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ASCO UK LIMITED

**GREAT YARMOUTH SHIP TO SHORE FACILITY
C736 ASSESSMENT**

APRIL 2023

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1 INTRODUCTION

1.1 General

1.1.1 Wardell Armstrong has been commissioned by ASCO Group Ltd to develop a waste storage facility (tank farm) at its 'ship to shore' site on South Denes Road, Great Yarmouth.

1.1.2 This report presents the findings of a containment risk assessment a review of the existing facility along with any recommendations for improvement as required.

1.2 Site Location

1.2.1 The facility is located on the quayside of Great Yarmouth Harbour on the tidal River Yare, South Denes Road, Great Yarmouth NR30 3LX. The NGR for the facility is TG 52665 05690. The location of the site is shown on drawing BM12124-001

1.2.2 Surrounding the site are a mixture of commercial and residential premises. Several environmentally sensitive areas are in the wider geographical area of the site. These receptors include Breydon Water SSSI, North Denes SSSI, residential areas and commercial areas. These are detailed in the Amenity and Accident Risk Assessment.

1.2.3 The River Yare directly borders the facility and the North Sea is some 600m to the East.

1.3 Environmental Setting

1.3.1 Geological information for the site has been obtained from the British Geological Survey website.

1.3.2 There are no groundwater Source Protection Zones within 2km of the facility.

Made Ground

1.3.3 While no intrusive surveys have been carried out at the site, given its previous use, it is reasonable to assume that there is a definite layer of surface and subsurface made ground that was used to construct some of the harbour area. The age and composition of this is unknown.

Natural Superficial Deposits

1.3.4 British Geological Survey records shows that the surface deposits are made up of sand and gravel deposits of Tidal River and Creek sands & gravels.

Solid Strata

- 1.3.5 The bedrock is comprised of Crag Group sand and gravel deposits according to data from the British Geological Survey website.

Surface Water Features

- 1.3.6 The Environment Agency's flood information for planning shows the site to be in a Flood Zone 3 area with a high risk of flooding. This is predominantly from the River Yare that runs north to south along the western boundary of the site.
- 1.3.7 The site is approximately 500m away from the open sea (to the east) and so any tidal events that might cause flooding could affect the site.
- 1.3.8 Apart from the River Yare there are no graded watercourses within 2km of the site. The Yare is classified as "moderate" under ecological and chemical classification.

Other Activities in The Vicinity of The Site

- 1.3.9 There are several discharge consents in the immediate and surrounding area of the proposed facility. Given that the facility will have sealed and impermeable surfaces then the facility will not impact upon these.

2 PERMITTED ACTIVITIES

- 2.1.1 The permit boundary is shown on drawing BM12124-003 and includes the tank farm, all related pipework and an area adjacent to the bund for out loading to road tankers. Five storage tanks are provided with a total storage capacity of 550m³. All tanks will be located within a single bund with a capacity of c. 392m³ that provides sufficient capacity for 110% of the largest tank (c. 177m³) or 25% of the total storage capacity (137.5m³).
- 2.1.2 The site will be operated according to the operator's management procedures and Environmental Management System (EMS) utilising best available techniques (BAT) to reflect best practice and ensure environmental protection.
- 2.1.3 Wastes will arrive on resupply ships. Following checks, the wastes will be offloaded into one of the tanks on site according to its properties. At appropriate times, these tanks will be emptied to road tanker and the wastes removed to appropriately permitted facilities.
- 2.1.4 Wastes will be segregated in terms of their nature and characteristics including hazardous classification or state.
- 2.1.5 The proposed permitted wastes are a known type and composition due to the mature nature of the offshore oil and gas industry however, all appropriate Duty of Care and documentation will be exchanged and appropriately retained at the site in regard to the wastes accepted and dispatched from the site.
- 2.1.6 Due to tide and resupply requirements in the industry ships may arrive at varying times through the day and night. The site will therefore operate and be able to accept waste 24 hours a day, 365 days a year.
- 2.1.7 An appropriately qualified Technically Competent Manager and trained staff will be on site during opening hours and waste deliveries or dispatch to ensure that the site complies with its permit conditions and does not cause pollution. The Technically Competent Manager will be present at the site in line with Environment Agency guidance requirements.
- 2.1.8 All waste storage tanks will have appropriate over-fill alarms and non-return valves fitted.
- 2.1.9 Tanks and pipework will be cleaned and flushed at appropriate times and between waste transfer to prevent the contamination of non-hazardous wastes with hazardous

