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CALMAC FERRIES LTD

OBAN NAVIGATION RISK ASSESSMENT

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MARINE AND RISK CONSULTANTS LTD

CALMAC FERRIES LTD

OBAN NAVIGATION RISK ASSESSMENT

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1 INTRODUCTION

The Oban ferry harbour is situated on the south-east of Oban Bay (**Figure 1**, see **Annex D** for A3 plots), north-west Scotland.

Caledonian Maritime Assets Ltd (CMAL) is the owner of the harbour infrastructure and the Statutory Harbour Authority (SHA) for a small area of the harbour within Oban Bay. CalMac Ferries Ltd (CalMac) is appointed the harbour operator having won the Clyde and Hebrides Ferry Services contract on 1st October 2007. CalMac Ferries Ltd also operates the Clyde and Hebrides Ferry Services to and from Oban under the same contract.

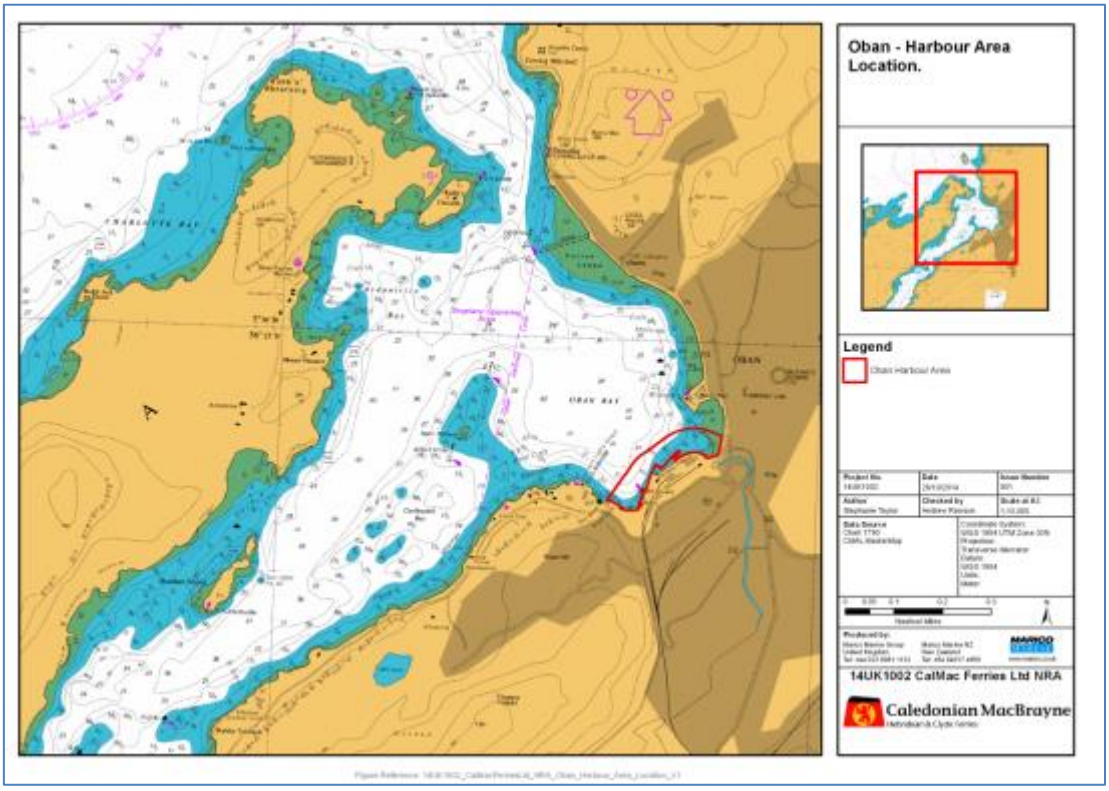


Figure 1: Oban - Harbour Area Location.

The Port Marine Safety Code (PMSC) established the requirement for ports and harbours to undertake a formal assessment of navigation risk. The requirement for the SHA (CMAL) of Oban to undertake a navigation risk assessment has been devolved to the port operator, CalMac under the Harbour Access and Operating Agreement.

This navigation risk assessment only addresses navigation risk inside the CMAL SHA area (the area inside the red lines in **Figure 2**); it does not address the wider navigational issues in the Oban Bay area (see **Section 2**).

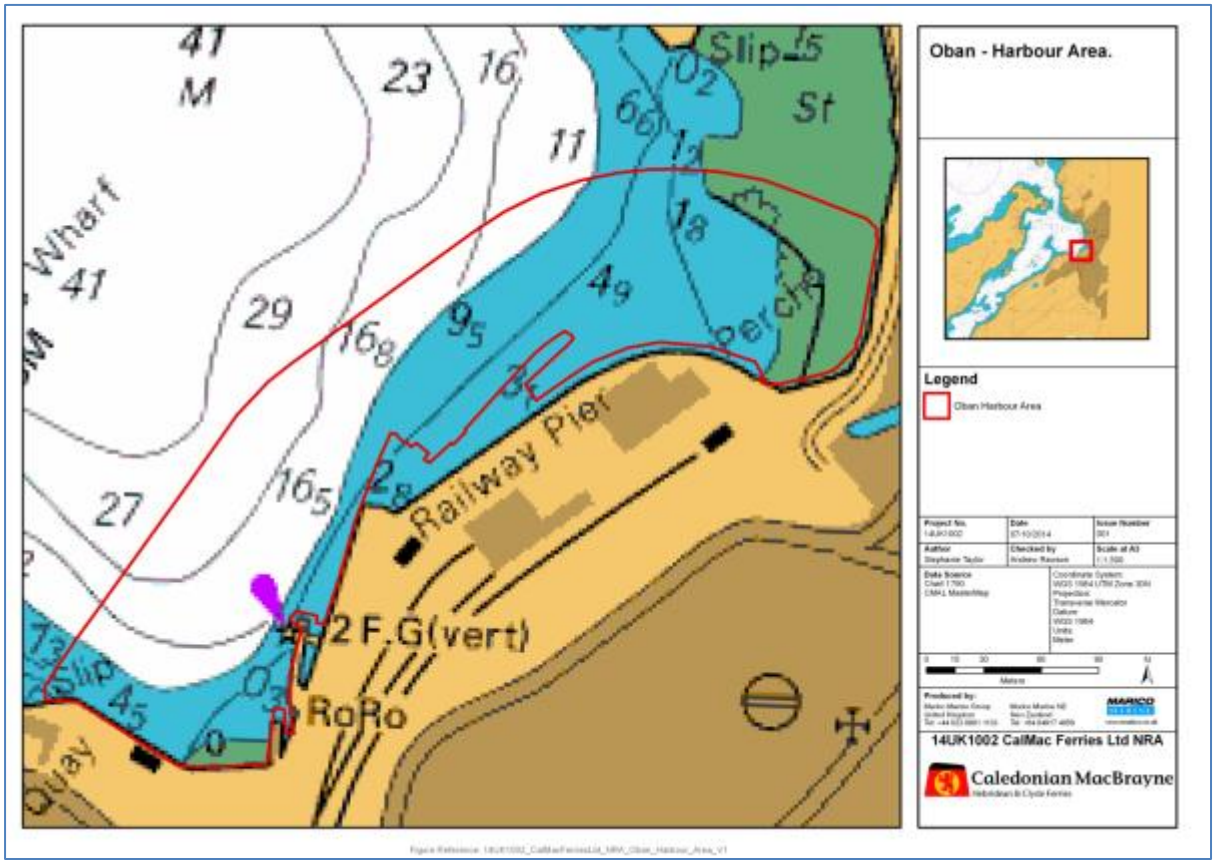


Figure 2: Oban Harbour Area.

The navigation risk assessment process is split into the following phases:

1. Navigation within the Oban CMAL SHA area (i.e. nature of harbour area, types of vessel; existing legislation / procedures, etc.) – **Section 2**;
2. Consultation with local stakeholders to better understand local issues – **Section 3**;
3. Assessment of risk – **Section 4**; and
4. Conclusions and recommendations – **Section 5**.

2 NAVIGATION WITHIN OBAN

This section outlines the current navigation disposition in Oban.

Oban Bay is protected by the island of Kerrera and is predominantly used by ferries, fishing vessels and recreational traffic. Caledonian MacBrayne ferries sail from Oban to Craignure, Lismore, Coll, Tiree, Colonsay, and Castlebay. CMAL owns Railway Pier (the RoRo ferry service operates from the linkspan) as well as the South Pier (South Quay handles fishing vessels). A small zone, adjacent to these piers forms the CMAL SHA area (see **Figure 2**).

The North Pier is a SHA and is a general purpose pier in Oban Bay which is owned and operated by Argyll and Bute Council. Recreational and all other users use the North Pier which has a main berth with a length of 73m and depths from 3 to 5m alongside.

A Northern Light House pier, without SHA status is located to the west of the CMAL harbour.

A variety of recreational craft utilise the bay and there are several small craft moorings dotted around the immediate area.

Admiralty chart 1790 “Oban and Approaches” covers Oban Bay. The current paper edition of the Admiralty chart does not show the recent development of the Railway Pier.

2.1.1 Tidal Range and Tidal Streams

Oban is a Standard Harmonic harbour. The tide type is Semi-Diurnal, with the following tidal ranges (predicted heights are in metres above Chart Datum):

- Highest Astronomic Tide 4.5m;
- Mean High Water Springs 4.0m;
- Mean High Water Neaps 2.9m;
- Mean Sea Level 2.39m;
- Mean Low Water Neaps 1.8m;
- Mean Low Water Springs 0.7m; and
- Lowest Astronomic Tide 0.0m;

In Oban Bay the tidal streams are weak.

2.1.2 Prevailing Wind and Swell

The Railway Jetty is exposed to winds from the north-west however swell rarely builds up significantly in the CMAL SHA area.

Oban Bay is sheltered from the west by the island of Kerrera although winds from the south-west blow up Kerrera Sound.

2.1.3 Local Regulations

There is no overarching navigation authority in Oban Bay.

A "Code for Safe Navigation in and around Oban Bay" has been agreed by the MCA and harbour users and ratified by the MCA[1]. The code covers:

- The navigation of "Large" and "Small" vessels in the area;
- Speed; and
- VHF communications and calls.

The CMAL SHA area lies inside the area covered by the code.

A navigational risk assessment for the whole of Oban Bay was commissioned by CMAL, Argyll and Bute Council, and the Northern Lighthouse Board in 2013, with the report issued in May 14[2].

2.2 NAVIGATION AIDS

The local Light House Authority is CMAL who is responsible for the following aids to navigation that are either within, or close to the Oban SHA area:

- Oban Windsock No. 10, located on the quayside near to No. 1 Linkspan dolphin;
- Oban Windsock No. 11, located on Linkspan No. 2 pier head;
- Oban Railway Pier Linkspan No. 1 Light, located on Oban Linkspan No. 1 lifting dolphin; and
- Oban Railway Pier Linkspan No. 2 Light, located on Oban Linkspan No. 2 pier head.

2.3 LOCAL VHF PROCEDURES

Local VHF procedures are laid down in the "Code for Safe Navigation in and around Oban Bay".

2.4 PILOTAGE

There is no Competent Harbour Authority in Oban Bay and pilotage is not available.

[1] MCA Press Notice No: 266/00

[2] ABPMer Report R, 2265 dated May 14.

2.4.1 CalMac Ferry Internal Training System

CalMac Ltd has internal procedures for the training and authorisation of masters and mates to command vessels entering or leaving the ports and harbours they operate in. These procedures are documented in the vessel safety management system and with authorisation limited to specific vessels. Therefore a master or mate authorised to take vessel A into Oban, must also be assessed and authorised on vessel B prior to entry into the harbour.

The system is administered by an authorised vessel master granting authorisation to other masters' or mates'.

2.5 PASSAGE PLAN

CalMac Ferries operate a specific voyage passage plan for each route which have been frequently developed over many years of operating in the Western Isles, and have become detailed and comprehensive. The requirement for other vessels to undertake detailed voyage planning is as required by IMO SOLAS requirements[3].

2.6 HARBOUR USERS

Oban harbour users can be split into the following categories:

- Major CalMac Ferries (SOLAS vessels);
- Small CalMac Ferries;
- Cruise vessels;
- Commercial coastal cargo and Northern Lighthouse Board vessels;
- Fishing vessels; and
- Recreational craft.

2.6.1 CalMac Ferries

CalMac ferries under the Clyde and Hebrides Ferry Services contract provide a ferry service between Oban and Craignure, Lismore, Coll, Tiree, Colonsay, and Castlebay. The services are operated by both the "Major CalMac ferry fleet" and the "Small CalMac ferry fleet", which includes vessels capable of coastal and inshore passage. Currently the services are primarily operated by the

[3] https://mcanet.mcga.gov.uk/public/c4/solas/solas_v/Annexes/Annex24.htm

following vessels in **Table 1** (however, during periods of maintenance or in high / low peak times this will vary):

Table 1: Vessel particulars.

	MV Hebridean Isles	*MV Clansman*	*MV Lord of the Isles*	*MV Isle of Mull:*
Length	85m	99m	85m	90m
Passengers	494	638	506	951
Cars	62	90	54	70
Speed	15 knots	16.5 knots	16 knots	15 knots

A swept path plot of the CalMac ferries *MV Lord of the Isles* and *MV Clansman* at Oban is given in **Figure 3** (see **Annex D** for A3 plots).

A swept path plot of the CalMac ferry *MV Clansman* departing Oban is given in **Figure 4**.

A swept path plot of the CalMac ferry *MV Lord of the Isles* approaching and departing Oban is given in **Figure 5**.

2.6.2 Cruise Ships

Cruise ships visit Oban during the summer months.

The larger cruise ships anchor in Oban Bay and operate tenders to the town usually berthing on the North Pier. Because of the absence of an overall navigation authority there is no control over where cruise ships anchor in Oban Bay.

Small Cruise ships occasionally berth alongside the Northern Lights Wharf or on North Pier.

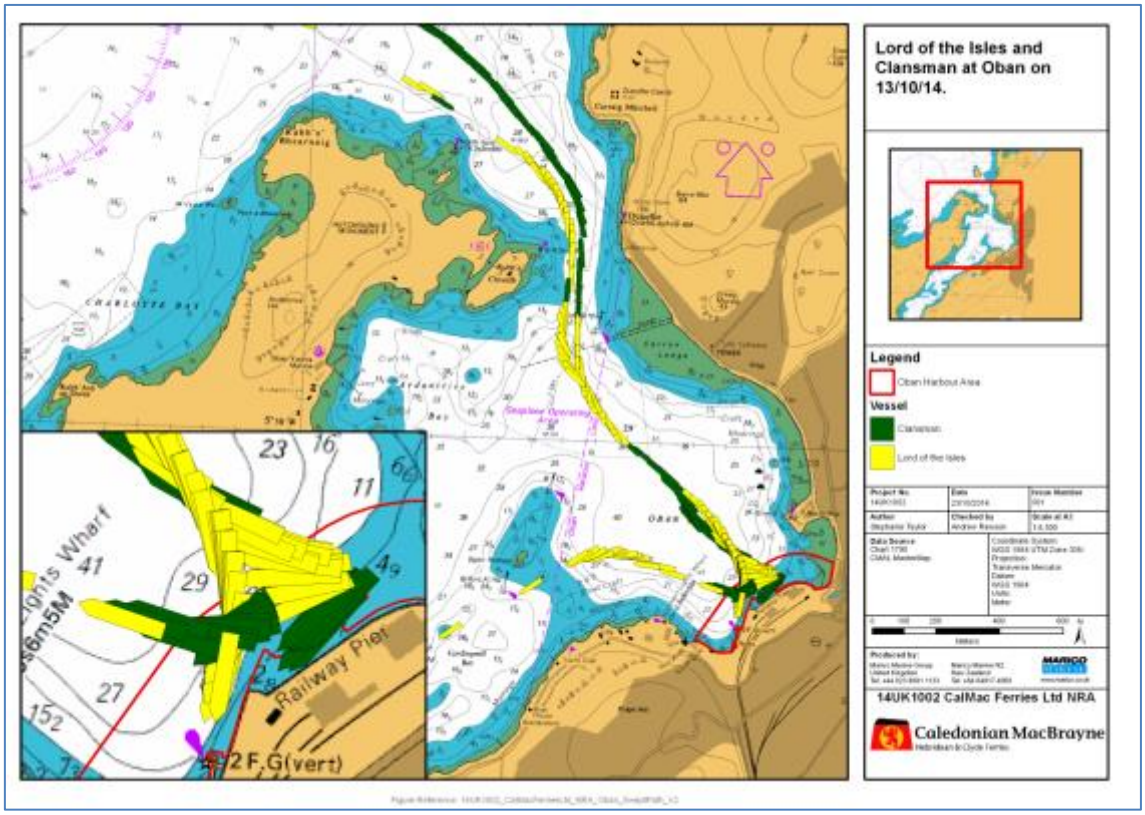


Figure 3: Swept path plot of MV Lord of the Isles and MV Clansman at Oban.

