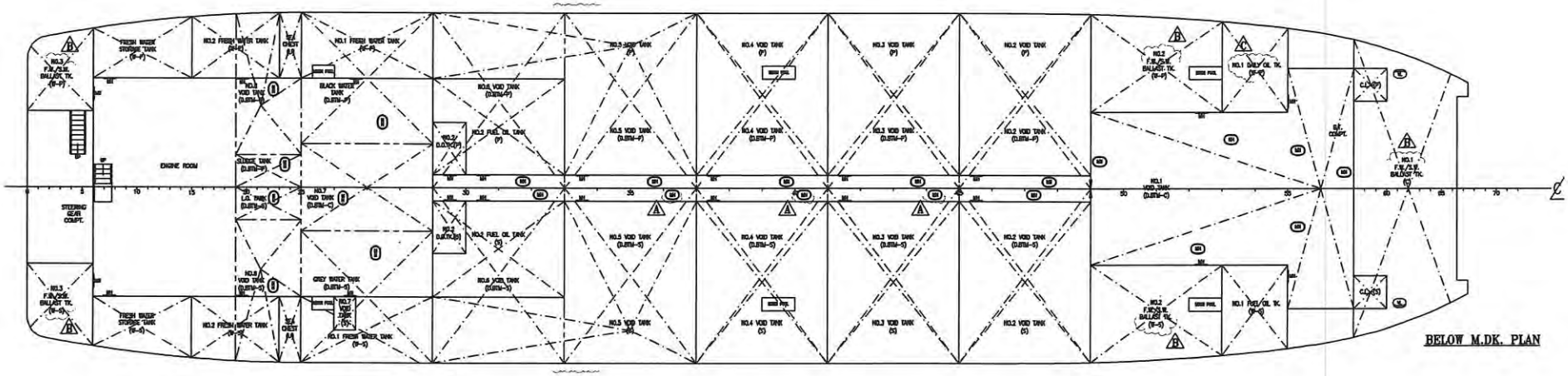
EMAIL : usdesign@usdesign.com.my
WEBSITE : www.usdesign.com.my

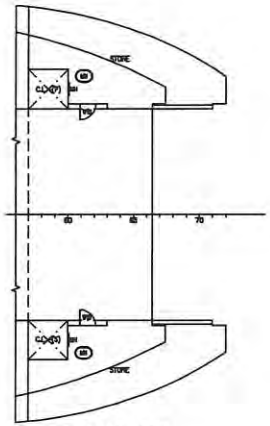
SHIP
68M LANDING CRAFT

TITLE
SCHEMATIC TANK VENT, SOUNDING & FILLING SYSTEM

OWNER					
BUILDER	BERJAYA DOCKYARD SDN BHD				
CLASS	BV		HULL NO.	BJ98	
DRAWN	CHECKED	APPROVED	SCALE	DRAWING NO.	REV.
HONG	T.W.HONG		1 : 125 (A1)	US/768-P1	E
29.08.18	29.08.18				



POSITIONS	CUT OPENING	M.H. TYPE	QTY.
NO.1 F.W./S.W. BALLAST TK. (C)	600 x 400	NON-FLUSH	2
NO.2 F.W./S.W. BALLAST TK. (W-P&S)	600 x 400	NON-FLUSH	2
NO.3 F.W./S.W. BALLAST TK. (W-P&S)	600 x 400	NON-FLUSH	2
F.W. STORAGE TK. (W-P&S)	600 x 400	NON-FLUSH	2
NO.1 FRESH WATER TANK (W-P&S)	600 x 400	NON-FLUSH	2
NO.2 FRESH WATER TANK (W-P&S)	600 x 400	NON-FLUSH	2
NO.1 VOID TANK (D.BTM-C)	600 x 400	NON-FLUSH	6
NO.2 VOID TANK (W-P&S)	600 x 400	NON-FLUSH	2
NO.3 VOID TANK (W-P&S)	600 x 400	NON-FLUSH	2
NO.4 VOID TANK (W-P&S)	600 x 400	NON-FLUSH	2
NO.5 VOID TANK (W-P&S)	600 x 400	NON-FLUSH	2
NO.7 VOID TANK (S)	600 x 400	NON-FLUSH	1
NO.2 VOID TANK (D.BTM-P&S)	600 x 400	NON-FLUSH	2
NO.3 VOID TANK (D.BTM-P&S)	600 x 400	NON-FLUSH	2
NO.4 VOID TANK (D.BTM-P&S)	600 x 400	NON-FLUSH	2
NO.5 VOID TANK (D.BTM-P&S)	600 x 400	NON-FLUSH	2
NO.6 VOID TANK (D.BTM-P&S)	600 x 400	NON-FLUSH	2
NO.7 VOID TANK (D.BTM-C)	600 x 400	NON-FLUSH	1
NO.8 VOID TANK (D.BTM-P&S)	600 x 400	NON-FLUSH	2
NO.1 DAILY OIL TK. (W-P)	600 x 400	NON-FLUSH	1
NO.1 FUEL OIL TK. (W-S)	600 x 400	NON-FLUSH	1
NO.2 FUEL OIL TK. (P&S)	600 x 400	NON-FLUSH	2
NO.2 DAILY OIL TANK (P&S)	600 x 400	NON-FLUSH	2
BLACK WATER TANK (D.BTM-P)	600 x 400	NON-FLUSH	1
GREY WATER TANK (D.BTM-S)	600 x 400	NON-FLUSH	1
SLUDGE TANK (D.BTM-P)	600 x 400	NON-FLUSH	1
LUB OIL TANK (D.BTM-S)	600 x 400	NON-FLUSH	1
CHAIN LOCKER-(P&S)	600 x 400	NON-FLUSH	2
		TOTAL	52



MAIN DECK PLAN

NOTES:-

1. REFER SEPARATE DRAWING FOR:
   -MANHOLE TYPE AND DETAILS.
   -EXACT LOCATION OF MANHOLES
2. THE DIMENSIONS IN PARENTHESES MAY BE MODIFIED ACCORDING TO THE PLACE WHERE TO INSTALL.
3. BOW THRUSTER D.O.TK. (PORTABLE) IS NOT INCLUDED.

DATE	MODIFICATION	REV	BY
10.05.19	UPDATE DRAWING.	C	HONG
02.05.19	UPDATE DRAWING.	B	HONG
10.10.18	AMENDED AS PER BUILDER'S REQUEST. (PI-100418)	A	HONG

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SHIP: 68M LANDING CRAFT

TITLE: MANHOLE ARRANGEMENT

OWNER					
BUILDER	BERJAYA DOCKYARD SDN BHD				
CLASS	BV		HULL NO.	BJ98	
DRAWN	CHECKED	APPROVED	SCALE	DRAWING NO.	REV.
HONG	T.K.WONG		1 : 200 (A3)	US/786-F11	C
30.08.18	01.10.18				

APPENDIX 2

BALLAST WATER REPORTING FORM

Guidelines for completing the ballast water reporting form

This form is an example developed in IMO, to serve as a guide for use when reporting to a national authority that requests information in advance. To avoid misunderstandings, some guidance for completing it follows on the page opposite. It should be noted that question 3, 'Total number of tanks on board' refers only the total number of segregated ballast tanks.

Care should be taken using this general form, that the country being approached does not have its own form for use when reporting.

BALLAST WATER REPORTING FORM

(To be provided to Port State Authority upon request)

1 SHIP INFORMATION

Ship's Name:	Type:	IMO Number :
Owner :	Gross Tonnage:	Call Sign :
Flag:	Arrival Date :	Agent :
Last Port and Country :		Arrival Port :
Next Port and Country :		

2 BALLAST WATER

Specify Units: M ^{3}, MT, LT, ST
Total Ballast Water onboard :
Total Ballast Water Capacity :

3 BALLAST WATER TANKS Ballast Water Management Plan on board? YES☐ NO☐ Management Plan Implemented? YES☐ NO☐

Total number of ballast tanks on board: _____ No. of tanks in ballast:_____ IF NON IN BALLAST GO TO NO. 5

No. of tanks exchanged: _____No. of tanks not exchanged:_____

4. BALLAST WATER HISTORY: RECORD ALL TANKS THAT WILL BE DEBALLASTED IN PORT STATE OF ARRIVAL; IF NONE GO TO NO. 5

Tanks/ Holds List multiple sources per tank separately	BALLAST WATER SOURCE				BALLAST WATER EXCHANGE Circle on Empty/Refill or Flow Through					BALLAST WATER DISCHARGE			
	DATE DDMMYY	Port or Lat/ Long	Volume (Units)	Temperature (Units)	DATE DDMMYY	Endpoint Lat/Long	Volume (Units)	% Exchange	Sea Height (m)	DATE DDMMYY	Port or Lat/ Long	Volume (Units)	Salinity (Units)

Ballast Water Tank Codes: Forepeak =FP; Aft peak=AP; Double Bottom=DB; Wing=WT; Center Tank=CT; Topside=TS; Cargo Hold=CH; Other= O

IF EXCHANGES WERE NOT CONDUCTED, STATE OTHER CONTROL ACTION(S) TAKEN:_____

IF NONE, STATE REASON WHY NOT:_____

5. IMO Ballast Water Guideline onboard? Yes/No

RESPONSIBLE OFFICER'S NAME, TITLE (PRINTED) AND SINGATURE:_____

GUIDANCE FOR COMPLETING THE BALLAST WATER REPORTING FORM

SECTION 1: SHIP INFORMATION

SHIP NAME: print the name of the ship.
Owner: The registered owner(s) or operator(s) of the ship.
Flag: Country under which the ship normally operates. Write the full name. Do not use abbreviations.
Last Port and Country: Last port and country at which the ship called before arrival in the current port. Write the country and port names in full. Do not use abbreviations.
Next Port and Country: Next port and country at which the ship will call, upon departure from the current port. Write the country and port names in full. Do not use abbreviations.
Type: List specific ship type, write out or use the following abbreviations: Bulk (bc); ro-ro (rr); container (cs); tanker (ts); passenger (pa); oil/bulk ore (ob); general cargo (gc). Write in any additional ship types.
GT: Gross tonnage.
Arrival Date: Arrival date to current port. Use the European date format (DDMMYY).
IMO Number: Identification number of the ship used by the International Maritime Organization.
Call Sign: Official call sign.
Agent: Agent used for this voyage
Arrival Port: This is the current port. Write the name in full. Do not use an abbreviations.

SECTION 2: BALLAST WATER

(Note: Segregated ballast water = clean, non-oily ballast)
Total ballast water onboard: Total segregated ballast water upon arrival to current port, with units.
Total ballast water capacity: Total volume of all ballast tanks or holds. with units.

SECTION 3: BALLAST WATER TANKS

Count all tanks and holds separately (e.g. port and starboard tanks should be counted separately).
Total No. of Tanks onboard; Count all tanks and holds that can carry segregated ballast water.
Ballast water management plan: Do you have a ballast water management plan specific to your ship onboard? Check YES or NO.
Use of Management plan: Do you follow the above management plan? Check Yes or No.
No. of tanks in ballast: Number of segregated ballast water tanks and holds with ballast at the onset of the voyage to the current port. If you have no ballast water onboard, go to Section 5.
No. of tanks exchanged: This refers only to tanks and holds with ballast at the onset of the voyage to the current port.
No. of tanks not exchanged: This refers only to tanks and holds with ballast at the onset of the voyage to the current port.

SECTION 4: BALLAST WATER HISTORY

BW Source: Please list all tanks and holds that you have discharged or plan to discharge in this port (carefully write out, or use codes listed below the table). Follow each tank across the page listing all source(s), exchange events, and/or discharge events separately. If the ballast water history is identical (i.e., the same source, exchange and discharge dates and locations), like tanks can be combined (example: wing tank 1 with wing tank 2 both water from Belgium, exchanged 02.11.97, mid ocean- can be combined. See first line of the table in the sample form). Use an additional page if necessary. Include ship name, date and IMO number at the top of each page.
Date/Time: Date and time of ballast water uptake. Use European format (DDMMYY) and (HHMMSS).
Port of Latitude/ Longitude; Location of ballast water uptake. If carried out in port, write the port name in full.
Volume: Volume of ballast water uptake, with units.
Temperature: Water temperature at time of ballast water uptake, in degrees centigrade (Celsius)
BW Exchange: Indicate exchange method: Circle empty / refill or flow through.
Date/Time: Date and time of ballast water exchange. Use European format (DDMMYY) and (HHMMSS).
Endpoint or Latitude/ Longitude: Location of ballast water extended exchange. If it occurred over an extended distance, list the end point latitude and longitude.
Volume: Volume of ballast water exchanged, with units.
Percentage exchanged: Percentage of ballast water exchanged. Calculate this by dividing the number of units of water exchanged by the original volume of ballast water in the tank. If necessary, estimate based on pump rate. (Note: For effective flow-through exchange this value should be at least 300%)
Sea Height (m): Document the sea height in meters at the time of the ballast exchange. (Note: This is the combined height of the wind seas and swell, measured from crest to trough).
BW Discharge:
Date/Time: Date and Time of ballast water discharge. Use European format (DDMMYY) and (HHMMSS).
Port or Latitude/ Longitude: Location of ballast water discharge, If discharged in a port, write the name of the port in full.
Volume: Volume of ballast water discharged, with units.
Salinity: Document salinity of ballast water at the time of discharge, with units (i.e. specific gravity (sg) or parts per thousand (ppt).
If exchanges were not conducted, state other control action(s) taken: If exchanges were not made on all tanks and holds to be discharged, what other actions were taken? E.g. transfer of water to a land-based holding facility or other approved treatment.
If none, state reasons why not: List specific reasons why ballast exchange was not done. This applies to all tanks and holds being discharged.

