

Appendix 12A  
Flood Risk Assessment

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# SSE Tarbert Next Generation Power Station

Environmental Impact Assessment Report (EIAR)  
Volume II

Appendix 12A Flood Risk Assessment  
SSE Generation Ireland Limited

November 2023

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## Table of Contents

1.	Introduction .....	5
1.1	Scope of Services .....	6
2.	Site Information .....	7
2.1	Summary of the Proposed Development .....	8
2.2	Site Topography .....	9
2.3	Local Hydrology .....	11
2.4	Utilities .....	11
3.	Stage 1 - Flood Risk Identification .....	12
3.1	Hydrometric Data .....	13
3.2	Office of Public Works Hazard Maps .....	14
3.3	Geological Survey Mapping .....	15
3.4	OPW Land Benefitting Maps .....	15
3.5	Tarbert Flood Defence Scheme .....	16
3.5.1	Initial Flood Defence Proposal .....	16
3.5.2	Revised Flood Defence Scheme .....	17
3.6	Catchment Flood Risk Assessment and Management Mapping .....	18
3.6.1	Fluvial Mapping .....	18
3.6.2	Coastal Mapping .....	18
3.6.3	Pluvial Mapping .....	21
3.7	Reservoirs / Artificial Sources .....	21
3.8	Screen Assessment Conclusion .....	22
4.	Stage 2 – Initial Flood Risk Assessment .....	23
4.1	Determination of Vulnerability .....	23
4.2	Determination of Flood Zone .....	24
4.3	Justification Test Requirement .....	25
4.3.1	Coastal Flooding .....	26
4.3.1.1	Present Day .....	26
4.3.1.2	Climate Change .....	28
4.3.1.3	Tarbert Flood Defence Scheme .....	29
4.3.2	Pluvial Flooding .....	29
4.4	Stage 2 Flood Assessment Conclusion .....	29
5.	Conclusion .....	31
5.1	Next Steps .....	31
6.	References .....	33
	Appendix A Topographic Surveys .....	34
	Appendix B Utilities Information .....	35
	Appendix C Proposed Flood Defence .....	36

## Plates

Plate 1: Site Location .....	5
Plate 2: Existing site layout .....	7
Plate 3: Proposed Development Site layout.....	8
Plate 4: Proposed Development layout.....	8
Plate 5: Topographical Survey (Mott MacDonald, 2009) .....	9
Plate 6: Topographical Survey (Murphy Geospatial, 2023) .....	10
Plate 7: Watercourses .....	11
Plate 8: Hydrometric Gauges .....	13
Plate 9: OPW Past Flood Events Map .....	14
Plate 10: Geological Survey Map (Source: Geological Survey Ireland) .....	15
Plate 11: Tarbert Power Plant – Flood Defence Strategy (Mott MacDonald, 2010).....	16
Plate 12: Tarbert Power Plant – Flood Defence Strategy (AECOM, 2023).....	17
Plate 13: Shannon CFRAM Study boundary .....	19
Plate 14: CFRAM Present Day Coastal Flood Model Extents .....	20
Plate 15: Proposed Development CFRAM Present Day Coastal Flood Extents .....	21
Plate 16: Shannon CFRAM Study Coastal flood depths 0.5% AEP .....	27
Plate 17: Mid-Range Future Climate Change Scenario Coastal Flood Map .....	28

## Tables

Table 1: Possible Flood Mechanisms .....	22
Table 2: Classification of Vulnerability .....	23
Table 3: Flood Zone Description.....	24
Table 4: Justification Test Matrix.....	25
Table 5: Shannon CFRAM Study; Tarbert Power Station .....	26
Table 6: Shannon CFRAM Study; Tarbert Power Station .....	28

# 1. Introduction

AECOM have been appointed by SSE Generation Ireland Limited (“the Applicant”) to undertake a Flood Risk Assessment to inform the Environmental Impact Assessment Report (EIAR) for a development at SSE Tarbert Power Station (“SSE Tarbert”). The Applicant are seeking planning permission for a proposed Open Cycle Gas Turbine (OCGT) power plant, administrations building, workshop, and ancillary plant, site works and services (herein referred to as the ‘Proposed Development’). The location of the Proposed Development site is shown in Plate 1. The Site of the Proposed Development is located within the boundary of the existing SSE Tarbert, in Tarbert, County Kerry (Co. Kerry).



Plate 1: Site Location

## 1.1 Scope of Services

AECOM is required to undertake a Site-Specific Flood Risk Assessment (FRA) for the Proposed Development.

This FRA study has been undertaken in consideration of the following guidance document:

- *'The Planning System and Flood Risk Management – Guidelines for Planning Authorities'* DOEHLG 2009.

The assessment will demonstrate that the Proposed Development will:

1. Not increase flood risk elsewhere and, if practical, will reduce overall flood risk.
2. Include measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible; and
3. Include measures to ensure that residual risks to the area, and/or development can be managed to an acceptable level.

## 2. Site Information

The Proposed Development Site is located approximately 2km north of Tarbert town, Co. Kerry (ITM of (X) 507508 (Y) 649652). The existing Site layout is shown in Plate 2.

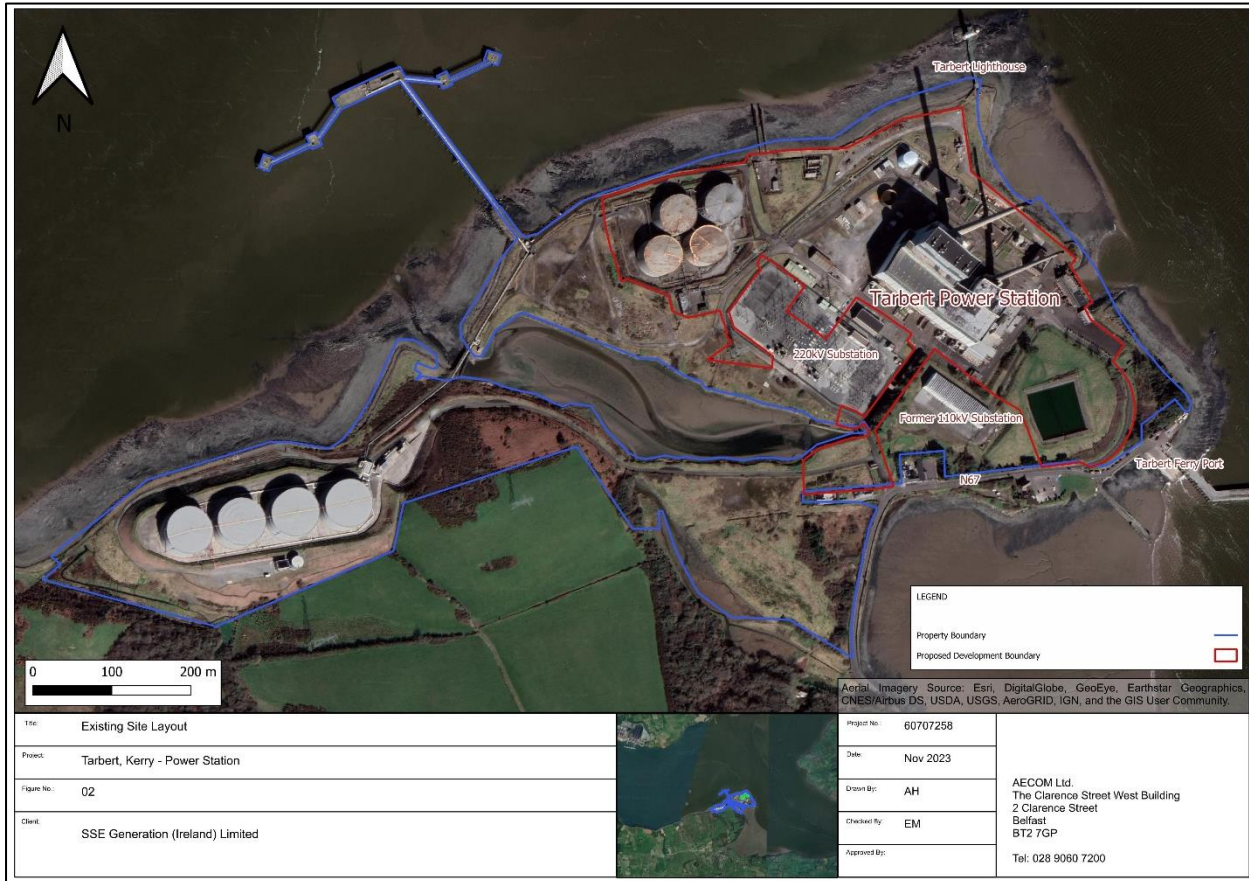


Plate 2: Existing site layout



## 2.1 Summary of the Proposed Development

The Proposed Development involves the installation and associated works of an OCGT power plant (350MW) fuelled by Hydrotreated Vegetable Oil (HVO), and to include an administration building, workshop, ancillary plant, site works and services. The Proposed Development Site layout is shown in Plate 3 and Plate 4.