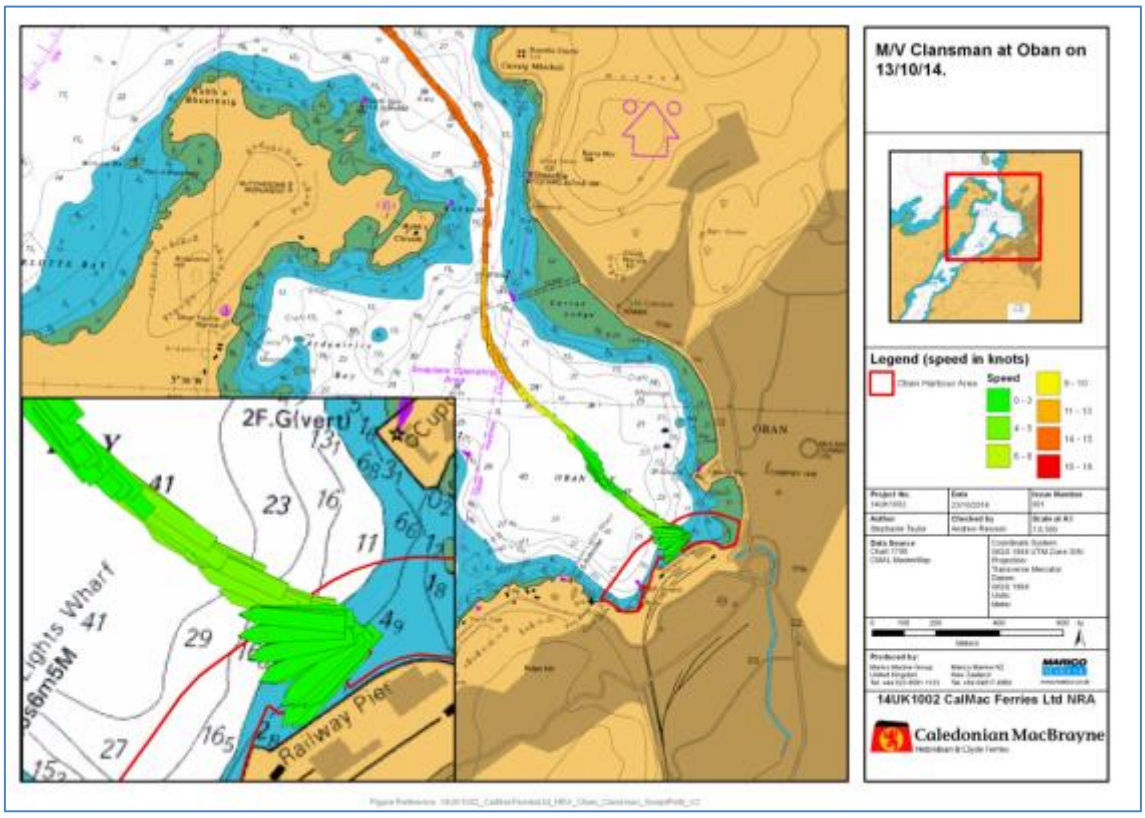


Figure 4: Swept path plot of the CalMac ferry MV Clansman departing Oban.

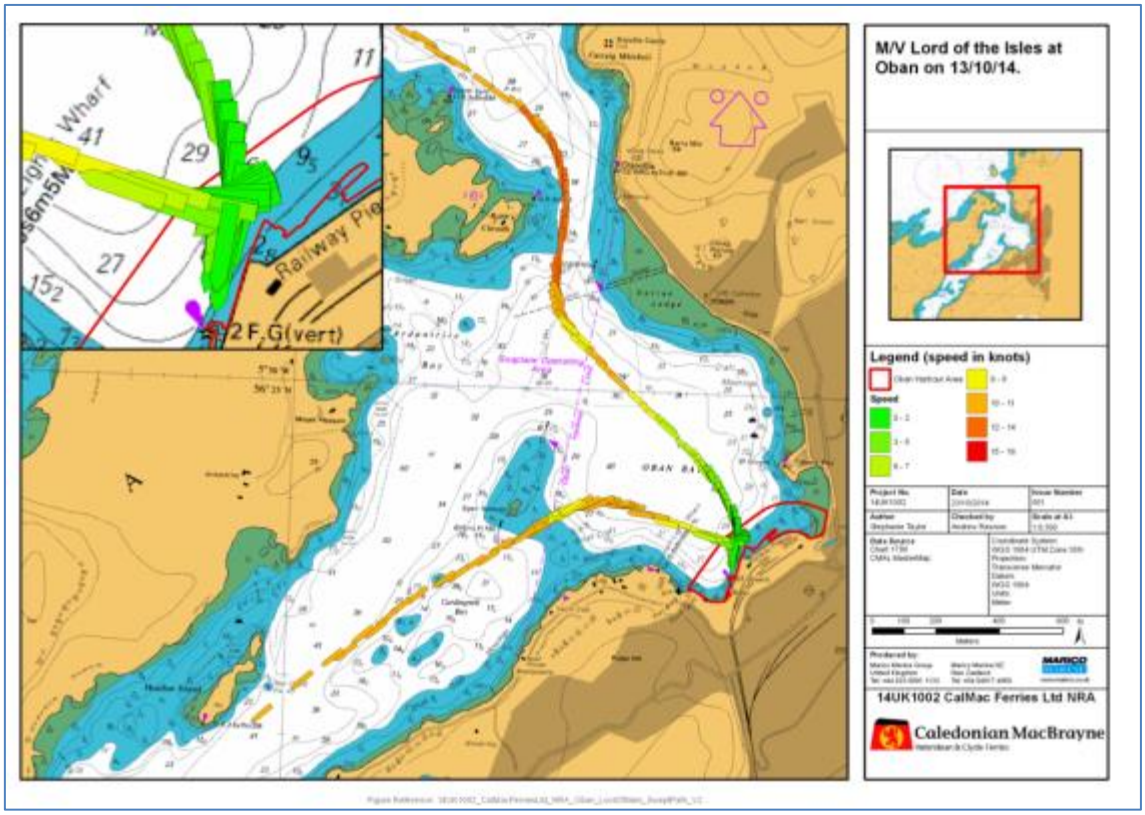


Figure 5: swept path plot of the CalMac ferry MV Lord of the Isles approaching and departing Oban.

Figure 6: Railway Pier with two CalMac vessels alongside plus MV Hebridean Princess (small cruise ship) alongside the Northern Lights Wharf.

2.6.3 Commercial Vessels

Occasionally, small cargo vessels and well-boats berth on the North Pier adjacent to the CMAL SHA area.

2.6.3.1 Fishing

A number fishing vessels berth and discharge their catch on South Quay. Fishing vessels also berth on the northern end of Railway Jetty. Both areas lie within the CMAL SHA area.

Figure 7: Fishing vessels alongside South Quay and the Railway Jetty.

2.6.4 Recreational Craft

Although there is considerable yachting activity in Oban Bay in the summer months, few yachts moor in Oban harbour (including the CMAL SHA) preferring to berth at the Oban Marina and take the marina ferry across the bay to the town.

2.6.5 Terminal

The CalMac Oban ferry terminal (the terminal plan is illustrated in **Figure 8**) consists of two, well fendered, RoRo berths for CalMac "major vessels" the plus a slipway for "small vessel" operations (**Figure 9** and **Figure 10**).

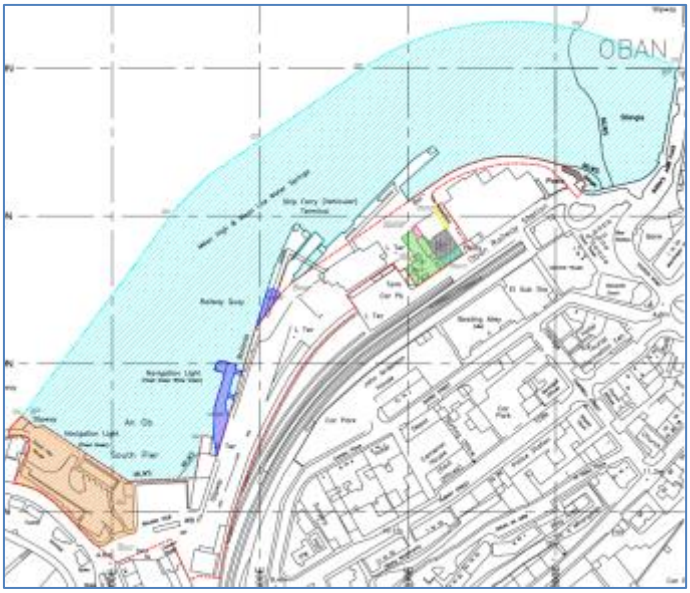


Figure 8: Oban terminal plan.

Figure 9: Railway Jetty showing the two RoRo berths.

Figure 10: Slipway for small ferries.

2.7 INCIDENT DATA

The CalMac incident database was analysed and Oban incidents were extracted by port location between 01/01/2002 and – 14/10/2014. Ten navigational incidents were logged (see **Figure 11**). The majority of incidents were "Mooring breakouts" which includes the failure of mooring lines. The "Contact berthing" incident occurred on 29th July 2009 when the *MV Isle of Mull* was berthing stern in at No.2 berth. The vessel continued astern and made contact with the linkspan.

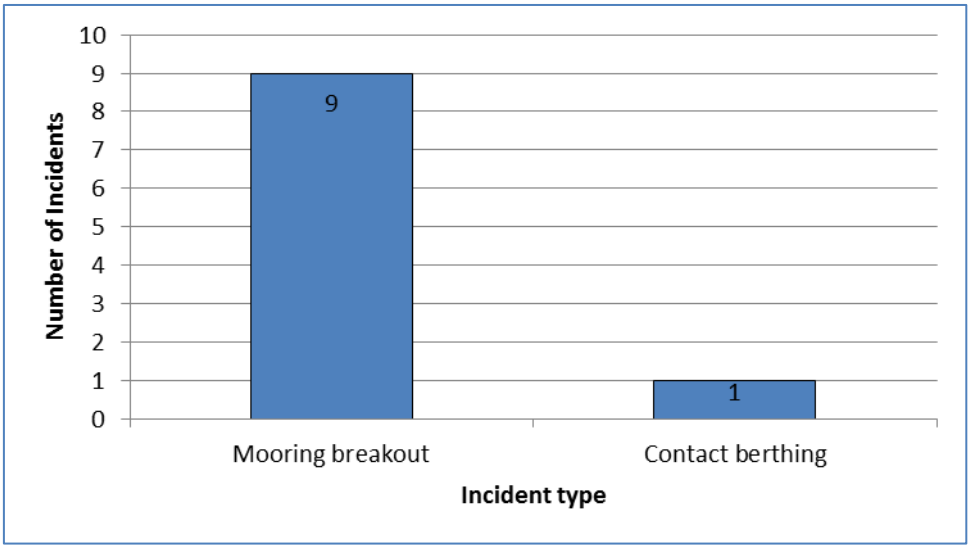


Figure 11: Incident types at Oban.

In Oban Bay 68 incidents have been recorded by the Marine Accident Investigation Branch (MAIB) occurring between 2002 and 2012 (see **Figure 12**). The majority of incidents were categorised as "accident to person". "Machinery failure" was the second highest incident type. Of those 68 incidents, 8 were recorded to result in "minor damage" and 8 were recorded to result in "material damage".

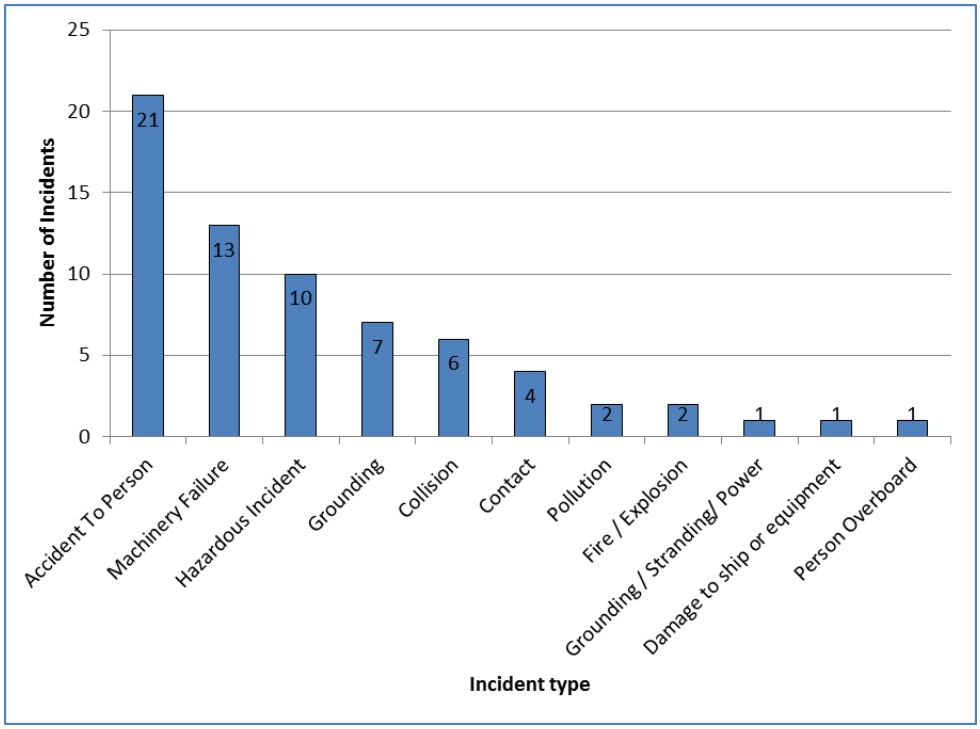


Figure 12: MAIB recorded incidents.

Two notable navigational incidents have been recorded by the MAIB. The first notable incident is the grounding of the *MV Isle of Arran* on 28th March 2009[4]. Though out with of the SHA, the vessel departed Oban bound for Colonsay and grounded on Sgeir Rathaid reef. The vessel suffered hull damage, but was able to return to her berth without assistance. There was no pollution caused by the incident. The second notable incident occurred on 29th December 2004 when the *MV Isle of Mull* made contact with the vessel *MV Lord of the Isles* which was moored alongside, and then made contact with Oban Railway Pier. No injuries were sustained as a result of this incident.