SECTION 5: IMO Ballast Water

IMO Ballast Water Convention and IMO Guidelines Onboard: is a copy of the IMO convention and IMO guidelines onboard? Circle YES or NO

Responsible Officer's name and title (printed) and signature: e.g. Master, Chief Officer or Chief Engineer must PRINT their name and title and sign the form.

APPENDIX 3

List of Reference Documents:

The International Convention for the Control and Management of Ships Ballast Water and Sediments 2004

Resolution MEPC.127 (53) - Guidelines for Ballast Water Management and Development of Ballast Water Management Plans.

Resolution MEPC.124 (53) - Guidelines for Ballast Water Exchange.

IMO Assembly Resolution A.868 (20) Guidelines for the Control and management of ship's ballast water to Minimize the transfer of harmful aquatic organisms and

APPENDIX 4

BLANK FORMS

1. **RECORD OF CIRCULATION**
2. **RECORD OF AMENDMENT**
3. **TRAINING RECORD FOR BALLAST WATER MANAGEMENT MANUAL**
4. **BALLAST WATER REPORTING FORM**
5. **BALLAST WATER HANDLING LOG***
   - **(a) Record of ballast water management on board**
   - **(b) Narrative record of events related to ballast water management on board**

Note *:

Ballast Water Handling Logs herein attached are sample of effective forms as Ballast Water Record Book.

Practical form of Ballast Water Record Book onboard to be exhibited in this appendix.

1. RECORD OF CIRCULATION (SAMPLE)

This document to be circulated to ships stuff that will be responsible for Ballast Water Management, by the holder of the copy.
After reading, the Ballast Water Management Plan it is to be signed and returned to the Ballast Water Management Officer.

Name	Rank	Date Joined	Signature and Date

2. RECORD OF AMENDMENT (SAMPLE)

When any change/ amendment is made to chapter, a new "Table of Contents" page shall also be sent together with the relevant amended chapter.

The holder of the controlled copy shall enter all amendments made to this document and register such changes in those pages.

No	Date	Revised Part	Revision detail/ description	Signature	Master of Signature

3. TRAINING RECORD FOR BALLAST WATER MANAGEMENT MANUAL (SAMPLE)

Date	Name	Rank	Signature	Remarks	Verified by

4. BALLAST WATER REPORTING FORM

(To be provided to Port State Authority upon request)

1 SHIP INFORMATION

Ship's Name:	Type:	IMO Number :
Owner :	Gross Tonnage:	Call Sign :
Flag:	Arrival Date :	Agent :
Last Port and Country :		Arrival Port :
Next Port and Country :		

2 BALLAST WATER

Specify Units: M ³, MT, LT, ST
Total Ballast Water onboard :
Total Ballast Water Capacity :

3 BALLAST WATER TANKS Ballast Water Management Plan on board? YES ☐ NO ☐ Management Plan Implemented? YES ☐ NO ☐

Total number of ballast tanks on board: _____ No. of tanks in ballast: _____ IF NON IN BALLAST GO TO NO. 5

No. of tanks exchanged: _____ No. of tanks not exchanged: _____

4. BALLAST WATER HISTORY: RECORD ALL TANKS THAT WILL BE DEBALLASTED IN PORT STATE OF ARRIVAL; IF NONE GO TO NO. 5

Tanks/ Holds List multiple sources per tank separately	BALLAST WATER SOURCE				BALLAST WATER EXCHANGE Circle on Empty/Refill or Flow Through					BALLAST WATER DISCHARGE			
	DATE DDMMYY	Port or Lat/ Long	Volume (Units)	Temperature (Units)	DATE DDMMYY	Endpoint Lat/Long	Volume (Units)	% Exchange	Sea Height (m)	DATE DDMMYY	Port or Lat/ Long	Volume (Units)	Salinity (Units)

Ballast Water Tank Codes: Forepeak =FP; Aft peak=AP; Double Bottom=DB; Wing=WT; Center Tank=CT; Topside=TS; Cargo Hold=CH; Other= O

IF EXCHANGES WERE NOT CONDUCTED, STATE OTHER CONTROL ACTION(S) TAKEN: _____

IF NONE, STATE REASON WHY NOT: _____

5. IMO Ballast Water Guideline onboard? Yes/No

RESPONSIBLE OFFICER'S NAME, TITLE (PRINTED) AND SINGATURE: _____

(b) Narrative record of events related to ballast water management on board

Ship _____ Port Of Registry _____ IMO Number _____

Record here events which are relevant to ballast management, and which will be of interest to quarantine officers, such as sediment removal during drydock, or tank flushing at sea. Each entry should be completed with the signature and rank of the officer making the entry.

Date	Activity	Comments

5. BALLAST WATER HANDLING LOG (SAMPLE)

(a) Record of ballast water management on board

Ship _____ Port Of Registry _____ IMO Number _____

TANK LOCATION	DATE	INITIAL CONTENT (tonnes)	FINAL CONTENT (tonnes)	GEOGRAPHIC LOCATION OF SHIP (Port of Lat. & Long.)	PUMPS USED, or GRAVITATE	DURATION OF OPERATION	SALINITY	SIGNATURE OF OFFICER IN CHARGE	RANK

APPENDIX 5

Existing National or Local Quarantine Requirements For Ballast Water Management

5.1 Useful internet links

5.2 National and local quarantine requirements for ballast water management

1. USEFULL INTERNET LINKS

A list of internet connections to be collected and inserted here.

IMO
http://globallast.imo.org/
http://www.cqdjournal.com/Hot_Events/ballast-imo/ballast-tech/ballast-tech.htm

Australia
http://www.affa.gov.au/docs/quarantine/shipping/ballastwater.html
http://search1.affa.gov.au/compass?scope=ballast+water&ui=sr&chunk-size=&page=view-template=search
http://www.affa.gov.au/corporate_docs/publications/cover_page/quarantine/border/kit.html

Canada
http://www.shipfed.ca/Library/Ballast Water/BallastWaterCanadianGuidelines.html
http://www.shipfed.ca/Library/BallastWater/BallastWaterBestPractices.html

US ANS Law
http://anstaskforce.gov/toc.htm

US-California
http://www.slc.ca.gov/Program_Information/MFDBallast_Water/default.htm

US- Washington
http://www.cdlaw.com/2000/CHAP_108.htm

US-Maryland
http://mlis.state.md.us/2000rs/billfile/hb1305.htm

SOCP Ballast Water management Information Center
http://www.socp.org/ballast/bwm.htm

Lloyd's Register Of Shipping
http://www.irg.org/services/index.html

Marinetalk
http://www.marinetalk.com/frame2.asp?pagename=infodesk&category=TU

Intertanko
http://www.intertanko.com/tankerfacts/environmental/ballast/ballastreq.htm

Maritime Solutions Inc.
http://www.maritimesolutionsinc.com/

Optimarin AS
http://www.ballastwater.com/prodcuts.htm

2. NATIONAL AND LOCAL QUARANTINE REQUIREMENTS FOR BALLAST WATER MANAGEMENT

STATUS OF EXISTING NATIONAL OR LOCAL QUARANTINE REQUIREMENTS FOR BALLAST WATER MANAGEMENT

September 2001

COUNTRY	STATUS
Argentina- Buenos Aires	Mandatory application. Quarantine health authorities require ships arriving from WHO listed cholera areas to treat their ballast water with chlorine before discharge.
Australia	Mandatory application, including reporting, from 1 July 2001
Canada	Voluntary application, although the Guidelines are treated as Mandatory by Transport Canada.
Canada- Vancouver	Mandatory application affecting all ships arriving at port excluding those arriving from west Coast of USA, Canada and Alaska
Chile	Mandatory application
Israel	Mandatory application for all ships destined for Israeil ports wishing to exchange ballast in port or along the coast.
New Zealand	Mandatory application
Qatar-Ras Laffan	Mandatory reporting, ships are not allowed to discharge ballast in port apart from segregated ballast. Ballast to be discharged in this port will be subject to chemical analysis.
UK- Orkney Islands	Mandatory application. Ships wishing to discharge ballast at the Flotta Terminal can do so only to a shore-based reception facility.
USA	Voluntary application, but mandatory reporting affecting ships carrying ballast and arriving from outside the US exclusive economic zone.
USA-California Great Lakes and Hudson River north of George Washington Bridge, Port of Oakland, Washington	Mandatory Application, including reporting.

Appendix 2: Anti-Foul Description and Application

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Appendix 2: Anti-Foul Description and Application Plan

To comply with Auckland Council and Northern Regional Council and Ministry for Primary Industries regulations, the *William Fraser* has scheduled hull inspections, dry dock cleans, maintenance, and anti-fouling paint. The details of these are given on the following pages and the specifications of the current paint system used on the William Fraser are in Appendix 3.

Description of Areas on the Ship Susceptible to Biofouling

Identify the niche areas relevant for the ship in question in the table below (Tick as appropriate).

GENERAL HULL AND APPENDAGES	NICHE AREAS
■ VERTICAL SIDES	■ SEA CHESTS
■ FLAT BOTTOM	■ INLET GRATINGS
■ BOOT TOP	■ SEA INLET PIPES
■ KEELS	■ BOW THRUSTER
■ RUDDER	■ PROPELLOR AND SHAFT
■ DOCK BLOCK POSITIONS	■ ROPE GUARDS
■ STERN TUBE	■ BOX COOLER
■ CATHODIC PROTECTION ANODES	■ MOON POOLS
■ DRAFT AND HULL MARKINGS	☐ OTHER

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Description of the Anti – Fouling Systems

	Area / Location applied and date of application	Dry Film Thickness	Expected Life Span	Manufacturer	If requirements for Cleaning – Method should be specified	Anti-foul certificate	Year Completed
Products(s) / systems applied[1] *[Enter details of the coating applied for each section of the ship – hull and niche area. For sea chests, indicate function and if MGPS dosed, or containing box coolers]*	All undersides of vessel except those specified above	40	60 Month	International Paints Intershield 300 using Intergard 263 as a tar free tie coat to the subsequent antifouling scheme. Interswift 6800HS Tin Free antifouling scheme (see Appendix 2)	Scrape and freshwater blast	Yes	2019
products(s) / systems applied[2] *[Enter details of the coating applied for each section of the ship – hull and niche area. For sea chests,*	All undersides of vessel except those specified above	40	60 Month	Altex **TBT-free (Tri-Butyl Tin-free) Antifouling Sea~Barrier® 3000, Deep Red**	Scrape and freshwater blast	Yes	2024

indicate function and if MGPS dosed, or containing box coolers]							

Detail any immersed areas where AFS are not applied or installed	Propellor, shaft. Docking block areas
Marine Growth Prevention Systems[3](MGPSs) *Dosing frequency*	60 month lifespan system
List seawater systems without fitted MGPSs, and presence and location of box	Nil
Operating profile required for each AFS to be effective	For use at Newbuilding or Maintenance & Repair.
Other specifications relevant for AFS performance, if any	N/A
Previous reports on AFS performance (If Available)	N/A

[1] This section can be completed using the AFS 'specification' or warranty document provided by your AFS supplier.
[1] This section should be completed in collaboration with your MGPS provider
[3] Product data sheets should be attached as an appendix

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Biofouling Management Action Plan to Minimise the Transfer of Invasive Aquatic Species

Ship area *(To be completed for areas particularly susceptible to biofouling – see previous)*	Planned management action and frequency *(e.g., inspections, cleaning, repairs, and maintenance)*	Management action if ship operates outside its usual operating profile
Hull		Should vessel be required to operate outside regular operating area and a clean hull certificate is required, divers will be engaged to clean the hull, intakes and any other areas which require attention, a report will be provided as evidence to the authority issuing the clean hull certificate
Vertical	**Due for dry dock August / Sept 2027**	
Flat-bottom	**Due for dry dock August / Sept 2027**	
Docking block positions	**Due for dry dock August / Sept 2027**	
Boot-top	**Due for dry dock August / Sept 2027**	
Hull appendages and fittings:		
keels	**Due for dry dock August / Sept 2027**	
A-brackets	**Due for dry dock August / Sept 2027**	
CP anodes	**Due for dry dock August / Sept 2027**	
Steering, propulsion, and positioning:		
Propellers	**Due for dry dock August / Sept 2029**	
Stern tube seal	**Due for dry dock August / Sept 2029**	
Rope guards	**Due for dry dock August / Sept 2029**	
Anchor and chain	**Due for dry dock August / Sept 2027**	
Chain locker	**Due for dry dock August / Sept 2027**	

