ISLE OF WIGHT COUNCIL

NEWPORT HARBOUR NAVIGATION RISK ASSESSMENT

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MARINE AND RISK CONSULTANTS LTD

ISLE OF WIGHT COUNCIL

NEWPORT HARBOUR NAVIGATION RISK ASSESSMENT

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EXECUTIVE SUMMARY

This Navigation Risk Assessment report has been prepared by Marine and Risk Consultants Limited for Isle of Wight Council.

This Navigation Risk Assessment is intended to support the Newport Harbour Safety Management System, which aims to enhance safety within the harbour by ensuring that all marine navigation hazards are identified, control measures are in place, and levels of risks are "As Low As Reasonably Practicable" (ALARP).

The Port Marine Safety Code establishes a national standard for every aspect of port marine safety and aims to enhance safety for those who use ports or work within them, their ships, passengers and the environment. The Port Marine Safety Code applies to all Harbour Authorities in the UK that have statutory powers and duties. It promotes the principle that all Harbour Authorities shall base their policies and procedures relating to marine operations on a formal assessment of hazards and risks to marine operations. They shall maintain a Safety Management System based on a formal navigation risk assessment, and any subsequent supporting risk assessments deemed necessary as the Safety Management System develops and evolves over time as a result of changing trade and harbour usage.

This Navigation Risk Assessment complies with the Port Marine Safety Code and its associated Guide to Good Practice and was conducted in accordance with the International Maritime Organisation's Formal Safety Assessment methodology for risk assessments. It comprises the following four Stages (a detailed description of each Stage is provided in **Annex A**):

- Stage 1: Data Gathering and Vessel Traffic Analysis;
- Stage 2: Hazard Identification;
- Stage 3: Risk Assessment; and
- Stage 4: Risk Controls.

This Navigation Risk Assessment identified 32 navigation-related hazards in Newport Harbour.

Contact between a leisure vessel and a buoy or pontoon was assessed to be highest risk, with a risk score of 4.44. The second highest ranked risk was a collision between a commercial (passenger) vessel with another commercial (passenger) vessel, with a risk score of 3.65.

Only the highest scoring hazard has a score which lies within the "ALARP" region; and efforts should be made to reduce this risk further, based on the cost-effectiveness of implementing additional risk control measures.

The other 31 navigation-related hazards in Newport Harbour were assessed to be either “negligible” or “low risk”. However, additional risk control measures have been suggested in order to further reduce any risks associated with activity in the harbour.

CONTENTS

FIGURES

TABLES

ANNEXES

ABBREVIATIONS

Abbreviation	Detail
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
CCTV	Closed Circuit Television
HW	High Water
ICW	In Collision With
IMO	International Maritime Organisation
LW	Low Water
m	Metre
Marico Marine	Marine and Risk Consultants Ltd
MCA	Maritime and Coast Guard Agency
ML	Most Likely
nm	Nautical Mile
NRA	Navigation Risk Assessment
PEC	Pilotage Exemption Certificate
RHIB	Rigid-Hulled Inflatable Boat
SHA	Statutory Harbour Authority
SMS	Safety Management System
STCW	Standards of Training Certification and Watchkeeping
VHF	Very High Frequency (radio communication)
WC	Worst Credible

1 INTRODUCTION

This Navigation Risk Assessment (NRA) report has been prepared by Marine and Risk Consultants Limited (Marico Marine) for Isle of Wight Council which is the Statutory Harbour Authority for the Port of Newport (Isle of Wight).

The NRA report will provide input to the decision-making process relating to the safe management of vessels and operations for the port. Ultimately, it is intended to enhance safety by ensuring that all marine-related hazards are identified, control measures are in place, and hazard risk levels are maintained to acceptable levels.

1.1 BACKGROUND AND SCOPE

The Port Marine Safety Code (PMSC)[1] establishes a national standard for every aspect of port marine safety and aims to enhance safety for those who use or work within ports, their ships, passengers and the environment.

The PMSC promotes the principle that all Harbour Authorities shall base their policies and procedures relating to marine operations on a formal assessment of hazards and risks to marine operations. They shall maintain a Safety Management System (SMS) based on a formal navigation risk assessment, and any subsequent supporting risk assessments deemed necessary as the SMS develops and evolves over time as a result of changing trade and harbour usage.

Figure 1 shows the revised Newport Statutory Harbour Authority Limits (SHA Limit) contained in the draft Harbour Revision Order that is currently with the Marine Management Organisation (MMO) for final approval.

This NRA complies with the PMSC and its associated Guide to Good Practice[2], and was conducted in accordance with the International Maritime Organisation (IMO) Formal Safety Assessment (FSA) methodology for risk assessments. It comprises the following four Stages (a detailed description of each Stage is provided in **Annex A**):

- Stage 1: Data Gathering and Vessel Traffic Analysis;
- Stage 2: Hazard Identification;

[1] Port Marine Safety Code, Department for Transport, November 2016

[2] A Guide to Good Practice on Port Marine Operations, Prepared in Conjunction with the Port Marine Safety Code 2016, DfT, February 2017

- Stage 3: Risk Assessment; and
- Stage 4: Risk Controls.

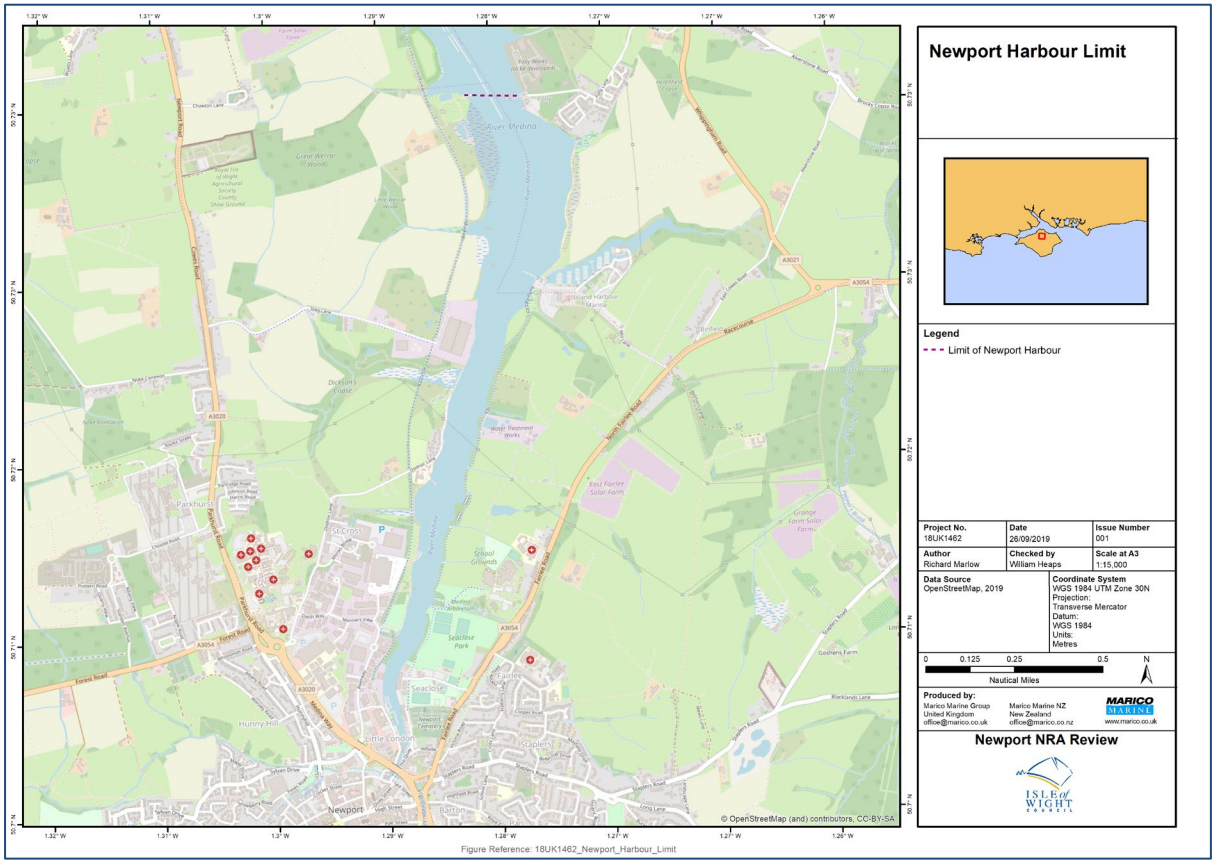


Figure 1: Newport Statutory Harbour Limit.

Marico Marine provides PMSC Designated Person Services to Isle of Wight Council in respect of Newport Harbour, and the named Designated Person has undertaken PMSC compliance audits on behalf of the port and provided additional advice and training.

The Designated Person has advised that the port's Navigation Risk Assessments should be fully reviewed and updated, and Marico Marine were appointed to undertake this task. However, in order to maintain the independence of the Designated Person, alternative marine consultants employed by Marico Marine undertook the assessment and produced the final report.

2 STAGE 1: DATA GATHERING AND VESSEL TRAFFIC ANALYSIS

The primary objective of the Data Gathering and Vessel Traffic Analysis stage is to ensure that all relevant facts and information are identified, for utilisation in subsequent stages of the NRA. The structured procedure which was followed included:

- Review of Newport Harbour Procedures and other Documentation / Information;
- Stakeholder Consultation Meetings;
- Review of Incident Records; and
- Vessel Traffic Review (chiefly from consultation input).

2.1 NEWPORT HARBOUR PROCEDURES AND OTHER DOCUMENTATION / INFORMATION

A review of existing harbour procedures and other documentation / information was undertaken. This provided the foundations for the assessment and ensured that all relevant issues were considered from the outset. It included a review of:

- Local Enabling Legislation;
- Harbour Byelaws;
- Marine Safety Management System;
- Notices to Mariners;
- Port Procedures;
- Marine Charts and Nautical Publications;
- MCA Health Check Reports;
- Hydrographic Survey Programme; and
- Designated Person PMSC Audit Reports

Note that the documents listed above are not included in this report but are available from the Harbour Master.

2.2 STAKEHOLDER CONSULTATION

Stakeholder consultation is an important and integral part of any NRA. During this assessment, a number of consultation meetings were held with harbour users (stakeholders) including harbour staff. Stakeholder consultation notes can be found in **Annex B** [removed from published version]. The primary aim was to collect data and other information to enhance the NRA and ensure, as far as possible, that all relevant issues are taken into account during the assessment.

These meetings were facilitated by Marico Marine personnel and included:

- **Cowes Harbour Commission**;
- **Newport Harbour**: Senior Harbour Master;
- **Newport Harbour User Group**;
- **The Medina Mariners Association**;
- **Houseboat Owner**;
- **Odessa Boatyard**;
- **Island Harbour Marina**;
- **Cowes Water Taxis**;
- **Williams Shipping**; and
- **Harbour Labourers**.

