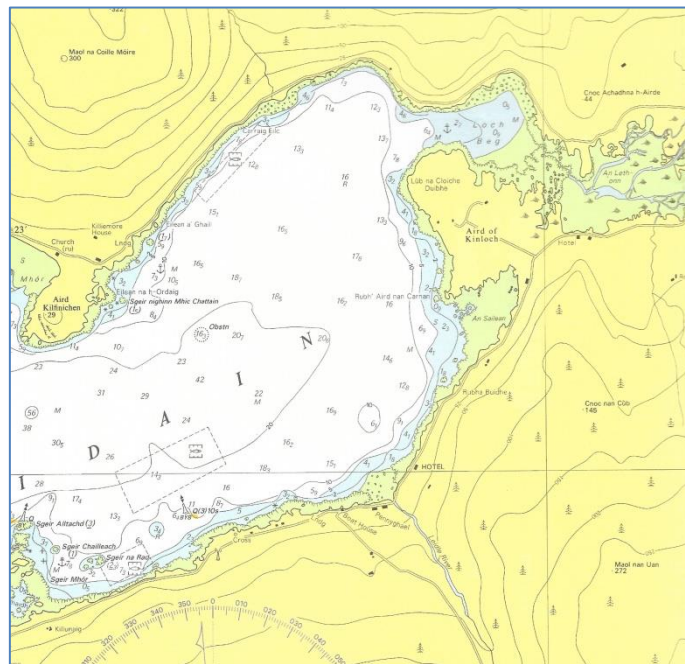


Navigational Risk Assessment (NRA)
For
Proposed Timber Export Berth at Kilfinichen Estate, Isle of Mull



16th August 2018 - FINAL

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Abbreviations

A&BC	Argyle and Bute Council	MEPC	IMO Marine Environment Protection Committee
ALARP	As Low As Reasonably Practicable	MSC	Maritime and Coastguard Agency
DfT	Department for Transport	MSC Circ	IMO Maritime Safety Committee
DMC	Drennan Marine Consultancy Ltd	MSMP	Marine Scotland (Major Projects)
DP	Designated Person (a role within the PMSC)	NLB	Northern Lighthouse Board
dwt	Deadweight Tonnes / Tonnage	nm	Nautical Mile(s)
EIA	Environmental Impact Assessment	NRA	Navigational Risk Assessment
FRA	Formal Risk Assessment	PMSC	Port Marine Safety Code
GtGP	Guide to Good Practice (part of the PMSC)	RIN	Royal Institute of Navigation
IMO	International Maritime Organisation	SHA	Statutory Harbour Authority
KE	Kilfinichen Estate	SMS	Safety Management System
LNtoM	Local Notice to Mariners	SOP	Standard Operating Procedures
LOA	Length Over All	UKC	Under Keel Clearance
m	Metre(s)	UKHO	United Kingdom Hydrographic Office

Section 1 Background and Introduction

Context

- 1.1 This Navigational Risk Assessment (NRA) is written on behalf of Kilfinichen Estate (KE) in support of their proposed development of a pier on the foreshore of the estate, which is located on the north shore of Loch Scridain, on the west coast of the Isle of Mull.
- 1.2 The proposed development is slightly unusual in that the coastal area does not lie within waters which are under the jurisdiction of a Statutory Harbour Authority (SHA). It would be standard practice for a NRA to be undertaken for a new development within a SHA, not least because the host SHA would wish to be satisfied, for the purposes of complying with the Port Marine Safety Code (PMSC), that the risks from and to the proposed development are tolerable.
<https://www.gov.uk/government/publications/port-marine-safety-code>
- 1.3 The KE development proposal has been directed to undertake this NRA by the Maritime and Coastguard Agency (MCA) in their response to the lead consenting authority, Marine Scotland Major Projects (MSMP), on behalf of the Scottish Government (email exchange[Redacted] of MCA to R Sermpezi of 13th February 2018 refers).
- 1.4 The MCA request for a NRA is consistent with the Department for Transport (DfT) policy statement within the PMSC which states at the foreword that ***“It is strongly recommended that organisations or facilities which are not a statutory harbour authority, including berths, terminals and marinas, seek to comply with this Code through the adoption of a marine safety management system or any alternative similar standard assessment process”***
- 1.5 As explained further in section 3, this NRA follows a format similar to that which would be used if the proposed development was within a SHA.