wastes. The effluent from this cleaning will be collected and removed by tanker to an appropriately permitted facility.

2.1.10 Further information is provided in the Operating Techniques report.

3 RISK ASSESSMENT

3.1 Methodology

3.1.1 Section 2 of the CIRIA C736 “Containment Systems for the Prevention of Pollution” provides guidance for undertaking a risk assessment of secondary and tertiary containment systems.

3.1.2 The methodology assesses the risk of a site, based on a source, pathway, and receptor model to determine the containment classification required.

3.1.3 The assessment classifies the level of risk for the site, based on the nature of the substances used or stored on site (source), the potential routes (pathway) via which a hazardous substance may reach a potential receptor, and the types of receptors that surround the site that could potentially be affected.

3.1.4 The following sections discuss the source, pathways and receptors for the ASCO ship to shore site following the guidance given in the CIRIA C736 document and provide an overall site hazard rating.

3.1.5 A site visit has also been carried out by a competent Civil Engineer the details of which are also presented in Sections 4 and 5 below.

3.2 Source Materials

3.2.1 In the context of Section 2 of the CIRIA C736 “Containment Systems for the Prevention of Pollution” source materials comprise the following.

Substance	Use/source
Hazardous drilling fluids and slops	Offshore oil and gas drilling
Non-hazardous drilling fluids and muds	Offshore oil and gas drilling

3.2.2 The source materials have been assessed to have low, medium, or high risk on Table 1 which can be seen in Appendix 1.

3.3 Pathways

3.3.1 Four main pathways have been considered in this assessment: surface runoff, superficial deposits, the River Yare and the North Sea. These sources have been assessed to have low, medium or high risk on Table 2 which can be seen in Appendix 1.

3.3.2 **Surface Runoff**

3.3.3 Spillages or leakages of contaminants may migrate via simple overland flow by and contaminate nearby receptors directly. Contaminants may preferentially flow into the River Yare and be subsequently transported further from site.

Superficial Deposits

3.3.4 Although the site is underlain by hardstanding, contaminants can potentially flow through any disparities within this layer and into the superficial sands and gravels. The soil could act as a pathway for contaminants to migrate off site.

River Yare

3.3.5 If contaminants reach the River Yare, tidal action will transport contaminants both northwards and southwards, to Breydon Water and the North Sea respectively.

North Sea

3.3.6 Wave and tidal action can transport contaminants to other coastal regions on the east of the UK and potentially further.

3.4 Receptors

3.4.1 All potentially sensitive receptors have been identified and the site operations have been subject to rigorous scrutiny to ensure that all risks have been understood.

3.4.2 Potentially sensitive receptors may include but are not limited to:

- surface water bodies; streams and rivers;
- townships and residential areas;
- industrial estates;
- conservation areas (nature reserves SSRIs, special protection areas).

3.4.3 Potentially sensitive receptors may be impacted by the following activities:

- spillages;
- leakages.