[4] http://www.maib.gov.uk/publications/completed_preliminary_examinations/completed_preliminary_examinations_2009/isle_of_arran.cfm

3 STAKEHOLDER CONSULTATION

Stakeholder engagement was carried out with local harbour users to gain a detailed understanding of the navigation issues at Oban. The information gained from these meetings has been utilised in the identification and assessment of navigation risk for the harbour area. The meetings were facilitated by Marico Marine personnel:

- Mr David Foster – Marico Marine Principal Consultant and harbour master specialist; and
- Dr Ed Rogers – Marico Marine Operations Director and risk specialist.

The following stakeholders were consulted between 13 and 14 October 2014 on the risk assessment and given an opportunity to discuss navigation issues:

CalMac Ferries Ltd:

- Capt. John Davis – Master *MV Isle of Mull*;
- Mr Allan Greig – Duty Pier Master; and
- Mr Cameron MacPhail – Area Harbours Manager.

Other Harbour Users:

- Mr Stephen Woods – Scottish Sea Farms;
- Mr Billy Forteith – RNLI;
- Mr Allan Strang – Tour boat operator;
- Captain Philip Day – Northern Lighthouse Board. (Telephone conference);
- Mr Peter Weir – Oban Marina; and
- Mr Neil Price – Oban Marina.

4 RISK ASSESSMENT

4.1 METHODOLOGY

The risk assessment methodology is divided into four main stages:

- Stage 1 – Data gathering;
- Stage 2 – Hazard identification;
- Stage 3 – Generation of the "Risk Profile"; and
- Stage 4 – Development of new risk control options if required.

Details of the Marico navigation risk assessment methodology is given in **Annex A**. It is important to note the navigation assessment sought to assess the baseline risk conditions in Oban, and was not focused on assessing the inherent risk without risk controls in place, or the residual risk if additional risk controls were added.

4.2 GENERIC RISK CONTROL MEASURES

In discussion with the CalMac personnel a baseline of risk control measures within the control of the harbour operator, as identified below, was discussed and considered relevant for the assessment (however these controls are not explicitly documented within the CalMac Safety Management System):

- Operations are to be planned to the extent necessary to ensure safety;
- Operations are to be fully compliant with legislation, guidance and best practice;
- All those involved in operations are to be competent persons;
- All the necessary information is provided to undertake the movement safely;
- All equipment provided is fit for purpose;
- All necessary resources are allocated to mitigate identified risks;
- Operations are undertaken in accordance with up to date written procedures;
- Any exceptions to safe practice are reported;
- Incidents and near misses are investigated; and
- A planned response to emergencies is available.

When the navigational hazards were scored it was assumed that the above risk control measures, were in place.

The main reasons attributed to navigation hazards include:

- Human error including inexperience e.g.;
    - Officer of the watch failure to observe the COLREGs;
    - Fatigue, particularly on smaller coastal vessels;
- Met ocean conditions;
- Mechanical Failure;
    - Propulsion / steering / navigation system failure;
- Non- adherence to the Company's Safety Management System (SMS); and
- A combination of inexperience and systematic failure in the shipboard organisation.

The primary mitigation measure against the hazard of vessels colliding with one another is the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS) and Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1995.

This risk assessment, in considering measures to minimise the risk of hazards in respect of navigation within Oban, makes the assumption that vessels will be compliant with the COLREGS and STCW.

4.3 NAVIGATION HAZARDS

A hazard identification process was undertaken in consultation with the view of local Oban Stakeholders. A Hazard Log presenting details on each Hazard and the scoring related to the risk matrix is presented in **Annex B**. Health and Safety Hazards are not included within this navigation risk assessment framework.

In total 32 individual navigation hazards were identified of which;

- 15 were related to collision hazards;
- 5 were related to contact hazards;
- 5 were related to grounding hazards;
- 5 were related to mooring breakout hazards;
- 1 was related to foundering hazards; and
- 1 was related to diving incident hazards.

4.4 ANALYSIS OF RANKED HAZARDS

The scoring of the hazards (see **Annex C**) identified during the stakeholders' and management meetings, the facility visits and from the documentation and analysis shows that:

- 0 hazards were assessed as "High Risk" (9.0 - 10);
- 0 hazards were assessed as "Significant Risk" (6.0 - 8.9);

- 3 hazards were assessed as “ALARP” (4.0 - 5.9);
- 25 hazards were assessed as “Low Risk” (2.0 - 3.9); and
- 4 hazards were assessed as “Negligible Risk” (0 - 1.9).

A summary of the ranked Oban navigation hazards is shown below in **Table 2**. The assessment shows that none of the navigation hazards assessed within the harbour is assessed as “High Risk” or “Significant Risk” and that the majority of assessed hazards fall within the “Low Risk” category.

The highest single hazard was assessed to be the “Collision between a major CalMac ferry / cruise ship and another major CalMac ferry / cruise ship”. It is important to note, however, that whilst this is the highest scoring hazard, it does not represent a “Significant” or “High” risk hazard.

The highest scoring category of hazard was assessed as the collision category. This category is frequently scored as the highest risk category in many ports due to the widespread and significant consequence of occurrence.

Those hazards identified as ALARP include:

- Rank: 1, Hazard Id.: 1. “Collision between major CalMac ferry / cruise ship and major CalMac ferry / cruise ship”;
- Rank: 2, Hazard Id.: 2. “Collision between major CalMac ferry / cruise ship and small CalMac ferry”; and
- Rank: 3, Hazard Id.: 16. “Contact berthing - major CalMac ferry / cruise ship”.

ALARP refers to a level of risk that is neither negligibly low nor intolerable high. ALARP is the attribute of a risk, for which further investment of resources for risk reduction may not be justifiable. ALARP means that hazardous events whose risks fall within this region have to be reduced unless there is a disproportionate cost to the benefits obtained.

Table 2: Summary Ranked Hazard List.

			Most Likely Risk				Worst Credible Risk				
Haz. Rank	Haz. Ref	Title	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders	Overall
1	1	Collision between major CalMac ferry / cruise ship and major CalMac ferry / cruise ship	0.0	5.9	3.5	3.5	3.5	4.9	5.9	4.9	5.0
2	2	Collision between major CalMac ferry / cruise ship and small CalMac ferry	0.0	5.9	3.5	3.5	1.9	4.9	4.9	4.9	4.5
3	16	Contact berthing - major CalMac ferry / cruise ship	0.0	3.5	3.5	0.0	2.4	5.9	5.9	5.9	4.1
4	3	Collision between a major CalMac ferry / cruise ship and commercial vessel	0.0	4.4	2.4	2.4	2.9	4.1	5.1	4.1	4.0
5	26	Mooring breakout of a major CalMac ferry / cruise ship	0.0	5.9	0.0	0.0	0.0	3.5	4.9	4.9	3.9
6	8	Collision between small CalMac ferry and fishing vessel / small commercial craft	0.0	4.4	2.4	2.4	0.0	4.9	4.9	3.5	3.7
7	9	Collision between a small CalMac ferry / cruise ship and a recreational vessel	0.0	4.4	2.4	2.4	0.0	4.9	3.5	3.5	3.6
8	4	Collision between a major CalMac ferry / cruise ship and a fishing vessel / small commercial craft	0.0	3.5	0.0	0.0	2.4	5.9	5.9	2.4	3.6
9	31	Foundering / swamping	1.9	3.5	3.5	3.5	2.9	4.1	4.1	4.1	3.6
10	17	Contact berthing - small CalMac ferry	0.0	3.5	0.0	0.0	0.0	5.9	4.4	4.4	3.5
11	6	Collision between small CalMac ferry and small CalMac ferry	0.0	4.4	2.4	2.4	0.0	4.1	4.1	4.1	3.5
12	27	Mooring breakout of a small CalMac ferry	0.0	5.9	0.0	0.0	0.0	3.5	3.5	3.5	3.4
13	5	Collision between a major CalMac ferry / cruise ship and a recreational vessel	0.0	3.5	0.0	0.0	0.0	5.9	2.4	4.4	3.4
14	7	Collision between a small CalMac ferry and commercial vessel	0.0	3.5	1.9	1.9	0.0	4.1	4.1	2.9	3.0
15	10	Collision between commercial vessel and commercial vessel	0.0	3.5	1.9	0.0	1.5	4.1	4.1	2.9	3.0
16	19	Contact berthing - Fishing / small commercial craft	0.0	3.5	0.0	0.0	0.0	4.4	4.4	2.4	2.9
17	32	Diving incident	0.0	3.5	0.0	0.0	0.0	4.9	0.0	3.5	2.8
18	12	Collision between commercial vessel and recreational vessel	0.0	3.5	0.0	0.0	1.5	4.1	2.9	1.5	2.7
19	11	Collision between commercial vessel and fishing vessel / small commercial craft	0.0	3.5	0.0	0.0	1.5	4.1	2.9	1.5	2.7
20	13	Collision between Fishing vessels / small commercial craft	0.0	3.5	0.0	0.0	0.0	4.1	2.9	1.5	2.6
21	18	Contact berthing - commercial vessel	0.0	1.9	1.9	0.0	1.5	4.1	4.1	4.1	2.6
22	29	Mooring breakout of a fishing vessel / small commercial craft	0.0	3.5	0.0	0.0	0.0	3.5	3.5	1.9	2.5
23	21	Grounding of a major CalMac ferry / cruise ship	0.0	0.0	1.9	1.9	2.9	2.9	4.1	2.9	2.5
24	28	Mooring breakout of a commercial vessel	0.0	2.4	0.0	0.0	0.0	2.9	4.1	4.1	2.5
25	15	Collision between recreational vessels	0.0	2.9	0.0	0.0	0.0	4.1	2.9	1.5	2.4
26	23	Grounding of a commercial vessel	0.0	0.0	1.5	1.5	2.9	2.9	4.1	1.5	2.3
27	20	Contact berthing - recreational vessel	0.0	2.4	0.0	0.0	0.0	3.5	3.5	1.9	2.2
28	14	Collision between fishing vessel / small commercial craft and recreational vessel	0.0	1.9	0.0	0.0	0.0	4.1	2.9	1.5	2.1
29	30	Mooring breakout of a recreational vessel	0.0	2.4	0.0	0.0	0.0	2.9	2.9	1.5	1.9
30	22	Grounding of a small CalMac ferry	0.0	0.0	0.0	0.0	1.5	2.9	2.9	2.9	1.4
31	24	Grounding of a fishing vessel / small commercial craft	0.0	0.0	0.0	0.0	1.5	2.9	2.9	0.0	1.2
32	25	Grounding of a recreational vessel	0.0	0.0	0.0	0.0	0.0	2.9	2.9	0.0	1.1

4.5 ADDITIONAL RISK CONTROL MEASURES

If any navigation hazards are scored as high or significant risk then they are termed “intolerable” and as such additional risk control measures should be implemented. This may range from stopping the activities which brings about such high risk hazards or by measures which seek to reduce the likelihood and / or consequence of hazard occurrence.

Given that all navigation hazards identified and scored for the Oban risk assessment fall into the ALARP or lower categories of risk, then current navigation activities can be considered to be largely acceptable. This does not however mean that mitigation for the ALARP hazards must not be considered.

There is also the rationale underlying any risk assessments that no matter how low the risk, there remains, no matter how small, a possibility that hazards may occur. There are also underlying principles of the Port Marine Safety Code (PMSC) which encourage port authorities and operators to operate as safely as possible and implement coherent and clear SMSs. The role of the risk assessment, as defined by the PMSC is to drive an appropriate and fit for purpose SMS (see **Figure 13**).

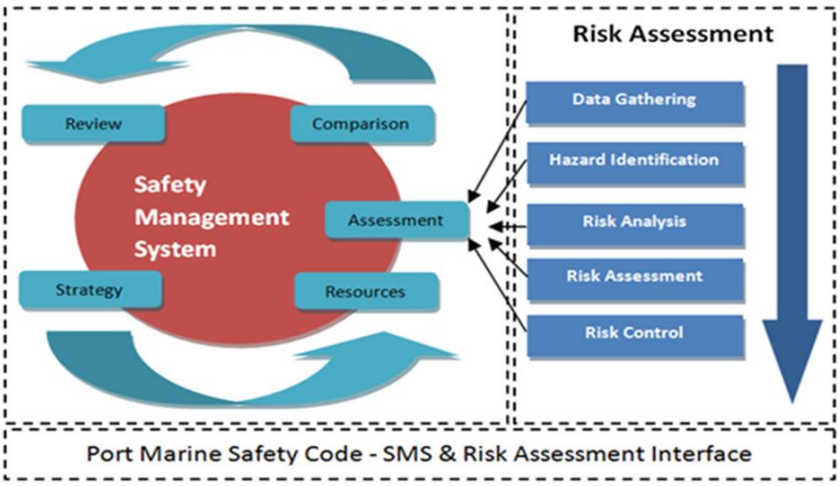


Figure 13: Relationship between Risk assessment and the Safety Management System as taken from the Guide to Good Practice on Port Operations.

It is also the case that should a major incident occur, the ensuing investigation may seek to identify any weaknesses within a SMS, irrespective of whether they are material causes to the incident occurring.

The following section is taken from the PMSC and related to implementation of a SMS:

"3.8 A safety management system – which manages the hazards and risks along with any preparations for emergencies – must be developed, implemented and maintained. This should be operated effectively and revised periodically.

3.9 This system should incorporate safety policies and procedures to:

- *ensure there is proper control of ship movements by regulating the safe arrival, departure and movement within the harbour of all vessels;*
- *protect the general public from dangers arising from marine activities within the harbour;*
- *carry out all its functions with special regard to the possible environmental impact; and*
- *prevent acts or omissions that may cause personal injury to employees or others.*

It should also:

- *outline present procedures for marine safety within the harbour (including the port approaches);*
- *measure performance against targets (harbour authorities must have a database or system to record incidents, including near misses);*
- *refer to emergency plans that would need to be exercised;*
- *be audited (internally) on an annual basis; and*
- *confirm the roles and responsibilities of key personnel at the harbour authority".*

It is recommended that CalMac continue putting in place an effective and robust marine SMS covering their areas of jurisdiction as contracted through the Harbour Access and Operating Agreement.

In order to determine additional possible risk control measures a number of specific additional controls have been identified (see **Table 3**). An assessment has also been made whether the introduction of such additional risk control measures would be cost effective.

Almost all of these additional risk control measures, which were specifically identified through the risk assessment process, are essential components of a fit for purpose Marine SMS for port marine operations.

Table 3: Possible additional risk control measures table.

