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Assessment

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North Lincolnshire Green Energy Park

Preliminary Navigation Risk Assessment

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date **27/05/2022**



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Glossary

Term	Definition
ABP	Associated British Ports Ltd
AIL	Abnormal Indivisible Loads
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AtoN	Aids to Navigation
CD	Chart Datum
DWT	Deadweight Tonnage
EA	Environment Agency
IMO	International Maritime Organisation
MMO	Marine Management Organisation
NLGEP	North Lincolnshire Green Energy Park
pNRA	preliminary Navigation Risk Assessment
PAVIS	Port and Vessel Information System
PHL	Preliminary Hazard List
PMSC	Port Marine Safety Code
RFI	Request For Information
SMS	Safety Management System
UKHO	United Kingdom Hydrographic Office
VTS	Vessel Traffic Services

1 Introduction

1.1 DCO Application Description

- 1.1.1 The North Lincolnshire Green Energy Park (NLGEP) (the Project), located at Flixborough, North Lincolnshire, is a Nationally Significant Infrastructure Project (NSIP) with an Energy Recovery Facility (ERF) capable of converting up to 760,000 tonnes of non-recyclable waste into 95 MW of electricity and a carbon capture, utilisation and storage (CCUS) facility which will treat a proportion of the excess gasses released from the ERF to remove and store carbon dioxide (CO₂) prior to emission into the atmosphere. The design of the ERF and CCUS will also enable future connection to the Zero Carbon Humber pipeline, when this is consented and operational, to enable the possibility of full carbon capture in the future.
- 1.1.2 The NSIP incorporates a switchyard, to ensure that the power created can be exported to the National Grid or to local businesses, and a water treatment facility, to take water from the mains supply or recycled process water to remove impurities and make it suitable for use in the boilers, the CCUS facility, concrete block manufacture, hydrogen production and the maintenance of the water levels in the wetland area.
- 1.1.3 The Project will include the following Associated Development to support the operation of the NSIP:
- a bottom ash and flue gas residue handling and treatment facility (RHTF);
 - a concrete block manufacturing facility (CBMF);
 - a plastic recycling facility (PRF);
 - a hydrogen production and storage facility;
 - an electric vehicle (EV) and hydrogen (H₂) refuelling station;
 - battery storage;
 - a hydrogen and natural gas above ground installations (AGI);
 - a new access road and parking;
 - a gatehouse and visitor centre with elevated walkway;
 - railway reinstatement works including, sidings at Dragonby, reinstatement and safety improvements to the 6km private railway spur, and the construction of a new railhead with sidings south of Flixborough Wharf;

- a northern and southern district heating and private wire network (DHPWN);
- habitat creation, landscaping and ecological mitigation, including green infrastructure and 65 acre wetland area;
- new public rights of way and cycle ways including footbridges;
- Sustainable Drainage Systems (SuDS) and flood defence; and
- utility constructions and diversions.

1.1.4 The Project will also include development in connection with the above works such as security gates, fencing, boundary treatment, lighting, hard and soft landscaping, surface and foul water treatment and drainage systems and CCTV.

1.1.5 Figure 1-1 shows the location of the Project and the DCO Order Limits.

1.1.6 A Preliminary Navigation Risk Assessment (pNRA) has been undertaken to support the DCO application by assessing the additional vessel movements that could take place within the River Trent associated with the delivery and export of goods to Flixborough Wharf as a result of the Project.

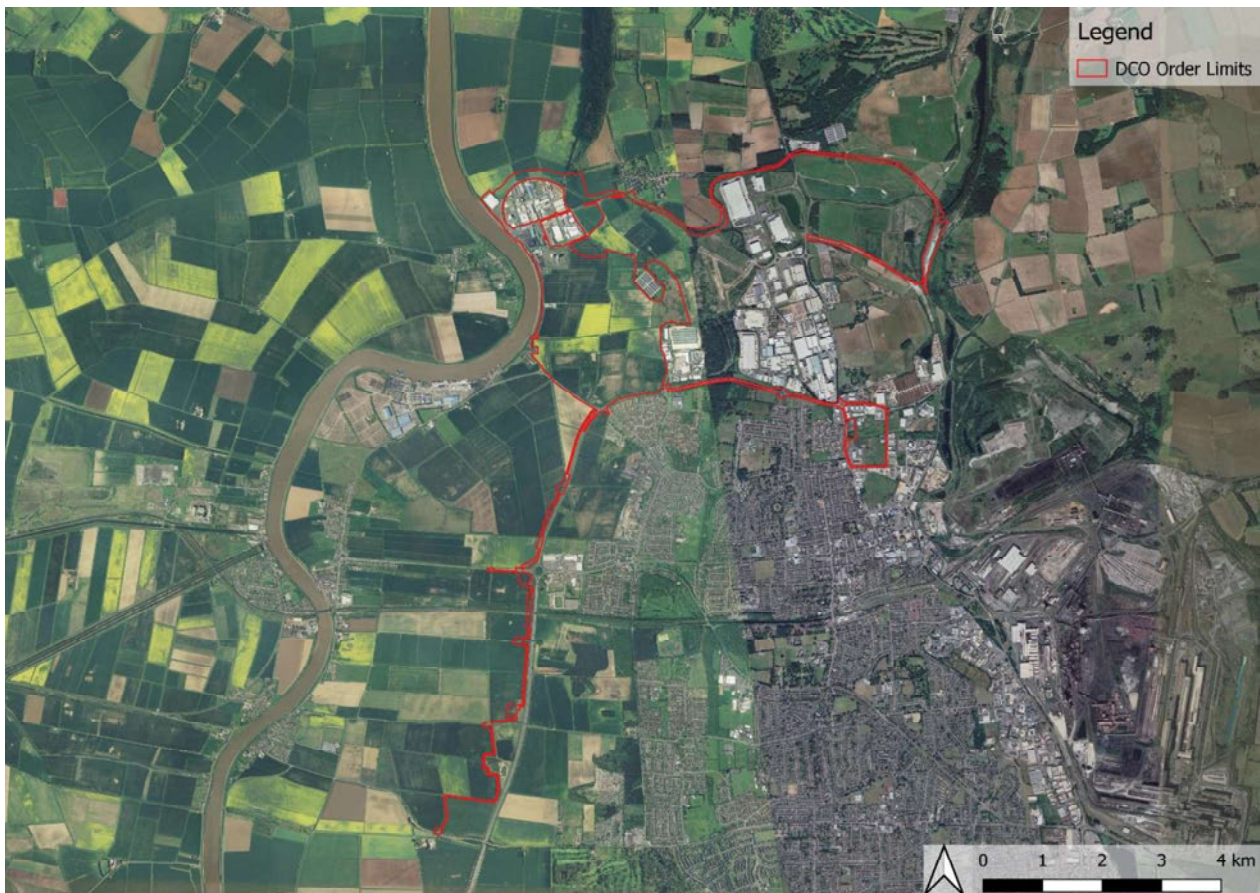


Figure 1-1 – The Project Order Limits

1.2 Assessment Objectives

1.2.1 The objective of this pNRA is to assess the impact and propose mitigation for any identified risks associated with the Project on navigation in the River Trent. The pNRA seeks to establish whether the proposed operations on the River Trent can be undertaken safely alongside other known or committed river traffic, and to assess the potential impact of the project on river navigation as whole, for example, impacts on sightlines and navigational aids. The assessment takes account of existing navigation control measures and identifies any additional measures that are considered necessary for safe navigation.

1.2.2 The pNRA includes:

- overview of navigational features
- marine traffic analysis
- impacts on marine navigation and communication equipment; and

- identification of mitigation measures.

1.2.3 At an initial consultation meeting with the Harbour Authority, ABP, it was agreed that the scope of the pNRA should be comprise the water area between the mouth of the River Trent (confluence with the River Humber), and the whole river bend upstream of Flixborough Wharf, downstream of Groves Wharf, a distance of approximately 12 km.

1.3 Comprehensive NRA

1.3.1 This document is primarily intended to support the DCO Application and so assumptions are made regarding the future construction and operations. Such considerations can only be finalised following the DCO determination following more detailed work, when a full NRA will be produced.

1.3.2 The full NRA will capture the relevant updates and refinement to the design and finalised post DCO application. This will be undertaken in accordance with the principles described in this document. Finalisation of the NRA will be undertaken in consultation with ABP, RMS Ports, stakeholders and future contractors/operators.

2 Site Conditions

2.1 Assessment Area

River Trent

- 2.1.2 Marine traffic enters the River Trent from the River Humber north and downstream of the Flixborough Wharf. Between Flixborough and the confluence with the Humber there is only one additional facility, located at Burton Stather, the Kings Ferry Wharf. The width of the River Trent enables a two-way traffic. Associated British Ports Ltd (ABP) is the Statutory Harbour Authority for the Humber Estuary, including the study area within the Trent.
- 2.1.3 The River Trent is generally used for commercial shipping and observing a recreational craft is considered exceptional. At Keadby lock (upstream of the site) there is an entrance to the Canal and River Trust (CRT) waterways, but it is not often used. ABP's general advice is that recreational craft should only use the waterway outside of the commercial river operation times i.e. high tide. The impact to recreational craft is therefore considered negligible for this pNRA.
- 2.1.4 Figure 2-1 shows the stretch of the River Trent from the River Humber to Flixborough Wharf identifying the existing navigational aids, and the location of Burton Stather.



Figure 2-1 - Overview of the River Trent between the River Humber and Flixborough Wharf including the navigation aids

Tide Levels

2.1.5 Water levels in the River Trent are tidally influenced. Table 2-1 and

2.1.6 Table 2-2 show the present day tide levels applicable to Flixborough and Burton Stather that have been taken from ABP's published hydrographic survey chart from the bi-annual survey conducted on 27th October 2020. It is noted that the levels in this table are expected to increase in the future due to sea level rise as a result of climate change.

Table 2-1 - Flixborough Tide Levels

Tidal Reference	Present Day (2020)	
	Level (mOD)	Level (mCD)
Mean High Water Springs (MHWS)	5.90	5.00
Mean High Water Neaps (MHWN)	4.10	3.20
Mean Low Water Neaps (MLWN)	0.90	0.00
Mean Low Water Springs (MLWS)	0.90	0.00
NOTES:		
1. 0mCD = +0.90mOD as specified in the ABP chart		
2. The spring tidal range between MHWS and MLWS is 5.00m		

Table 2-2 - Burton Stather Tide Levels

Tidal Reference	Present Day (2020)	
	Level (mOD)	Level (mCD)
Mean High Water Springs (MHWS)	6.30	5.20
Mean High Water Neaps (MHWN)	4.60	3.50
Mean Low Water Neaps (MLWN)	1.40	0.30
Mean Low Water Springs (MLWS)	1.10	0.00
NOTES:		
1. 0mCD = +1.10mOD as specified in the ABP chart		
2. The spring tidal range between MHWS and MLWS is 5.20m		

Bed Levels

2.1.7 Figure 2-2 shows the bathymetry of the River Trent in the vicinity of Flixborough Wharf and part of the river downstream. The data was provided by ABP, with the survey dated 27th October 2020. The depths shown are in metres relative to Chart Datum (mCD).



Figure 2-2 - Bathymetry at Flixborough Wharf and the River Trent (Source: ABP 27th October 2020)

2.1.8 There is no maintenance dredging undertaken in the river way or navigable channels, however, RMS Ports undertake localised dredging of the berths at Flixborough Wharf. The material in the berth pockets is generally very soft mud. Since it is such a strong tidal river there is only a requirement to level the material. Methods used are either side casting with a grab and dropping the dredging material into the navigation channel allowing the current to disperse the material, or, via a levelling bar off the back of a tug being dragged along the riverbed to mobilise the material. The side casting takes place approximately every 6 weeks and levelling bar approximately twice a year. As the material is not being removed from the river no permitting is required.

Currents

2.1.9 Currents at the Project location are driven by the tide. At times of spring tides, the arrival of the flood can result in an initial very rapid rise in the water level. At Flixborough, on a predicted 6m tidal range, the water level can rise by 1 metre in the first 10 minutes of the flood tide. At times, a tidal bore can occur (locally known as Trent Aegir), leading to sudden and severe strain on the mooring lines of berthed vessels.

2.1.10 Current speeds can range between 0 and 5 knots, and navigation generally occurs in the river when the current is between 0 and 3 knots. Mooring operations can sometimes take place with current speeds of up to 5 knots.

Nautical Charts/ Aids to Navigation

2.1.11 Figure 2-3 shows the stretch of the River Trent from Man Reval Light to Amcotts Hook Light identifying the existing navigational aids and guidance (ABP).

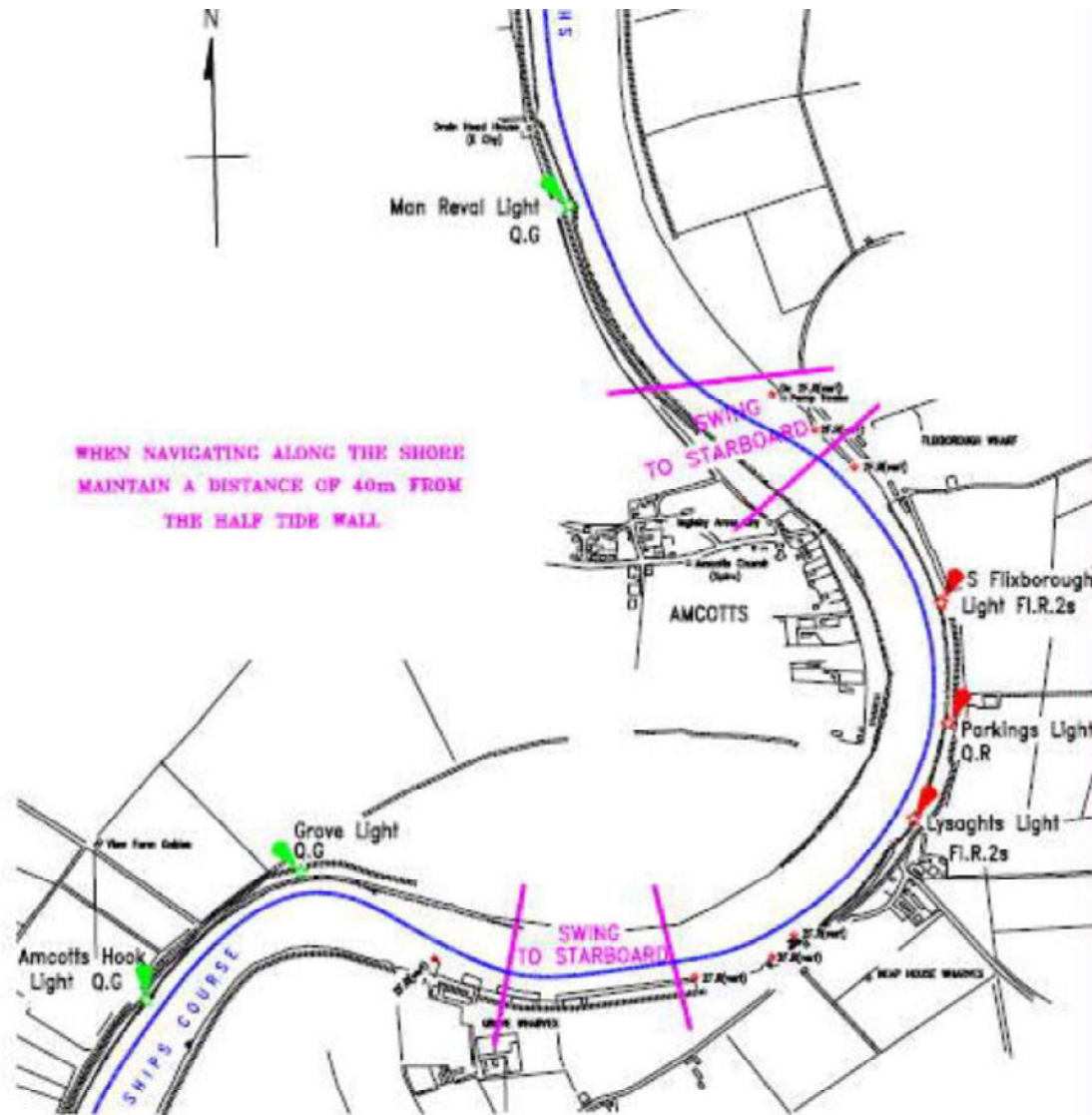


Figure 2-3 - Overview of the River Trent between Man Reval Light and Amcotts Hook Light including navigation aids (Source: ABP)

- 2.1.12 ABP is not aware of any plan to alter the existing Aids to Navigation (AtoN) but note changes could be implemented on a need basis/maintenance requirement. With regards to potential light pollution from the development, ABP's general recommendation is for lights from the development point away from the river. Further consultation would be necessary with ABP to confirm suitability and avoid potential signalling conflicts.
- 2.1.13 The Harbour Authority establishes guidance for lighting of the riverbank. Illumination directly onto the River Trent shall be avoided, and light spill limited to no more than 2lux, unless deemed required to the purposes of safety and operations. As a rule, the use of red, green, and white light onto or near the waterway shall be avoided. It is however expected that the use of white light would be required for the illumination of the ferry port to ensure suitable level of illumination for safe operation.
- 2.1.14 Several times a year, very dense fog can impact navigation along the River Trent. In those instances, the pilots turn around halfway between the mouth of the Trent and the Humber Bridge.
- 2.1.15 RMS Ports are in the process of replacing lights at the end of the wharf to compensate for the loss of lights on the gantry crane, which is being decommissioned. The other cranes all have their own lights. The update to lights at the wharf does not need to be consented providing the light do not spill onto the River Trent.