The stakeholder consultation meetings covered the following topics:

- Introduction and overview of the project, scope, aims and objectives;
- Clarification of regular operators (e.g. ferry timetabling / schedules);
- Clarification of other (irregular) services;
- Clarification of other harbour users (such as fishing, leisure, etc.);
- Discussion on environmental issues such as tides and weather characteristics;
- Discussion on navigational issues and navigational hazards and risks;
- Discussion on operational issues that could affect navigational risks (such as planned works, personnel); and
- Discussion on historical incidents and / or near-misses.

Data and information from the meetings / workshops were used throughout all stages of the NRA but in particular in the Hazard Identification (HAZID) and the risk assessment.

2.3 REVIEW OF THE INCIDENT RECORDS

Information relating to accidents / incidents that have occurred in the past can provide a valuable input to the hazard identification and risk assessment process. In the absence of information from a dedicated Incident Database from Newport Harbour, incident records have been determined from the consultation process. A summary of navigational incident types reported over various time periods and applicable to this NRA are given in **Table 1**.

Table 1: Incident Reporting Summary.

Navigational Incident	Incident Detail	Source
Grounding, drowning, collision, contact, occasional mooring breakout, reports of people stuck in mud	From 2002, approximately <5 incidents of any type recorded	Cowes Water Taxis
Various (no detail)	No incidents reported in the past 5 years	Newport Harbour User Group
Drowning	1 recorded incident in the past 3 years	Medina Mariners Association
Grounding	Approximately 1 per week as a result of UK Sailing Academy training (RIBS and SUPs)	Harbour Labourers
Capsizing, speeding, collision	Most common incident types, typically related to the UK Sailing Academy	Cowes Harbour Commission

2.4 VESSEL TRAFFIC ANALYSIS

A full understanding of vessel traffic in the SHA area is an important and integral part of any NRA.

No recorded data is available for the harbour (no radar or AIS coverage), but a good idea of vessel traffic density was gained from the Harbour Master and stakeholders, supported by some limited data regarding use of pontoons and marinas.

2.4.1 Vessel Categories and Newport Harbour Areas

Newport Harbour is used by a wide variety of commercial and recreational vessels and it comprises two areas split into a North/South divide which are characterised by differing marine traffic patterns. In order to help structure the overall NRA, the following vessel type categories (**Table 2**) and harbour areas (**Table 3**) were used.

Table 2: Vessel Categories.

Ref	Vessel Type Category	Including
A	Commercial (Non-Passenger)	General Cargo (E.g. "*Goole Star*") and Wind Turbine Blade Carrier ("*Blade Runner*").
B	Commercial (Passenger)	Ferry, Passenger Rigid Hulled Inflatable Boat (RHIB), Water Taxi
C	Leisure	Sailing Yacht, Motor Yacht, Powerboat, Canoe, RHIB

Table 3: Newport Harbour Areas.

Ref	Area Name	Comments
A	North	Northern extent of the Newport Harbour Limits to approximately 0.28nm south of Port Channel Buoy No. 18
B	South	From Port Channel Buoy No. 18 south to the A3020 bridge at Newport Harbour where the channel narrows.

The Newport Harbour NRA risk areas are illustrated in **Figure 2**.

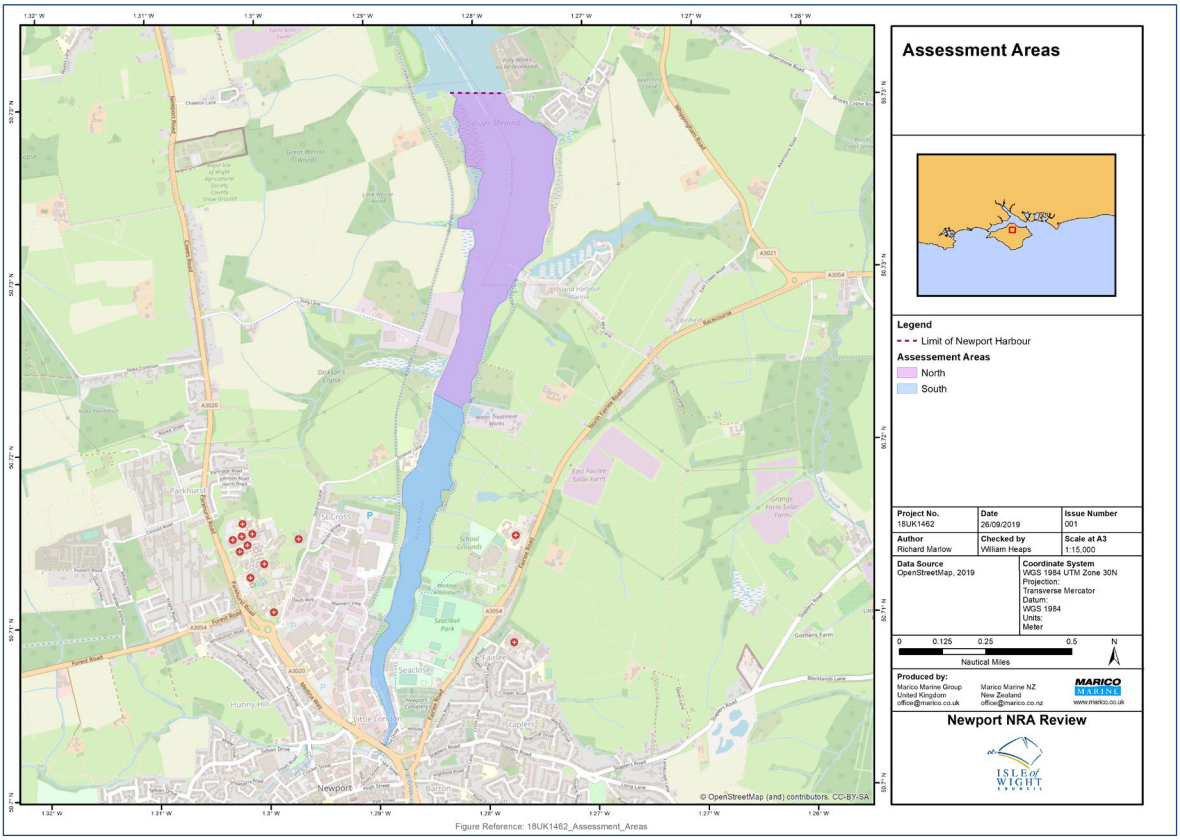


Figure 2: Newport Harbour Risk Areas.

2.4.2 Vessel Traffic Data

In the absence of any recorded AIS data, an understanding of harbour vessel traffic was gained from the Harbour Master and stakeholders. **Figure 3** illustrates usage numbers for pontoons and marinas within the Newport Harbour Limits in 2018 from both short and overnight staying vessels.

Vessel traffic in Newport Harbour reached a peak of 312 in June 2018, with traffic steadily increasing from April/May and decreasing from September/October.

Traffic to the Folly pontoons reached notable peaks in June and August 2018, with visitor numbers exceeding 500. Visitor numbers, and subsequently vessel traffic in the area, dropped significantly between August and September, with numbers falling from 540 to 184.

Berth allocation at Island Harbour remained consistent throughout the summer months, with berthing numbers peaking at 250 between June and August. Odessa Boatyard berth numbers remained consistently low in 2018, with visitors only recorded in June (6) and July (1).

Table 4 gives a summary of the permanent berths at each of the harbour locations in 2018.

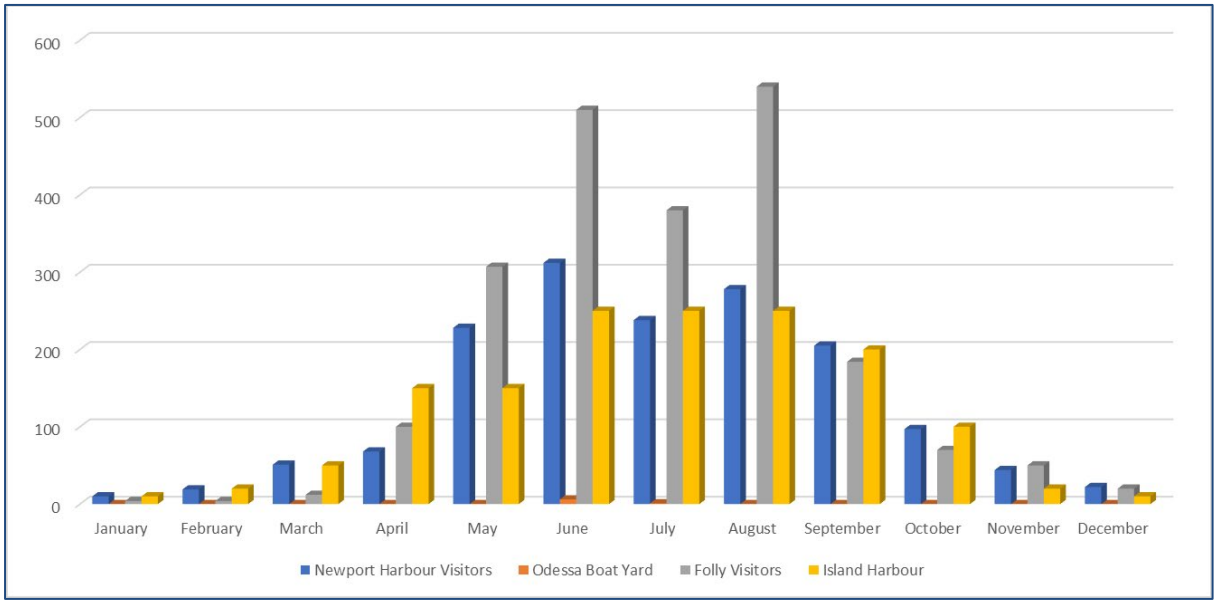


Figure 3: Newport Harbour Visitor Numbers 2018

Table 4: Permanent Berths 2018.

	Regular Users (Pontoon)	Houseboats	Swing	Commercial	Storage Ashore
Newport Permeant Berths	19	5	3	2	8
Odessa Boat Yard Permeant Berths	32	-	-	-	30
Newport Harbour Folly Permeant Berths	89	-	73	-	-
Island Harbour Permanent Berths	225	-	-	-	100

Some limited data was provided regarding commercial vessel movements within Newport Harbour. **Figure 4** illustrates movement numbers by vessels chartered by Williams Shipping (marine and logistics services provider based in Southampton) and "*Goole Star*" (a non-passenger commercial cargo vessel).

Williams Shipping vessel numbers averaged 14 per month between January and July, during which vessel movements peaked at 17 per month. Williams Shipping took over the operation of "*Blade Runner 2"* (a non-passenger cargo vessel transiting wind turbine blades in and out of Newport Harbour) on 1 April 2018, and this is indicative of the increase in movement numbers shown post-April. August saw a reduction in traffic numbers (11) and subsequent movements increased to a peak in October (17) before dropping during the winter months.