No.	Possible Additional Risk Control Measures	SMS*	Cost Effective+	CalMac Progress
1	Clarify the division of the roles and the responsibilities between CMAL and CalMac on the operation of the PMSC in the harbour. *There is confusion over the roles of CMAL and CalMac with respect to the PMSC in the harbour.* *Almost everybody interviewed were unaware of CalMac's role in the overall management of navigation safety in the whole harbour area rather than just that associated with the immediate running of the ferry service and berth.*	Yes	Yes	On going
2	Appoint an individual, with appropriate powers, to act as the day to day Harbour Master in the harbour. *Currently nobody is appointed, with the powers of Special Direction, to carry out the duties of the local Harbour Master for the whole harbour area on a day to day basis. The person appointed should be provided with appropriate training and guidance.*	Yes	Yes	On going
3	Inform CalMac ferry crews and the local harbour users of the identification of the local Harbour Master and the roles of CMAL and CalMac in the harbour. *Once the roles of CMAL and CalMac have been defined and a local Harbour Master has been appointed all harbour users should be briefed on the management of the whole harbour area.*	Yes	Yes	On going
4	Introduce local harbour user stakeholder engagement and consultation. *One of the basic premises of the PMSC is that all harbour users (Including: ferry, commercial, fishing, recreational and the users of the foreshore) should be consulted about the management of the harbour.*	Yes	Yes	On going
5	Consider becoming a Competent Harbour Authority and introducing compulsory pilotage and a PEC system. *The CalMac in-house training and ship handling qualification system only applies to CalMac ferries.* *Commercial ships, some with minimal manoeuvring aids, regularly visit the harbour. Pilotage is not available in the harbour and the Master of these vessels is therefore required to berth and sail without any local assistance.* *Cruise ships also anchor in the bay without pilotage.*	No	No - may not be cost effective for CalMac but could be cost effective for the whole of Oban Bay	Unknown
6	Consider introducing weather and sea state limitations for ferry and commercial operations in the harbour. *At present the decision whether a CalMac ferry can sail from or berth at a harbour lies solely with the Master. Although there will always be a combination of factors to be considered including: wind speed and direction, sea state, swell, height of tide and manoeuvrability of the vessel, some guidelines may assist the Master in making his/her decision.*	Yes	Yes	Not known
7	Consider introducing minimum under-keel clearance limits. *At present there is no formal guidance on the minimum acceptable under-keel clearance for ferries, cruise ships and commercial vessels using the harbour.*	Yes	Yes	Not known
8	Establish a consistent navigation incident database. *CalMac to develop a navigation incident and near miss reporting system enabling company wide trend analysis.*	Yes	Yes	Not known
9	Establish VHF licensing for harbour staff and office. *CalMac to introduce VHF training and licensing for staff and the harbour office to enable shore to ship communications.*	Yes	Yes	Not known
10	Establish effective promulgation of Notice to Mariners. *CalMac to ensure effective promulgation of Notice to Mariners to local mariners.*	Yes	Yes	Not known
11	Improve promulgation of information to all harbour users. *CalMac to ensure effective promulgation of information to local mariners.*	Yes	Yes	Not known

* Should be contained within a Marine Safety Management System
+ Defined as a cost effective risk reduction measure

5 CONCLUSIONS AND RECCOMENDATIONS

Analysis of the navigation risk assessment indicates that all the navigation hazards associated with Oban CMAL SHA are at, or below the ALARP region, with the highest risk hazard being the collision between a major CalMac ferry / cruise ship and another major CalMac ferry / cruise ship.

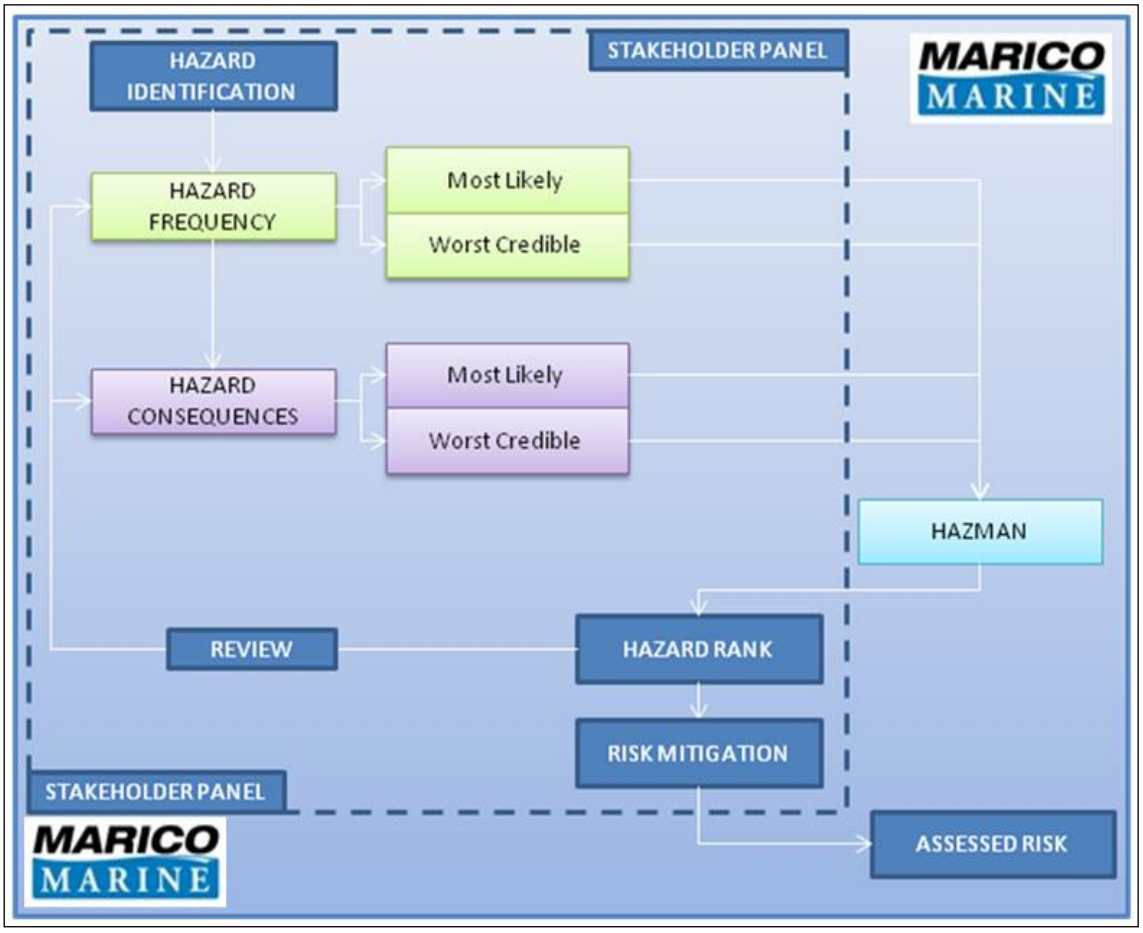
The relatively low risk profile of the CMAL SHA area is due to the very small size, however the absolute level of risk within wider Oban Bay is thought to be higher. This is because a greater number of vessels pass through the bay including more vessels not engaged on regular runs. Whilst this risk assessment deals solely with the CMAL SHA area, any improvement in navigation management within the bay will have beneficial knock on effect in the CMAL SHA area.

Through conducting the risk assessment process, including stakeholder engagement, it is noted that there is a developing solidification of the roles and responsibilities of the harbour operational staff in relation to the PMSC. At the time of drafting this report, the process of developing the Safety Management System and compliance with the PMSC was underway and progressing well. It is therefore recommended that CalMac Ferries Ltd ensure that the Port Operations Manual meets all requirements of a PMSC Safety Management System including the description of the roles and responsibilities of the harbour personnel and, the policies and procedures required, to operate the harbour safely.

Annex A Risk Assessment Methodology

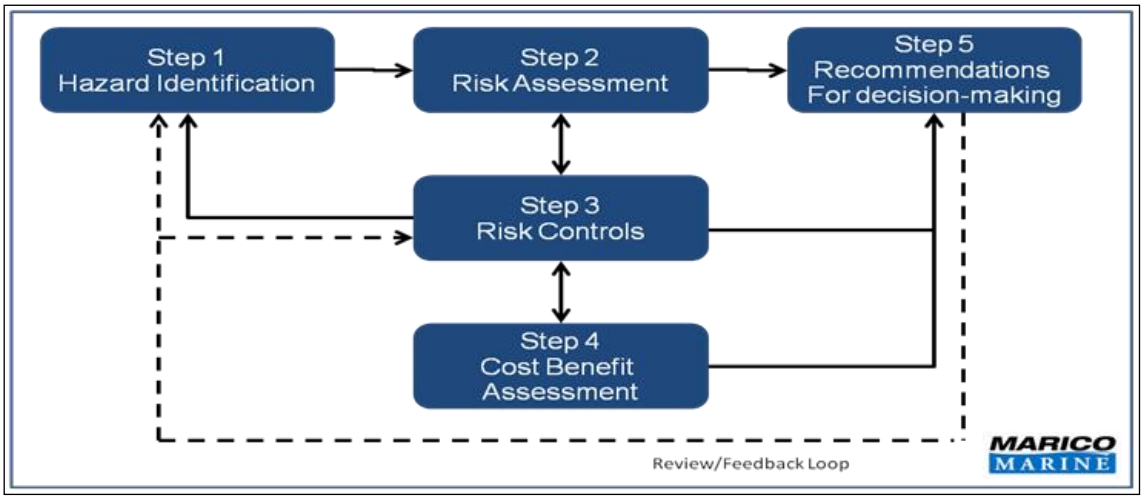
RISK ASSESSMENT METHODOLOGY

The Navigation risk assessment methodology was based on the Formal Safety Assessment methodology as adopted by IMO. It also follows the guidance set out within the Port Marine Safety Code. Marico Marine uses a form of risk assessment that has been specifically adapted for navigational use. It is unique to Marico and is fundamentally based on concepts of "Most Likely" and "Worst Credible", which reflect the range of outcomes arising from a shipping accident. This approach matches marine incident data that is customarily available. It is relevant that incident data often shows a high frequency of "Most Likely" events, separated from a much lower frequency of "Worst Credible" events.



Marico hazard identification and risk assessment process

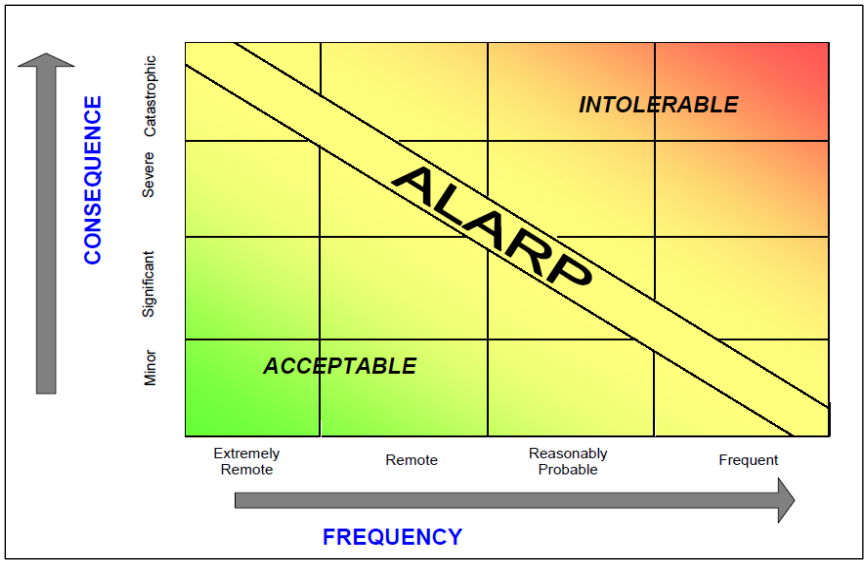
The NRA for the project was carried out using the Marico Marine "HAZMAN II" program to provide ranked hazard reports. The data handled within "HAZMAN II" can subsequently form the basis for an on-going navigational Safety Management System (SMS).



Formal Safety Assessment Risk Assessment Process

IMO Guidelines define a hazard as "*something with the potential to cause harm, loss or injury*", the realisation of which results in an accident. The potential for a hazard to be realised can be combined with an estimate or known consequence of outcome. This combination is termed "risk". Risk is therefore a measure of the frequency and consequence of a particular hazard. One way to compare risk levels is to use a matrix approach as illustrated below. At the lowest end of the scale, frequency is extremely remote and consequence insignificant such that a risk can be said to be negligible. At the high end, where hazards are defined as frequent and the consequence catastrophic, then risk is termed intolerable. Between the two lies an area known "As Low As Reasonably Practicable" (ALARP).

The IMO guidelines allow the selection of definitions of frequency and consequence to be made by the organisation carrying out the risk assessment. This is important, as it allows risk to be applied in a qualitative and comparative way. To identify high risk levels in a purely mathematically quantitative way would require a large volume of casualty data, which is rarely available in the maritime context. ALARP can be accepted as being "Tolerable", if the further reduction of the risk is impracticable, or if the cost of such reduction would obviously be highly disproportionate to the improvement. It can also be considered "Tolerable", if the cost of reducing the risk is greater than any improvement gained.



Frequency / Consequence Chart

The NRA used accident categories to organise hazards for assessment. The hazard categories identified as relevant to this study are likely to be:

- Collision;
- Grounding;
- Contact;
- Mooring breakout hazards;
- Foundering hazards; and
- Diving incident hazards.

Each hazard was reviewed with respect to cause and effect. Frequencies were then derived for notional "Most Likely" and "Worst Credible" hazard events in each case, using the frequency bands defined below.

Frequency criteria

Scale	Description	Definition	Operational Interpretation
F5	Frequent	An event occurring in the range once a week to once an operating year.	One or more times in 1 year
F4	Likely	An event occurring in the range once a year to once every 10 operating years.	One or more times in 10 years 1 - 9 years
F3	Possible	An event occurring in the range once every 10 operating years to once in 100 operating years.	One or more times in 100 years 10 – 99 years
F2	Unlikely	An event occurring in the range less than once in 100 operating years.	One or more times in 1,000 years 100 – 999 years
F1	Remote	Considered to occur less than once in 1,000 operating years (e.g. it may have occurred at a	Less than once in 1,000 years >1,000 years

		similar site, elsewhere in the world).	

Consequence Categories and Criteria

Cat.	People	Property	Environment	Business
C1	Negligible	Negligible	Negligible	Negligible
	Very minor injury (e.g. bruising).	Very minor damage.	No effect of note. Tier 1 may be declared but criteria not necessarily met.	Small disruption to services.
		Costs <£10k	Costs <£10k	Costs <£10k
C2	Minor	Minor	Minor	Minor
	Single minor injury.	Minor damage	Tier 1 – Tier 2 criteria reached. Small operational (oil) spill with little effect on environmental amenity.	Bad local publicity and/or short-term loss of revenue including minor disruption to services.
		Costs £10k –£100k	Costs £10K–£100k	Costs £10k – £100k
C3	Moderate	Moderate	Moderate	Moderate
	Multiple minor or single major injury.	Moderate damage.	Tier 2 spill criteria reached but capable of being limited to immediate area within area.	Bad widespread publicity Temporary suspension of operations or prolonged restrictions, moderate disruption to services.
		Costs£ 100k - £1M	Costs £100k -£1M	Costs £100k - £1M
C4	Major	Major	Major	Major
	Multiple major injuries or single fatality.	Major damage.	Tier 3 criteria reached with pollution requiring national support. Chemical spillage or small gas release.	Bad widespread national publicity. Indefinite suspension of operations or prolonged restrictions, major disruption to life line services
		Costs £1M -10M	Costs £1M - £10M	Costs £1M -£10M
C5	Catastrophic	Catastrophic	Catastrophic	Catastrophic
	Multiple fatalities	Catastrophic damage	Tier 3 oil spill criteria reached. International support required. Widespread shoreline contamination. Serious chemical or gas release. Significant threat to environmental amenity.	International media publicity. Operations and revenue seriously disrupted. Ensuing loss of revenue. Prolonged suspension to life line services.
		Costs>£10M	Costs >£10M	Costs >£10M

Using the assessed notional frequency for the "Most Likely" and "Worst Credible" scenarios for each hazard, the probable consequences associated with each were assessed in terms of damage to:

- People - Personal injury, fatality etc.;
- Property – CMAL/CalMac and third party;
- Environment - Oil pollution etc.; and
- Business - Reputation, financial loss, public relations etc.

The magnitude of each is then assessed using the consequence categories as shown in the table below. These have been set such that the consequences in respect of property, environment and business have similar monetary equivalent outcomes.