Navigation

- 2.1.16 Figure 2-4 shows the Vessel tracks in the River Trent from 2015 Automatic Identification System (AIS) data. The analysis of the AIS data for the River Trent area has been used to identify the baseline of vessel routes. Predictions of vessel types and vessel movements have been used to assess future traffic growth.



Figure 2-4 - Vessel tracks in the River Trent from 2015 AIS data (Source: MMO)

- 2.1.17 There is a navigation channel (ships course – blue line in Figure 2-3) but due to the ever-changing nature of the riverbed it fluctuates regularly. The River Trent is surveyed every 2 months, which means the navigation channel is updated on this basis.
- 2.1.18 The general distance kept between moving vessels is 1 mile, and can be 50 - 100m apart when passing. The sailing speed is between 6 and 10 knots.
- 2.1.19 From ABP experience, the most frequent area for grounding is at the mouth of the River Trent. There are no known wrecks. The anchorage on the west bank was for recreational craft, but ABP try to discourage the use of this anchorage as, in general, vessels try to sail to the East side of Island Sand but sometimes they need to sail on the West side through the anchorage.

2.2 Flixborough Wharf

- 2.2.1 Flixborough is one of a number of wharves on the River Trent, operated by RMS Ports. Predominantly, the wharf handles steel and bulk cargoes and can accommodate vessels up to a maximum of 100m length overall (LOA), with a draft of up to 5.5m during Spring Tides. The southern (upstream) berth is serviced by overhead gantry crane, capable of lifts up to 35 tonnes, and mobile crawler cranes for general offloading and loading at the northern (downstream) berth. Loading shovels assist for the handling of bulk cargoes, and a dedicated weighbridge and lorry wheel wash for bulk cargoes are located within the site. Flixborough Wharf operates a dedicated steel terminal and has access to the national rail network via their own rail head.
- 2.2.2 The wharf is an open-piled structure with a total approximately length of 230m, of which approximately 155m is actually quayside adjacent to the water, with a deck height of +5.885mOD. The front of the wharf has timber fendering that appears to run to the riverbed based on the structural drawings provided by North Lincolnshire Green Energy Park Limited ('the Applicant'), as shown in Figure 2-5. The structural drawing produced by Alan Wood and Partners is contained within Appendix B .

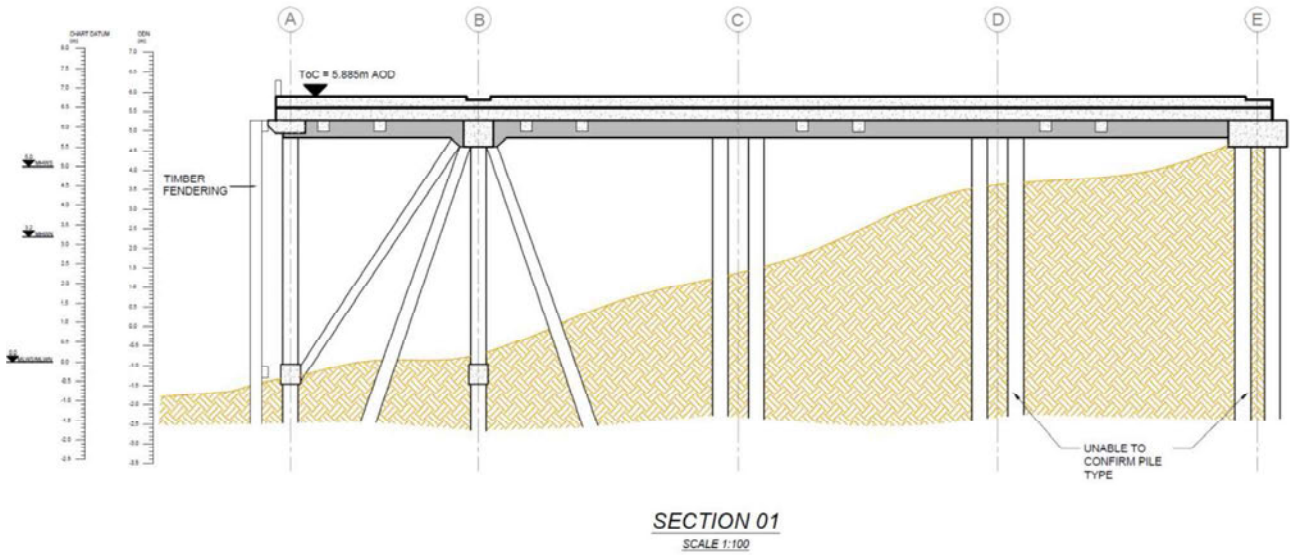


Figure 2-5 - Cross section of Flixborough Wharf taken from GA Plans of Existing Wharf

2.2.3 Figure 2-6 shows a view of the wharf from the River, showing the piles and timber fenders along with the cranes.

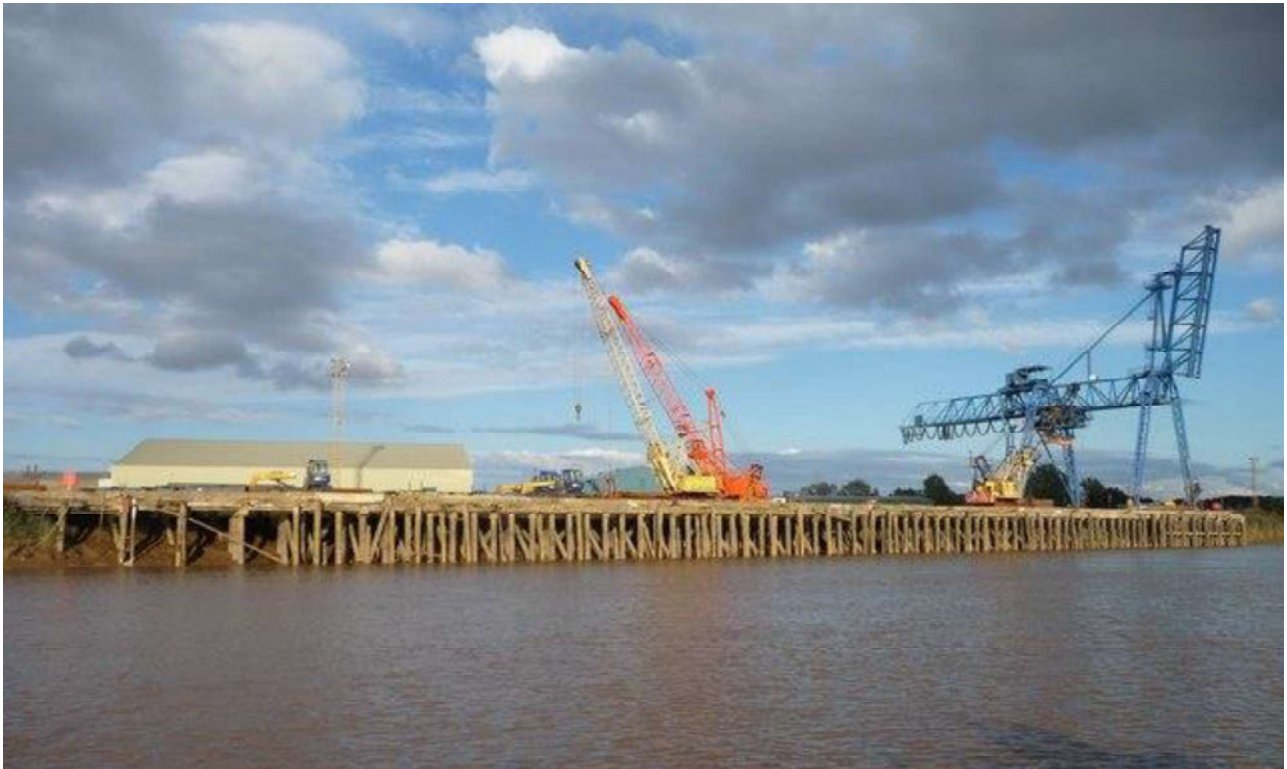


Figure 2-6 - Photograph of Flixborough Wharf (source: [redacted])

- 2.2.4 RMS Ports provided some information regarding the existing cranes and their future plans. The current wharf includes a blue Rail Mounted Gantry (RMG) crane and two crawler cranes. The two crawler cranes are capable of handling steel, bulk and bailed RDF.
- 2.2.5 The existing blue Rail Mounted Gantry (RMG) crane is being decommissioned and will be replaced in the next three to four months by a multi-purpose Liebherr crane (boom type crane). The new crane will be able to operate at both berths and will be used to handle bulk, steel, bailed RDF and can be adapted to handle containers if required. The rails for the RMG crane run the full length of the wharf. RMS Ports are not planning to remove them as rails are flush with the deck surface of the wharf and will not impact the new crane.
- 2.2.6 The new crane has a fast lift speed and, once fitted with a container beam, will be able to move a container in approximately a 2-3min/cycle. This rate of unloading is possible even when the tide is low (with vessels sitting on the riverbed) providing the berths are dredged accordingly, and the correct equipment is used.
- 2.2.7 The end of the wharf was being repaired by the Environment Agency (EA); like-for-like repairs were due to be completed by the middle of April 2021. The EA are responsible for maintaining the height of the quay as it sits below the flood risk level.
- 2.2.8 A survey (Condition Survey and Exception Report, Alan Wood & Partners, 2018) of the underside of the wharf is conducted every 2 years to monitor the condition of the structure with ad hoc repairs taking place when required. The structural assessment is based on the maximum lifting weights for the ground loadings of the new crane as a worst-case scenario.

3 Existing Operations

3.1 Wharf Operations

3.1.1 The current operations at Flixborough Wharf are as follows:

- offloading of bulk materials
- offloading/loading of steel; and
- monthly delivery of pig iron.

3.1.2 The average vessel at Flixborough Wharf handles 1,500 to 2,000t, but there is the capacity for up to 3,000t with the largest vessels.

3.1.3 For steel cargo, unloading can currently take up to 2 days, whereas for bulk material it takes 1 day for the same tonnage. The density of cargo varies, for bulk material it is typically between 0.3t/m³ and 2t/m³ depending on categories (minerals, clay, wheat...). Steel materials come in many categories (sections, plates, beams, rebars...) and steel density depends on each one.

3.1.4 The wharf current working hours are 06:00 to 18:00 but it is noted that the wharf can be open and operated continuously 24-hours per day, 365 days per year if cargo demand is high. Pig iron is the only constraint; due the noise associated with its handling it must not be managed past 23:00. There is no formal planning restriction to the wharf, only an agreement with adjacent parties to keep noise to a reasonable level.

3.1.5 RMS Ports advised that the current operation times are sufficient to deal with cargo tonnages now. Based on the Project and associated future increase in tonnages, RMS Ports anticipate that the wharf may have to operate 24hr per day. As an example, approx. 300,000t of material is handled per year based on a 12hr shift noting that some of this will also be steel which requires 2 days to unload. The wharf has previously operated 24-hours per day, 365 days per year (up to 1997) and can operate at that level again if the business case requires it. At that time, the wharf was handling 600,000 tonnes a year and could have handled more.

3.2 Vessel Traffic Baseline

3.2.1 The number of vessel movements in the River Humber is shown in Table 3-1, based on data provided by ABP.

Table 3-1 - No. of vessel movements in the River Humber between 2016-2020

	Vessel Movements				
	2016	2017	2018	2019	2020
ABP Acts	16,161	16,997	17,092	15,499	13,747
VLS Moves	1,070	1,022	1,068	930	842
Non VLS Moves	15,091	15,975	16,024	14,569	12,905
PEC Acts	8,715	8,543	8,545	9,126	7,904
Total Movements	24,876	25,540	25,637	24,625	21,651

3.2.2 The number of vessel movements in the River Trent is shown in Table 3-2, based on data provided by ABP.

Table 3-2 - No. of vessel movements in the River Trent between 1998-2020

Year	Number of Movements	Year	Number of Movements
1998	2651	2010	1427
1999	2481	2011	1443
2000	2637	2012	1318
2001	2554	2013	1274
2002	2442	2014	1352
2003	2385	2015	1193
2004	2480	2016	1216
2005	1980	2017	1069
2006	2119	2018	1049
2007	2282	2019	999
2008	1951	2020	765
2009	1184		

3.2.3 The number of vessel movements per wharf in the River Trent is shown in Table 3-3, based on data provided by ABP.

Table 3-3 - No. of vessel movements per wharf in the River Trent in 1999, 2000, 2019 and 2020

Wharf	Number of Movements per Year per Wharf			
	1999	2000	2019	2020
Flixborough	449	433	305	247
Groveport	960	1056	485	308
Gunness	537	606	169	124
Neap House	257	246	18	6
Gainsborough	0	0	0	3
Keadby	124	166	22	71
Burton Stather	151	130	0	0
Beckingham	3	0	0	6
Total	2481	2637	999	765

3.2.4 ABP consider that a maximum of four vessel movements could occur on a single spring high tide: two vessels arriving and two vessels departing the wharf, irrespective of vessel size. Vessel movements are more likely to occur at spring tides (62%) rather than neap tides (38%) thanks to the higher water levels.

3.3 Vessel Types and Dimensions

3.3.1 The average size vessel and large size vessel (example shown in Figure 3-1) sailing in this section of the River Trent have been assessed based on records provided by ABP, as summarised in Table 3-4:

Table 3-4 - Average and large vessel sizes operating in the River Trent

	Length Overall (LOA)	Draft	Gross Tonnage	DWT
Average Vessel	80-85m	3-4m	≈1,000-2,000t	≈1500-2,500t
Large Vessel	86-99m	4-5.5m	≈2,000-2,500t	≈2,500-4,000t



Figure 3-1 - Illustration of large cargo vessel (Source: Fast Jef (fast-lines.com))

- 3.3.2 The wharf length is 180m and a 6-8m distance is usually maintained between vessels. This means that two average size vessels can moor at the same time without any problem. 99m LOA vessels such as the "RMS DUISBURG" are not frequent at the wharf (approx. 15 times a year according to RMS Ports) and are accommodated by freeing the second berth or by combining its visit with one of the smaller cargo ships.
- 3.3.3 Due to close proximity between vessels, strong currents, and large tidal amplitude, it is essential that mooring lines are monitored correctly.

3.4 Existing Communication Measures

- 3.4.1 Prior to arrival at the wharf, every vessel receives a documentation pack from RMS Ports which includes notice to mariners with everything they need to be aware of regarding wharf access, communication, and procedures.
- 3.4.2 Any vessel with a length exceeding 60m requires a pilot for all operations. Vessels use their own bow thrusters and do not need tugs. Prior to arrival the vessel waits on anchor at Spur Point and the vessels are then called in via an automated system to direct them to the appropriate berth (north or south) based on their draft / length.

- 3.4.3 ABP are the Harbour Master who control the vessel movements to the wharf through their own control centre. Once the vessel is at Flixborough Wharf, RMS Ports communicate directly with the vessel using VHF radio in order to coordinate all the subsequent operations (mooring, loading/unloading cargo etc.).
- 3.4.4 Vessel Traffic Services (VTS) Humber, which is located at Spurn Point, operates a 24-hour service for all river users. Its major function is to monitor and regulate navigation of the Humber Estuary and the River Trent. The system is compulsory for all sea-going vessels and craft when entering the Humber VTS area. The Service provides AIS coverage throughout the VTS area and radar tracking within the area bounded by the Humber Bridge and the seaward limits of the VTS area. VTS uses channel 15 for the Humber but is an information service only. The Trent Inter-ship channel is 17 and vessel will do regular all ship calls to inform of their location and movements along the Trent.

3.5 Safety Management System

- 3.5.1 RMS Ports have set up their own safety management system and emergency plan for Flixborough Wharf. As part of the emergency plan, RMS Ports incorporated the key risks linked with marine operations throughout the wharf, in compliance with the requirements of the Port Marine Safety Code (Department for Transport).

3.6 Incident Reports

- 3.6.1 The number of vessel incidents in the River Humber is shown in Table 3-5, based on ABP data for some key hazards.

Table 3-5 - No. of vessel incidents in the River Humber between 2016-2020

	Vessel Incidents				
	2016	2017	2018	2019	2020
Impact with Structure	23	70	63	57	32
Temporary Grounding	4	17	26	13	10
Grounding over a tide	4	9	7	4	5
Collision between vessels	0	5	8	11	3

Contact with floating mark	0	1	5	8	2
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3.6.2 The number of vessel incidents in the River Trent is shown in Table 3-6, based on ABP data for some key hazards.

Table 3-6 - No. of vessel incidents in the River Trent between 2016-2020

	Vessel Incidents				
	2016	2017	2018	2019	2020
Impact with Structure	0	1	3	1	1
Temporary Grounding	1	3	3	5	1
Grounding over a tide	1	3	5	1	0
Collision between vessels	0	0	0	0	0
Contact with floating mark	0	0	0	0	0

3.6.3 ABP could not advise on the location of the different incidents. We are aware of the grounding of the Sea Mithril in February 2008 next to the wharf, understood to be due a human error, and the grounding of the H&S Fairness in September 2019 in the River Trent.

3.6.4 RMS Ports have highlighted that there is a significant risk of ranging (mooring breakout) at Flixborough Wharf. This type of incident occurred on the Frisium in February 2019 at Flixborough. The vessel broke away during rising tide due to poor dredging maintenance and insufficient monitoring of the mooring lines.