Plate 3: Proposed Development Site layout

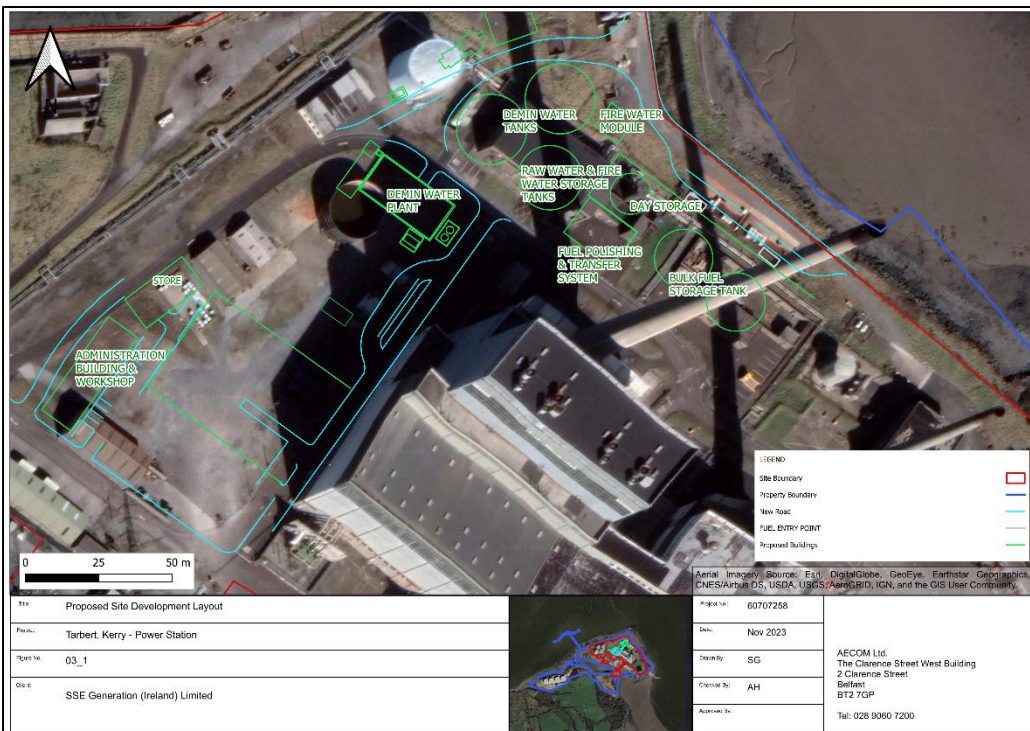


Plate 4: Proposed Development layout

## 2.2 Site Topography

A topographical survey was conducted by Mott MacDonald in 2009 which covered the existing SSE Tarbert site and indicates that the Proposed Development area is between 6.0mAOD and 6.8mAOD (Poolbeg Lighthouse datum). The Proposed Development area appears to gradually decrease towards the sea (north).

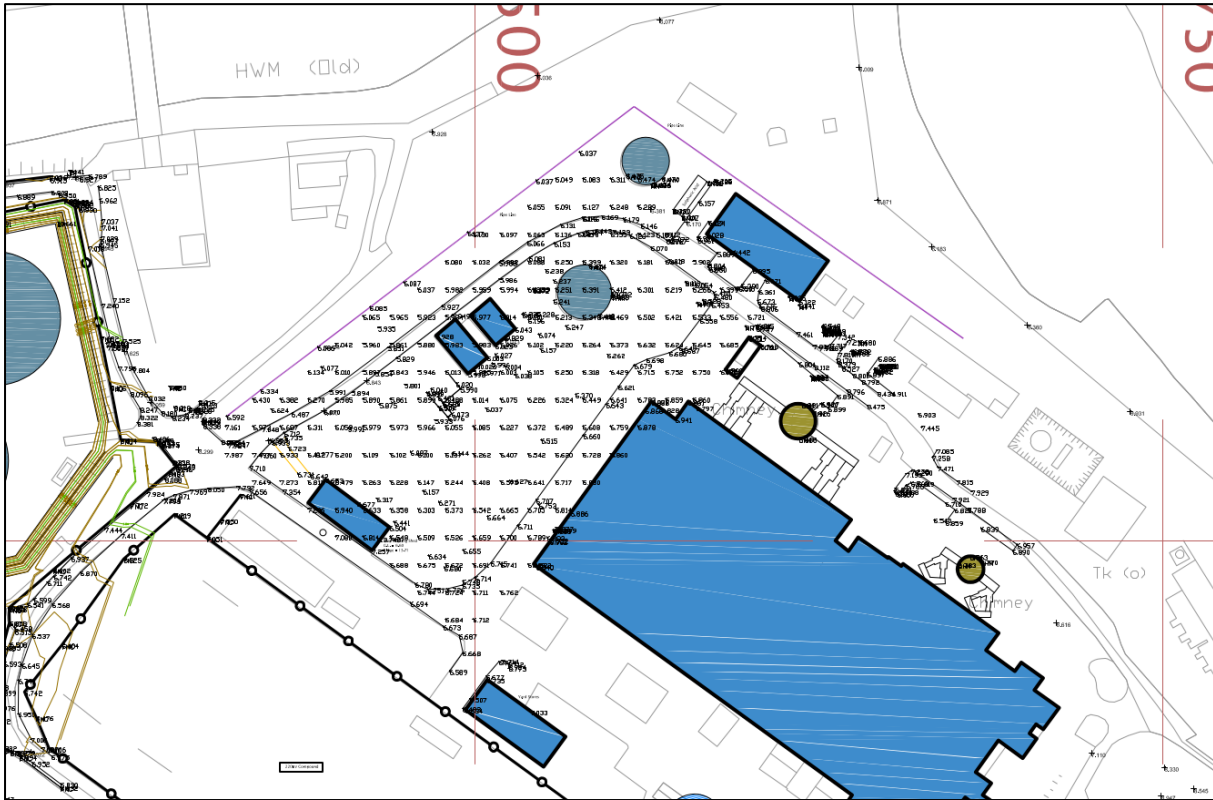
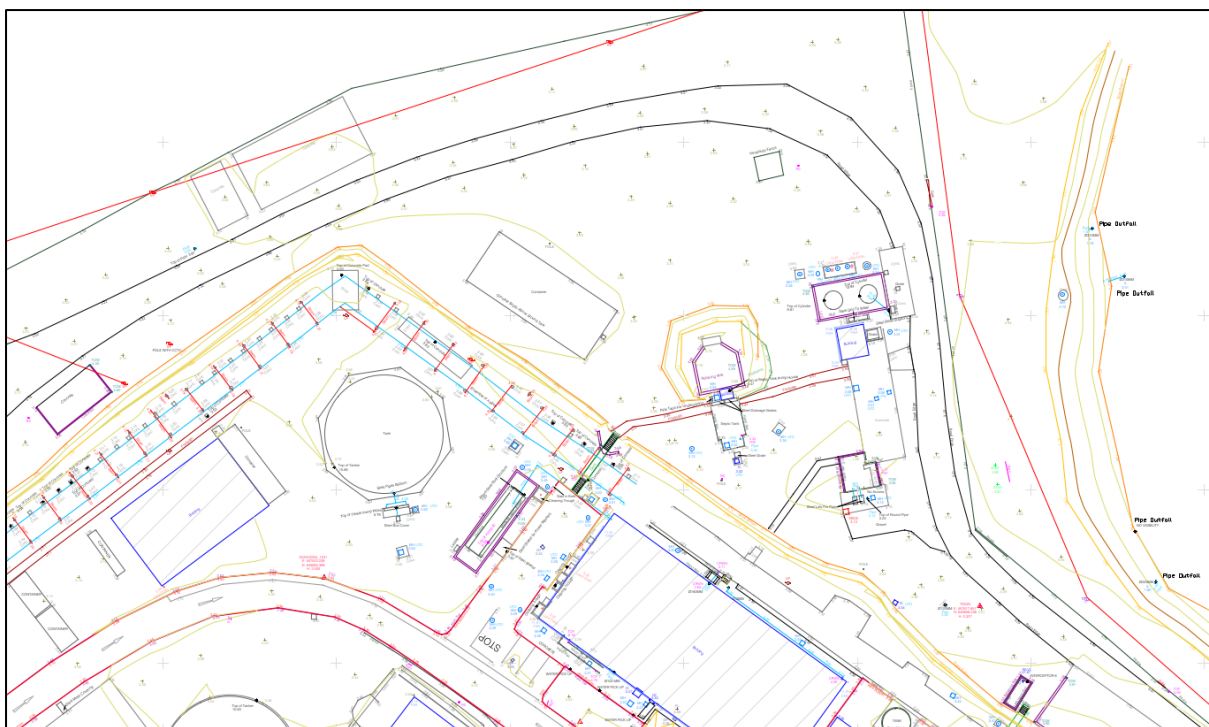