Drennan Marine Consultancy Ltd

- 1.6 Drennan Marine Consultancy Ltd (DMC) is an experienced ports and harbours consultancy with a strong background in supporting developers and port authorities in navigational risk work. Captain [Redacted]
 - Holds a UK Class 1 Master Mariner Certificate
 - Was formerly a senior VTS Officer with the Port of London Authority (PLA)
 - Is one of the first candidates to attain the (then) new Nautical Institute Harbour Masters Certificate (awarded, with distinction, in 1990)

- Managed a tug and salvage company for 10 years
- Is the Designated Person (DP) for two UK Statutory Harbour Authorities, one of which serves the nuclear industry
- Is a Commissioner of the Board of his local harbour, Littlehampton in West Sussex.

1.7 In 2012, [Redacted] was made a Fellow of the Royal Institute of Navigation (RIN)
“In recognition of his contribution to safety in port areas through the development of port risk assessment and navigational safety management systems.”

Section 2 Project Overview

- 2.1 This section is to demonstrate, for the purposes of context, the proposed development and to characterise the marine operations which are the subject of the NRA. This report does not purport to be a full and technically complete description of every element of the KE proposal. Such information is not held by DMC and it is presumed that other submissions within the wider application process will address such detail where required.
- 2.2 The purpose of the proposed pier is to facilitate export of timber which has been harvested from the forests of Kilfinichen estate and the larger Tiroran Community Woodlands by sea, rather than use road transport over a weak road to a more distant facility and/or then ferry to the mainland.

Location

- 2.3 Kilfinichen Estate lies on the Ardmeanach Peninsular on the west coast of Mull.



- 2.4 The coastal location for the pier itself is shown in more detail in the figure below, which is an extract from the UKHO chart No. 2771. The figure shows the general location of the proposed pier and also of a neighbouring facility at Pennyghael on the south side of Loch Scridain, the purpose of which is discussed later.
- 2.5 The extract below from chart 2771 is the inshore (east) end of Loch Scridain and the site itself is approximately 7 nm from the loch entrance. The water depth throughout the mid part of the loch from the seaward end to the point where a ship would

The development is similar to the facility in Pennyghael on the opposite shore of Loch Scridain which was constructed in 2012. Due to the unsuitable road network there is no transport link between these sites. To enhance the sustainable design of the development the proposal is to share the floating pier and linkspan between Pennyghael and Kilfinichen.

Project Phases Construction

Stacking Area and Reclaimed Pier

The shoreside works, which are already approved under the Town and Country Planning (Scotland) Act 1997, comprises of the construction of a laydown area for stacking timber. The rock extracted to create a level area for timber stacking will be used for the construction of the pier causeway. The rock armoured causeway will be 130m long and have a 60m L-shaped return to provide protection to a 30m long pontoon. It is proposed that the rock will be predrilled and split by excavator mounted hydraulic breaker to create the majority of the armour sized stones. The remaining rockfill and armour stone will be obtained from a local forestry borrow pit. It is not anticipated that any causeway material will be required from outwith the immediate area.

The rockfill will be placed from the shore working outwards. The rock armour layers will be placed by excavator machine with grab attachment as the structure extends outwards.

Floating linkspan and barge

On completion of the rock bund and armouring, the concrete foundation for the floating linkspan will be poured in situ. In addition, two concrete jack up pads will be set into the toe of the causeway to allow for the installation and removal of the linkspan and loading barge.

