Picture 1 – Aerial view of East Cove Port with West Jetty in the foreground, RoRo Main Jetty in distance.

BRITISH FORCES SOUTH ATLANTIC ISLANDS

EAST COVE PORT

NAVIGATION RISK ASSESSMENT 2021

Current Edition: Version 5 – effective June 2021

Next Edition: June 2022

OVERVIEW:

1. This East Cove Port (ECP) Navigation Risk Assessment (NRA) is a living document that will be regularly updated throughout the life of port operations. As such, hard copies remain uncontrolled. Responsibility for the maintenance of the ECP NRA resides with the Queen's Harbour Master (QHM). The NRA will be reviewed at least annually and as the result of any of the following;

- Major organisational changes within the port.
- Changes in IMO, MCA or Command Policy.
- Changes in military of civil service legislation.
- Changes to the Port Marine Safe Code (PMSC).
- Changes to current best practise.
- Experience gained from operating this NRA.

2. **Disclaimer:** Nothing contained within this manual removes the responsibility of the Authorised Person and Delegated Representative to comply with the law and MOD requirements

3. **CBFSAI is the Ports Authorised Person.**

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CHAPTER 1 – INTRODUCTION

East Cove Port (ECP) is the primary maritime logistics node for British Forces in the South Atlantic. The harbour is the operational base port for HMS FORTH as the Falkland Islands Patrol Vessel (FIPV), as well as a frigate/destroyer (FF/DD), the Ice Patrol Ship and the Royal Fleet Auxiliary (RFA) when deployed to the Atlantic Patrol Task (South). Most newer RFA vessels are unable to use East Cove due to increased draught. The port also supports British Antarctic Survey vessels. The port has a Single Point Mooring (SPM) for the discharge of fuels to a Petroleum Storage Depot (PSD) and a RoRo berth for the handling of bulk cargo.

ECP is defined and authorised as Mare Harbour Naval Port (MHNP) by Falkland Islands Ordinance* for the purposes of this Navigation Risk Assessment. However, it will be referred to by its colloquial name 'East Cove Port' (ECP). As a military port, it adheres to the MoD Dockyard Port governance arrangements described in the Port Marine Safety Code (PMSC)*, which directs that in instances where legislation does not bind the MoD, the MoD will nevertheless comply with that legislation, in so far as it is reasonably practicable to do so. In accordance with this principle, the MoD recognises the Department of Transport's 'Port Marine Safety Code' (PMSC)* as the authoritative articulation of best practise in port safety and is committed to meet these, or equivalent standards as far as is reasonable and practicable.

The PMSC recommends a Safety and Environmental Management System (SEMS)* based on formal risk assessment as a core tenet of a safely operated port. This Navigation Risk Assessment (NRA) articulates a comprehensive analysis of the risks and hazards prevalent within ECP and, as such, is a fundamental pillar of SEMS. The NRA is a structured and comprehensive analysis of the operation and is based on a combination of local knowledge, stakeholder engagement, expert judgement, regular review and best practise across the field of risk science. This assures that all risks are identified and controlled, with the more severe ones either eliminated or reduced 'As Low As Reasonably Practicable' (ALARP).

The NRA is presented in four stages;

- Stage 1 – Overview of the East Cove operation
- Stage 2 – Hazard Identification
- Stage 3 – Analysis of the Identified Hazards – Ranking
- Stage 4 – Development of Mitigation and Control Options

The identified hazards will, under normal conditions, be managed through Standard Operating Procedures (SOPs). For those identified hazards where the risks cannot be reduced an ALARP Risk Assessment (RA) will be produced detailing the mitigations in place to reduce the risk to a tolerable level, or to articulate where treatment is needed. The detailed Risk Management Strategy for the port is detailed in the SEMS Chapter 4.

This NRA is therefore, the higher-level management document that supports the construction of the Hazard Log. It will be reviewed formally on an annual cycle and re-issued accordingly. The Hazard Log will be stakeholder reviewed on a 6-monthly basis, a process that will be documented as part of the port's Quality Assurance and Review process (SEMS Chapter 9).

*Falkland Islands Ordinance No. 18 of 1987, Naval Ports Ordinance, dated 18 January 1988
*The Dockyard Ports Safety Management Policy (DPSMP), Issue 3
*Department of Transport's Port Marine Safety Code, updated November 2016
*ECP Marine Safety Management System

CHAPTER 2 – OVERVIEW OF EAST COVE OPERATIONS

2.1 The Port Situation

East Cove Port is situated on the South East coast of East Falkland in the South Atlantic. Almost the newest of the Falkland Port settings, it was built in 1985 to facilitate the building of the new airport at Mount Pleasant following the 1982 conflict.

The port has gone by various names over that time; Mare Harbour Naval Port and East Cove Military Port, but East Cove Port is now in colloquial parlance reflecting the mix of military and commercial business. The port limits encompass Mare Harbour and East Cove, between them providing a reasonably well-sheltered deep-water facilities accessed from the sea through Choiseul Sound.

The port sits in a pristine natural environment rich in bird and marine life. The port limits adjoin the internationally important RAMSAR site of Bertha's Beach, giving a unique environmental responsibility and custodianship for all port activities.

The port is shared with a constantly changing population of Gentoo Penguins, Southern Sealions, Southern Giant Petrels, Rock Shags, numerous gull species, Kelp Geese and many native small birds. Turkey Vultures are regular visitors, as well as the occasional Variable Hawk.

Beneath the water is an environment still poorly understood, but there is a resident family of Commerson's Dolphins, as well as occasional visitors as diverse as Killer Whales, Leopard Seals and South American Fur Seals. At certain times of year there are huge Krill swarms and periodic algal blooms too. There are a number of rich Kelp forests that provide essential natural underwater habitats for a wide variety of species.

In common with many areas, East Cove Port has suffered over the years from poor environmental understanding and awareness. Previous inadequate fencing has allowed sheep into the port areas and this has devastated the native shoreline grasses to the extent that bare earth is now predominant. The shallow peat layer has suffered extensive wind erosion leaving sand banks that are barely fertile and difficult for native plants to re-establish following livestock control. Non-native invasive species, such as Thistle, have been allowed to establish. In turn this has removed much of the natural fauna so essential for breeding and feeding habitat for the native birds the area is renowned for.

Fortunately this lack of care on the land has not extended to the water where the marine environment has been spared the ravages of pollution or exploitation, remaining largely as pristine as it was before the port was developed in 1985.

2.2 Geology and Undersea Features

The Falklands was originally part of the African continental formation (Gondwana) rather than the South American. It is split between very difference rock formations; East Cove is on the northern fringe of the Lafonia Group, comprising mud and sandstone dating back to the Carboniferous-Permain period of 300 million years ago.

This geology has created a coastline with multiple bays, inlets and sounds, and outlying grassy islets. The 100m depth contour is generally less than 10 nautical miles (nm) offshore and shelves rapidly, such that within 2 – 3nm of the shoreline depths rarely exceed 20m.

