HFO Project Technical Landuse Planning Report

ESB Moneypoint Generating Station
EHS Support
IE0311713-23-RP-0002, Issue: C

Issue date: 30 May 2024

Document Sign Off

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EHS Support
IE0311713-23-RP-0002, Issue C

File No:IE0311713.23.140

CURRENT ISSUE					
Issue No: C	Date: 30 May 2024	Reason for issue: Planning Update			
Sign Off	Originator	Checker	Reviewer	Approver	Customer Approval (if required)
Print Name	ORLA.DUGGAN	JENNIFER.RYAN		ORLA.DUGGAN	
Signature	**Authorised Electronically**				
Date	30.05.2024	30 May 2024		30 May 2024	

PREVIOUS ISSUES							
Issue No	Date	Originator	Checker	Reviewer	Approver	Customer	Reason for issue
A	09.01.2024	O. Duggan	B. Madden		O. Duggan		Planning
B	23.05.2024	O. Duggan	J. Ryan		O. Duggan		Planning

Contents

1 Introduction

ESB Moneypoint Generating Station has applied to An Bord Pleanála for planning permission to implement proposed changes on site. The proposed changes (see Section 2.4) will facilitate the switch to use of Heavy Fuel Oil (HFO) as the primary fuel at the site, from coal which is currently the primary fuel. The transition period will be between October 2024 and December 2025.

This is Issue C of the Technical Landuse Planning Report. Issue A was submitted with Planning Application No. ABP-319080-24 to An Bord Pleanála in February 2024. Following review of the planning application the Health & Safety Authority (HSA), as a statutory consultee, has requested further information.

The Technical Landuse Planning Report was updated to Issue B version in order to provide the requested further information. Following preparation of Issue B updated information on the HFO marine transfer scenario became available which has been incorporated into this Issue C version.

The main updates since Issue A, and the associated sections of the report are summarised as follows:

1. Section 2.8 – the drawings referenced in this section have been provided in Attachment 1
2. Section 3.3 – update to explanation of modelling of Category 3 flammable substances
3. Section 3.3.1 – updated modelling of marine transfer scenario – Scenario 3.1
4. Sections 3.4.2 & 3.4.3 - more detailed, semi-quantitative assessment is provided on how 1) a catastrophic HFO tank failure & overtopping scenario and 2) a marine transfer leak at the jetty, might occur and how these scenarios are mitigated by technical and operational control measures.
5. Section 5 – updated to align with updates to Sections 3.4.2 & 3.4.3

Sections updated from Issue A to Issue C are denoted by a black line in the right-hand margin.

2 Information Required under Third Schedule of the Major Accident Regulations

This section provides the information specified in the Third Schedule of the Major Accident Regulations (i.e. the Third Schedule of the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2006 (S.I. No. 74 of 2006)). This information is to be included in the planning application as required under Article 134 of the Planning & Development Regulations 2001-2022.

2.1 Name of the operator and Address of the Establishment

Electricity Supply Board
Carrowdotia
Killimer
Kilrush
Co. Clare
V15 R963

2.2 Registered place of business of the operator

27 Fitzwilliam Street Lower
Dublin 2
D02KT92

2.3 Person in Charge of the Establishment

Stephen O'Mahoney, Station Manager is the person in charge of the establishment.

2.4 Activity of the Installation

Currently the installation activity is electricity generation with coal as the primary fuel.

It is proposed to change the primary fuel from coal to HFO – the transition period will be between October 2024 and December 2025.

In accordance with Section 37E of the Planning and Development Act 2000 (as amended), the Electricity Supply Board (ESB), has applied to An Bord Pleanála for PERMISSION for development within the existing Moneypoint Generating Station complex, in the townlands of Carrowdotia North, Carrowdotia South, and Ballymacrinan, Killimer, Kilrush, County Clare (Eircode V15 R963).

The proposed development will comprise of the following:

1. Transition and conversion of the existing coal fired power station's primary fuel from coal to Heavy Fuel Oil (HFO) for limited hours of operation and a temporary period of five years until 2029;
2. Construction of 2 no. HFO tanks each with a capacity of 25,000 tonnes (approx. 48.7m diameter x 15m H) and associated bund walls (approx. 5.0m high);
3. Construction of a new boiler house (approx. 24m L x 18m W x 11m H) to house 2 no. auxiliary boilers (1 no. electric and 1 no. distillate, each 22.7MW (thermal output), including:
   - 1 no. Blow down vessel (approx. 4.5m wide x 13m high)
   - 1 no. Exhaust Stack (approx. 1.0m diameter and 30m H)
   - 1 no. Annex structure (approx. 10.0m L x 5m W x 4m H)
4. Construction of an extension to each of the existing 3 no. Flue Gas Desulphurisation Absorbers (FGD) - units 1, 2 and 3, to provide additional reclaimed ash unloading facilities, comprising:
   - 1 no. conveyor enclosure (approx. 7.0m L x 2.5m W x 22m H)
   - 1 no. hopper enclosure (approx. 6m L x 5m W x 6m H)
5. Construction of a reclaimed ash unloading facility at the existing landfill capping batching plant, comprising of a hopper enclosure adjoining the existing batching plant (approx. 14.0m L x 6.5m W x 6.0m H) and conveyor enclosure (approx. 3.5m L x 3.5m W x 11.5m H)
6. Dismantling and removal of 2no. mobile stacker reclaimers and 1no. coal conveyor bridge;
7. Changes to existing permitted Flue Gas Desulphurisation (FGD) and ash storage area (ASA) arrangements (Pl. Ref. 14/373) to utilise spare capacity in the existing ASA [capping layer thickness increase from 0.6m (*minimum*) up to a maximum of 1.6 meters] with an overall proposed reduction in height of the currently permitted ASA by approx. 1.85m; and,
8. All associated ancillary site development works to facilitate the proposed development, including a new lighting arrangement, surface water drainage, internal roads and temporary construction compounds and laydown areas.

Moneypoint Generating Station is licensed by the Environmental Protection Agency (EPA) under an Industrial Emissions (IE) Licence (Ref: P0605-04). The proposed development includes works located entirely within the IE licenced boundary of Moneypoint Generating Station which is an Upper-tier establishment to which the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (the COMAH Regulations) apply.

The planning application is accompanied by an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS).

Only changes no. 1 - 3 above involve changes to the storage or use of COMAH substances – i.e. HFO and Diesel. These changes are the focus of this Technical Land use Planning assessment.

2.5 Dangerous Substance Information

Based on the proposed changes outlined in Section 2.4 this section provides information on the dangerous substances or category of substances involved; and the quantity and physical form of the dangerous substance or substances involved.

The only proposed change to the site's inventory of COMAH substances in the increase in storage of HFO from 50,000 tonnes (in 2 tanks) to 100,000 tonnes (in 4 tanks).

2.6 Environment of the Establishment

The immediate environment of the establishment (elements liable to cause a major accident or to aggravate the consequences thereof):

The ESB Moneypoint site is located at National Grid Co-ordinates 102800E; 152045N, in Co. Clare. The site is located on the north bank of the River Shannon Estuary, 5km east of Kilrush. Access is available to the site by road and by sea.

2.6.1 Significant Local Infrastructure

There are no motorways, rail networks, stations or airports within a 1km radius of the Moneypoint generating station. The N67 road is the nearest national secondary road to the site and allows access to the site.

The jetty at Moneypoint is a large and specialised structure designed specifically to off-load coal from bulk ships with displacement weights of up to 177,000 tonnes and it also unloads HFO.

2.6.2 Land Use within 1km of the Site

The land use within a 1km radius of the facility is a mixture of residential and agriculture. There are no commercial or industrial facilities within 1km radius of the facility. The nearest church is located in the village of Killimer approximately 2km from the site and the nearest schools are located in Knockerra, Burrane and Kilrush.

2.6.3 Land Use within 10km of the Site

The land use within 10km of the site includes a number of local villages and towns on both the north and south sides of the River Shannon Estuary. A significant portion of the estuary itself lies within this area.

The other significant fuel storage facilities in this area are the SSE Generation Ireland Ltd. establishment (Tarbert Power Station) and the National Oil Reserves Agency Tank Farm, both located across the Shannon Estuary in Tarbert. The Tarbert-Killimer Car Ferry is also a significant transport route in this area, linking the two sides of the estuary.

2.6.4 Natural Heritage

The Shannon Estuary is a very important and sensitive ecosystem. The entire area is designated as a Special Area of Conservation (SAC) as part of a network of sites across Europe under the Habitats Directives - Lower River Shannon SAC 002165. A "special area of conservation" means a site of Community importance designated by a Member State pursuant to Article 4(4) of the Habitats Directive.

All of the Shannon Estuary as far west as Foynes is also designated as a Special Protection Area (SPA) – as part of a network of sites across Europe that are protected under the Birds Directive - River Shannon and River Fergus Estuaries SPA 004077. A "special protection area" means an area classified pursuant to Article 4(1) or 4(2) of the Birds Directive.

2.7 Other Local Establishments

The name of any establishment in proximity where the likelihood and the possibility or consequences of a major accident may be increased because of its location and inventory of dangerous substances:

There are no establishments in proximity to ESB Moneypoint that have a significant inventory of dangerous substances – i.e. there are no COMAH establishments in proximity. The nearest Lower Tier COMAH establishment is Exolum Shannon Ltd. in Foynes Harbour and is located 20km from the ESB Moneypoint site. The nearest Upper Tier COMAH establishments are the National Oil Reserves Agency Ltd. & SSE Generation Ireland Ltd. establishments, both of which are located approximately 3km from the ESB Moneypoint site, across the Shannon Estuary in Tarbert. These three COMAH establishments are too far from the ESB Moneypoint site to increase the possibility or consequences of a major accident at the ESB Moneypoint site, or vice versa.

2.8 Map showing Establishment Location

Maps of 1:2,500 showing the site location, boundary and immediate environment are included in the planning application drawings – ESB drawing numbers QP-000017-65-D451-002-001-000; QP-000017-65-D451-002-002-000; and QP-000017-65-D451-002-003-000 Site Location Sheets 1-3.

Copies of these drawings in A3 size are provided in Attachment 1 of this report. Full size versions of these drawings are available for review within the planning application pack.

3 Technical Land-use Planning Assessment

3.1 COMAH Scenarios for TLUP Assessment

Based on the activities and dangerous substance inventories presented in Section 2, and with reference to the HSA Guidance on technical land-use planning advice[1] (hereafter referred to as the HSA TLUP Guidance), the COMAH scenarios included in this assessment are provided in Table 3.1.

3.2 Consequence Modelling Inputs

As stated above the modelled scenarios and the specific inputs relating to each are set out in Table 3.1. The more general model inputs are provided in the following sections.

3.2.1 Weather

As per the HSA TLUP Guidance all scenarios are modelled under D5 and F2 weather conditions.

D5 denotes a D stability category (Neutral – little sun and high wind or overcast/windy night) and a wind speed of 5m/s. D5 conditions are modelled in combination with an ambient temperature of 15°C.

F2 denotes an F stability category (Stable – Night with moderate clouds and light/moderate winds) and a wind speed of 2m/s. F2 conditions are modelled in combination with an ambient temperature of 10°C.

3.2.2 Terrain Conditions

In accordance with Section 2.5.7 of the HSA TLUP Guidance a roughness length of 0.1m has been conservatively selected.

3.2.3 Height of Interest

The modelling endpoints have been determined at a height of interest of 1.5m to represent average head height of a person standing at ground level.

3.2.4 Thermal Radiation Endpoints

In accordance with Section 2.3.1 of the HSA TLUP Guidance the modelling has been carried out to determine the distances to the following thermal radiation endpoints.

- 8.02kW/m^2: represents a 1% fatality risk outdoors
- 10.9kW/m^2: represents a 10% fatality risk outdoors
- 15.9kW/m^2: represents a 50% fatality risk outdoors
- 31.5kW/m^2: represents a 99% fatality risk outdoors

1 https://www.hsa.ie/eng/your_industry/chemicals/legislation_enforcement/comah/land_use_planning/guidance_on_technical_land_use_planning_feb23.pdf

Table 3.1: Consequence Modelling Scenarios & Input Data

	LOCATION & CONSEQUENCE TYPE	Proposed Representative Inventory of COMAH Substances for Consequence Modelling	Type of Model	Temp	Pressure	Release Aperture	Height of Release	No. of Vessels	Tank Head (m)	Bund Size
1	**HFO TANKS**									
1.1	Pool Fire	25,000 tonnes HFO (one tank)	Leak + Ignition	55C	Atmos.	1. Instantaneous 2. Release through 50mm pipe over 30mins	0.5m	4	13.6	9,971m2
2	**DIESEL TANK**									
2.1	Pool Fire	300 tonnes Diesel (one tank)	Leak + Ignition	20C	Atmos.	1. Instantaneous 2. Release through 50mm pipe over 30mins	0.5m	2	6.5	560m2
3	**HFO MARINE TANKER UNLOADING**									
3.1	Pool Fire	60 tonnes HFO (release for 3mins)	Leak + Ignition	60C	6barg	1. Full rupture unloading line 2. 10% leak of unloading line	0.5m	1	N/A	Unbunded
4	**DIESEL ROAD TANKER**									
4.1	Pool Fire	25.5 tonnes Diesel	Leak + Ignition	20C	Atmos.	1. Instantaneous 2. Release through 50mm pipe	0.5m	1	3.5	Unbunded
5	**DIESEL ROAD TANKER UNLOADING**									
5.1	Pool Fire	25.5 tonnes Diesel	Leak + Ignition	20C	4barg	1. Full rupture of 100mm diam loading/unloading line 2. 10% leak of 100mm diam loading/unloading line	0.5m	1	N/A	Unbunded

3.3 Consequence Modelling Results

3.3.1 Scenario 1.1: HFO Tanks – Pool Fire

With reference to Section 3.6.4 of the HSA TLUP Guidance fire and explosion events are not considered for Category 3 substances, unless they are co-located in the same bund as Category 1 or Category 2 substances. HFO is classified as a Category 3 substance and although it is not co-located with a Category 1 or 2 substance the site propane tank is located close to the HFO bund wall. Therefore conservatively the impact of leak and ignition from a HFO tank, resulting in a pool fire, has been considered. Details of the representative release scenario are set out in Table 3.1.