Plate 5: Topographical Survey (Mott MacDonald, 2009)



**Plate 6: Topographical Survey (Murphy Geospatial, 2023)**

The full topographic survey outputs can be viewed in Appendix A.



## 2.3 Local Hydrology

The Proposed Development is situated on the Shannon Estuary approximately 16km downstream from Limerick City, as shown in Plate 7.



**Plate 7: Watercourses**

A watercourse referred to as Doonard Lower flows through Tarbert town, south of the SSE Tarbert site before discharging into Tarbert Bay.

## 2.4 Utilities

Utilities information available indicate that a water main crosses the location of the proposed Demineralisation Water Plant and Bulk Fuel Storage associated with the new development. The Proposed Development is also situated within an area of surface water and foul water networks. The surface water network across the SSE Tarbert site and process networks appear to discharge at various locations within the Shannon Estuary, outside of the Proposed Development area.

Consultation is required with the landowner/occupier and service providers to ensure flood risk is not increased during construction of the Proposed Development. The utilities information compiled by Mott MacDonald (2009) and SEE Generation (2014) can be viewed in Appendix B.

### 3. Stage 1 - Flood Risk Identification

The purpose of Stage 1 is to establish whether a flood-risk issue exists or may exist in the future. If a potential flood risk issue exists then, in accordance with '*The Planning System and Flood Risk Management – Guidelines for Planning Authorities (DOEHLG 2009)*', the flood risk assessment procedure should proceed to 'Stage 2 – Initial Flood Risk Assessment'. If no potential flood risk is identified during Stage 1, then the overall flood risk assessment can be concluded.

The potential flood risk mechanisms are also discussed in this Section of the report. Such mechanisms include the risk of:

- Flooding from fluvial sources which result from the overtopping of river embankments and streams.
- Coastal and Tidal flooding.
- Pluvial sources which occur when the ground becomes saturated and surface water runoff from rainfall events cannot effectively infiltrate the ground or when surface water drainage systems become overwhelmed; and
- Flood risk from groundwater which may be exacerbated by high groundwater levels.

The following assessment includes information and data collated as part of the screening assessment for the Proposed Development.

### 3.1 Hydrometric Data

Existing sources of hydrometric data from the EPA (<https://gis.epa.ie/EPAMaps/Water>) were investigated and one gauging station named as 'Tarbert' was noted as shown in Plate 8.

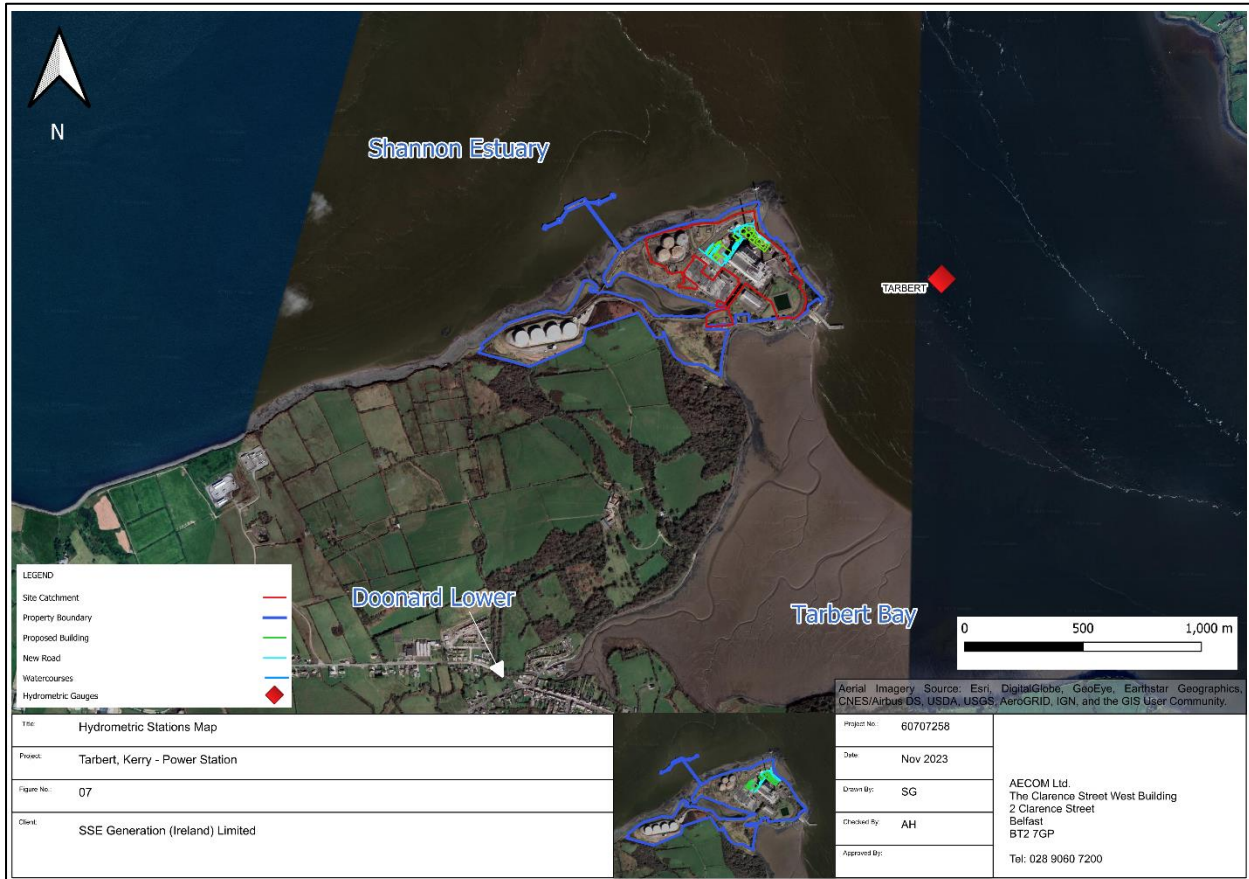


Plate 8: Hydrometric Gauges

## 3.2 Office of Public Works Hazard Maps

The Office of Public Works (OPW) Flood Mapping website (<https://www.floodinfo.ie/>) was consulted in relation to available historical or anecdotal information on any flooding incidences or occurrence in the vicinity of the Proposed Development.



**Plate 9: OPW Past Flood Events Map**

As shown in Plate 9, there is a 'recurring' flood event recorded by OPW south of the SSE Tarbert site on Ferry Road. The incident recorded in 2005 states that the N67 is impassable for half hour approximately twice per year due to high tide and overtopping of the sea wall creating surface water.



### 3.3 Geological Survey Mapping

The Geological Survey Ireland Spatial Resources ([Geological Survey Ireland](http://www.gsi.ie)) mapping was utilised to determine the underlying geology bedrock (Plate 10) as mudstone, siltstone and sandstone, which is generally unproductive. The Teagasc Soils layer classified the area of the Proposed Development as made ground. In addition, Geological Survey Ireland displays no records of groundwater flood probability and historic flooding for the Proposed Development area.



Plate 10: Geological Survey Map (Source: Geological Survey Ireland)

The Proposed Development is within an area of moderate ground water vulnerability and low soil permeability which indicates there is potentially moderate seepage (infiltration) of the surface water to the ground and where applicable, seepage into underlying aquifers or streams.