3.4.4 More detail on the potential receptors are given in Table 3.2.

Table 3.2: Potential Receptors Within 2km of the ASCO Waste Transfer Facility			
Receptor	Type of receptor	Direction	Distance from facility
ASCO COMAH installation	Industrial	North	<50m
Harfreys Industrial estate	Industrial	West	660m
Industrial estate	Industrial	North, South and East	<50m – 370m
Shops and retail outlets	Retail	North west	1.12km
Residential housing	Residential	North west	380m
Housing	Residential	North west	1.12km
Housing estate	Residential	North east	330m
Housing estate	Residential	South west and west	276m and 240m
Southtown Common recreation ground	Leisure	West	431m
Kingsgate Community Church	Commercial/ Leisure	West north west	580m
Breydon Water	Environmental	North west	2.7km
Great Yarmouth North Denes	Environmental	North	3.5km
Southern North Sea Special Area of Conservation (Candidate)	Environmental	North East, East, South East	621m
Outer Thames Estuary - Marine Special Protection Area	Environmental	North East, East, South East	621m
Coastal habitat Corton Cliffs	Environmental	South	3.7km

3.4.5 The receptors have been assessed to have low, medium, or high risk on Table 3 which is shown in Appendix 1.

3.4.6 The locations of the receptors are shown on Figures 1 and 2, the receptor numbers are referenced in Appendix 1.

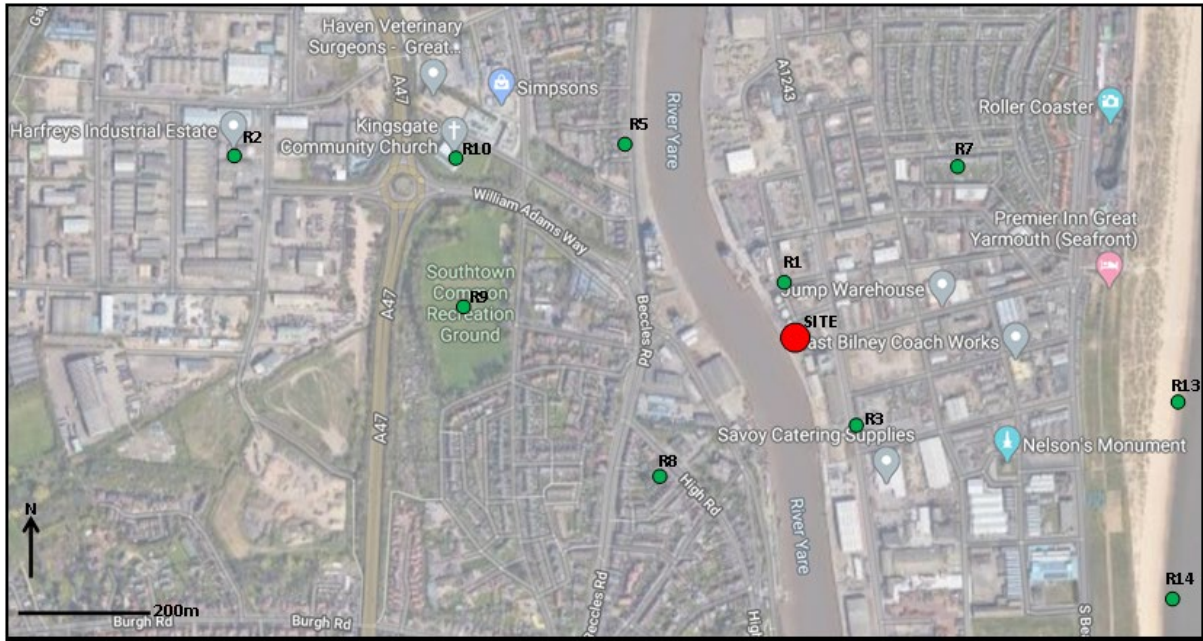


Figure 1. Map showing site location and proximal receptors.