Movements by "*Goole Star*" steadily increased from January 2018 to May (peaking at 8) at which point numbers gradually declined until October (2 movements).

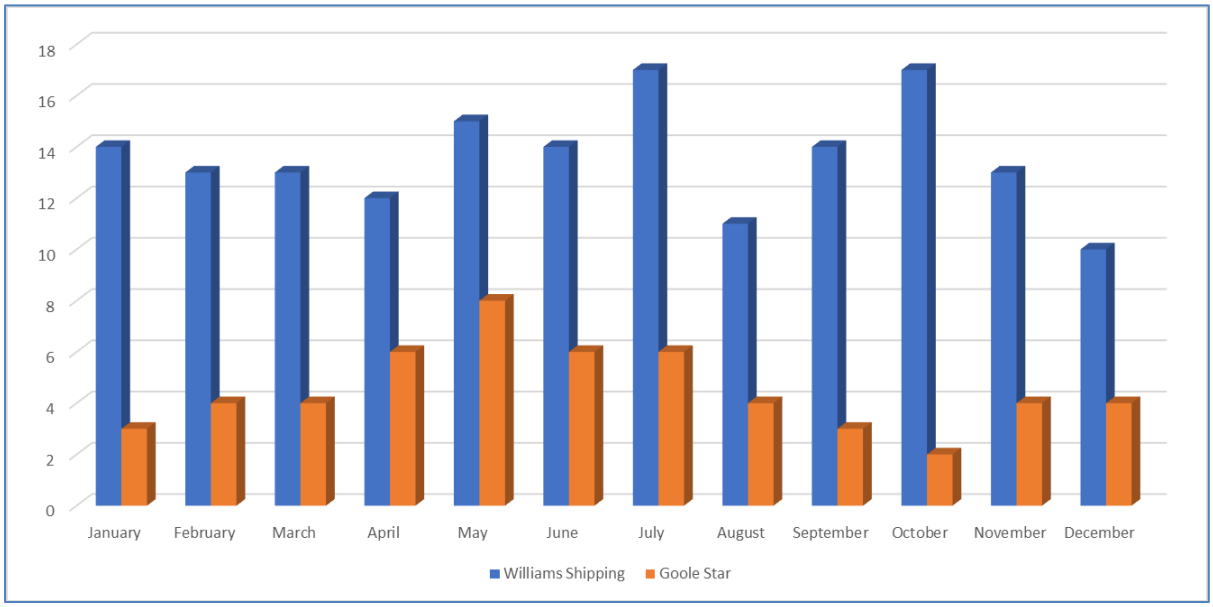


Figure 4: Commercial Vessel Movements in Newport Harbour.

3 STAGE 2: HAZARD IDENTIFICATION

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 likelihood that the hazard will be realised can be combined with an estimate of the consequence, and this combination is termed "risk". Risk is therefore a measure of the likelihood and the consequence of a particular hazard.

It is important that the hazard identification process follows a structured and systematic process that is thorough and comprehensive. It must identify common hazards as well as hazards that may never have occurred in Newport harbour in the past but are nonetheless possible and credible.

3.1 HAZARD IDENTIFICATION

Hazards relating to navigation within Newport harbour were identified through the stakeholder consultation meetings, review of incident records, and traffic analysis.

3.1.1 Hazard Categories

In order to focus the overall NRA and provide a structured hazard identification process, the following hazard categories were used (**Table 5**). Categorising hazards in this way also helps in the determination of risk control measures pertinent to the geographic location of each hazard.

Note that Health and Safety (H&S) hazards are not included within the scope of this NRA, for example slips/trips/falls.

Table 5: Hazard Categories.

Ref	Hazard Category	Comments
A	Collision	When two or more vessels impact each other whilst manoeuvring.
B	Contact	When one or more vessels makes physical contact with a fixed object such as a pier / jetty or a mooring buoy. This hazard is sometimes referred to as "allision" when contact is made with a fixed structure, or a "striking" when contact is made with a floating structure (e.g. navigation buoy or anchored ship).
C	Grounding	When a vessel unintentionally makes contact with the seabed.
D	Breakout or Mooring Incident	When a vessel ranges (moves excessively) whilst alongside the berth or when one or more mooring lines fail resulting in the vessel unintentionally breaking away from its moored position. This may be due to a combination of strong winds, large waves, wash or the effect of passing vessels, adverse mooring arrangements (bollards) or poor seamanship / mooring technique.
E	Diving / Swimming Incident	Diving incident involving Recreational or Commercial diving.
F	Fire / Explosion	Fire or explosion on vessel caused by human error, equipment failure, vandalism or terrorism.
G	Personal Injury	When a person in the water is endangered by other port users.

3.2 NAVIGATION HAZARDS

The Hazard Identification process identified a total of 32 hazards for the Newport Harbour area, as shown in **Table 6**. The full Hazard Logs with additional information are shown in **Annex D**.

Note that the hazard identification process aims to identify all potential hazards and then to amalgamate similar hazards together to provide a total number that can be effectively managed within the port / harbour safety management system.

Table 6: Newport Harbour Hazards.

No.	Area	Category	Hazard Title
1	North	Collision	Collision - Commercial (Non-Passenger) with Commercial (Non-Passenger)
2	North	Collision	Collision - Commercial (Non-Passenger) with Commercial (Passenger)
3	North	Collision	Collision - Commercial (Non-Passenger) with Leisure
4	North	Collision	Collision - Commercial (Passenger) with Leisure
5	North	Collision	Commercial (Passenger) with Commercial (Passenger)
6	North	Collision	Leisure with Leisure

No.	Area	Category	Hazard Title
7	South	Collision	Commercial (Non-Passenger) with Commercial (Non-Passenger)
8	South	Collision	Commercial (Non-Passenger) with Commercial (Passenger)
9	South	Collision	Commercial (Non-Passenger) with Leisure
10	South	Collision	Commercial (Passenger) with Leisure
11	South	Collision	Commercial (Passenger) with Commercial (Passenger)
12	South	Collision	Leisure with Leisure
13	North	Contact	Commercial (Non-Passenger)
14	North	Contact	Commercial (Passenger)
15	North	Contact	Leisure
16	South	Contact	Commercial (Non-Passenger)
17	South	Contact	Commercial (Passenger)
18	South	Contact	Leisure
19	Both	Grounding	Commercial (Non-Passenger)
20	Both	Grounding	Commercial (Passenger)
21	Both	Grounding	Leisure
22	North	Breakout	Commercial (Non-Passenger)
23	North	Breakout	Commercial (Passenger)
24	North	Breakout	Leisure
25	South	Breakout	Commercial (Non-Passenger)
26	South	Breakout	Commercial (Passenger)
27	South	Breakout	Leisure
28	Both	Diving / Swimming	Diving / Swimming Incident (Commercial and General Public)
29	Both	Fire / Explosion	Commercial (Non-Passenger)
30	Both	Fire / Explosion	Commercial (Passenger)
31	Both	Fire / Explosion	Leisure
32	Both	Personal Injury	Personal Injury

4 STAGE 3: RISK ASSESSMENT

This risk assessment complies with the PMSC and its associated Guide to Good Practice and was conducted in accordance with the International Maritime Organisation (IMO) Formal Safety Assessment (FSA) methodology for risk assessments. A detailed description of the methodology is provided in **Annex A**.

Note that the aim of this stage was to assess the baseline risk conditions in Newport Harbour - i.e. the risk with all existing risk control measures in place.

4.1 OVERVIEW OF THE RISK ASSESSMENT METHODOLOGY

A standard 5x5 risk matrix was used (see **Figure 5**) and each hazard was assessed twice. Firstly, to determine the risk associated with the "*most likely*" outcome of the hazard and secondly to determine the risk associated with the "*worst credible*" outcome for each hazard. The results are then combined to give a total Risk Score for each Hazard.

This approach provides a realistic and thorough assessment of risk, which reflects reality, in that relatively few incidents result in the "worst credible" outcome.

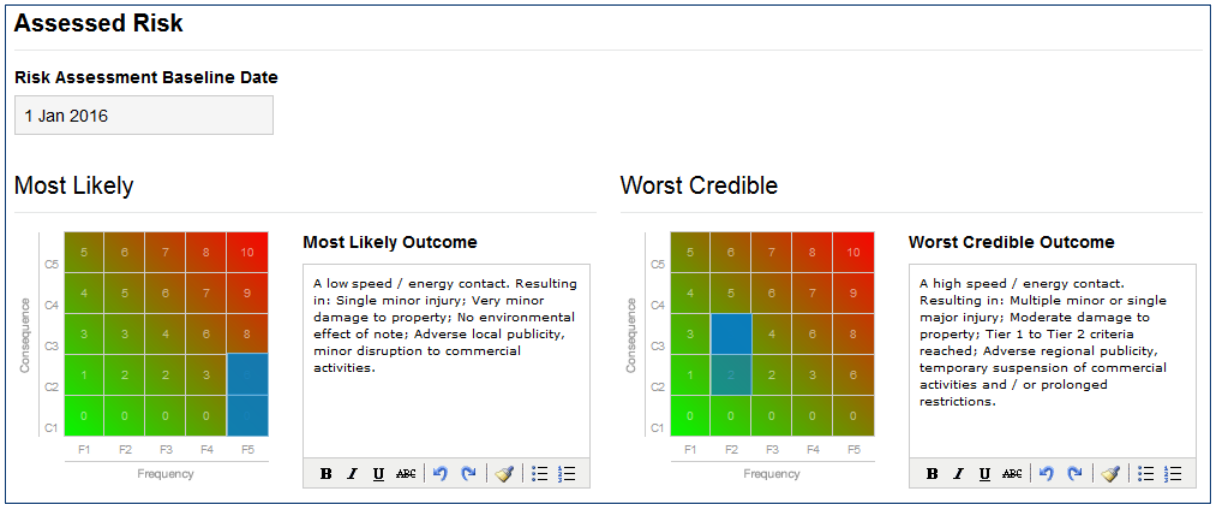


Figure 5: Example Risk Matrix.

4.1.1 Assessment of Frequency and Consequence

The assessment of frequency was made for a notional "*most likely*" and "*worst credible*" likelihood of occurrence, for each hazard. These were combined with assessments of typical consequences to people, property, environment and business. The frequency and consequence bands used for this NRA are shown in **Annex A**.

The frequency and consequence assessments were largely based on the data / information collected during Stage 1 of this NRA, and in particular:

- Review of NPA Procedures and other Documentation / Information;
- Stakeholder Consultation Meetings;
- Review of the Incident Records; and
- Vessel Traffic Review (chiefly from consultation input).

This data / information was supplemented by expert judgement and specialist knowledge provided by the assessment team, who have considerable experience in undertaking NRAs of this type in ports / harbours all around the world.