No evidence of groundwater wells or springs and boreholes within the area of the Proposed Development was identified however as part of the project scope a ground investigation was carried out in July 2023.

### 3.4 OPW Land Benefitting Maps

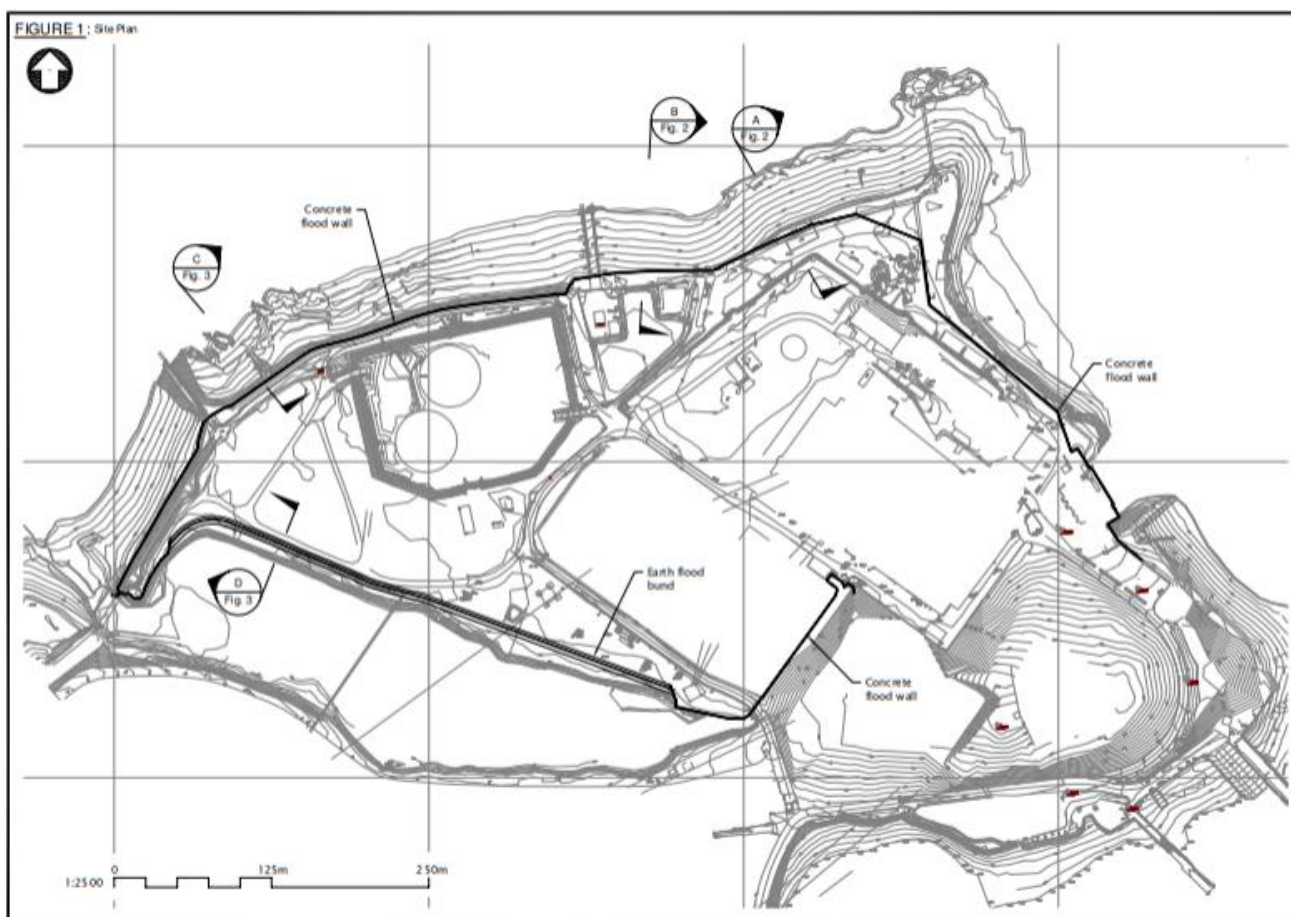
According to OPW ([Flood Maps - Floodinfo.ie](http://www.floodinfo.ie)) the Proposed Development is not located within an area of 'Benefitting Land'.

## 3.5 Tarbert Flood Defence Scheme

### 3.5.1 Initial Flood Defence Proposal

A flood defence scheme ('Proposed Flood Defence Scheme') for a previously submitted planning application for power generation on the southwest of the SSE Tarbert site was produced by Mott MacDonald (2010) due to the requirements identified from the December 2009 Environmental Impact Statement (EIS), and the Detailed Coastal Flood Risk Assessment (April 2010). The Proposed Flood Defence Scheme identified the defence height to be at a level of +7.5mAOD (+4.8mAOD Malin Head), which will give rise to structures of varying heights around the site up to 1.5m above existing ground level but typically up to 1m above existing ground level. The proposed consisted of reinforced concrete wall of 1cum per metre run of wall on average with a 300m thick cantilever.

Flood embankments with a footprint of approximately 8m containing an impermeable clay core flanked by compacted general fill were also proposed. The slope of the embankment faces was proposed to be a nominal 1:2.



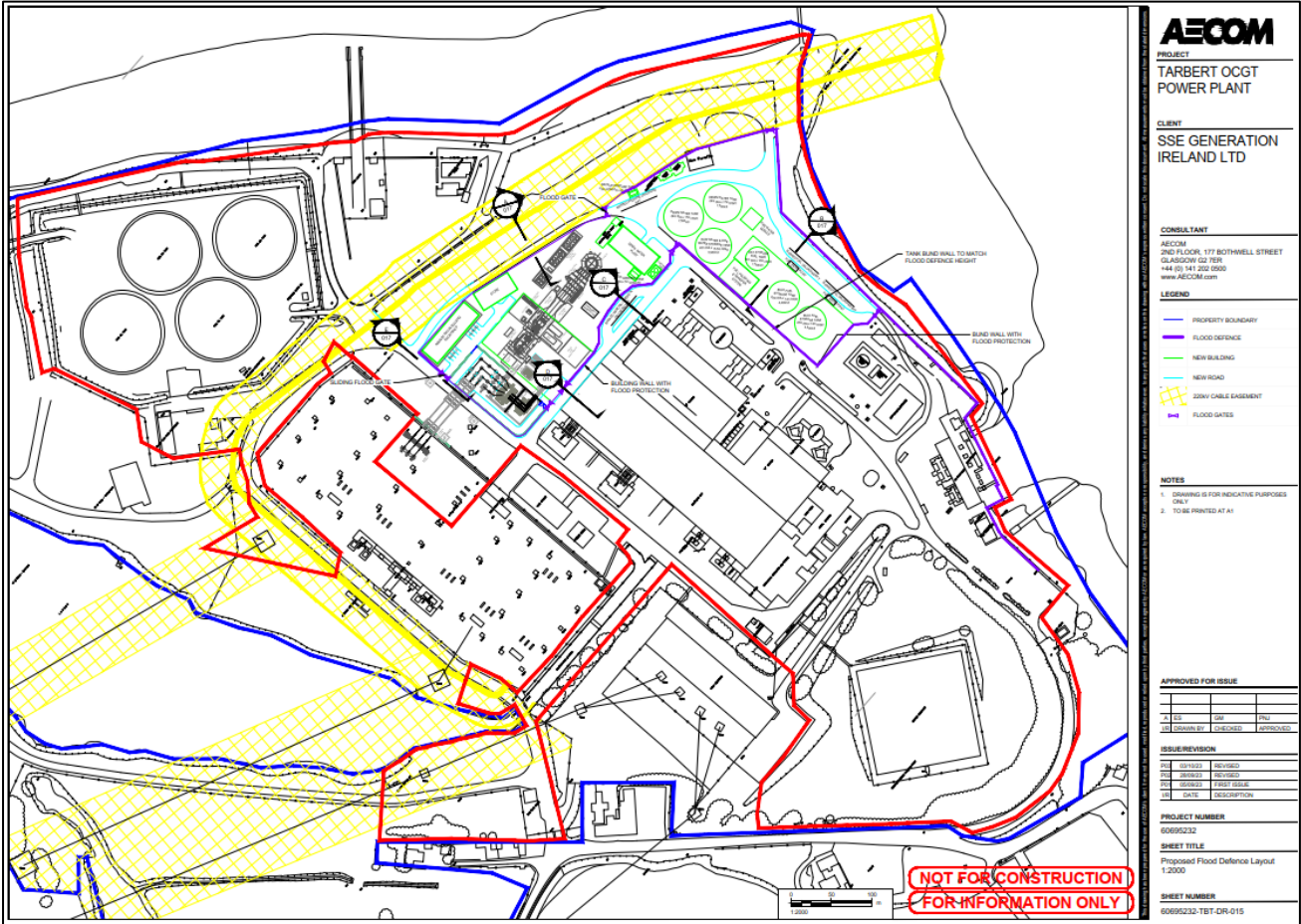
**Plate 11: Tarbert Power Plant – Flood Defence Strategy (Mott MacDonald, 2010)**

The Proposed Flood Defence Scheme concluded that the preferred option comprised of vertical cantilevered concrete flood walls on the Shannon Frontage with earth embankments on the northern side of the inlet as shown in Plate 11.