4 Proposed Operations

4.1 Assumptions

4.1.1 The pNRA covers the construction and operational phases of the Project.

Construction Phase Assumptions

4.1.2 The majority of construction materials and equipment will be transported to site via the highway network. However, it is probable that some of the fill material will be imported via the river during the construction phase. RMS Ports confirmed that this is feasible and could be an efficient solution thanks to the proximity of the wharf to the Project. Using ships would replace a large amount of road traffic and would therefore be favourable from an environmental and sustainability perspective.

4.1.3 A spread of fill material import during approximately 4 years of construction (2022-2026) is being assumed with monthly tonnages varying between 5,000t and 20,000t depending on the activities taking place, with a maximum total of 100,000t per year. These figures are estimates at this stage and will need to be confirmed as the project develops.

Abnormal Indivisible Loads (AIL)

4.1.4 Based on the existing wharf arrangement and the constrained navigation conditions (issues with under keel clearance and pylons across the river), it is unlikely that AILs would come via the River Trent as part of the construction phase.

4.1.5 This assumption will be reviewed as part of the final NRA when more details are available on the proposed AILs, and the design of the Project has been further refined.

4.1.6 It is likely that the new mobile crane will be transported to Flixborough Wharf by road before the start of the construction phase as it is part of RMS Ports current plans.

Operational Phase Assumptions

4.1.7 The current strategy in terms of the future wharf operations (in addition to existing activities) includes the proposed river activities [Transport Flow Diagram, Appendix D]:

- offloading of containerised waste (RDF): 182,000t per year (river only)

- loading of empty containers: Same vessels as the ones bringing containers
- offloading of bulk materials, primarily aggregate for construction of concrete blocks: 2,900t every 4.4 days; and
- loading of Carbon dioxide (CO₂): 56,000t per year

4.1.8 The following assumptions have been made based on the data provided by ABP/RMS Ports and the Applicant:

- the current strategy assumes the existing wharf will remain as existing (no extension of usable wharf length because of tidal access limitations and sufficient operational capacity)
- the average sized vessel is considered for the vessel movement numbers
- 24% of import of RDF is via the river. RDF density assumed to be 387kg/m³
- CO₂ storage provided at the wharf. CO₂ export to vessels via pipelines. Density of liquid CO₂: 1029kg/m³
- 80 TEU per vessel in average has been assumed for the capacity of the future container vessels. RMS Ports concurred with this value, but advised that it would need confirmation at a later stage once agreements with shipping companies have been made
- all vessels travel under their own power - no barges and tugs operate in the river; and
- the shipping and navigation baseline and impact assessment has been carried out based on the information available and responses received at the time of preparation. It is assumed that any notable changes will be re-assessed if required.

4.2 Capacity Assessment

River Trent

4.2.2 Information supplied by ABP show a decrease in vessel movements over the last 20 years which is thought to relate to the economic situation and has been observed across the overall area not just the River Trent. Vessel movements in the River Trent have dropped from around 2,500 in year 2000, down to around 1,000 in 2020 (Table 3-2).

4.2.3 An increase of up to 1,500 yearly vessel movements in the River Trent, associated with the Project would remain within past levels and would therefore present a limited navigation impact (provided types of ships remain similar).

Flixborough Wharf

4.2.4 Using the vessel movements provided by ABP and RMS Ports, as well as some assumptions stated below, a high-level assessment has been conducted to estimate the maximum number of vessel movements which could occur at Flixborough Wharf. The capacity assessment has been estimated based on the following assumptions:

- the number of vessels arriving during a neap period is calculated based on the ratio of vessels arriving in a spring tide/ neap tide given by ABP. (2 vessels for a spring tide, and 1.25 vessels on average during a neap tide)
- the number of vessels arriving and departing per year are calculated for both spring and neap tides, assuming 26 spring tides per year and 26 neap tides per year
- several scenarios have been considered: wharf operating 5 days a week or 7 days a week, different types of cargo influencing loading/unloading times (steel: 2 days/ bulk: 1 day). Certain operational constraints can impact the number of vessel movements (cargo type, tide hours, weather...)
- the current operational hours at Flixborough Wharf are maintained at 06:00 to 18:00, as there is currently no need to expand those hours to meet cargo demand. A 12-hour operation (a single high tide per day) is therefore assumed as the most likely scenario. Since there is potential to increase those hours if needed in the future to cope with more vessel movements, a 24-hour operation scenario is also presented

- the maximum number of vessel movements during a high tide is two vessels arriving at the wharf and two vessels departing; and
- the incoming and outgoing vessels sail in convoy with the majority of vessel passing occurring between mouth of the River Trent and Burton Stather. On a normal tide, outgoing vessels leave 2 hours before high tide, inbound come in 1 hour before high tide. Inbound will pass outbound somewhere between Flixborough and the mouth of the River Trent.

4.2.5 A breakdown of the maximum capacity in terms of vessel movements associated with the different scenarios are provided in Table 4-1:

Table 4-1 - Summary of results for estimating wharf capacity in vessel movements

Operating hours	Operating days	No. of vessels movements (one day rotation)	No. of vessels movements (mix 1 day and 2-day rotations)
12-hour day (1 high tide)	5 day a week	842	562
	7 day a week	1,182	786
24-hour day (2 high tides)	5 day a week	1684	1,124
	7 day a week	2,364	1,572

- 4.2.6 The bold values for the one-day rotation align with the values provided initially in the Marine Traffic Assessment [Buro Happold, 2021].
- 4.2.7 These capacity estimates present a wide range of values, depending on number of days worked and cargo handled at the wharf (steel materials taking longer to unload). It is worth noting that these estimated numbers of vessel movements are theoretical and present a realistic worst-case for environmental impact studies. The numbers should not be used for creating a business case for transporting goods and supplies to and from the project by river without further consultation with ABP and RMS Ports, and consideration with the wider transport strategy for the project.
- 4.2.8 To put those values into perspective, Flixborough Wharf recorded 305 vessel movements in 2019. Before 2000, when the traffic on the River Trent was busier, the vessel movements at Flixborough Wharf were approximately 450 per year. RMS Ports indicated that the wharf operated 24h a day/ 7 days a week up to 1997 and can operate at that level again if the business case requires it.

4.3 Proposed Vessel Movements

Construction Phase

- 4.3.2 It is assumed that cargo vessel bringing fill material to Flixborough Wharf will handle in average 2,500t. This would represent between 4 and 16 additional vessel movements at the wharf per month during the construction phase and a maximum total of 80 vessel movements per year between 2022 and 2026.
- 4.3.3 This represents a yearly increase of 25% at Flixborough Wharf (compared to the 305 movements in 2019). Considering the capacity assessment of the River Trent and at Flixborough Wharf, the additional number of vessel movements during the construction phase can be accommodated with the current infrastructure.
- 4.3.4 The proposed type of cargo is similar to the one currently handled, it is relatively quick to offload and it will not require any changes to the yard or the handling equipment.

Operational Phase

- 4.3.5 Vessel movements expected during the operational phase (in addition to baseline traffic) are described below according to the proposed river activities:
- offloading of containerised waste (RDF): approximately 350 vessel movements per year

- loading of empty containers: Same vessels as the ones bringing containers
- offloading of bulk materials, primarily aggregate for construction of concrete blocks: approximately 180 vessel movements per year; and
- loading of Carbon dioxide (CO₂): approximately 50 vessel movements per year.

4.3.6 The combination of all the new activities would result in 580 additional vessel movements at the wharf per year, nearly 50 additional vessel movements per month. This represents a significant yearly increase of nearly 200% at Flixborough Wharf (compared to the 305 movements in 2019).

4.3.7 Based on the capacity assessment presented here, the increase of vessel movements during the operational phase can be accommodated at Flixborough Wharf with the existing two berths available. However, some changes may be required at the wharf in terms of handling operations so that vessel rotation can be quicker and enable all vessels to leave within one day. Operating hours might also need to be extended from 12hr to 24hr during peak periods to accommodate the higher demand and increase capacity.

4.3.8 Considering the traffic baseline, and the historic traffic in the Humber Estuary and the River Trent, it is considered that the navigation impact of the river freight associated with the Project will be limited and that total vessel movements will remain within a level which has already been experienced in the 1990s.

5 Assessment Methodology

5.1 Assessment Process

5.1.1 This assessment comprises of four stages:

5.1.2 **1. Data gathering:** gathering of data relating to the existing site and proposed operations, including environmental conditions, vessel management and organisational procedures, and the Statutory Harbour Authority (ABP) systems. Relevant findings have been presented in Section 2, Section 3 and Section 4.

5.1.3 **2. Hazard identification:** based upon the findings of the data gathering, this stage comprises the identification of hazards relating to the proposed operations, both generic and specific. This stage also introduces the risk control measures that are already in place.

5.1.4 **3. Risk analysis and assessment:** this stage analyses the risk associated with each hazard as a combination of frequency (likelihood of occurrence) and consequence (severity of occurrence). The assessment of risk aims to identify gaps within existing control measures, if any.

5.1.5 **4. Risk control:** in this final stage, the requirement for specific control measures is considered, with recommendations for adoption included.

5.1.6 This pNRA uses a baseline assessment (established using the data presented in Section 3), in addition to consultation with stakeholders, to identify potential impacts relevant to shipping and navigation receptors that may arise as a result of the Project. Impacts are then reviewed and screened in to be carried forward to the DCO Application.

5.1.7 It is noted that ABP, as the Statutory Harbour Authority, have conducted a full risk assessment for the Humber Estuary. The risk assessment detailed in this report is cognisant of this wider risk assessment that has been conducted by ABP. Where possible, phraseology has been used that is consistent with the ABP risk assessment so that the assessments are comparable and may be used to complement each other.

5.1.8 The risk assessment is limited to a stretch from the mouth of the River Trent (confluence with the River Humber) to the end of the river bend upstream of Flixborough Wharf before Groves Wharf, a distance of approximately 12 km.

5.1.9 Where identified, the overall severity of consequence to the receptor and the frequency of occurrence has been determined. The severity of consequence has been assessed against the frequency of occurrence to provide the level of tolerability of the impact. Further detail of the assessment methodology is provided in Section 6.

5.2 Consultation

5.2.1 The data presented in this report has been obtained through consultation with ABP and RMS Ports and analysis of their records for the River Trent. The data was provided via email, Requests for Information (RFI) and in meetings. Minutes of the meetings are available in Appendix A, RFI are available in Appendix C. The below list summarises when the information was provided:

- Email correspondence 11 December 2020 from ABP to the Applicant – breakdown of vessel movements entering the River Trent and typical vessel information
- Email correspondence 12 January 2021 from ABP to BH – number of vessels that could access and depart Flixborough Wharf on a Spring high tide
- Email correspondence 13 January 2021 from ABP to BH – breakdown of vessel movements arriving at Flixborough Wharf in relation to spring and neap tides with a percentage ratio
- Virtual meeting 14 January 2021 between BH and ABP – agreed a process for assessing the marine traffic and provision of a typical vessel operating in the River Trent
- Virtual meeting 11 March 2021 between BH and ABP – agreed the approach for the preliminary navigation risk assessment and reviewed the RFIs to confirm ABP inputs
- Virtual meeting 26 March 2021 between BH and RMS Ports – reviewed the RFIs to confirm RMS Ports inputs; and
- Virtual meeting 21 April 2021 between BH and ABP – reviewed the risk assessment and the methodology.

5.3 Guidance and References

- 5.3.1 The primary guidance document is the **International Maritime Organisation (IMO) Guidelines for Formal Safety Assessment (FSA)** – MSC (Maritime Safety Committee)/Circ. 1023 (IMO, 2002). The Guidelines for Formal Safety Assessment (FSA) for use in the IMO rule-making process were approved in 2002 (MSC/Circ.1023/MEPC/Circ.392). The Guidelines have since been amended by MSC/Circ.1180-MEPC/Circ.474 and MSC-MEPC.2/Circ.5. The Guidelines have now been superseded by MSC-MEPC.2/Circ.12/Rev.2.
- 5.3.2 **The Ship and Port Facility (Security) Regulations 2004:** The Regulations contain provisions which supplement Regulation (EC) No 725/2004 of 29 April 2004 on enhancing ship and port facility security (the EC Regulation). The EC Regulation provides for the harmonised implementation of the new international maritime security regime agreed by the International Maritime Organization (IMO) in December 2002.
- 5.3.3 **British Transport Docks Act 1972:** The British Transport Docks Act 1972 gives General Directions to vessels navigating in the River Humber. Berthing procedures for the Project will take due consideration of the General Directions.
- 5.3.4 **The Port Marine Safety Code (PMSC) 2016:** The Port Marine Safety Code (PMSC) (Department of Transport, 2009a) and associated Guide to Good Practice on Port Marine Operations (Department of Transport, 2009b), amongst other things, requires ports to 'ensure all risks are formally assessed and as low as reasonably practicable in accordance with good practice'. The methodology to assess navigational risk, described below, will comply with this requirement.
- 5.3.5 **Humber Passage Plan 2008:** The Humber Passage Plan has been prepared by ABP to 'facilitate the safe movement of large vessels in the River Humber'. The Plan applies to all Passage Plan Vessels navigating to or from a specified berth.
- 5.3.6 **Humber Navigation Byelaws 1990:** These byelaws set by ABP include requirements for vessels navigating in the Humber that will need to be factored into berthing procedures at the Project. Byelaws empower harbour authorities to regulate activities for specific purposes.

5.3.7 **ABP Marine Policy 2018:** As the Statutory and Competent Harbour Authority for the River Humber, ABP fulfils several navigational safety functions. The policies and plans are based upon a full assessment of the requirements of the Port Marine Safety Code and the hazards that have to be managed to provide for the marine safety of ABP's ports and harbours and their users. The methodology described below involves comprehensive consultation with stakeholders including ABP.

5.4 Hazard Identification

5.4.1 IMO guidelines define a hazard as 'something with the potential to cause harm, loss or injury'. Main hazard scenarios are identified in Table 5-1, in line with ABP guidelines:

Table 5-1 - Categories of hazard scenarios

Hazard Scenario	Description
Ranging (mooring break-out)	Failure of mooring or anchor
Shift berth to berth	Movement of a vessel from one berth to another or from anchorage to a berth
Collision ship-ship (general cargo to general cargo)	Any cargo vessel striking or being struck by another cargo vessel, regardless of whether the ships are underway, anchored or moored.
Collision ship-ship (tanker to general cargo)	Any tanker vessel striking or being struck by a cargo vessel, regardless of whether the ships are underway, anchored or moored.
Impact with structure	Unplanned contact by a vessel with a fixed structure in the project area
Grounding	Unplanned contact by a vessel with the sea or riverbed whilst underway, moored, alongside or at anchor; or the action of a vessel hitting the sea or riverbed due to squat.
Sinking and capsizing	Any vessel taking on water or overturning, after losing stability
Striking with floating object	Any vessel striking or being struck by a floating object (cargo, ice, other or unknown)
Striking with moored ship	Any vessel striking or being struck by a moored ship

Fire/ Explosion (underway)	An unexpected fire or explosion on a vessel underway in the River Trent
Fire/ Explosion (at wharf)	An unexpected fire or explosion on a vessel at berth
Marine pollution	The entry of harmful/polluting substances into the water or onto the foreshore (i.e. oils, chemicals, solid matter etc.)

5.4.2 Likely causes and risk control measures follow ABP guidelines. Those elements are provided in the relevant columns of the risk assessment (Appendix E – Preliminary Navigation Risk Assessment). Causes of hazards can generally be described under the following key categories:

- navigation conditions (weather, tide, current, fog...)
- equipment failure
- communication failure
- human error
- procedures not followed; and
- vessel related issues.

5.4.3 Control measures associated to the hazard scenarios can generally be described under the following key categories:

- traffic management systems
- communication to mariners
- competence and training of personnel
- operational/ safety procedures
- regulations and policies
- hydrographic information
- lighting and marking of obstructions (AtoNs); and
- waterway management/ Passage Plan.

6 Risk Assessment

6.1 Likelihood and Severity

6.1.1 Risk is widely accepted as a being a measure of the likelihood and severity of a particular hazard. At the low end of the scale where likelihood is rare and the severity minor, then the risk would be considered negligible and acceptable. At the high end of the scale where likelihood is almost certain and the severity severe, the risk would be considered very high and intolerable.

6.1.2 Navigation risks are generally assessed against four typologies: people, environment, property, and port business. The severity classifications related to four typologies resulting from a nautical safety accident or incident are:

Table 6-1 - Severity classification

Category	People	Environment	Property	Port Business
Cat 0	No injury	None (No incident – or a potential incident/near miss)	Negligible (£0 - £10,000)	None
Cat 1	Minor injury(s)	No measurable impact (An incident or event occurred, but no discernible environmental impact – Tier 1 but no pollution control measures needed)	Minor (£10,000 - £750,000)	Minor (Little local publicity, minor damage to reputation, minor loss of revenue, £0 - £750,000)
Cat 2	Serious injury(s)	Minor (An incident that results in pollution with limited/local impact – Tier 1, Harbour Authority pollution controls measures deployed)	Moderate (£750,000 - £4m)	Moderate (Negative local publicity, moderate damage to reputation, moderate loss of revenue, £750,000 - £4m)

Category	People	Environment	Property	Port Business
Cat 3	Single fatality	Significant (Has the potential to cause significant damage and impact – Tier 2, pollution control measures from external organisation required)	Serious (£4m - £8m)	Serious (Negative national publicity, serious damage to reputation, serious loss of revenue, £4m - £8m)
Cat 4	Multiple fatalities	Major (Has the potential to cause catastrophic and/or widespread damage – Tier 3, requires major external assistance)	Major (>£8m)	Major (Negative national and international publicity, major damage to reputation, major loss of revenue, >£8m)

6.1.3 The likelihood classification of a nautical safety accident or incident are:

- **Very unlikely** – an event occurring once every 50 years
- **Unlikely** – an event occurring once every 25 years
- **Occasionally** – an event occurring once every 10 years
- **Probably** – an event occurring once every 5 years
- **Likely** – an event occurring more than once every year

6.1.4 In accordance with “A Guide to Good Practice on Port Marine Operations”, prepared in conjunction with the “Port Marine Safety Code 2016” by the Department for Transport, one useful approach is to consider both the most likely and the worst credible outcomes (set against likely frequency of the event happening in each case). This approach provides a more realistic and thorough assessment of risk, which reflects reality, in that relatively very few incidents result in the worst credible outcome. This approach of considering both the most likely and the worst credible outcomes is recommended by ABP.