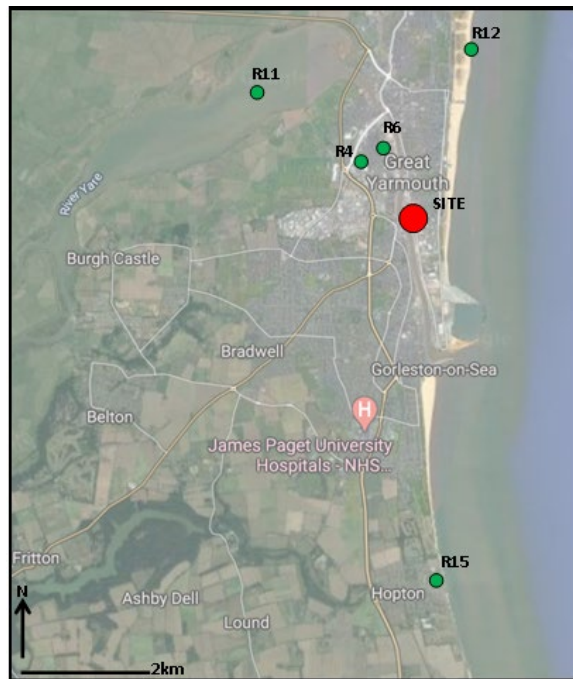


Figure 2. Map showing site location and distal receptors.

3.5 Risk Assessment

3.5.1 As part of the requirements for CIRIA C736 “Containment Systems for the Prevention of Pollution”, (specifically Section 5, Figure 5.1) it is necessary to have a baseline asset schedule in place which is in accordance with the above guidance document. This allows for the class of secondary containment to be determined and compared to the required class for the site. In situations where there is not an existing baseline asset schedule; it is a requirement to obtain information on the infrastructure in place, typically involving a site visit to inspect the site.

3.6 Site Hazard Rating

3.6.1 The site hazard rating has been assessed on Table 4 which can be found in Appendix 1.

3.6.2 The overall site hazard rating is calculated by combining the residual source hazard rating, the pathway hazard rating and the receptor hazard rating.

3.6.3 The worst site hazard rating is assessed to be Low Medium High which gives an overall Site Hazard Rating of Moderate.

3.7 Site Risk Rating

3.7.1 The assessment to calculate the site risk rating is shown in Table 5 in Appendix 1.

3.7.2 Table 5 assessed the following mechanisms which will result in loss of containment:

- fire;
- flooding;
- vandalism;
- harmful gas emissions;
- operational failure;
- earthquakes;
- lightning strikes;
- landslides/land subsidence.

3.7.3 Without control measures the likelihood of these mechanisms occurring is considered from high to low.

3.7.4 Control measures are assessed with a resulting in a residual likelihood rating of Low for each mechanism.

- 3.7.5 This is then assessed against each source and its risk rating to give an overall Site Risk Rating
- 3.7.6 The site has an overall Site Risk Rating of Low.
- 3.7.7 As a result of the site risk being low, a containment type **Class 1** is required (i.e. base level of integrity).

4 REVIEW OF AS-BUILT INFORMATION

4.1.1 Limited as built information was available from the client, The following information was reviewed as part of this assessment:

- Hipwell Consulting inspection report dated 7th September 2010;
- ASCO Drawings 16447 001-004;
- Plandescil Drawing 16447-004 – Storm Drainage – Layout & Emergency Procedure.

4.1.2 Hipwell Consulting Ltd undertook an inspection of the concrete structures in 2010. Their report refers to the proposed tank location as the 'Unused Tank Farm'. Hipwell understood that the eastern side of the southern wall appears to have been built on top of an existing plinth wall. This could therefore be simply dowelled into the existing wall and hence the strength capacity of this section was in doubt. Hipwell recommended additional investigations if this area was to be utilised in the future. It is our understanding that this has not been undertaken. We would recommend that this is assessed to confirm the wall's capability of withstanding forces that would be placed on the wall if the bunded area was to be flooded.

4.1.3 The site has a suitable emergency storm drainage system as shown on Plandescil Drawing 16447-004. Automated shut off valves were installed at all discharge points. These engage if hydrocarbon is detected in the runoff from site preventing contamination entering the River Yare.

5 REVIEW OF AS-BUILT FACILITY

5.1 General

5.1.1 An inspection was undertaken by Wardell Armstrong on the 19th January 2021. This inspection was to allow a full visual check of the As-Built condition of the bund to be carried out, along with a review of the on-site construction details to ensure it aligned with the available As-Built data.