### 3.5.2 Revised Flood Defence Scheme

In October 2022, AECOM carried out a review of the Proposed Flood Defence Scheme to ensure the 2010 design can be utilised alternatively if it needs to be revised in view of the latest guidance on extreme water levels. The review concluded that the type and extent of flood defences is still considered to be suitable.

While the crest levels of the Proposed Flood Defence Scheme were deemed suitable, the extent of the Scheme has been revised by AECOM in 2023, with a flood defence wall outline of +7.54 m ODP (+4.83 mAOD Malin Head), as shown in Plate 12. Additional information is viewable in Appendix C.



**Plate 12: Tarbert Power Plant – Flood Defence Strategy (AECOM, 2023)**

According to the Talbert Flood Defence Review (AECOM 2023), the flood wall alignment was adjusted to protect the Biofuel Site and to also avoid the foreshore lease area and the 220kV cables. The wall length was minimised by only enclosing the essential part of the Biofuel site. Other benefits include security, whereby access is minimised by the reduction of access points.

The Proposed Flood Defence Scheme was undertaken to ensure flood risk is not increased elsewhere while also including measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible.

## 3.6 Catchment Flood Risk Assessment and Management Mapping

The Catchment Flood Risk Assessment and Management (CFRAM) Programme was developed under the EU Floods Directive and national flood policy. As part of the programme, mapping has been produced by OPW and provides flood risk maps for present day and future scenarios for both coastal and fluvial flooding events. AECOM have reviewed the GIS layers from <https://www.floodinfo.ie> and provide a detailed synopsis in the following subsections.

### 3.6.1 Fluvial Mapping

The CFRAM mapping provides present day flooding extents for three different categories of probability: High (10%), Medium (1%) and Low (0.1%).

As per *The Planning System and Flood Risk Management* guidance, three levels of flood zone should be identified:

- Flood Zone A (Fluvial) – High Probability of Flood (Greater than a 1 in 100 year. (Greater than 1% Annual Exceedance Probability (AEP)).
- Flood Zone B (Fluvial) – Moderate Probability of Flood (Between 1 in 100 year and 1 in 1000 year flood event. (between 0.1% and 1% AEP)).
- Flood Zone C (Fluvial) – Low Probability of Flood (Less than a 1 in 1000 year flood event. (Less than 0.1% AEP)

CFRAM fluvial flood extents for High, Medium and Low probability for present day flood extents are not visible for the Site. Based on the absence of both CFRAM fluvial extents and National Indicative Fluvial Mapping (NIFM) extents, the Site is deemed to be at minimal risk of fluvial flooding.

### 3.6.2 Coastal Mapping

The OPW delivered the CFRAM Study for the Shannon River Basin District<sup>1</sup> (herein referred to as the 'Study') in 2016 and included the River Shannon catchment and its estuary. The Study focused on historic flooding and areas subject to future flooding due to development pressures or climate change. Tarbert Power Station was included within Units of Management (UoM) 24 as an Individual Risk Receptor (IRR). The Study provides present day flooding extents for three different categories of probability: High (10% AEP), Medium (0.5% AEP) and Low (0.1% AEP).

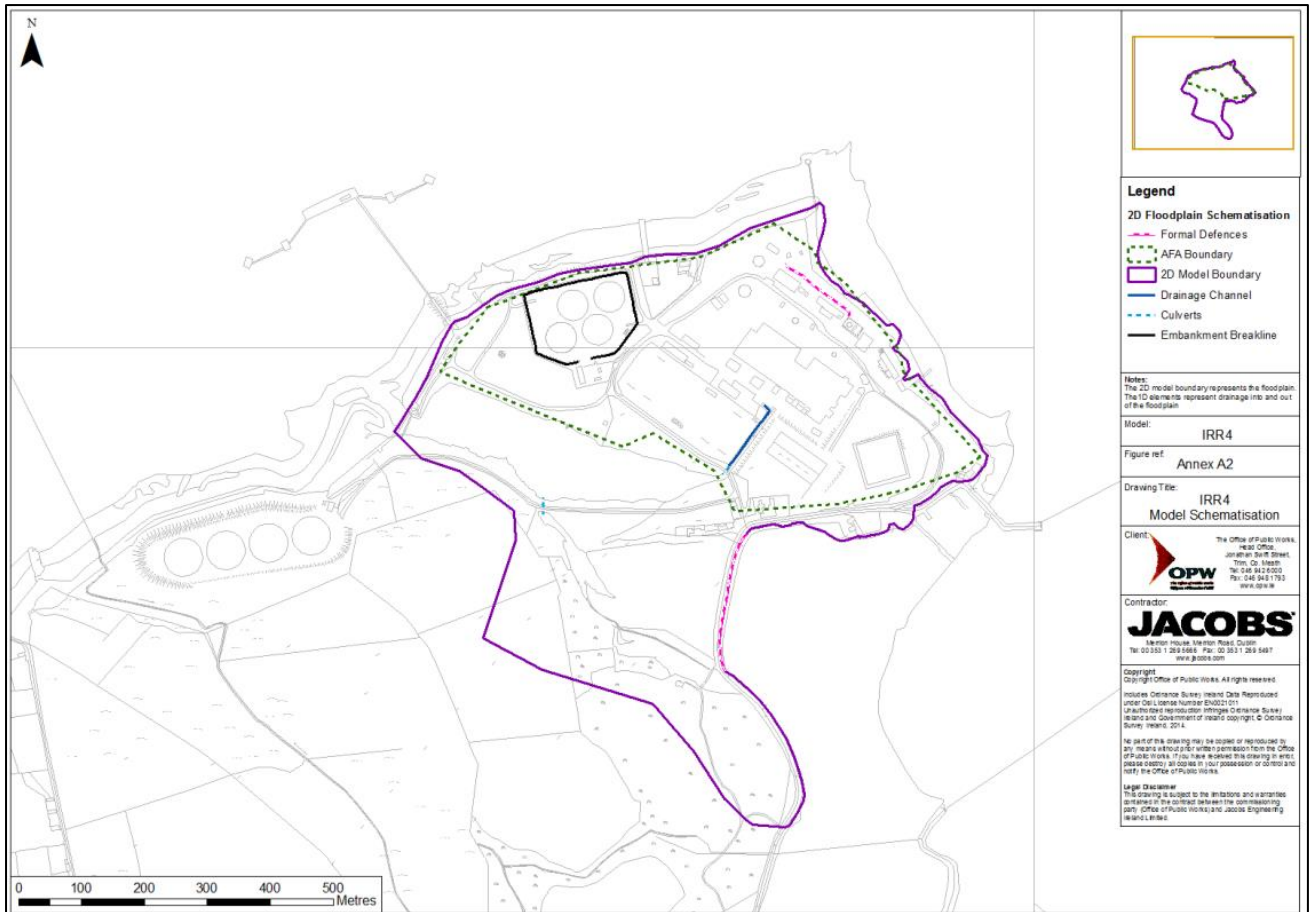
As per *The Planning System and Flood Risk Management* guidance three levels of flood zone should be identified:

- Flood Zone A (Coastal) – High Probability of flood events have approximately a 1 in 200 chance of occurring or being exceeded in any given year (0.5% AEP)
- Flood Zone B (Coastal) – Moderate Probability of flood events (between 0.1% AEP or 1 in 1000 year and 0.5% or 1 in 200 year).
- Flood Zone C (Coastal) – Low Probability of flood events (less than 0.1% AEP or 1 in 1000 year)