Rudder	**Due for dry dock August / Sept 2027**

Ship area *(To be completed for areas particularly susceptible to biofouling – see previous)*	**Planned management action and frequency** *(e.g., inspections, cleaning, repairs, and maintenance)*	**Management action if ship operates outside its usual operating profile**
Steering, propulsion and positioning (continued):		
Rudder recesses (pintle recesses, lifting tubes etc.)	**Due for dry dock August / Sept 2027**	
Thruster propeller(s)	**Due for dry dock August / Sept 2027**	
Thruster body(s)	**Due for dry dock August / Sept 2027**	
Thruster rope guards / shaft seals	**Due for dry dock August / Sept 2027**	
Tunnel(s)	**Due for dry dock August / Sept 2027**	
Tunnel grates	**Due for dry dock August / Sept 2027**	
Intake and internal seawater systems		
Engine cooling system	**Due for dry dock August / Sept 2027**	
Sea chests	**Due for dry dock August / Sept 2027**	
Emergency fire-fighting system	**Due for dry dock August / Sept 2027**	
Auxiliary services system	**Due for dry dock August / Sept 2027**	
Potable water generation	**Due for dry dock August / Sept 2027**	

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Ballast water uptake	**Due for dry dock August / Sept 2027**
Ancillary systems	**Due for dry dock August / Sept 2027**
Other systems (itemize each)	**Due for dry dock August / Sept 2027**

Operation and maintenance of the anti-fouling systems

Timing of operational and maintenance activities

Schedule of planned inspections, repairs, maintenance, and renewal of AFS

Due for dry dock Sept 2027

Timing of operational and maintenance activities

Schedule of planned inspections, repairs, maintenance and renewal of AFS

Cleaning to be completed by an authorised organisation (NZDS) as required if vessel transits into an area where a clean hull certificate is required

In-water cleaning and maintenance procedures

Schedule of planned maintenance procedures to be completed between dry-docking events

Treatment / cleaning conducted and detailed operational procedures, chemicals, discharge standards applied to specific areas

In September 2024 The hull was cleaned and re-painted on a dry dock.

Hull was cleaned in December 2022 as part of the 2.5 Periodic survey, BV Class surveyor allowed this to occur as this was the first intermediate survey conducted since the vessel was launched.

The hull was cleaned again in June 2024 as the vessel was scheduled to travel to Chatham Islands where a clean hull certificate is required.

Safety procedures for the ship and crew

Safety procedures to be followed during ship inspections

Details of specific operational or safety restrictions, including those associated with the management system that affects the ship and / or the crew

If Divers are engaged, The company Diver in water Safety procedures are triggered. This involves both PCBUs signing documents acknowledging the propulsion systems and any other systems which may present a risk is locked out and tagged.
On dry dock the shipyard are responsible for the safety of the vessel and the workforce carrying out the required maintenance.

Disposal of biological waste

Procedures for the disposal of biological waste generated by treatment / cleaning processes

When the cleaning is conducted by, or under the direct supervision of, the ship owner, master or crew

N/A

Biofouling record book

Recording requirements

Documentation to be kept verifying operations / treatments

Record book is completed at each hull inspection and clean

Crew training and familiarisation

Safety procedures to be followed during shipinspections

Details of specific operational or safety restrictions, including those associated with the management system that affects the ship and/or the crew

Crew complete a sign off which includes contractor management, in this case the Diver in water specific requirements.

PLAN UPDATES.

DATE	UPDATE	UPDATED BY	COMMENTS
August 2023			Document Implementation
October 2024	Update Following vessel slipping	Andrew Lees	

Appendix 3: Anti-Foul Paint Specifications

Where legislation does not explicitly restrict or limit the use of lead containing coatings it is the responsibility of the client to inform International Paint in writing of their specific requirements

Technical Specification

68M LANDING CRAFT (SAND DREDGE)

BERJAYA DOCKYARD SDN BHD

Other Ports, Malaysia

20-Jun-2018

MYSS1-39CX-X7MB/1

Sing Kieu, Su
[redacted]
Lu Yun Court
1st Floor, Lot 2394,
Piasau Business Park,
98000, Miri, Sarawak, Malaysia.
Telephone : +6085 655650
Fax : +6085 655696

IMPORTANT
a.) All repair percentages and or loss factors are estimations only, and should these differ to actual, respectively - the end volume consumption will reflect this. Ensure that accurate measurements are obtained prior to order placement to provide accuracy.
b.) Ensure that the Coating Specification is fully read, realized & observed throughout the project, inclusive of 'Application and Scheme Notes', which have been included to assist with clarification of surface preparation and coating procedures, and or any likely deviations.
c.) Prices supplied are in the strictest of 'commercial confidence' and are exclusive of G.S.T/ Taxes; and should be included wherever needed.
d.) Refer to International Paint Representative for clarification, should any ambiguity exist.

Main Schemes		
Area	Description	Area (m^2)
Underwater Anticorrosives	An Intershield 300 abrasion resistant epoxy underwater scheme, using Intergard 263 as a tar free tie coat to the subsequent antifouling scheme. An Interswift 6800HS tin free antifouling scheme with a 60 month in-service period.	1,600
Topsides	An Intershield 300 abrasion resistant epoxy scheme directly overcoated with an polyurethane finish, Interthane 990.	700
External Superstructure, Wheelhouse, Funnel, Mast	An Intershield 300 abrasion resistant epoxy scheme overcoated with a polyurethane finish, Interthane 990, using a tie coat of Intergard 269	700
External Sand Bin & Floor	An Intershield 300 abrasion resistant epoxy scheme.	650
Internal Bulwarks, Foc'sle Exterior	An Intershield 300 abrasion resistant epoxy scheme overcoated with a polyurethane finish, Interthane 990, using a tie coat of Intergard 269	300
Interior Surfaces - Accommodation, Engine Room, Steering Gear Compartment and B/T Room	An Intershield 300 abrasion resistant epoxy scheme overcoated with a polyurethane finish, Interthane 990, using a tie coat of Intergard 269	1,200
Winches, Bollards and Other Deck Fittings	An Intershield 300 abrasion resistant epoxy scheme overcoated with a polyurethane finish, Interthane 990, using a tie coat of Intergard 269	300
Staircases, Internal & External, Handrails	An Intershield 300 abrasion resistant epoxy scheme overcoated with a polyurethane finish, Interthane 990, using a tie coat of Intergard 269	350
Ballast & Freshwater/ Potable Water Tanks, Fuel & Day Fuel Tanks Internals	An Intershield 300 epoxy anticorrosive scheme for long term protection.	5,000
Grey & Black/ Sewage Water Tanks, Hydraulic/ Lube Oil & Oily Sludge Tanks	A two pack, FDA compliant epoxy cargo tank coating offering extensive cargo resistance.	800
External Passenger Decks	An Intershield 300 abrasion resistant epoxy scheme.	500
Bilges/Void Tanks, Chain Lockers	An Intershield 300 epoxy anticorrosive scheme for long term protection.	2,000
Thinners		

Underwater Anticorrosives [1,600 m²]

An Intershield 300 abrasion resistant epoxy underwater scheme, using Intergard 263 as a tar free tie coat to the subsequent antifouling scheme.

An Interswift 6800HS tin free antifouling scheme with a 60 month in-service period.

Surface Preparations
Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.
Blast to Sa2 ISO 8501-1 or SSPC SP6.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m²)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intergard 269	EGA088/EGA089	47	Red	FC	30	40	85	0.09	20mins	6hrs	ext.	GTA220	194.4
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	125	208	0.21	2hrs	4hrs	14days	GTA220	476.2
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	125	208	0.21	2hrs	4hrs	14days	GTA220	476.2
Intergard 263	FAJ034/FAA262	57	Light Grey	FC	30	75	132	0.13	4hrs	5hrs	7days	GTA220	300.8
Interswift 6800HS	BMA688	62	Brown	FC	30	130	210	0.21	1.5hrs	4hrs	ext.	GTA007	479.0
Interswift 6800HS	BMA684	62	Red	FC	30	130	210	0.21	1.5hrs	4hrs	ext.	GTA007	479.0
						625	1,053						2,405.6

Intergard 269, EGA088/A is proposed as holding primer. (Optional)

Topsides [700 m^2]

An Intershield 300 abrasion resistant epoxy scheme directly overcoated with an polyurethane finish, Interthane 990.

Surface Preparations

Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.
Blast to Sa2 ISO 8501-1 or SSPC SP6.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m^2)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intergard 269	EGA088/EGA089	47	Red	FC	30	40	85	0.09	20mins	6hrs	ext.	GTA220	85.1
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	150	250	0.25	2hrs	4hrs	3mths	GTA220	250.0
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	150	250	0.25	2hrs	4hrs	2days	GTA220	250.0
Interthane 990	PHA071/PHA046	57	Subritzky Orange	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	153.5
Interthane 990	PHA071/PHA046	57	Subritzky Orange	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	153.5
						440	761						892.1

Intergard 269, EGA088/A is proposed as holding primer. (Optional)

External Superstructure, Wheelhouse, Funnel, Mast [700 m^2]

An Intershield 300 abrasion resistant epoxy scheme overcoated with a polyurethane finish, Interthane 990, using a tie coat of Intergard 269

Surface Preparations

Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.

Blast to Sa2 ISO 8501-1 or SSPC SP6.

Apply the material before visible oxidation occurs. If oxidation does occur, the entire oxidised surface should be re-blasted to the standard specified above.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m^2)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intergard 269	EGA088/EGA089	47	Red	FC	30	40	85	0.09	20mins	6hrs	ext.	GTA220	85.1
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	150	250	0.25	2hrs			GTA220	250.0
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	100	167	0.17	2hrs	4hrs	2days	GTA220	166.7
Interthane 990	PHB000/PHA046	57	White	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	153.5
Interthane 990	PHB000/PHA046	57	White	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	153.5
						390	678						808.8

Intergard 269, EGA088/A is proposed as holding primer. (Optional)

Tie coat, Intergard 269, EGA088/A to extend overcoating for Interthane 990.

External Sand Bin & Floor [650 m^2]

An Intershield 300 abrasion resistant epoxy scheme.

Surface Preparations
Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.
Blast to Sa2 ISO 8501-1 or SSPC SP6.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m^2)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intergard 269	EGA088/EGA089	47	Red	FC	30	40	85	0.09	20mins	6hrs	ext.	GTA220	79.0
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	150	250	0.25	2hrs	4hrs	3mths	GTA220	232.1
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	150	250	0.25	2hrs	4hrs	3mths	GTA220	232.1
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	150	250	0.25	2hrs	4hrs	3mths	GTA220	232.1
						490	835						775.3

Intergard 269, EGA088/A is proposed as holding primer. (Optional)

Internal Bulwarks, Foc'sle Exterior [300 m²]

An Intershield 300 abrasion resistant epoxy scheme overcoated with a polyurethane finish, Interthane 990, using a tie coat of Intergard 269

Surface Preparations

Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.

Blast to Sa2 ISO 8501-1 or SSPC SP6.

Apply the material before visible oxidation occurs. If oxidation does occur, the entire oxidised surface should be re-blasted to the standard specified above.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m²)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intergard 269	EGA088/EGA089	47	Red	FC	30	40	85	0.09	20mins	6hrs	ext.	GTA220	36.5
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	150	250	0.25	2hrs			GTA220	107.1
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	100	167	0.17	2hrs	4hrs	2days	GTA220	71.4
Interthane 990	PHB000/PHA046	57	White	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	65.8
Interthane 990	PHB000/PHA046	57	White	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	65.8
						390	678						346.6

Intergard 269, EGA088/A is proposed as holding primer. (Optional)

Tie coat, Intergard 269, EGA088/A to extend overcoating for Interthane 990.

Interior Surfaces - Accommodation, Engine Room, Steering Gear Compartment and B/T Room [1,200 m²]

An Intershield 300 abrasion resistant epoxy scheme overcoated with a polyurethane finish, Interthane 990, using a tie coat of Intergard 269

Surface Preparations

Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.
Blast to Sa2 ISO 8501-1 or SSPC SP6.
Apply the material before visible oxidation occurs. If oxidation does occur, the entire oxidised surface should be re-blasted to the standard specified above.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m²)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intergard 269	EGA088/EGA089	47	Red	FC	30	40	85	0.09	20mins	6hrs	ext.	GTA220	145.8
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	150	250	0.25	2hrs			GTA220	428.6
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	100	167	0.17	2hrs	4hrs	2days	GTA220	285.7
Interthane 990	PHB000/PHA046	57	White	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	263.2
Interthane 990	PHB000/PHA046	57	White	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	263.2
						390	678						1,386.5

Intergard 269, EGA088/A is proposed as holding primer. (Optional)
Tie coat, Intergard 269, EGA088/A to extend overcoating for Interthane 990.