4.1.2 Risk Scores

The frequency and consequence scores are combined to give two separate risk scores that represent the "*most likely*" and the "*worst credible*" risk for each hazard. These two scores are further combined to give a final risk score for each hazard, between 0 (negligible) and 10 (high). The risk scores are sorted into a Ranked Hazard List that shows the highest risk hazards prioritised at the top and the lowest at the bottom (see **Section 4.2**).

Risks are deemed to be negligible, low, As Low as Reasonably Practicable (ALARP), significant or high, as per **Table 7**. ALARP represents that risk band where the level of risk is neither acceptable nor unacceptable. It is the risk band for which further investment of resources for risk reduction may not be justifiable – i.e. risks which fall within the ALARP band have to be reduced unless there is a disproportionate cost to the benefits obtained.

A navigation hazard with a risk score that is "significant" or "high" is termed "unacceptable" and as such additional risk control measures should be implemented. This may range from stopping the activities which bring about such high-risk hazards or by measures which seek to reduce the likelihood and / or consequence of the hazard occurrence.

Table 7: Risk Scoring.

Risk Score	Risk Definition	Action Taken
0 - 1.99	Negligible	The risk is acceptable and at level where operational safety is unaffected.
2 - 3.99	Low	The risk is acceptable and at level where operational safety is assumed.
4 - 6.99	ALARP	The risk is neither acceptable nor unacceptable. Risks in the ALARP band are to be managed to a level which is "As Low As Reasonably Practicable", based on the cost-effectiveness of implementing additional risk control measures. These risks and associated risk control measures shall be regularly reviewed as part of the Safety Management System.
7 - 8.99	Significant	The risk is unacceptable and additional risk control measures shall be identified and implemented as soon as possible (or the activity / operation temporarily suspended). These risks and associated risk control measures shall be regularly reviewed as part of the Safety Management System.
9 - 10	High	The risk is unacceptable and additional risk control measures shall be identified and implemented immediately (or the activity / operation permanently suspended). These risks and associated risk control measures shall be regularly reviewed as part of the Safety Management System.

4.2 RISK ASSESSMENT RESULTS

Table 8 shows a summary of the Ranked Hazard List for Newport Harbour. More details on each hazard is provided in **Annex C** (which contains the risk data input scores in terms of the "*most likely*" and the "*worst credible*" consequences to people, property, environment and business). **Annex D** contains the Ranked Hazard List.

Table 8: Summary of the Ranked Hazard List.

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Risk Overall
1	15	North	Contact	Leisure	4.44
2	5	North	Collision	Commercial (Passenger) with Commercial (Passenger)	3.65
3	4	North	Collision	Commercial (Passenger) with Leisure	3.58
4	10	South	Collision	Commercial (Passenger) with Leisure	3.58
5	2	North	Collision	Commercial (Non-Passenger) with Commercial (Passenger)	3.41
6	8	South	Collision	Commercial (Non-Passenger) with Commercial (Passenger)	3.41
7	3	North	Collision	Commercial (Non-Passenger) with Leisure	3.33
8	9	South	Collision	Commercial (Non-Passenger) with Leisure	3.33
9	11	South	Collision	Commercial (Passenger) with Commercial (Passenger)	3.33
10	31	Both	Fire / Explosion	Leisure	3.15
11	13	North	Contact	Commercial (Non-Passenger)	2.86
12	14	North	Contact	Commercial (Passenger)	2.86
13	18	South	Contact	Leisure	2.63
14	1	North	Collision	Commercial (Non-Passenger) with Commercial (Non-Passenger)	2.46
15	7	South	Collision	Commercial (Non-Passenger) with Commercial (Non-Passenger)	2.46

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Risk Overall
16	25	South	Breakout	Commercial (Non-Passenger)	2.46
17	30	Both	Fire / Explosion	Commercial (Passenger)	2.42
18	24	North	Breakout	Leisure	2.4
19	16	South	Contact	Commercial (Non-Passenger)	2.39
20	23	North	Breakout	Commercial (Passenger)	2.3
21	27	South	Breakout	Leisure	2.17
22	29	Both	Fire / Explosion	Commercial (Non-Passenger)	2.13
23	6	North	Collision	Leisure with Leisure	2.12
24	12	South	Collision	Leisure with Leisure	2.12
25	22	North	Breakout	Commercial (Non-Passenger)	2.11
26	21	Both	Grounding	Leisure	1.86
27	28	Both	Diving / Swimming	Diving / Swimming Incident (Commercial and General Public)	1.85
28	26	South	Breakout	Commercial (Passenger)	1.84
29	17	South	Contact	Commercial (Passenger)	1.75
30	32	Both	Personal Injury	Personal Injury	1.74
31	20	Both	Grounding	Commercial (Passenger)	0.99
32	19	Both	Grounding	Commercial (Non-Passenger)	0.47

The highest single hazard for Newport Harbour was assessed to be “Contact - Leisure” with a score of 4.44. This was assessed to be the highest risk hazard primarily due to the potential “worst credible” consequence of a large leisure vessel coming into contact with a pontoon or moored vessel(s) at speed, with the potential for multiple loss of life.

The risk of collision between a commercial (passenger) vessel and a commercial (passenger) vessel was assessed to be the second highest risk, with a risk score of 3.65.

Only the highest scoring hazard has a score which lies within the “ALARP” region; and efforts should be made to reduce this risk further, based on the cost-effectiveness of implementing additional risk control measures.

5 STAGE 4: RISK CONTROL MEASURES

There are a number of over-arching merchant shipping regulations that apply in all ports / harbours in the UK, and the most applicable include (but not limited to):

- International Convention for the Safety of Life at Sea (SOLAS), 1974 (and amendments);
- The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (or STCW), 1978 (and amendments);
- The International Regulations for Preventing Collisions at Sea (COLREGs);
- The Merchant Shipping (Oil Pollution Preparedness, Response Co-operation Convention) Regulations 1998, Statutory Instrument 1998 No. 1056; and
- Marine and Coastguard Agency National regulations (MGNs, MSNs, etc.)

5.1 EXISTING RISK CONTROL MEASURES

Existing Risk Control measures are listed in **Table 9** below:

Table 9: Existing Risk Control Measures.

#	Control Description	Area Applied
1	Navigation Aids and inspections	N and S
2	Harbour patrols during events	N and S
3	Local Notice to Mariners	N and S
4	Maintenance of moorings and pontoons	N and S
5	Hydrographic surveys and routine visual checks	N and S
6	Byelaws (4 knots above Five Tree Point)	S
7	Advisory signage (including 6 knot speed limit and no swimming)	N and S
8	Fixed lifesaving appliances	N and S
9	Additional navigation procedures for Blade Runner	N and S
10	Emergency Plans	N and S

5.2 ADDITIONAL RISK CONTROL MEASURES

Table 10 provides a list of additional control measures that has been identified during the consultation process to improve safety within the harbour.

Table 10: Additional Risk Control Measures.

Additional Risk Controls Measures for Newport Harbour
Additional Harbour staff watch cover e.g: staff the harbour south +/- 3 hours of HW (between 08.00 and 20.00)
Provide additional lighting on channel marker buoys
Raise leading lights to be seen over excessive foliage, or ensure foliage is regularly trimmed
Provide Notice to Mariners for movement of pontoons
Improved marking of wreck to south of harbour entrance
Consider applying for Powers to make Harbour or General Directions

Consideration should be given to implementing these control measures as risks are reviewed, but currently all risks are acceptable without these additional controls being in place.

6 CONCLUSIONS

This Navigation Risk Assessment identified 32 navigation-related hazards in Newport Harbour.

Contact between a leisure vessel and a buoy or pontoon was assessed to be highest risk, with a risk score of 4.44. The second highest ranked risk was a collision between a commercial (passenger) vessel with another commercial (passenger) vessel, with a risk score of 3.65.

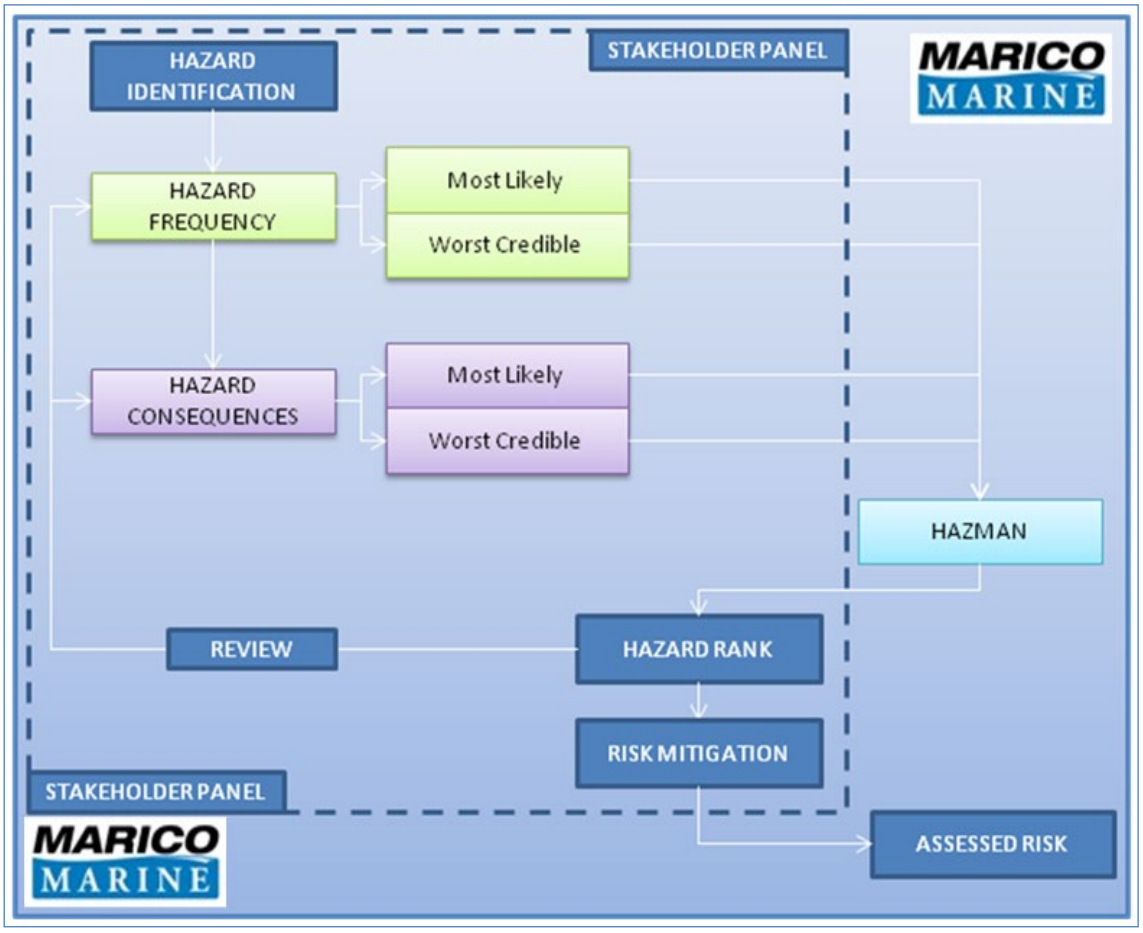
Only the highest scoring hazard has a score which lies within the "ALARP" region; and efforts should be made to reduce this risk further, based on the cost-effectiveness of implementing additional risk control measures.