Pontoon

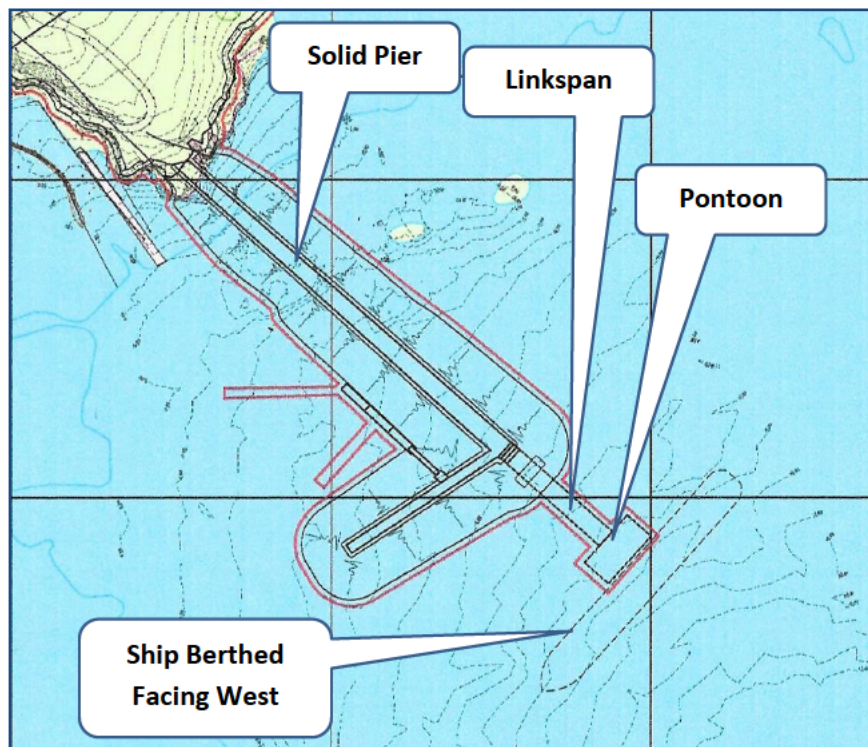
The existing anchorage into which the pier will extend is currently home to a number of boats on swinging moorings. Since these will need to be removed a small floating pontoon (already in use at the site) will be re-located and incorporated into the pier.

A small concrete shoreblock will be constructed on the L-shaped return to provide foundation for the pontoon gangway access at the head of the pier. The 30m length of pontoons will be installed with chain and anchor moorings.

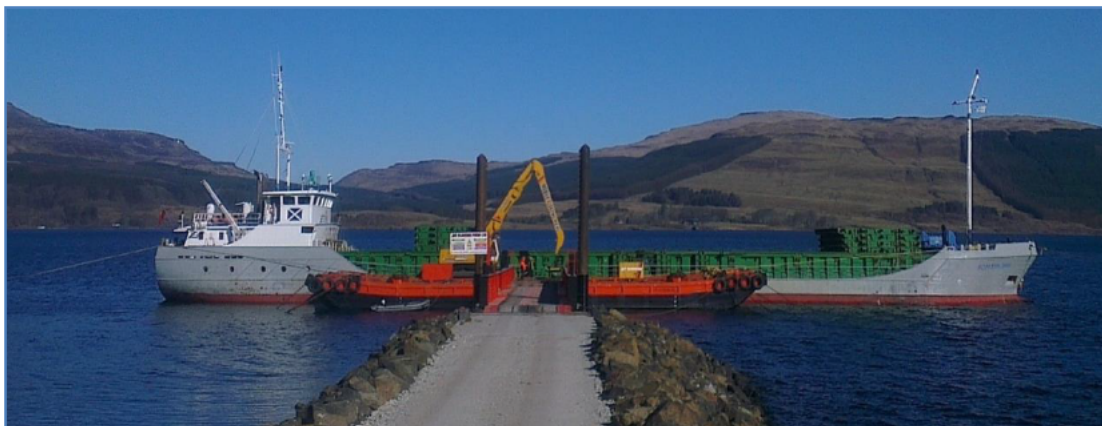
Operation

This development will allow the shipping of 376,000 tonnes of timber per harvest cycle, by sea, for all forestry from the Ardmeanach Peninsula. The pier will transport approximately 9,250 tonnes of timber per year. Its sheltered location means that the site will permit vessels of up to 3,500 tonnes to load all year round in various weather conditions. Timber will be stacked in the laydown area prior to being loaded onto the vessel for transport by sea to United Kingdom (UK) and European destinations.

- 2.7 The image below is also taken from the Affric EIA Scoping report, and shows the key features described above.



- 2.8 The image below shows the similar pier / linkspan / pontoon arrangement which is already in place at Pennyghael.



Pennyghael Pier, Approximately 1.3 nm South East of the Kilfinichen Site

Proposed Operations

- 2.9 The concept is simple. At both the Pennyghael and the Kilfinichen sites the fixed infrastructure of the pier would remain, but the linkspan would be lifted on to the floating pontoon which would be moved between the two sites for use, according to the export needs of each timber producing area.
- 2.10 The pontoon is the structure which the ship would moor against and from which timber will be loaded on to the ship by mean of a hydraulic crane mounted on the pontoon.
- 2.11 In addition to the current Pennyghael ship movements, it is estimated that the Kilfinichen pier would generate a further 8 ship calls per year, or 16 movements within Loch Scridain.

Indicative Ships Used

- 2.12 Kilfinichen Estates has provided the following list of ships as being representative of the vessels which will use the pier, and for which the pier is being designed.