Mare Harbour and East Cove have depths typically less than 15m. The bottom type is a shallow layer of sandy silt over a rocky base. There are areas where mud is more prevalent, but in general this is a shallow layer over rock.

There is only one estuarine feature in the port authority area; Swan Inlet at the NW corner of Mare Harbour. However, this does not have a high outflow rate and the quantity of deposition is assessed as low.

A key undersea feature of the port is the Kelp forestation. Whilst the main channels are currently clear (2020), closer inshore there are considerable amounts of Kelp bank that are increasing on an annual basis. These are kept under close observation through periodic hydrographical survey. Survey conducted January 2020, awaiting data.

Hazard Considerations:

- Holding ground for anchorages is moderate, but not good.
- Kelp forests will need routine survey to assure they are not impeding navigation in the main channels.

2.3 Tidal Data and Water Movement

Mare Harbour and East Cove are essentially tidal sea lochs accessed from Choiseul Sound. East Cove is enclosed with the only access through the narrow Hecate Channel. A single estuarine feature, Swan Inlet, empties in to the NW area of Mare Harbour; no flow models are recorded, but rates are generally assessed to be not much more than 1 knot (kt).

There are no tidal stream data models currently available. A flow meter was laid in the Hecate Channel in late 2019 and data will reported when available.

Tidal ranges do not exceed 1.1m at Springs (see Table 1), again supporting the assertion that water movement across the port areas is not prone to rates that are liable to have a significant impact on navigation. Invariably wind is the dominant natural factor in consideration of shipping and ship movements.

Place	LAT (S)	LONG (W)	MHWS	MHWN	MLWS	MLWN
Mare Harbour	51 54	58 27	1.3	0.9	0.2	0.4

Table 1: Tidal Levels above Chart Datum

The land surrounding the port is low lying with a maximum height of 30m above chart datum. This dictates that there is very little shelter from the prevalent winds, which are the dominant natural factor affecting the port (see Section 2.4). The predominantly westerly flow of the winds, typically 20 – 30kts, generates short, choppy water across both Mare Harbour and East Cove, but there is little fetch due to the enclosed nature. The short, sharp waves have been known to reach heights of 1 – 2m in a prolonged westerly gale.

Hazard Considerations:

- Vessels are generally not tidally constrained unless they have a particularly deep draft, in which case a separate RA will be needed.
- Absence of qualitative water flow models will need a separate RA until treated.
- Strong winds are the dominant factor determining water behaviour, and will be particularly relevant when determining small boat operations (RIBs, leisure users).

2.4 Weather Factors

The annual wind rose for Mount Pleasant Airfield (MPA) below, shows a prevailing westerly wind, with directions between 200° and 340° accounting for 70% to 80% of observed wind direction, with 290° the prevailing direction. A strong secondary 'spike' exists for Northerly winds, which are more likely to be stronger than Westerly ones. Northerly winds are often accompanied by extremely gusty and turbulent conditions caused by high ground to the north; these conditions generally extend South to ECP, although conditions experienced can be markedly different from those at the airfield 10km to the North. Winds from broadly East and South Easterly directions are of relatively low frequency; Easterly winds in particular, are often accompanied by quite poor weather conditions, low cloud and reduced visibility. In summer, lulls in the wind can be experienced around dawn and dusk.

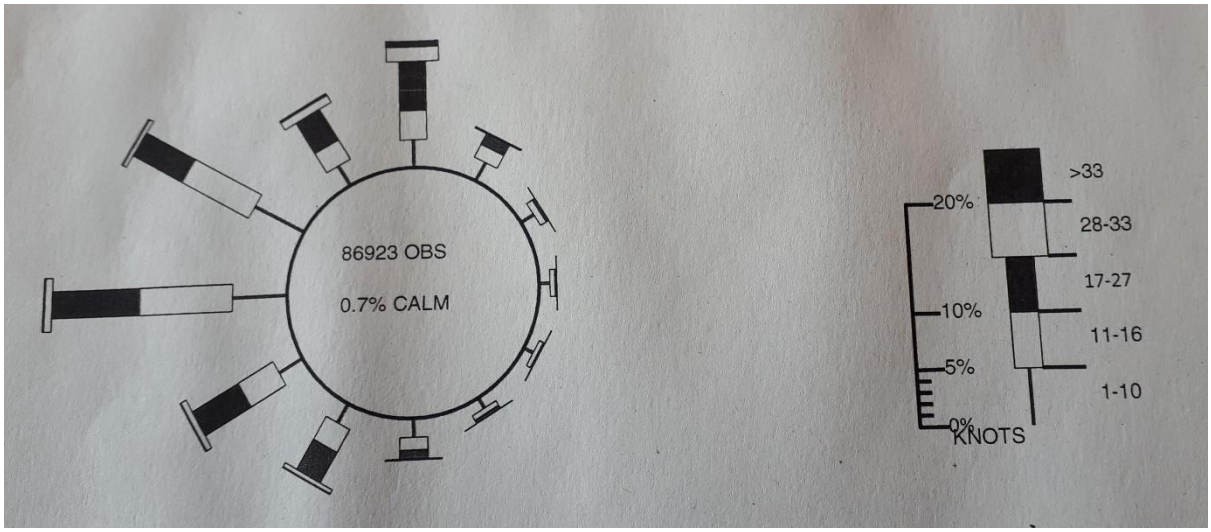


Table 2: Wind Rose

Strong winds (i.e. Force 6 or greater) occur approximately 25% of the time most months whilst gales occur around 2% to 4% of the time. There is a slight seasonal bias as to when stronger mean winds are most frequent, 1986 to 2010 averages indicating the summer half of the year as being slightly windier than the period April to August. Gusts exceeding 33 knots can be expected to occur on approximately 66% of days, whilst gusts in excess of 47 knots occur, on average, 3 or 4 days per month. Gusts exceeding 60 knots can be expected, on average, about once a month and gusts exceeding 70 nots can, on average, be expected about once a year. The highest gust recorded at MPA is 72 knots in March 1992.

Hazard Considerations:

- Wind strength and direction are the dominate factors in all ship movement and operational decisions for ECP.
- Operating limitations should be clearly defined in General and Special Directions.

2.5 Infrastructure

This section on infrastructure covers berths, moorings and Aids to Navigation (AtoN).