6.1.5 Using the severity and likelihood classifications above, the following scoring matrix is used for assessing the risk levels:

Table 6-2 - Risk Matrix and Total Risk Score

	Risk Score Matrix					Total Risk Score	
Cat 4	5	6	7	8	10	Negligible	0
Cat 3	4	5	6	7	9	Low	1-2
Cat 2	3	3	4	6	8	Medium	3-5
Cat 1	1	2	2	3	6	Significant	6-8
Cat 0	0	0	0	0	0	High	9-10
Severity	Very Unlikely	Unlikely	Occasionally	Probably	Likely	Likelihood	

6.1.6 This risk classification indicates the magnitude and acceptability of the risk and guides whether additional mitigating control measures are required to bring the risk to ALARP (As Low As Reasonably Practicable). "Unacceptable" risks are normally those with a total score above 6 (significant risk).

6.2 Risk Analysis and Control

- 6.2.1 Hazards, their consequences and their probability of occurrence have been assigned, based on the results of a desktop exercise and a risk assessment workshop (meeting minutes in Appendix A.4). Hazards have been assessed in terms of damage or injury to life (personal injury, fatality, etc), environment (oil pollution, etc), property and port business (reputation, financial loss, etc). They have been populated into the risk assessment in Appendix E – Preliminary Navigation Risk Assessment.
- 6.2.2 Additional risk control measures are not envisaged at this stage, since there are no changes to the existing wharf/ berths. Existing control measures implemented by ABP and RMS Ports might only require minimal adjustments for the new CO₂ and container activities, such that there is no need for new mitigations. This will be confirmed as part of the final NRA.
- 6.2.3 More frequent inspections of the wharf infrastructure may be recommended, together with training and familiarisation program for the new CO₂ and container activities.

7 Conclusion

7.1 Navigation Assessment

7.1.1 Based on the traffic baseline assessment (Section 3.2), the number of vessel movements in the Humber Estuary and the River Trent has significantly decreased in the last 20 years. Vessel movements in the River Trent dropped from 2,500 to 1,000 between 1999 and 2019, while vessel movements at Flixborough Wharf dropped from 450 to 300.

7.1.2 There is an increase in vessel movements associated with the import of fill material at construction phase (2022-2026). This has been estimated to represent between 4 and 16 additional vessel movements at the wharf per month and a maximum total of 80 vessel movements per year.

7.1.3 Vessel movements expected during the operational phase (in addition to baseline traffic) are described below according to the proposed river activities:

- offloading of containerised waste (RDF): approximately 350 vessel movements per year
- loading of empty containers: Same vessels as the ones bringing containers
- offloading of bulk materials: approximately 180 vessel movements per year; and
- loading of Carbon dioxide (CO₂): approximately 50 vessel movements per year

7.1.4 The combination of all the new activities would result in 580 additional vessel movements at the wharf per year, nearly 50 additional vessel movements per month. This represents a significant increase of nearly 200% at Flixborough Wharf (compared to the 305 movements in 2019).

- 7.1.5 Based on the capacity assessment presented in the preliminary NRA, the increase of vessel movements during the operational phase can be accommodated at Flixborough Wharf with the existing two berths available. However, some changes may be required at the wharf in terms of handling operations (loading/ offloading materials), so that vessel rotation can be fastened and enable vessels to leave within one day. Operating hours might also need to be extended from 12hr to 24hr during peak periods to accommodate the higher demand and increase vessel capacity.
- 7.1.6 Considering the traffic baseline, and the historic traffic in the Humber Estuary and the River Trent, it is considered that the navigation impact of the river freight associated with the Project will be limited and that total vessel movements will remain within a level which has already been experienced in the 1990's.
- 7.1.7 ABP and RMS Ports have been consulted on multiple occasions for this report. ABP will follow closely the evolution of the traffic and assist RMS Ports in ensuring safe navigation in the project area.

7.2 Risk Assessment

- 7.2.1 Hazards, their consequences and their probability of occurrence, have been assigned in a risk assessment table (Appendix E), in line with ABP guidelines. No major changes to navigational risk have been identified and the previously identified risk control measures are considered appropriate to reduce risks to a level that can be considered As Low As Reasonably Practicable (ALARP).
- 7.2.2 Additional risk control measures are not envisaged at this stage, considering that there are no changes to the existing wharf/ berths. Existing control measures implemented by ABP and RMS Ports might only require minimal adjustments for the new CO₂ and container activities, such that there is no need for new mitigations. This will be confirmed as part of the final Navigation Risk Assessment. More frequent inspections of the wharf infrastructure may be recommended, together with training and familiarisation program for the new CO₂ and container activities.

8 References

Port Marine Safety Code, DfT/MCA Nov 2016

A Guide to Good Practice on Port Marine Operations, DfT/MCA Feb 2018

International Maritime Organisation (IMO) Guidelines for Formal Safety Assessment (FSA) – MSC (Maritime Safety Committee)/Circ. 1023 (IMO, 2002)

Humber Passage Plan, 2008

ABP Marine Policy, 2018

NLGEP TN Vessel Traffic Assessment 01_Final, Buro Happold, February 2021

Outline Construction Logistics Plan, Buro Happold, 2021

Transport Flow Diagram Assessment, Buro Happold, 2021

Appendix A – Minutes of Meetings

A.1 Meeting 1

Minutes

Subject North Lincolnshire Green Energy Park Job no 0046658
Place Teams Call Date 14 January 2021
Present Andrew Firman (AF) – ABP Apologies
Jonathan Ogilvie (JO) – BH
Distribution As above

Objective of meeting: To discuss the vessel movement information ABP had provided prior to the meeting

Item	Action
1.0 Introduction	
1.1 JO outlined to AF the reason for the call was to discuss the data ABP had provided via email and to obtain some further clarification in order to allow BH to determine the number of vessel movements that could occur in the River Trent.	
1.2 AF highlighted that he was slightly concerned with providing too much information as he did not want ABP's data to be used to determine a business case. JO assured AF that the vessel movements are to determine a possible "worst case" from an environmental perspective such as assessing noise and air.	
2.0 Vessel movements	
2.1 Discussion on the possible additional vessel movements that could take place within the River Trent associated with the Flixborough Wharf and agreed that the maximum number of vessel movements during high tide is two vessel sailing in to arrive at the wharf and two vessels departing the wharf and sailing downstream to the Humber.	
2.2 AF highlighted that there will be numerous operational aspects that could mean this scenario may not occur every time. JO acknowledged this but clarified that this would still in theory be the maximum and AF agreed.	
2.3 JO queried if the River Trent was two way or single traffic, AF confirmed that it is two way.	
2.4 AF provided further information on when vessels would need to depart / sail into the river and suggested it would be a window around 2 hours of high tide, with the departing vessel most likely requiring to depart first. AF felt there is sufficient time for the required vessel movements, i.e. two in 2 out.	
2.5 JO asked if AF could provide some guidance on the typical vessels that operate to determine a suitable standard vessel that could operate at the	

wharf. AF suggested a couple of vessels but it was agreed that "Fast Jef" was the best example of a bulk carrier (sea snake) with dimensions of:

- Length of 87.94m
- Beam of 12.9m
- Draft of 4.8m (loaded)
- DWT of 3,180

Post meeting note: JO obtained vessel specification for Fast Jef from the following website link: [REDACTED]

- 2.6 JO outlined his thoughts on how best to calculate the total number of vessel movements to determine the possible percentage increase in vessel movements due to the project. By using the maximum two in two out during spring high tides and assuming unloading/loading could take place prior to the next high tide. Then use the ratio between vessel movements during spring and neap tides to apply a reduction to consider the possible limitations in access during the lower neap high tides. Then use the total of 800 vessel movements in a year to determine the percentage increase of vessel movements due to the project. AF had no objections to the method.
- 2.7 AF suggested contacting RMS Ports for further detail around the operations at the port for unloading and loading timings.

3.0 Other

- 3.1 AF confirmed if further discussions are required it is best to arrange a call.
-

The minutes detailed herein reflect the author's recollection of the discussions held during the meeting detailed above. If you feel that these minutes are inaccurate; proposed additions, corrections and/or comments must be submitted to the author in writing within five working days of the date of these minutes. If no written responses are received within this period, these minutes will be deemed the official record of the meeting.

A.2 Meeting 2

Minutes

Subject	ABP and RMS Ports Meeting Minutes	Job no	0046658
Place	Virtual	Date	17 February 2021
Distribution	Andrew Firman (AF) (ABP) Ben Brown (BB) (ABP) Gavin Hindley (GH) (RMS Ports) Richard Thompson (RT) (RMS Ports) Gabriella Panteli (GP) (BH)	Time	15:00

Objective of meeting: To review and agree the marine traffic assessment technical note produced by BH and next steps for the preliminary navigation risk assessment

Item	Action
1.0 Introduction	
1.1 Individuals from ABP, RMS Ports and BH all introduce themselves.	
2.0 Marine Traffic Assessment	
2.1 JO introduces the Marine Traffic Assessment and talks through the main sections:	
<ul style="list-style-type: none"> • JO confirms Tide levels direct extraction from ABP charts dated 27 October 2020. • JO talks through input data used in the assessment as provided by ABP via previous correspondence. Highlighting that the assumption is 2 vessels can arrive and 2 vessels depart the wharf per spring high tide as a maximum operation. Acknowledging that there is likely a reduction in vessel movements during the neap tides and used the ratio given from ABP for their total vessels arriving at Flixborough over a year during spring and neap tides to identify the number of vessel movements during a neap tide. • JO confirms agreement of FAST JEF used as a general design vessel and explains its characteristics, including 4.65m loaded draught. The technical note identifies the average and maximum sized vessels operating on the River Trent; maximum being 99m LOA and 5.5m draught. AF and GH commented that the southern berth can accommodate the 5.5m draught but that northern berth has a lower draught capacity which is approx. 80cm less than the southern berth. BH to add text to TN. AF confirms it is theoretically possible to get 2 vessels in and 2 out of the wharf on every tide but that this is unlikely to work in practice. • JO presented assumed tidal curve using the "rule of 12" indicating the possible operational window available at Flixborough Wharf. AF 	BH

explained this is not realistic for Flixborough and the **Ebb has a usual duration of 9-hours, with a 3-hour flood; therefore, a much narrower operational window at the berth. Essentially only 2 hours of window each tide.** BH to update the tidal section of the note accordingly based on this information.

BH

- RT explained it is hard to quantify what you can and cannot do with regards to vessel movements but reiterates the quick flood window. GH highlights that you **could not fit 2 x 99mLOA vessels on the berths at the same time. Currently, RMS work on the basis of allowing for a total 180m length at the berths at any one time.**
- JO confirms we are looking at theoretical worst case. AF understands that if this note is only on an environmental basis and predicting a potential worst case and agrees that is ok. JO confirms the note highlights it is not to be used as an example of the proposed operations at the wharf.
- JO highlights it would be helpful to receive guidance on what would be realistic in terms of the available operational window at Flixborough. GH or BB will send link to website (EA) which shows river levels and how it floods and ebbs just up from Flixborough.
- **AF explains departure can occur 2 hours before high tide and arrive 1 hour before high tide. Although vessels typically arrive half an hour before the high tide. Essentially, the vessels depart from the wharf before the arrival of the new vessels.** Clarification that if you miss the tide, you've missed it. BH to update penultimate bullet point in section 5.3 of the TN to reflect bold statement above regarding minimum navigable window.
- JO talks through assessment approach and results of calculations.
- GH clarifies that **they are allowed to operate 24hrs a day, the only restrictions is on loading/unloading of pig iron (once a month due to noise).** Business case is 24hr operation is not needed at the moment. JO and GP to update paragraph above table 6-1 regarding reasons behind choosing a 12-hour operational window, rather than a 24hr.
- AF highlights need to consider other vessels operating along the Trent, you cannot think of Flixborough in isolation. ABP will look at the potential capacity of the river Trent based on previous experiences on the Trent. GH says 1996/1997 was probably the busiest year. BB will provide some data of busiest years. JO confirms it would be helpful to have the current baseline (already provided by ABP to BH), and also maximum capacity (example being one of the busiest years).
- All agree that the additional vessel movements for the 12hr operations detailed in the TN should be taken forward for assessment. BH to update TN and address comments.
- BB highlights 5.5m might not be max draught on all tides. JO says we will make this clear and look into this in the NRA.

RMS

BH

BH

ABP

3.0 Preliminary NRA

3.1 General approach

	<ul style="list-style-type: none"> • AF makes BH aware there is already an NRA for the River Trent and entire Humber, although it is generic in nature. BB will provide BH with the NRA documentation along with information from the pilot handbook. • ABP clarified that they cannot provide any commercial support that would lead to a business case relating to vessel operations at Flixborough as part of the proposed project. • AF advises that as RMS Ports as the operators of the Port are best placed to assist with the NRA although noted ABP are happy to provide assistance with the NRA. • JO confirms he believes the berth extension is not currently part of the scheme. • JO says the NRA will focus mainly on navigation risk assessment and vessel movements. AF says as there is no proposal to increase the maximum vessel size/draught and not altering the wharf it should be fairly simple – only change is the increase in vessel numbers. • JO asks for any templates or additional supporting documentation that might assist in developing the NRA further. Highlighting that some of the information will come from the example NRAs to be provided by ABP. • JO confirms that BH won't be looking at any simulation modelling. • Vessel types might not feed in as might not be defined at this stage. 	ABP
3.2	<p>Required data – incident records, vessel movement data</p> <ul style="list-style-type: none"> • JO to email what data BH requires and ABP will provide. For example 5 years of incident records. 	BH and ABP
3.3	<p>Operational timings at wharf</p> <ul style="list-style-type: none"> • JO asks about unloading, mooring times etc, indicating the possible risks of missing a tide. RT explains unloading time varies massively on the commodity being handled, noting that containers are quicker to unload. GH states some vessels are in and out in 12 hours, some maybe days. Depends on commodities, some are weather dependant and cannot be discharged in certain conditions. GH will email a general note on mooring/un-mooring times. RT highlighted timings can also depend on the crew. AF says mooring and unloading times should only refer to time around high water as previously mentioned. It is agreed by ABP and RMS that mooring times should not be considered in detail, instead the following thoughts should be used; departure can occur 2 hours before high water to high water and arrival can occur 1 hour before high water to high water. GH and RT will speak and get back to us after if anything more. 	RMS RMS
3.4	<p>Hazard workshop</p> <ul style="list-style-type: none"> • JO explains a hazard workshop is usually involved with all parties to confirm the hazards and potential risks and mitigations associated for each identified risk. RMS and ABP both confirm they are happy to attend the workshop and complete the process in a collaborative way. 	
3.5	<p>Timeframes</p>	

- JO says draft of NRA needed for middle of April. A lot of information should be available and should be possible given the development is only increasing volume of vessel movement.

4.0 AOB

- AF highlights that the risk of different cargo types and their characteristics could create potential issues. JO to highlight this with wider project team; can produce some mitigations against this.
- GH and RT will digest the TN and information from the meeting and respond via email to BH with any additional points.

BH

RMS

A.3 Meeting 3

Minutes

Subject	North Lincolnshire Green Energy Park meeting with ABP	Job no	0046658
Place	Teams call	Date	11 March 2021
Distribution	Ben Brown (ABP) Andrew Firman (ABP) Jonathan Ogilvie (BH) Fabien Loy (BH) Gabriella Panteli (BH)	Time	13:00

Objective of meeting: To discuss the data and information requested by BH to ABP to assist in developing the preliminary Navigation Risk Assessment

Item	Action
1.0 Introduction	
1.1 Individuals from ABP and BH all introduce themselves.	
1.2 JO explains the aim of the call today; to review and talk through the RFIs and ensure ABP are happy with the approach taken in the preliminary Navigation Risk Assessment (NRA) and the data used within it.	
2.0 Navigation Risk Assessment	
2.1 AF confirms that ABP have their existing NRAs in place and would not adjust them in light of the increase in vessel numbers proposed at Flixborough Wharf. This would only be the case if there were a change to the wharf itself. AF highlights that the increase in vessel movements in and out of Flixborough Wharf would have more importance to RMS Ports and their operations.	
2.2 JO highlights that BH have requested information from RMS Ports too.	
2.3 JO – As we are preparing a preliminary NRA, we will not be detailing the change in vessel types linked with the new proposed activities. At the wharf the NRA will only mainly be looking into potential striking of the structure. AF agrees this will be a main hazard to assess. JO - as a final NRA is developed more details might be captured. It is noted that most required information for the preliminary NRA is in the Risk Assessments (Ras) provided by ABP already.	
3.0 Request for information	
3.1 BH then ran through the spreadsheet detailing the RFIs for ABP.	