5.1.2 For the purpose of the report the bund construction will be broken down into three specific sections, the walls, the tank bases and the slabs. Each section will detail the overall condition of the construction along with any deviations from the construction drawings.

5.2 Walls

5.2.1 The bund walls have been constructed using reinforced concrete. The walls were generally in good condition.

5.3 All joins and cracks had been sealed using Sikaflex Tank N elastic sealant, a product designed to seal joints exposed to chemicals. This appeared this had been undertaken to a good standard. The sealant joints appeared smooth and were of a consistent width.

5.3.1 It was observed that in isolated areas some chipping to the concrete walls had occurred, typically the chipping was to maximum depth of 20mm and had not exposed any reinforcement. Although not affecting the structural capacity it would be advised to repair these with a concrete repair mortar or similar to ensure long-term that the reinforcement is not affected by a lack of concrete cover.

5.3.2 Overall, the detailing, design and over all condition of the walls is acceptable with the only recommendation being that the localised areas of chipping to the top of the walls be repaired with a repair mortar to stop future issues with reinforcement corrosion.

5.3.3 On the southern wall there was a metal pipe of approx. 150mm in diameter protruding the concrete wall. This would require a blanking flange fitting to the inside flange and the seal on the interface with the pipe and the concrete wall checking.

5.4 Base Slab Tank Plinths

5.4.1 In general, the quality of the bund slab construction was good with a good quality surface finish. Parts of the slab were under surface water at the time of inspection

- 5.4.2 Within the bund there are a series of separate foundation plinths that support the tanks. 2no of the plinths have tanks on them. It is understood an additional 3no tanks will be installed on some of the others. We assume these plinths have been designed as independent foundations and have been designed to support the loadings that will be exerted by the new proposed tanks.
- 5.4.3 WA have not reviewed reinforcing details for these plinth foundations or associated calculations.
- 5.4.4 Vertical settlement may not have an impact on the tank stability or the design of the concrete plinth but it may impact on any pipework connections to the tank, and will also have a significant impact on the suitability of the joint at the interface of the plinths and the bund base slab.
- 5.4.5 Based on the observations made during the site inspection it was apparent that the quality of surface finish to the tank slab and plinths was of a good standard. It was observed that in isolated areas some chipping and historical groves to the concrete had occurred, typically the chipping was to maximum depth of 20mm and had not exposed any reinforcement. Although not affecting the structural capacity it would be advised to repair these with a concrete repair mortar or similar to ensure long-term that the reinforcement is not affected by a lack of concrete cover.
- 5.4.6 No details have been made available for the interface of walls and the tank bases. It therefore cannot be confirmed that there are any hydrophilic strips or hydrophilic coatings between the two surfaces. For the purpose of the report, it will be assumed that there is not.
- 5.4.7 The interfaces between the base slab and plinths have been sealed with a flexible sealant, there did not appear to be any gaps in the sealant at the time of inspection and it appeared to have bonded well to the substrate. Due to the lack of hydrophilic strip regular inspection and maintenance of the sealant will need to be undertaken to ensure the seal is maintained and no pathway for liquids to escape the bund is allowed. This is of particular importance due to the lack of settlement calculations for the plinth foundations.
- 5.5 Bund Sizing
- 5.5.1 Within the information provided to WA there was a calculation that had been undertaken to establish the storage capacity of the bund.

- 5.5.2 The calculations indicate the bund has sufficient capacity and freeboard when considered against the guidelines within CIRIA C736. This needs to be reviewed once the exact dimensions of the tanks have been decided.
- 5.5.3 It is also notable that the rules of C736 and in particular Section 4.2.1 make only nominal allowances for rainwater inclusion in the storage calculations. Should there be a tank failure the process of emptying the bund should be undertaken as soon as practicably possible to avoid over topping of the bund should prolonged period of rain an extreme weather event or a occur.