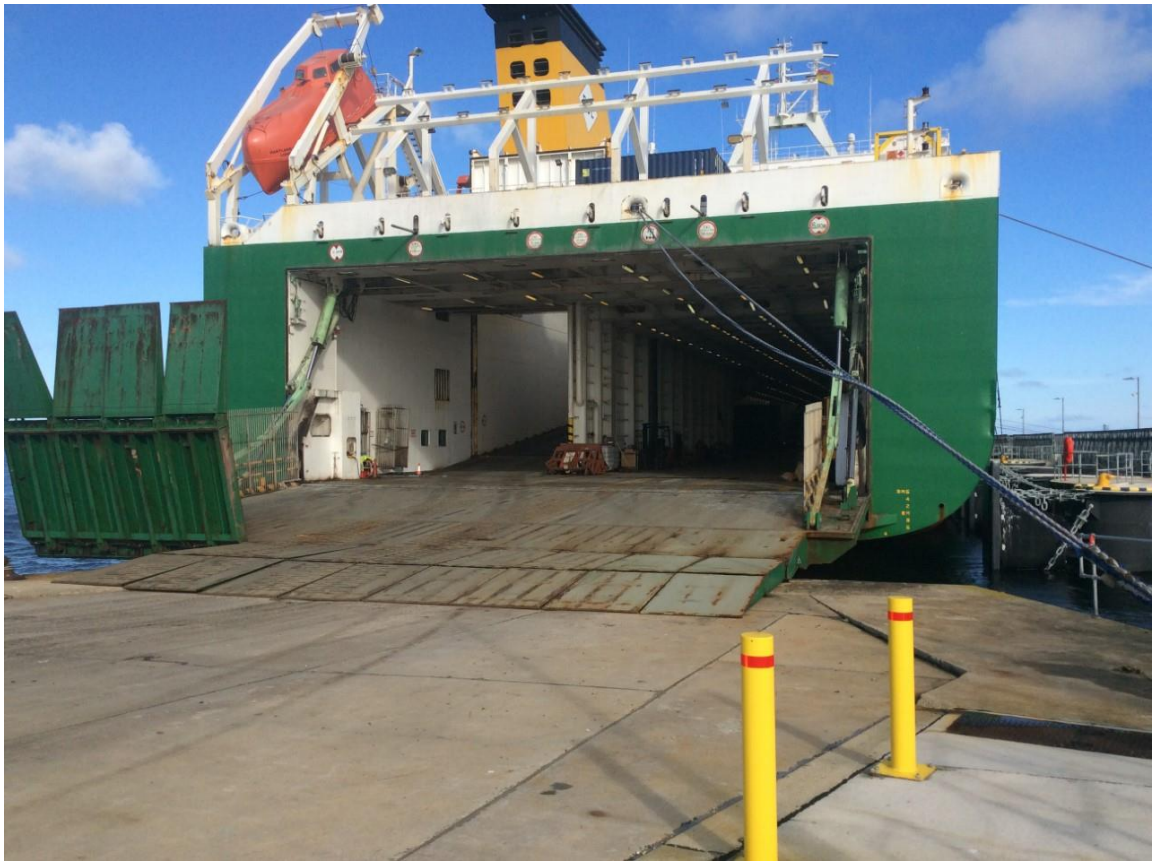
2.5.1 Berths

Main Jetty: A T-shaped jetty projecting from the north face of East Cove; outer face concrete with rubber strakes and a chart datum of 8.1m. Yokahama fenders are provided and positioned according to the size of the ship.

Hazard Considerations:

- Strong cross winds may require tug support to augment mooring capability given the bollard limitations.

RoRo Jetty: The RoRo terminal comprises of 6 mooring dolphins 40m apart, connected by walkways, extending West from the western extremity of the Main Jetty, but displaced to the North to allow stern ramp vessels to operate. The RoRo underwent a complete upgrade in 2017 and this included the addition of 2 further mooring dolphins. The depth at chart datum is 8.6m



Picture 2 – RoRo moored alongside Jetty viewed from the landing ramp.

Hazard Considerations:

- Personnel on the bridges and dolphins are particularly vulnerable during large ship moves. Close liaison between Jetty and Pilot required before committing personnel to manning the dolphins.

West Jetty: A T-shaped Jetty 4 cables to the West of the Main Jetty. Primarily for the FIPV. Depth at berth 7.8m.

Main Jetty (Inner): This 30m berth is used by the Marine Services provider to berth the multi-purpose barge and two harbour tugs. Small mooring bollards are provided and only used for the smaller vessels that use this relatively sheltered berth.

Picture 3 – Main Jetty Inner with tug and barge berthed.

Small Boat Pontoon: A 30m X 10m floating pontoon linked to the shore by a walkway. The berth is to the north side of the Main Jetty and is used for berthing smaller RHIBs or yachts. There is a VersaDock complex for the safe storage of the RHIBs and RRC on the north face of the pontoon. The pontoon was upgraded in 2017 to include power, water and lighting facilities.

Picture 4 – Small Boat Pontoon with VersaDock.

2.5.2 Moorings

Single Point Mooring (SPM): The SPM is a Catenary Anchor Leg Mooring (CALM) used for the receipt of bulk fuels from an ocean going tanker. A second, reserve buoy is moored in Camp Bay.

Picture 5 – tanker at the SPM Buoy.

Hazard Considerations:

- Mooring operations at the SPM will always mandate 2 x tugs to be in attendance; one to hold the hoses clear and one to assist with vessel holding position whilst connecting.

2.5.3 Aids to Navigation (AtoN)

Channel Marker Buoys: ECP has 10 channel marker buoys, consisting of 3 starboard markers, 5 port markers and 2 cardinal danger marks. The port is in IALA (International Association of Lighthouse Authorities) Region B. The buoys are maintained by the harbour tug crews; the tugs have buoy maintenance and anchor handling capability. The contract for the buoys is managed by the Salvage and Marine Project Team, DE&S, based at Abbey Wood.

Picture 6 – Channel Marker Buoy undergoing maintenance at stern of tug.

Shore Navigation Light Beacons and Day Marks: The shore beacons and day marks were installed in 1985 as part of the port construction project. Typically they are a 1.5m wooden triangle, fluorescent painted and mounted on a concrete block approximately 1m high.

Picture 7 – the newly installed Beacon India.

Hazard Considerations:

- Piloted moves for ships unfamiliar with waters due to poor visibility of marks.
- Over-inspection of shore lights due to unreliability until ALL replacements installed.
- Restrict moves to daylight, good visibility unless operationally essential.

Jetty and Obstruction Marks: Are well lit, having undergone improvement during the RoRo berth upgrade.

2.6 Vessels Using The Port

This section describes the typical vessels that use the port over the course of an average year. Detailed analysis and breakdown of movement date is covered in Chapter 3.

2.6.1. Warships

Falkland Islands Patrol Vessel (FIPV). HMS FORTH is the standing FIPV and generally uses West Jetty as her primary berth. The ship is 90m long with conventional twin screw propulsion and a bow thruster. FIPV is one of the few vessels that would routinely attract a Pilotage Exemption Certificate (PEC).

Picture 8 – HMS FORTH (credit David Mackinnon MarineTraffic.com)

Hazard Considerations:

- HMS FORTH routine moves will be programmed for daylight working hours.
- Safe control of tugs is essential. PEC holders are required to spend time on the tug to manoeuvre it and be briefed.