Section 3.6.4 also states that a Category 3 pool fire should also be modelled if the pool has the potential to run offsite.

With reference to Section 3.6 of the HSA TLUP Guidance the diameter limit for an overtopping pool fire is 100m (which equates to a pool area of 7,850m^2). Below a pool fire of area 9,971m^2 has been modelled, which is the largest bund area – therefore this represents modelling of a bunded and unbunded/overtopping pool fire.

It is noted that the diameter limit for an overtopping pool fire of 100m does not extend outside the Moneypoint site. This Category 3 pool fire has been modelled due to the proximity of the site propane tank, not because the pool fire has the potential to extend offsite.

It is noted that a release of the entire contents of a 25,000 tonne HFO tank over 10mins is not considered to be significantly different from catastrophic failure. Therefore the scenario of release over 10mins is not considered as a standalone scenario.

It is also considered that a leak aperture of 10mm as prescribed in the HSA TLUP Guidance is too small for this tank size, so a leak aperture of 50mm has been considered.

Table 3.2: Results for Scenario 1.1 due to Catastrophic Rupture

Endpoint Pool Fire	kW/m^2	Distance to Endpoint (m)	
		D5	F2
1% Fatality	8.02	194	191
10% Fatality	10.9	173	169
50% Fatality	15.9	151	146
99% Fatality	31.5	120	110

Table 3.3: Results for Scenario 1.1 due to 50mm Leak over 30mins

Endpoint Pool Fire	kW/m^2	Distance to Endpoint (m)	
		D5	F2
1% Fatality	8.02	202	198
10% Fatality	10.9	181	176
50% Fatality	15.9	158	153
99% Fatality	31.5	128	117

The site boundary is approximately 330m from the Tank Farm at its nearest point. As can be seen from Tables 3.2 & 3.3, none of the endpoints of interest extend beyond the site boundary. This is shown in Figure 3.1. Therefore there are no Land-use Planning implications associated with this scenario.

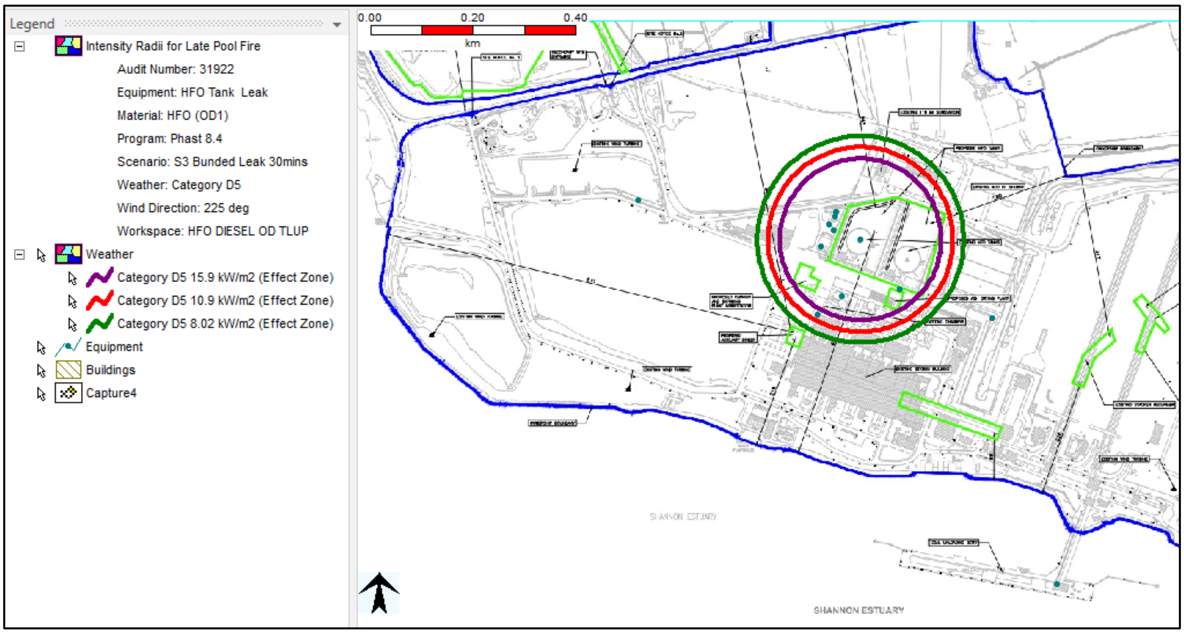


Figure 3.1: Worst Case HFO Late Pool Fire at Tank Farm

3.3.2 Scenario 2.1: Diesel Tank – Pool Fire

With reference to Section 3.6.4 of the HSA TLUP Guidance fire and explosion events are not considered for Category 3 substances, unless they are co-located in the same bund as Category 1 or Category 2 substances. Diesel is classified as a Category 3 substance and although it is not co-located with a Category 1 or 2 substance the site propane tank is located close to the Diesel bund wall. Therefore conservatively the impact of leak and ignition from a Diesel tank, resulting in a pool fire, has been considered. Details of the representative release scenario are set out in Table 3.1.

Section 3.6.4 also states that a Category 3 pool fire should also be modelled if the pool has the potential to run offsite. With reference to Section 3.6 of the HSA TLUP Guidance the diameter limit for an overtopping pool fire is 100m (which equates to a pool area of 7,850m^2). It is noted that the diameter limit for an overtopping pool fire of 100m does not extend outside the Moneypoint site. This Category 3 pool fire has been modelled due to the proximity of the site propane tank, not because the pool fire has the potential to extend offsite.

It is noted that a release of the entire contents of a 300 tonne Diesel tank over 10mins is not considered to be significantly different from catastrophic failure (release aperture of approx. 35cm would be needed to achieve this discharge). Therefore the scenario of release over 10mins is not considered as a standalone scenario.

It is also considered that a leak aperture of 10mm as prescribed in the HSA TLUP Guidance is too small for this tank size, so a leak aperture of 50mm has been considered.

Table 3.4: Results for Scenario 2.1 due to Catastrophic Rupture

Endpoint Pool Fire	kW/m^2	Distance to Endpoint (m)	
		D5	F2
1% Fatality	8.02	236	232
10% Fatality	10.9	210	205
50% Fatality	15.9	182	175
99% Fatality	31.5	145	132

Table 3.5: Results for Scenario 2.1 due to 50mm Leak

Endpoint Pool Fire	kW/m²	Distance to Endpoint (m)	
		D5	F2
1% Fatality	8.02	73	70
10% Fatality	10.9	65	62
50% Fatality	15.9	56	53
99% Fatality	31.5	44	40

The site boundary is approximately 380m from the Diesel Tanks at its nearest point. As can be seen from Tables 3.4 & 3.5, none of the endpoints of interest extend beyond the site boundary. This is shown in Figure 3.2. Therefore there are no Land-use Planning implications associated with this scenario.

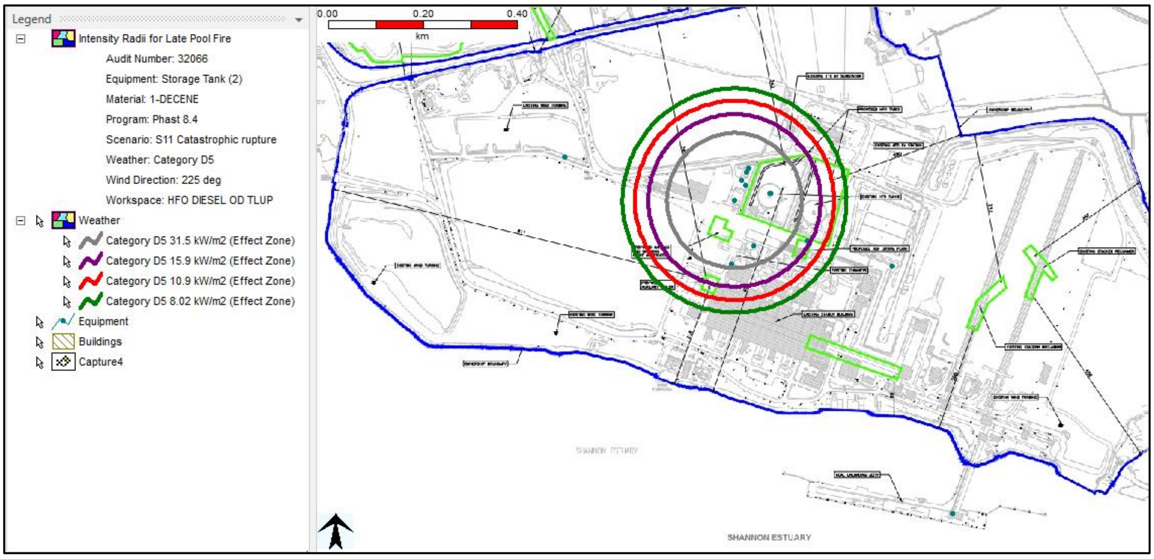


Figure 3.2: Worst Case Diesel Late Pool Fire

3.3.3 Scenario 3.1: HFO Marine Tanker Unloading – Pool Fire

With reference to Section 3.6.4 of the HSA TLUP Guidance fire and explosion events are not considered for Category 3 substances - HFO is classified as a Category 3 substance. However Section 3.6.4 also states that a Category 3 pool fire should also be modelled if the pool has the potential to run offsite. A pool fire due to a release during marine tanker unloading has the potential to occur, at least partially, offsite in the Shannon Estuary.

Details of the representative release scenario are set out in Table 3.1. The jetty and the ship's deck are continually staffed during the HFO transfer and the ship's crew and jetty operators are in continual radio contact. The transfer line is pressure tested before pumping is commenced, and pumping is started at one third of the full transfer flowrate. The full transfer flowrate is approximately 1,000 tonnes per hour so the transfer is started at approximately 333 tonnes per hour. It is only when it is confirmed that the transfer is proceeding as planned into the designated tank with no leaks, that the pumping pressure is increased to the full transfer flowrate. If a leak is identified on the continually staffed jetty, there is an agreed call on the radio of 'Stop, stop, stop'. This triggers the immediate shut-off of the transfer pump by the ship's crew. It is estimated that the pump shut-off can be achieved within 30secs to 1min of a leak being identified. An additional 2 minutes of flow is considered in this assessment to allow for residual flow in the line after the pump has been shut off. Therefore it considered that a full rupture of the unloading arm could leak for no more than 3 minutes before flow is stopped. Three minutes of flow at the full transfer rate of 1,000 tonnes per hour equates to 50 tonnes. A very conservative allowance of 10 tonnes is made for the contents of the unloading arm. So it is estimated that in a worst case 60 tonnes of HFO could be released in the very unlikely event of a full bore rupture. A 10% leak case is also considered – i.e. a release of 6 tonnes.

Table 3.6: Results for Scenario 3.1 due to Full Rupture of Unloading Line (1,000 tonnes per hour/ 60 tonnes released)

Endpoint Pool Fire	kW/m²	Distance to Endpoint (m)	
		D5	F2
1% Fatality	8.02	237	233
10% Fatality	10.9	212	207
50% Fatality	15.9	185	179
99% Fatality	31.5	138	125

Table 3.7: Results for Scenario 3.1 due to 10% Leak of Unloading Line (100 tonnes per hour/ 6 tonnes released)

Endpoint Pool Fire	kW/m²	Distance to Endpoint (m)	
		D5	F2
1% Fatality	8.02	103	100
10% Fatality	10.9	92	89
50% Fatality	15.9	80	76
99% Fatality	31.5	59	53

The land site boundary to the west is approximately 1,000m from the Jetty at its nearest point. To the east the boundary is approximately 300m from the Jetty at its nearest point. As can be seen from Tables 3.6 & 3.7 none of the endpoints of interest extend to the site boundary to the west or the east. This is shown in Figure 3.3. Therefore there are no Land-use Planning implications associated with this scenario.