6 CONCLUSIONS

- 6.1.1 A risk assessment has been undertaken in accordance with CIRIA 736 which concludes that Class 1 containment is required for this site.
- 6.1.2 The overall quality of construction on site appears to be to a good standard. There were minimal defects observed during the site inspection all of which are easily repairable. The reservations Wardell Armstrong have is with the detailing as opposed to the build quality.
- 6.1.3 To allow the bund to be accepted as compliant by Wardell Armstrong the following will need to be confirmed or carried out:
- confirmation that the original designer has considered the lack hydrophilic protection in the depth of the bund base slab joints;
 - confirmation of proposed inspection and maintenance regime for the joint in the base slab to allow for lack of hydrophilic protection;
 - confirmation that the joint detail at the interface of the bund slab and the tank plinths is capable of withstanding the potential plinth settlements;
 - confirmation that repairs to any slab cracking has been carried out;
 - confirmation that the protruding pipe has been sealed;
 - confirmation that the eastern side of the southern wall would be able to support the subjected forces of a full tank.
- 6.1.4 Wardell Armstrong are able to validate the construction of the bund, subject to the responses above, and therefore consider the facility when assessed against CIRIA 736 guidance as having a Class 1 rating i.e. a low site risk rating.

APPENDIX 1

CIRIA Risk Assessment



Item	Source	Description	Risk Rating
S1	Tanks containing hazardous waste fluids from the off-shore oil and gas industry	Hazardous drilling fluids and slops contaminated with hydrocarbons	M
S2	Tanks containing non hazardous waste fluids from the off-shore oil and gas industry	Non-hazardous waste fluids and muds from drilling processes	L



Item	Pathways	Information	Movement	Constraints	Distance from Site (m)	Risk
P1	Surface run-off	Spillages and leakages could migrate from site as simple overland flow following topography	Runoff will follow existing topography of site and transport contaminant to receptors directly. The runoff could travel West and enter the River Yare.	A concrete bund in the form of wall, approximately 1.44m in height will prevent any spillages leaving site. A sealed drainage system is in place and utilised at the site. Only clean rainwater will be discharged from the facility. Spillage kits will be in place and available for use at the site. Staff will be trained in their use.	0m	L
P2	Superficial deposits	The hardstanding on site is underlain by tidal, river and creek sands and gravels	Groundwater flow of contaminants can be facilitated if contaminants migrate and reach superficial deposits.	Hardstanding across the site prevents leaks from reaching superficial deposits	0m	L
P3	River Yare	Spillages and leakages could enter the River Yare as surface run off and further migrate to distant receptors.	The River Yare will transport contaminants approximately 2km south-east from the site and enter the North Sea. The river can also flow northwards due to tidal influence	Concrete bund prevents surface water migrating to river. Flood defences in the form of sheet piled concrete walls prevent the river water from overflowing onto site. A major flood defence improvement scheme is currently underway in Great Yarmouth, with the aim of improving the condition of the existing flood defences and increasing the standard of protection where needed.	20m	L
P4	North Sea	Contaminants may reach the North Sea via the River Yare and further be transported by tidal action.	Tidal/wave action can potentially transport contaminants along the coast to other regions	none	2km (River pathway)	L