The other 31 navigation-related hazards in Newport Harbour were assessed to be either "negligible" or "low risk". However, additional risk control measures have been suggested in order to further reduce any risks associated with activity in the harbour.

Annex A NRA Methodology

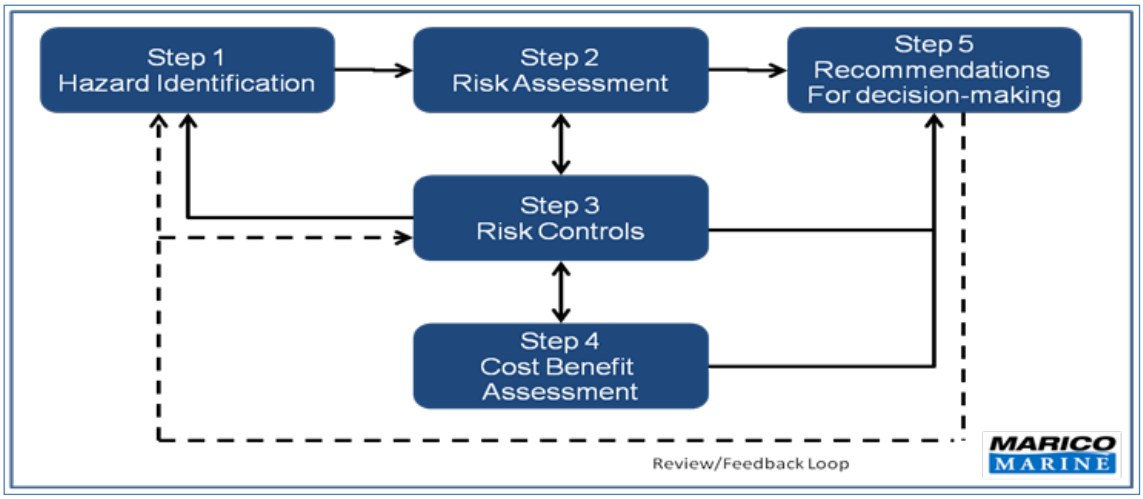
RISK ASSESSMENT METHODOLOGY

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.

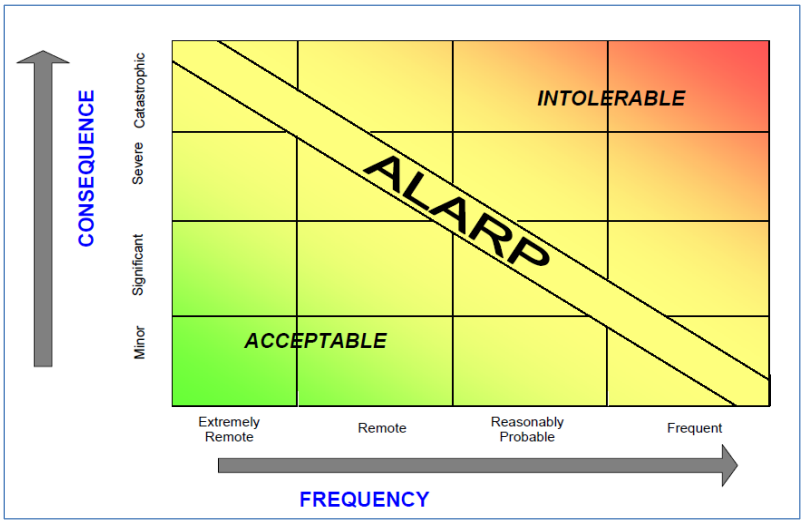
The NRA for the project was carried out using the Marico Marine "HAZMAN II" program to provide ranked hazard reports. The data handled within "HAZMAN II" can subsequently form the basis for an on-going navigational Safety Management System (SMS).



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;
- Contact;
- Diving incident;
- Grounding;
- Mooring incident / breakout;
- Personal injury; and

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
F5	Frequent	An event that could be expected to occur more than once per year.
F4	Likely	An event that could be expected to occur between 1 to 10 years.
F3	Possible	An event that could be expected to occur between 10 to 100 years.
F2	Unlikely	An event that could be expected to occur between 100 to 1000 years.
F1	Remote	An event that could be expected to occur less than once in 1000 years.

Assessment of Consequence

Using the assessed notional frequency for the "*most likely*" and "*worst credible*" scenarios for each hazard, an assessment was made for the consequences to people, property, environment and business, using the categories and criteria below.

Consequence Categories and Criteria.

Cat.	People	Property	Environment	Business
C1	Negligible			
	Very minor injury (e.g. bruising).	Very minor damage to property.	No effect of note. Tier 1 may be declared but criteria not necessarily met.	Very short-term disruption to services (1-2hrs) with ensuing loss of revenue.
		Costs <£10k	Costs <£10k	Costs <£10k
C2	Minor			
	Single minor injury.	Minor damage to property.	Tier 1 – Tier 2 criteria reached. Small operational (oil) spill with little effect on environmental amenity.	Adverse local publicity. Short-term loss of revenue including minor disruption to commercial activities (<1 day).
		Costs £10k –£100k	Costs £10K–£100k	Costs £10k – £100k
C3	Moderate			
	Multiple minor or single major injury.	Moderate damage to property.	Tier 2 spill criteria reached but capable of being limited to immediate area within area.	Adverse regional publicity. Temporary suspension of commercial activities and/or prolonged restrictions (1≥7 days).
		Costs£ 100k - £1M	Costs £100k -£1M	Costs £100k - £1M
C4	Major			
	Multiple major injuries or single fatality.	Major damage to property.	Tier 3 criteria reached with pollution requiring national support. Chemical spillage or small gas release.	Adverse national publicity. Medium-term suspension of operations or prolonged restrictions, major disruption to commercial activities.
		Costs £1M -10M	Costs £1M - £10M	Costs £1M -£10M
C5	Catastrophic			
	Multiple fatalities	Catastrophic damage to property.	Tier 3 oil spill criteria reached. International support required. Widespread shoreline contamination. Serious chemical or gas release. Significant threat to environmental amenity.	Adverse international publicity. Long-term suspension of operations, prolonged restrictions, and/or termination of commercial activities.
		Costs>£10M	Costs >£10M	Costs >£10M

Note that the Oil Pollution Preparedness, Response Co-operation Convention[3] defines the following response levels for oil spills in the United Kingdom:

- Tier 1 Local (within the capability of the operator on site): A Tier 1 response is the lowest response level and requires resources to be available locally. Depending on the characteristics of the oil this may or may not include the use of dispersants. By definition these resources must be at or near the incident site. It is expected that these resources will be deployed as quickly as operational circumstances allow.
- Tier 2 Regional (beyond the in-house capability of the operator): For larger pollution incidents, local resources may be insufficient to deliver a proper response. In these cases it may be that resources from a regional centre will be required. A key component of UK offshore Tier 2 response is that operators are expected to have this capability mobilised and applied within 2 to 6 hours of an oil pollution incident.
- Tier 3 National (requiring national resources): For very large pollution incidents, resources supplied from national and international sources may be required. A key component of UK offshore Tier 3 response is that operators are expected to have this capability mobilised and applied within 6 to 18 hours of an oil pollution incident.

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 – including 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.

[3] The Merchant Shipping (Oil Pollution Preparedness, Response Co-operation Convention) Regulations 1998, Statutory Instrument 1998 No. 1056

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 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 Stakeholder Consultation Notes

[Annex B removed from published version]

Annex C Risk Data Input Scores

						Consequence Descriptions		Risk By Consequence Category										Risk Overall
								ML					WC					
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	
14	1	North	Collision	Collision - Commercial (Non-Passenger) with Commercial (Non-Passenger)	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action	E.g. Goole Star / Blade Runner. Single minor injury; Negligible damage (cargo not damaged); Negligible environmental impact – pollution; Negligible stakeholder impact	E.g. Goole Star / Blade Runner. Multiple major injuries or single fatality; Major damage to property (turbine blade); Moderate - Tier 2 spill; Moderate stakeholder impact	2	1	2	1	1	1	3	4	4	3	2.46
5	2	North	Collision	Collision - Commercial (Non-Passenger) with Commercial (Passenger)	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action	E.g. Goole Star / Blue Funnel. Multiple minor or single major injury; Negligible damage (cargo not damaged); Negligible environmental impact – pollution; Minor stakeholder impact	E.g. Blade Runner / Blue Funnel. Multiple fatalities; Major damage to property (turbine blade); Moderate - Tier 2 spill; Moderate stakeholder impact	2	1	3	1	2	1	3	5	4	3	3.41
7	3	North	Collision	Collision - Commercial (Non-Passenger) with Leisure	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Leisure vessel unlit	E.g. Goole Star / yacht. Multiple minor or single major injury; Negligible damage (cargo not damaged); Negligible environmental impact – pollution; Minor stakeholder impact	E.g. Blade Runner / larger yacht. Multiple fatalities; Major damage to property (turbine blade); Minor Tier 1 to 2; Moderate stakeholder impact	2	1	3	1	2	1	2	5	4	3	3.33
3	4	North	Collision	Collision - Commercial (Passenger) with Leisure	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Leisure vessel unlit	E.g. Passenger RIB / tender. Multiple minor or single major injury; Negligible damage; Negligible environmental impact – pollution; Minor stakeholder impact	E.g. Blue Funnel / small leisure. Multiple fatalities; Moderate damage; Minor Tier 1 to 2; Moderate stakeholder impact	3	1	3	1	2	1	2	5	3	3	3.58
2	5	North	Collision	Collision - Commercial (Passenger) with Commercial (Passenger)	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action	E.g. 2 passenger RIBs. Multiple minor or single major injury; Negligible damage; Negligible environmental impact – pollution; Minor stakeholder impact	E.g. 2 RIBs at speed. Multiple fatalities; Moderate damage; Minor Tier 1 to 2; Major stakeholder impact	3	1	3	1	2	1	2	5	3	4	3.65