- Ref 1: AF suggests it is too much information to include the type of cargo and vessel characteristics. BH and ABP agree average size and maximum vessel size has already been provided by ABP. JO highlights we are looking at overall operations along the river and that is why it would be helpful to understand the different cargo types. AF says there are a couple of tankers, general cargo (steel, timber) but explains that in ABP's records the vessel type will only come up as 'general cargo' and they do not hold data related to the type of cargo being transported. JO suggests that we agree to only use data up to end of 2020 within the NRA. BB and AF agree.
- Ref 2: JO explains that BH have AIS data from the MMO for the year 2015 that could be used to give an indication of vessel tracks and movements. AF explains it would be extremely challenging for ABP to obtain this information and only hold up to 3 months of AIS data. Agreed by ABP that BH suggestion to use readily available AIS data from the MMO for the year of 2015 will provide sufficient detail and will be useful for giving perspective in the report. ABP do not think density maps will provide much value to the NRA and do not think they are need. JO queries how the 2-way traffic, previously mentioned, works. AF explained the current operations are that the incoming and outgoing vessels sail in convoy with the majority of vessel passing occurring between mouth of the River Trent and Burton Stather. On a normal tide, outgoing vessels leave 2 hours before high tide, inbound come in an hour before high tide. Inbound will pass outbound somewhere between Flixborough and the mouth of the Trent.
- Ref 3: AF says information on the vessel movements for the busiest two weeks and slowest two weeks of a typical year in the Trent is unknown. FL notes that dates are available in the overall vessel movement spreadsheet ABP has previously provided. Agreed that BH could look at using that information to determine approximate vessel movements during a busy and slow period. AF – ABP could look at general spring/ neap numbers if required. It is queried if COVID has impacted vessel movements. AF – no major impact of COVID to vessel movements.
- Ref 4: ABP have provided a spreadsheet with the vessel movements from previous years. FL queries the reasons for the drop in vessel movements. AF and BB note that the information shows a decrease in vessel movements over the recent years which is thought to relate to economic situations and has been observed across the overall area not just the Trent. AF highlights vessel movements have decreased from around 21,000 movements down to 14,000 for the whole estuary.
- Ref 5: ABP has provided the vessel incident data from 2016 to 2020 for both the Humber and Trent. AF confirms that ABP does not have the information in a suitable format to extract and present spatially. FL highlights that the RAs provided by ABP include information on latest incident related to that hazard and a general location. AF confirms that having discussed everything that will be included in the NRA, they are happy with level of detail and the information BH current has and what will be presented.

BH

ABP

- Ref 6: ABP do not record information around visibility along the Trent but AF notes that the Trent valley can be subject to fog. ABP suggest that BH could look to obtain that from an external party such as the local airfield who may hold meteorological information. AF notes that ABP do not think the information overly critical for inclusion in the preliminary NRA. AF and BB confirm that the general distance between vessels is 1 mile (8 cables) and can be 50 - 100m apart when passing. JO queries the sailing speed. AF advises it is between 6 and 10 knots.
- Ref 7: Baseline meteorological and oceanographic conditions requested by BH. AF response similar to Ref 6; ABP do not have this data. JO states that it would be interesting and helpful to understand the currents around bends. AF explains that experience ABP believe the current speeds can be between 0-5 knots but will try to only navigate the river when the current is between 0-3 knots. Noting that mooring operations could take place during current speeds of 5 knots.
- Ref 8: JO – are there any plans for maintenance dredging of the Humber or the Trent? AF – no dredging in the river way or navigable channels, however ABP are aware that some dredging of berth pockets take place. AF - the dredging is undertaken by the operators and believe RMS Ports have undertaken dredging through the use of a tug and levelling bar at Flixborough Wharf and suggest BH obtain further details from RMS Ports.
- Ref 9: JO - What is the situation with AtoN and lighting from the estuary to Flixborough? Are you looking at making changes in near future? ABP will provide relevant charts and a list of lights with lats and longs to BH. ABP is not aware of any major plans to alter the existing AtoN but note changes can be on a need basis/maintenance requirement. With regards to potential light pollution from the development ABP would advise on making sure the lights from the development point away from River. ABP would have discussions around this at planning stage to ensure they were happy.
Post meeting note: Charts and list of lights has been provided
- Ref 10: JO - Are there specific areas with high risk of grounding or collisions on the way to Flixborough? Narrow points / wrecks / high number of ships? JO highlights that recent bathymetry did not show anything. AF –Spatial records are not kept, but from experience the most frequent area for grounding is at the entrance to the River Trent. There are no known wrecks. The anchorage on the west bank was for recreational craft but ABP try to discourage the use of this anchorage as in general vessel try to sail to east side of Island Sand but sometimes, they need to sail on the west through the anchorage.
- Ref 11: JO - are there recreational uses along the river, can they represent a risk of collision? AF - the River Trent is generally used for commercial shipping and observing a recreational craft is the exception. It is worth highlighting that at Keadby lock there is an entrance to the Canal and River Trust waterways. ABP's general advice is that recreational craft should only use the waterway outside of the commercial river operation times i.e. around high tide. The impact to recreational craft is not thought to be an issue for this NRA. BB highlights that he has maybe seen 2 recreational crafts

BH

BH

ABP

along the Trent in years working on the Trent. FL specifically asked about rowing, AF and BB confirm it does not take place.

- Ref 12: JO – what are the existing vessel traffic management/ existing control measures used by ABP as a standard? PTS Humber are an information service only on that section of the River. VTS uses channel 15 for the Humber but is an information service only. The Trent Inter-ship channel is 17 and vessel will do regular all ship calls to inform of their location and movements along the Trent.
- Ref 13: JO - What is the Trent River strategy in regard to dealing with shipping hazards, do you have a Safety Management Plan? AF – it is believed the RAs already provided by ABP provide the relevant information, noting that there is an overarching general Safety Management System for the Humber, but it is generic.
- Ref 14: JO - Are pilotage services compulsory to reach Flixborough Wharf? Where do pilots get onboard / exit? Both directions? AF – any vessel with a length of 60m or more requires a pilot for all operations.
- Ref 15: JO - Are you aware of new planned maritime operations / wharfs opening or expanding in the area? AF - no new infrastructure that ABP are aware of.
- Ref 16: JO - Vessel speeds have been mentioned previously.
- Ref 17: JO – is there a defined navigation channel along the Humber or Trent? There is a navigation channel but due to the changing nature of the Riverbed it is not clearly defined and changes weekly, from the Humber Bridge to Trent the navigation channel can be amended fortnightly. Whereas, the River Trent is surveyed every 2-3 months, so the navigation channel is updated on this basis, so not as frequently.

4.0 Additional Queries

- 4.1 FL – Are there additional mitigation measures that need considering as part of the present RA exercise or just the existing control measures? AF – additional measures not really needed if we are not changing the design of the wharf/ berths. AF - risk is deemed acceptable, such that there is currently no need for new mitigations.
- 4.2 FL – Any additional risk associated with the new Cargo or container ships? JO suggests that there may be issues around visibility and manoeuvrability. JO highlights that BH will look at specific commodities being shipped such as a typical coaster vessel bringing in containers – could lead to these risks. AF agrees that these risks should be considered. AF – Hazardous cargos would need dealing with locally by berth operator but ABP would need to know.
- 4.3 FL – Highlights that there are possible proposals during the construction phase to bring in the new crane by boat. Is it worth highlighting as a different phase? Have cranes been brought in on the Trent before? AF – notes this has not been done before and he would not recommend it; especially not vertically. AF highlights the high risk of grounding on a vessel and load this size. AF suggests that any vessel suitable to carry a massive crane, should not be taken down the Trent; so not recommended. Stating the ABP work on the

<p>basis of an 20cm underkeel clearance (UKC) and this is unlikely to be met in this case.</p> <p>4.4 FL – confirms that the risk of mooring breakout should be one to be considered. AF – reiterates that risk of breakout would be one of the biggest worries if you were changing/ adding a berth. Breakouts are real issues on the Trent, due to tidal bores. Important that the vessels stay where they are at Flixborough; AF suggests discussing with RMS.</p> <p>4.5 FL – should we include capsizing as a risk? JO suggests that the hazards could be scored by BH and checked through with ABP. AF and BB agree. This hazard would be scored lowly.</p> <p>4.6 FL – should we include the risk of fire and explosion. AF - ABP do have fire and explosion as a general RA, just not specific to Trent. BB will send this over.</p> <p><i>Post meeting note: ABP has provided the additional RAs</i></p> <p>4.7 FL – should a fuel spill be considered as a risk? AF – No, this can be viewed more as a consequence of a hazard. AF highlights that the Trent is covered by ‘Humber Clean’ mitigation for any oil spills.</p>	<p></p> <p>BH</p> <p>ABP</p>
<p>5.0 AOB</p> <p>5.1 JO – As discussed previously, BH will go through the exercise of scoring the hazards, then will organise a workshop to check through with both RMS and ABP. AF and BB confirm they are happy with this approach. It is suggested for the last week of March – on the 25/26th, with the RA being sent at the beginning of the week. Time will be agreed over email.</p>	<p>BH</p>

The minutes detailed herein reflect the author’s recollection of the discussions held during the meeting detailed above. If you feel that these minutes are inaccurate; proposed additions, corrections and/or comments must be submitted to the author in writing within five working days of the date of these minutes. If no written responses are received within this period, these minutes will be deemed the official record of the meeting.

A.4 Meeting 4

Meeting:

Marine Traffic Assessment RFIs – Meeting with RMS Ports and Solar 21

Date:

26/03/21 10:00-11:00

Attendees:

Gavin Hindley – GH (RMS Ports)

Andrew Bradley – AB (Solar 21)

Colin Hammond – CH (Solar 21)

Neil Wright – NW (Solar 21)

Jonathan Ogilvie – JO (BH)

Gabriella Panteli – GB (BH)

Fabien Loy – FL (BH)

Colin Byrne – CB (BH)

**Items discussed:**

1. Introduction

- All parties introduce themselves and explain what aspect they are involved in.
- JO explains the purpose of the meeting; to run through the Requests for Information (RFIs) with RMS Ports to help complete the Marine Traffic Assessment and the Preliminary Navigation Risk Assessment (NRA).

2. RFIs

- Ref 1 – JO requests RMS to provide records of Wharf operations over the last 2 years, including vessel types, numbers, ship dimensions and cargo type. GH confirms he sent the Maritime Statistics for the last 3 years to BH prior to the meeting which includes all of this information. FL confirms receipt and will share around BH.
- Ref 2 – JO requests confirmation on the arrangements for loading/ unloading equipment along with the average time taken per ship depending on cargo type. GH – The average vessel at Flixborough Wharf handles ~3,000 tonnes. For steel this can take up to 2 days to unload, whereas for bulk material it takes typically 1 day for the same tonnage. The density of cargo varies, for bulk material it is typically between 0.3t/m³ and 2t/m³. The unloading times are based on the present working hours of 06:00 to 18:00 but it is noted that the wharf can be open and operated 24/7 other than for pig iron which must not be managed past 23:00. GH notes that the new crane's lift speed will reduce the loading/ unloading time.
- Ref 3 – JO queries the future plans of the wharf in terms of crane numbers and capabilities. GH - Based on the new crane arriving and the blue gantry crane having been decommissioned there will be 3 cranes operating at the wharf. The cranes are made up of 2 crawler cranes which are capable of handling steel, bulk and bailed RDF; with the new tracked crawler crane being able to handle everything including containers. The new crane has a fast lift speed and once fitted with a container beam (to be purchased) will be able to move a container in approx. 2-3min/cycle. This rate of unloading is possible even when the tide is low (with vessels sitting on the river bed) as long as the berths are dredged accordingly (which it is) and the correct equipment is used. Containers could be

unloaded in approx. 3 hours but due to the tidal constraints the vessel will stay alongside until the next high tide (approx. 9 hours later). With regards to BH's assuming 80 TEU per vessel in average, this seems to make sense but would need clarifying at a later stage once agreements with shipping companies have been made.

- Ref 4. JO asks about the wharfs' usual operating times and queries whether operations could occur at night. AB explains there is a general agreement that the wharf does not currently operate at night as there is currently no need for it. GH – the usual operational day is 06:00 to 18:00. There is a gentlemen's agreement with locals that there will be no work at night, but this relates specifically to the unloading of PIG Iron which occurs on a monthly basis. There is no formal planning restriction to the wharf and RMS are able to operate 24/7. GH explains that the current operation times are currently sufficient but based on the new development and potential increase in tonnages to handle, RMS Ports anticipate that the wharf may have to operate 24hr per day. As an example, in a 10hr shift approx. 300,000 tons of material is handled per year noting that some of this will also be steel which requires 2 days to unload. It is noted that the new crane will have a quicker operating time although JO highlights that there are still tidal constraints limiting vessel movements. The wharf has previously operated 24h a day/ 7 days a week (up to 1997) and can operate at that level again if the business case requires it. CH notes that at that time, the wharf was handling 600,000 tonnes a year and they could have handled more.
- Ref 5. JO asks what the situation is with AtoN and lighting at the wharf, querying whether the wharf will be well equipped and visible under strong fog? JO highlights ABP have shared that there could be some risk of fog limiting navigation. GH – RMS Ports do not monitor the weather, however when dense fog occurs the pilots will turn around halfway between the mouth of the Trent and the Humber Bridge. The estimated frequency of this occurring is approx. 2-3 times per year. GH highlighted that the fog has to be very dense to affect navigation. CB highlights that BH have done a lighting survey. FL – will there be needs for more lighting going forward as the gantry crane is removed? GH - RMS Ports are in the process of replacing lights at the end of the wharf to compensate for the lights on the gantry crane which is being decommissioned, the other cranes all have their own lights. The update to lights on wharf does not need to be consented providing they do not shine out over the river.
- Ref 6. JO asks if a maintenance plan exists for quay walls/ river structures detailing the frequency of inspections and if there are any maintenance operations planned in the near future? GH – the end of the quay wall is currently being repaired by EA which are likely to be completed in the next 2 weeks. The EA are responsible for maintaining the height of the quay as it sits below the flood risk level and is a potential flood risk, the current repairs are a like for like repair. A survey of the underside of the wharf is conducted every 2 years to monitor the status of the wharf with ad hoc repairs taking place when needed. JO and CB agree it would be good to see this. RMS Ports will submit the latest survey report (completed about 2 years ago) to BH for their consideration. FL queries if a structural assessment has been considered with the new crane? GH - with the new crane arriving a structural assessment of the wharf has taken place based on the maximum lifting weights for the crane ground loadings for the worst-case scenario.
- Ref 7. FL queries if there are hazardous materials/ products used on site or on ships passing by? Do they present a health and safety risk at all? GH confirms that nothing dangerous is handled at the wharf. GH – all cargo types are listed in the Maritime Statistics.
- Ref 8. JO asks if briefings, trainings or notices are given to shipmasters before they get to the wharf? GH confirms that prior to arrival at the wharf, every vessel is sent a documentation pack which includes notice to mariners with everything they need to be aware of regarding wharf operations. GH sent this to FL prior to the meeting.

- Ref 9. JO queries if departing and berthing manoeuvres are deemed difficult and if they depend on tides and currents at all? JO queries if there is additional vessel support when they come alongside? GH confirms that vessels use their own bow thrusters and do not need tugs. GH confirms all vessels arrive with a pilot, RMS Ports is not aware of any issues. Prior to arrival the vessel wait on anchor at spur point and the vessels are then called in via an automated system to direct them to the appropriate berth based on their draft / length. JO - ABP mentioned currents could be up to 5knots currents and that can be manoeuvred in at the wharf. GH notes that current speeds are not within RMS Ports remit.
- Ref 10. JO asks if there is a safety management system in place? GH – yes there is, will email this information over to BH.
- Ref 11. What local emergency response documentation/ emergency procedures are in place? GH – RMS Ports have their own complete management system. JO requests the reference to these documents for BH to include in the NRA. GH will provide these.
- Ref 12. JO queries if RMS Ports have a marine control centre with a dedicated dockside marine manager and VHF channel to manage the berthing and departure of vessels? GH explains ABP are the Harbour Master that control the vessel movements to the wharf through their own control centre. Once the vessel is at Flixborough wharf, RMS Ports communicate directly with the vessel using VHF radio in order to coordinate all the subsequent operations (mooring, unloading cargo etc.). Which channels to be used and the procedures are provided to the vessel in the documentation pack mentioned in Ref. 8
- Ref 13. What is the frequency of the 99m LOA vessel that moors at the wharf? GH - Vessels of 99m length arrive occasionally approx. 15 times a year. An example of a frequent vessel of this size is "RMS DUISBURG". The wharf can accommodate 180m of vessels with a 6-8m distance between vessels, noting that the wharf can handle more than 180m but that would be more challenging. GH notes that the vessels on the south berth can overhang off the back. Due to the close proximity between vessels, strong currents and large tidal amplitude it is very important that the vessels monitor their mooring lines correctly.
- Ref 14. CB – what logistics space does the wharf require to operate? considering reception space, laydown, storage etc? CB notes that the design is evolving and changing but they can consider RMS Ports’ preferences. GH will take the opportunity to think more on this topic. GH highlights only welfare offices need to be onsite accommodating around 20 people (it is suggested the staff working on the wharf could have facilities located where the existing workshop and sub-station are) and admin staff could be located within the new admin building outside the wharf. GH notes steel facilities already has a mess room. It was noted that the current operations have the trucks arriving via Stather Road and turning down fourth avenue then left onto First Avenue before accessing the wharf and that the trucks can be held at First Avenue. Noting that further consideration needs to be given to the weight bridge and access gate requirements, but initial thoughts are that this could be at First Avenue for RMS Ports to manage the security access to the wharf. GH - with regards to laydown space etc. as much as possible space available. GH requests the present layout for the development so he can review the information and provide a suitable response – BH to send after approval from Solar 21.
- Ref.15. CB – what are the requirements for staff/ operator vehicle parking? GH confirms admin staff would be a maximum of 15 parking spaces.
- Ref 16. FL – would it be feasible to bring fill material via the river to site during construction? GH confirms that this is absolutely feasible, highlighting the close proximity of the wharf to the new development.
- Ref 17. JO – Does dredging take place in berth pockets? ABP said that side casting and levelling via a levelling bar is used. JO looks for confirmation that this approach is correct?