Project Risk Matrix

Consequences	Cat 5	5.1	5.9	7.0	8.3	10.0
	Cat 4	4.1	4.9	5.9	7.4	9.4
	Cat 3	2.9	3.5	4.4	5.9	8.3
	Cat 2	1.5	1.8	2.4	3.5	5.9
	Cat 1	0	0	0	0	0
	Frequency (movements)	>10,000	1,000-10,000	500-1,000	100-500	<100

Navigation hazards are identified by the project team, and scored for "frequency" and "consequence" and in terms of a "Most Likely" and "Worst Credible" outcome, with results documented in a "Hazard Log".

Risk bands

Matrix Outcome	Risk Definition	Action Taken
0 & 1	Negligible Risk	A level where operational safety is unaffected.
2 & 3	Low risk	A level where operational safety is assumed.
4 ,5 and 6	As Low As Reasonably Practicable (ALARP)	A level defined by study at which risk control in place is reviewed. It should be kept under review in the ensuing Safety Management System (SMS).
7 & 8	Significant Risk	A level where existing risk control is automatically reviewed and suggestions made where additional risk control could be applied if appropriate. Significant risk can occur in the average case or in individual categories. New risk controls identified should be introduced in a timescale of two years.
9 & 10	High Risk	A level requiring immediate mitigation.

Risk is then calculated for each consequence category (e.g. people, property, environment and business) based on the scores in the hazard log, using a risk matrix. Risk scores are calculated for each hazard under the "Most Likely" and "Worst Credible" scenarios for each of the consequence criteria. This generates eight individual risk scores per hazard. These risk scores are documented in the "Ranked Hazard Lists". The risk scores are then analysed further to obtain four indices for each hazard as follows:

- The average risk score of the categories in the 'most likely' set;
- The average risk score of the categories in the 'worst credible' set;
- The maximum risk score of the categories in the 'most likely' set; and
- The maximum risk score of the categories in the 'worst credible' set.

These scores were then combined to produce a single numeric value representing each of the four indices. The hazard list was then sorted in order of the aggregate of the four indices to produce a 'Ranked Hazard List' with the highest risk hazards prioritised at the top. The ranked hazard list documents the individual category risk scores in more detail.

All risk scores, whether individual per consequence category, or overall for a hazard are scored on a scale of 0 (low risk) to 10 (high risk). Where the resultant risk levels cannot be considered in the low/negligible risk range, possible risk mitigation measures are identified for implementation.

Annex B Hazard Logs

							Consequence Descriptions		Risk By Consequence Category											
									ML					WC						
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Hazard Detail	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	Risk Overall
1	1	Oban SHA limits	Collision	Collision between major CalMac ferry / cruise ship and major CalMac ferry / cruise ship	A major CalMac ferry / cruise ship collides with another major CalMac ferry / cruise ship. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	4	1	3	2	2	2	3	4	5	4	4.96
2	2	Oban SHA limits	Collision	Collision between major CalMac ferry / cruise ship and small CalMac ferry	A major CalMac ferry / cruise ship collides with a small CalMac ferry. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	4	1	3	2	2	2	2	4	4	4	4.53
3	16	Oban SHA limits	Contact	Contact berthing - major CalMac ferry / cruise ship	A major CalMac ferry / cruise ship contacts the berth. ML: Low speed impact with avoiding action. WC: High speed impact with no avoiding action.	Mechanical defect / failure. Master error. Result of avoiding action with third party vessel. Sudden change in weather conditions during berthing manoeuvre. Reduced visibility.	Minor damage to vessel; Minor damage to structure, third party vessel.	Death or major injuries to people on-board other vessels; Possible injury to crew or berthing party; Major damage to both vessel and structure; Major damage to third party vessels; Pollution.	4	1	2	2	1	3	2	4	4	4	4.05
4	3	Oban SHA limits	Collision	Collision between a major CalMac ferry / cruise ship and commercial vessel	A major CalMac ferry / cruise ship collides with a commercial vessel. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	3	1	3	2	2	1	3	4	5	4	3.97
5	26	Oban SHA limits	Mooring breakout	Mooring breakout of a major CalMac ferry / cruise ship	A major CalMac ferry / cruise ship breaks away from her moorings. ML: Lines parting causing ranging on the berth, mitigated by additional lines or vessel manoeuvring aids / anchor. WC: Complete breakout, leading to grounding through failure of systems to hold vessel alongside.	Failure of ship's mooring gear. Failure of fixed mooring gear. Inadequate seamanship / watch keeping. Extreme weather. Excessive wash or draw-off. Water surge caused by major vessel moving in the harbour (Especially at low water). Vandalism.	Minor damage to vessel and other vessels and structures in vicinity; Minor injury.	Moderate injuries; Major damage to vessel; Significant damage to other vessels and structures in vicinity struck whilst drifting; Minimal pollution; Access / berth blocked.	5	1	2	1	1	2	1	3	4	4	3.89
6	8	Oban SHA limits	Collision	Collision between small CalMac ferry and fishing vessel / small commercial craft	A small CalMac ferry collides with a fishing vessel / small commercial craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Reduced visibility.	Minor damage to both vessels; Crew / passengers sustain minor injuries.	Death or major injuries most likely on fishing boat; Major damage to both vessels; Minor pollution with release of fuel oil; Vessel sinks blocking access.	3	1	3	2	2	2	1	4	4	3	3.73
7	9	Oban SHA limits	Collision	Collision between a small CalMac ferry / cruise ship and a recreational vessel	Small Recreational craft including Yacht, kayak, rib collides with a small CalMac ferry. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure; Skipper error; Result of avoiding action with third party vessel; Unlit recreational craft; Sailing vessel taking additional risks during racing.	Minor damage to both vessels; People on both vessels sustain minor injuries.	Death or major injuries on both vessels; Major damage to both vessels; Minimal pollution with release of fuel oil; Recreational vessel sinks blocking access for short period.	3	1	3	2	2	2	1	4	3	3	3.64

							Consequence Descriptions		Risk By Consequence Category											
									ML					WC						
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Hazard Detail	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	Risk Overall
8	4	Oban SHA limits	Collision	Collision between a major CalMac ferry / cruise ship and a fishing vessel / small commercial craft	A major CalMac ferry / cruise ship collides with a fishing vessel / small commercial craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Reduced visibility.	Minor damage to both vessels; Crew / passengers sustain minor injuries.	Death or major injuries most likely on fishing boat; Major damage to both vessels; Minor pollution with release of fuel oil; Vessel sinks blocking access.	4	1	2	1	1	3	2	4	4	2	3.62
9	31	Oban SHA limits	Foundering / swamping	Foundering / swamping	Any vessel founders / swamps. ML: Vessel floods some compartments but is able to return to harbour. WC: Vessel sinks.	Hatches / bow doors left open when at sea. Failure to close watertight doors in rough weather. Heavy seas.	Minor injuries; Minor damage to vessel.	Multiple deaths or major injuries to crew members / passengers on vessel; Major damage to vessel; Pollution with release of fuel oil; Vessel sinks blocking access.	2	2	3	3	3	1	3	4	4	4	3.61
10	17	Oban SHA limits	Contact	Contact berthing - small CalMac ferry	A small CalMac ferry contacts the berth. ML: Low speed impact with avoiding action. WC: High speed impact with no avoiding action.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Sudden change in weather conditions during berthing manoeuvre. Reduced visibility.	Minor damage to vessel; Minor damage to structure, third party vessel.	Death or major injuries to people on-board other vessels; Possible injury to crew or berthing party; Major damage to both vessel and structure; Major damage to third party vessels; Pollution.	4	1	2	1	1	3	1	4	3	3	3.5
11	6	Oban SHA limits	Collision	Collision between small CalMac ferry and small CalMac ferry	A small CalMac ferry collides with a small CalMac ferry. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	3	1	3	2	2	1	1	4	4	4	3.47
12	27	Oban SHA limits	Mooring breakout	Mooring breakout of a small CalMac ferry	A small CalMac ferry breaks away from her moorings. ML: Lines parting causing ranging on the berth, mitigated by additional lines or vessel manoeuvring aids / anchor. WC: Complete breakout, leading to grounding through failure of systems to hold vessel alongside.	Failure of ship's mooring gear. Failure of fixed mooring gear. Inadequate seamanship / watch keeping. Extreme weather. Excessive wash or draw-off. Water surge caused by major vessel moving in the harbour (Especially at low water). Vandalism.	Minor damage to vessel and other vessels and structures in vicinity; Minor injury.	Moderate injuries; Major damage to vessel; Significant damage to other vessels and structures in vicinity struck whilst drifting; Minimal pollution; Access / berth blocked.	5	1	2	1	1	2	1	3	3	3	3.38
13	5	Oban SHA limits	Collision	Collision between a major CalMac ferry / cruise ship and a recreational vessel	Small Recreational craft including Yacht, kayak, rib collides with a major CalMac ferry / cruise ship. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure; Skipper error; Result of avoiding action with third party vessel; Unlit recreational craft; Sailing vessel taking additional risks during racing.	Minor damage to both vessels; People on both vessels sustain minor injuries.	Death or major injuries on both vessels; Major damage to both vessels; Minimal pollution with release of fuel oil; Recreational vessel sinks blocking access for short period.	4	1	2	1	1	3	1	4	2	3	3.37
14	7	Oban SHA limits	Collision	Collision between a small CalMac ferry and commercial vessel	A small CalMac ferry collides with a commercial vessel. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	2	1	3	2	2	1	1	4	4	3	3.03

							Consequence Descriptions		Risk By Consequence Category											
									ML					WC						
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Hazard Detail	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	Risk Overall
15	10	Oban SHA limits	Collision	Collision between commercial vessel and commercial vessel	A commercial vessel collides with another commercial vessel. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	2	1	3	2	1	1	2	4	4	3	3.01
16	19	Oban SHA limits	Contact	Contact berthing - Fishing / small commercial craft	A fishing vessel / small commercial craft contacts the berth. ML: Low speed impact with avoiding action. WC: High speed impact with no avoiding action.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Sudden change in weather conditions during berthing manoeuvre. Reduced visibility.	Minor damage to vessel; Minor damage to structure, third party vessels; Minor injuries.	Possible moderate injury to crew; Major damage to vessel and possible damage to structure; Minor pollution.	4	1	2	1	1	3	1	3	3	2	2.91
17	32	Oban SHA limits	Diving	Diving incident	Divers in water endangered by other harbour users. ML: Diving operations are disrupted. WC: Driver is struck by a third party vessel.	Diver struck or separated from support vessel by passing vessel. Diver injured by machinery / equipment operated by people that are unaware of dive operations in the vicinity.	Minor injury.	Single fatality; Loss to business.	4	1	2	1	1	2	1	4	1	3	2.83
18	12	Oban SHA limits	Collision	Collision between commercial vessel and recreational vessel	Small Recreational craft including Yacht, kayak, rib collides with a commercial vessel. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure; Skipper error; Result of avoiding action with third party vessel; Unlit recreational craft; Sailing vessel taking additional risks during racing.	Minor damage to both vessels; People on both vessels sustain minor injuries.	Death or major injuries on both vessels; Major damage to both vessels; Minimal pollution with release of fuel oil; Recreational vessel sinks blocking access for short period.	2	1	3	1	1	1	2	4	3	2	2.73
19	11	Oban SHA limits	Collision	Collision between commercial vessel and fishing vessel / small commercial craft	A commercial vessel collides with fishing vessel / small commercial craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Reduced visibility.	Minor damage to both vessels; Crew / passengers sustain minor injuries.	Death or major injuries most likely on fishing boat; Major damage to both vessels; Minor pollution with release of fuel oil; Vessel sinks blocking access.	2	1	3	1	1	1	2	4	3	2	2.73
20	13	Oban SHA limits	Collision	Collision between Fishing vessels / small commercial craft	A fishing vessel / small commercial craft collides with another fishing vessel / small commercial craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Reduced visibility.	Minor damage to both vessels; Crew / passengers sustain minor injuries.	Death or major injuries most likely on fishing boat; Major damage to both vessels; Minor pollution with release of fuel oil; Vessel sinks blocking access.	2	1	3	1	1	1	1	4	3	2	2.64
21	18	Oban SHA limits	Contact	Contact berthing - commercial vessel	A commercial vessel contacts the berth. ML: Low speed impact with avoiding action. WC: High speed impact with no avoiding action.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Sudden change in weather conditions during berthing manoeuvre. Reduced visibility.	Minor damage to vessel; Minor damage to structure, third party vessel.	Death or major injuries to people on-board other vessels; Possible injury to crew or berthing party; Major damage to both vessel and structure; Major damage to third party vessels; Pollution.	2	1	2	2	1	1	2	4	4	4	2.57
22	29	Oban SHA limits	Mooring breakout	Mooring breakout of a fishing vessel / small commercial craft	A fishing vessel / small commercial craft breaks away from her moorings. ML: Lines parting causing ranging on the berth, mitigated by additional lines or vessel manoeuvring aids / anchor. WC: Complete breakout, leading to grounding through failure of systems to hold vessel alongside.	Failure of ship's mooring gear. Failure of fixed mooring gear. Inadequate seamanship / watch keeping. Extreme weather. Excessive wash or draw-off. Water surge caused by major vessel moving in the harbour (Especially at low water). Vandalism.	Minor damage to vessel and other vessels and structures in vicinity; Minor injury.	Moderate injuries; Major damage to vessel; Significant damage to other vessels and structures in vicinity struck whilst drifting; Minimal pollution; Access / berth blocked.	4	1	2	1	1	2	1	3	3	2	2.52

							Consequence Descriptions		Risk By Consequence Category											
									ML					WC						
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Hazard Detail	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	Risk Overall
23	21	Oban SHA limits	Grounding	Grounding of a major CalMac ferry / cruise ship	A major CalMac ferry / cruise ship runs aground. ML: Slow speed grounding event, able to refloat by itself. WC: Grounding at speed either powered or drifting.	Mechanical defect / failure. Master error. Result of avoiding action with third party vessel. Tide not running to prediction. Navigation marks out of position, unlit or missing. Shallow Water Effect / Bank Effect. Insufficient allowance for wind and tidal stream when approaching / leaving the harbour. Insufficient Maintenance Dredging. Inadequate survey or dissemination of information. Reduced visibility.	Moderate damage to vessel; Minor injury; Minor business loss.	Minor injuries; Major damage to vessel; Major pollution with release of fuel oil; Vessel blocks access for prolonged period; Vessel breaks back (Wisbech incident); Major business loss.	2	1	1	2	2	1	3	3	4	3	2.5
24	28	Oban SHA limits	Mooring breakout	Mooring breakout of a commercial vessel	A commercial vessel breaks away from her moorings. ML: Lines parting causing ranging on the berth, mitigated by additional lines or vessel manoeuvring aids / anchor. WC: Complete breakout, leading to grounding through failure of systems to hold vessel alongside.	Failure of ship's mooring gear. Failure of fixed mooring gear. Inadequate seamanship / watch keeping. Extreme weather. Excessive wash or draw-off. Water surge caused by major vessel moving in the harbour (Especially at low water). Vandalism.	Minor damage to vessel and other vessels and structures in vicinity; Minor injury.	Moderate injuries; Major damage to vessel; Significant damage to other vessels and structures in vicinity struck whilst drifting; Minimal pollution; Access / berth blocked.	3	1	2	1	1	1	1	3	4	4	2.47
25	15	Oban SHA limits	Collision	Collision between recreational vessels	Recreational craft including Yacht, kayak, rib collides with another recreational craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure; Skipper error; Result of avoiding action with third party vessel; Unlit recreational craft; Sailing vessel taking additional risks during racing.	Minor damage to both vessels; People on both vessels sustain minor injuries.	Death or major injuries on both vessels; Major damage to both vessels; Minimal pollution with release of fuel oil; Recreational vessel sinks blocking access for short period.	1	1	3	1	1	1	1	4	3	2	2.44
26	23	Oban SHA limits	Grounding	Grounding of a commercial vessel	A commercial vessel runs aground. ML: Slow speed grounding event, able to refloat by itself. WC: Grounding at speed either powered or drifting.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Tide not running to prediction. Navigation marks out of position, unlit or missing. Shallow Water Effect / Bank Effect. Insufficient allowance for wind and tidal stream when approaching / leaving the harbour. Insufficient Maintenance Dredging. Inadequate survey or dissemination of information. Reduced visibility.	Moderate damage to vessel; Minor Injury; Minor business loss.	Minor injuries; Major damage to vessel; Major pollution with release of fuel oil; Vessel blocks access for prolonged period; Vessel breaks back (Wisbech incident) Major business loss.	1	1	1	2	2	1	3	3	4	2	2.28
27	20	Oban SHA limits	Contact	Contact berthing - recreational vessel	A recreational vessel contacts the berth. ML: Low speed impact with avoiding action. WC: High speed impact with no avoiding action.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Unlit moored vessel or object. Sudden change in weather conditions during berthing manoeuvre. Sailing vessel taking additional risks during racing. Reduced visibility.	Minor damage to vessel; Minor damage to structure.	Possible injury to crew; Major damage to vessel and minor damage to structure; Minor pollution.	3	1	2	1	1	2	1	3	3	2	2.18