Job No. BM12124

Site Great Yarmouth Ship to Shore Facility

Project CIRIA 736 Assessment

Title Table 3: Summary of Potential Receptors



Item No	Receptor	Info	Proximity	Source of Info
R1	ASCO COMAH installation	Industrial	<50m	Accident, Amenity Risk Assessment
R2	Harfreys Industrial estate	Industrial	900m	Accident, Amenity Risk Assessment
R3	Industrial estate	Industrial	<50m – 370m	Accident, Amenity Risk Assessment
R4	Shops and retail outlets	Retail	1.12km	Accident, Amenity Risk Assessment
R5	Residential housing	Residential	380m	Accident, Amenity Risk Assessment
R6	Housing	Residential	1.12km	Accident, Amenity Risk Assessment
R7	Housing estate	Residential	330m	Accident, Amenity Risk Assessment
R8	Housing estate	Residential	276m and 240m	Accident, Amenity Risk Assessment
R9	Southtown Common recreation ground	Leisure	431m	Accident, Amenity Risk Assessment
R10	Kingsgate Community Church	Commercial/ Leisure	580m	Accident, Amenity Risk Assessment
R11	Breydon Water	Environmental	2.7km	Accident, Amenity Risk Assessment
R12	Great Yarmouth North Denes	Environmental	3.5km	Accident, Amenity Risk Assessment
R13	Southern North Sea Special Area of Conservation (Candidate)	Environmental	621m	Accident, Amenity Risk Assessment
R14	Outer Thames Estuary - Marine Special Protection Area	Environmental	621m	Accident, Amenity Risk Assessment
R15	Coastal habitat Corton Cliffs	Environmental	3.7km	Accident, Amenity Risk Assessment

Note. The hazard rating for the receptors has not been assessed in this table as different sources affect the rating produced and is therefore presented in Table 4

Key: Low	Hazard Rating for Source, Pathway & Receptor
Moderate	
High	
Low	Overall Site Hazard Rating
Moderate	
High	



Item	Source	Description	Source Hazard Rating	Existing Source Control Measure	Residual Source Hazard Rating (A)	Relevant Potential Pathways	Pathway Hazard Rating (B)	Existing Pathway Control Measure	Residual Pathway Hazard Rating	Relevant Potential Receptors	Receptor Hazard Rating (C)	CIRIA C732 Overall Site Hazard Rating (AxBxC)	WA Risk Assessment Comments
S1	Tanks containing hazardous waste fluids from the off-shore oil and gas industry	Hazardous drilling fluids and slops contaminated with hydrocarbons	M	Tank within secondary containment bund	L	P1 - Surface Runoff	M	A concrete bund in the form of wall, approximately 1.44m in height will prevent any spillages leaving site. A sealed drainage system is in place and utilised at the site.	L	R1	L	LML	
										R3	L	LLL	
						P2 - Superficial deposits	L	Hardstanding on and around site prevents contaminanets reaching the superficial deptsits	L	R2	L	LLL	
										R3	L	LLL	
										R7	L	LLL	
										R9	L	LLL	
										R10	L	LLL	
										R11	L	LLL	
						P3 - River Yare	M	Flood defences in the form of sheet piled concrete walls prevent the river water from overflowing onto site. A major flood defence improvement scheme is currently underway in Great Yarmouth, with the aim of improving the condition of the existing flood defences and increasing the standard of protection where needed	L	R4	L	LML	
										R5	L	LML	
										R6	L	LML	
										R8	L	LML	
										R9	L	LML	
										R10	L	LML	
						P4 - North Sea	L	none	L	R12	H	LMH	
										R13	H	LMH	
R14	H	LMH											
R15	H	LMH											
R12	H	LLH											
S2	Tanks containing non hazardous waste fluids from the off-shore oil and gas industry	Non-hazardous waste fluids and muds from drilling processes	L	Tank within secondary containment bund	L	P1 - Surface Runoff	M	A concrete bund in the form of wall, approximately 1.44m in height will prevent any spillages leaving site. A sealed drainage system is in place and utilised at the site.	L	R1	L	LML	
										R3	L	LLL	
						P2 - Superficial deposits	L	Hardstanding on and around site prevents contaminanets reaching the superficial deptsits	L	R2	L	LLL	
										R3	L	LLL	
										R7	L	LLL	
										R9	L	LLL	
										R10	L	LLL	
										R11	L	LLL	
						P3 - River Yare	M	Flood defences in the form of sheet piled concrete walls prevent the river water from overflowing onto site. A major flood defence improvement scheme is currently underway in Great Yarmouth, with the aim of improving the condition of the existing flood defences and increasing the standard of protection where needed	L	R4	L	LML	
										R5	L	LML	
										R6	L	LML	
										R8	L	LML	
										R9	L	LML	
										R10	L	LML	
						P4 - North Sea	L	none	L	R12	H	LMH	
										R13	H	LMH	
R14	H	LMH											
R15	H	LMH											
R12	H	LLH											
Average Site Hazard Rating													
LOW													