Name	LOA	Beam	Draft	Deadweight
mv Scot Mariner	89.99m	12.50m	5.31m	3,502dwt
mv cot Ranger	84.80m	12.60m	5.11m	3,200dwt
mv Scot Venture	89.98m	13.75m	4.92m	3,200dwt
mv Scot Isles	89.95m	13.75m	4.93m	3,065dwt
mv Scot Carrier	81.90m	12.40m	4.25m	2,375dwt
mv Scot Explorer	81.90m	12.40m	4.25m	2,375dwt
mv Scot Trader	82.15m	11.30m	4.21m	2,200dwt
mv Scot Emsland	80.17m	12.17m	4.25m	2,100dwt
mv Red Baroness	64.94m	10.70m	4.80m	1,450dwt
mv Boisterous	59.60m	9.20m	3.21m	1,020dwt

Images for a selection of the above ships are given below.



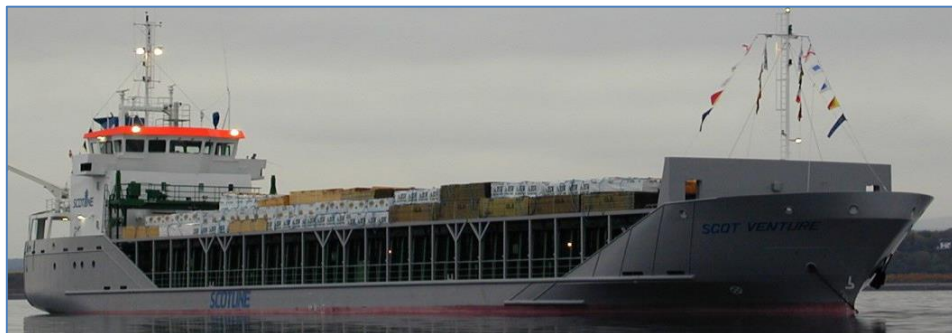
mv "Scot Mariner"



mv "Scot Ranger"



mv "Scot Isles"



mv "Scot Venture"



mv "Boisterous"

Section 3 Explanation of Risk Assessment Process

Description of FRA Process

- 3.1 All marine operations - like all of life – has some risk. The problem is that the same activity can often mean different levels of risk to different people. For example, crossing a busy road is higher risk to a small child than to an adult but the hazard is exactly the same – the hazard of being struck by a car. Such subjectivity is not helpful so the Formal Risk Assessment (FRA) process is a means of ensuring that the rather subjective opinions of “risk” are established in a more consistent, professional, and analytical way.
- 3.2 In comparison with other sectors of industry such as the nuclear industry and the offshore oil and gas industry, the international ports sector has been slow to embrace the concept and value of Formal Risk Assessment (FRA). The extent to which port regulatory bodies around the world (eg port authorities or government departments) embrace FRA, and the methodologies which they use, will vary. However, most port authorities will recognise guidance FRA guidance published by the International Maritime Organisation (IMO) in:
- MS/Circ.1023 MEPC/Circ.392: 5-4 2002;
 - MSC/Circ.1180 MEPC/circ.474: 25-8-2005;
 - MSC-MEPC.2/Circ.:16-10-2006.
- 3.3 In the UK, the serious grounding of the tanker “Sea Empress” in 1993 resulted in a fundamental change in the way that UK harbours manage their marine safety issues. The outcome was the development and introduction by the UK Department for Transport (DfT) of the Port Marine Safety Code (PMSC) and the associated publication known as the Guide to Good Practice (GtGP) <https://www.gov.uk/government/publications/port-marine-safety-code>
- 3.4 The methodology used in this risk assessment mirrors the guidance in the PMSC which itself is based on guidance published by IMO given in section 3.2.

Applicability at Kilfinichen

- 3.5 The proposed development at Kilfinichen is an abbreviated / desktop study of a full FRA which has a proportionate consideration of the five key steps in the FRA process, viz:
1. Data Gathering and Familiarisation
 2. Hazard Identification
 3. Risk Analysis
 4. Risk Assessment
 5. Risk Control

The stages are described in more detail below but, firstly, some definitions and terminology are given below:

- A **Hazard** is something that has the potential to cause harm to either people, property, the environment, or to the business reputation (***what can happen?***)
- **Frequency or Probability** is the likelihood of that hazard occurring (***how often could it happen?***)
- **Consequence** is the effect which the hazard would have, if the hazard was to occur (***what would be the result if it did happen?***)
- **Risk** is the combined effect of Frequency and Consequence
- **Risk Control Option (RCO)** is something which is done to reduce the frequency of a hazard occurring, or to reduce the consequences / effects of that hazard if it was to occur. These are also called **mitigations** (***what can we do to make it better?***)
- **Risk Category** is a definition of relative risk. A hazard which was very likely to occur and had severe consequences would be a hazard which is categorised as Extreme or High Risk. A hazard which was unlikely to occur and had minor consequences would be a hazard which is categorise as Low Risk
- **ALARP means As Low As Reasonably Practicable.** Between the limits of Extreme or High Risk and Low Risk, there is a range of risks which may be considered as acceptable because they are (or can be made) ALARP.

Stage 1 - Data Gathering and Familiarisation

- 3.6 In preparation for the risk assessment, DMC has carried out familiarisation with the site, the vessels, the proposed pier infrastructure and the proposed operations.

This has included:

- A review of public forum data including navigational chart UKHO 2711 (Loch Scridain)
- Review of other studies carried out in support of the Kilfinichen with particular reference to the Affric EIS Scoping Study and the responses to that study from a range of stakeholders including the MCA and the Northern Lighthouse Board (NLB)
- Web searches and reviews of industry / media material to gain a sense of marine activities in the Loch Scridain area.

No site visit or Hazard Identification (Hazid) workshop involving local stakeholders has been undertaken.

Stage 2 - Hazard Identification

- 3.4 This phase builds on the work of Stage 1 and identifies known hazards expected to be encountered because of the nature and/or area of the operation, and the existing risk control measures relating to those hazards. Equally importantly, it sought to identify any new hazards created as a result of the proposed service or operation.
- 3.5 The identification of hazards was carried out by the DMC team of professionals drawing on information obtained at Stage 1, including the concerns previously expressed by consultees.
- 3.6 The hazards identified, and taken forward to the risk assessment stage are:

Hazard No.	Hazard Description
<i>Hazards Associated With Construction at Kilfinichen</i>	
1	Floating construction plant (eg crane barge) grounds
2	Floating construction plant (eg crane barge) in collision with local craft
3	Local craft fouled by crane barge anchor cables
4	Dropped object
<i>Hazards Associated With Timber Export Operations at Kilfinichen</i>	
5	Ship grounds whilst navigating to or from KE pier
6	Ship is in collision with local craft
7	Ship suffers mechanical failure
8	Ship strikes KE pontoon
9	Ship breaks adrift from moorings
10	Pontoon breaks adrift
11	Linkspan fails
<i>Hazards Associated With Shifting Between Kilfinichen and Pennyghael</i>	
12	Attachment of linkspan fails
13	Lifting of linkspan on to pontoon fails
14	Attachment of pontoon from piles fails
15	Towlines from tug to pontoon fails
16	Pontoon sinks
17	Linkspan falls off pontoon
18	Tow complex (tug and pontoon) collides with local craft

Stage 3 – Risk Analysis

3.7 Stage 3 introduces the concept of risk in a qualitative way in order to prioritise the hazards identified during Stage 2 and assess their impact on safety. As explained above, risk is the combination of frequency and consequence. Prioritisation is an essential part of the process, as clearly, the greater the potential posed by a hazard, the greater the need to ensure that there are control measures, or defences, in place to mitigate that risk.

3.8 Sorting and ranking the HAZID output and adding the frequency component (i.e. how often such a hazard could happen – once a year, once every 10 years; 100 years 1000 years...)* generates the risk profile. The frequency or likelihood of incidents can be established using professional advice, judgement or experience and, where appropriate, historical data identified in the first stage of the work (or a combination of all of these).

*It is appreciated that the Kilfinichen project is not intended to last for 1,000 years or even 100 years. The above frequencies are simply used as a means of differentiating between hazard frequencies in a relative way.

Normally, risks are assessed in four ways against a common frequency scale:

- Consequence to life
- Consequence to the environment;
- Consequence to port authority operations; and
- Consequence to port users' business activity or reputation.

Stage 4 – Risk Assessment

3.9 This process compares existing operations and procedures supported by relevant control measures with the new risk profile created by the introduction of the new trade or operation. It identifies gaps, which will require the introduction of new or enhanced risk control measures to reduce the level of risk to an acceptable level.