Winches, Bollards and Other Deck Fittings [300 m²]

An Intershield 300 abrasion resistant epoxy scheme overcoated with a polyurethane finish, Interthane 990, using a tie coat of Intergard 269

Surface Preparations

Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.

Blast to Sa2 ISO 8501-1 or SSPC SP6.

Apply the material before visible oxidation occurs. If oxidation does occur, the entire oxidised surface should be re-blasted to the standard specified above.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m²)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intergard 269	EGA088/EGA089	47	Red	FC	30	40	85	0.09	20mins	6hrs	ext.	GTA220	36.5
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	150	250	0.25	2hrs			GTA220	107.1
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	100	167	0.17	2hrs	4hrs	2days	GTA220	71.4
Interthane 990	PHY999/PHA046	57	Black	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	65.8
Interthane 990	PHY999/PHA046	57	Black	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	65.8
						390	678						346.6

Intergard 269, EGA088/A is proposed as holding primer. (Optional)

Tie coat, Intergard 269, EGA088/A to extend overcoating for Interthane 990.

Staircases, Internal & External, Handrails [350 m²]

An Intershield 300 abrasion resistant epoxy scheme overcoated with a polyurethane finish, Interthane 990, using a tie coat of Intergard 269

Surface Preparations

Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.

Blast to Sa2 ISO 8501-1 or SSPC SP6.

Apply the material before visible oxidation occurs. If oxidation does occur, the entire oxidised surface should be re-blasted to the standard specified above.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m²)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intergard 269	EGA088/EGA089	47	Red	FC	30	40	85	0.09	20mins	6hrs	ext.	GTA220	42.5
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	150	250	0.25	2hrs			GTA220	125.0
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	100	167	0.17	2hrs	4hrs	2days	GTA220	83.3
Interthane 990	PHB000/PHA046	57	White	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	76.8
Interthane 990	PHB000/PHA046	57	White	FC	60	50	88	0.09	60mins	4hrs	ext.	GTA056, GTA713, GTA733	76.8
						390	678						404.4

Intergard 269, EGA088/A is proposed as holding primer. (Optional)

Tie coat, Intergard 269, EGA088/A to extend overcoating for Interthane 990.

Ballast & Freshwater/ Potable Water Tanks, Fuel & Day Fuel Tanks Internals [5,000 m²]

An Intershield 300 epoxy anticorrosive scheme for long term protection.

Surface Preparations

Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.
Clean welds, damaged and corroded shop primer by blasting to near white metal SSPC-SP10 or Sa21/2 ISO 8501-1 or by power tooling to Pt3 JSRA SPSS-1984.
For PVB and unapproved shop primer grit blast to Sa2½ ISO 8501-1 or SSPC SP10.
For optimised mechanical properties on typical zinc and iron oxide epoxy shop primers, grit sweep intact areas to AS.2 International Sweep Blast Standards.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m²)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	160	267	0.27	2hrs	4hrs	14days	GTA220	1,901.1
Intershield 300	ENA301/ENA303	60	Aluminium	15% SC	30	0	0	0.08	2hrs	4hrs	14days	GTA220	89.3
Intershield 300	ENA300/ENA303	60	Bronze	15% SC	30	0	0	0.08	2hrs	4hrs	14days	GTA220	89.3
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	160	267	0.27	2hrs	4hrs	14days	GTA220	1,901.1
						320	534						3,980.8

Grey & Black/ Sewage Water Tanks, Hydraulic/ Lube Oil & Oily Sludge Tanks [800 m^2]

A two pack, FDA compliant epoxy cargo tank coating offering extensive cargo resistance.

Surface Preparations
Consult International Paint

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m^2)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Interline 704	THA700/THA703	53	Pink	FC	30	125	236	0.24	60mins	7hrs	14days	GTA220	269.4
Interline 704	THA702/THA703	53	Grey	15% SC	30	0	0	0.09	60mins	7hrs	14days	GTA220	16.2
Interline 704	THA700/THA703	53	Pink	15% SC	30	0	0	0.09	60mins	7hrs	14days	GTA220	16.2
Interline 704	THA702/THA703	53	Grey	FC	30	125	236	0.24	60mins	7hrs	14days	GTA220	269.4
						250	472						571.2

External Passenger Decks [500 m^2]

An Intershield 300 abrasion resistant epoxy scheme.

Surface Preparations
Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.
Blast to Sa2 ISO 8501-1 or SSPC SP6.
Apply the material before visible oxidation occurs. If oxidation does occur, the entire oxidised surface should be re-blasted to the standard specified above.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m^2)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	150	250	0.25	2hrs	4hrs	3mths	GTA220	178.6
Intershield 300	ENA301/ENA303	60	Aluminium	10% SC	30	0	0	0.00	2hrs	4hrs	3mths	GTA220	0.0
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	125	208	0.21	2hrs	4hrs	3mths	GTA220	148.8
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	125	208	0.21	2hrs	4hrs	3mths	GTA220	148.8
						400	666						476.2

Bilges/Void Tanks, Chain Lockers [2,000 m^2]

An Intershield 300 epoxy anticorrosive scheme for long term protection.

Surface Preparations

Where necessary remove all weld splatter, smooth weld seams and sharp edges. Fresh water wash to remove all dirt and contamination, as necessary. Degrease according to SSPC-SP1 solvent cleaning. Ensure area is clean and dry prior to application.

Blast to Sa2 ISO 8501-1 or SSPC SP6.

Apply the material before visible oxidation occurs. If oxidation does occur, the entire oxidised surface should be re-blasted to the standard specified above.

Product	Sales Code	Volume Solids (%)	Colour	Coats	% Loss factor	DFT (µm)	WFT (µm)	TSR (lt/m^2)	Touch Dry 35°C	Overcoating 35°C		Thinner	Volume (lt)
										Min	Max		
Intershield 300	ENA300/ENA303	60	Bronze	FC	30	150	250	0.25	2hrs	4hrs	14days	GTA220	714.3
Intershield 300	ENA301/ENA303	60	Aluminium	15% SC	30	0	0	0.08	2hrs	4hrs	14days	GTA220	35.7
Intershield 300	ENA300/ENA303	60	Bronze	15% SC	30	0	0	0.08	2hrs	4hrs	14days	GTA220	35.7
Intershield 300	ENA301/ENA303	60	Aluminium	FC	30	150	250	0.25	2hrs	4hrs	14days	GTA220	714.3
						300	500						1,500.0

Thinners			
Product	Colour	Sales Code	Volume (lt)
International		GTA007	25.0
International		GTA220	580.0
International		GTA733	80.0
Total			685.0

Application Notes

1. All finishing colours not highlighted in this specification will need confirmation from the vessel owner.
2. Quantities and coverage stated in this specification are estimates only and will vary according to a number of factors including wastage, surface profile, any structural modifications and actual film thickness
applied. Stated quantities and coverage must therefore, only be used as a guide.
3.Quantities given for touch up are estimated based on the areas given or estimated. Actual consumption will be higher due to overlapping onto the surrounding areas and the quantity will increase with each
subsequent touch up coat. In estimating the requirement for the areas, this must be taken into consideration.
4. Airless spray application is necessary to achieve the film thickness specified. Brushing, roller and conventional spray applications may not achieve the required film thickness.
5. Thinning of products is not recommended without prior consultation from International Paint representatives.
6. Quotations for M&R repaints / repairs are based on the best available estimate of the hull condition. If the actual condition is materially different from the estimate an alternative system and / or surface
preparation may be advisable. Please contact International Paint representatives for further information.
7. When using any type of paint in confined spaces, proper ventilation is required. For more information, please refer to the relevant Material Safety Data Sheets available from International Paint representatives.
8. International Paint may at its discretion provide free of charge technical support to customers consisting of the provision of a technical representative who may periodically or on reasonable request visit the
vessel and liaise with the customer concerning product requirements, application training and general advise concerning International Paint products.
9. International Paint accepts no liability whatsoever in connection with the provision of or failure to provide such free of charge technical services support.
10. All products supplied and any technical support given are subject to International Paint's standard terms of sale. Please ask your local International Paint representatives for a copy.

Terms and Conditions

This confidential document is for the use of the above named client and its contents should not be reproduced or transmitted without prior written permission from International Paint. The information is given in good faith and attention to the following statement :

The information given in this report is not intended to be exhaustive and any person using any products for any purpose other than that specifically recommended in this report without first obtaining written confirmation from us as to the suitability of the product for the intended purpose does so at his own risk. Any warranty, if given, or specific Terms & Conditions of Sale are contained in International Paints Terms and Conditions of Sale, a copy of which can be obtained on request. Whilst we endeavour to ensure that all advice we give about the product (whether in this report or otherwise) is correct we have no control over either the quality or condition of the substrate or the many factors affecting the use and application of this product. Therefore, unless we specifically agree in writing to do so, we do not accept any liability whatsoever for howsoever arising for the performance of our products or for any loss or damage (other than death or personal injury resulting from our negligence) arising out of the use of the product. The information contained in this report is liable to modification from time to time in the light of experience and our policy of continuous product development.

It is the user's responsibility to check that upto date product data sheets are obtained prior to using the products and that local environmental controls that may be in force are observed when using any of our products.
Health & Safety
Products referred to in this report are intended for use only by professional applicators in industrial situations in accordance with the advice given on our Technical Datasheetst, the Material Safety Data Sheet and the container(s), and should not be used without reference to the Material Safety Data Sheet (MSDS).

All work involving the application and use of this product should be performed in compliance with all relevant national Health, Safety & Environment standards and regulations.

In the event welding or flame cutting is performed on metal coated with this product, dust and fumes will be emitted which will require the use of appropriate personal protective equipment and adequate local exhaust ventilation.

If in doubt regarding the suitability of use of this product, consult International Paint for further advice.

Appendix 4: Ministry for Primary Industries - New Zealand Marine Pest ID Guide

Biosecurity New Zealand
Ministry for Primary Industries
Manatū Ahu Matua

New Zealand Marine Pest ID Guide

February 2024

KO TĀTOU THIS IS US

CONTENTS

Report suspected marine pests or diseases online report.mpi.govt.nz/pest/
or call 0800 80 99 66

INTRODUCTION

This guide describes some of the marine pest species that have recently arrived in New Zealand, as well as some of the worst global marine pests that Biosecurity New Zealand is trying to keep out. This guide also includes information on diseases of fish, shellfish and crustaceans and what to do if you suspect a disease.

Since 2005 we have found more than 360 introduced (non-native) species, of which about half now have an established population or populations in New Zealand. These can have negative impacts on our fisheries, the environment, the aquaculture industry and be a considerable nuisance to a wide range of recreational or customary users and marine industries. Introduced species can also harbour new diseases and parasites.

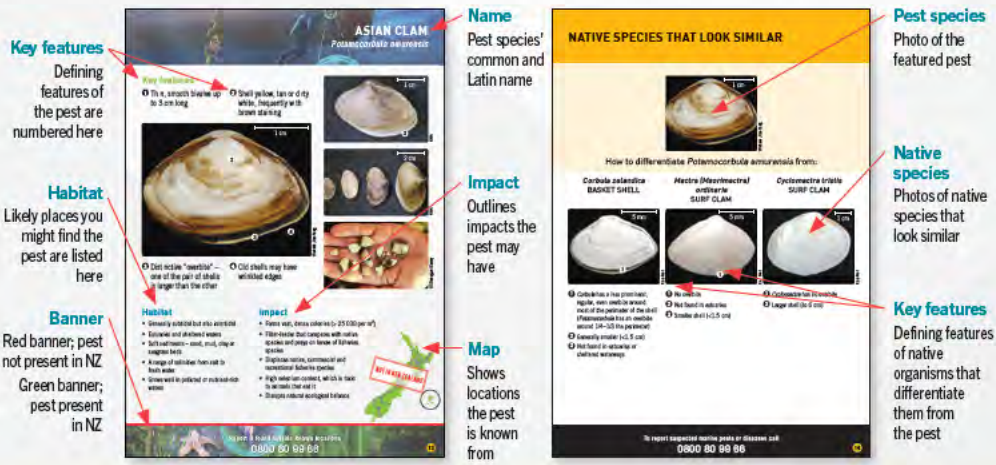
How to use this guide

Each page of this guide has information on the main marine pests of concern and is ordered alphabetically by taxonomic group. Pages with species that are established in some parts of New Zealand are green. Pages with species that have caused problems overseas and which we are actively trying to keep out are red.

Note: Distribution as depicted in the maps is accurate as of the time of printing and should be used as a guide only. If you want more information on the updated distribution of these species visit the marine biosecurity porthole, www.marinebiosecurity.org.nz.