						Consequence Descriptions		Risk By Consequence Category										Risk Overall
								ML					WC					
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	
23	6	North	Collision	Collision - Leisure with Leisure	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Leisure vessel unlit	E.g. 2 small pleasure craft. Possible minor injury; Negligible damage; Negligible environmental impact – pollution; Negligible stakeholder impact	E.g. large powerboat / canoe. Multiple fatalities; Moderate damage; Minor Tier 1 to 2Major stakeholder impact	5	1	1	1	1	1	2	5	3	4	2.12
15	7	South	Collision	Collision - Commercial (Non-Passenger) with Commercial (Non-Passenger)	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action	E.g. Goole Star / commercial. Single minor injury; Negligible damage; Negligible environmental impact – pollution; Negligible stakeholder impact	E.g. Goole Star / commercial. Multiple major injuries or single fatality; Major damage to property; Moderate - Tier 2 spill; Moderate stakeholder impact	2	1	2	1	1	1	3	4	4	3	2.46
6	8	South	Collision	Collision - Commercial (Non-Passenger) with Commercial (Passenger)	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action	E.g. Goole Star / water taxi. Multiple minor or single major injury; Negligible damage Negligible environmental impact – pollution; Minor stakeholder impact	E.g. Goole Star / water taxi. Multiple fatalities; Moderate damage to property; Moderate - Tier 2 spill; Major stakeholder impact	2	1	3	1	2	1	3	5	3	4	3.41
8	9	South	Collision	Collision - Commercial (Non-Passenger) with Leisure	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Leisure vessel unlit	E.g. Goole Star / small leisure. Multiple minor or single major injury; Negligible damage; Negligible environmental impact – pollution; Minor stakeholder impact	E.g. Goole Star / rowing skiff. Multiple fatalities; Moderate damage to property; Minor Tier 1 to 2; Major stakeholder impact	2	1	3	1	2	1	2	5	3	4	3.33
4	10	South	Collision	Collision - Commercial (Passenger) with Leisure	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Leisure vessel unlit	E.g. water taxi / small leisure. Multiple minor or single major injury; Negligible damage; Negligible environmental impact – pollution; Minor stakeholder impact	E.g. powerboat / water taxi. Multiple fatalities; Moderate damage; Minor Tier 1 to 2; Moderate stakeholder impact	3	1	3	1	2	1	2	5	3	3	3.58

						Consequence Descriptions		Risk By Consequence Category										Risk Overall
								ML					WC					
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	
9	11	South	Collision	Collision - Commercial (Passenger) with Commercial (Passenger)	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action	E.g. 2 passenger RIBs. Multiple minor or single injury; Negligible damage; Negligible environmental impact – pollution; Minor stakeholder impact	E.g. 2 RIBs at speed. Multiple fatalities; Moderate damage; Minor Tier 1 to 2; Major stakeholder impact	2	1	3	1	2	1	2	5	3	4	3.33
24	12	South	Collision	Collision - Leisure with Leisure	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Leisure vessel unlit	E.g. 2 small leisure craft. Possible minor injury; Negligible damage; Negligible environmental impact – pollution; Negligible stakeholder impact	E.g. large powerboat / rowing skiff. Multiple fatalities; Moderate damage; Minor Tier 1 to 2; Major stakeholder impact	5	1	1	1	1	1	2	5	3	4	2.12
11	13	North	Contact	Contact - Commercial (Non-Passenger)	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Obstacle unlit / unmarked	E.g. contact with buoy or pontoon. Possible minor injury; Minor damage; Negligible effect on environment; Negligible stakeholder impact	E.g. large commercial contact with pontoon and moored vessels at speed. Multiple fatalities; Major property damage; Tier 2 spill criteria; Major stakeholder impact	2	1	1	2	1	1	3	5	4	4	2.86
12	14	North	Contact	Contact - Commercial (Passenger)	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Obstacle unlit / unmarked	E.g. contact with buoy or pontoon. Possible minor injury; Minor damage; Negligible effect on environment; Negligible stakeholder impact	E.g. large passenger contact with pontoon and moored vessels at speed. Multiple fatalities; Major property damage; Tier 2 spill criteria; Major stakeholder impact	2	1	1	2	1	1	3	5	4	4	2.86
1	15	North	Contact	Contact - Leisure	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Obstacle unlit / unmarked	E.g. contact with buoy or pontoon. Possible minor injury; Minor damage; Negligible effect on environment; Negligible stakeholder impact	E.g. large leisure boat contact with pontoon and moored vessels at speed. Multiple fatalities; Moderate property damage; Tier 2 spill criteria; Major stakeholder impact	5	1	1	2	1	2	3	5	3	4	4.44

						Consequence Descriptions		Risk By Consequence Category										Risk Overall
								ML					WC					
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	
19	16	South	Contact	Contact - Commercial (Non-Passenger)	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Obstacle unlit / unmarked	E.g. contact with buoy or structure. Possible minor injury; Minor damage; Negligible effect on environment; Negligible stakeholder impact	E.g. large commercial contact with structure and moored vessels. Major injury or single fatality; Moderate property damage; Tier 2 spill criteria; Moderate stakeholder impact	2	1	1	2	1	1	3	4	3	3	2.39
29	17	South	Contact	Contact - Commercial (Passenger)	Human error. Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Obstacle unlit / unmarked	E.g. water taxi contact with buoy or pontoon. Possible minor injury; Minor damage; Negligible effect on environment; Negligible stakeholder impact	E.g. water taxi heavy contact with buoy or pontoon. Multiple minor or single major injury; Minor damage; Minor effect on environment; Minor stakeholder impact	2	1	1	2	1	1	2	3	2	2	1.75
13	18	South	Contact	Contact - Leisure	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Obstacle unlit / unmarked	E.g. contact with pontoon or structure. Possible minor injury; Minor damage; Negligible effect on environment; Negligible stakeholder impact	E.g. large leisure boat contact with pontoon and moored vessels at speed. Multiple minor or single major injury; Moderate property damage; Tier 1 or Tier 2 spill criteria; Minor stakeholder impact	4	1	1	2	1	2	2	3	3	2	2.63
32	19	Both	Grounding	Grounding - Commercial (Non-Passenger)	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Unexpected shoaling; Cut in tide; Insufficient channel markings	E.g. briefly grounds, floats off on the same tide. Very minor injury; Negligible impact to property; Negligible impact to environment; Negligible stakeholder impact	E.g. Goole Star stuck for 2 weeks in Harbour South. Very minor injury; Negligible impact to property; Negligible impact to environment; Minor stakeholder impact	2	1	1	1	1	1	1	1	1	2	0.47
31	20	Both	Grounding	Grounding - Commercial (Passenger)	Human error: Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action;	E.g. briefly grounds, floats off on the same tide. Very minor injury; Negligible impact to property; Negligible impact to environment; Negligible stakeholder impact	E.g. Blue Funnel stuck for one tide in Harbour South. Very minor injury; Minor impact to property; Negligible impact to environment; Moderate stakeholder impact	2	1	1	1	1	1	1	1	2	3	0.99

						Consequence Descriptions		Risk By Consequence Category										Risk Overall
								ML					WC					
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	
					Unexpected shoaling; Cut in tide; Insufficient channel markings													
26	21	Both	Grounding	Grounding - Leisure	Human error; Adverse weather conditions; Poor visibility; Mechanical failure; Result of taking avoiding action; Unexpected shoaling; Cut in tide; Insufficient channel markings	E.g. briefly grounds, floats off on the same tide. Very minor injury; Negligible impact to property; Negligible impact to environment; Negligible stakeholder impact	E.g. leisure vessel grounds at speed. Multiple major injury or single fatality; Minor impact to property; Minor impact to environment; Minor stakeholder impact	5	1	1	1	1	2	2	4	2	2	1.86
25	22	North	Breakout	Breakout or Mooring Incident - Commercial (Non-Passenger)	Human error; Adverse weather conditions; Structural failure; Mooring rope failure; Vandalism; Interaction; Anchor dragging	E.g. Blade Runner breaking free from berth. Negligible injury; Minor impact to property; Negligible impact to environment; Negligible stakeholder impact	E.g. Blade Runner breaking free from berth and damaging blade. Negligible injury; Major impact to property; Negligible impact to environment; Major stakeholder impact	2	1	1	2	1	1	1	1	4	4	2.11
20	23	North	Breakout	Breakout or Mooring Incident - Commercial (Passenger)	Human error; Adverse weather conditions; Structural failure; Mooring rope failure; Vandalism; Interaction; Anchor dragging	E.g. water taxi breaking free from berth. Negligible injury; Minor impact to property; Negligible impact to environment; Negligible stakeholder impact	E.g. large passenger breaking free from Island Harbour pontoon. Major multiple injury or single fatality; Moderate impact to property; Minor impact to environment; Moderate stakeholder impact	2	1	1	2	1	1	2	4	3	3	2.3
18	24	North	Breakout	Breakout or Mooring Incident - Leisure	Human error; Adverse weather conditions; Structural failure; Mooring rope failure; Vandalism; Interaction; Anchor dragging	E.g. yacht breaking free from pontoon. Negligible injury; Minor impact to property; Negligible impact to environment; Negligible stakeholder impact	E.g. yacht breaking free from pontoon. Multiple minor or single major injury; Moderate impact to property; Negligible impact to environment; Negligible stakeholder impact	4	1	1	2	1	2	1	3	3	1	2.4

						Consequence Descriptions		Risk By Consequence Category										Risk Overall
								ML					WC					
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	
16	25	South	Breakout	Breakout or Mooring Incident - Commercial (Non-Passenger)	Human error; Adverse weather conditions; Poor visibility; Structural failure; Mooring rope failure; Vandalism; Interaction; Anchor dragging	E.g. Goole Star breaking free from berth. Negligible injury; Moderate impact to property; Negligible impact to environment; Minor stakeholder impact	E.g. Goole Star breaking free from berth following mooring gang incident. Multiple minor or single major injury; Moderate impact to property; Negligible impact to environment; Moderate stakeholder impact	2	1	1	3	2	1	1	3	3	3	2.46
28	26	South	Breakout	Breakout or Mooring Incident - Commercial (Passenger)	Human error; Adverse weather conditions; Structural failure; Mooring rope failure; Vandalism; Interaction; Anchor dragging	E.g. water taxi breaking free from berth. Negligible injury; Minor impact to property; Negligible impact to environment; Negligible stakeholder impact	E.g. large water taxi mooring failure. Moderate minor or single major injuries; Moderate impact to property; Minor impact to environment; Minor stakeholder impact	2	1	1	2	1	1	2	3	3	2	1.84
21	27	South	Breakout	Breakout or Mooring Incident - Leisure	Human error; Adverse weather conditions; Structural failure; Mooring rope failure; Vandalism; Interaction; Anchor dragging	E.g. yacht breaking free from pontoon. Negligible injury; Minor impact to property; Negligible impact to environment; Negligible stakeholder impact	E.g. yacht breaking free from pontoon. Multiple minor or single major injury; Moderate impact to property; Negligible impact to environment; Negligible stakeholder impact	4	1	1	2	1	1	1	3	3	1	2.17
27	28	Both	Diving / Swimming	Diving / Swimming Incident (Commercial and General Public)	Human error; D&A abuse; Adverse weather conditions; Failure to follow procedures (commercial); Failure of third party to follow procedures; Equipment failure	E.g. casual swimmer in difficulties. Negligible injury; Negligible impact to property; Negligible impact to environment; Negligible stakeholder impact	E.g. diver / swimmer fatality. Major multiple injury or single fatality; Minor impact to property; Negligible impact to environment; Moderate stakeholder impact	4	1	1	1	1	2	1	4	2	3	1.85
22	29	Both	Fire / Explosion	Fire / Explosion - Commercial (Non-Passenger)	Human error; Equipment failure; Vandalism; Terrorism; Failure to follow procedures	E.g. galley fire. Single minor injury; Minor damage to property; Negligible impact to environment; Negligible stakeholder impact	E.g. engine fire. Multiple minor or single major injury; Moderate damage to property; Tier 2 impact to environment; Moderate stakeholder impact	2	1	2	2	1	1	3	3	3	3	2.13