3.10 At Kilfinichen, this stage is actually of little significance for two reasons:

- a) the proposed infrastructure mirrors (indeed, shares) the existing Pennyghael pier, so there is confidence that "the system works".
- b) the existing level of marine activity is very low, and will remain low even after the KE project is operational. This is why this risk assessment is deliberately proportionate to the development operations.

Stage 5 – Risk Control

3.11 This stage identifies the specific Risk Control Options (RCOs) or mitigations to be adopted to reduce the risks to ALARP or below.

3.12 The details available from, or produced by, the above five stages are brought together in the Risk Matrix. This is the means of:

- Placing initial (raw) values of frequency and consequence for each hazard,
- Determining the initial (raw) risk value and identifying which hazards have the highest score
- Consider what RCOs can and should be applied. The application of RCOs is essential for hazards which are initially categorised as Extreme or High Risk
- Re-assessing these hazards after the application of RCOs.

3.13 The Risk Matrix, along with the definitions of Frequency, Consequence, and Risk are shown in the Figure at the end of this section.

Production of Risk Register

3.14 The whole NRA process has two equally important end products. The first end product is that the very **process** of following a structured and methodical approach has safety improvement benefits. The **process** finds risks and reduces or eliminates them in advance of the operations commencing (rather than finding out the risks after an accident has occurred!)

3.15 The other end product is the record of what was agreed and committed to and a statement that the residual risk is accepted by all parties and is “owned” by the lead party, in this case Kilfinichen Estate.

RISK ASSESSMENT MATRIX: RISK CRITERIA		FREQUENCY				
		Level 1	Level 2	Level 3	Level 4	Level 5
		Rare	Unlikely	Possible	Likely	Almost Certain
		One or more times greater than 100	One or more times 100 year	One or more times in 10 years	One or more times per year	Ten or more times per year
Consequence	5 – Loss of vessel or severe damage to vessel / environment. Multiple fatalities International news coverage.	Moderate (5)	High (10)	Extreme (15)	Extreme (20)	Extreme (25)
	4 – Major damage to vessel / environment. Single Fatality. National news coverage.	Minor (4)	Moderate (8)	High (12)	Extreme (16)	Extreme (20)
	3 – Moderate damage to vessel / environment. Moderate / major injury Regional news coverage.	Minor (3)	Moderate (6)	Moderate (9)	High (12)	Extreme (15)
	2 - Minor or superficial damage to vessel / environment. Minor injuries and local news coverage.	Slight (2)	Minor (4)	Moderate (6)	Moderate (8)	High (10)
	1 - Insignificant or no damage to vessel / equipment / environment. No injuries.	Slight (1)	Slight (2)	Minor (3)	Minor (4)	Moderate (5)
ACTION KEY	Slight (1 – 2)	No Action is required				
	Minor (3 – 4)	No additional controls are required, monitoring is required to ensure no changes in circumstances				
	Moderate (5 – 9)	Efforts should be made to reduce risk to ‘As low as reasonably practicable’ (ALARP), but activity may be undertaken				
	High (10 – 14)	Efforts should be made to reduce risk to ‘As low as reasonably practicable’ (ALARP). Activity can only be undertaken with further additional controls.				
	Extreme (15 – 25)	Intolerable risk. Activity not authorised				

Risk Matrix Used In Kilfinichen Risk Assessment

Section 4 Risk Analysis at Kilfinichen

4.1 The 18 hazards identified in this desktop study are summaries here and shown in full in Appendix 1. If there are any further hazards then it is very likely that they will be variations on the ones already identified rather than something entirely new.

4.2 The results are as follows:

ASSESSMENT OF RISKS AT KILFINICHEN ESTATE							
Hazard No.	Hazard and Existing RCOs	Raw Scores			Mitigated Scores		
		P	C	R	P	C	R
1	Floating construction plant (eg crane barge) grounds	1	2	2	1	2	2
2	Floating construction plant in collision with local craft	1	2	2	1	2	2
3	Local craft fouled by crane barge anchor cables	3	2	6	3	2	6
4	Dropped object	1	3	3	1	3	3
5	Ship grounds whilst navigating to or from KE pier	2	2	4	2	2	4
6	Ship is in collision with local craft	1	2	2	1	2	2
7	Ship suffers mechanical failure	2	1	2	2	1	2
8	Ship strikes KE pontoon	2	2	4	1	2	2
9	Ship breaks adrift from moorings	2	1	2	1	1	1
10	Pontoon breaks adrift	1	3	3	1	3	3
11	Linkspan fails	1	1	1	1	1	1
12	Attachment of linkspan fails	2	2	4	2	2	4
13	Lifting of linkspan on to pontoon fails	2	2	4	2	2	4
14	Attachment of pontoon from piles fails	1	3	3	3	1	3
15	Towlines from tug to pontoon fails	2	2	4	2	2	4
16	Pontoon sinks	2	2	4	2	2	4
17	Linkspan falls off pontoon	2	3	6	1	3	3
18	Tow complex (tug and pontoon) collides with local craft	1	2	2	1	2	2