For each species, key features and the habitat where it is likely to be found are outlined and some of its impacts are described. Native species that look similar are shown, with key distinguishing features labelled to assist with field identification.

Diseases in fish and shellfish are just as important as pests, but are harder to detect and diagnose, so information on diseases in fish and fish kills can be found in the first section of this guide.



INTRODUCTION

How you can help: be our underwater eyes

If you see anything out of the ordinary including unusual marine plants and animals, or unusual numbers of dead fish or aquatic life, call 0800 80 99 66 or report online at report.mpi. govt/nz/pest/.

If you come across a suspect non-native marine plant or animal outside of its known range (as shown on the maps in this guide), or a large number of dead or diseased fish or shellfish:

1. **Take a photo**
2. **Collect a sample**
3. **Record location and landmarks**
4. **Call 0800 80 99 66 or go to report.mpi.govt.nz/pest/ to report a find**

Remember, don't spread or introduce marine pests or diseases:

- Check, clean and dry any equipment (e.g. pots, nets, fishing or diving gear) before moving to a new location, to ensure it is free of marine life. Use fresh water and detergent or soak in a 2% bleach solution for 30 minutes. Additionally, dry your equipment then leave it for >48 hours before using it in a different area, this is especially important for equipment that is difficult to dry (e.g. diving gear).
- Inspect and clean your boat's hull, niche areas and other places that retain water before moving to a new location. This includes anchor wells, livebait wells, bilges, ballast tanks, etc. Remove any marine life contained within these areas and dispose of them to landfill.
- Seafood waste, offal and bait from non-local sources can transfer pests and diseases, so dispose of them thoughtfully. A land-based rubbish bin is best.
- Regularly apply antifouling paint to your moored vessel's hull.
- Use this guide to make yourself aware of pests that are likely to occur in your area, and ensure you don't spread these further.
- If disposing of aquarium plants, animals or other materials, treat them as a biosecurity risk. Ideally dispose of them to landfill.

DISEASES OF FISH, CRUSTACEANS AND SHELLFISH

Impact

Diseases can cause fish, crustacean and shellfish stock collapses, which in turn can affect the entire ecosystem. Stock collapses can have severe effects on commercial, cultural and recreational fisheries and diseases may also be of concern to human health.

Mass mortality events

Mass mortality events involve the death of an unusually large number of organisms. A mass mortality is usually unexpected and there may be a number of species involved (including but not limited to fish, invertebrates and marine plants, including farmed or wild species). A mass mortality of commercially or recreationally valuable species is often known as a "fish kill", and it is this type of event that is of particular concern. If you see a fish kill, please call 0800 80 99 66 as soon as possible.

The following information is useful when investigating a fish kill and should be recorded whenever possible:

- Date and time of the event
- When animals were collected
- Location and size of the fish kill
- Species and number of individuals affected (photos are often useful)
- Abnormal behaviour of animals
- Abnormal environmental conditions (e.g. river flooded, algal bloom present, unusually high temperature)
- Condition of the animals when found (e.g. near death, dead, decomposing)
- Any lesions or other marks on animals

DISEASES OF FISH

Key diagnostic features

A fish kill may be obvious: a large number of a single species of fish dead or dying, over a wide area. Fish respond to diseases in a fairly consistent way. The signs of disease may be subtle, but more obvious indications of disease may be behavioural or visible on the organism itself.

External signs:

- Obvious lesions on the fish (ulcers, loss of fins, strange lumps or growths, red streaks or spots)
- Reddening at the base of the fins or in the eyes
- Bulging eyes
- Gills swollen or covered in mucus
- Fish fat or bloated
- Rash on the body

Behavioural signs:

- Fish displaying abnormal swimming behaviour (lethargy, swimming in circles)
- Gasping for air, especially near surface (open mouth)
- Quick spinning movements and/or scratching or rubbing against objects

Some examples of diseased fish

Chris Speirs

A snapper with redding beneath the skin on its underbelly, in this case caused by a common opportunistic bacterium.

Cara Brosnahan

A wild-caught rainbow trout with unusual skin discolouration as may be observed in a diseased fish

DISEASES OF CRUSTACEANS

Key diagnostic features

Mass mortality of crustaceans may be obvious: large number of dead individuals of a single species washed up on the beach, or recently dead or dying over a wide area in the water. Signs of disease in crustaceans can be subtle and in many circumstances present as abnormal behaviour.

External signs:

- Wasting away of muscle tissue – atrophy
- Opaque abdominal muscles
- Soft shell
- Visible spots or lesions within shell or tissue

Behavioural signs:

- Reduced feeding and movement
- Increased growth of organisms (fouling) on shell and gills
- Erratic swimming

Example of diseased crustaceans

Grant Stentiford CEFAS

Infected scampi (top) has different shell pigmentation and body tissue is more opaque compared to the uninfected scampi (bottom).

Grant Stentiford CEFAS

Viewing the underside of the scampi also highlights the differences between infected (top) and uninfected (bottom) individuals.

DISEASES OF SHELLFISH

Key diagnostic features

A mass mortality may be obvious: a large number of a single species of recently dead shellfish washed up on the beach, or recently dead or dying over a wide area in the water. Except in cases of mass mortality, signs of disease are usually more subtle.

External signs:

- Shellfish such as paua may be retracting from the shell with the edges of the mantle curling away
- There may be visible pustules, lesions or hard nodules present
- Shellfish may look watery or in poor condition
- Bivalves may not be able to stay shut
- Excess mucus production may be evident

Behavioural signs:

- Shellfish such as paua may not be able to stay attached to substrate
- Shellfish such as paua may not be able to right themselves when turned upside down
- Bivalves may be gaping or slow to react when touched

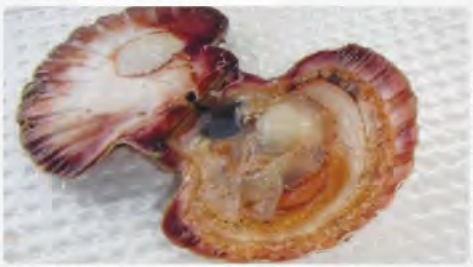
Some examples of diseased shellfish

Paua retracting its mantle away from its shell.

Watery, sick-looking oyster.

Anjali Pande, Biosecurity New Zealand

Shucked paua with nodules associated with *Perkinsus*.



Watery, sick-looking scallops infected with several pathogenic species of bacteria.

Anjali Pande, Biosecurity New Zealand

DISEASES OF FISH AND SHELLFISH

Collecting samples for investigation

Call Biosecurity New Zealand on 0800 80 99 66 – they will advise on whether samples are required, how to pack them and where to send them. Otherwise, as a general rule:

- Collect 5–10 whole animals that are moribund (dying but not dead) or freshly dead
- Chill them on ice or in a refrigerator (but do not freeze)
- Talk to Biosecurity New Zealand about how to package and send the animals to the lab

Information to collect

- Date and time of the observation, and when the animals were collected
- Location and approximate size of area affected
- Species and number of individuals affected (a photo is often useful)
- Whether the animals were dead or moribund when collected (or both)
- Any abnormal environmental conditions (e.g. river flooded, algal bloom present, unusually high water temperature)

If you suspect you have seen signs of disease in captive or wild fish or shellfish call Biosecurity New Zealand immediately on 0800 80 99 66.

AQUARIUM CAULERPA

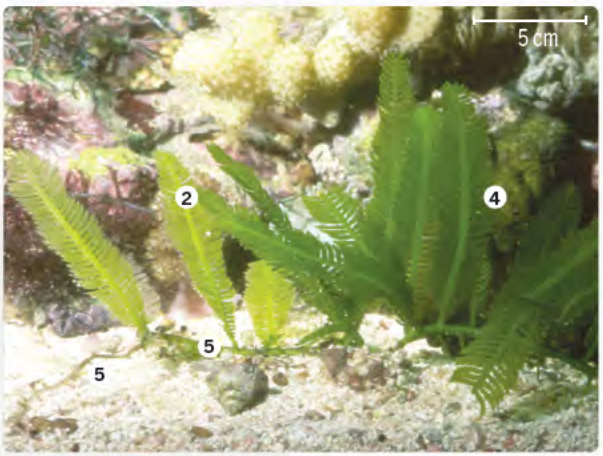
Caulerpa taxifolia

Key features

❶ Bright green

❷ Fronds have a smooth midrib

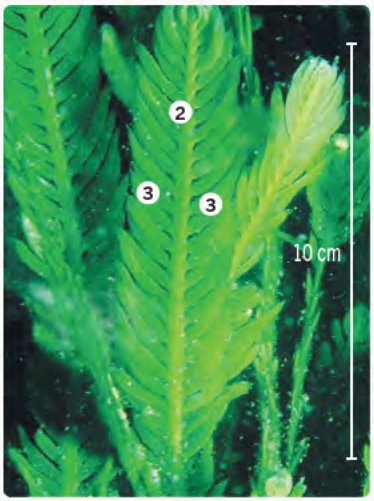
❸ Paired branchlets, all flattened in the same plane



Bob Fenner

❹ Fronds up to 15 cm (tropical form) or 40+ cm (Mediterranean form) in length

❺ Long horizontal runners (stolons) with many upright, flattened fronds



Australian Institute of Marine Science

Government of South Australia, Biosecurity SA

Habitat

- Marine aquaria

If Caulerpa was to be released into the environment, then it would be found in:

- Sand, mud, rock or seagrass beds
- Estuaries, harbours and coasts
- Sheltered to semi-exposed environments
- Low tide to 100 m depth

Impact

- Forms vast, dense beds
- Smothers and displaces native and fisheries species
- Fast-growing
- Disrupts natural ecological processes
- Accumulates toxins

Report suspected marine pests or diseases online report.mpi.govt.nz/pest/
or call 0800 80 99 66

EXOTIC CAULERPA

Caulerpa brachypus & *Caulerpa parvifolia*

Both exotic *Caulerpa* species look the same

Key features

❶ Bright green

❷ Fronds (leaves) are shaped as "solid" oar blades

❸ Fronds grow from long horizontal runners (stolons)

❹ Fronds are up to 10 cm in length

Oliver Evans, NIWA

Oliver Evans, NIWA

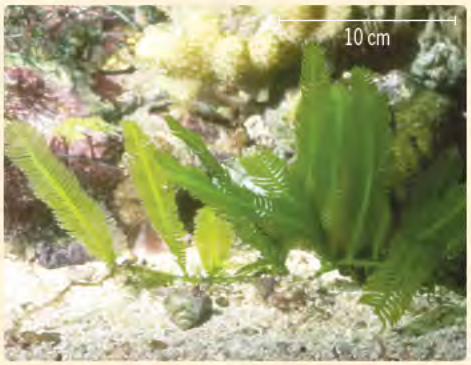
Habitat

- Sand, mud, reef or seagrass beds
- Estuaries, harbours and coasts
- Reaches highest densities in sheltered, low wave energy environments
- Low tide to approximately 50 m water depth

Impact

- Forms vast, dense beds
- Smothers and displaces native species
- Fast-growing
- Disrupts natural ecological processes

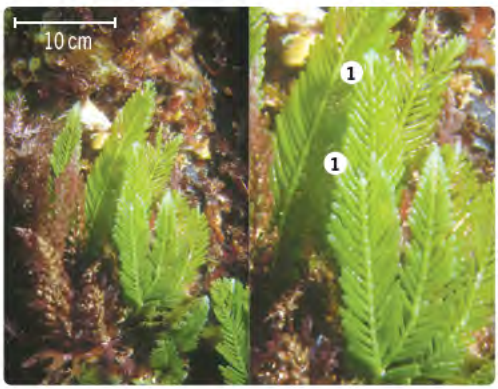
NATIVE SPECIES THAT LOOK SIMILAR



Bob Fenner

How to differentiate between *Caulerpa taxifolia* (left) and exotic *Caulerpa* (right) species from native species below:

Caulerpa articulata

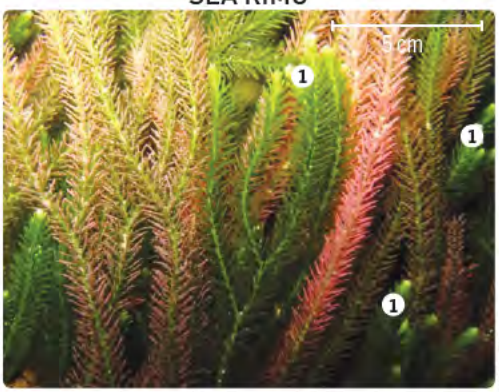


J.M. Hulsman

❶ *C. articulata* has cylindrical, turgid, bead-like vesicles along the midrib, not flattened like *C. taxifolia*

❷ *C. articulata* is found in the North Island and offshore islands, and the northern South Island

Caulerpa brownii
SEA RIMU



Richard Kinsey

❶ *C. brownii* has distinctively three-dimensional shaggy fronds; they are not flattened in cross-section

❷ *C. brownii* is found in the southern North Island, South Island and offshore islands

Additional information: the most likely way of *Caulerpa taxifolia* arriving in New Zealand is through importation with other aquarium species. Aquarium caulerpa is an unwanted organism, so if you suspect you've seen it in aquaria, or anywhere, please call **0800 80 99 66** immediately.