Frigates and Destroyers (DD/FF). ECP can handle DD/FF who are mandated to take a Pilot.

Hazard Considerations:

- As with HMS FORTH, experience of handling conventional tugs is a weakness.
- Pilot will be embarked.

Royal Fleet Auxiliary (RFA) Vessels. RFA operating patterns generally match those of DD/FF.

2.6.2. Research and Patrol Vessels.

British Antarctic Survey (BAS). Over the course of the Austral Sumer (Nov-Mar) ECP hosts RRS SIR DAVID ATTENBOROUGH for logistic support, bunkering and crew changes. The BAS vessels are able to take fuel alongside. The ships are well handled and with Dynamic Positioning (DP) classification, are highly manoeuvrable for berthing. Main, RoRo

or West have all been routinely used for these vessels. Other vessels can be supported where there is a Memorandum of Understanding (MOU) in place.

PHAROS SG. The Fisheries Patrol vessel for the Government of South Georgia and The South Sandwich Islands (GSGSSI). PHAROS calls at ECP approximately once every 6 weeks for bunkers; typically she anchors in MH and bunkers from one of the harbour tugs (approx.; 100m3 diesel). A PEC is required. Letter of agreement in place between BFSAI and GSGSSI.

Picture 10 – The PHAROS.

Hazard Considerations:

- Bunkering at anchor will need careful OSR consideration.
- Consider weather limitations for bunkering.
- Location of OSR equipment for bunkering ops at anchor.
- Additional Spill Kit now carried on the tugs (as of 2019).

2.6.3. Ro Ro and Lo Lo Vessels on Contract

The primary logistic supply route for BFSAI utilises a POINT Class strategic Ro Ro vessel, which calls approximately once every 6 weeks. The vessels berth on the RoRo terminal and discharge/load via a stern ramp. Headlines can now be used for safer mooring due to an upgrade of the berth IN 2017.

Picture 11 - LoLo vessel sent in lieu of FIRS due to Brexit.

Picture 12 – Point Class (FIRS) alongside the RoRo berth unloading small craft with own crane.

Hazard Considerations:

- Two tugs mandated for large vessel moves.
- POINT Class is vulnerable to Northerly winds once alongside.
- Tugs will always be at immediate notice to ‘push-on’ when POINT berthed on RoRo.

2.6.4. Tankers

Bulk fuel is delivered to BFSAI by contracted ocean tankers. The vessel moors to the SPM with the assistance of both harbour tugs and a RHIB for buoy-jumping duties. Pilotage for these vessels is mandatory. This mooring is rated to 35,000 tonnes in winds up to 42 knots mean.

Picture 13 – Tanker secured to the PSM.

Hazard Considerations:

- SPM Safety and Environment Management Procedures and Discharge SOP preparations must all be in place prior to committing to mooring.
- Two tugs mandated for SPM operations.
- Strict wind limits to be enforced.

2.6.5. Other Commercial Vessels.

Generally, commercial vessel calls to ECP are rare. However, 2019/20 saw a succession of commercial LoLo vessels visiting the port to discharge cargo for capital works projects. Early liaison with the QHM is always established to assure that the vessel is suitable for entering the port. A Pilot is mandatory.

2.6.6. Harbour Tugs and Multi-Purpose Barge.

Towage in MH is provided under MoD contact by the Netherlands Marine Services company Van Wijngaarden. Two 45 tonne bollard pull tugs are based in the port – GIESENSTROOM and DINTELSTROOM. These are conventionally propelled 30m Damen Shoalbuster tugs, with twin fixed propellers in Kort Nozzles and a 250HP bow thruster. They are well handled, but generally less manoeuvrable and more susceptible to girding than Voith Schneider or Azimuth Propulsion tugs. The tugs are in class with Bureau Veritas and introduced an ISM accredited Safety Management System in 2017. The contract also includes a multi-purpose barge (MP2003), which holds 300 cubic metres, used for transporting fuel to the West Falkland operations, two cranes and independent generators. The barge can also be fitted with vehicle ramps, an ‘A’ frame for heavy anchor or buoy maintenance work (including SPM) and has ISO container securing points. It is also used to embark a commercial diving operation with all their equipment for the maintenance of the SPM and undersea pipeline.

Picture 14 – One of the harbour tugs working with the Point class. Picture 15 – tug working with HMS FORTH.

2.6.7. Small or Leisure Craft.

There is no formal leisure craft operation at ECP. The military port limits are a restricted area and are therefore not subject to passing or transit craft.

ECP hosts its own RHIB for harbour duties. The port engineering team maintain and support HMS FORTH boats. BFSAI boats are either removed from the water via the slipway or berthed on the VersaDock complex.

Hazard Considerations:

- Prevalent strong winds and unpredictable weather conditions dictate high risk conditions for the operation of small boats.
- Steep, choppy seas create testing conditions for inexperienced RHIB Coxswains.
- There are no SAR facilities for small boats in difficult in shallow inshore waters.
- 'Operational Acquaint' sorties in RHIBs need to be tightly controlled to mitigate the 'red mist' factor.
- Weather limits (QHM Directions) to be strictly applied.
- Lack of navigation equipment in the boats dictates boats to remain in sight of Port Ops unless 'handed over' to another controlling unit and associated SOP.

2.7 Port Operations

This section describes the typical operations that are conducted in the port, such as bunkering, bulk fuel discharge or cargo handling.

2.7.1. Berthing. On the Main and RoRo berths the line party / riggers are provided by 460 (Port) Troop RLC. 'Toolbox Talks' are given prior to each berthing event and correct PPE issued. An independent Supervisor (JNCO or SNCO) oversee the operation. Where available QHM, DQHM or PSM, attend to provide higher-level maritime awareness and liaison with the Pilot and/or Ship's Navigator. A Green Flag will be positioned to indicate the compass position based on pre-measurement of the desired berthing position in relation to the length of the Jetty. Yokohama fenders are similarly positioned. Communications with the line party are maintained via VHF radio.

A similar regime is followed on West Jetty. However, the line party is provided by the Naval Engineering Party (NEFI) and overseen by an RN SNCO Seaman Specialist.

The tugs 'self-berth' on the Inner Jetty and maintain a current Risk Assessment for stepping ashore and handling their own lines.

Modern, approved brows are provided on Main and West Jetties. West has a cantilever design 9m brow, whilst on Main a choice of 6m or 9m aluminium 1m wide straight brows are available. Vessels berthing on the RoRo Jetty will be provide with a suitably sized brow according to their transom or flight deck arrangements. These require careful placing due to the sloping nature of the RoRo landing area. Brows are positioned using a 35t cane operated by Port Troop. Ships are required to provide their owns safety nets.