Job No. BM12124 - Great Yarmouth
 Site Great Yarmouth Ship to Shore Facility
 Project CIRIA 736 Assessment
 Title Table 5: Site Risk Rating

Key:
Low
Moderate
High



Loss of Containment Mechanism	Description	Likelihood	Control measures	Residual Likelihood	Source	Source Risk Rating	Site Risk Rating
Fire	Generation of fumes from combustion of waste. Fire water runoff	H	There are no flammable wastes that are contained at the site. Should a fire start in a neighbouring facility then the tanks are contained in an area with secondary containment which will ensure that any spillages or damage to tanks, along with fire waters, will be adequately retained so as not to cause a pollution	L	S1-Tanks containing hazardous waste fluids from the off-shore oil and gas industry	M	ML
					S2- Tanks containing non hazardous waste fluids from the off-shore oil and gas industry	L	LL
Flooding	Flooding of the site from rising levels in the River Yare from storm events, or from extreme sea level rise. Flood risk zone 3 without taking into account mitigations	H	Flood defences near the River Yare and concrete bund surrounding the site	L	S1-Tanks containing hazardous waste fluids from the off-shore oil and gas industry	M	ML
					S2- Tanks containing non hazardous waste fluids from the off-shore oil and gas industry	L	LL
Vandalism	Vandalism may cause damage to containment and result in spread of contaminants	M	Site is protected by concrete wall with barbed wire fencing	L	S1-Tanks containing hazardous waste fluids from the off-shore oil and gas industry	M	ML
					S2- Tanks containing non hazardous waste fluids from the off-shore oil and gas industry	L	LL
Harmful gas emissions	Release of emissions from the containmnet into the air	M	Emissions to air will be limited to any releases through the pressure relief valves fitted to each storage tank for health and safety purposes. Any scenarios where the PRV is open will be very short (seconds as opposed to minutes or longer) and will not present a risk to air quality.	L	S1-Tanks containing hazardous waste fluids from the off-shore oil and gas industry	M	ML
					S2- Tanks containing non hazardous waste fluids from the off-shore oil and gas industry	L	LL
Operational failure	Leakage of contaminants when being transferred to and from containmets. Overfill of containmets. Mixing of two sources	M	Storage volumes will be monitored through the use of fill levels and alarms. All waste storage tanks will have appropriate over-fill alarms and non-return valves fitted. Tanks and pipework will be cleaned and flushed at appropriate times and between waste transfer to prevent the contamination of non-hazardous wastes	L	S1-Tanks containing hazardous waste fluids from the off-shore oil and gas industry	M	ML
					S2- Tanks containing non hazardous waste fluids from the off-shore oil and gas industry	L	LL
Earthquakes	Earthquakes could lead to toppling of containment and leakage of waste.	L	None	L	S1-Tanks containing hazardous waste fluids from the off-shore oil and gas industry	M	ML
					S2- Tanks containing non hazardous waste fluids from the off-shore oil and gas industry	L	LL
Lightning strikes	Failure of containment and source storage, leading to loss of containment.	L	None	L	S1-Tanks containing hazardous waste fluids from the off-shore oil and gas industry	M	ML
					S2- Tanks containing non hazardous waste fluids from the off-shore oil and gas industry	L	LL
Landslides/land subsidence	Landslides or subsidence leading to failure of containment mechanisms.	L	There are no nearby slopes observed nearby that can fail directly into the site. No mining activity is evident around the site so subsidence is unlikely	L	S1-Tanks containing hazardous waste fluids from the off-shore oil and gas industry	M	ML
					S2- Tanks containing non hazardous waste fluids from the off-shore oil and gas industry	L	LL
Average Site Risk Rating							Low

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