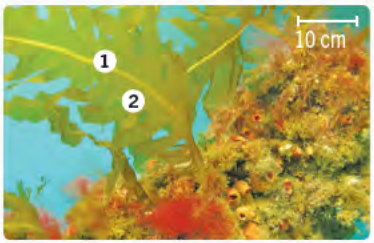
WAKAME/UNDARIA

Undaria pinnatifida

Key features

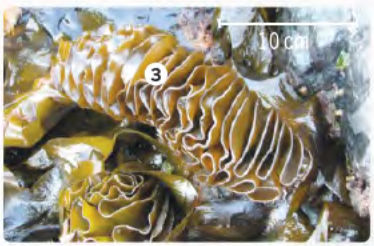
❶ Strap-like midrib in plants larger than 10 cm

❷ Smooth, thin, laminar blade, with side lobes, that starts just above the holdfast, or above the frilly reproductive tissue in mature plants

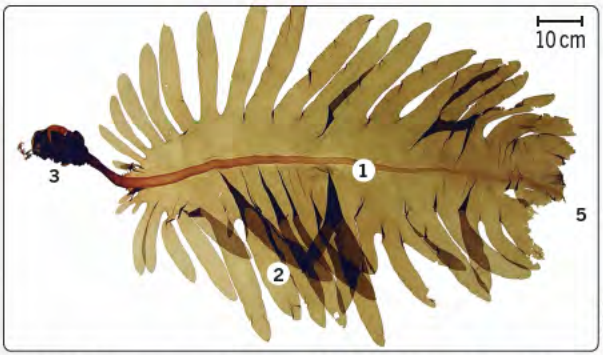


Kath Blakemore


Lesley Paterson



Serena Cox



Kate Neill

❸ Base of mature plant is frilly (reproductive tissue), with a root-like holdfast

❹ Adult plants brown to yellowish, up to 3 m tall

❺ Tops of mature plants are often eroded

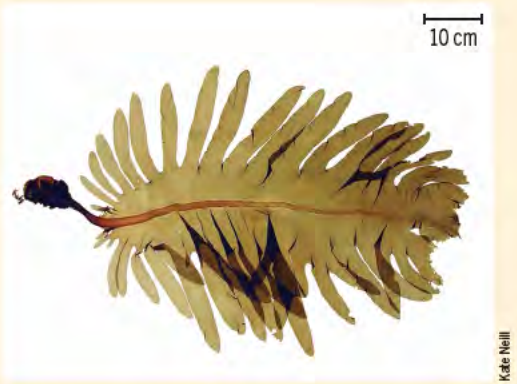
Habitat

- Intertidal to 40 m depth
- Wharves, pontoons and buoys
- Rocky coasts and reefs
- Boat hulls
- Sheltered to exposed environments
- Grows well in polluted or nutrient-enriched waters

Impact

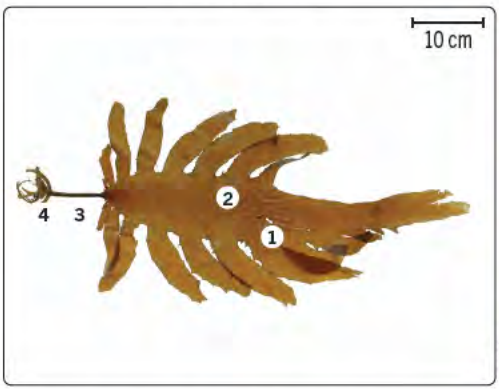
- Very fast growing and can form dense colonies displacing native and fisheries species
- Fouls boats, aquaculture installations and other marine structures

NATIVE SPECIES THAT LOOK SIMILAR



How to differentiate *Undaria pinnatifida* from:

Ecklonia radiata
ECKLONIA



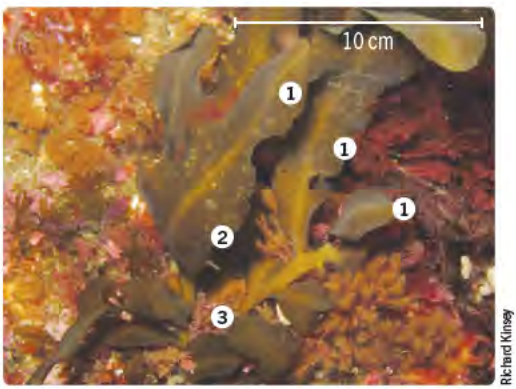
❶ *Ecklonia* has rough, leathery blade, often with many small, raised bumps; *Undaria* has smooth, thin and fragile blades

❷ *Ecklonia* has no midrib (Note: plants are difficult to differentiate before this character develops in *Undaria* at about 10 cm length)

❸ *Ecklonia* has a cylindrical trunk-like stipe. *Undaria* has a flattened, strap-like stipe

❹ *Ecklonia* has no frilly reproductive tissue at base

Carpophyllum flexuosum



❶ *Carpophyllum* has multiple ribbed leaves; *Undaria* has only a single midrib and blade

❷ *Carpophyllum* has stiff, tough, leathery leaves

❸ *Carpophyllum* has no frilly base

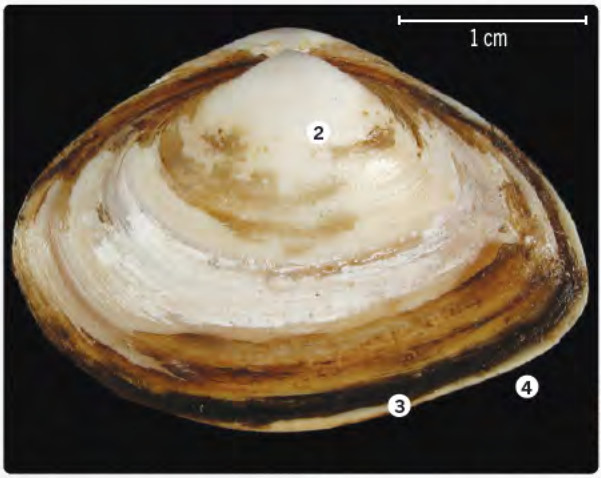
ASIAN CLAM

Potamocorbula amurensis

Key features

❶ Thin, smooth bivalve up to 3 cm long

❷ Shell yellow, tan or dirty white, frequently with brown staining



YHshells; Hao Yang

❸ Distinctive "overbite" – one of the pair of shells is larger than the other

❹ Old shells may have wrinkled edges

NIWA

NIWA

US Geological Survey

Habitat

- Generally subtidal but also intertidal
- Estuaries and sheltered waters
- Soft sediments – sand, mud, clay or seagrass beds
- A range of salinities from salt to fresh water
- Grows well in polluted or nutrient-rich waters

Impact

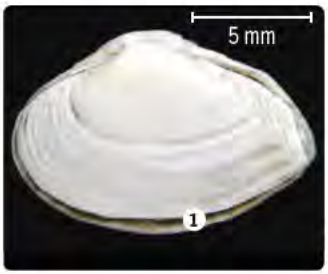
- Forms vast, dense colonies (> 25 000 per m^2)
- Filter-feeder that competes with native species and preys on larvae of fisheries species
- Displaces native, commercial and recreational fisheries species
- High selenium content, which is toxic to animals that eat it
- Disrupts natural ecological balance

NATIVE SPECIES THAT LOOK SIMILAR

YHshells; Hao Yang

How to differentiate *Potamocorbula amurensis* from:

Corbula zelandica
BASKET SHELL



Kate Neill

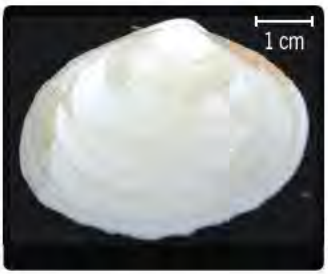
1. *Corbula* has a less prominent, regular, even overbite around most of the perimeter of the shell (*Potamocorbula* has an overbite around 1/4–1/3 the perimeter)
2. Generally smaller (<1.5 cm)
3. Not found in estuaries or sheltered waterways

Mactra (Maorimactra) ordinaria
SURF CLAM

Kate Neill

1. No overbite
2. Not found in estuaries
3. Smaller shell (<1.5 cm)

Cyclomactra tristis
SURF CLAM



Kate Neill

1. *Cyclomactra* has no overbite
2. Larger shell (to 6 cm)

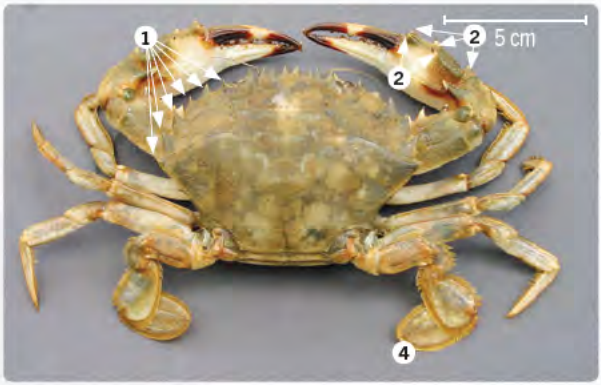
ASIAN PADDLE CRAB

Charybdis japonica

Key features

❶ Six prominent spines on each side of the carapace

❷ Five prominent spines on upper surface of each claw



Colin McLay

❸ Carapace up to 12 cm wide

❹ Flattened swimming paddles on back legs

Serena Cox

❺ Colour ranges from off-white and pale green, through olive-green to a deep chestnut brown with purplish markings

Serena Cox

Habitat

- Low tide to 15 m depth
- Sand and mud
- Estuaries, harbours and and most coastal habitats

Impact

- Highly detrimental to shellfish aquaculture
- Aggressive predator
- Displaces native and fisheries species
- Can carry diseases that affect crab, lobster, shrimp and prawn fisheries

NATIVE SPECIES THAT LOOK SIMILAR

Colin McLay

How to differentiate *Charybdis japonica* from:

Ovalipes catharus SWIMMING/PADDLE CRAB

Colin McLay

1. *Ovalipes* has five flattened spines on each side along the front and extending around the sides (not six pointed spines along the front as in *C. japonica)*
2. One prominent spine on the claw
3. Two distinct reddish "spots" on the carapace
4. Pale sandy-grey with orange-red highlights
5. Swimming paddles often with purplish tint

Liocarcinus corrugatus DWARF SWIMMING CRAB

Colin McLay

1. *Liocarcinus* has five spines on each side (not six)
2. Much smaller – maximum 2.5 cm wide
3. Fine corrugations over most of the shell

Nectocarcinus antarcticus HAIRY RED SWIMMING CRAB

Colin McLay

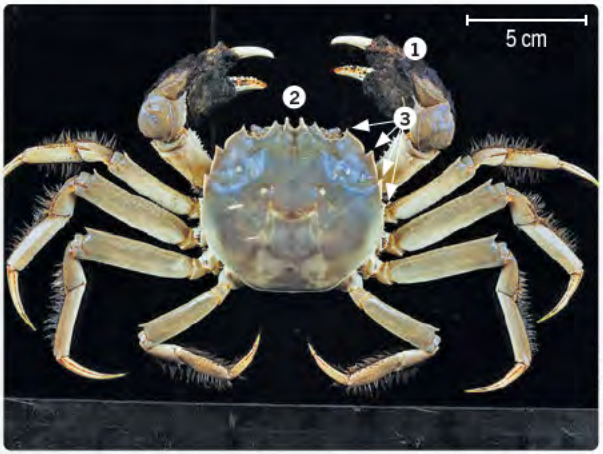
1. *Nectocarcinus* has four spines on each side (not six)
2. Red to pinkish-red colouration

CHINESE MITTEN CRAB

Eriocheir sinensis

Key features

1. Hairy "mittens" with white tips on front claws
2. Distinctive notches between the eyes
3. Four spines on each side of the carapace



University of Valencia

Phil Crabb, Natural History Museum

Central Fisheries Board, Ireland

4. Carapace 0.5-10 cm wide but generally >3 cm
5. Light brown to olive-green carapace

Habitat

- Above high tide to subtidal
- Burrows in sand, mud, silt or clay
- Freshwater, brackish, estuarine and marine waters
- Prefers polluted or nutrient-enriched waters

Impact

- Can form dense colonies
- Disrupts natural ecological balance
- Accumulates toxins
- Aggressive, highly effective predator
- Displaces native and fisheries species
- Damages fishing nets and catches
- Burrowing weakens and collapses river/estuary banks
- Can carry a liver fluke that harms humans