GH confirms that this is correct and explains due to it being such a strong tidal river there is only a requirement to level the material. GH confirms the methods used are either side casting with a grab and dropping the dredging material into the navigation channel allowing the tide/current to disperse the material or via levelling using a levelling bar off the back of a tug being dragged along the river bed to mobilise the material. The material in the berth pockets is made of very soft mud. The side casting takes place every 6 weeks and levelling bar approx. twice a year. As the material is not being removed from the river no licence is required – can see easily be checked by looking how the ships are sitting.

- Ref 18. FL – are there any key hazards related specifically to the operations at the wharf? ABP mentioned the main hazards in the Trent may be grounding or mooring lines break out. GH – only real hazard that could occur is if the vessels do not pay attention to their mooring lines then during a flood tide if a vessel passes in proximity it can cause vessel mooring lines to break.

3. Summary

- All parties confirm no other business.

Summary of actions:

1. FL to share information provided by RMS Ports to wider BH
2. BH to send present layout for the development to RMS Ports for their review and consideration of logistics space
3. GH to send BH the references to the Safety Management Systems and Emergency Response documentation
4. GH to send BH the Documentation of the Wharf Inspection 2 years ago
5. BH to finalise RFIs document and Minutes and send to all parties

Changes to the DCO:

A.5 Meeting 5

Meeting:

Preliminary NRA Hazard Risk Assessment Workshop – Meeting with ABP (Associated British Ports)

Date:

21/04/21 14:30

Attendees:

Jonathan Ogilvie (BuroHappold - BH)
Gabriella Panteli (BH)
Fabien Loy (BH)
Andrew Firman (ABP)
Ben Brown (ABP)

**Items discussed:**

- Introduction

- FL introduces the aim of today's meeting; to talk through the Risk Assessment (RA) and get agreement on the risks included and method used.

- Risk Assessment Spreadsheet

- FL introduces the RA - talks through the introduction page and risk scoring and the references page - key risks, collisions. Notes BH have categorised ABP's risks and causes from their RA's to simplify the method in the main table. FL shows the main table - following ABP's scoring so ends up with same scoring.
- FL asks if the format of the main RA spreadsheet is ok or if it needs to be broken down more or summarised? AF queries who the audience is. JO explains that the Preliminary NRA will be submitted to PINS, supporting the PIER as part of the DCO application process. The statutory authorities will all receive this document and come back with stakeholder comments (from ABP and possibly the MMO). JO notes that we would not expect many comments from MMO as the proposals are only to increase vessel movements, not alter the wharf. AF recommends that changes should be made due the BH RA having direct similarities and references to ABP's risk assessments. AF recommends that BH remove the initial reference tab and refine the listing of causes. AF and BB agree that the spreadsheet needs some work making it more relevant to Flixborough Wharf, highlighting that the current RAs produced by ABP are quite general with some items applicable, and some not so relevant. JO queries that because there are pilots operating along the Trent, is it not the ABP documentation that needs to govern? AF suggests that the ABP RAs could be submitted as appendices and then BH's RA can be more specific to the wharf. BH and ABP agree that the BH RA should be more specific to the wharf and can just reference the ABP RAs for the more general risks. It could be included in the Preliminary NRA report that the RA has aimed to align to ABP's general RA for the Humber. It is agreed that the screenshots and methodology will be removed from the Introduction page of the spreadsheet and the RA will be tailored for the wharf.
- FL talks through the risks that are included to discuss with ABP whether these are relevant to the wharf and which risks should be focused on more and elaborated on. AF – ranging is a very important hazard to include at Flixborough Wharf due to the constraints in length

at the wharf depending on the combination of different lengths of vessels. AF recommends removing the risk of shift berth to berth as this is not a risk relevant to the wharf. It is noted by ABP that sinking and capsizing is a risk that is high for Flixborough given the draft limitations and the need for frequent dredging/ levelling in the berth pocket. AH notes that there are no navigation buoys at Flixborough therefore striking with a floating object could be removed as a risk. Alternatively, it could be kept in with the risk being low for this item.

- JO highlights to ABP that the Client is looking to offload liquid CO₂ at the wharf. This would represent approximately 26 vessels a year if it happens. JO notes that this is not classed as handling dangerous goods but queries whether it should be included as a risk. AF suggests noting that the RA is based on current cargo in the Preliminary Risk Assessment. JO notes that some text should be included in the Preliminary NRA noting that the document is preliminary, and a full NRA will be required which would need to look more at cargo specific risks once certain project assumptions are confirmed.
- AF recommends writing out the causes and consequences in full rather than numbering them as previously done. AF agrees that they can review the updated RA once BH have made it more specific to Flixborough Wharf.
- FL asks ABP if they agree with the following approach: as long as the hazard scores below 6, that there are mitigations in place and that we don't need to include additional mitigations. ABP agree.
- FL highlights that within the NRA there is an assumption that there will be some vessels under the construction phase. AF said that this is unlikely to increase vessel numbers by much so can add that there is no extra risks associated with the construction phase. JO suggests that within the report, it can be explained the difference between the construction and operational phase, but that risks are assessed in the same way in the RA.
- The risk of visibility and windage of container ships was raised. JO highlighted that BH spoke with RMS Ports and agreed that for the design vessel (FAST JEF), there would be a limit of 80 containers per vessel instead of the 140 they could carry. AF suggests adding a hazard around the visibility of container ships, explaining that containers in the hold is not an increased risk but too high on deck creates added risks such as containers falling off the boat during the event of grounding or reduces pilot visibility.
- **Conclusions**
- BH to update the RA and send to ABP for comments before a final call to review. ABP do not require a draft of the NRA report.

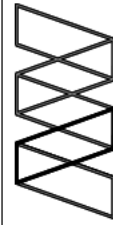
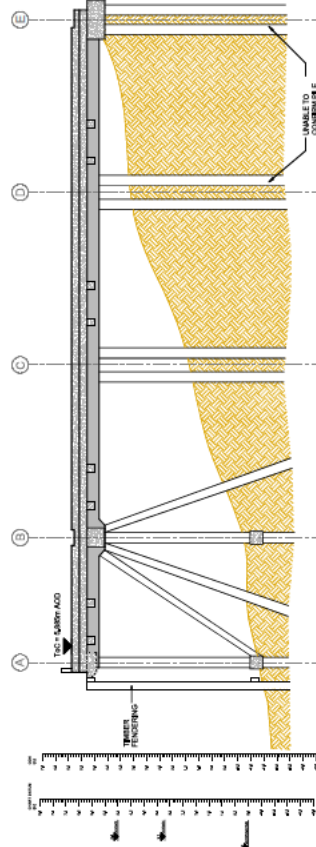
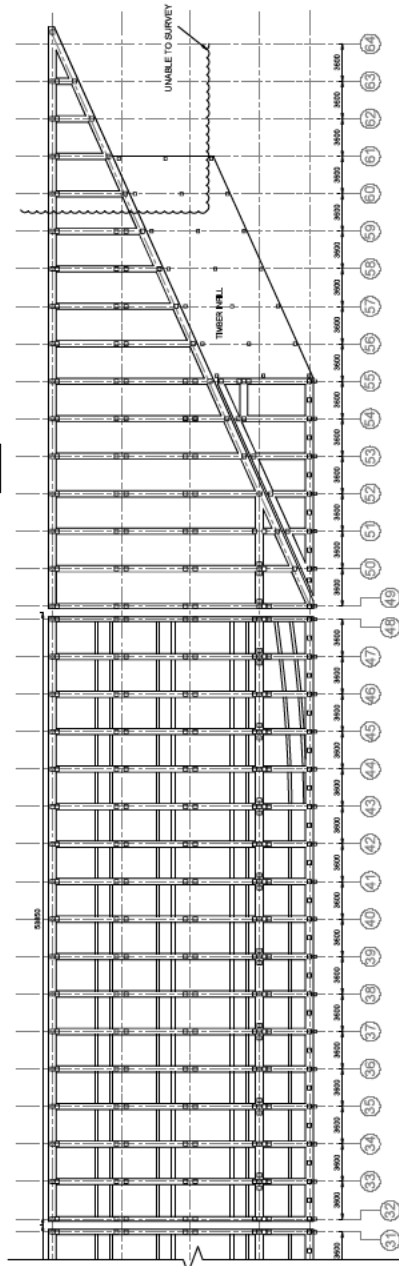
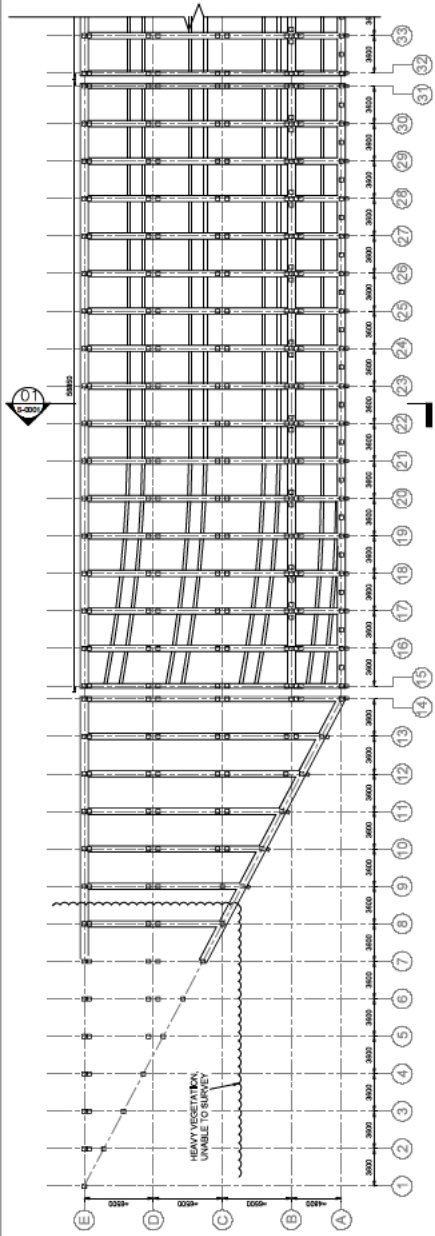
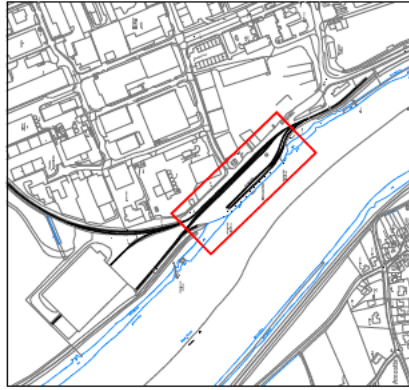
Summary of actions:

1. BH to update the RA document in light of ABP comments
2. BH to send a copy of the updated RA to ABP
3. ABP to comment on the RA and have a meeting after to discuss as required

Changes to the DCO:

N/A

Appendix B – Wharf Drawings



Alan Wood & Partners
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Project Managers
Building Surveyors

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Project	CONDITION SURVEY: FLXBROUGH WHARF, SCUNTHORPE					
Client	RMS TRENT PORTS LTD					
Design	GA PLANS OF EXISTING WHARF					
DWG	SURVEYOR					
CHKD	WORK IN PROGRESS					
DATE	38870					
Project	Originator	Value	Level	Type	Risk	Number
FWS - AWP	- 00 - GF	- DR	- S	- 0001		

Appendix C – Requests for Information

C.1 Requests for Information – ABP

Request for information ABP					
Ref.	Query	Format	Date Request	ABP Response	Date Response
1	Please provide vessel movements at the wharf with description on vessel type, cargo and number of vessels, vessel dimensions for the last 2 years.	Excel table / graphs	25.02.2021	ABP have provided the average and maximum vessel size in length and note that in ABP's records the vessel type will only come up as "general cargo" and they do not hold data related to the type of cargo being transported	11.03.2021
2	What is the best way to obtain Automatic Identification System (AIS) data for the Trent River? Have you already processed this data recently? Can you please provide?	Please advise on available formats	25.02.2021	It would be extremely challenging for ABP to obtain this information and only hold up to 3 months of AIS data. BH suggestion to use readily available AIS data from the MMO for the year of 2015 will provide sufficient detail. ABP do not think density maps will provide much value to the NRA. The current operations are that the incoming and outgoing vessels sail in convoy with the majority of vessel passing occurring between mouth of the River Trent and Burton Stather.	11.03.2021
3	What are the vessel movements for the busiest two weeks and slowest two weeks of a typical year in the Trent River and at Flixborough Wharf?	Excel table / plans from AIS	25.02.2021	This level of information unknown, it is noted that dates are available in the overall vessel movement spreadsheet ABP previous provided and that BH could look at using that information to determine approximate vessel movements during a busy and slow period.	11.03.2021
4	Please advise on the estimated capacity for the Trent River based on busiest year in term of number of vessels?	text / Excel table	17.02.2021	ABP have provided a spreadsheet with the vessel movements from previous years, noting that the information shows a decrease in vessel movements over the recent years which is thought to relate to economic situations and has been observed across overall area not just the Trent	24.02.2021
5	Please provide incident records for the last 10 years describing incident types, location and Severity for the area of waterway shown in the proposed extent to be reviewed under the preliminary NRA	Excel table / shapefile / plans from AIS	25.02.2021	ABP has provided the vessel incident data from 2016 to 2020 for both the Humber and Trent. ABP does not have the information in a suitable format to extract and present spatially. Noting that the RAs provided by ABP include information on latest incident related to that hazard and a general location	09.03.2021
6	Please describe typical visibility in the area (especially Trent River)? What is the minimum distance / time required between ships? Do you have a set "peak capacity" traffic limit?	text / plans	25.02.2021	ABP do not record this type of information but note that the Trent valley can be subjected to fog. ABP suggest if BH require the information then they could look to obtain it from an external party such as the local airfield who may hold meteorological information. But note that ABP do not think the information overly critical to the preliminary NRA. The general distance between vessels is 1 mile (8 cables) and can be 50 - 100m apart when passing	11.03.2021
7	Could you describe the baseline meteorological and oceanographic / river conditions / currents / wind / fog etc.	text / Excel table / graphs / plans	25.02.2021	ABP do not have this data, see above response to item 6. From experience ABP believe the current speeds can be between 0-5 knots but will try to only navigate the river when the current is between 0-3 knots. Noting that mooring operations could take place during current speeds of 5 knots.	11.03.2021
8	What is the usual observed situation with siltation/sedimentation rates? Are there plans for maintenance dredging of the Humber estuary or Trent River or future capital dredging?	text / plans	25.02.2021	No dredging will take place within navigable channel, however ABP are aware that some dredging of berth pockets take place. The dredging is undertaken by the operators and believe RMS Ports have undertaken dredging through the use of a tug and levelling bar at Flixborough Wharf and suggest BH obtain further details from RMS Ports.	11.03.2021