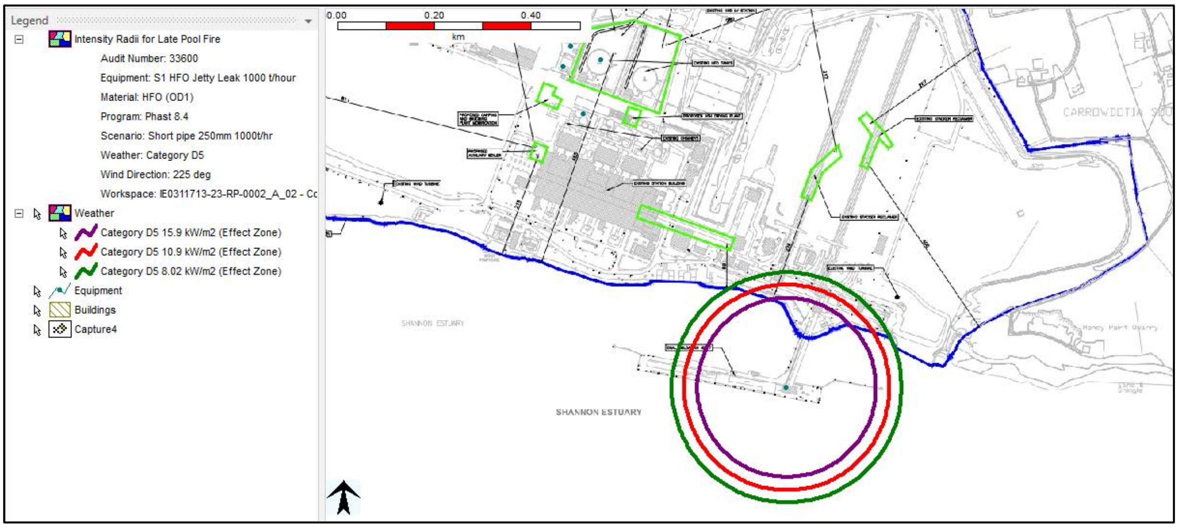


Figure 3.3: Late Pool Fire at the Jetty due to marine tanker unloading

3.3.4 Scenario 4.1: Diesel Road Tanker – Pool Fire

With reference to Section 3.6.4 of the HSA TLUP Guidance fire and explosion events are not considered for Category 3 substances. Diesel is classified as a Category 3 substance, however the impact of leak and ignition from the failure of a Diesel road tanker while on site resulting in a pool fire, has conservatively been considered. Details of the representative release scenario are set out in Table 3.1.

Table 3.8: Results for Scenario 4.1 due to Catastrophic Failure

Endpoint Pool Fire	kW/m^2	Distance to Endpoint (m)	
		D5	F2
1% Fatality	8.02	225	218
10% Fatality	10.9	200	193
50% Fatality	15.9	174	166
99% Fatality	31.5	137	125

Table 3.9: Results for Scenario 4.1 due to 50mm diameter Leak

Endpoint Pool Fire	kW/m^2	Distance to Endpoint (m)	
		D5	F2
1% Fatality	8.02	223	220
10% Fatality	10.9	199	195
50% Fatality	15.9	173	167
99% Fatality	31.5	136	125

The site boundary is approximately 380m from the Tanker Unloading area at its nearest point. As can be seen from Tables 3.8 & 3.9 none of the endpoints of interest extends this distance. However it is noted that a Diesel Tanker could fail en route from the site entrance to the Tanker Unloading area so the effects of a tanker pool fire are depicted in Figure 3.4 as occurring halfway from the site entrance/boundary to the Unloading area. It is concluded that there are no Land-use Planning implications associated with this scenario.

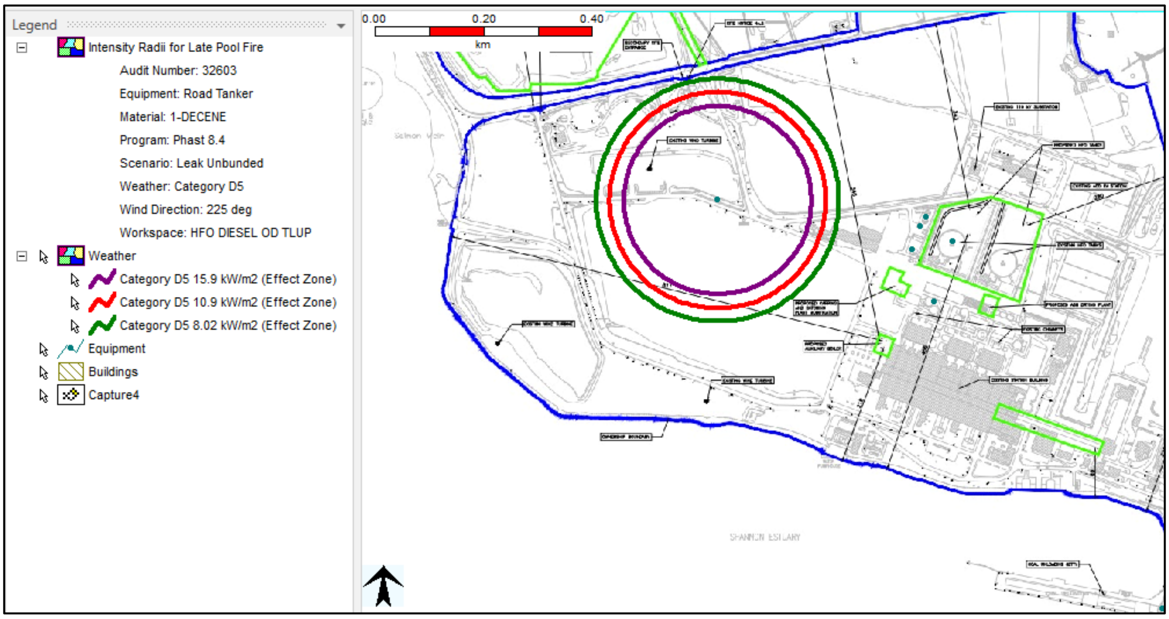


Figure 3.4: Late Pool Fire due to Tanker failure halfway to Unloading area

3.3.5 Scenario 5.1: Diesel Road Tanker Unloading – Pool Fire

With reference to Section 3.6.4 of the HSA TLUP Guidance fire and explosion events are not considered for Category 3 substances. Diesel is classified as a Category 3 substance, however the impact of leak and ignition from the unloading of a Diesel road tanker, resulting in a pool fire, has conservatively been considered. Details of the representative release scenario are set out in Table 3.1.

Table 3.10: Results for Scenario 4.1 due to Full Rupture of Unloading Line 100mm

Endpoint Pool Fire	kW/m^2	Distance to Endpoint (m)	
		D5	F2
1% Fatality	8.02	242	236
10% Fatality	10.9	218	211
50% Fatality	15.9	191	184
99% Fatality	31.5	158	145

Table 3.11: Results for Scenario 4.1 due to 10% Leak of Unloading Line 10mm

Endpoint Pool Fire	kW/m^2	Distance to Endpoint (m)	
		D5	F2
1% Fatality	8.02	108	105
10% Fatality	10.9	97	94
50% Fatality	15.9	85	81
99% Fatality	31.5	70	62

The site boundary is approximately 380m from the Tanker Unloading area at its nearest point. As can be seen from Tables 3.10 & 3.11 none of the endpoints of interest extend this distance, therefore there are no Land-use Planning implications. This is shown in Figure 3.5.

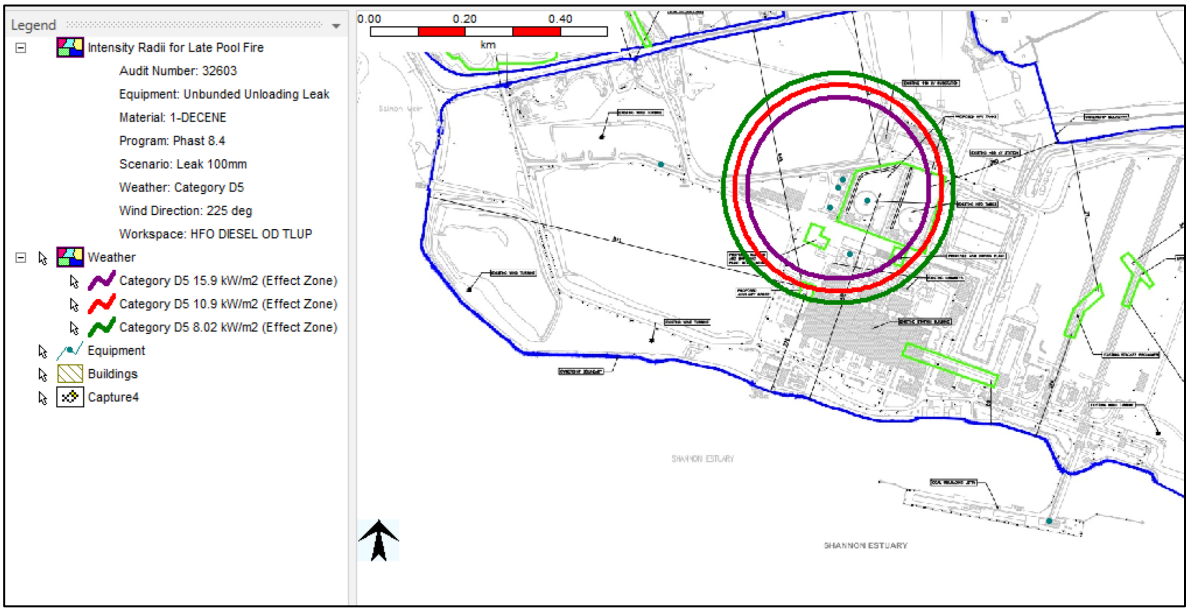


Figure 3.5 Late Pool Fire at the Tanker Unloading area

3.4 Major Accident to the Environment (MATTE) Assessment

Section 1.8 of the HSA TLUP Guidance states:

In the context of LUP, the prevention of MATTEs will be the primary objective and it is expected that accident pathways will be prevented. Where this is not practicable, or in the context of significant modifications at existing COMAH establishments, the assessment of major accidents to the environment focuses on the specific risks to sensitive receptors within the local environment, the extent of consequences to such receptors and the ability of such receptors to recover: environmental damage may be relatively long-lasting but is not necessarily irreversible. Recovery of habitats within a reasonable period of time is possible, depending on the dangerous substance involved.

Significant assessment of the proposed development at the ESB Moneypoint site has been undertaken, namely in the following assessments:

- Environmental Impact Assessment Report (EIAR) (included in the planning application)
- Appropriate Assessment Screening Report & Natura Impact Assessment (included in the planning application)

These reports consider the potential impacts of the development on sensitive offsite environmental receptors, and document the following proposed containment measures to prevent accident pathways:

- The existing bunds to be upgraded to include a concrete floor across the entirety of the bunds. New bund walls to be constructed from reinforced concrete. This takes into account the largest tank oil volume, a potential extreme rainfall event to cover any emergency response periods and an additional 3,981m^3 for any potential firefighting water.
- Major environmental damage to be controlled and prevented by prompt isolation and containment of an oil spill – isolating local drains using absorbent booms, securing the area against traffic, containing the spill and monitoring oil interceptor outlets to detect oil spill to the Shannon.

Given the mitigation measures detailed in these reports it is concluded in the reports that there will be no significant impacts on surface water, land, soils or hydrogeology as a result of the construction or operation of the proposed development.

The site is also subject to the environmental protection conditions contained within its Industrial Emissions Licence. The conditions most relevant to the proposed development are summarised as follows:

- Implementation & Maintenance of an Environmental Management System which is reviewed by senior management for suitability, adequacy and effectiveness and updated on an annual basis.
- Appropriate provision of containment and bunding
- Inspection & Maintenance of Stormwater Drainage System, Oil Separators and Bunds
- Documented Accident Prevention and Emergency Response Procedures which are reviewed annually and updated as necessary
- Storage of adequate supply of containment booms and/or suitable absorbent material
- Implementation of a fire safety system that addresses fire prevention, detection, control and response. Includes an emergency response plan prepared in consultation with the Fire Service, for dealing with a tank farm fire. Reviewed annually and updated as necessary.

In relation to potential Major Accidents to the Environment and with reference to the site's existing COMAH Safety Report a MATTE Assessment is set out in the following sections which addresses potential major accidents in more detail.

3.4.1 Environmental Hazard Assessment

Any release of HFO or diesel outside a bund may be able to reach local environmental receptors via the following pathways:

- Spill during transfer from marine ⟶ jetty ⟶ Shannon Estuary
- Spill to ground ⟶ groundwater ⟶ Shannon Estuary/local groundwater sources (wells)
- Spill to ground ⟶ soil ⟶ Onsite land contamination
- Spill to ground ⟶ site drainage system ⟶ Shannon Estuary

Figure 3.6: *Image of the Moneypoint site on the Shannon Estuary*

With respect to potential leaks to soil/ground from equipment, pipework and tanks containing HFO and diesel, these would comprise releases or leaks outside bunds onto unpaved or gravelled areas, and also in the unlikely event of bund failure or overtopping.

Any liquids in the site's drainage system pass through an interceptor before being released from the site. It is possible that very large spills of HFO or diesel could overflow the interceptor.

With respect to consequence assessment potential environmental release major accident hazard scenarios break down into two different types of accidents to produce the following the representative environmental release scenarios:

a) Catastrophic tank failure would result in a significantly larger HFO or diesel spill than the other scenarios identified. Therefore, the first worst-case representative accident scenario chosen for a HFO or diesel release is catastrophic HFO tank failure followed by overtopping. In the event of an ensuing fire the generation of firewater could exacerbate the severity of the release to the environment

b) Release of HFO during transfer from a marine tanker is the only release likely to directly reach an aquatic environment. Therefore, the second worst-case representative accident scenario chosen for a HFO release is line failure during transfer from a marine tanker

3.4.2 Detailed Source-Pathway-Receptor Assessment

The two worst-case environmental release scenarios identified in Section 3.4.1 are discussed and assessed in the following sections in further detail.