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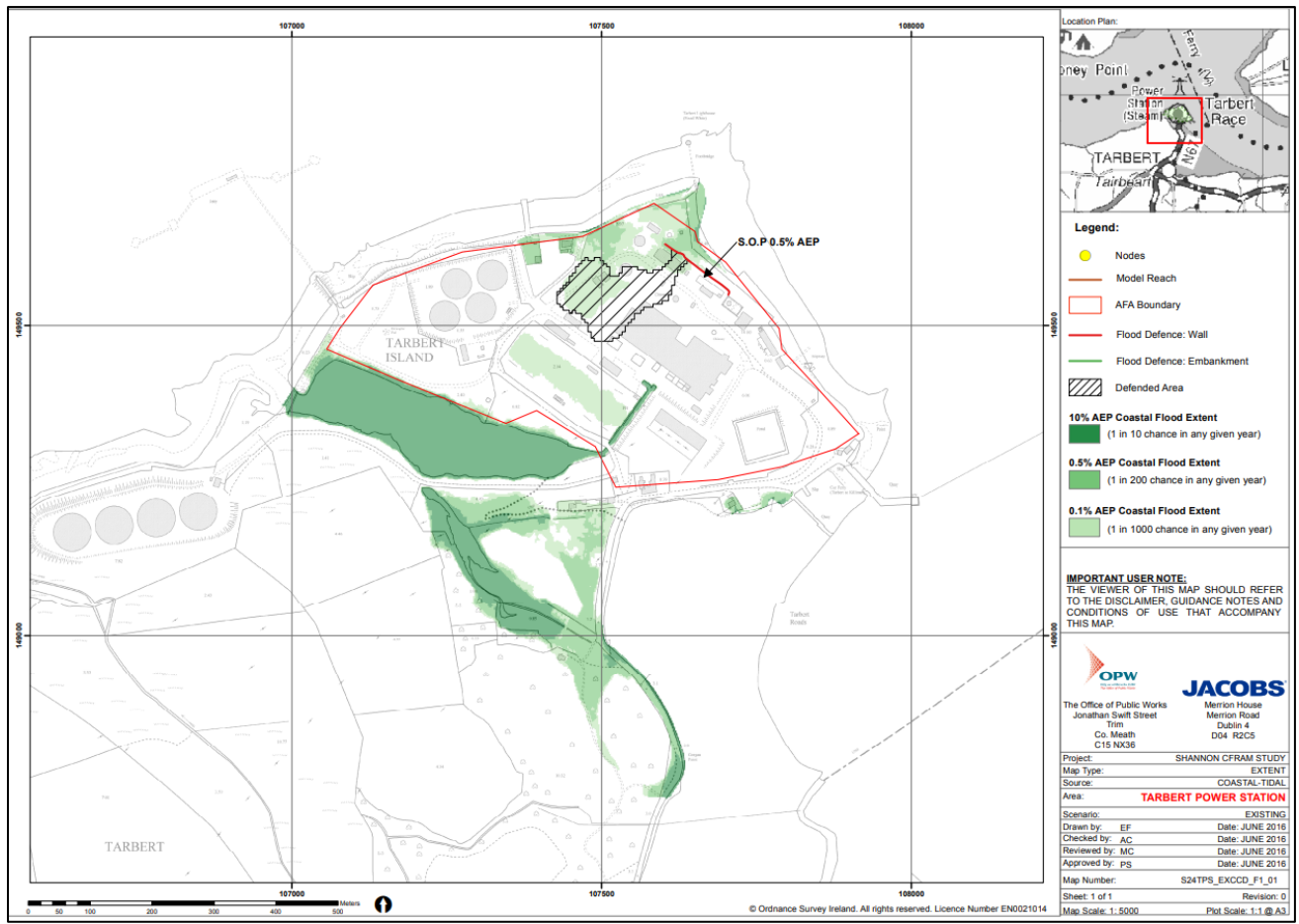
<sup>1</sup> Shannon Catchment-based Flood Risk Assessment and Management (CFRAM) [Study Hydraulics Report](#) Unit of Management 24, 2016





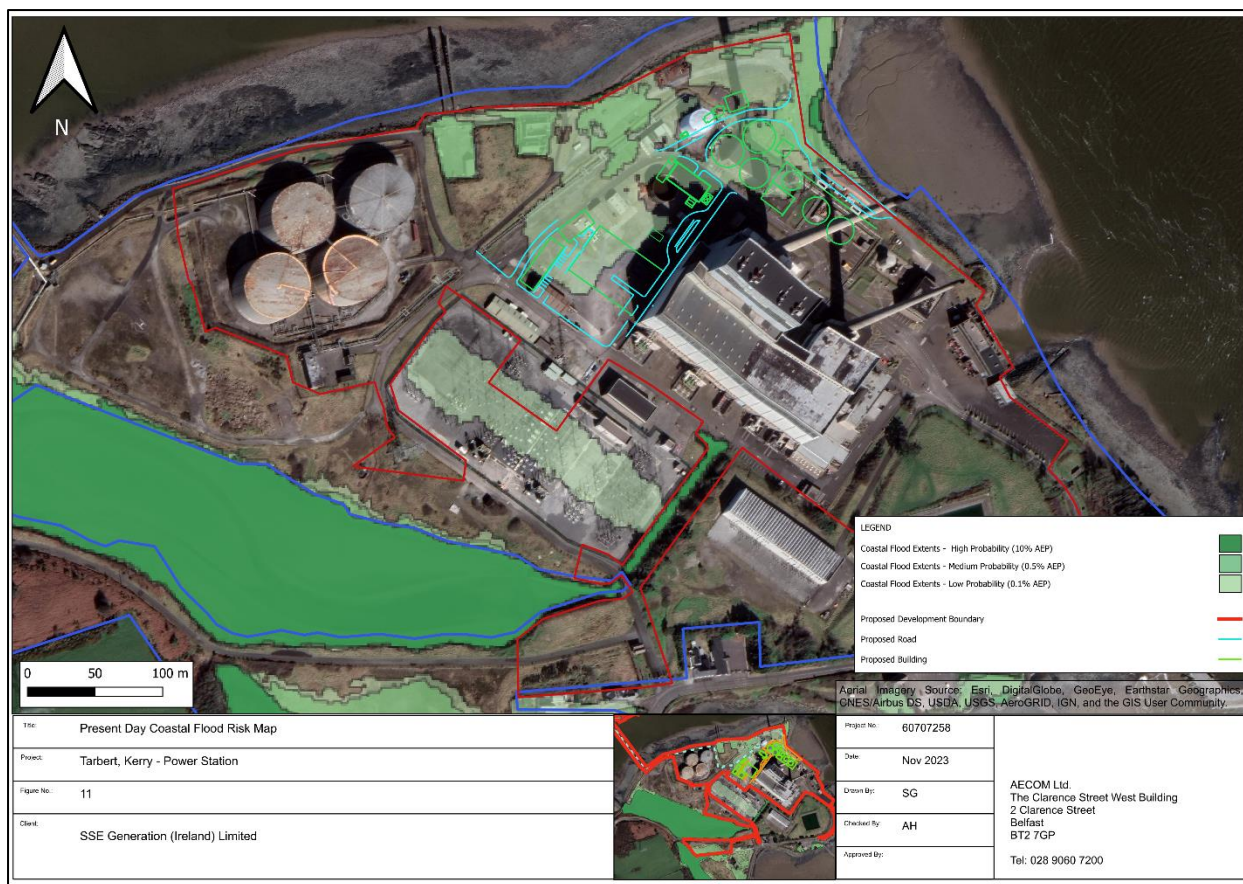
**Plate 13: Shannon CFRAM Study boundary**

As illustrated in Plate 14, the CFRAM coastal flood extents for High, Medium and Low probability for present day flood extents as visible for the SSE Tarbert site.



**Plate 14: CFRAM Present Day Coastal Flood Model Extents**

As mentioned previously, OPW information shows the high probability extent is 10% AEP, medium probability represents 0.5% AEP and the low probability extent is 0.1% AEP. Plate 15 illustrates the coastal CFRAM extents in relation to the Site.