							Consequence Descriptions		Risk By Consequence Category											
									ML					WC						
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Hazard Detail	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	Risk Overall
28	14	Oban SHA limits	Collision	Collision between fishing vessel / small commercial craft and recreational vessel	Small Recreational craft including Yacht, kayak, rib collides with a Fishing vessel / small commercial craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure; Skipper error; Result of avoiding action with third party vessel; Unlit recreational craft; Sailing vessel taking additional risks during racing.	Minor damage to both vessels; People on both vessels sustain minor injuries.	Death or major injuries on both vessels; Major damage to both vessels; Minimal pollution with release of fuel oil; Recreational vessel sinks blocking access for short period.	2	1	2	1	1	1	1	4	3	2	2.12
29	30	Oban SHA limits	Mooring breakout	Mooring breakout of a recreational vessel	A recreational vessel breaks away from her moorings. ML: Lines parting causing ranging on the berth, mitigated by additional lines or vessel manoeuvring aids / anchor. WC: Complete breakout, leading to grounding through failure of systems to hold vessel alongside.	Failure of craft's mooring gear. Failure of fixed mooring gear. Inadequate seamanship / watch keeping. Extreme weather. Excessive wash or draw-off. Water surge caused by major vessel moving in the harbour (Especially at low water). Vandalism.	Minor damage to vessel and other vessels and structures in vicinity.	Moderate injuries; Major damage to vessel; Significant damage to other vessels and structures in vicinity struck whilst drifting; Minimal pollution; Access / berth blocked.	3	1	2	1	1	1	1	3	3	2	1.93
30	22	Oban SHA limits	Grounding	Grounding of a small CalMac ferry	A small CalMac ferry runs aground. ML: Slow speed grounding event, able to refloat by itself. WC: Grounding at speed either powered or drifting.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Tide not running to prediction. Navigation marks out of position, unlit or missing. Shallow Water Effect / Bank Effect. Insufficient allowance for wind and tidal stream when approaching / leaving the harbour. Insufficient Maintenance Dredging. Inadequate survey or dissemination of information. Reduced visibility.	Moderate damage to vessel; Minor injury; Minor business loss.	Minor injuries; Major damage to vessel; Major pollution with release of fuel oil; Vessel blocks access for prolonged period; Vessel breaks back (Wisbech incident); Major business loss.	2	1	1	1	1	1	2	3	3	3	1.35
31	24	Oban SHA limits	Grounding	Grounding of a fishing vessel / small commercial craft	A fishing vessel / small commercial craft runs aground. ML: Slow speed grounding event, able to refloat by itself. WC: Grounding at speed either powered or drifting.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Tide not running to prediction. Insufficient allowance for wind and tidal stream when approaching / leaving the harbour. Navigation marks out of position, unlit or missing. Insufficient Maintenance Dredging. Inadequate survey or dissemination of information. Reduced visibility.	Minor damage to vessel; Minor business loss.	Major injuries; Major damage to vessel; Minor pollution with possible release of fuel oil; Vessel blocks navigation channel for prolonged period; Vessel breaks back; Major business loss.	2	1	1	1	1	1	2	3	3	1	1.17
32	25	Oban SHA limits	Grounding	Grounding of a recreational vessel	A recreational vessel runs aground. ML: Slow speed grounding event, able to refloat by itself. WC: Grounding at speed either powered or drifting.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Tide not running to prediction. Insufficient allowance for wind and tidal stream when approaching / leaving the harbour. Navigation marks unlit/missing. Inadequate survey or dissemination of information. Insufficient Maintenance Dredging. Sailing vessel taking additional risks during racing. Reduced visibility.	Minor damage to vessel.	Major injuries; Major damage to vessel; Minimal pollution; Vessel temporarily blocks access; Major business loss.	2	1	1	1	1	1	1	3	3	1	1.08

Annex C Ranked Hazard Lists

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Hazard Detail	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall
									ML				WC				
							Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders	
1	1	Oban SHA limits	Collision	Collision between major CalMac ferry / cruise ship and major CalMac ferry / cruise ship	A major CalMac ferry / cruise ship collides with another major CalMac ferry / cruise ship. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	0	6	3	3	3	5	6	5	4.96
2	2	Oban SHA limits	Collision	Collision between major CalMac ferry / cruise ship and small CalMac ferry	A major CalMac ferry / cruise ship collides with a small CalMac ferry. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	0	6	3	3	2	5	5	5	4.53
3	16	Oban SHA limits	Contact	Contact berthing - major CalMac ferry / cruise ship	A major CalMac ferry / cruise ship contacts the berth. ML: Low speed impact with avoiding action. WC: High speed impact with no avoiding action.	Mechanical defect / failure. Master error. Result of avoiding action with third party vessel. Sudden change in weather conditions during berthing manoeuvre. Reduced visibility.	Minor damage to vessel; Minor damage to structure, third party vessel.	Death or major injuries to people on-board other vessels; Possible injury to crew or berthing party; Major damage to both vessel and structure; Major damage to third party vessels; Pollution.	0	3	3	0	2	6	6	6	4.05
4	3	Oban SHA limits	Collision	Collision between a major CalMac ferry / cruise ship and commercial vessel	A major CalMac ferry / cruise ship collides with a commercial vessel. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	0	4	2	2	3	4	5	4	3.97
5	26	Oban SHA limits	Mooring breakout	Mooring breakout of a major CalMac ferry / cruise ship	A major CalMac ferry / cruise ship breaks away from her moorings. ML: Lines parting causing ranging on the berth, mitigated by additional lines or vessel manoeuvring aids / anchor. WC: Complete breakout, leading to grounding through failure of systems to hold vessel alongside.	Failure of ship's mooring gear. Failure of fixed mooring gear. Inadequate seamanship / watch keeping. Extreme weather. Excessive wash or draw-off. Water surge caused by major vessel moving in the harbour (Especially at low water). Vandalism.	Minor damage to vessel and other vessels and structures in vicinity; Minor injury.	Moderate injuries; Major damage to vessel; Significant damage to other vessels and structures in vicinity struck whilst drifting; Minimal pollution; Access / berth blocked.	0	6	0	0	0	3	5	5	3.89
6	8	Oban SHA limits	Collision	Collision between small CalMac ferry and fishing vessel / small commercial craft	A small CalMac ferry collides with a fishing vessel / small commercial craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Reduced visibility.	Minor damage to both vessels; Crew / passengers sustain minor injuries.	Death or major injuries most likely on fishing boat; Major damage to both vessels; Minor pollution with release of fuel oil; Vessel sinks blocking access.	0	4	2	2	0	5	5	3	3.73
7	9	Oban SHA limits	Collision	Collision between a small CalMac ferry / cruise ship and a recreational vessel	Small Recreational craft including Yacht, kayak, rib collides with a small CalMac ferry. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure; Skipper error; Result of avoiding action with third party vessel; Unlit recreational craft; Sailing vessel taking additional risks during racing.	Minor damage to both vessels; People on both vessels sustain minor injuries.	Death or major injuries on both vessels; Major damage to both vessels; Minimal pollution with release of fuel oil; Recreational vessel sinks blocking access for short period.	0	4	2	2	0	5	3	3	3.64
8	4	Oban SHA limits	Collision	Collision between a major CalMac ferry / cruise ship and a fishing vessel / small commercial craft	A major CalMac ferry / cruise ship collides with a fishing vessel / small commercial craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Reduced visibility.	Minor damage to both vessels; Crew / passengers sustain minor injuries.	Death or major injuries most likely on fishing boat; Major damage to both vessels; Minor pollution with release of fuel oil; Vessel sinks blocking access.	0	3	0	0	2	6	6	2	3.62

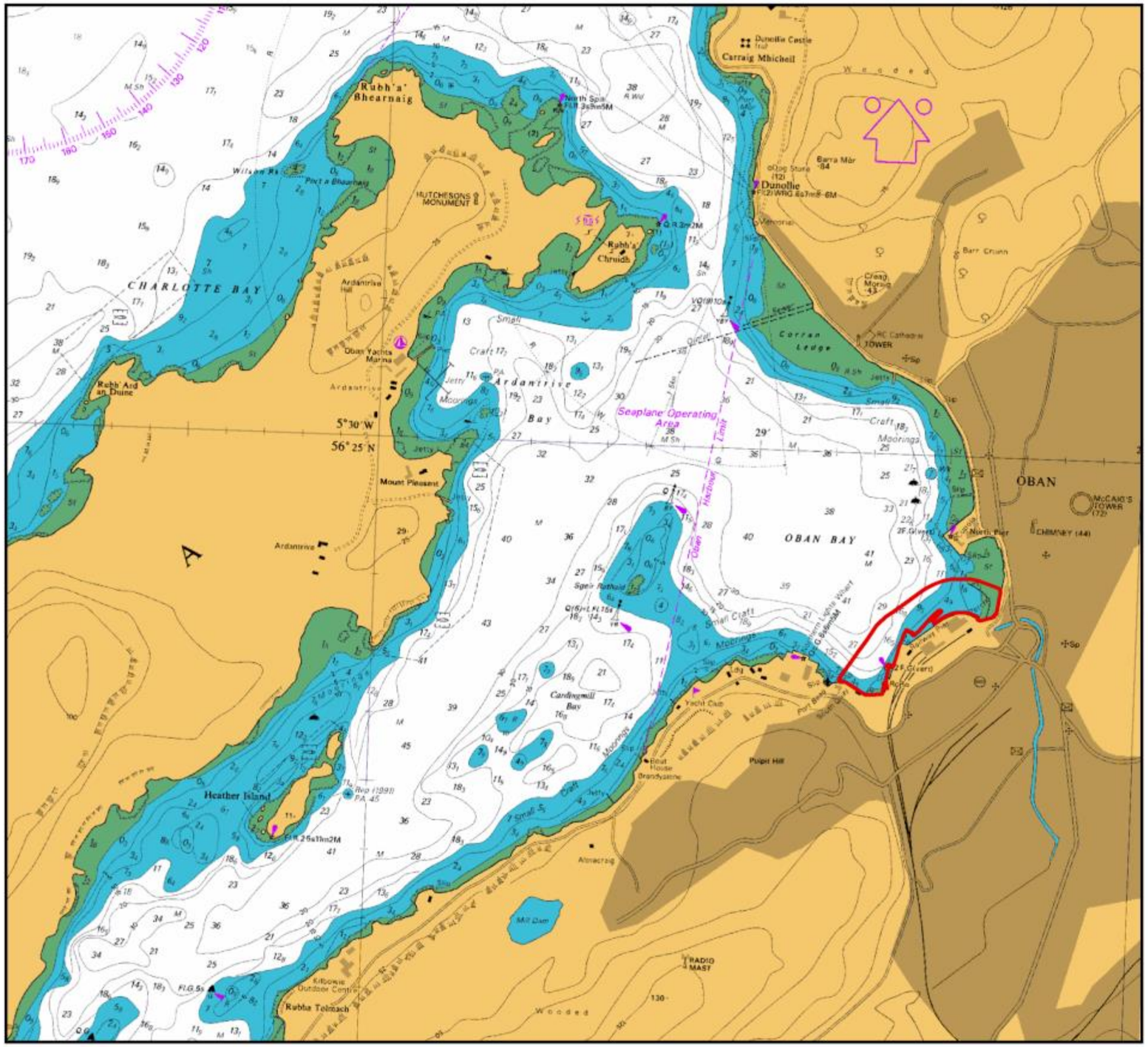
Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Hazard Detail	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall
									ML				WC				
							Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders	
9	31	Oban SHA limits	Foundering / swamping	Foundering / swamping	Any vessel founders / swamps. ML: Vessel floods some compartments but is able to return to harbour. WC: Vessel sinks.	Hatches / bow doors left open when at sea. Failure to close watertight doors in rough weather. Heavy seas.	Minor injuries; Minor damage to vessel.	Multiple deaths or major injuries to crew members / passengers on vessel; Major damage to vessel; Pollution with release of fuel oil; Vessel sinks blocking access.	2	3	3	3	3	4	4	4	3.61
10	17	Oban SHA limits	Contact	Contact berthing - small CalMac ferry	A small CalMac ferry contacts the berth. ML: Low speed impact with avoiding action. WC: High speed impact with no avoiding action.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Sudden change in weather conditions during berthing manoeuvre. Reduced visibility.	Minor damage to vessel; Minor damage to structure, third party vessel.	Death or major injuries to people on-board other vessels; Possible injury to crew or berthing party; Major damage to both vessel and structure; Major damage to third party vessels; Pollution.	0	3	0	0	0	6	4	4	3.5
11	6	Oban SHA limits	Collision	Collision between small CalMac ferry and small CalMac ferry	A small CalMac ferry collides with a small CalMac ferry. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	0	4	2	2	0	4	4	4	3.47
12	27	Oban SHA limits	Mooring breakout	Mooring breakout of a small CalMac ferry	A small CalMac ferry breaks away from her moorings. ML: Lines parting causing ranging on the berth, mitigated by additional lines or vessel manoeuvring aids / anchor. WC: Complete breakout, leading to grounding through failure of systems to hold vessel alongside.	Failure of ship's mooring gear. Failure of fixed mooring gear. Inadequate seamanship / watch keeping. Extreme weather. Excessive wash or draw-off. Water surge caused by major vessel moving in the harbour (Especially at low water). Vandalism.	Minor damage to vessel and other vessels and structures in vicinity; Minor injury.	Moderate injuries; Major damage to vessel; Significant damage to other vessels and structures in vicinity struck whilst drifting; Minimal pollution; Access / berth blocked.	0	6	0	0	0	3	3	3	3.38
13	5	Oban SHA limits	Collision	Collision between a major CalMac ferry / cruise ship and a recreational vessel	Small Recreational craft including Yacht, kayak, rib collides with a major CalMac ferry / cruise ship. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure; Skipper error; Result of avoiding action with third party vessel; Unlit recreational craft; Sailing vessel taking additional risks during racing.	Minor damage to both vessels; People on both vessels sustain minor injuries.	Death or major injuries on both vessels; Major damage to both vessels; Minimal pollution with release of fuel oil; Recreational vessel sinks blocking access for short period.	0	3	0	0	0	6	2	4	3.37
14	7	Oban SHA limits	Collision	Collision between a small CalMac ferry and commercial vessel	A small CalMac ferry collides with a commercial vessel. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	0	3	2	2	0	4	4	3	3.03
15	10	Oban SHA limits	Collision	Collision between commercial vessel and commercial vessel	A commercial vessel collides with another commercial vessel. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel; Reduced visibility.	Minor damage to both vessels; Minor injuries.	Death or major injuries to crew members / passengers on either vessel; Major damage to both vessels; Pollution with release of fuel oil; Vessel sinks blocking access.	0	3	2	0	1	4	4	3	3.01
16	19	Oban SHA limits	Contact	Contact berthing - Fishing / small commercial craft	A fishing vessel / small commercial craft contacts the berth. ML: Low speed impact with avoiding action. WC: High speed impact with no avoiding action.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Sudden change in weather conditions during berthing manoeuvre. Reduced visibility.	Minor damage to vessel; Minor damage to structure, third party vessels; Minor injuries.	Possible moderate injury to crew; Major damage to vessel and possible damage to structure; Minor pollution.	0	3	0	0	0	4	4	2	2.91
17	32	Oban SHA limits	Diving	Diving incident	Divers in water endangered by other harbour users. ML: Diving operations are disrupted. WC: Driver is struck by a third party vessel.	Diver struck or separated from support vessel by passing vessel. Diver injured by machinery / equipment operated by people that are unaware of dive operations in the vicinity.	Minor injury.	Single fatality; Loss to business.	0	3	0	0	0	5	0	3	2.83