The consequence of any such release scenarios must be balanced against the extremely low likelihood of the scenario occurring (refer to quantitative frequencies calculated in Section 4 of report), taking into account the various control measures implemented by ESB Moneypoint to prevent and mitigate any such releases.

1. **Catastrophic Failure of a HFO tank followed by over-topping of a bund and potentially subsequent ignition and fire leading to release to the environment of HFO and firewater run-off**

Source

The source of the release is one of the 25,000 tonne HFO tanks. The catastrophic rupture would mean an instantaneous release of this quantity. The HFO will be in the liquid phase and at an operating temperature of 50°C. The maximum temperature that can be reached is 55°C, at which point an interlock will automatically stop the steam heating system. Two tanks, one in each bund, may be maintained at this operational supply temperature during filling and tank transfer activities. The other two tanks to be maintained at a standby temperature of approx. 30-35˚C.

The catastrophic failure of storage tanks under ambient conditions is extremely unlikely but consideration must be given to this scenario as per the HSA TLUP Guidance. With reference to Section 3.6 of the guidance the likelihood of catastrophic (instantaneous) failure of a tank is 5×10^{-6} per year or once in every 200,000 years.

Mitigation of Catastrophic Failure of a HFO tank at the Moneypoint site is provided by the following measures:

- The design and construction of the two new HFO tanks and associated pipework & controls, to be carried out to current best practice engineering standards (EN.14015:2004 Specification for manufacture of vertical steel welded non-refrigerated storage tanks with butt-welded shells for the petroleum industry). The design to be carried out by specialist contractors with extensive experience in the provision of large tanks to the petroleum industry.
- A documented system of inspection, testing and maintenance is in place at the Moneypoint site, in accordance with ESB standard PGTS 33/22 Inspection and Testing of Fixed Plant. Maintenance of the HFO tanks is carried out specifically in accordance with ESB standard PGTS 16/07 Inspection of Oil Storage Tanks & Oil Pipework.
- 10 Year Tanks inspections have been completed in 2018 and 2022 on the existing tanks in accordance with ESB standards PGTS 33/22 & PGTS 16/07, and both tanks are in good condition.

Mitigation of Bund Overtopping - bunds provide secondary containment around the HFO tanks but in the event of catastrophic failure of a HFO tank, over-topping of the bund must be considered. However the design of the bunds will minimise the extent of overtopping as far as possible, as follows:

- The 2 no. HFO bunds will be fully upgraded as part of the HFO project with raised bund walls and concrete floors for environmental protection. In the design of the upgraded bunds there is sufficient bund capacity in each bund to retain one tank rupture and 90mins of firewater generation (cooling and firefighting). The bund details are summarised in the following table:

Table 3.12: Bund Size Calculation Details

	Bund 1	Bund 2
Area of Base of Bund (m^2)	9,971	9,119
Area Occupied by new tank (m^2)	1,863	1,863
Area available for retention in new bund (excludes area taken up by 2nd tank (m^2)	8,108	7,256
Height of Bund Wall (m)	3.73	4.16
Total Retention Volume (m^3)	**30,238**	**30,186**
Additional Height of Freeboard (m)	0.25	0.25
Additional Retention Volume Provided by Freeboard (m^3)	2,027	1,814
Volume of Material in Largest Tank	25,761	25,761
Rainfall Allowance – 10% Annual Exceedance Probability (m^3)	495	443
90mins Firewater Generation (for firefighting and tank cooling) (m^3)	3,981	3,981
Total Retention Required (m^3)	**30,238**	**30,186**

The bunds each provide retention capacity of approx. 117% of the largest tank in the bund – not including the freeboard. The freeboard has been designed in accordance with CIRIA Guidance C736 Containment Systems for the prevention of pollution (2014) and equates to an additional 250mm of bund wall height, on top of the standard height that allows retention capacity for the largest tank. The CIRIA guidance recommends this additional 250mm of freeboard as a surge allowance to minimise overtopping potential.

- Eight million gallons (approx. 36,500m^3) of firewater is stored at the ESB Moneypoint site. However the Moneypoint site has adopted an alternative fire-fighting strategy to minimise generation of fire water in the event of a HFO tank fire. This means that a HFO tank fire would be fought for 90mins only. If the fire is not extinguished within this period it would be allowed to burn in a managed and monitored approach until the fuel supply is depleted. The other HFO tanks in the bund would be cooled to prevent escalation of the fire to them. The alternative fire-fighting strategy specifically aims to limit the amount of environmentally hazardous firewater run-off generated in event of a prolonged fire scenario, and retain it within the bunds.

Pathways

As set out in the Source section above the HFO tanks and bunds are designed to minimise the risk of bund overtopping. Also the fire-fighting strategy is designed to minimise the amount of firewater generated, and retain it within the bunds. However it is still conservatively considered that some HFO would overtop the bund if catastrophic tank failure occurs. It is very difficult to predict the extent of overtopping so in line with Section 3.6 of the HSA TLUP Guidance, 50% overtopping is conservatively assumed. However 50% overtopping is considered extremely unlikely given the very high viscosity of HFO as discussed below, and the proposed height of the bund walls (see Table 3.12).

Each HFO tank contains up to 25,000 tonnes – assuming a density of 0.97g/cm^3, the 50% overtopping volume equals approximately 13,000m^3.

The identified pathways to the environment for any overtopped HFO are as follows:

a) Ground (soil & groundwater) - the ground around the HFO bunds consists of gravel over underlying soil layer and concreted site areas (including the new bund floors). The viscosity and density of the HFO will significantly impede both its horizontal and vertical migration. The density of HFO which is similar to water will impede the displacement of the water in the soil pore spaces. The viscosity of HFO is extremely high – approximately 380mm^2/s at 50°C. This is almost 400 times higher than the viscosity of water at ambient temperature (1mm^2/s). As the HFO cools the viscosity will increase significantly – its viscosity has been estimated by ESB to be approx. 1,500mm^2/s at 20˚C. It is noted that the groundwater body in this area is of Extreme Vulnerability. Despite the immobility of HFO there is some potential for it to reach groundwater.

   Mitigation – as part of site clean-up in the event of HFO overtopping the bund, contaminated soil and ground cover would be removed as quickly as possible, to prevent the potential for further downwards migration of the HFO and groundwater contamination.

b) Site Drainage – the site surface water drainage system is the most direct pathway available to a HFO release. All drains around the HFO storage area incorporate interceptors but these are likely to be overwhelmed in the event of a catastrophic release – the HFO could flow through the interceptors or back up the drainage system and overflow across the ground. However it is again noted that the viscosity of HFO is extremely high – approx. 380mm^2/s at 50°C and 1,500mm^2/s at 20˚C (the viscosity of water at ambient temperature is 1mm^2/s). This will severely impede the movement of the HFO through the interceptors or overground, with the viscosity increasing significantly as it cools.

   Mitigation –The mobility of the HFO release in the drainage system could be facilitated by the presence of firewater run-off in the event of release and fire scenario but as outlined above an alternative fire-fighting strategy specifically aims to limit the amount of environmentally hazardous firewater run-off generated in event of a prolonged fire scenario, and retain it within the bunds.

   There are shut-off valves on the interceptors that are positioned on the drain lines that lead to the surface water outfalls at the Shannon Estuary. As part of the emergency response procedure these valves will be shut as required in the event of a significant release of HFO. The relevant valves are listed as follows:

   - Upstream of SW2 outfall – Outlet Valves on Interceptors 1, 2 & 11 (this is the main drainage system route and outfall leading from the HFO bunded area) – see drainage drawings from planning application pack provided in Attachment 3 of this report.
   - Upstream of SW6 outfall - Outlet Valve on Interceptor 4A (unlikely to be affected but can be shut if deemed appropriate)
   - Upstream of SW7 outfall - Outlet Valve on Interceptor 5A (may be affected in overtopping scenario and can be shut if deemed appropriate)

c) Overground Pathway - In the event that the drainage system pathway is blocked both deliberately by shutting the interceptor outlet valves and naturally due to blockage caused by the viscosity of the HFO then it is anticipated that the HFO will move overground as far as possible because there is no divert system or dedicated retention area at the site.

In this case it is considered how far the HFO might spread and whether it has the potential to reach the shoreline by moving overground. Again it is noted that the viscosity of HFO is extremely high – approx. 380mm^2/s at 50°C and approx. 1,500mm^2/s at 20˚C. This will severely impede the movement of the HFO overground, with the viscosity increasing significantly as it cools.

Since it is conservatively assumed that 50% of the contents of the HFO tank could overtop the bund a scenario is considered whereby the HFO flows away from the bund in a semi-circle.

The site plan provided in Attachment 2 of this report shows that the HFO tanks and bunds are at a height at the north of the site (12.0m OD – base of bunds & approx. 16m OD – bund walls). To the south and southwest between the bunds and the shoreline, the site falls to a lower level where the main site buildings are located (approx. 6m OD). The site areas to the north and east of the bunds rise to approx. 16m OD and 20m OD, respectively.

Therefore any released HFO is likely to flow down the bund embankment to the south and then spread out over the level ground to the south and southwest. At its closest point the bottom of the embankment is approx. 340m from the shoreline. If a semi-circle of spreading HFO is considered, with a radius of 340m, then it is calculated that an area of approximately 180,000m^2 would be covered before the HFO could reach the shoreline overground. As calculated at the start of this Pathways section the volume of the released HFO could conservatively be approx. 13,000m^3, in the event of 50% overtopping. Under these conditions the thickness of the HFO layer is estimated be approx. 7cm.

It is considered that the extent of movement would be mitigated as follows:

- The liquid HFO would cool rapidly once released and would become semi-solid in nature once ambient temperature was reached.
- Movement of the HFO to the south would be impeded and slowed down by the presence of the main station buildings. It is anticipated that it would collect and clog in this area due to the obstacles in its path. So although the presence of the main station buildings would reduce the free area over which the HFO can spread, to less than 180,000m^2, it is considered that the retention effect of the buildings would be such that the overall area affected would not be greater than the estimated 180,000m^2.
- The kerbing at the roadway running along the south of the site is expected to provide tertiary containment to a height of at least 7cm. Containment devices would also be deployed as tertiary containment at the shoreline as required, to prevent the HFO flowing overground into the Shannon Estuary.

d) Air – it is also acknowledged that in the event of a fire the resulting combustion gases and smoke would be released into the local air. The exact pathway of the airborne release would depend predominantly on wind and weather conditions at the time. Under prevailing wind conditions it is expected that the airborne releases would be blown in a north-easterly direction towards the villages and townlands of Killimer, Tarmon. Ennis is approximately 40km from the site and Shannon Airport is approximately 35km away, to the northwest. It is also noted that the southern edge of the Burren is approximately 40km from the site to the north.

However it is noted that air impacts would dissipate relatively quickly once the fire has burned out. Protection of surface water receptors is considered of greater importance than air receptors due to the risk of long-term impacts on water receptors. Hence the adoption of an alternative fire-fighting strategy to minimise generation of fire water.

Receptors

The identified environmental receptors are as follows:

a) Land – there is potential for contamination of the soil under the site. As discussed above the potential for HFO to migrate into and contaminate soil is limited and it is considered that any resulting requirement for contaminated soil removal would be limited and achievable.

b) Groundwater sources - As detailed in the Fuel Oil Tank Bund Report (PA619-R42-1) the groundwater flow beneath the site is from north to south towards the Shannon Estuary. All local wells are located to the north of the site and therefore are at little or no risk of contamination.

c) Shannon Estuary

This receptor is the most significant with respect to its vulnerability.

The River Shannon is the largest river in Ireland. It rises in County Cavan and flows for ca. 260km before entering the Shannon Estuary at Limerick City. Hydrometric data for the River Shannon indicates a long term average flow rate of 209 m^3/s. The river becomes tidal a short distance upstream of Limerick city.

The Shannon Estuary itself forms the largest estuarine complex in Ireland covering an area of 500km^2 of navigable water, and extending for 100km from Limerick City at its head to its seaward limits marked by Loop Head, County Clare to the north and Kerry Head, County Kerry to the south. The mouth of the estuary is over 15 km wide, narrowing to just over 3 km between Kilcredaun and Kilconly Headlands.

The relatively deep water and shelter from the Atlantic Ocean has led to the development of the estuary as an important centre for industry, imports and exports for Ireland. The Estuary area is a multi-functional zone, with the waters and adjoining lands supporting a range of functions, uses and activities. Most notable are:

- Shipping/Port functions
- Industry/Marine related Industry
- Fishing/Aquaculture
- Marine Tourism, Leisure and Recreation
- Energy generation
- Fuel Storage
- Aviation
- Heritage and Landscape
- Valuable Habitats and Species including a designated Special Protection Area (SPA) and Special Area of Conservation (SAC).

The multi-functional use and importance of the Estuary has led the local authorities to develop and publish the *Strategic Integrated Framework Plan (SIFP) for the Shannon Estuary 2013 – 2020* which will be incorporated into the relevant County and City Development Plans. The purpose of the plan is to guide the future management and development of the Shannon Estuary and ensure that the full potential of the estuary can be harnessed in a sustainable manner.

A description of the Shannon Estuary SAC and SPA is given in Table 3.12 below based on information provided on the National Parks & Wildlife Service (NPWS) website.

There are no designated Natural Heritage Areas (NHAs) located in the Shannon Estuary, but there are a number of proposed Natural Heritage Areas (pNHAs) which have not yet been statutorily proposed or designated. These are areas considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. NHAs are also designated to conserve and protect nationally important landforms, geological or geomorphological features. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation.