Hazard Considerations:

- Careful bollard management is required when two or more ships are berthed between Main and RoRo due to the small number of bollards fitted. Dipping of ropes.
- Line handling in strong winds presents challenges, particularly when operating from mooring dolphins to the RoRo, the Eastern end of the Main or both ends of West Jetty.
- Gangway positioning on RoRo landing area needs care due to slope and proximity to edge.

2.7.2. Bunkering

Bunkering details are available from QHM on request.

2.7.3. Bulk Fuel Discharge.

Bulk fuel discharges/receipts are conducted at the SPM. QHM is responsible as Deputy Duty Holder for all aspects of the discharge operation from mooring and buoy operations, and equipment safety and serviceability of the SPM itself and the undersea pipeline to the beach-head valve. OC of the Fuels and Lubes unit has Duty Holder responsibility from the beach-head valve to the PSD tanks. The SPM is covered by a local Operators Safety Case and a robust SOP. In addition to the on-Island Oil Spill Response (OSR) capability, additional Level 5 expertise is contracted to attend bulk discharge operations.

Hazard Considerations:

- Strict OSR precautions and Permit to Work regimes to be applied for all fuel transfers due to sensitive nature of port environment and proximity to RAMSAR site and important bird area.

2.7.4. Cargo Handling.

Stevedoring functions are provided by 460 (Port) Troop of the RLC who are based at Marchwood, Southampton. Troop soldiers are posted to the port and hold all the relevant equipment operating certificates and licenses for plant (fork-lifts, top-loaders, etc.) and mobile cranes. For major offload and unload operations, the Troop are augmented by drivers locally contracted from the Falkland Island Company (FIC) under a global arrangement through DHL/DSCOM. ECP employs a Marine Superintendent to oversee the safe loading/unloading of cargo.

The Port maintains a large import park paved with a concrete surface and an export park that has a compacted mud/shale surface. The import park has 16 reefer power points.

Hazard Considerations:

- Traffic entering the port and proceeding to Port Ops building or jetties has no option other than to pass through working container parks.
- Careful control of access, briefing and traffic management required during cargo working operations.

2.7.5. Aids to Navigation Maintenance.

The Aids to Navigation are split between ‘wet’ and ‘dry’ for maintenance.

Wet. The buoys and channel markers are under a repair and replacement contract arrangement with the Salvage and Marine (SALMO) Project Team under Defence Equipment and Support (DE&S) at Abbey Wood. The buoys are checked on a weekly basis b the tug crews who are also responsible for their maintenance. Spare parts are ordered/organised by the Port Services \manager (PSM) through SALMO. Comprehensive maintenance records are maintained by SALMO with copies held by QHM and the tugs. Test

certificates, where applicable, are held by SALMO (chains, shackles, etc.) The tugs are contracted with a comprehensive buoy and anchor handling capability.

Dry. Responsibility for the maintenance of the defence estate is vested in the Defence Infrastructure Organisation (DIO). DIO sub-contract maintenance in the Falkland Islands to Mitie.

2.7.6. Personnel Transfers.

Personnel transfers to and from ships in the roads are generally conducted by the harbour tugs. Their class certification imposes a limit of 11 passengers who can be carried within harbour limits. However, DINTELSTROOM has the capability to embark a crew cabin, which allows her to carry a total of 40 persons (including crew) within harbour limits. Transfers are programmed following liaison between ship and QHM/DQHM to ensure numbers are not exceeded. Weather limitation always apply and transfers are at the discretion of the Tug Master.

The tug construction with a relatively high fore-deck and gate in the 'garden wall', allows for a relatively safe 'step across' transfer to many classes of ship, or is in a stable position for a pilot ladder.

Occasionally ships utilise their own RHIBs for passenger transfers. The launch of a RHIB will always be at CO discretion, but invariably involves a discussion with QHM to agree suitability of conditions in the harbour.

Hazard Considerations:

- Strict passenger number control needs to be applied at the programming stage to avoid breaching class safety limitations.
- Weather and vessel movement limitations will be at the discretion of the Tug Master, but may also be overridden by the QHM.

2.7.7. SAR Training Activity with Helos.

BFSAI has a contracted Search and Rescue (SAR) helicopter capability that utilises two AW 189 helicopters operated by 'Team AAR'. The service is primarily designed for military SAR cover in support of fast jet activity. However, a 'best endeavour' service is offered on a humanitarian basis in accordance with IAMSAR principles for other emergencies at sea or on land. To maintain crew currency, ECP tugs are programmed in support of winching drills with the AAR helicopters. The activity is typically conducted in Choiseul Sound, outside of port limits, giving plenty of sea room for the tugs to manoeuvre and maintain winching wind limits for the aircraft.

Winching drills are not routinely approved in the port areas due to the proximity to sensitive wildlife areas and limited sea-room.

2.7.8. Military Training Activity.

As a military port, military training within the port areas, military training will take place periodically.

2.7.9. Flying From Vessels Alongside.

Each request is considered on a case-by-case basis. Flying activities are covered by an SOP, which includes the necessity for jetty clearance, FOD precautions, sentries and notification. Aircraft are generally instructed to route away from the port area to the West through the Hecate Channel to minimise interaction with the RAMSAR site and Import Bird Areas to the East of the port limits around Bertha's Beach and Kukri Point.

Drone flying is considered on a case by case basis.

2.7.10. Small Boat Operations.

Strict operational limits are applied by SOP and General Direction for the operation of small boats, acknowledging the increased risks of limited SAR cover, weather and lack of navigation fit to the boats.

Survey Motor Boat (SMB). Visiting hydrographical survey vessels (HMS PROTECTOR, HMS ENTERPRISE, etc.) frequently operate their SMB within the port areas in support of ongoing survey activity. These craft have comprehensive navigation suites and enclosed crew cabins and are therefore, more capable of operating in more testing weather conditions. A discussion between ship (CO Duty Holder) and QHM will normally agree weather parameters and suitability on a sortie-by-sortie basis.

Hazard Considerations:

- Prevalent strong winds and unpredictable weather conditions dictate high risk conditions for the operation of small boats.
- Steep, choppy seas create testing conditions for inexperienced RHIB Coxswains.
- There are no SAR facilities for small boats in difficulties in shallow inshore waters.
- 'Operational Acquaint' sorties in RHIBs need to be tightly controlled to mitigate the 'red mist' factor.
- Weather limits (QHM Directions) to be strictly applied.
- Lack of Navigation Equipment in boats dictates boats to remain in sight of Port Ops unless 'handed over' to other controlling unit iaw SOP.

2.7.11. Leisure Activity (Kite and Windsurfing).

Watersports in ECP are extremely rare due to the generally harsh weather and sea conditions. As an enclosed bay harbour there is no passing traffic and the remote location on the South side of East Falkland dictates that it would be unusual for it to be a transit stop. However, there are occasional requests for wind or kit surfing activities at the Eastern end of East Cove. The predominantly Westerly winds give relatively 'clean' air down to the shallow end of the bay at Bertha's Beach, rendering it a reasonably safe sailing area. However, a robust SOP and sign-out procedure is in force due to the lack of formalised SAR cover.