Report suspected marine pests or diseases online report.mpi.govt.nz/pest/
or call 0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

University of Valencia

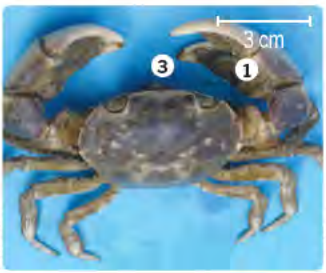
How to differentiate *Eriocheir sinensis* from:

Austrohelice crassa TUNNELLING MUD CRAB

Chris Woods

1. *A. crassa* has large, rounded claws – not furry or white-tipped
2. *A. crassa* is much smaller – carapace width 4 cm max and distinctly oblong/square-shaped
3. *A. crassa* has no spines on the front edge of the carapace

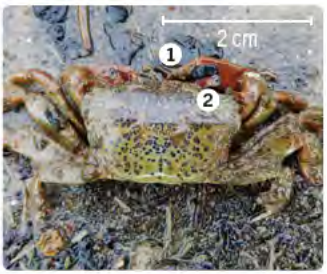
Hemigrapsus crenulatus HAIRY-HANDED CRAB



Colin McLay

1. *H. crenulatus* claws are only slightly hairy and the hairs are on the inner side only
2. *H. crenulatus* is a much smaller crab – carapace width less than 4 cm
3. *H. crenulatus* has no spines on the front edge of the carapace

Hemiplax hirtipes STALK-EYED MUD CRAB



Serena Cox

Chris Woods

1. *Hemiplax* claws are small, fringed with hairs and with long slender pincers
2. *Hemiplax* has eyes on long stalks
3. *Hemiplax* is a much smaller crab – carapace width less than 3 cm

EUROPEAN SHORE CRAB

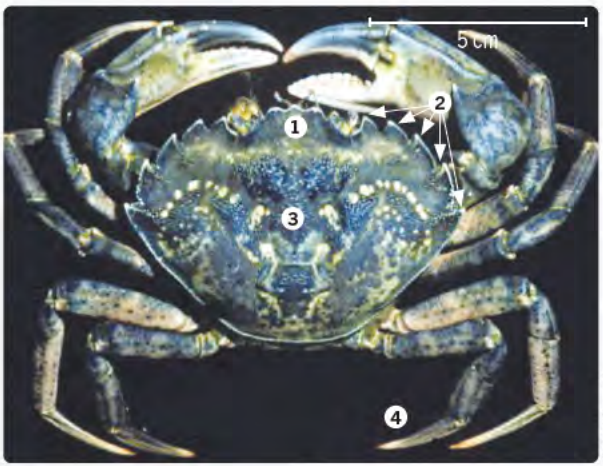
Carcinus maenas

Key features

❶ Three rounded "teeth" or lobes between the eyes

❷ Five spines on each side

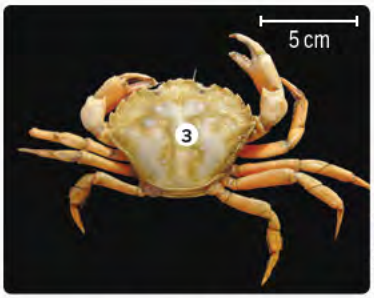
❸ Adult up to 8 cm wide



Michael Marmach

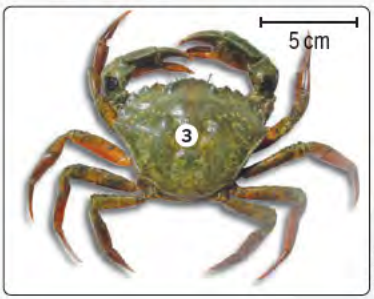
❹ No swimming paddles on legs

❺ Juveniles generally lighter in colour than adults



Hans Hillewaert

❻ Adult colour varies from green on top and yellowish underneath, to mottled red and orange above and orange or partly red underneath



A.M. Arias

Habitat

- Intertidal to 60 m depth
- Sand, mud, rock or seagrass beds
- Estuaries, harbours and coasts
- Generally nocturnal

Impact

- Can form dense colonies (up to 200 per m^2)
- Aggressive and highly effective predator
- Displaces native and fisheries species
- Highly detrimental to shellfish aquaculture
- Can collapse wild-harvest shellfisheries
- Facilitates other pest invasions

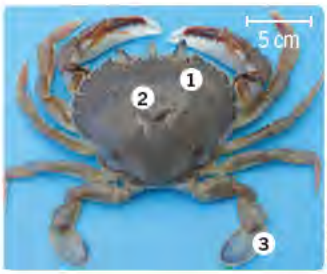
Report suspected marine pests or diseases online report.mpi.govt.nz/pest/
or call 0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

Michael Marmach

How to differentiate *Carcinus maenas* from:

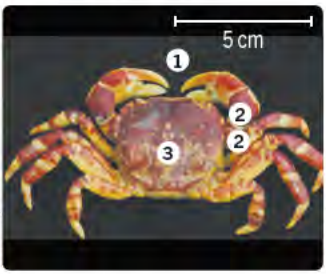
Ovalipes catharus SWIMMING/PADDLE CRAB



Colin McLay

1. *O. catharus* is larger – carapace width up to 15 cm, compared to 8 cm in *Carcinus*
2. *O. catharus* is sandy grey in colour with orange-red highlights
3. *O. catharus* has paddles on rear legs for swimming

Hemigrapsus sexdentatus COMMON ROCK/ SHORE CRAB



Colin McLay

1. *H. sexdentatus* has no spines/lobes between the eyes
2. *H. sexdentatus* has two (not five) spines on outer edges of carapace
3. *H. sexdentatus* has a distinctive square purple-and-cream carapace
4. *H. sexdentatus* is smaller – maximum width about 4 cm

Leptograpsus variegatus PURPLE ROCK CRAB

Colin McLay

1. *L. variegatus* has no spines/lobes between the eyes
2. *L. variegatus* has three spines on each side of the carapace behind the eyes
3. *L. variegatus* has grooves on the surface of the carapace
4. The carapace is variegated with many colours including green, brown, purple and cream
5. *L. variegatus* has a carapace less than 7.5 cm wide

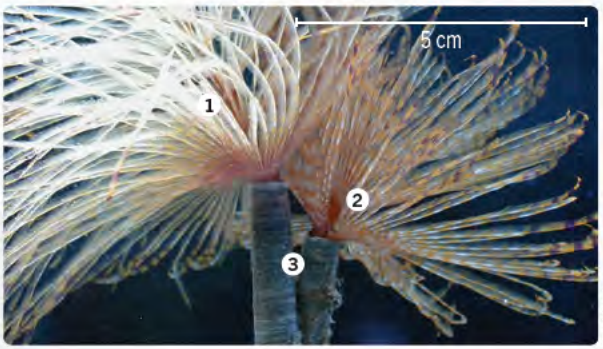
MEDITERRANEAN FANWORM

Sabella spallanzanii

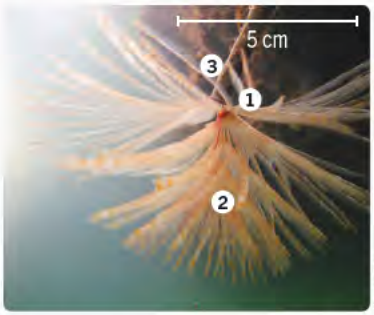
Key features

❶ Single spiral crown of elongated filaments projects from tube

❷ Spiral appears yellow-orange, made of bands of white, yellow and brown



Geoff Read



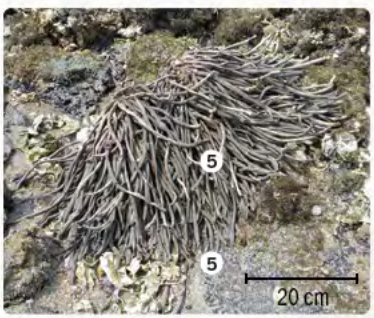
Serena Cox

❸ Tube is brown to grey, finely banded, muddy-looking, made of a leathery, flexible material; normally 10–50 cm but rarely up to 1 m long

❹ Bristle lobes on body segments with bristles set in a spiral pattern (evident when worm removed from tube)

❺ Tubes may be evident at low tide

❻ Can form dense clumps of many individuals, creating a large area of feeding fans



Richard Taylor

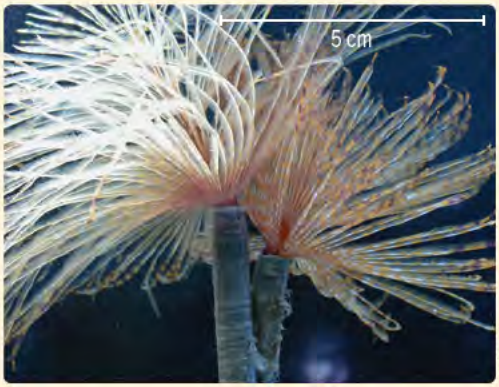
Habitat

- Low tide to 30 m depth
- Sheltered harbours to semi-exposed rocky coasts and reefs
- Wharves, pontoons and aquaculture structures
- Boat hulls
- Attaches to hard surfaces in soft sediments

Impact

- Can form dense colonies (1000 individuals per m^2)
- Displaces native and fisheries species
- Highly effective filter-feeder
- Preys on larvae of fisheries species
- Disrupts natural ecological balance
- Fouls boats, aquaculture installations and other marine structures

NATIVE SPECIES THAT LOOK SIMILAR



Geoff Read

How to differentiate *Sabella spallanzanii* from:

Native sabellid and serpulid tubeworms

Department of Conservation

Ken Grange

1. No native sabellids have a banded yellow-orange crown like *Sabella spallanzanii*
2. Native sabellids have a non-elongate, more flower-like, denser crown, not usually spiralled; and none of them have spiralled body bristles
3. All native sabellid fanworms are smaller, with tubes rarely longer than 20 cm
4. All serpulid fanworms have a hard whitish calcareous tube that is attached to the substrate along much or all of its length; *Sabella* has a flexible tube and is only attached at one end

NORTHERN PACIFIC SEASTAR

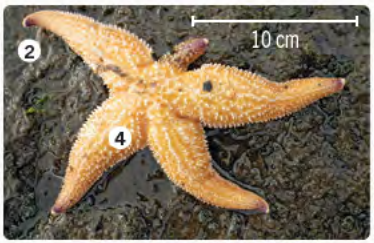
Asterias amurensis

Key features

1. Five arms
2. Pointed, often upturned tips
3. Yellow to orange, often with purple markings on top; yellow underneath

Serena Cox

4. Arms covered with numerous small, irregularly-arranged chisel-like spines
5. Usually up to 24 cm across, but can reach 50 cm
6. Reaches high densities



Serena Cox

Creative commons Flikr – Saipdato

CSIRO

Habitat

- Low intertidal to 25 m, occasionally to 200 m
- Rocky reef, mud, sand or pebbles
- Wharves, pontoons and buoys
- Aquaculture structures
- Estuaries, harbours and coasts
- Sheltered to semi-exposed environments

Impact

- Fast-growing
- Forms vast, dense colonies
- Displaces native and fisheries species
- Voracious predator
- Highly detrimental to shellfish aquaculture and wild-harvest shellfisheries

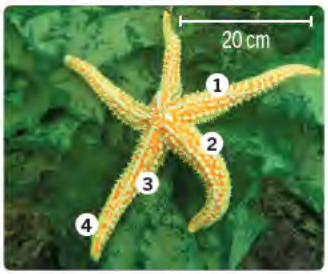
Report suspected marine pests or diseases online report.mpi.govt.nz/pest/
or call 0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

Serena Cox

How to differentiate *Asterias amurensis* from:

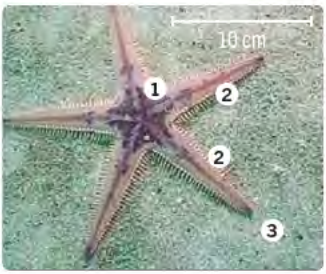
Sclerasterias mollis APRICOT SEASTAR/ CROSS FISH



Chris Woods

1. Well-defined rows of spines extending down the arms
2. Pale red to orange, with yellow bands and cream spines
3. Thin arms
4. Generally does not have prominently upturned armtips unless it's moving along the substrate

Astropecten polyacanthus COMB SEASTAR



seafriends.org.nz

1. *A. polyacanthus* is generally brownish red to fawn with a darker centre
2. Has a row of spines extending laterally around the edges of the arms
3. *A. polyacanthus* does not generally have prominently upturned armtips unless it's moving along the substrate

Allostichaster insignis THREE-AND-THREE SEASTAR

Paddy Ryan

1. *A. insignis* is orange, red or purple
2. *A. insignis* usually has six arms (occasionally five); *Asterias* always has five arms
3. *A. insignis* has groups of ~3 spines in rows extending down the arms, which *Asterias* lacks
4. *A. insignis* does not generally have prominently upturned armtips unless it's moving along the substrate
5. Smaller body (< 35 cm across)