The Shannon Estuary Anti-Pollution Team (SEA-PT) Oil Spill Plan would be implemented in the event of a release or significant risk of release to the Estuary. The team have a number of response options available, depending on the circumstances of the spill. These include use of booms, skimmers (mechanical, vacuum, oliophilic) and absorbents for containment and collection of the oil, and chemical dispersants for dispersing the pollutants.

Table 3.13: Description of Shannon SAC and SPA

Site Name	Description
Lower River Shannon Special Area of Conservation (SAC) Site Code: 002165	The Lower River Shannon Special Area of Conservation (Site Code: 002165) is a large site that encompasses the lower reaches of the River Shannon extending from just south of Lough Derg at its eastern end to a line drawn from Loop Head to Kerry Head at the west. The site is a candidate SAC selected for lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is a candidate SAC selected for lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for floating river vegetation, Molinia meadows, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, Salicornia mudflats, sand banks, perennial vegetation of stony banks, sea cliffs, reefs and large shallow inlets and bays all habitats listed on Annex I of the E.U. Habitats Directive. This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitat lagoon, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter. Site-specific conservation objectives are set which aim to define favourable conservation conditions for the Lower Shannon Estuary SAC. The objectives include restoring the following: Freshwater Pearl Mussel , Freshwater Pearl Mussel , Sea Lamprey, Salmon, Condition of Coastal lagoons, Atlantic salt meadows (Glauco-Puccinellietalia maritimae), Otter , Condition of Mediterranean salt meadows (Juncetalia maritimi), Condition of Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) The objectives also include maintaining the: 1. Brook Lamprey 2. Condition of River Lamprey 3. Condition of Sandbanks which are slightly covered by sea water all the time 4. Condition of Mudflats and sandflats not covered by seawater at low tide condition of large shallow inlets and bays 5. Favourable conservation condition of Reefs 6. Favourable conservation condition of Perennial vegetation of strong banks 7. Favourable conservation condition of Vegetated sea cliffs 8. Favourable conservation condition of Salicornia and other annuals colonizing mud and sand 9. Favourable conservation condition of Bottlenose Dolphin 10. Favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachiion vegetation

Site Name	Description
	11. Favourable conservation condition of Molinia meadows on calcareous, peaty or clayey-silt laden soils (Molinion caeruleae) 12. Favourable conservation condition of Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
River Shannon and River Fergus Estuaries Special Protection Area (SPA) Site Code: 004077	The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site has vast expanses of intertidal flats. The main macro-invertebrate community present is a Macoma Scrobicularia-Nereis community which provides a rich food resource for the wintering birds. The site provides both feeding and roosting areas for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Habitat quality for most of the estuarine habitats is good. The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl (mean of 59,183 for the 4 seasons 1996-97 to 1999/00), a concentration easily of international importance. Apart from the wintering birds, large numbers of some species also pass through the site whilst on migration in spring and/or autumn. Regular species include Blacktailed Godwit, Whimbrel and Greenshank. This site is of great ornithological interest, being of international importance on account of the numbers of wintering birds it supports. It also supports internationally important numbers of three species, i.e. Dunlin, Black-tailed Godwit and Redshank. In addition, there are 16 species that have populations of national importance. Also of note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Site-specific conservation objectives are set which aim to define favourable conservation conditions for the River Shannon and River Fergus Estuaries. The main objective is to maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. The objective is to maintain the favourable conservation condition for the following: Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull

d) Human receptors/buildings – human and buildings would be adversely affected by the smoke and combustion gases released during a significant HFO fire. However the released materials would not persist in the environment and would be significantly dispersed by prevailing weather conditions. In addition humans would be inclined to limit their exposure by moving indoors, closing windows etc. until the release had dissipated. This potential impact is not considered as significant as liquid release of HFO and associated firewater.

2. **HFO Transfer Line Failure during marine transfer and subsequent Environmental release**

Source

The source of the release is up to 50,000 tonnes of HFO in a marine tanker. This scenario considers a pressurised leak from the delivery pipeline near the jetty, most probably at the unloading arm. As per Section 3.3.3 a full rupture of the unloading arm and a 10% leak are considered.

The jetty and the ship's deck are continually staffed during the HFO transfer and the ship's crew and jetty operators are in continual radio contact. The transfer line is pressure tested before pumping is commenced and pumping is started at one third of the full transfer flowrate. The full transfer flowrate is approximately 1,000 tonnes per hour so the transfer is started at approximately 333 tonnes per hour. It is only when it is confirmed that the transfer is proceeding as planned into the designated tank with no leaks, that the pumping pressure is increased to the full transfer flowrate. If a leak is identified on the continually staffed jetty, there is an agreed call on the radio of 'Stop, stop, stop'. This triggers the immediate shut-off of the transfer pump by the ship's crew. It is estimated that the pump shut-off can be achieved within 30secs to 1min of a leak being identified. An additional 2 minutes of flow is considered in this assessment to allow for residual flow in the line after the pump has been shut off. Therefore it considered that a full rupture of the unloading arm could leak for no more than 3 minutes before flow is stopped. Three minutes of flow at the full transfer rate of 1,000 tonnes per hour equates to 50 tonnes. A very conservative allowance of 10 tonnes is made for the contents of the unloading arm. So it is estimated that in a worst case 60 tonnes of HFO could be released in the very unlikely event of a full bore rupture.

The HFO for transfer from the marine tanker will be in the liquid phase and at a maximum temperature of 60°C.

It is noted that site maximum HFO tank operating temperature is 55˚C however the marine tanker HFO discharge temperature may reach 60˚C.

The release could potentially be mitigated by the sump which is located on the jetty under the unloading arm, and which can contain up to 19m^3 of oil. However due to the high pressure nature of the transfer a significant jetted release is likely and therefore it may not be retained by the sump. Direct release of a significant portion of the 60 tonnes directly into the Estuary is possible in the very unlikely event of a full bore rupture. A release onto the jetty surface could be mitigated by the deployment of available spill containment materials.

Mitigation measures to prevent leaks at source are summarised as follows:

- Unloading arm will receive a comprehensive overhaul or replacement as appropriate, and the supply line to undergo an extensive internal magnetic flux leakage (MSL) inspection.
- The release could potentially be mitigated by the sump which is located on the jetty under the unloading arm, and which can contain up to 19m^3 of oil (sump dimensions are 3.2m x 3m x 2m) - this volume was designed to contain the HFO volume in the marine unloading arm & the transfer pipe section to 1st isolating device (totalling less than 10m^3), as well as additional capacity for spill onto the jetty.
- Before the HFO transfer starts the ESB appointed person (loading master) meets with the Master and chief officer of the vessel. This pre-discharge meeting allows the vessel and facility to agree and document all agreed variables in the unloading - this includes continuous watching-keeping on the ship and on the jetty until the cargo is fully unloaded. The agreed emergency shut down arrangements (i.e. radio call of 'Stop, stop, stop') are confirmed at the pre-discharge meeting.

- When the unloading arm is connected and before the HFO transfer starts the arm connection is pressure tested. Once it is confirmed that it is holding pressure the transfer can start. Under the connection on the oil ship there is a permanently fitted spill tank to capture any spill on board the ship. In addition all deck scuppers are sealed prior to unloading. All safety devices on board the ship are tested prior to berthing at Moneypoint.
- Connection checklist is completed and signed off
- Reduced pumping pressure and flow rate at start-up to ensure there is a clear path to the HFO tanks and the integrity of the system.

Pathways

The identified pathway to the environment is as follows:

a) Direct – in the case of a release at the jetty during the transfer operation the pathway to the Estuary will be direct via jetting or run-off from the surface of the jetty.

Measures to mitigate the leak pathway are set out in the Moneypoint Generation Station Oil Spill Emergency Response Procedure SMS 8.11.06, and are summarised as follows:

- Isolation of the source of the leak (transfer pumping will stopped as outlined in Source section above)
- Spill will be contained using absorbent materials/booms available at designated oil spill response kit on the jetty
- The severity of the spill will be assessed by the site's Operational Team Leader. In the event of a lower severity spill such that the spill can be contained on site, additional station personnel will be dispatched to the jetty/shoreline to minimise the damage by further isolating the source, isolating drains, using additional oil absorbent materials to contain the spill, and monitoring interceptors
- Full review of HFO unloading and emergency spill procedures is presently taking place to ensure compliance with EU shipping regulations and will ensure an appropriate holding of spill response materials for Shannon Estuary protection.
- In the event of a higher severity spill that results in a release or significant risk of release to the Shannon Estuary, contact is made immediately with Shannon Estuary Anti-Pollution Team (SEA-PT) and the Harbour Master. The SEA-PT Oil Spill Plan and the ESB Major Incident Plan are activated. SEA-PT will contact both Clare and Kerry County Councils.

The SEA-PT Oil Spill Plan has been prepared to current industry best practice standards and to comply with the requirements of the Irish Coast Guard. It has received formal approval by the Irish Coast Guard. SEA-PT has a number of response options available, depending on the circumstances of the spill. These include use of booms, skimmers (mechanical, vacuum, oleophilic) and absorbents for containment and collection of the oil.

Receptors

The identified environmental receptor is as follows:

a) Shannon Estuary – this receptor is the most significant with respect to its vulnerability. Refer to prior description of Shannon Estuary above.

3.4.3 Qualitative Assessment of Extent and Severity of the Environmental Consequences

1. General

From the above source-pathway-receptor discussion in Section 3.4.2 it is concluded that the most significant environmental consequence is the potential for released HFO to be released into the Shannon Estuary. There is limited potential for the release to migrate into onsite soil and underlying ground water. In the case of ground water contamination the ultimate receptor is the Estuary due to the direction of groundwater flow in the area. Airborne releases of combustion gases will be quickly dispersed and the effects will be short-lived.

With reference to the HSA TLUP Guidance and the topographical information shown on the Proposed Site Layout drawing provided in Attachment 2, a semi-quantitative assessment of potential spread of HFO across the site was undertaken. It was estimated that a 50% overtopping of a HFO tank contents could spread out to create a layer of approx. 7cm before reaching the shoreline. As set out in Section 3.4.2 (Overground Pathway section) the kerbing at the roadway running along the south of the site is expected to provide tertiary containment to a height of at least 7cm. Also containment devices would be deployed as tertiary containment at the shoreline as required, to prevent the HFO flowing overground into the Shannon Estuary.

It was also concluded that by closing the outlet valves from the main site interceptors, that the flow of HFO through the drainage system to the surface water outfalls, could be impeded. Firewater generated would be contained within the HFO bunds through successful implementation of the site's alternative fire-fighting strategy to minimise generation of fire water.

So although there is the *potential* for very significant volumes of both HFO and firewater to be generated under catastrophic release conditions and significant *potential* for considerable volumes of these releases to reach the Estuary it is considered that the mitigation measures described in Section 3.4.2 demonstrate that this risk is being managed to as low as is reasonable practicable.

2. Relevant Properties of Heavy Fuel Oil (HFO)

The relevant hazard statements, ecological and physico-chemical properties of HFO with respect to an environmental release, based on Safety Data Sheet information, are summarised in Table 3.13 below:

Table 3.13: *Relevant Hazard statements, Ecological and physico-chemical properties of Heavy Fuel Oil (HFO)*

Property	Description
Hazard Statements	H410: Very toxic to aquatic life with long lasting effects H400: Very toxic to aquatic life
Appearance	Brown to Black. Viscous Liquid.
Odour	Hydrocarbon / Oily
Density	0.97 to 1.01 g/cm^3 at 15 ºC
Water Solubility	Negligible, Predominantly Hydrophobic
n-octanol/water partition coefficient (log Pow)	3 - 7
Acute Toxicity	Expected to be very toxic: LL/EL/IL50 < 1mg/l (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract) Fish: Harmful: LL/EL/IL50 10-100mg/l Aquatic Invertebrates: Toxic: LL/EL/IL50 1-10mg/l Algae: Very Toxic: LL/EL/IL50 < 1 mg/l Microorganisms: Expected to be practically non-toxic: LL/EL/IL50 > 100mg/l
Chronic Toxicity	Fish: NOEC/NOEL > 0.01 ≤ 0.1mg/l Invertebrates: NOEC/NOEL > 0.1 ≤ 1mg/l
Persistence and degradability	The volatile constituents will oxidise rapidly by photochemical reactions in air. Major constituents are inherently biodegradable.
Bioaccumulative Potential	Contains constituents with the potential to bioaccumulate
Mobility	Partly evaporates from water or soil surfaces, but a significant proportion will remain after one day. Large volumes may penetrate soil and could contaminate groundwater. May accumulate in sediments. Sinks in fresh water, but will float on seawater and form a slick. Contains volatile constituents
Result of the PBT and vPvB assessment	The substance does not fulfil all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB
Other Adverse Effects	Films formed on water may affect oxygen transfer and damage organisms. May cause physical fouling of aquatic organisms.

Another relevant property with respect to heavy fuel oil is its limited flow potential at lower temperatures. A publication by HELCOM[2] suggests the pour point (the temperature below which the oil becomes a semi-solid and will not flow) for heavy fuel oils is often 30ºC or higher, and therefore many heavy fuel oils will act as viscous semi-solids after being spilled and cooled at ambient temperatures.

[2] Baltic Marine Environment Protection Commission - Helsinki Commission (HELCOM) (2004) Guidance on Issues to High Density/Heavy Oil. HELCOM Response 4/2004.