**Plate 15: Proposed Development CFRAM Present Day Coastal Flood Extents**

Based on the flood extents shown in Plate 15, it can be determined that the Proposed Development site is predominantly in an area of low probability (0.1% AEP) while one of the Demineralisation Water Tanks is in an area of medium probability (0.5% AEP), indicating the Proposed Development is located in Flood Zone A (0.1% to 0.5% AEP).

### 3.6.3 Pluvial Mapping

AECOM have reviewed the CFRAM GIS layers from <https://www.floodinfo.ie/> and confirms that the pluvial flood risk mapping does not extend to the Proposed Development site. There are no known historic instances of pluvial flooding on the Site however overtopping due to wave action may occur resulting in surface water accumulation in areas of low-lying land.

## 3.7 Reservoirs / Artificial Sources

There is a reservoir located 250m south-east of the Proposed Development (52.587730, -9.361804). According to a topographic survey (Appendix A), the reservoir is elevated in relation to the surrounding site with the land elevation inclining towards the north-west. There is a risk of flooding from this reservoir however the probability has been assessed as low due to the recorded elevations and proximity of the sea.

## 3.8 Screen Assessment Conclusion

The possible flooding mechanisms in consideration of the Proposed Development are summarised in Table 1. The purpose of this screening assessment was to identify whether a potential risk of flooding exists and to what extent within the Proposed Development Site. This assessment is based on the collation and analysis of existing information current information, historical information and data which may indicate the level or extent of any flood risk.

**Table 1: Possible Flood Mechanisms**

Source of Flooding	Significant?	Comment / Reason
Tidal / Coastal	Yes	The Proposed Development is shown to be in Flood Zone A and therefore is deemed high risk from flooding due to tidal and coastal sources
Fluvial	No	The Proposed Development is shown to not be in a Flood Zone, and therefore is deemed to be at low risk from flooding due to fluvial sources
Pluvial	Yes	No OPW pluvial flood risk mapping data is available therefore it is difficult to determine the pluvial flood risk to the Proposed Development. There has been no record of any previous pluvial flooding on the site however this will be discussed further at Stage 2.
Groundwater	No	There is no evidence of historical groundwater flooding within the area and the soil permeability is low, therefore the site is deemed to be at low risk. Whilst taking into consideration the works that are proposed, it is unlikely that the proposed works would increase the groundwater flood risk in the area.
Reservoirs / Artificial Sources	Yes	The Proposed Development located near a reservoir however the probability of flooding has been assessed as low due to the recorded elevations and proximity of the sea.

In consideration of the data sources assessment discussed within the first part of this report, this flood risk assessment is therefore required to proceed to 'Stage 2 - Initial Flood Risk Assessment' which is detailed in Section 4 of this report.

# 4. Stage 2 – Initial Flood Risk Assessment

In order to undertake the initial flood assessment, the flood zone and the vulnerability of the location of the Proposed Development is required.

## 4.1 Determination of Vulnerability

The vulnerability of the Proposed Development is categorised into three classes as detailed in Table 2.

**Table 2: Classification of Vulnerability<sup>2</sup>**

Vulnerability class	Land uses and types of development*
Highly vulnerable development (including essential infrastructure).	Garda, ambulance and fire stations and command centres required to be operational during flooding, Hospitals, Emergency access and egress points, Schools, Dwelling houses, student halls of residence and hostels, Residential institutions such as residential care homes, children’s homes and social services homes, Caravans and mobile home parks, Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility, and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development.	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions, Land and buildings used for holiday or short-let caravans and camping (subject to specific warning and evacuation plans), Land and buildings used for agriculture and forestry, Waste treatment (except landfill and hazardous waste), Mineral working and processing, and Local transport infrastructure.
Water-compatible development.	Flood control infrastructure, Docks, marinas and wharves, Navigation facilities, Ship building, repairing and dismantling, Dockside fish processing and refrigeration and compatible activities requiring a waterside location, Water-based recreation and tourism (excluding sleeping accommodation), Lifeguard and coastguard stations, Amenity open space, Outdoor sports and recreation and essential facilities such as changing rooms, and essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

\* Uses not listed here should be considered on their own merits

The guidelines would indicate that the Proposed Development, should be considered to be a **highly vulnerable development**.

<sup>2</sup> Source: The Planning System and Flood Risk Management - Guidelines for Planning Authorities



## 4.2 Determination of Flood Zone

In accordance with 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities (DOEHLG 2009)', there are three flood zones designated in the consideration of flood risk to a particular site. The three flood zones are described in Table 3.

**Table 3: Flood Zone Description<sup>3</sup>**

<b>Flood Zone</b>	<b>Description</b>
Flood Zone A	Where the probability of flooding from watercourses is the highest (greater than 1% or 1 in 100 year for watercourse flooding or 0.5% or 1 in 200 for coastal flooding).
Flood Zone B	Where the probability of flooding from watercourses is moderate (between 0.1% or 1 in 1000 year and 1% or 1 in 100 year for watercourse flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).
Flood Zone C	Where the probability of flooding from watercourses and the sea is low or negligible (less than 0.1% or 1 in 1000 year for both watercourse and coastal flooding). Flood Zone C covers all areas which are not in Zones A or B.

The planning implications for each of the flood zones are:

- Zone A - High probability of flooding. Most types of development would be considered inappropriate in this zone. Development in this zone should be avoided and/or only considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the Justification Test has been applied. Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation, would be considered appropriate in this zone.
- Zone B - Moderate probability of flooding. Highly vulnerable development, such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses and primary strategic transport and utilities infrastructure, would generally be considered inappropriate in this zone, unless the requirements of the Justification Test can be met. Less vulnerable development, such as retail, commercial and industrial uses, sites used for short-let for caravans and camping and secondary strategic transport and utilities infrastructure, and water-compatible development might be considered appropriate in this zone. In general, however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone C and subject to an FRA to the appropriate level of detail to demonstrate that flood risk to and from the development can or will adequately be managed.
- Zone C - Low probability of flooding. Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

In consideration of the above guidelines, the 0.5% AEP coastal event is taken into consideration to assess whether any parts of the Site are located within Flood Zone 'A' or Flood Zone 'B'.

<sup>3</sup> Source: The Planning System and Flood Risk Management - Guidelines for Planning Authorities

## 4.3 Justification Test Requirement

The requirement for a justification test was reviewed for this study to determine whether the proposed works would be considered acceptable in terms of flood risk. The conclusion of ‘Stage 1 – Flood Risk Identification’ noted that the works may be impacted by coastal and pluvial flooding.

The requirement for a Justification Test is determined based on the type of development and flood zone designation as indicated in Table 4. The Proposed Development is deemed ‘Highly Vulnerable Development’ and situated within Flood Zone A and therefore a Justification Test is required as shown below (red text).

**Table 4: Justification Test Matrix<sup>4</sup>**

	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable Development:	Justification Test,	Justification Test,	Appropriate.
Less Vulnerable Development:	Justification Test,	Appropriate,	Appropriate.
Water-Compatible Development:	Appropriate,	Appropriate,	Appropriate.

The Justification Test has been designed to assess the appropriateness of developments that are being considered in areas of moderate or high flood risk. The test is comprised of two processes:

*Plan-making Justification Test:* Used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding.

*Development Management Justification Test:* Used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

Based on the development being categorised as highly vulnerable and with the assumption that it is located in Flood Zone A, the development requires a Justification Test.

<sup>4</sup> Source: The Planning System and Flood Risk Management - Guidelines for Planning Authorities

### 4.3.1 Coastal Flooding

This section of the report will review the peak tidal levels produced as part of the Study and assess against the Proposed Development. It must be noted that the outputs of the Study are given in Malin Head datum whereas the topographic survey conducted in 2009 (Plate 5) is given in Poolbeg Lighthouse datum. Therefore, the Proposed Development site ranges from 6.0 to 6.8m AOD (Poolbeg Lighthouse) which corresponds to approximately 3.3 to 4.1m AOD (Malin Head), using as conversion of -2.705.