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Hazard Detail	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall
									ML				WC				
							Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders	
18	12	Oban SHA limits	Collision	Collision between commercial vessel and recreational vessel	Small Recreational craft including Yacht, kayak, rib collides with a commercial vessel. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure; Skipper error; Result of avoiding action with third party vessel; Unlit recreational craft; Sailing vessel taking additional risks during racing.	Minor damage to both vessels; People on both vessels sustain minor injuries.	Death or major injuries on both vessels; Major damage to both vessels; Minimal pollution with release of fuel oil; Recreational vessel sinks blocking access for short period.	0	3	0	0	1	4	3	1	2.73
19	11	Oban SHA limits	Collision	Collision between commercial vessel and fishing vessel / small commercial craft	A commercial vessel collides with fishing vessel / small commercial craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Reduced visibility.	Minor damage to both vessels; Crew / passengers sustain minor injuries.	Death or major injuries most likely on fishing boat; Major damage to both vessels; Minor pollution with release of fuel oil; Vessel sinks blocking access.	0	3	0	0	1	4	3	1	2.73
20	13	Oban SHA limits	Collision	Collision between Fishing vessels / small commercial craft	A fishing vessel / small commercial craft collides with another fishing vessel / small commercial craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Reduced visibility.	Minor damage to both vessels; Crew / passengers sustain minor injuries.	Death or major injuries most likely on fishing boat; Major damage to both vessels; Minor pollution with release of fuel oil; Vessel sinks blocking access.	0	3	0	0	0	4	3	1	2.64
21	18	Oban SHA limits	Contact	Contact berthing - commercial vessel	A commercial vessel contacts the berth. ML: Low speed impact with avoiding action. WC: High speed impact with no avoiding action.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Sudden change in weather conditions during berthing manoeuvre. Reduced visibility.	Minor damage to vessel; Minor damage to structure, third party vessel.	Death or major injuries to people on-board other vessels; Possible injury to crew or berthing party; Major damage to both vessel and structure; Major damage to third party vessels; Pollution.	0	2	2	0	1	4	4	4	2.57
22	29	Oban SHA limits	Mooring breakout	Mooring breakout of a fishing vessel / small commercial craft	A fishing vessel / small commercial craft breaks away from her moorings. ML: Lines parting causing ranging on the berth, mitigated by additional lines or vessel manoeuvring aids / anchor. WC: Complete breakout, leading to grounding through failure of systems to hold vessel alongside.	Failure of ship's mooring gear. Failure of fixed mooring gear. Inadequate seamanship / watch keeping. Extreme weather. Excessive wash or draw-off. Water surge caused by major vessel moving in the harbour (Especially at low water). Vandalism.	Minor damage to vessel and other vessels and structures in vicinity; Minor injury.	Moderate injuries; Major damage to vessel; Significant damage to other vessels and structures in vicinity struck whilst drifting; Minimal pollution; Access / berth blocked.	0	3	0	0	0	3	3	2	2.52
23	21	Oban SHA limits	Grounding	Grounding of a major CalMac ferry / cruise ship	A major CalMac ferry / cruise ship runs aground. ML: Slow speed grounding event, able to refloat by itself. WC: Grounding at speed either powered or drifting.	Mechanical defect / failure. Master error. Result of avoiding action with third party vessel. Tide not running to prediction. Navigation marks out of position, unlit or missing. Shallow Water Effect / Bank Effect. Insufficient allowance for wind and tidal stream when approaching / leaving the harbour. Insufficient Maintenance Dredging. Inadequate survey or dissemination of information. Reduced visibility.	Moderate damage to vessel; Minor injury; Minor business loss.	Minor injuries; Major damage to vessel; Major pollution with release of fuel oil; Vessel blocks access for prolonged period; Vessel breaks back (Wisbech incident); Major business loss.	0	0	2	2	3	3	4	3	2.5
24	28	Oban SHA limits	Mooring breakout	Mooring breakout of a commercial vessel	A commercial vessel breaks away from her moorings. ML: Lines parting causing ranging on the berth, mitigated by additional lines or vessel manoeuvring aids / anchor. WC: Complete breakout, leading to grounding through failure of systems to hold vessel alongside.	Failure of ship's mooring gear. Failure of fixed mooring gear. Inadequate seamanship / watch keeping. Extreme weather. Excessive wash or draw-off. Water surge caused by major vessel moving in the harbour (Especially at low water). Vandalism.	Minor damage to vessel and other vessels and structures in vicinity; Minor injury.	Moderate injuries; Major damage to vessel; Significant damage to other vessels and structures in vicinity struck whilst drifting; Minimal pollution; Access / berth blocked.	0	2	0	0	0	3	4	4	2.47

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Hazard Detail	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall
									ML				WC				
							Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders	
25	15	Oban SHA limits	Collision	Collision between recreational vessels	Recreational craft including Yacht, kayak, rib collides with another recreational craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure; Skipper error; Result of avoiding action with third party vessel; Unlit recreational craft; Sailing vessel taking additional risks during racing.	Minor damage to both vessels; People on both vessels sustain minor injuries.	Death or major injuries on both vessels; Major damage to both vessels; Minimal pollution with release of fuel oil; Recreational vessel sinks blocking access for short period.	0	3	0	0	0	4	3	1	2.44
26	23	Oban SHA limits	Grounding	Grounding of a commercial vessel	A commercial vessel runs aground. ML: Slow speed grounding event, able to refloat by itself. WC: Grounding at speed either powered or drifting.	Mechanical defect / failure. Master / Skipper error. Result of avoiding action with third party vessel. Tide not running to prediction. Navigation marks out of position, unlit or missing. Shallow Water Effect / Bank Effect. Insufficient allowance for wind and tidal stream when approaching / leaving the harbour. Insufficient Maintenance Dredging. Inadequate survey or dissemination of information. Reduced visibility.	Moderate damage to vessel; Minor Injury; Minor business loss.	Minor injuries; Major damage to vessel; Major pollution with release of fuel oil; Vessel blocks access for prolonged period; Vessel breaks back (Wisbech incident) Major business loss.	0	0	1	1	3	3	4	1	2.28
27	20	Oban SHA limits	Contact	Contact berthing - recreational vessel	A recreational vessel contacts the berth. ML: Low speed impact with avoiding action. WC: High speed impact with no avoiding action.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Unlit moored vessel or object. Sudden change in weather conditions during berthing manoeuvre. Sailing vessel taking additional risks during racing. Reduced visibility.	Minor damage to vessel; Minor damage to structure.	Possible injury to crew; Major damage to vessel and minor damage to structure; Minor pollution.	0	2	0	0	0	3	3	2	2.18
28	14	Oban SHA limits	Collision	Collision between fishing vessel / small commercial craft and recreational vessel	Small Recreational craft including Yacht, kayak, rib collides with a Fishing vessel / small commercial craft. ML: Glancing blow with some avoiding action taken. WC: Head-on or crossing collision at speed.	Mechanical defect / failure; Skipper error; Result of avoiding action with third party vessel; Unlit recreational craft; Sailing vessel taking additional risks during racing.	Minor damage to both vessels; People on both vessels sustain minor injuries.	Death or major injuries on both vessels; Major damage to both vessels; Minimal pollution with release of fuel oil; Recreational vessel sinks blocking access for short period.	0	2	0	0	0	4	3	1	2.12
29	30	Oban SHA limits	Mooring breakout	Mooring breakout of a recreational vessel	A recreational vessel breaks away from her moorings. ML: Lines parting causing ranging on the berth, mitigated by additional lines or vessel manoeuvring aids / anchor. WC: Complete breakout, leading to grounding through failure of systems to hold vessel alongside.	Failure of craft's mooring gear. Failure of fixed mooring gear. Inadequate seamanship / watch keeping. Extreme weather. Excessive wash or draw-off. Water surge caused by major vessel moving in the harbour (Especially at low water). Vandalism.	Minor damage to vessel and other vessels and structures in vicinity.	Moderate injuries; Major damage to vessel; Significant damage to other vessels and structures in vicinity struck whilst drifting; Minimal pollution; Access / berth blocked.	0	2	0	0	0	3	3	1	1.93
30	22	Oban SHA limits	Grounding	Grounding of a small CalMac ferry	A small CalMac ferry runs aground. ML: Slow speed grounding event, able to refloat by itself. WC: Grounding at speed either powered or drifting.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Tide not running to prediction. Navigation marks out of position, unlit or missing. Shallow Water Effect / Bank Effect. Insufficient allowance for wind and tidal stream when approaching / leaving the harbour. Insufficient Maintenance Dredging. Inadequate survey or dissemination of information. Reduced visibility.	Moderate damage to vessel; Minor injury; Minor business loss.	Minor injuries; Major damage to vessel; Major pollution with release of fuel oil; Vessel blocks access for prolonged period; Vessel breaks back (Wisbech incident); Major business loss.	0	0	0	0	1	3	3	3	1.35

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Hazard Detail	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall
									ML				WC				
							Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders	
31	24	Oban SHA limits	Grounding	Grounding of a fishing vessel / small commercial craft	A fishing vessel / small commercial craft runs aground. ML: Slow speed grounding event, able to refloat by itself. WC: Grounding at speed either powered or drifting.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Tide not running to prediction. Insufficient allowance for wind and tidal stream when approaching / leaving the harbour. Navigation marks out of position, unlit or missing. Insufficient Maintenance Dredging. Inadequate survey or dissemination of information. Reduced visibility.	Minor damage to vessel; Minor business loss.	Major injuries; Major damage to vessel; Minor pollution with possible release of fuel oil; Vessel blocks navigation channel for prolonged period; Vessel breaks back; Major business loss.	0	0	0	0	1	3	3	0	1.17
32	25	Oban SHA limits	Grounding	Grounding of a recreational vessel	A recreational vessel runs aground. ML: Slow speed grounding event, able to refloat by itself. WC: Grounding at speed either powered or drifting.	Mechanical defect / failure. Skipper error. Result of avoiding action with third party vessel. Tide not running to prediction. Insufficient allowance for wind and tidal stream when approaching / leaving the harbour. Navigation marks unlit/missing. Inadequate survey or dissemination of information. Insufficient Maintenance Dredging. Sailing vessel taking additional risks during racing. Reduced visibility.	Minor damage to vessel.	Major injuries; Major damage to vessel; Minimal pollution; Vessel temporarily blocks access; Major business loss.	0	0	0	0	0	3	3	0	1.08

Annex D A3 Plots



Oban - Harbour Area Location.

Legend

Oban Harbour Area

Project No.	Date	Issue Number
14UK1002	29/10/2014	001
Author	**Checked by**	**Scale at A3**
Stephanie Taylor	Andrew Rawson	1:10,000

Data Source
Chart 1790
CMAL MasterMap

Coordinate System:
WGS 1984 UTM Zone 30N
Projection:
Transverse Mercator
Datum:
WGS 1984
Units:
Meter

0 0.05 0.1 0.2 0.3
Nautical Miles

N

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Marico Marine Group
United Kingdom
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New Zealand
Tel: +64 04917 4959

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Caledonian MacBrayne
Hebridean & Clyde Ferries