3. Ecological Effects of Environmental Releases of HFO

As described above, the Shannon Estuary is a designated SAC and SPA, and therefore has high ecological value. A significant release of HFO to the Shannon Estuary could affect the habitats, flora and fauna in a number of different ways including:

Toxic effects, both acute and chronic: HFO is classified as very toxic to aquatic organisms.

Physical contact effects: Oil can cause physical fouling of birds and aquatic organisms. With respect to birds, in the event of an oil spill, the oil coats their feathers, hampering their ability to fly, float and stay warm. Oil can be transferred from birds' plumage to the eggs they are hatching. Oil can smother eggs by sealing pores in the eggs and preventing gas exchange. It affects other animals such as otters as they won't be able stay warm if they can't clean their fur. Freshwater organisms are at risk of being smothered by oil that is carried by the current. A film formed on water may also affect oxygen transfer resulting in damage to organisms.

Destruction of habitats and food resources: Oil spilled in rivers often collects along the banks, where the oil clings to plants and grasses. The animals that ingest these contaminated plants may also be affected. The number of bird breeding and the nestling habitats can be reduced by an oil spill. Species that are not directly in contact with oil can be harmed by a spill. Predators that consume contaminated prey can be exposed to oil through ingestion. As oil contamination gives fish and other animals an unpleasant taste and smell, predators can refuse to eat their prey and begin to starve. Sometimes, a local population of prey organisms are destroyed, leaving no food resources for predators. Oil floats on water and affects those animals who live on or at the surface of the water or the surrounding land. Some components of HFO have the potential to bioaccumulate, which means that harmful components could be concentrated in the food chain. However based on safety data sheet information, while some constituents have the potential to bioaccumulate, HFO does not fulfil all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT (Persistent Bioaccumulative and Toxic) or vPvB (very Persistent and very Bioaccumulative)

Due to the very toxic nature of HFO in the aquatic environment (Hazard Statements H400/H410) and high sensitivity of the Shannon Estuary as a SAC and SPA, it is considered that the severity and duration of effects could be very high with respect to vulnerable habitats, flora and fauna.

4 Technical Land-use Planning Impacts

4.1 Individual Risk of Fatality

Based on the consequence modelling results in Section 3 of this report it is concluded that there are no Land-use Planning implications because there is no risk of off-site fatality identified.

4.2 Societal Risk of Fatality

Section 1.7 of HSA TLUP Guidance has been reviewed for consideration of Societal Risk. This section of the guidance states that *there are times when the risk of multiple fatalities from an accident – societal risk – should be taken into account more explicitly* (i.e. than is considered when assessing individual risk).

However since there is no risk of off-site fatality identified there is correspondingly no identified societal risk.

4.3 MATTE Risk

With reference to Section 3.4 of this report a Major Accident to the Environment (MATTE) has been considered with respect to the criteria set out in Schedule 6 of the Chemical Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015, for notification of a major accident to the European Commission.

It is considered that a release to the Shannon Estuary from one of the two representative worst-case environmental release scenarios identified, could fall under the following reportable category and constitute a MATTE:

> *3. Immediate damage to the environment*
>
> *significant or long-term damage to freshwater and marine habitats(*)*
>
> *— 2 ha or more of a coastline or open sea,*

Under Section 1.8 of the HSA TLUP Guidance it is required to categorise potential MATTEs in accordance with the CDOIF methodology[3]. With reference to this methodology it is considered that the above reportable category corresponds to the following CDOIF Categories:

- Severity of Harm Category of 2: Severe
  - Receptor Type – Marine
  - Extent of Impact - 2-20ha littoral or sublittoral zone, 100-1000ha of open sea benthic community, 100-1000 dead sea birds (500-5000 gulls), 5-50 dead/significantly impaired sea mammals
- Harm Duration Category of 3: Long Term
  - Surface Water – greater than 10 years

These categories lead to an overall MATTE categorisation of MATTE B.

The likelihoods of the two representative worst-case environmental release scenarios are considered as follows:

a) Catastrophic HFO tank failure – 4.95 x 10^{-6} per year (Table 44 of HSA TLUP Guidance**)**

[3] https://www.sepa.org.uk/media/219154/cdoif_guideline__environmental_risk_assessment_v2.pdf, last accessed 03.01.2024

b) HFO release due to rupture of an unloading arm - 3 x 10^{-8} per hour (Table 52 of HSA TLUP Guidance**)**

There could be up to 24 HFO deliveries to site per year and each unloading operation takes approximately 24 hours to complete – i.e. approximately 576 unloading hours per year.

Therefore the likelihood of a loss of containment at the delivery arm is taken as 1.7 x 10^{-5} per year.

Therefore the overall risk is:

4.95 x 10^{-6} per year x 4 tanks = 2 x 10^{-5} per year

+ 1.7 x 10^{-5} per year

= 3.7 x 10^{-5} per year

This likelihood exceeds the broadly acceptable risk level for a MATTE B set out in Table 6 of the HSA TLUP Guidance. However significant Additional Technical Measures to sufficiently mitigate the risk are to be put in place as set out in Section 3.4.2, and summarised in Section 5.

5 Additional Technical Measures

With reference to Section 4 of this report it is concluded that the level of risk associated with the potential for a MATTE warrants the implementation of Additional Technical Measures to mitigate the risk.

Significant safety and environmental protection measures will be taken as part of the HFO project, outlined as follows:

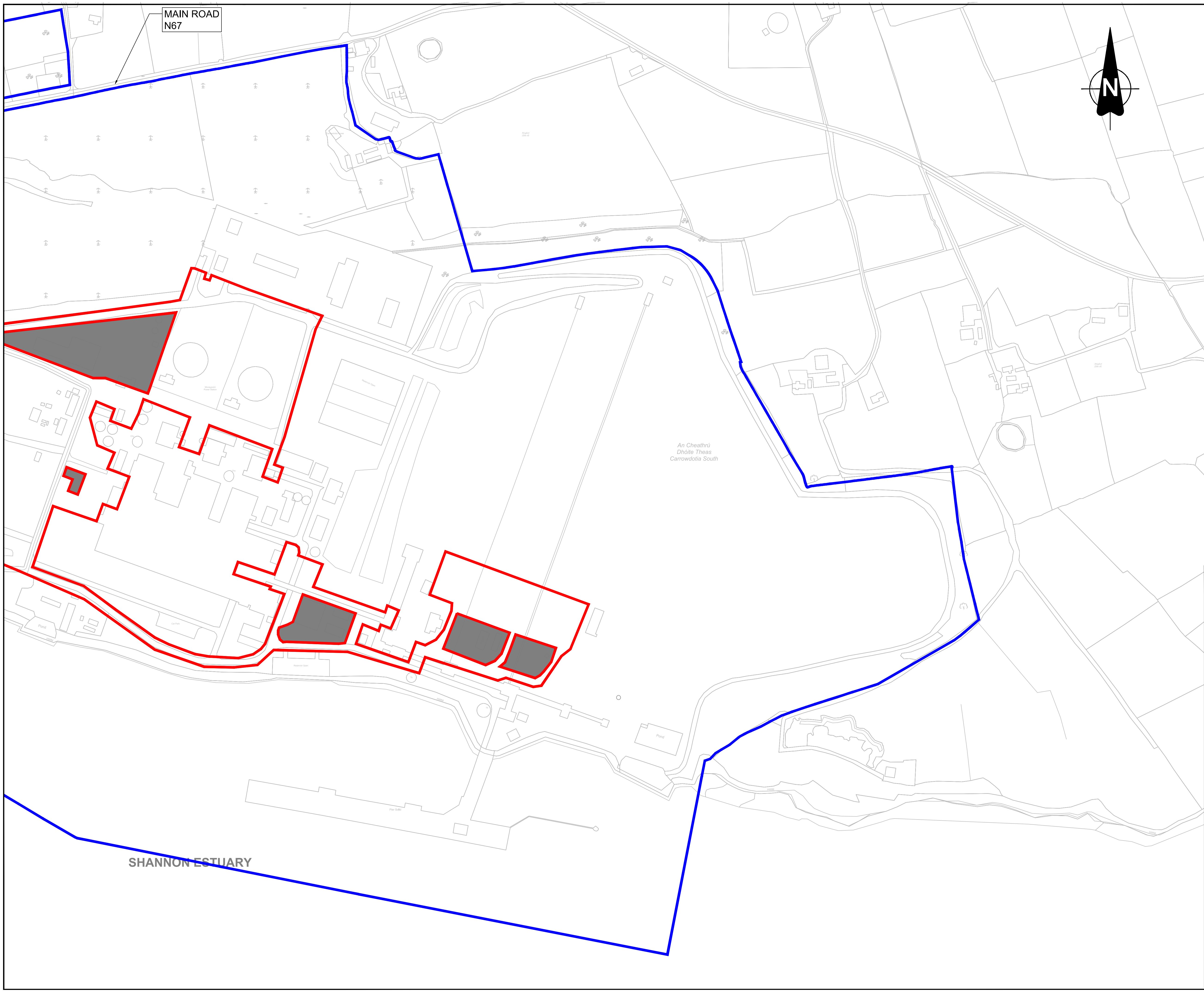
- The design and construction of the two new HFO tanks and associated pipework & controls, to be carried out to current best practice engineering standards (EN.14015:2004 Specification for manufacture of vertical steel welded non-refrigerated storage tanks with butt-welded shells for the petroleum industry). The design to be carried out by specialist contractors with extensive experience in the provision of large tanks to the petroleum industry.
- All new fuel pipelines (HFO and Diesel) to be located above ground to minimize corrosion potential and facilitate NDT testing.
- The 2 no. HFO bunds will be fully upgraded with raised bund walls and concrete floors for environmental protection. In the design of the upgraded bunds there is sufficient capacity in each bund to retain one tank rupture and 90mins of firewater generation (cooling and firefighting).

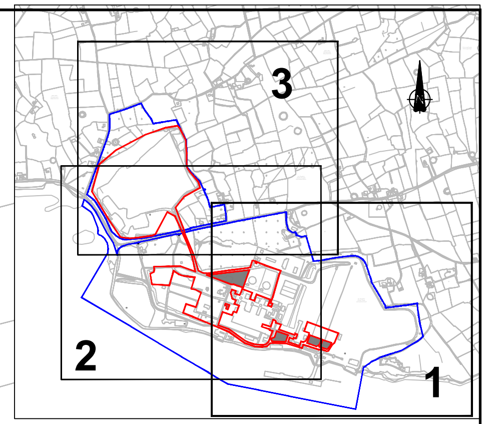
  An additional freeboard has been designed in accordance with CIRIA Guidance C736 Containment Systems for the prevention of pollution (2014) and equates to an additional 250mm of bund wall height, on top of the standard height that allows retention capacity for the largest tank. The CIRIA guidance recommends this additional 250mm of freeboard as a surge allowance to minimise overtopping potential.
- A control interlock modification to be implemented as part of the HFO project to ensure that the HFO tanks cannot be heated above 55˚C. This control modification is to be implemented on all tanks - the two existing and the two new HFO Tanks. The current high temperature alarms are to be adjusted down below the interlock setting of 55˚C, with an independent high-high alarm on each tank set at 55˚C.
- New fire-fighting detection systems to be installed in both HFO forwarding pump houses.
- Full life-time assessment and inspection program are presently being carried out on all HFO, Diesel, Propane and Auxiliary Steam pipework.
- Unloading arm to receive a comprehensive overhaul or replacement as appropriate, and the supply line to undergo an extensive internal magnetic flux leakage (MSL) inspection.
- The site Emergency Response Plan already includes/ to include the following:
  - An alternative HFO fire-fighting strategy that minimises firewater generation and retains it within the bunds
  - Closing outlets valves on surface water drainage system interceptors as appropriate in the event of bund overtopping
  - Deployment of tertiary containment devices as appropriate at the southern shoreline to prevent HFO travelling overground into the Estuary in the event of bund overtopping
  - Full review of HFO unloading and emergency spill procedures currently taking place to ensure compliance with EU shipping regulations and will ensure an appropriate holding of spill response materials for Shannon Estuary protection.

6 Conclusion

Based on the Technical Land-use Planning assessment presented in this report, and in particular the inclusion of the additional technical measures set out in Sections 3.4.2 and 5, it is concluded that the risk of a major accident at the ESB Moneypoint site as a result of the proposed development is acceptably low with respect to the Land-use Planning criteria (as set out in the HSA TLUP Guidance).

Attachment 1
Site Location Drawings





KEYPLAN
SCALE N.T.S.

LEGEND:

- PLANNING APPLICATION BOUNDARY
- OWNERSHIP BOUNDARY
- AREA OUTSIDE PLANNING APPLICATION BOUNDARY

NOTES:

1. CO-ORDINATES TO ITM GRID.
2. LEVELS TO MALIN HEAD DATUM.
3. ALL DIMENSIONS ARE IN METERS. NO DIMENSIONS SHALL BE SCALED FROM THE DRAWINGS.