Risk Type	No.	%	ALARP
Extreme Risk Hazards	0	0%	
High Risk Hazards	0	0%	
Moderate Risk Hazards	1	6%	
Minor Risk Hazards	9	50%	
Low Risk Hazards	8	44%	
Total	18	100%	

4.3 As explained further in the next section, all risks are already As Low As Reasonably Practicable (ALARP) or can be mitigated to make them so.

4.4 Section 5 offers some advice for KE in terms of operating their jetty in a safe manner.

Section 5 Conclusions and Recommendations

5.1 The development and operation at Kilfinichen Estate is considered to be a low risk operation in a low risk area. However, there are a few recommendations which can be made to KE which they, in turn, are recommended to communicate to and act upon jointly with key stakeholders, particularly the marine civils contractor who is building the pier and installing the linkspan and pontoon, and also the shipping company chartered to export the timber.

5.2 Given that the Kilfinichen pier does not lie within the jurisdiction of a SHA, but bearing in mind the intent of the PMSC which states:

“It is strongly recommended that organisations or facilities which are not a statutory harbour authority, including berths, terminals and marinas, seek to comply with this Code through the adoption of a marine safety management system or any alternative similar standard assessment process”,

it is appropriate to ask the question as to what extent KE must / should / can comply with the above statement.

5.3 It is the opinion of this report that, given:

- the low risk profile (as assessed in this report) and
- the temporary nature of the facilities and
- the benign and non-noxious nature of the cargoes

it is disproportionately burdensome for KE to develop a full Safety Management System (SMS) of the type which would “pass muster” in a PMSC compliant SHA.

5.4 What is considered more proportionate is that KE notes this report and adopts the following actions for implementation throughout the lifetime of the project.

Rec. No.	Description
1	<p>Although the Northern Lighthouse Board (NLB) has stated that they do not require the pier to be permanently lit in accordance with IALA guidelines, it is <u>recommended</u> that a light is installed or a KE employee is on the pontoon with a torch if a ship is berthing during darkness.</p> <p>This will help the Captain judge the distance off and his speed of approach, thereby preventing damage when berthing.</p>
2	<p>It is <u>recommended</u> that KE develops a simple Local Notice to Mariners (LNtoM) scheme and uses this to inform relevant stakeholders about information which may affect navigational safety.</p> <p>Recipients should be:</p> <ul style="list-style-type: none">• Local boat owners

	<ul style="list-style-type: none"> • Fish farms / aquaculture interests • Sailing and kayaking clubs • Tourism offices • Argyle and Bute Council (A&BC) <p>Relevant content for LNtoM should be:</p> <ul style="list-style-type: none"> • Commencement of civil engineering works, with particular emphasis on the avoidance of anchor cables deployed by crane barges etc and the use of marker buoys used on site • Movement of barge and linkspan between Kilfinichen Estate and Pennyghael, and vice versa • Anything else which, in their judgement, KE considers prudent to cover by means of a LNtoM.
3	It is <u>recommended</u> that KE communicated with the UKHO at Taunton prior to commencement of work and again on completion with sufficient information (as guided by the UKHO) to enable chart corrections to be issued.
4	<p>It is <u>recommended</u> that KE develops a simple series of Standard Operation Procedures (SOPs) in a check list format for use when the pier is operational. These should be proportionate to the enterprise and might include:</p> <ul style="list-style-type: none"> • The normal method and pattern for deployment of mooring lines from ships • Weather limitations for berthing and remaining alongside • Information for ships such as water depth alongside; mooring arrangements; communications with KE; and emergency response capabilities (eg for on-board emergencies) • Lifting of linkspan and securing atop the pontoon • Towing between sites • Inspection and condition reporting upon shifting between sites.
5	It is <u>recommended</u> that KE identifies a person who shall have responsibility for the safe use of the pier. This Designated Person (DP) shall be made known to the shipping companies using the pier and to local boat owners.