2.7.12. Diving Activities.

Service Diving. Service diving activity is relatively rare, with typically HMS PROTECTOR the only platform with a service diving team embarked. Although operating under DSA 02 – DMR Defence Diving Regulations, ECP also requires that they fulfil the port Permit to Work regulations.

Commercial Diving. Commercial diving is regulated under the HSE Diving at Work (DWR) regulations. ECP has a regular schedule of diving as part of the maintenance framework for the SPM and undersea pipeline. This is part of an enduring contract (CB/3267) between DE&S and SALMO Project Team and Briggs Marine Ltd. Briggs maintain a containerised full saturation diving capability in theatre; the system is designed to fit on the multi-purpose barge and includes compressors, diving bottles, 2-man decompression chamber, underwater camera equipment and a hoist for the deployment and recovery of divers.

Commercial divers are subject to their own method statements and safety systems to meet the requirements of HSE and DWR as a requirement of their contract with DE&S. ECP has pre-sight of the dive plans and systems prior to any diving mobilisation. The safety systems are also audited by an attending DE&S representative.

ECP also maintains a robust Permit to Work (PTW) system which requires a face-to-face briefing with QHM or PSM prior to completion of the permit and permission to dive being granted. The permits never exceed a single working day and are formally closed daily once all divers are safely recovered ad work complete. QHM does not delegate this authority other than in writing if off-island.

Adventurous Training (AT) Diving.

Since 2018 there has been no sub-aqua Club diving.

Hazard Considerations:

- Diving is a high risk activity whoever is conducting it.
- Authorisation for diving will always be held strictly b QHM or PSM reflecting the importance placed on correct application of procedures.
- Diving Permit to Work systems must always be adhered to.
- Contract divers must provide evidence of Safe Systems at Work and emergency plans.

2.8 Port Management and Control

This section describes those activities connected to the day-to-day management and control of port operations.

2.8.1. Traffic Control. ECP has insufficient traffic to require a Vessel Traffic Service (VTS). Instead it operates a Local Port Service (LPS) which is able to provide limited information service to vessels which use the port.

LPS Radio Operators. The VHF radio is manned by QHM and soldiers from 460 (Port) Troop, 17 Port and Maritime Regiment, Royal Logistics Corps.

Reporting Points. ECP has two reporting points – Fox Point for arrival / departure into Choiseul Sound and Pandora Point for the entrance to the port authority area. The point of no return is due West of Arrow Point.

Anchorages. There are no nominated anchorages in the port authority area. The most common anchorage position is in Choiseul Sound, 2nm West of Pandora Point in reasonable holding ground on the South West of Johnson's Island.

2.8.2. Pilotage Service.

Pilotage Service. QHM is the Competent Harbour Authority (CHA) and provides a pilotage service; QHM authorises, examines and assesses pilots. Pilots are generally available, on call, within approximately 6 hours. Pilotage is published in QHM Directions as being conducted under the framework of the 1987 Pilotage Act. There is ongoing training requirement for Pilots within the National Occupational Standards for marine pilots.

Pilotage Exemption Certificate (PEC). Masters or COs of vessels can request a PEC in ECP. However, as the majority of vessels make only infrequent calls and then typically with a new Master each time, few vessels meet the eligibility criteria for a PEC. Following discussions, an oral test with the QHM and PSM or Pilot, and a tug acquaint will take place before the PEC is issued.

Pilot Boarding. The Pilot boards from one of the Harbour Tugs in Choiseul Sound, usually 1nm East of Choiseul Sound Shoal Buoy, which gives sufficient time for briefing and consideration of the plan prior to committing to the Channel passing Pandora Point. Whilst the tugs do not directly meet the ACOP for Embarkation and Disembarkation of Pilots, they nevertheless provide a stable platform for the transfer. The risks and mitigations are covered by separate Risk Assessment.

2.8.3. Towage.

Towage. Two Harbour Tugs are provided as articulated in this document. Towage procedures are fully detailed in QHM Directions. Invariably the tugs will be controlled by the experienced ECP Pilot when connected to vessels in the harbour for berthing or unberthing operations. The exemption is HMS FORTH who is generally awarded a PEC. Large vessels are not permitted to berth in the port without the attendance of two tugs; if operational circumstances dictate that one or both tugs are unavailable, a separate dynamic risk assessment is conducted.

2.8.4. Oil Spill Response.

The following marine pollution risks are present at ECP:

- The Single Point Mooring (SPM) in Mare Harbour.

- The SPM also has the capability to deliver fuel.
- Vessels refuelling alongside from a road tanker.
- Bunker transfers takes place at anchor in Mare Harbour.

Oil Spillage Contingency Plan (OSCP). ECP maintains a comprehensive OSCP, authored by a specialist environmental company and regularly reviewed and tested. It is signed off by the MCA and Falkland Islands Government and has been validated by the JFC [sic] (as SDH) Environmental Competent Authority. The plan recommends holding in excess of the normal Tier 1 response capability (Tier 1 being the most credible size of spill likely to be encountered) given the remote location and additional time it would take to mobilise reinforcements. Plans are also held for remote fuel operations on West Falkland.

Oil Spill Response (OSR) Contract. A comprehensive OSR contract enables Tier 1 response on island and Tier 2 response from the UK.

Hazard Considerations:

- Strict OSR precautions and Permit to Work regimes to be applied for all fuel transfers due to sensitive nature of the port environment and proximity to a RAMSAR site and Important Bird Area.

2.8.5. Rigging and Line Parties.

For the Main and RoRo jetties, line parties are provided by soldiers from 460 (Port)Troop, 17 Port and Maritime Regiment, Royal Logistics Corps.

West Jetty line parties are provided by NEFI and are overseen by an RN Seaman Specialist Petty Officer.

2.8.6. Gangways.

The port holds a selection of gangways.

Picture 16 – Cantilever gangway being moved.

2.8.7. Fenders.

Main and West jetties are protected with Yokohama-type fenders, with large and small sizes available. They are routinely inspected and serviced and positioned according to the specific requirements of differing classes of vessel. RoRo berth fenders are of a commercial ferry style with a vertical slab sided configuration.

2.9 Navigation

2.9.1. Normal Approaches to Mare Harbour and East Cove. The following notes are indicative of the current standard approach from open sea through to approaches to the berths. This approach does not fully follow the charted leading lines and has evolved over the years as established 'best practise' based on available safe water and climatic conditions. These notes are provided to enhance understanding of the leading lines indicated on Admiralty Chart 2506:

Leg 1 (L1): The normal line of approach is to proceed westerly along Choiseul Sound heading for Centre Island and when passed Choiseul Sound Shoal Cardinal 'Bravo' buoy on the starboard beam, ships will then turn on to 014° baring following the sectored light and day marks of Juliet Beacon. As the predominate wind direction is westerly, inbound vessels tend to bias towards Whaler Reef Buoy ('Delta') as close as possible to maximise sea room off of Prominent Point. At this range the leading marks ('Juliet') are impossible to pick out. NB: April 2020 proposed new lights are due to be fitted in the next few months West of the existing position. Proposed new heading 007° - Notice to Mariners to follow once work is complete.