SCALE 1:2500
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O.S.I. 1:5000 VECTORS TILE NUMBERS 4789 & 4790 ARE SHOWN ON THIS DRAWING

REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP
000	12.2023	ISSUED FOR PLANNING	AB	HG	ED	JH

PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED

CLIENT APPROVAL ☐ PLANNING ☒ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

CLIENT
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PROJECT
MONEYPOINT SECURITY OF SUPPLY PROJECT

CONTRACT

DRAWING TITLE
SITE LOCATION
SHEET 1 OF 3

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A. Butur	H.Griffin	E. Dunphy	J. Haverty	Dec 2023
CLIENT REF		NO. OF SHTS	SIZE	SCALE
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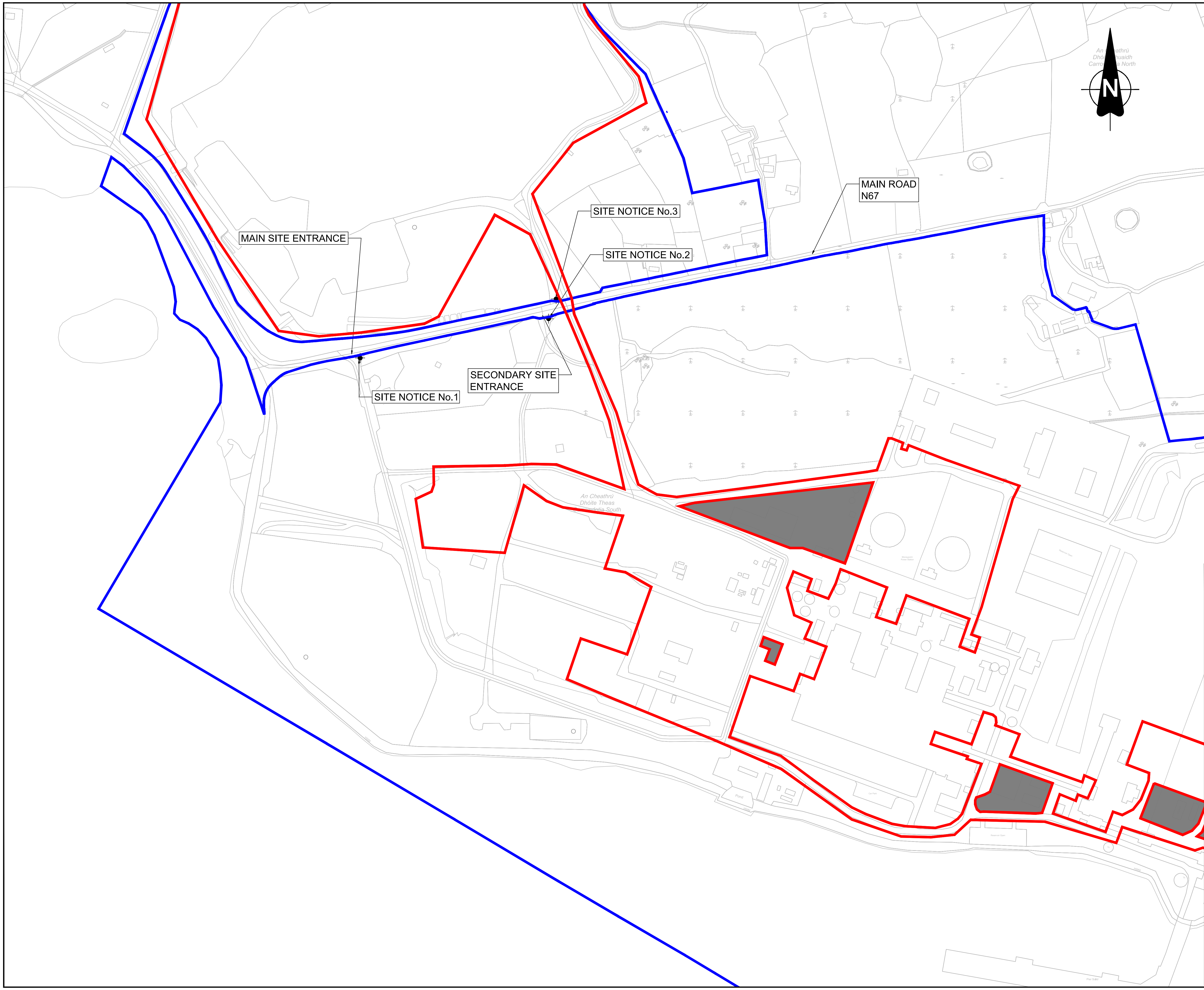
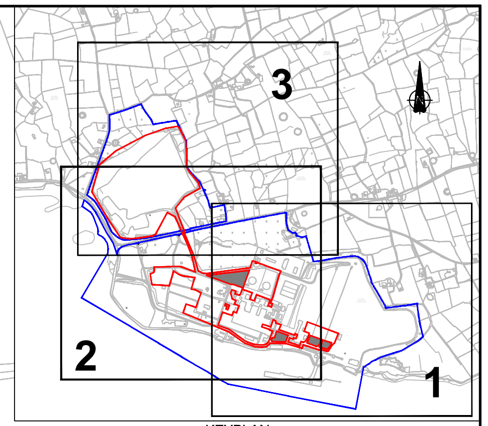
DRAWING NUMBER	SHEET	REV
QP-000017-65-D451-002-001-000		





KEYPLAN
SCALE N.T.S.

LEGEND:

- PLANNING APPLICATION BOUNDARY
- OWNERSHIP BOUNDARY
- AREA OUTSIDE PLANNING APPLICATION BOUNDARY

NOTES:

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CLIENT
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CONTRACT

DRAWING TITLE
SITE LOCATION
SHEET 2 OF 3

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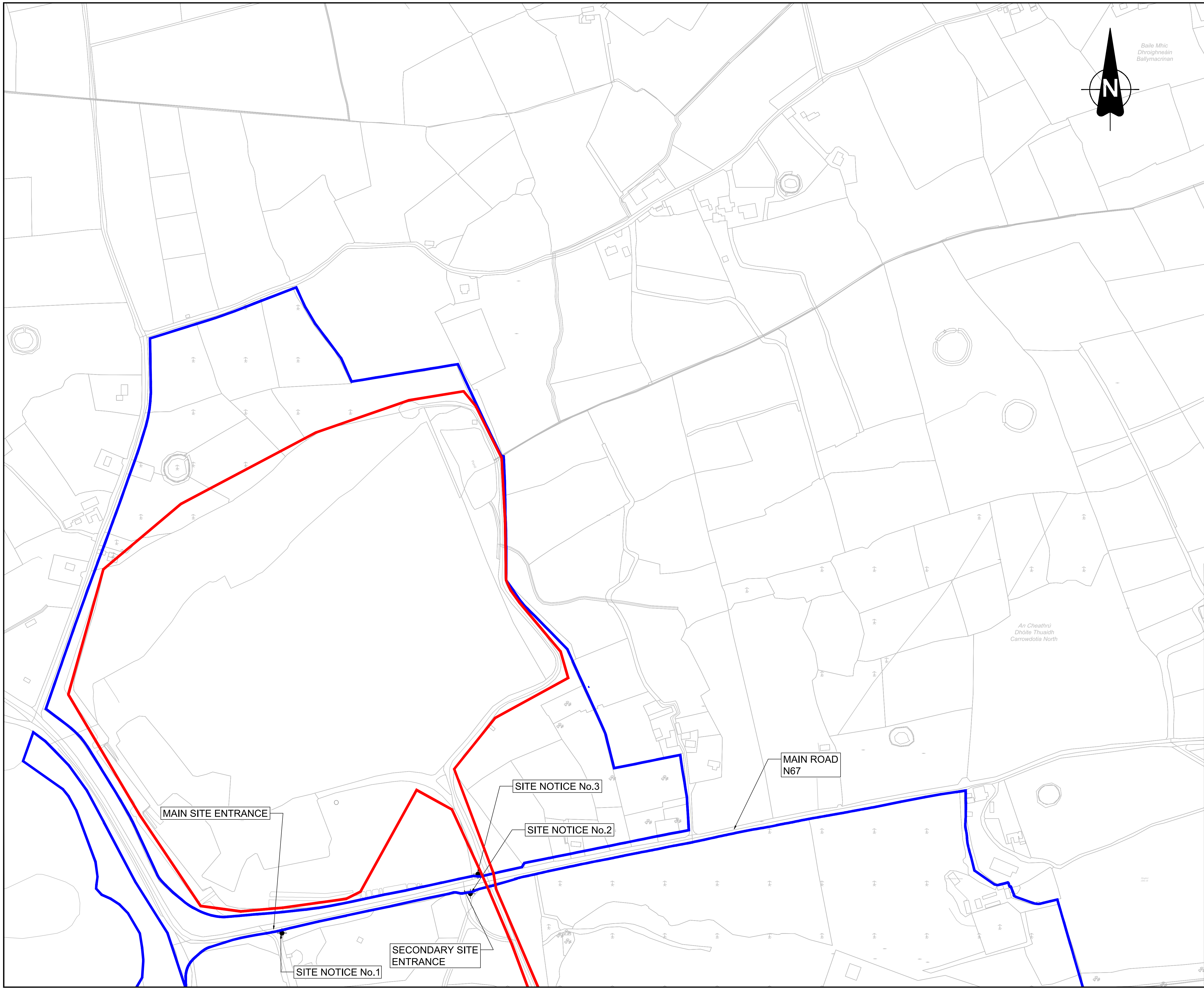

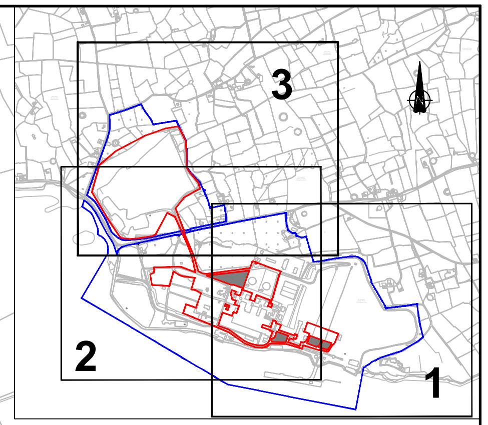

KEYPLAN
SCALE N.T.S.

LEGEND:

- PLANNING APPLICATION BOUNDARY
- OWNERSHIP BOUNDARY
- AREA OUTSIDE PLANNING APPLICATION BOUNDARY

NOTES:

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SITE LOCATION
SHEET 3 OF 3

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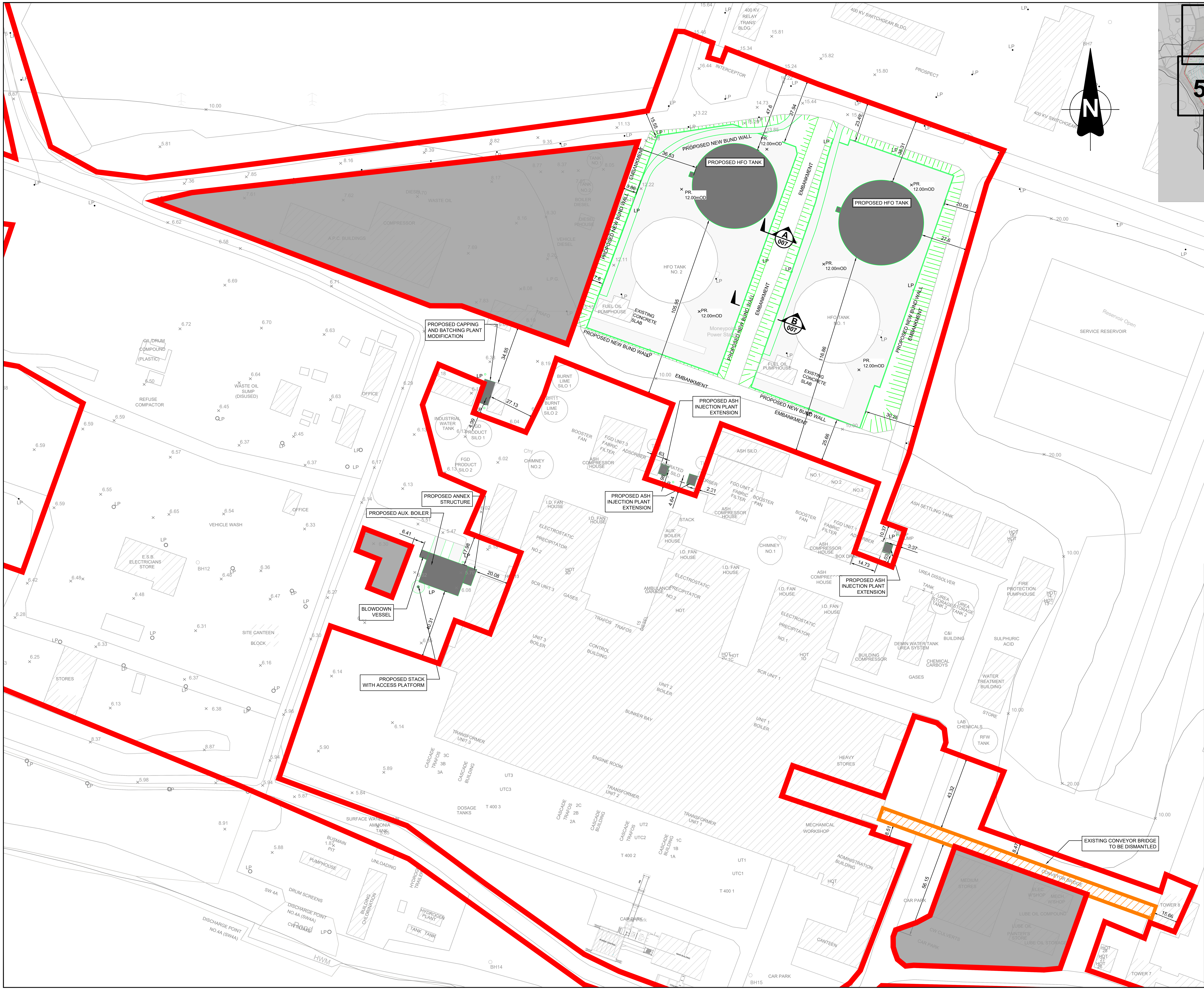
QP-000017-65-D451-002-003-000		

Attachment 2
Proposed Site Layout Drawing



KEYPLAN
SCALE N.T.S.