5.5 The above is considered to be a form of SMS which is proportionate to the risks, as identified, and proportionate for a private operation which does not lie within a SHA.

ASSESSMENT OF RISKS AT KILFINICHEN ESTATE

Hazard No.	Hazard and Existing RCOs	Raw Scores			Additional Risk Control Options (RCOs) If Necessary	Mitigated Scores		
		P	C	R		P	C	R
1	Floating construction plant (eg crane barge) grounds	1	2	2		1	2	2
	Contractor develops a clear passage plan				No further RCOs required			
	Craft with construction barges equipped with best available charts							
	KE or contractor issues a Local Notice to Mariners							
2	Floating construction plant in collision with local craft	1	2	2		1	2	2
	Existing moorings relocated to allow construction to take place				No further RCOs required			
	KE or contractor issues a Local Notice to Mariners							
	All craft follow Colregs at all times							
3	Local craft fouled by crane barge anchor cables	3	2	6		3	2	6
	KE or contractor issues a Local Notice to Mariners				No further RCOs required			
	Anchor marker buoys used as required				but monitoring to be undertaken			
4	Dropped object	1	3	3		1	3	3
	All lifting equipment suitably rated, checked, and in good condition				No further RCOs required			
	All lifts carried out in accordance with a clear lifting plan							
5	Ship grounds whilst navigating to or from KE pier	2	2	4		2	2	4
	Ship develops a clear passage plan				No further RCOs required			
	Ship equipped with best available charts (with UKHO correction)							
	KE or contractor issues a Local Notice to Mariners							
6	Ship is in collision with local craft	1	2	2		1	2	2
	All craft follow Colregs at all times				No further RCOs required			

ASSESSMENT OF RISKS AT KILFINICHEN ESTATE

Hazard No.	Hazard and Existing RCOs	Raw Scores			Additional Risk Control Options (RCOs) If Necessary	Mitigated Scores		
		P	C	R		P	C	R
7	Ship suffers mechanical failure	2	1	2		2	1	2
	Ship to be fully operational before approaching berth				No further RCOs required			
8	Ship strikes KE pontoon	2	2	4		1	2	2
	Moderate speed approach				Pontoon to be lit if ship			
	Fenders at the ready				berthing at night			
9	Ship breaks adrift from moorings	2	1	2		1	1	1
	Mooring lines to pontoon and shore if possible				KE to have weather limits			
	Master to have sight of mooring arrangements prior to berthing				for berthing			
10	Pontoon breaks adrift	1	3	3		1	3	3
	Pontoon moorings engineered to relevant codes and standards				Pontoon moorings to be			
					inspected regularly, and condition to			
					be noted at each shift between sites			
11	Linkspan fails	1	1	1		1	1	1
	Linkspan to be engineered to relevant codes and standards				Linkspan to be			
					inspected regularly, and condition to			
					be noted at each shift between sites			
12	Attachment of linkspan fails	2	2	4		2	2	4
	Linkspan to be engineered to relevant codes and standards				Linkspan to be			
					inspected regularly, and condition to			
					be noted at each shift between sites			

ASSESSMENT OF RISKS AT KILFINICHEN ESTATE

Hazard No.	Hazard and Existing RCOs	Raw Scores			Additional Risk Control Options (RCOs) If Necessary	Mitigated Scores		
		P	C	R		P	C	R
13	Lifting of linkspan on to pontoon fails	2	2	4		2	2	4
	Method Statement for lifting of linkspan to be developed, communicated, and used by KE staff				No further RCOs required			
14	Attachment of pontoon from piles fails	1	3	3		3	1	3
	Pontoon moorings engineered to relevant codes and standards				Pontoon moorings to be inspected regularly, and condition to be noted at each shift between sites			
15	Towlines from tug to pontoon fails	2	2	4		2	2	4
	Preferred towing method to be identified in advance				No further RCOs required			
	Possibly towing alongside							
16	Pontoon sinks	2	2	4		2	2	4
	Pontoon to be checked for watertight integrity before and after tow				Tow to be aborted if ingress is noted			
17	Linkspan falls off pontoon	2	3	6		1	3	3
	Pontoon to be secured with suitable deck fastenings (wires and bottlescrews or similar)				Security of pontoon to be verified			
18	Tow complex (tug and pontoon) collides with local craft	1	2	2		1	2	2
	Existing moorings relocated to allow construction to take place				No further RCOs required			
	KE or contractor issues a Local Notice to Mariners							
	All craft follow Colregs at all times							