Request for information ABP					
Ref.	Query	Format	Date Request	ABP Response	Date Response
9	What is the situation with AtoN and lighting from the estuary to Flixborough? Are you looking at making changes in near future? Would you recommend some improvements in the Trent River?	text / plans	25.02.2021	ABP will provide relevant charts and a list of lights with lats and longs to BH. ABP is not aware of any major plans to alter the existing AtoN but note changes can be on a need basis/maintenance requirement. With regards to potential light pollution from the development ABP would advise on making sure the lights from the development point away from River. Subsequent information to be provided by ABP	11.03.2021
10	Are there specific areas with high risk of grounding or collisions on the way to Flixborough? Narrow points / wrecks / high number of ships?	text/ plan	25.02.2021	Spatial records are not kept, but from experience the most frequent area for grounding is at the entrance to the River Trent. There are no known wrecks.	11.03.2021
11	What is the situation with recreational boats? Can they represent a risk of collision? How is their number evolving?	text	25.02.2021	The River Trent is generally used for commercial shipping and observing a recreational craft is the exception. It is worth highlighting that at Keadby lock there is an entrance to the Canal and River Trust waterways. ABP's general advise is that recreational craft should only use the waterway outside of the commercial river operation times i.e. around high tide. The impact to recreational craft is not thought to be an issue for this NRA.	11.03.2021
12	What are the existing Vessel Traffic Management and Local VHF procedures along the Trent River? Any documentation available?	text	25.02.2021	VTS uses channel 15 for the Humber but is an information service only. The Trent Intership channels is 17 and vessel will do regular all ship calls to inform of their location and movements along the Trent.	11.03.2021
13	What is the Trent River strategy in regards to dealing with shipping hazards, do you have a Safety Management Plan? Please provide existing NRAs applicable for the study area or nearby?	text	25.02.2021	It is believed the RAs already provide by ABP provide the relevant information, noting that there is a overarching general Safety Management System for the Humber but it is generic.	11.03.2021
14	Are pilotage services compulsory to reach Flixborough Wharf? Where do pilots get onboard / exit? Both directions?	text	25.02.2021	Any vessel with a length of 60m and greater are required to have pilot for all operations	11.03.2021
15	Are you aware of new planned maritime operations / wharfs opening or expanding in the area?	text	25.02.2021	ABP is not aware of such works	11.03.2021
16	What are the speed restrictions in the Trent River?	text	25.02.2021	Vessel speeds in the Trent are 6 - 10 knots	11.03.2021
17	Is there a defined navigation channel along the Humber or Trent River?	text / plans	25.02.2021	There is a navigation channel but due to the changing nature of the River Bed it is not clearly defined and changes weekly, from the Humber Bridge to Trent the navigation channel can be amended fortnightly. Whereas, the River Trent is surveyed every 2-3 months so the navigation channel is updated on this basis, so not as frequently.	11.03.2021
18	Is the anchorage in the River Trent near the mouth to the Humber used?	text / plans	11.03.2021	The anchorage is for recreational craft but ABP are try to discourage the use of this anchorage as in general vessel try to sail to east side of Island Sand but sometimes they need to sail on the west through the anchorage.	11.03.2021
19	Can you confirm that the scores in the ABP risk assessment process already include the control measures in place?	text	11.03.2021	Yes, they do. Considering the unchanged wharf configuration, ABP do not consider the need for further mitigation measures to be introduced or mentioned in the RA.	11.03.2021
20	In terms of hazards to be assessed, most are already included in the RAs shared by ABP. Do you think we should consider sinking/ capsizing in the Trent? Do you think we should add "fire/explosion" as a hazard and potentially "fuel spill/ pollution" as well?	text	11.03.2021	ABP advised that ranging (mooring breakout) would be the key hazard for any new berth (not the case here), and that sinking/ capsizing as well as fire/explosion should be considered. ABP have got general RA about that which they have agreed to share. "Fuel spill/ pollution" is seen more as a consequence than an actual hazard.	11.03.2021

Request for information ABP					
Ref.	Query	Format	Date Request	ABP Response	Date Response
21	Do you anticipate any issue with new proposed wharf activities and cargo?	text	11.03.2021	No, not really, apart maybe potentiall visibility issues caused by stacking containers too high. Ships should therefore limit container levels.	11.03.2021
22	Have you ever seen large operating crane or other abnormal loads being transported on the river before? To understand if we need to create a separate "construction phase" in our RA table.	text	11.03.2021	Abnormal loads do not come via river in the Trent as these specific carrier vessels are too large for the river and draughts are not within the 20cm underkeel clearance so there is an increased risk of grounding and the potential issues with listing once alongside at wharfs during unloading and changes in tides and the vessels touching the river bed. ABP did not recommend abnormal loads coming via the river and. They can therefore be discarded from the RA assessment.	11.03.2021
23					

C.2 Requests for Information – RMS Ports

Request for information - RMS Ports					
Ref.	Query	Response Format	Date Request	RMS Ports Response	Date Response
1	Please provide records of Wharf operations over the last 2 years: vessel types, numbers, ship dimensions, cargo etc.	Excel table / graphs	25.02.21	RMS have sent BH the Maritime Statics for the last 3 years which includes information on vessel name, type, and cargo	26.03.21
2	Wharf operations: could you describe loading / unloading equipment arrangements and processes and the average time required per ship depending on cargo?	text / table	25.02.21	The average vessel at Flixborough Wharf handles approx. 3,000 tonnes. For steel this can take up to 2 days to unload, whereas bulk material is typical 1 day for same tonnage. The density of cargos varies, for bulk material it is typically between 0.3t/m3 and 2t/m3. The unloading times are based on the present working hours of 06:00 to 18:00	26.03.21
3	What are the future plans in terms of crane number and capabilities? Will they be able to handle containers/ RDF? How many of them?	text	22.03.21	Based on the new crane arriving and the blue gantry crane having been decommissioned there will be 3 cranes operating at the wharf. The cranes are made up of 2 crawler cranes which are capable of handling steel, bulk and bailed RDF; with the new tracked crane being able to handle everything including containers. The new tracked crane has a fast lift speed and once fitted with a container beam (to be purchased) will be able to remove a container in approx. 2-3min/cycle. With containers potentially arriving via the river this is possible even when the tide is low and the vessel is sitting on the river bed as long as the berths are dredged accordingly (which it is) and the correct equipment is used there should be no issue with lift etc. noting that containers could be unloaded in approx. 3 hours but due to the tidal constraints the vessel will stay alongside until the next high tide (approx. 9 hours later). With regards to BH's assuming 80 TEU per vessel this seems to make sense but would need clarifying at a later stage once agreements with shipping companies have been made.	26.03.21
4	What are the ports usual operating times? Could operations occur at night? Is sailing safe at night?	text	25.02.21	Average day is between 06:00 to 18:00. There is a gentlemen's agreement with locals that there will be no work at night but this relates specifically to the unloading of PIG Iron which occurs monthly. Noting there is no formal planning restriction to the wharf and they are able to operate 24/7. Based on the new development RMS Ports anticipate that the wharf will have to operate 24hrs. As an example in a 10hr shift approx. 300,000 tons of material is handled per year noting that the some of this will also be steel which requires 2 days to unload. The wharf has previously operated 24h a day/ 7 days a week (up to 1997) and can operate at that level again if the business case requires it.	26.03.21
5	What is the situation with AtoN and lighting at the wharf? Is the wharf well equipped and visible in fog / darkness? Please provide drawings indicating the location of navigation lighting	text / plans	25.02.21	RMS Ports do not monitor the weather, however when dense fog occurs the pilots will turn around halfway between the mouth of the Trent and the Humber Bridge. The estimated frequency of this occurring is approx. 2-3 times / year. RMS Ports are in the process of replacing lights at the end of the wharf to compensate for the lights on the gantry crane which is being decommissioned, the other cranes all have their own lights. The update to lights on wharf does not need to be concerted (except with neighbour across the river).	26.03.21
6	Does a maintenance plan for quay walls / river structures detailing the frequency of inspections exist? Are there any maintenance operations planned in near future?	text	25.02.21	The quay wall is being presently being repaired by EA which are likely to be completed in the next 2 weeks. The EA are responsible for maintaining the height of the quay as it sits below the flood risk level and is a potential flood risk, the current repairs are a like for like repair. A survey of the underside of the wharf is conducted every 2 years to monitor the status of the wharf with ad hoc repairs taking place when needed. RMS Ports will submit the latest survey report to BH for their consideration. With the new crane arriving a structural assessment of the wharf has taken place based on the maximum lifting weights for the crane ground loadings for the worst case scenario.	26.03.21
7	Are there hazardous materials / products used on site or on ships passing by?	text	25.02.21	Nothing dangerous is handled at the facility, reference to the Maritime Statistic already provided	26.03.21
8	Are briefings, training or notices given to ship masters / bridge operators before they get to the wharf?	text	25.02.21	Prior to arrival at the wharf every vessel is emailed a documentation pack which includes notice to mariners and instructions on wharf operations etc. this information pack has been sent to BH for their review	26.03.21

Request for information - RMS Ports					
Ref.	Query	Response Format	Date Request	RMS Ports Response	Date Response
9	Are departing and berthing manoeuvres deemed difficult? Do these manoeuvres depend on tides and currents?	text	25.02.21	All vessels arrive with a pilot, RMS Ports is not aware of any issues. Prior to arrival the vessel wait on anchor at spur point and the vessels are then called in via an automated system to direct them to the appropriate berth based on their draft / length	26.03.21
10	Is there a Safety Management System meeting the PMSC requirements in place? Please describe.	text	25.02.21	Yes, RMS Ports will provide the information to BH	26.03.21
11	What local emergency response documentation, emergency procedures are in place? Please describe.	text	25.02.21	Yes, RMS Ports have their own management system which they use at the wharf. RMS Ports will provide the reference to these documents for BH to include in the NRA.	26.03.21
12	Do you have a Marine Control Centre with a dedicated dockside marine manager and VHF channel to manage the berthing and departure of vessels? Please describe.	text	25.02.21	ABP as the Harbour Master control the vessel movements to the wharf through their own control centre. Once the vessel is at Flixborough wharf RMS Ports communicate directly with the vessel using VHF radio in order to coordinate the all subsequent operations (mooring, unloading cargo etc.). Which channels to be used and the procedures are provided to the vessel in the information pack as mentioned in item no. 8	26.03.21
13	Frequency that a 99m LOA vessel moors at the Wharf	text	25.02.21	Vessels of 99m length arrive occasionally approx. 15 times a year. An example of a frequent vessel of this size is "RMS DUISBURG". The wharf can easily accommodate 180m of vessels with a 6-8m separation between the vessels, noting that the wharf can handle more than 180m but that would be more challenging. Due to the separation of the vessels and tides it is very important that the vessels monitor their mooring lines correctly	26.03.21
14	What logistics space does the port require to operate (reception space, laydown, storage, amenities etc)	text	22.03.21	RMS request the present layout for the development so they can review the information and provide a suitable response. Noting that the current operations have the trucks arriving via Stather Road and turning down fourth avenue then left onto First Avenue before accessing the wharf. Noting that the trucks can be held at First Avenue. With regards to the buildings it is thought that admin staff could be located within the new admin building (TBC) and the staff working on the wharf could have facilities located where the existing workshop and sub-station are. Noting that further consideration needs to be given to the weight bridge and access gate requirements but thoughts that this could be at First Avenue for RMS Ports to manage the security access to the wharf. With regards to laydown space etc. as much as possible space available	26.03.21
15	Please confirm any requirements for staff/operator vehicle parking.	text	22.03.21	Admin staff will require 15 parking spaces. 20 stevedores need suitable facility space and parking spaces.	26.03.21
16	Would it be feasible to bring fill material via to the river to the site during the construction	text	26.03.21	Yes it would be feasible to bring fill material via the wharf, noting the close proximity of the wharf to the new development	26.03.21
17	Does dredging take place at the berth pockets? If so, how and what is the frequency? Is permission required?	text	26.03.21	Dredging does take place in the berth pockets but the material is not physical removal from the river. The methods used are either side casting with a grab and dropping the dredging material into the navigation channel allowing the tide/current to disperse the material or via levelling using a levelling bar off the back of a tug being dragged along the river bed to mobilise the material. The material in the berth pockets are very soft mud. The side casting takes place every 6 weeks and levelling bar approx. twice a year. As the material is not being removed from the river no licence is required	26.03.21
18	Are there any key hazards related specifically to the operations at the wharf?	text	26.03.21	If the vessels do not pay attention to their mooring lines then during a flood tide if a vessel passes in close proximity it can cause vessel mooring lines to break	26.03.21

Appendix D – Transport Flow Diagram

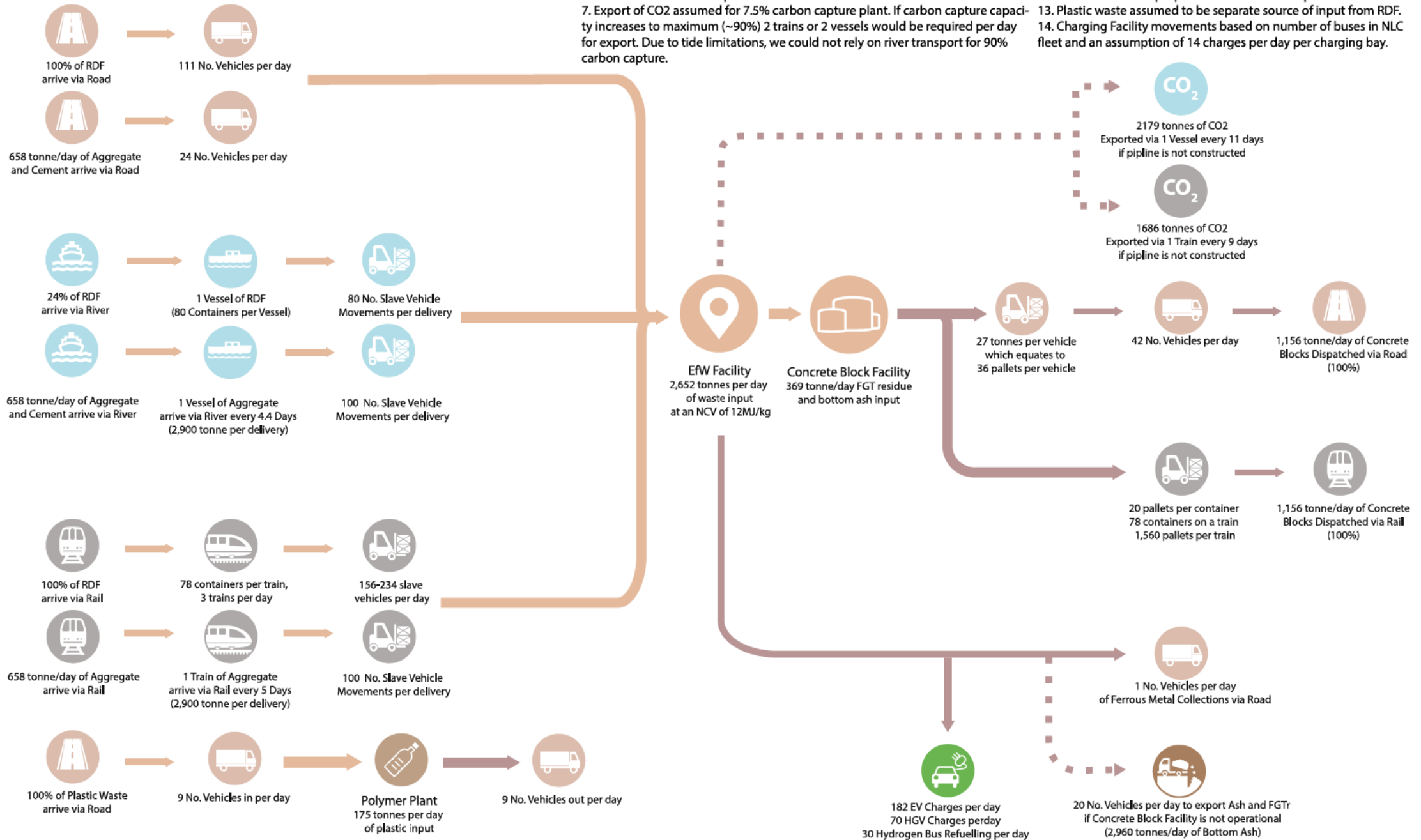
NLGEF Input/Output System Diagram – Assessment Scenario

2 Vessel In, 2 Vessel Out (1 same, 1 different vessel)

144 Vehicles In, 52 Vehicles Out (same vehicles)

3 Trains In, 1 Train Out (same train)

282 Charging Facility Movements



The below diagram is based on the following assumptions:

- Shipping vessel specification based off MV FAST JEF. This vessel has an assumed typical / average container capacity of 80 TEU.
- 20ft container volume assumed to be 33m³
- RDF density assumed to be 387kg/m³
- Operation hours of the port/railhead assumed to be 7am to 10pm.
- Tides limit number of vessels to 2 per day.
- Vessel which offloads RDF is unlikely to export CO2 or concrete blocks. Additional vessel needed to export CO2.
- Export of CO2 assumed for 7.5% carbon capture plant. If carbon capture capacity increases to maximum (~90%) 2 trains or 2 vessels would be required per day for export. Due to tide limitations, we could not rely on river transport for 90% carbon capture.

8. CO2 storage provided at port to allow buffer between what is collected and what can be exported via river per day.

9. Train offloading time assumed to be 3.5 hours.

10. 5 days of aggregate storage has been provided at the concrete block facility. Which allows for aggregate delivery every 5 days.

11. If aggregate is delivered via river, RDF cannot also be delivered via river on that day due to tidal constraints.

12. Train could be configured to deliver RDF and aggregate on same train. For assessment purposes assumed to be separate trains.

13. Plastic waste assumed to be separate source of input from RDF.

14. Charging Facility movements based on number of buses in NLC fleet and an assumption of 14 charges per day per charging bay.