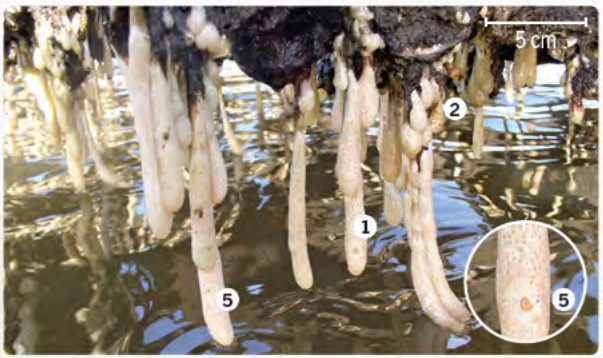
AUSTRALIAN DROPLET TUNICATE

Eudistoma elongatum

Key features

❶ White or cream-coloured cylindrical tubes (tunics)

❷ Sometimes with short, wartlike processes at the base



Sean Handley

❸ Generally 5–20 mm in diameter

❹ Tunic generally 5–30 cm long but can reach 1.5 m

❺ Tunic contains many small individual organisms and can sometimes appear orange-flecked owing to the presence of bright orange larvae

Northland RC


Sean Handley

H Blomfield

Habitat

- Intertidal to subtidal
- Sand, mud, rock or seagrass beds
- Aquaculture structures
- Wharves, pontoons and buoys
- Estuaries, harbours and coasts
- Sheltered/semi-sheltered environments

Impact

- Can form dense colonies
- Displaces native and fisheries species
- Smothers beaches, rocks, tidepools
- Fouls boats, aquaculture installations and other marine structures

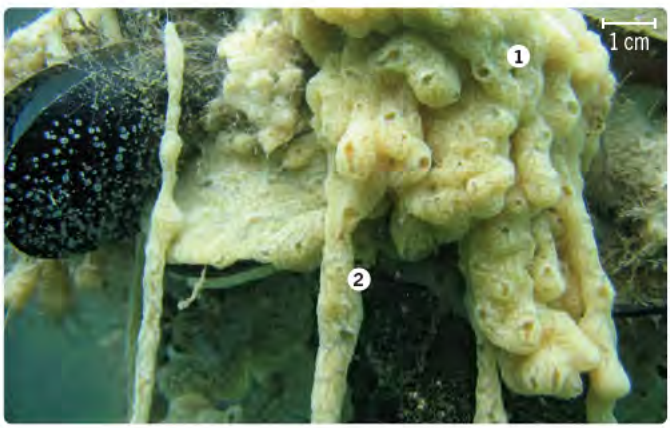
Report suspected marine pests or diseases online report.mpi.govt.nz/pest/
or call 0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

Sean Handley

How to differentiate *Eudistoma elongatum* from:

Didemnum spp.
COLONIAL SEA SQUIRT



Paul Barter, Cawthron Institute

1. *Didemnum* forms mats with messy interconnected drooping entwined tendrils, whereas *Eudistoma* consists of discrete circular tubes
2. A fine network of regular canals is visible on the surface of *Didemnum* but not on *Eudistoma,* where the pores are more irregularly distributed and lack visible canals
3. *Eudistoma* is firm and gelatinous to the touch; *Didemnum* less so and is also easily torn

SPECKLED AND LIGHT-BULB ASCIDIANS

Clavelina oblonga & Clavelina lepadiformis

Key features

❶ Are transparent and gelatinous to touch

❷ White rings and vertical lines give a "light bulb" appearance (*Clavelina lepadiformis*)

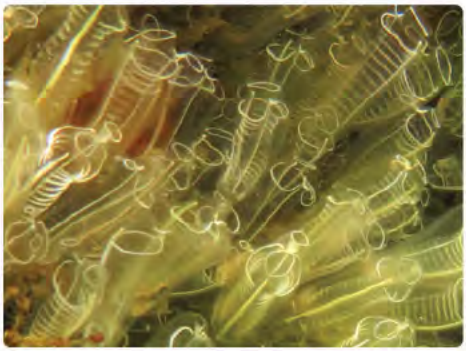
❸ Form colonies and can reach high densities

❹ Zooids (top part) reach a maximum height of 20 mm and are attached to substrate via a stolon

Clavelina oblonga

S. Happy, Auckland Council

Clavelina lepadiformis



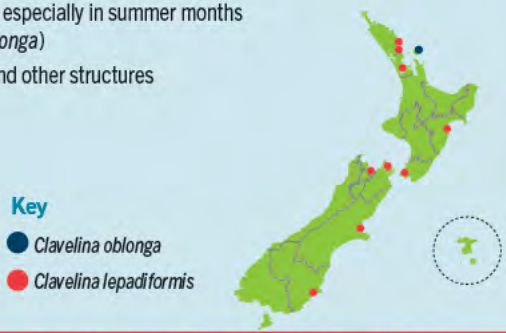
C. Woods, NIWA

Habitat

- Wharves, pontoons and buoys
- Grows on other organisms (e.g. mussels)
- Estuaries, harbours and coasts
- Sheltered/semi-sheltered environments
- Present to 50 m depth

Impact

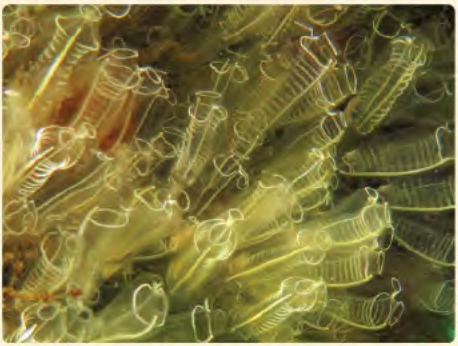
- Can reach high densities and smother other species especially in summer months (*Clavelina oblonga*)
- Fouls boats and other structures



Report suspected marine pests or diseases online report.mpi.govt.nz/pest/
or call 0800 80 99 66

NATIVE SPECIES THAT LOOK SIMILAR

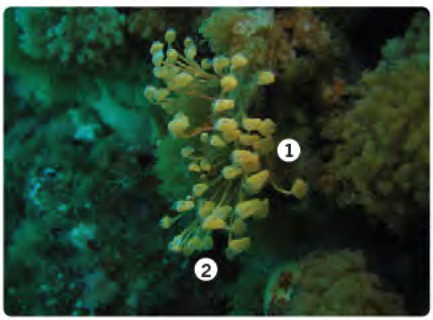
S. Happy, Auckland Council



Michael Marnach

How to differentiate *Clavelina oblonga* (left) and *Clavelina lepadiformis* (right) from:

Pycnoclavella kottae

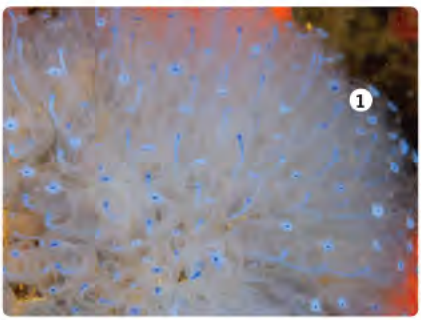


Sean Handley, NIWA

❶ Gold coloured rather than translucent

❷ Pod like heads at the end of long narrow stalks (appox. 10 cm), *Clavelina* is much smaller

Clavelina sp.
BLUEBELLS



Crispin Middleton, SeacologyNZ

❶ Blue coloured rather than translucent

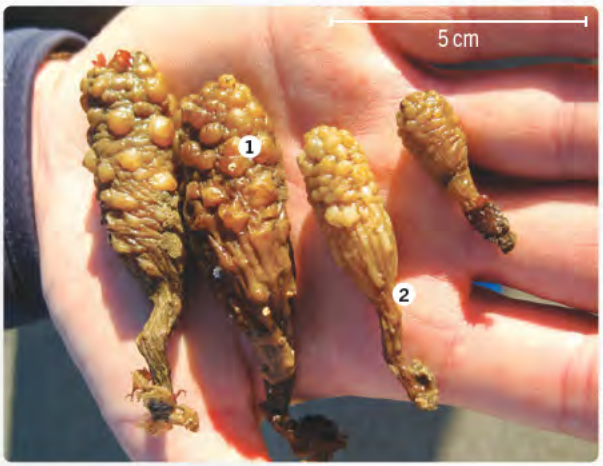
CLUBBED TUNICATE/LEATHERY SEA SQUIRT

Styela clava

Key features

❶ Brown with lumpy, leathery skin

❷ Woody stalk, generally longer than the body, with longitudinal folds

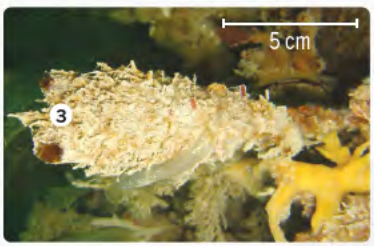


Jeannine Fischer

❸ Two closely spaced siphons at the top of the body, usually surrounded by warty projections

Biopix: JC Schou

Northland RC



Chris Woods

Habitat

- Low intertidal to 25 m depth
- Rocky coast and reef
- Boat hulls
- Wharves, pontoons and aquaculture structures
- Grows on other organisms

Impact

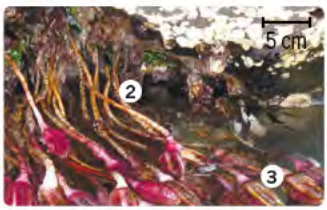
- Can form dense colonies excluding other organisms
- Highly effective filter-feeder
- Preys on larvae of commercially important fisheries species
- Displaces native and fisheries species
- Fouls boats, aquaculture installations and other marine structures

NATIVE SPECIES THAT LOOK SIMILAR

Jeannine Fischer

How to differentiate *Styela clava* from:

Pyura pachydermatina SEA TULIP

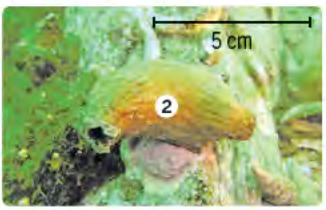


John Barkla

Chris Woods

1. *S. clava* is light or dark brown; *Pyura* is white to purplish-red
2. *P. pachydermatina* has a much longer stalk – up to three-quarters of its overall length – and can grow to over half a metre long; *Styela* only reaches 16cm
3. *P. pachydermatina* has a bulbous body with ridges along its length; *Styela's* body lacks ridges along its length

Cnemidocarpa bicornuta and *C. nisiotis*



Mike Page

Mike Page

1. Neither *Cnemidocarpa* species has a stalk
2. *C. biornuta* has a wide saddle between the siphons, whereas *Styela's* siphons are close together
3. *C. nisiotis* has siphons at opposite ends of the body. The body is flattened against the substrate, not stalked
4. The body of *C. nisiotis* can be obscured by heavy fouling, whereas *Styela* is always prominent

Styela plicata

Serena Cox

1. *S. plicata* has no stalk
2. Generally has a smooth, white to cream-coloured body and is not usually fouled with other species such as hydroids and bryozoans

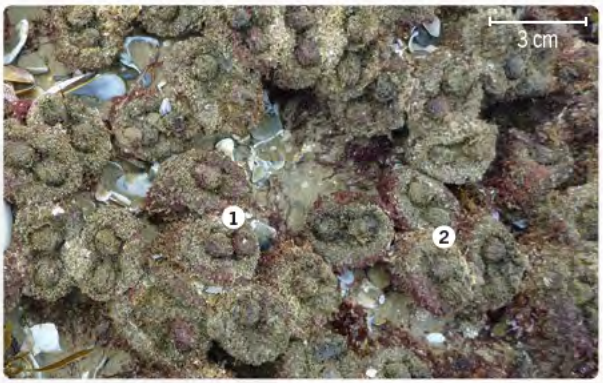
PYURA

Pyura doppelgangera

Key features

❶ Flattened upper surface surrounded by a ridge with two siphons projecting slightly from the centre

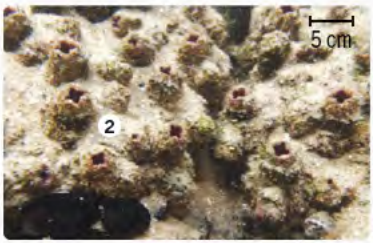
❷ Hard, sac-like body with brown or reddish-brown leathery skin, often incorporating sand and shell fragments



Roger Grace

❸ Adults 1.5–6 cm high and 3–5 cm in diameter, squat and globular in shape

❹ Colonies may form a dense mat, which may be visible at low tide



NRC

Serena Cox

Bruce Hayward

Habitat

- Rocky intertidal and shallow subtidal
- Grows on hard surfaces in soft sediments

Native species that look similar:

- No native species look similar to pyura

Impact

- Forms dense populations or mats, and can survive over a wide geographical range
- Could displace important native New Zealand species, including greenshell mussels

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KO TĀTOU THIS IS US