LEGEND:

- PLANNING APPLICATION BOUNDARY
- AREA OUTSIDE PLANNING APPLICATION BOUNDARY
- WIND TURBINE
- WIND TURBINE HARDSTAND
- EXISTING WOODLAND
- EXISTING BUILDINGS
- EXISTING ROADS
- EXISTING TANKS
- LP EXISTING LIGHTING
- PROPOSED STRUCTURES/ DEVELOPMENT
- PROPOSED ROADS/ HARDSTANDING
- STRUCTURES PROPOSED FOR DISMANTLING
- LP PROPOSED LIGHTING
- BH28 BOREHOLE LOCATIONS (HISTORICAL)
- ×12.00 EXISTING LEVEL
- ×PR. 12.00 PROPOSED LEVEL
- PROPOSED ASH STORAGE AREA CONTOURS
- EMBANKMENT PROPOSED TO BE MODIFIED

SCALE 1:1000
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O.S.I. 1:5000 VECTORS TILE NUMBERS 4789 & 4790 ARE SHOWN ON THIS DRAWING

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DRAWING TITLE
PROPOSED SITE LAYOUT
SHEET 2 OF 6

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CLIENT REF	NO. OF SHTS	SIZE	SCALE
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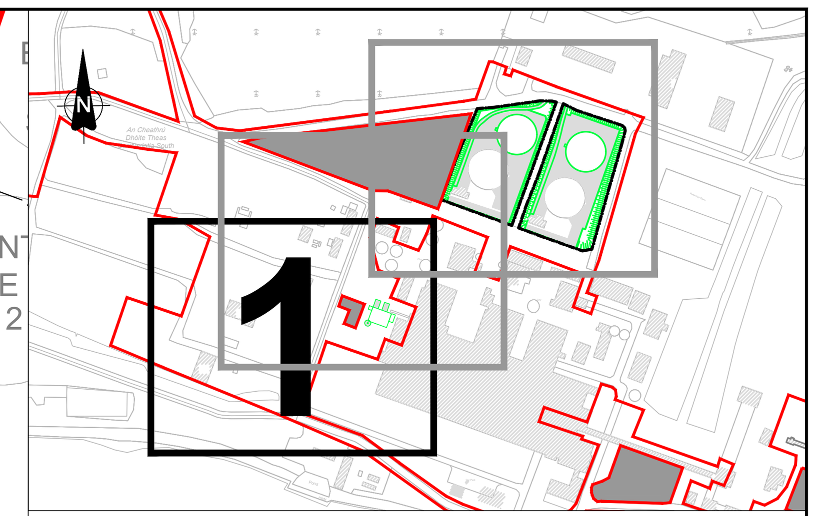
DRAWING NUMBER | SHEET | REV
QP-000017-65-D451-006-002-000

Attachment 3
Proposed Drainage Plan Drawings



KEY PLAN:

SCALE: N.T.S.

NOTES:

1. DRAWING ONLY DISPLAYS SURFACE WATER DRAINAGE NETWORK SW2 FOR CLARITY AS THIS NETWORK SHALL BE CONNECTED INTO FROM MODIFIED HFO BUND AND PROPOSED AUXILIARY BOILER HOUSE

LEGEND

EXISTING SURFACE WATER DRAINS CONNECTING FROM PROPOSED DEVELOPMENT AREAS TO OUTFALL	EXS
SURFACE WATER MANHOLE	SW 1
EX. GULLY	GY
OIL INTERCEPTOR	
PROPOSED SURFACE WATER	
CONCRETE ENCASED SURFACE WATER	
PROPOSED SURFACE WATER MANHOLE	SW 1
PROPOSED GULLY	GY
PROPOSED ACO	
PROPOSED AJ	AJ
PROPOSED RWP	RWP
PROPOSED CATCHPIT	CP
PROPOSED LAND DRAIN	
PROPOSED WATER SUPPLY	W
PROPOSED PROCESS WATER DISCHARGE	
PROPOSED STRUCTURES/ DEVELOPMENT	
PROPOSED ROADS/ HARDSTANDING	

SCALE 1:500

0 10 20 50

O.S.I. 1:5000 VECTORS TILE NUMBERS 4789 & 4790 ARE SHOWN ON THIS DRAWING

REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP
000	12.2023	ISSUED FOR PLANNING	AB	HG	ED	JH

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CLIENT APPROVAL ☐ PLANNING ☒ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

CLIENT: ESB GENERATION & TRADING

PROJECT: MONEYPOINT SECURITY OF SUPPLY PROJECT

CONTRACT:

DRAWING TITLE: PROPOSED DRAINAGE PLAN SHEET 1 OF 3

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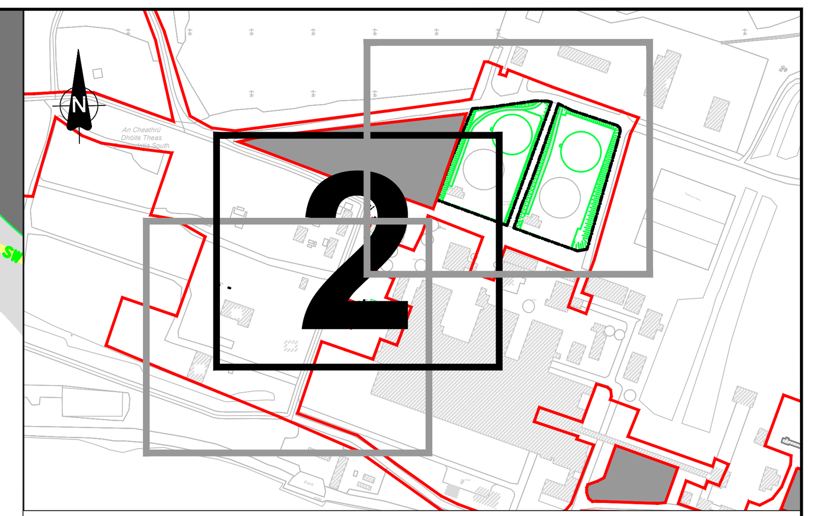
CLIENT REF		NO. OF SHTS: 3	SIZE: A1	SCALE: 1:500

DRAWING NUMBER	SHEET	REV
QP-000017-65-D451-009-001-000		



KEY PLAN:

SCALE: N.T.S.

NOTES:

1. DRAWING ONLY DISPLAYS SURFACE WATER DRAINAGE NETWORK SW2 FOR CLARITY AS THIS NETWORK SHALL BE CONNECTED INTO FROM MODIFIED HFO BUND AND PROPOSED AUXILIARY BOILER HOUSE

LEGEND

EXISTING SURFACE WATER DRAINS CONNECTING FROM PROPOSED DEVELOPMENT AREAS TO OUTFALL	EXS
SURFACE WATER MANHOLE	SW 1
EX. GULLY	GY
OIL INTERCEPTOR	
PROPOSED SURFACE WATER	
CONCRETE ENCASED SURFACE WATER	
PROPOSED SURFACE WATER MANHOLE	SW 1
PROPOSED GULLY	GY
PROPOSED ACO	
PROPOSED AJ	AJ
PROPOSED RWP	RWP
PROPOSED CATCHPIT	CP
PROPOSED LAND DRAIN	
PROPOSED WATER SUPPLY	W
PROPOSED PROCESS WATER DISCHARGE	
PROPOSED STRUCTURES/ DEVELOPMENT	
PROPOSED ROADS/ HARDSTANDING	

SCALE 1:500

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CLIENT: ESB GENERATION & TRADING

PROJECT: MONEYPOINT SECURITY OF SUPPLY PROJECT

CONTRACT

DRAWING TITLE: PROPOSED DRAINAGE PLAN SHEET 2 OF 3

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DRAWING NUMBER	SHEET	REV
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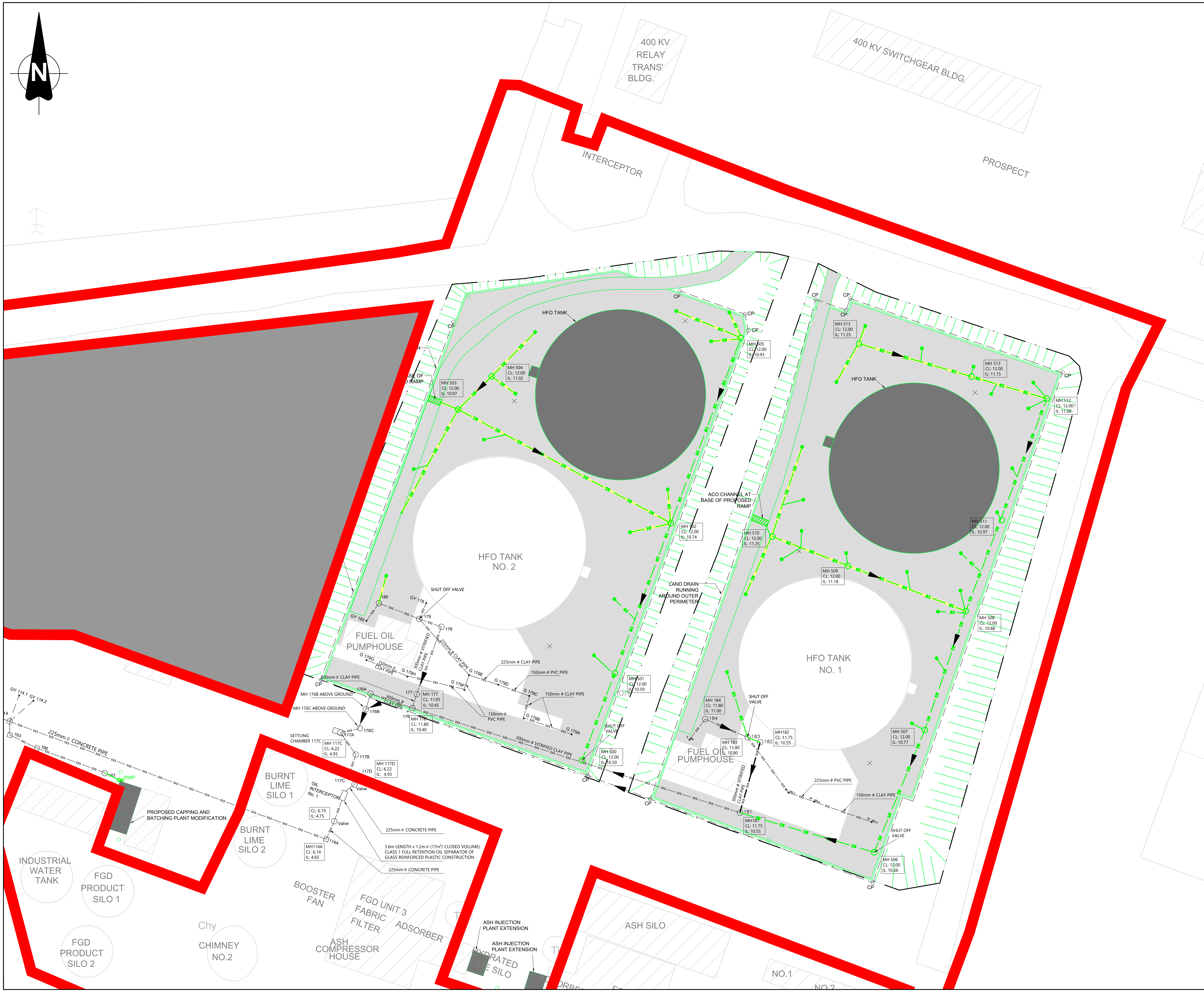

KEY PLAN:

SCALE: N.T.S.

NOTES:

1. DRAWING ONLY DISPLAYS SURFACE WATER DRAINAGE NETWORK SW2 FOR CLARITY AS THIS NETWORK SHALL BE CONNECTED INTO FROM MODIFIED HFO BUND AND PROPOSED AUXILIARY BOILER HOUSE

LEGEND

EXISTING SURFACE WATER DRAINS CONNECTING FROM PROPOSED DEVELOPMENT AREAS TO OUTFALL	EXS
SURFACE WATER MANHOLE	SW 1
EX. GULLY	GY
OIL INTERCEPTOR	
PROPOSED SURFACE WATER	
CONCRETE ENCASED SURFACE WATER	
PROPOSED SURFACE WATER MANHOLE	SW 1
PROPOSED GULLY	GY
PROPOSED ACO	
PROPOSED AJ	AJ
PROPOSED RWP	RWP
PROPOSED CATCHPIT	CP
PROPOSED LAND DRAIN	
PROPOSED WATER SUPPLY	W
PROPOSED PROCESS WATER DISCHARGE	
PROPOSED STRUCTURES/ DEVELOPMENT	
PROPOSED ROADS/ HARDSTANDING	

SCALE 1:500

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CLIENT
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PROJECT
MONEYPOINT SECURITY OF SUPPLY PROJECT

CONTRACT

DRAWING TITLE
PROPOSED DRAINAGE PLAN
SHEET 3 OF 3

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