						Consequence Descriptions		Risk By Consequence Category										Risk Overall
								ML					WC					
Rank	Ref	Affected Areas	Accident Category	Hazard Title	Possible Causes	Most Likely (ML)	Worst Credible (WC)	Frequency	Environment	People	Property	Stakeholders	Frequency	Environment	People	Property	Stakeholders	
17	30	Both	Fire / Explosion	Fire / Explosion - Commercial (Passenger)	Human error; Equipment failure; Vandalism; Terrorism; Failure to follow procedures	E.g. small electrical fire. Single minor injury; Minor damage to property; Negligible impact to environment; Negligible stakeholder impact	E.g. fuel fire. Multiple major injury or single fatality; Moderate damage to property; Tier 1 to Tier 2 impact to environment; Moderate stakeholder impact	2	1	2	2	1	1	2	4	3	3	2.42
10	31	Both	Fire / Explosion	Fire / Explosion - Leisure	Human error; Equipment failure; Vandalism; Terrorism	E.g. small electrical or galley fire. Single minor injury; Minor damage to property; Negligible impact to environment; Negligible stakeholder impact	E.g. small electrical or galley fire. Multiple major injury or single fatality; Major damage to property; Tier 1 to Tier 2 impact to environment; Major stakeholder impact	3	1	2	2	1	2	2	4	4	4	3.15
30	32	Both	Personal Injury	Personal Injury	Slip, trips and falls; Medical conditions; Failure of infrastructure; Insufficient guards / controls; Adverse weather conditions; Wash from passing vessels	E.g. fall on pontoon. Negligible injury; Negligible impact to property; Negligible impact to environment; Negligible stakeholder impact	E.g. fall from pontoon or structure. Multiple major injury or single fatality; Negligible impact to property; Negligible impact to environment; Moderate stakeholder impact	5	1	1	1	1	2	1	4	1	3	1.74

Annex D Ranked Risk Register and Controls Measures for Newport Harbour

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall	Risk Controls
								ML				WC					
						Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders		
1	15	North	Contact	North - Contact - Leisure	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Obstacle unlit / unmarked	E.g. contact with buoy or pontoon Possible minor injury Minor damage Negligible effect on environment Negligible stakeholder impact	E.g. large leisure boat contact with pontoon and moored vessels at speed Multiple fatalities Moderate property damage Tier 2 spill criteria Major stakeholder impact	0	0	6	0	3	6	3	5	4.44	Emergency Plans Navigation Aids and inspections
2	5	North	Collision	North - Collision - Commercial (Passenger) with Commercial (Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action	E.g. 2 passenger RIBs Multiple minor or single major injury Negligible damage Negligible environmental impact - pollution Minor stakeholder impact	E.g. 2 RIBs at speed Multiple fatalities Moderate damage Minor Tier 1 to 2 Major stakeholder impact	0	4	0	2	1	5	3	4	3.65	Harbour patrols during events Fixed lifesaving appliances Local Notice to Mariners Advisory signage (including 6 knot speed limit and no swimming) Navigation Aids and inspections Emergency Plans
3	4	North	Collision	North - Collision - Commercial (Passenger) with Leisure	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Leisure vessel unlit	E.g. Passenger RIB / tender Multiple minor or single major injury Negligible damage Negligible environmental impact - pollution Minor stakeholder impact	E.g. Blue Funnel / small leisure Multiple fatalities Moderate damage Minor Tier 1 to 2 Moderate stakeholder impact	0	4	0	2	1	5	3	3	3.58	Advisory signage (including 6 knot speed limit and no swimming) Emergency Plans Navigation Aids and inspections Local Notice to Mariners Harbour patrols during events Fixed lifesaving appliances
4	10	South	Collision	South - Collision - Commercial (Passenger) with Leisure	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Leisure vessel unlit	E.g. water taxi / small leisure Multiple minor or single major injury Negligible damage Negligible environmental impact - pollution Minor stakeholder impact	E.g. powerboat / water taxi Multiple fatalities Moderate damage Minor Tier 1 to 2 Moderate stakeholder impact	0	4	0	2	1	5	3	3	3.58	Emergency Plans Byelaws (4 knots above Five Tree Point) Harbour patrols during events Fixed lifesaving appliances Navigation Aids and inspections Local Notice to Mariners Advisory signage (including 6 knot speed limit and no swimming)
5	8	South	Collision	South - Collision - Commercial (Non-Passenger) with Commercial (Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action	E.g. Goole Star / water taxi Multiple minor or single major injury Negligible damage Negligible environmental impact - pollution Minor stakeholder impact	E.g. Goole Star / water taxi Multiple fatalities Moderate damage to property Moderate - Tier 2 spill Major stakeholder impact	0	3	0	2	3	5	3	4	3.41	Byelaws (4 knots above Five Tree Point) Emergency Plans Fixed lifesaving appliances Local Notice to Mariners Harbour patrols during events Advisory signage (including 6 knot speed limit and no swimming) Navigation Aids and inspections

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall	Risk Controls
								ML				WC					
						Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders		
6	2	North	Collision	North - Collision - Commercial (Non-Passenger) with Commercial (Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action	E.g. Goole Star / Blue Funnel Multiple minor or single major injury Negligible damage (cargo not damaged) Negligible environmental impact - pollution Minor stakeholder impact	E.g. Blade Runner / Blue Funnel Multiple fatalities Major damage to property (turbine blade) Moderate - Tier 2 spill Moderate stakeholder impact	0	3	0	2	3	5	4	3	3.41	Navigation Aids and inspections Additional navigation procedures for Blade Runner Local Notice to Mariners Advisory signage (including 6 knot speed limit and no swimming) Emergency Plans Harbour patrols during events Fixed lifesaving appliances
7	11	South	Collision	South - Collision - Commercial (Passenger) with Commercial (Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action	E.g. 2 passenger RIBs Multiple minor or single injury Negligible damage Negligible environmental impact - pollution Minor stakeholder impact	E.g. 2 RIBs at speed Multiple fatalities Moderate damage Minor Tier 1 to 2 Major stakeholder impact	0	3	0	2	1	5	3	4	3.33	Emergency Plans Navigation Aids and inspections Advisory signage (including 6 knot speed limit and no swimming) Fixed lifesaving appliances Harbour patrols during events Byelaws (4 knots above Five Tree Point) Local Notice to Mariners
8	3	North	Collision	North - Collision - Commercial (Non-Passenger) with Leisure	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Leisure vessel unlit	E.g. Goole Star / yacht Multiple minor or single major injury Negligible damage (cargo not damaged) Negligible environmental impact - pollution Minor stakeholder impact	E.g. Blade Runner / larger yacht Multiple fatalities Major damage to property (turbine blade) Minor Tier 1 to 2 Moderate stakeholder impact	0	3	0	2	1	5	4	3	3.33	Emergency Plans Advisory signage (including 6 knot speed limit and no swimming) Additional navigation procedures for Blade Runner Local Notice to Mariners Harbour patrols during events Navigation Aids and inspections Fixed lifesaving appliances
9	9	South	Collision	South - Collision - Commercial (Non-Passenger) with Leisure	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Leisure vessel unlit	E.g. Goole Star / small leisure Multiple minor or single major injury Negligible damage Negligible environmental impact - pollution Minor stakeholder impact	E.g. Goole Star / rowing skiff Multiple fatalities Moderate damage to property Minor Tier 1 to 2 Major stakeholder impact	0	3	0	2	1	5	3	4	3.33	Advisory signage (including 6 knot speed limit and no swimming) Navigation Aids and inspections Byelaws (4 knots above Five Tree Point) Local Notice to Mariners Harbour patrols during events Emergency Plans Fixed lifesaving appliances
10	31	Both	Fire / Explosion	North and South - Fire / Explosion - Leisure	Human error Equipment failure Vandalism Terrorism	E.g. small electrical or galley fire Single minor injury Minor damage to property Negligible impact to environment Negligible stakeholder impact	E.g. small electrical or galley fire Multiple major injury or single fatality Major damage to property Tier 1 to Tier 2 impact to environment Major stakeholder impact	0	2	2	0	2	5	5	5	3.15	Fixed lifesaving appliances Emergency Plans

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall	Risk Controls
								ML				WC					
						Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders		
11	13	North	Contact	North - Contact - Commercial (Non-Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Obstacle unlit / unmarked	E.g. contact with buoy or pontoon Possible minor injury Minor damage Negligible effect on environment Negligible stakeholder impact	E.g. large commercial contact with pontoon and moored vessels at speed Multiple fatalities Major property damage Tier 2 spill criteria Major stakeholder impact	0	0	2	0	3	5	4	4	2.86	Navigation Aids and inspections Emergency Plans Additional navigation procedures for Blade Runner
12	14	North	Contact	North - Contact - Commercial (Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Obstacle unlit / unmarked	E.g. contact with buoy or pontoon Possible minor injury Minor damage Negligible effect on environment Negligible stakeholder impact	E.g. large passenger contact with pontoon and moored vessels at speed Multiple fatalities Major property damage Tier 2 spill criteria Major stakeholder impact	0	0	2	0	3	5	4	4	2.86	Navigation Aids and inspections Emergency Plans
13	18	South	Contact	South - Contact - Leisure	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Obstacle unlit / unmarked	E.g. contact with pontoon or structure Possible minor injury Minor damage Negligible effect on environment Negligible stakeholder impact	E.g. large leisure boat contact with pontoon and moored vessels at speed Multiple minor or single major injury Moderate property damage Tier 1 or Tier 2 spill criteria Minor stakeholder impact	0	0	3	0	2	3	3	2	2.63	Emergency Plans Navigation Aids and inspections
14	7	South	Collision	South - Collision - Commercial (Non-Passenger) with Commercial (Non-Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action	E.g. Goole Star / commercial Single minor injury Negligible damage Negligible environmental impact - pollution Negligible stakeholder impact	E.g. Goole Star / commercial Multiple major injuries or single fatality Major damage to property Moderate - Tier 2 spill Moderate stakeholder impact	0	2	0	0	3	4	4	3	2.46	Local Notice to Mariners Advisory signage (including 6 knot speed limit and no swimming) Emergency Plans Byelaws (4 knots above Five Tree Point) Harbour patrols during events Fixed lifesaving appliances Navigation Aids and inspections
15	1	North	Collision	North - Collision - Commercial (Non-Passenger) with Commercial (Non-Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action	E.g. Goole Star / Blade Runner Single minor injury Negligible damage (cargo not damaged) Negligible environmental impact - pollution Negligible stakeholder impact	E.g. Goole Star / Blade Runner Multiple major injuries or single fatality Major damage to property (turbine blade) Moderate - Tier 2 spill Moderate stakeholder impact	0	2	0	0	3	4	4	3	2.46	Additional navigation procedures for Blade Runner Emergency Plans Local Notice to Mariners Navigation Aids and inspections Fixed lifesaving appliances Advisory signage (including 6 knot speed limit and no swimming) Harbour patrols during events