Leg 2 (L2): With Whaler Buoy passed to port, India Beacon opens up for the recommended heading of 331°. However, as India Beacon is largely indistinct against the background, most ships make for the SPM Buoy. Once Johnson's Shoal ('Golf Buoy') is abeam to port, ships commence the turn to starboard for the Hecate Channel. The channel entrance is not obvious to the unfamiliar and some ships utilise a short intermediate leg again, using Juliet Beacon as a head mark.

Leg 3 (L3): As the Hecate Channel opens up, Providence Point beacon comes in to view, although again it is difficult to pick it out against the background. The sectored light is of low intensity and is currently misaligned. The charted 107° bearing does not utilise the channel to its maximum advantage and most vessels steer 108°.

Leg 4 (L4): Once through the Hecate Channel, vessels come off 108°as required to come round to suit the allocated jetty and wind of the day. Invariably vessels make full use of the sea room to the eastern side of East Cove approaching Kukri Point beacon to swing and then berth bows west in to the prevailing wind. Kukri Point beacon is currently of limited value as a leading headmark. The beacons are therefore reduced to an additional fixing point.

The outbound passage follows essentially the reverse tracks; however, there are no dedicated lights or leading marks to follow other than utilising the existing beacons as stern-markers.

Hazard Considerations:

- Channels are subject to steady Kelp encroachment, which will require regular survey to monitor rate of progress.
- Navigation marks and lights are indistinct – restrictions on night and poor visibility movements may be appropriate.

- Day marks and beacons are incorrectly placed for optimal channel navigation. Piloted moves where possible will mitigate until new marks are placed.

CHAPTER 3 – VESSEL MOVEMENT ANALYSIS

3.1 Vessel Movement Planning

The long term programme for ECP is administered by DQHM in his role as SO2 J3 Maritime in HQBFSAI. In this position they are able to coordinate and manage multiple stakeholders and agencies in the primary task of operational output (warship programmes), which will always take operational priority for harbour movements and berth allocation. They are also best placed to liaise with the HQ logistics cell who maintain contact with DSCOM and DHL as well as MoD agencies for the scheduling of the FIRS and ocean tanker programmes.

DQHM combines this date into a document called the South Atlantic Programme (SAP), maintained at a higher security classification level and issued monthly. This document also contains the master berthing plot.

From the SAP vessel movements are planned and recorded in the Falkland Islands Naval Weekly Operational Programme (FINWOP), which is a two week look-forward programme with Week 1 in detail and Week 2 in draft. Users of the maritime space bid for arrival / departure times, use of facilities such as mooring, or tugs / RHIBs for training.

The FINWOP is moderated, de-conflicted and agreed at a weekly port conference for all stakeholders. The programme is published weekly on a Friday, with programme changes issued by e-mail as and when they arise.

Actual movements in and out of harbour, together with transcripts of radio conversations, are then recorded by the East Cove Port Ops Controller (ECPOC) in the Occurrence Log.

3.4 Mitigation Measures

Hazard Considerations:

- Any high sided vessel on the berths, especially the RoRo need mitigations. The resultant mitigations includes;
- Two tugs to be on immediate standby throughout the visit.
- Tugs to ‘push on’ when winds exceed 30kts with a Northerly component.

CHAPTER 4 – RISK AND HAZARD ASSESSMENT METHOD

4.1 Introduction. The PMSC (Art 2.1) mandates a formal assessment of hazards and risks as the foundation of the Marine Safety Management System. This Navigation Risk Assessment (NRA) fulfils that mandate by thoroughly research the port operations as a means of understanding the prevalent hazards and attendant risks. MARNIS is the port's marine Hazard log and risks tracker.

4.2 Definitions. The NRA makes a clear distinction between hazard and risk.

- Hazard is something with the potential to cause harm, loss or injury.
- Risk is the combination of frequency of occurrence and consequence (outcome).

4.3 Stages. The NRA follows the model of a 5-stage approach to the analysis:

4.3.1. **Problem Identification, Scoping and Understanding.** Chapter 2 articulated a comprehensive overview of ECP operations, noting by section the key hazards to be considered when formulating the overall risk profile. Chapter 3 developed an understanding of the routine port user community, identified patterns of traffic use and the historic (as far as records allowed) trend of significant accidents.

4.3.2. **Hazard Identification.** A comprehensive stakeholder-led assessment of the hazards prevalent in the port. This chapter (Chapter 4) articulates the method for creating a Hazard Log, which tabulates the identified hazards across the port operation.

4.3.3. **Risk Analysis.** Within the Hazard Log the hazards are ranked by frequency and occurrence to give a clear picture of which risks are acceptable and require no action, those that are tolerably (As Low As Reasonably Practicable – ALARP) and those which are intolerable and require further control or treatment. The HL details closely the control measures already in place, considers additional measures that may be invoked as resources allow, and signposts to the Risk Assessment (RA), Standard Operating Procedure (SOP) or Emergency Operating Procure (EOP) which applies.

4.3.4. **Risk Control.** Where the HL indicates a score in excess of ALARP, measures are indicated by separate RA, which may be transferred across the Duty Holder chain as articulated in the SEMS Chapter 4.

4.3.5. **Risk Review.** This NRA will be reviewed by stakeholders on an annual basis. The HL will be reviewed by stakeholders on a 6-monthly basis, or following a change in process, design, legislation, infrastructure or operating patterns.

4.4 Assessment Area. The port has been divided into three areas as shown at Illustration X, reflecting the different types of marine activity.

The three main areas are;

- **Area A** – The main approaches to the port through Mare Harbour and the narrow Hecate Channel that leads to East Cove.
- **Area B** – East Cove, once through the Hecate Channel.
- **Area C** – The Single Point Mooring (SPM) and northern part of Mare Harbour.

A fourth area, the 'dry' operation of the port, is considered under a separate section of the HL.