Figure Reference: 14UK1002_CalMacFerriesLtd_NRA_Oban_Harbour_Area_Location_V1

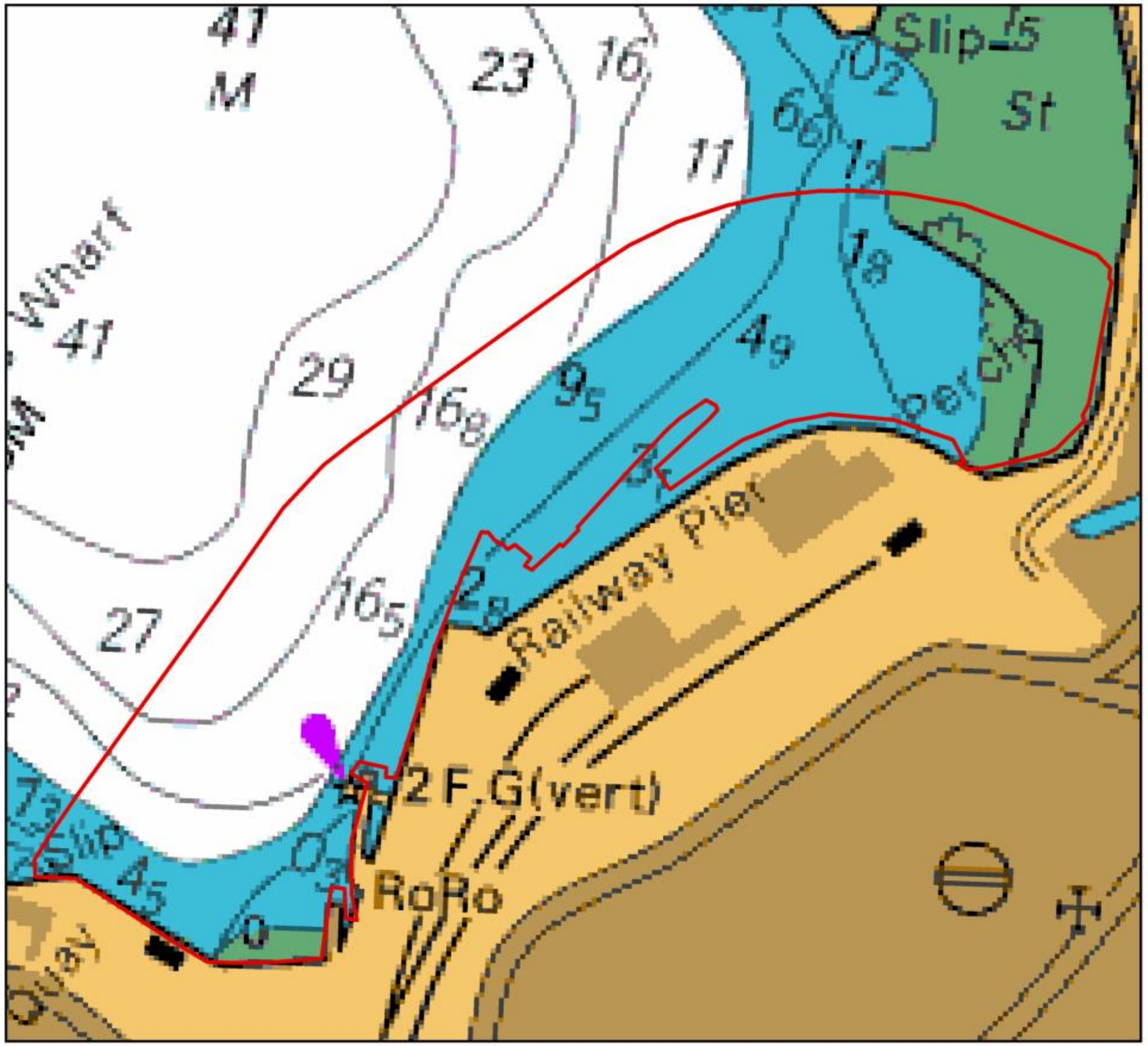
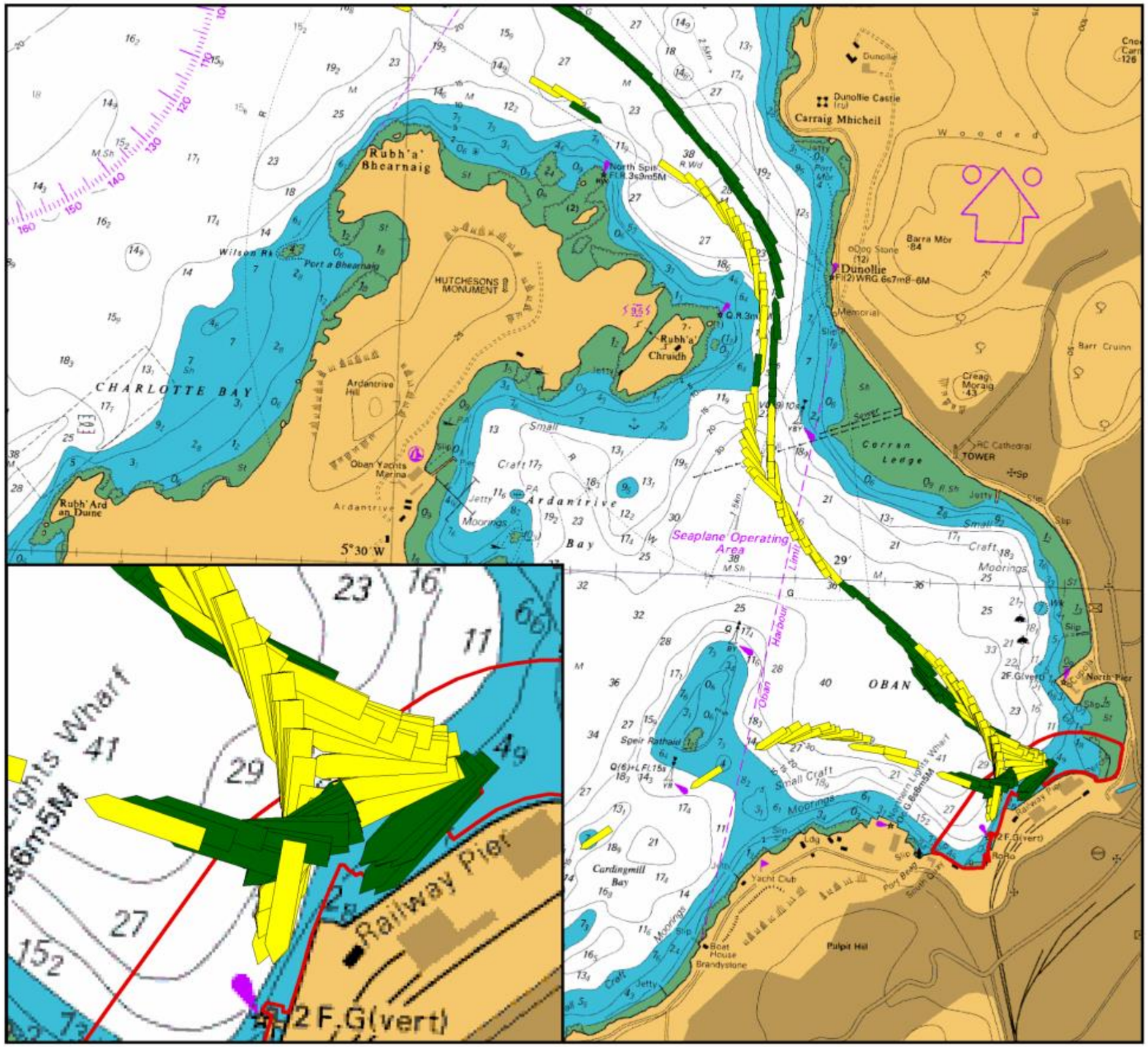
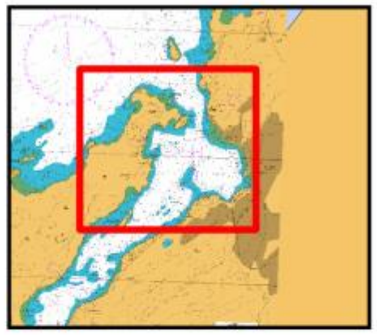


Figure Reference: 14UK1002_CalMacFerriesLtd_NRA_Oban_Harbour_Area_V1



Lord of the Isles and Clansman at Oban on 13/10/14.



Legend

- Oban Harbour Area

Vessel

- Clansman
- Lord of the Isles

Project No.	Date	Issue Number
14UK1002	23/10/2014	001
Author	**Checked by**	**Scale at A3**
Stephanie Taylor	Andrew Rawson	1:8,500

Data Source
Chart 1790
CMAL MasterMap

Coordinate System:
WGS 1984 UTM Zone 30N
Projection:
Transverse Mercator
Datum:
WGS 1984
Units:
Meter

0 100 200 400 600 N
Meters

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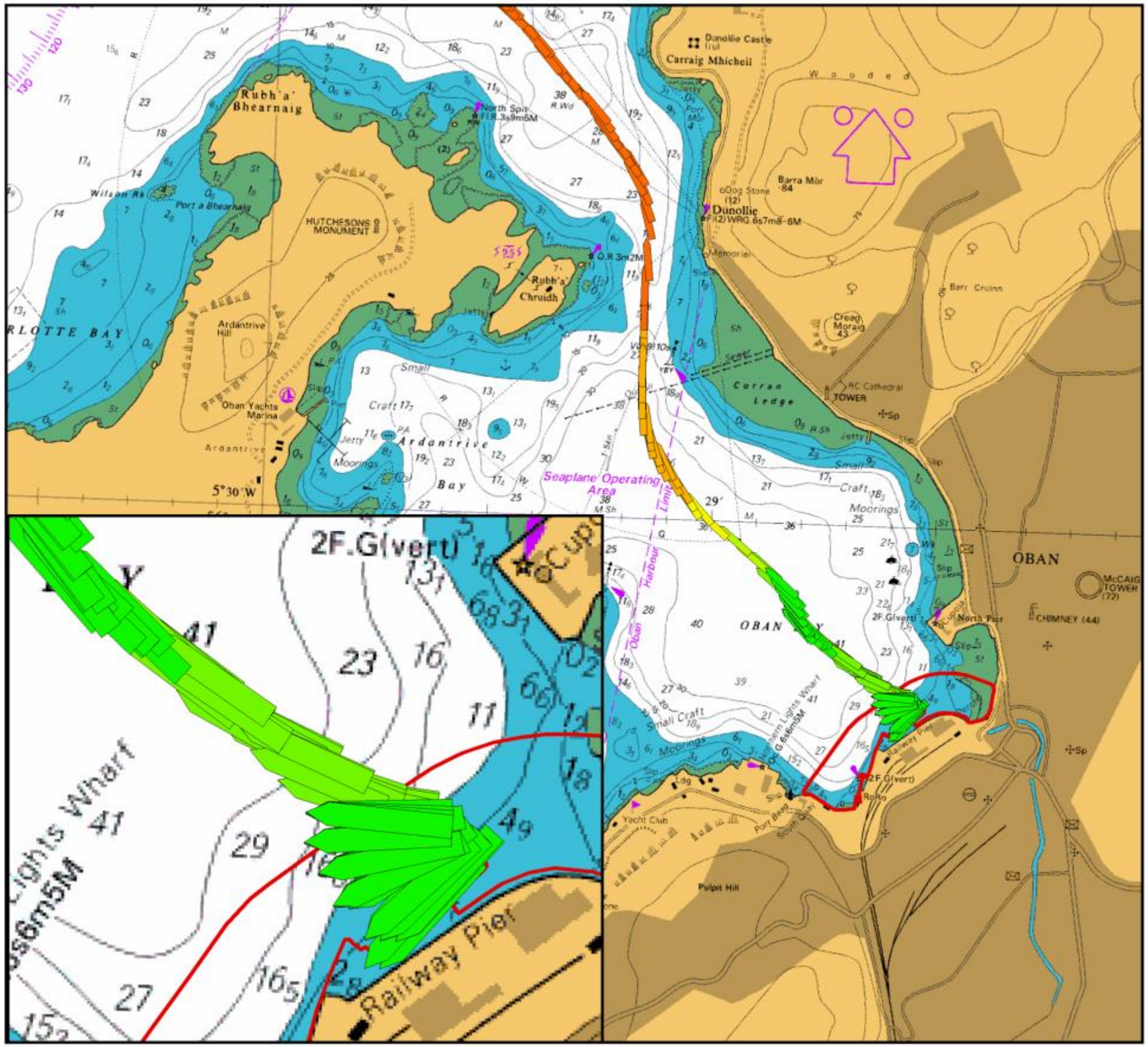
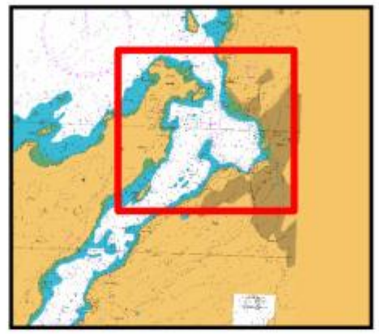
Figure Reference: 14UK1002_CalMacFerriesLtd_NRA_Oban_SweptPath_V2



M/V Clansman at Oban on 13/10/14.



Legend (speed in knots)

Oban Harbour Area

Speed	
0 - 3	9 - 10
4 - 5	11 - 13
6 - 8	14 - 15
	16 - 18

Project No.	Date	Issue Number
14UK1002	23/10/2014	001
Author	**Checked by**	**Scale at A3**
Stephanie Taylor	Andrew Rawson	1:8,500

Data Source
Chart 1790
CMAL MasterMap

Coordinate System:
WGS 1984 UTM Zone 30N
Projection:
Transverse Mercator
Datum:
WGS 1984
Units:
Meter

0 100 200 400 600 N
Meters

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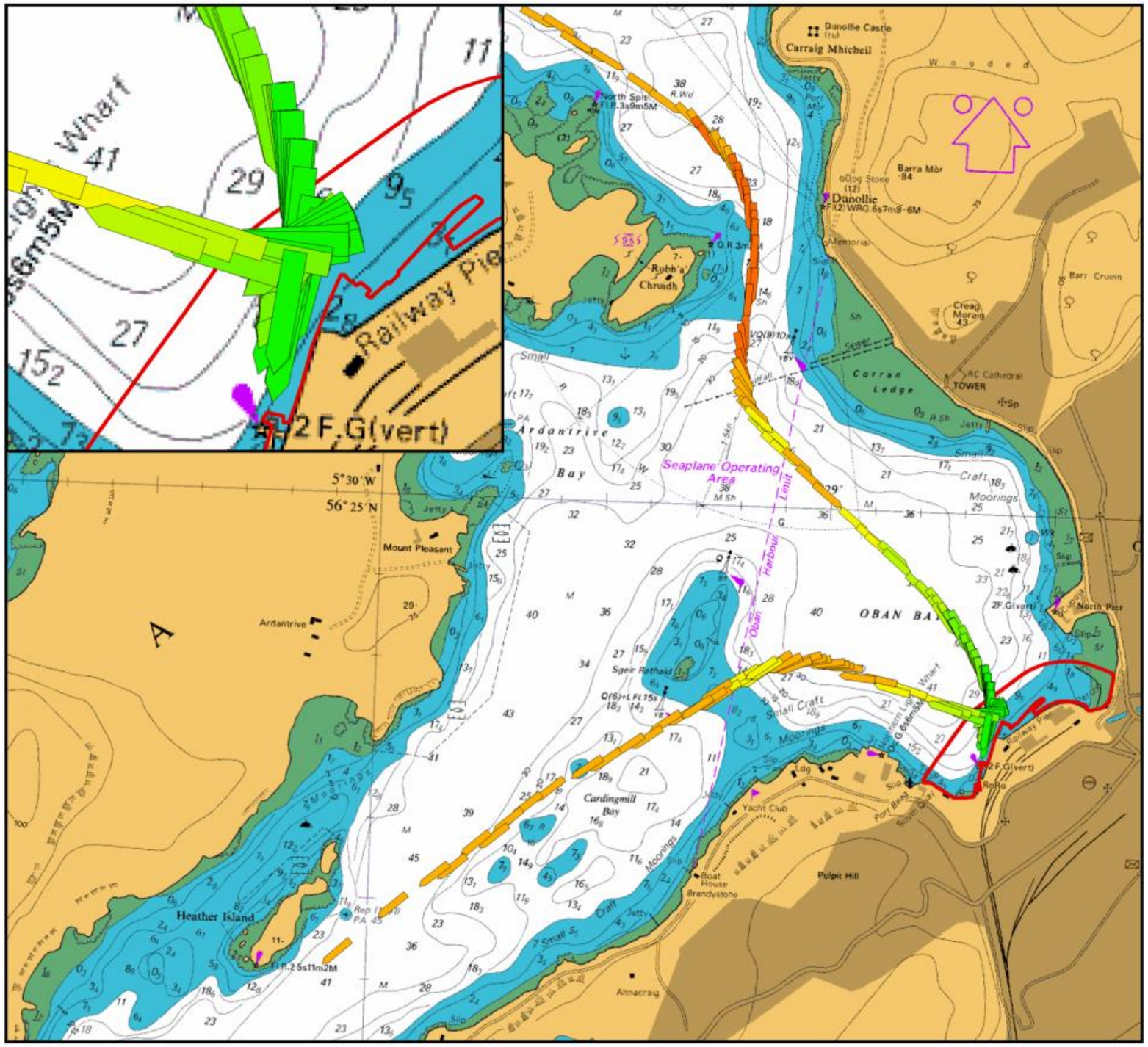
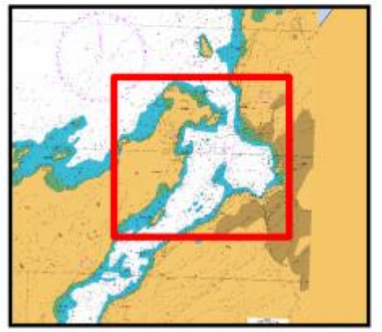
Hebridean & Clyde Ferries

Figure Reference: 14UK1002_CalMacFerriesLtd_NRA_Oban_Clansman_SweptPath_V2



M/V Lord of the Isles at Oban on 13/10/14.



Legend (speed in knots)

- Oban Harbour Area
- Speed
  - 0 - 2
  - 3 - 5
  - 6 - 7
  - 8 - 9
  - 10 - 11
  - 12 - 14
  - 15 - 16

Project No.	Date	Issue Number
14UK1002	23/10/2014	001
Author	**Checked by**	**Scale at A3**
Stephanie Taylor	Andrew Rawson	1:8,500

Data Source
Chart 1790
CMAL MasterMap

Coordinate System:
WGS 1984 UTM Zone 30N
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Units:
Meter

0 100 200 400 600 N
Meters

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Figure Reference: 14UK1002_CalMacFerriesLtd_NRA_Oban_LordOfIsles_SweptPath_V2