Appendix E – Preliminary Navigation Risk Assessment

Project: North Lincs Green Energy Park
 Subject: Preliminary Navigation Risk Assessment
 Doc Name: Hazard Risk Assessment
 Job No: 0046658

BURO HAPPOLD

Revision	Prepared by	Checked by	Date
1	PL	JD	4/26/2021

Hazard No.	Hazard Title	Hazard Details	Cause	Most Likely Consequence	Worst Credible Consequence	People (Most Likely)			Port Business (Most Likely)			Overall (Most Likely)	People (Worst Credible)			Port Business (Worst Credible)			Property (Worst Credible)	Overall (Worst Credible)	Overall	Control Measures							
						Likelihood	Severity	Score	Severity	Score	Severity		Score	Severity	Score	Severity	Score	Severity					Score						
1	Roughing (at wharf)	Mooring breakout	-adverse tide/ current conditions -adverse weather/ wind conditions -changes in riverbed levels at berth - uneven -failure of berth mooring systems -communication failure -draught - incorrectly advised -failure of wharf infrastructure or equipment -vessel breakdown/ defect -failure to comply with shore-side or vessel procedures -human error/ non attendance of line handlers -inadequate maintenance/inspection of mooring lines -designated berth unavailable	Vessel breakout from tidal river berth. No injuries. Minor damage to mooring equipment. No pollution. Minor disruption to Terminal operators and port business.	Derivation to port business and terminal operations.	Probably	Cat 0	0	Cat 0	0	Cat 0	0	Cat 1	3	1,20	Unlikely	Cat 4	6	Cat 4	6	Cat 4	6	Cat 4	6	4,00	3,84	-suitable allocation of berths -communications - what for ship -training of wharf operators & ship personnel -line/boom - available and suitably qualified -pilgrage directions -compliance with Hunter passage plan & regulations -accurate tidal information -accurate hydrographic information - latest survey data available -suitable mooring equipment & layouts -accurate draught, declared and within max limits		
2	Shift Berth to Berth	Project vessels shift berth to berth in tidal river, without letting go or using tug	-adverse tide/ current conditions -adverse weather/ wind conditions -changes in riverbed levels at berth - uneven -failure of berth mooring systems -communication failure -draught - incorrectly advised -failure of wharf infrastructure or equipment -vessel breakdown/ defect -failure to comply with shore-side or vessel procedures -human error/ non attendance of line handlers -inadequate maintenance/inspection of mooring lines -inadequate training/competence/bridge resource management	Vessel encounters difficulty during manoeuvre, operator is regained with no consequential injury, damage, pollution or effect on port business.	Vessel breaks away during manoeuvre. Major injury or single fatality, causing moderate damage to vessel, other vessels or infrastructure. Pollution requiring limited outside assistance. Moderate effects on port business.	Occasionally	Cat 1	2	Cat 0	0	Cat 0	0	Cat 0	0	1,20	Occasionally	Cat 3	6	Cat 2	4	Cat 2	4	Cat 2	4	5,25	3,25	-suitable allocation of berths -communications - what for ship -training of wharf operators & ship personnel -line/boom - available and suitably qualified -pilgrage directions -compliance with Hunter passage plan & regulations -accurate tidal information -accurate hydrographic information - latest survey data available -suitable mooring equipment & layouts -accurate draught, declared and within max limits		
3	Collision ship-ship	Project Cargo (A Containers to General Cargo (B Containers)	-adverse tide/ current conditions -adverse weather/ wind conditions -changes in riverbed levels -restricted visibility / failure of navigation lighting -failure of AtoN -failure of AIS (equipment or display) -failure of berth mooring systems -failure of wharf infrastructure or equipment -failure of VTS / URS equipment or to comply to instructions -communication failure - equipment (VHF, telephone, etc.) / personnel -master/Pilot exchange - lack of clarity/ failure of understanding -human error & fatigue -failure to follow Passage plan -manoeuvre misjudged -failure to comply with Byelaws/ harbour directions/ local regulations -necessary late amendment of Traffic management plan -inadequate training/competence/bridge resource management -anchored vessel represents a hazard/ vessel obstructing fairway -vessel breakdown/ defect	Minor damage to both vessels. No pollution from bunkers or cargo. No injuries to personnel and minor impact to Port Business	One vessel serious signficant, serious damage caused to 2nd vessel. Minor pollution from bunker tanks and cargo. Potential multiple fatalities and channel blocked for short time with moderate impact on port business.	Unlikely	Cat 0	0	Cat 0	0	Cat 1	2	Cat 1	2	1,20	Very Unlikely	Cat 4	5	Cat 3	4	Cat 2	3	Cat 2	3	4,38	3,84	-AIS coverage & C.C.T.V. coverage -VTS broadcast - navigation and safety information - traffic information -VTS personnel - training and authorisation -training of ship personnel -pilgrage directions -compliance with Hunter passage plan & regulations -accurate tidal information -accurate hydrographic information - latest survey data available -provision & maintenance of Aids to navigation -Passage planning (PMAP/PC) - (VTS/US/PA/VS functions) -cargo and containers do not limit or adversely affect the visibility from the bridge		
4	Collision ship-ship	Project Tanker to General Cargo	-adverse tide/ current conditions -adverse weather/ wind conditions -changes in riverbed levels -restricted visibility / failure of navigation lighting -failure of AtoN -failure of AIS (equipment or display) -failure of berth mooring systems -failure of wharf infrastructure or equipment -failure of VTS / URS equipment or to comply to instructions -communication failure - equipment (VHF, telephone, etc.) / personnel -master/Pilot exchange - lack of clarity/ failure of understanding -human error & fatigue -failure to follow Passage plan -manoeuvre misjudged -failure to comply with Byelaws/ harbour directions/ local regulations -necessary late amendment of Traffic management plan -inadequate training/competence/bridge resource management -anchored vessel represents a hazard/ vessel obstructing fairway -vessel breakdown/ defect	Minor damage to both vessels. No pollution from bunkers or cargo. No injuries to personnel. Minor impact on Port Business	One vessel serious, serious damage caused to 2nd vessel. Significant pollution from bunker tanks and cargo. Possible multiple fatalities. Channel blocked for a short time. Serious impact on port business and reputation.	Unlikely	Cat 0	0	Cat 1	2	Cat 1	2	Cat 1	2	1,75	Very Unlikely	Cat 4	5	Cat 3	4	Cat 3	4	Cat 3	4	Cat 3	4	4,63	3,18	-AIS coverage & C.C.T.V. coverage -VTS broadcast - navigation and safety information - traffic information -VTS personnel - training and authorisation -training of ship personnel -pilgrage directions -compliance with Hunter passage plan & regulations -accurate tidal information -accurate hydrographic information - latest survey data available -provision & maintenance of Aids to navigation -Passage planning (PMAP/PC) - (VTS/US/PA/VS functions) -advance notice of Hazardous cargoes
5	Impact	Impact with Structure	-adverse tide/ current conditions -adverse weather/ wind conditions -changes in riverbed levels -restricted visibility / failure of navigation lighting -failure of AtoN -failure of AIS (equipment or display) -failure of berth mooring systems -failure of wharf infrastructure or equipment -failure of VTS / URS equipment or to comply to instructions -communication failure - equipment (VHF, telephone, etc.) / personnel -master/Pilot exchange - lack of clarity/ failure of understanding -human error & fatigue -failure to follow Passage plan -manoeuvre misjudged -failure to comply with Byelaws/ harbour directions/ local regulations -necessary late amendment of Traffic management plan -inadequate training/competence/bridge resource management -anchored vessel represents a hazard/ vessel obstructing fairway -vessel breakdown/ defect	Minor damage to vessel and/or structure, no injuries to personnel, no pollution, no impact on Port business and reputation.	Serious damage to vessel and structure, multiple fatalities, vessel and installation out of commission for a significant period of time, significant pollution from cargo and bunker tanks, serious damage to Port Business and reputation.	Likely	Cat 0	0	Cat 1	6	Cat 0	0	Cat 0	0	3,75	Very Unlikely	Cat 4	5	Cat 3	4	Cat 3	4	Cat 3	4	Cat 3	4	4,63	4,18	-AIS coverage & C.C.T.V. coverage -VTS broadcast - navigation and safety information - traffic information -VTS personnel - training and authorisation -training of ship personnel -pilgrage directions -compliance with Hunter passage plan & regulations -accurate tidal information -accurate hydrographic information - latest survey data available -provision & maintenance of Aids to navigation -charting of sites and obstructions -Passage planning (PMAP/PC) - (VTS/US/PA/VS functions)
6	Grounding	In tidal river with changing water depths and currents	-adverse tide/ current conditions -adverse weather/ wind conditions -changes in riverbed levels -restricted visibility / failure of navigation lighting -failure of AtoN -failure of AIS (equipment or display) -failure of VTS / URS equipment or to comply to instructions -communication failure - equipment (VHF, telephone, etc.) / personnel -master/Pilot exchange - lack of clarity/ failure of understanding -human error & fatigue -failure to follow Passage plan -manoeuvre misjudged -failure to comply with Byelaws/ harbour directions/ local regulations -necessary late amendment of Traffic management plan -inadequate training/competence/bridge resource management -anchored vessel represents a hazard/ vessel obstructing fairway -vessel breakdown/ defect/ loss of stability	Vessel reflects on the same tide. No damage to vessel. No injuries. No pollution. No damage to Port Business and Reputation.	Unable to refuel on the same tide. Moderate damage to vessel. Channel blocked for a significant period of time. Serious injuries. Minor pollution from bunker tanks and hazardous cargo. Moderate damage to Port Business and Reputation.	Likely	Cat 0	0	Cat 0	0	Cat 0	0	Cat 0	0	5,00	Occasionally	Cat 2	4	Cat 2	4	Cat 2	4	Cat 2	4	Cat 2	4	4,00	3,00	-AIS coverage & C.C.T.V. coverage -VTS broadcast - navigation and safety information - traffic information -VTS personnel - training and authorisation -training of ship personnel -pilgrage directions -compliance with Hunter passage plan & regulations -accurate tidal information -accurate hydrographic information - latest survey data available -provision & maintenance of Aids to navigation -charting of sites and obstructions -Passage planning (PMAP/PC) - (VTS/US/PA/VS functions)

MARINE RISK ASSESSMENT FORM

7	Striking and Capsizing	Underway and at Wharf	<ul style="list-style-type: none"> -ship pitching if berth is not dredged and levelled -adverse tide/ current conditions -adverse weather/ wind conditions -draught incorrectly advised -human error & fatigue -inadequate training/competence/bridge resource management -anchored vessel represents a hazard/ vessel obstructing fairway -vessel breakdown/ defect/ loss of stability 	Minor damage to vessel but salvageable. No injuries to personnel. No measurable impact on pollution. Minor impact on Port Business and Reputation.	Serious damage to vessel or total constructive loss. Multiple fatalities/Serious injuries to personnel. Significant environmental pollution. Moderate impact on Port Business and Reputation.	Occasionally	Cat 0	0	Cat 1	2	Cat 1	2	Cat 1	2	1,75	Very Unlikely	Cat 4	5	Cat 3	4	Cat 3	4	Cat 2	3	4,50	3,19	<ul style="list-style-type: none"> -berth pockets dredged and levelled as all times -emergency plan - emergency services & equipment -AIS coverage & C.C.T.V. coverage -VTS broadcast - navigation and safety information - traffic information -VTS personnel - training and authorisation -training of ship personnel -pilottage directions -accurate draught declared and within max limits -compliance with Hunter passage plan & regulations -accurate tidal information -accurate hydrographic information - latest survey data available -provision & maintenance of Aids to navigation -charting of sites and obstructions -passage planning (Pilot/PC) - (VTS/PS/PAWS function) -Cargo and containers are stored/stacked appropriately with suitable lashing if required
8	Striking	with floating object (Noting no floating objects located between entrance to Trust and Fishbrough Wharf)	<ul style="list-style-type: none"> -adverse tide/ current conditions -adverse weather/ wind conditions -restricted visibility / failure of navigation lighting -failure of AtoN -failure of AIS (equipment or display) -failure of VTS / UPS equipment or to comply to instructions -communication failure - equipment (VHF, telephone, etc.) / personnel -manoeuvring error - lack of clarity/failure of understanding -human error & fatigue -failure to follow Passage plan -manoeuvre misjudged -necessary late amendment of Traffic management plan -inadequate training/competence/bridge resource management -vessel breakdown/ defect/ loss of stability 	Vessel suffers minor dents and scrapes. Floating mark suffers structural damage requiring replacement, no injury to personnel and no pollution. No impact on Port Business and reputation.	Small craft holed and floats prodder on the floating marks mooring chain. Small craft sinks (insurance brooked). Multiple fatalities and minor pollution from holed bunker tank. Moderate impact on Port Business and reputation.	Unlikely	Cat 0	0	Cat 1	2	Cat 0	0	Cat 0	0	1,25	Very Unlikely	Cat 4	5	Cat 2	3	Cat 2	3	Cat 2	3	4,25	3,75	<ul style="list-style-type: none"> -AIS coverage & C.C.T.V. coverage -VTS broadcast - navigation and safety information - traffic information -VTS personnel - training and authorisation -training of ship personnel -pilottage directions -compliance with Hunter passage plan & regulations -accurate tidal information -accurate hydrographic information - latest survey data available -provision & maintenance of Aids to navigation -charting of sites and obstructions -Passage planning (Pilot/PC) - (VTS/PS/PAWS function)
9	Striking	with Moored Ship	<ul style="list-style-type: none"> -adverse tide/ current conditions -adverse weather/ wind conditions -restricted visibility / failure of navigation lighting -failure of AtoN -failure of AIS (equipment or display) -failure of VTS / UPS equipment or to comply to instructions -communication failure - equipment (VHF, telephone, etc.) / personnel -manoeuvring error - lack of clarity/failure of understanding -human error & fatigue -failure to follow Passage plan -manoeuvre misjudged -failure to comply with Byelaws/harbour directions/ local regulations -necessary late amendment of Traffic management plan -inadequate training/competence/bridge resource management -anchored vessel represents a hazard/ vessel obstructing fairway -vessel breakdown/ defect/ loss of stability 	Minor damage to both vessels. No pollution, no injuries to personnel, minor damage to Port Business and reputation.	One vessel sinks, major damage caused to 2nd vessel. Significant pollution bunker tanks and hazardous cargo. Multiple fatalities, moderate negative local publicity and impact on Port Business and reputation.	Likely	Cat 0	0	Cat 1	0	Cat 0	0	Cat 1	0	4,50	Very Unlikely	Cat 4	5	Cat 4	5	Cat 3	4	Cat 2	3	4,83	4,68	<ul style="list-style-type: none"> -AIS coverage & C.C.T.V. coverage -VTS broadcast - navigation and safety information - traffic information -VTS personnel - training and authorisation -training of ship personnel -pilottage directions -compliance with Hunter passage plan & regulations -passage planning (Pilot/PC) - (VTS/PS/PAWS function) -accurate hydrographic information - latest survey data available -provision & maintenance of Aids to navigation -charting of sites and obstructions -Passage planning (Pilot/PC) - (VTS/PS/PAWS function) -suitable mooring equipment & layouts
10	Fire/ Explosion	Underway	<ul style="list-style-type: none"> -leak of the tanks -breakdown/malfunction of wharf equipment -breakdown/malfunction of wharf infrastructure -human error -vessel breakdown/ defect -inadequate maintenance/inspection of vessel -malicious action by external parties 	Vessel suffers minor damage, requires anchorage for repair. Minor or No injuries to personnel, no pollution. Minor loss of revenue.	Vessel suffers serious damage, towage required. Multiple fatalities/Serious injury to personnel. Minor pollution from hazardous cargo/burners. Serious damage to reputation and port business.	Likely	Cat 1	5	Cat 1	5	Cat 0	0	Cat 1	5	5,25	Very Unlikely	Cat 4	5	Cat 3	4	Cat 2	3	Cat 3	4	4,50	4,88	<ul style="list-style-type: none"> -AIS coverage & C.C.T.V. coverage -VTS broadcast - navigation and safety information - traffic information -VTS personnel - training and authorisation -training of ship personnel -emergency plan on board -emergency response centre & coastguards -vessel safety procedures -advance notice of hazardous cargoes
11	Fire/ Explosion	At wharf	<ul style="list-style-type: none"> -leak of the tanks -breakdown/malfunction of wharf equipment -breakdown/malfunction of wharf infrastructure -human error -vessel breakdown/ defect -inadequate maintenance/inspection of vessel -malicious action by external parties 	Vessel suffers minor damage, requires anchorage for repair. Minor or No injuries to personnel, no pollution. Minor loss of revenue.	Vessel suffers serious damage, towage required. Multiple fatalities/Serious injury to personnel. Minor Pollution from hazardous cargo/burners. Serious damage to reputation and port business.	Likely	Cat 1	6	Cat 1	6	Cat 0	0	Cat 1	6	5,25	Very Unlikely	Cat 4	5	Cat 3	4	Cat 2	3	Cat 3	4	4,50	4,88	<ul style="list-style-type: none"> -C.C.T.V. coverage -training of ship personnel -emergency plan (services, equipment) at the wharf -emergency response centre & coastguards -spill contingency plans & vessel safety procedures -pollution response equipment available -advance notice of hazardous cargoes
12	Marine Pollution	Minor Pollution from Ship (Fuel, oil, liquid CO2, bulk materials)	<ul style="list-style-type: none"> -leak of the tanks -breakdown/malfunction of wharf equipment -breakdown/malfunction of wharf infrastructure -human error -vessel breakdown/ defect/ loss of stability -inadequate maintenance/inspection of vessel -fire/ explosion 	Vessel has a minor release of fuel, oil, liquid CO2, bulk material resulting in no injuries to personnel, no or negligible damage to property and no measurable or discernible damage to the ecology of the river (pollution) and no negative publicity or loss of revenue.	Vessel has a major uncontrolled release of fuel, oil, liquid CO2, bulk material. Multiple fatalities. Major damage to property. Major pollution and major negative international publicity.	Probably	Cat 0	0	Cat 0	0	Cat 1	3	Cat 0	0	1,50	Very Unlikely	Cat 4	5	Cat 4	5	Cat 4	5	Cat 4	5	5,00	3,44	<ul style="list-style-type: none"> -AIS coverage & C.C.T.V. coverage -VTS broadcast - navigation and safety information - traffic information -VTS personnel - training and authorisation -training of ship personnel -emergency plan (services, equipment) at the wharf -emergency response centre & coastguards -spill contingency plans & vessel safety procedures -pollution response equipment available -advance notice of hazardous cargoes

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