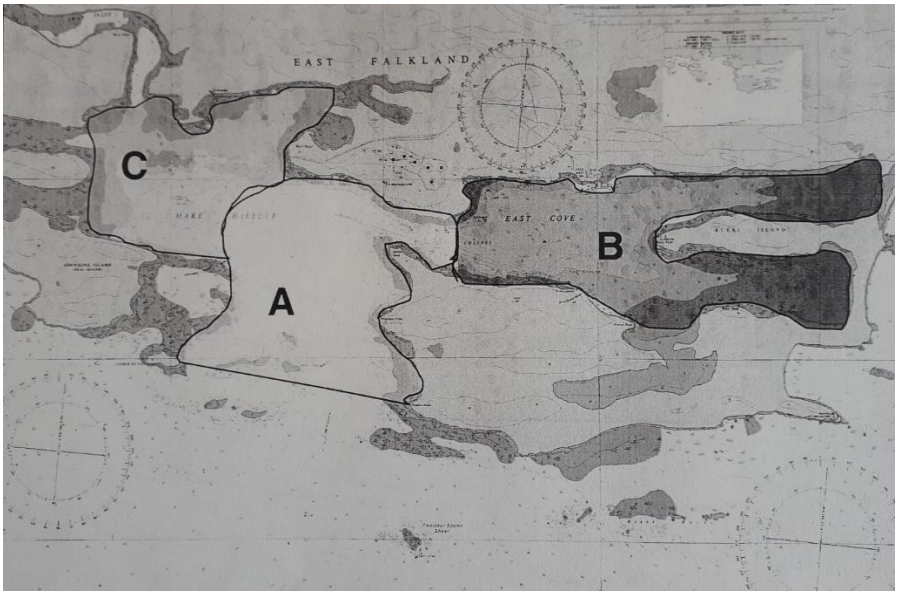


Table 4: East Cove Port geographical zones used for hazard identification.

This sub-division of areas allows deeper analysis of the hazards and risks if required as generally the different zones are utilised by difference classes of marine activity; for example Area C – the SPM – is generally an area restricted to those conducting fuel operations as an effective means of safeguarding critical infrastructure.

4.5 **Identification of Hazards.** The hazards tabulated in the HL were identified as the result of an extensive stakeholder consultation through a series of workshops and forums, and also by telephone and email where necessary for clarification or advice. Those consulted at various stages through the process included;

- Queen's Harbour Master
- Deputy Queen's Harbour Master
- Port Safety Manager
- Naval Engineering Falkland Islands (NEFI) OC and SNCOs
- 460 (Port) Troop OC and SNCOs
- ECP Chief Pilot
- Tug Masters and Mates from harbour tugs (Van Wijngaarden)
- Theatre Health and Safety Officer
- BFSAI Fuels and Lubs organisation
- Falkland Island Patrol Vessel
- Captain Port Operations
- Defence Maritime Regulator (Environment)
- Defence Marine Services
- Port user community – British Antarctic Survey (BAS), Government of South Georgia and South Sandwich Islands (GSCSSI), Byron Marine Ltd.
- DE&S SALMO
- Defence Infrastructure Organisation (DIO)

4.6 **Assessment Method.** Having identified the prevalent hazards in the port, the HL then assesses the risks by likelihood (frequency) and consequence (outcome). The scoring is done against **MOST LIKELY** consequence and **WORST CREDIBLE** outcome against the following four functional areas;

- **People** (Risk to life)
- **Property** (Risk to fixed infrastructure)
- **Environment** (Risk of environmental damage or pollution)
- **Operations** (Risk that the operational output is damaged, to include reputational damage).

For both frequency and consequence a scale of 1 (lowest) to 5 (highest/most severe) is used as follows;

4.6.1. **Consequence.** Consequence is graded as follows:

Category	People	Property	Environment	Operations
C1	**Negligible** Possible very minor injury (i.e. bruising)	**Negligible** Costs less than £10K	**Negligible** No effect of note. Tier 1 may be declared but criteria not necessarily met. Costs less than £10K	**Negligible** Costs less than £10K
C2	**Minor** Single minor injury	**Minor** Minor damage, costs between £10K and £100K	**Minor** Tier 1 – Tier 2 criteria reached. Small operational spill with little or no effect on environmental amenity. Costs between £10K and £100K	**Minor** Bad local publicity and/or short term loss of revenue. Costs £10K to £100K.
C3	**Moderate** Multiple minor or single major injury	**Moderate** Moderate damage – Costs £100K to £1M	**Moderate** Tier 2 spill criteria reached but capable of being limited to immediate area within port confines. Costs £100K to £1M	**Moderate** Bad widespread publicity. Temporary suspension of operations or prolonged restrictions within the port. Costs £100K to £1M.
C4	**Major** Multiple major injuries or single fatality	**Major** Major damage Costs £1M to £10M	**Major** Tier 3 criteria reached with pollution outside harbour limits, necessitating external specialist support. Costs £1M to £10M	**Major** National publicity. Temporary closure or prolonged restrictions on operation of port. Costs £1M to £10M
C5	**Catastrophic** Multiple fatalities	**Catastrophic** Catastrophic damage to port infrastructure. Costs over £10M.	**Catastrophic** Tier 3 spill criteria reached. International support required. Widespread shoreline contamination. Significant threat to environmental amenity. Costs over £10M.	**Catastrophic** Internal media coverage. Port closes. Operations seriously disrupted for extended period, with attendant effect on resupply to MPA. Costs over £10M.

Table 5: Consequence Table.

4.6.2. **Frequency.** Frequency is graded based on a prediction of an incident happening either by number of movements or against a time basis. Although necessarily a subjective assessment given the paucity of long-term records, bias is reduced through using a common assessment approach (the 'stakeholders').

Scale	Description	Definition
F5	Frequent	One or more times in 300 movements / 4 months
F4	Likely	One or more times in 1,000 movements / 1 year
F3	Possible	One or more times in 4,000 movements / 4 years
F2	Unlikely	One or more times in 40,000 movements /40 years
F1	Remote	Once in greater than 40,000 movements / 40 years plus

Table 6: Frequency Table.

4.6.4. **Hazard Ranking Grid**. Consequence and frequency are both ranked on a 1 – 5 scale; multiplied this gives an overall risk score that allows the HL to be ranked.

Consequence	Cat 5	5	10	15	20	25
	Cat 4	4	8	12	16	20
	Cat 3	3	6	9	12	15
	Cat 2	2	4	6	8	10
	Cat 1	1	2	3	4	5
	Frequency	F1	F2	F3	F4	F5

Table 7: Hazard Ranking Grid

Whilst the overall scores remain subjective, the assessment criteria and scoring panel are consistent, which again mitigates against bias. Hazards are ranked by multiplying frequency and consequence to generate a risk score as follows;

- 1 – 5 Low Risk – no additional control measures required
- 6 – 9 Medium Risk – additional control measures required
- 9 + Significant Risk – activity not to take place without control measures

The ECP HL takes the average of the Most Likely and Worst Credible hazard scores to produce an overall risk value that can be ranked.

4.7 **The Hazard Log.** The Hazard Log is compiled on the MARNIS register and / or within the BFSAI Risk Register. A separate Issues and Actions Log is maintained. Separate worksheets are created for the 'wet' and 'dry' operations conducted in the port. It can be accessed via the PSM.

Picture 17 – harbour tug assisting FIRS.