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall	Risk Controls
								ML				WC					
						Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders		
16	25	South	Breakout	South - Breakout or Mooring Incident - Commercial (Non-Passenger)	Human error Adverse weather conditions Poor visibility Structural failure Mooring rope failure Vandalism Interaction Anchor dragging	E.g. Goole Star breaking free from berth Negligible injury Moderate impact to property Negligible impact to environment Minor stakeholder impact	E.g. Goole Star breaking free from berth following mooring gang incident Multiple minor or single major injury Moderate impact to property Negligible impact to environment Moderate stakeholder impact	0	0	3	2	0	3	3	3	2.46	Maintenance of moorings and pontoons Emergency Plans
17	30	Both	Fire / Explosion	North and South - Fire / Explosion - Commercial (Passenger)	Human error Equipment failure Vandalism Terrorism Failure to follow procedures	E.g. small electrical fire Single minor injury Minor damage to property Negligible impact to environment Negligible stakeholder impact	E.g. fuel fire Multiple major injury or single fatality Moderate damage to property Tier 1 to Tier 2 impact to environment Moderate stakeholder impact	0	2	2	0	1	4	3	3	2.42	Fixed lifesaving appliances Emergency Plans
18	24	North	Breakout	North - Breakout or Mooring Incident - Leisure	Human error Adverse weather conditions Structural failure Mooring rope failure Vandalism Interaction Anchor dragging	E.g. yacht breaking free from pontoon Negligible injury Minor impact to property Negligible impact to environment Negligible stakeholder impact	E.g. yacht breaking free from pontoon Multiple minor or single major injury Moderate impact to property Negligible impact to environment Negligible stakeholder impact	0	0	3	0	0	3	3	0	2.4	Emergency Plans Maintenance of moorings and pontoons
19	16	South	Contact	South - Contact - Commercial (Non-Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Obstacle unlit / unmarked	E.g. contact with buoy or structure Possible minor injury Minor damage Negligible effect on environment Negligible stakeholder impact	E.g. large commercial contact with structure and moored vessels Major injury or single fatality Moderate property damage Tier 2 spill criteria Moderate stakeholder impact	0	0	2	0	3	4	3	3	2.39	Emergency Plans Navigation Aids and inspections
20	23	North	Breakout	North - Breakout or Mooring Incident - Commercial (Passenger)	Human error Adverse weather conditions Structural failure Mooring rope failure Vandalism Interaction Anchor dragging	E.g. water taxi breaking free from berth Negligible injury Minor impact to property Negligible impact to environment Negligible stakeholder impact	E.g. large passenger breaking free from Island Harbour pontoon Major multiple injury or single fatality Moderate impact to property Minor impact to environment Moderate stakeholder impact	0	0	2	0	1	4	3	3	2.3	Emergency Plans Maintenance of moorings and pontoons

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall	Risk Controls
								ML				WC					
						Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders		
21	27	South	Breakout	South - Breakout or Mooring Incident - Leisure	Human error Adverse weather conditions Structural failure Mooring rope failure Vandalism Interaction Anchor dragging	E.g. yacht breaking free from pontoon Negligible injury Minor impact to property Negligible impact to environment Negligible stakeholder impact	E.g. yacht breaking free from pontoon Multiple minor or single major injury Moderate impact to property Negligible impact to environment Negligible stakeholder impact	0	0	3	0	0	3	3	0	2.17	Maintenance of moorings and pontoons Emergency Plans
22	29	Both	Fire / Explosion	North and South - Fire / Explosion - Commercial (Non-Passenger)	Human error Equipment failure Vandalism Terrorism Failure to follow procedures	E.g. galley fire Single minor injury Minor damage to property Negligible impact to environment Negligible stakeholder impact	E.g. engine fire Multiple minor or single major injury Moderate damage to property Tier 2 impact to environment Moderate stakeholder impact	0	2	2	0	3	3	3	3	2.13	Fixed lifesaving appliances Emergency Plans
23	12	South	Collision	South - Collision - Leisure with Leisure	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Leisure vessel unlit	E.g. 2 small leisure craft Possible minor injury Negligible damage Negligible environmental impact - pollution Negligible stakeholder impact	E.g. large powerboat / rowing skiff Multiple fatalities Moderate damage Minor Tier 1 to 2 Major stakeholder impact	0	0	0	0	1	5	3	4	2.12	Advisory signage (including 6 knot speed limit and no swimming) Byelaws (4 knots above Five Tree Point) Harbour patrols during events Navigation Aids and inspections Emergency Plans Local Notice to Mariners Fixed lifesaving appliances
24	6	North	Collision	North - Collision - Leisure with Leisure	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Leisure vessel unlit	E.g. 2 small pleasure craft Possible minor injury Negligible damage Negligible environmental impact - pollution Negligible stakeholder impact	E.g. large powerboat / canoe Multiple fatalities Moderate damage Minor Tier 1 to 2 Major stakeholder impact	0	0	0	0	1	5	3	4	2.12	Harbour patrols during events Fixed lifesaving appliances Local Notice to Mariners Emergency Plans Navigation Aids and inspections Advisory signage (including 6 knot speed limit and no swimming)
25	22	North	Breakout	North - Breakout or Mooring Incident - Commercial (Non-Passenger)	Human error Adverse weather conditions Structural failure Mooring rope failure Vandalism Interaction Anchor dragging	E.g. Blade Runner breaking free from berth Negligible injury Minor impact to property Negligible impact to environment Negligible stakeholder impact	E.g. Blade Runner breaking free from berth and damaging blade Negligible injury Major impact to property Negligible impact to environment Major stakeholder impact	0	0	2	0	0	0	4	4	2.11	Emergency Plans Maintenance of moorings and pontoons
26	21	Both	Grounding	North and South - Grounding - Leisure	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Unexpected shoaling Cut in tide Insufficient channel markings	E.g. briefly grounds, floats off on the same tide Very minor injury Negligible impact to property Negligible impact to environment Negligible stakeholder impact	E.g. leisure vessel grounds at speed Multiple major injury or single fatality Minor impact to property Minor impact to environment Minor stakeholder impact	0	0	0	0	2	5	2	2	1.86	Emergency Plans Harbour patrols during events Local Notice to Mariners Hydrographic surveys and routine visual checks Fixed lifesaving appliances Navigation Aids and inspections

Rank	Hazard Ref.	Affected Areas	Accident Category	Hazard Title	Possible Causes	Consequence Descriptions		Risk By Consequence Category								Risk Overall	Risk Controls
								ML				WC					
						Most Likely (ML)	Worst Credible (WC)	Environment	People	Property	Stakeholders	Environment	People	Property	Stakeholders		
27	28	Both	Diving / Swimming	North and South - Diving / Swimming Incident (Commercial and General Public)	Human error D&A abuse Adverse weather conditions Failure to follow procedures (commercial) Failure of third party to follow procedures Equipment failure	E.g. casual swimmer in difficulties Negligible injury Negligible impact to property Negligible impact to environment Negligible stakeholder impact	E.g. diver / swimmer fatality Major multiple injury or single fatality Minor impact to property Negligible impact to environment Moderate stakeholder impact	0	0	0	0	0	5	2	3	1.85	Advisory signage (including 6 knot speed limit and no swimming) Fixed lifesaving appliances Emergency Plans Local Notice to Mariners
28	26	South	Breakout	South - Breakout or Mooring Incident - Commercial (Passenger)	Human error Adverse weather conditions Structural failure Mooring rope failure Vandalism Interaction Anchor dragging	E.g. water taxi breaking free from berth Negligible injury Minor impact to property Negligible impact to environment Negligible stakeholder impact	E.g. large water taxi mooring failure Moderate minor or single major injuries Moderate impact to property Minor impact to environment Minor stakeholder impact	0	0	2	0	1	3	3	1	1.84	Maintenance of moorings and pontoons Emergency Plans
29	17	South	Contact	South - Contact - Commercial (Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Obstacle unlit / unmarked	E.g. water taxi contact with buoy or pontoon Possible minor injury Minor damage Negligible effect on environment Negligible stakeholder impact	E.g. water taxi heavy contact with buoy or pontoon Multiple minor or single major injury Minor damage Minor effect on environment Minor stakeholder impact	0	0	2	0	1	3	1	1	1.75	Navigation Aids and inspections Emergency Plans
30	32	Both	Personal Injury	North and South - Personal Injury	Slip, trips and falls Medical conditions Failure of infrastructure Insufficient guards / controls Adverse weather conditions Wash from passing vessels	E.g. fall on pontoon Negligible injury Negligible impact to property Negligible impact to environment Negligible stakeholder impact	E.g. fall from pontoon or structure Multiple major injury or single fatality Negligible impact to property Negligible impact to environment Moderate stakeholder impact	0	0	0	0	0	5	0	3	1.74	Fixed lifesaving appliances Emergency Plans
31	20	Both	Grounding	North and South - Grounding - Commercial (Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Unexpected shoaling Cut in tide Insufficient channel markings	E.g. briefly grounds, floats off on the same tide Very minor injury Negligible impact to property Negligible impact to environment Negligible stakeholder impact	E.g. Blue Funnel stuck for one tide in Harbour South Very minor injury Minor impact to property Negligible impact to environment Moderate stakeholder impact	0	0	0	0	0	0	1	3	0.99	Emergency Plans Navigation Aids and inspections Harbour patrols during events Local Notice to Mariners Fixed lifesaving appliances Hydrographic surveys and routine visual checks
32	19	Both	Grounding	North and South - Grounding - Commercial (Non-Passenger)	Human error Adverse weather conditions Poor visibility Mechanical failure Result of taking avoiding action Unexpected shoaling Cut in tide Insufficient channel markings	E.g. briefly grounds, floats off on the same tide Very minor injury Negligible impact to property Negligible impact to environment Negligible stakeholder impact	E.g. Goole Star stuck for 2 weeks in Harbour South Very minor injury Negligible impact to property Negligible impact to environment Minor stakeholder impact	0	0	0	0	0	0	0	1	0.47	Additional navigation procedures for Blade Runner Harbour patrols during events Hydrographic surveys and routine visual checks Navigation Aids and inspections Local Notice to Mariners Fixed lifesaving appliances Emergency Plans