#### 4.3.1.1 Present Day

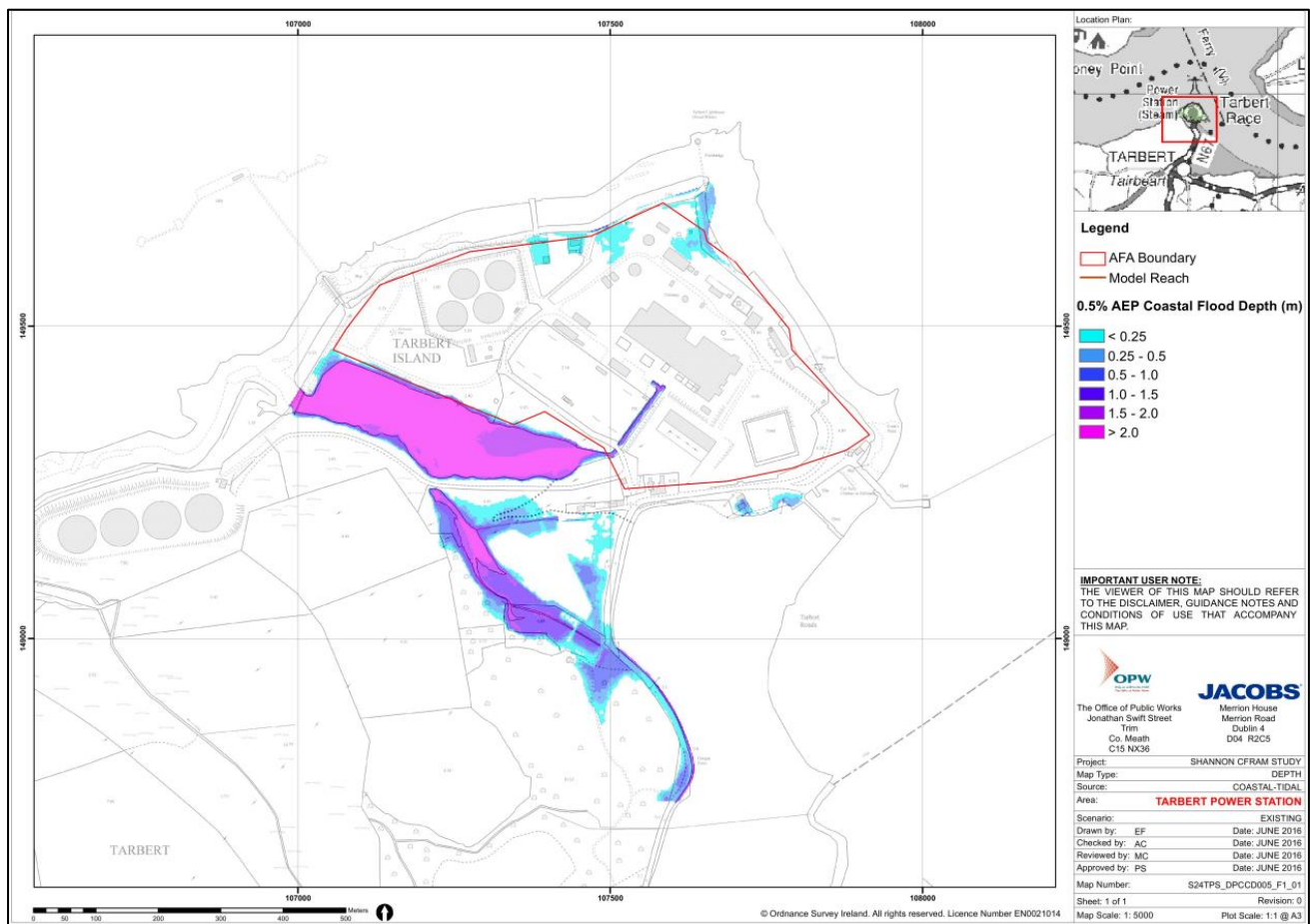
The Study states that the Site reaches peak tide levels of 3.3m AOD during a 0.5% AEP event while the 0.1% AEP level has been estimated to be 3.5m AOD. The full results are shown in Table 5.

**Table 5: Shannon CFRAM Study; Tarbert Power Station**

	Current Annual Exceedance Probability							
Peak tidal levels (m AOD)	50%	20%	10%	5%	2%	1%	0.5%	0.1%
	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.5



The Study advises that the Site may experience flood depths of 0.25m to 0.5m during a 0.5% AEP event as shown in Plate 16.



**Plate 16: Shannon CFRAM Study Coastal flood depths 0.5% AEP**

It must be noted that the AFA Boundary does not capture the full Proposed Development boundary however it is advised that the detailed design take into consideration the levels estimated within the Study.

### 4.3.1.2 Climate Change

In order to take a precautionary approach, it is necessary to understand the flood risk when accounting for climate change. Using the Mid-Range Future Scenario (MRFS) for Climate Change, Plate 17 shows that the Proposed Development is significantly flooded during a 10% AEP event, therefore reaching levels of 3.5m AOD.



**Plate 17: Mid-Range Future Climate Change Scenario Coastal Flood Map**

The Study gives peak tidal levels for climate change scenarios as summarised in Table 6.

**Table 6: Shannon CFRAM Study; Tarbert Power Station**

	MRFS Annual Exceedance Probability			HEFS Annual Exceedance Probability		
Peak tidal levels (m AOD)	10%	0.5%	0.1%	10%	0.5%	0.1%
	3.5	3.9	4.1	4.0	4.4	4.6

The Stage 1 – Flood Risk Identification determined the risk of coastal flooding to the Proposed Development is high.

The Justification test must quantify the flood risk at the Proposed Development, and where necessary mitigate the flood risk.

The CFRAM maps indicate that the Site is located in Flood Zone A for present day and therefore there is a high risk of coastal flooding. As previously shown in Plate 15 and Plate 17, the CFRAM extents predict that the Proposed Development will flood during a 0.5% AEP and 10% AEP peak tidal event respectively. The Study estimates that Proposed Development and surrounding area will be inundated during peak tide levels for all Climate Change future scenarios indicating the risk of flooding is very high.

### 4.3.1.3 Tarbert Flood Defence Scheme

As mentioned in Section 3.5, a flood defence strategy is proposed to protect the power station at a level of +4.8mAOD (Malin Head). This will allow for a freeboard of 0.2m during a 0.1% High End Future Scenario (HEFS) Annual Exceedance Probability (AEP) event. It should be noted that if additional flood defences are constructed to protect the Proposed Development it would still be considered to be in Flood Zone A as flood zoning policy assumes no defences are in place. Therefore, if this option was progressed the flood risk, including potential breach situations, should be quantified, and understood in order to inform the appropriateness of the Proposed Development in that location. The risk of breach can be managed by incorporating a detailed maintenance regime. The regime should include visual inspection on a regular basis and following any significant flood events.

### 4.3.2 Pluvial Flooding

The Stage 1 – Flood Risk Identification determined the risk of pluvial flooding to the Proposed Development is unknown.

The Proposed Development design should aim to utilise suitable drainage solutions to manage surface water runoff. The design should be sufficient to allow for 20% increase in rainfall intensities to allow for climate change. The drainage system should be designed to ensure no surcharging during the 30-year event and the designer should carry out checks for the 1 in 100-year return period to ensure that an adequate level of protection against the flooding of properties internally is achieved.

The design should also look to utilise SuDs if possible, within the development boundary.

The Tarbert Power Station Surface Water Drainage Strategy report (refer to Appendix 12B, EIAR Volume II) was developed to inform the surface water management strategy servicing the Proposed Development site on the existing Tarbert Power Station. The report is a comprehensive and detailed design of the surface water system, ground levels, finished slab levels, and SuDs measures to mitigate pluvial flood risk to the Proposed Development and ensure that the Proposed Development does not increase the pluvial flood risk to neighbouring properties.

## 4.4 Stage 2 Flood Assessment Conclusion

To fulfil the Justification test there is a requirement to quantify the flood risk at the Proposed Development, and where necessary mitigate the flood risk.

The purpose of the scoping stage is to identify possible flood risks and to implement the necessary level of detail required to assess these possible flood risks, and to ensure these can be adequately addressed in the FRA.

The CFRAM maps indicate that the Proposed Development is located in Flood Zone A for the present day and therefore the risk of coastal flooding has a high probability. The CFRAM Climate Change future scenarios extents predict the Proposed Development and surrounding area to be significantly flooded. Based on CFRAM flood depth mapping it is expected the Proposed Development will flood to a depth of 0.25m to 0.5m during a 0.5% AEP event.

The Tarbert Flood Defence Scheme (Section 3.5.2) that has been designed, demonstrates the current climate change scenario requirements. At present, the flood defence scheme proposal will protect the power station at a level of +4.8mAOD. This will allow for a freeboard of 0.2m during a 0.1% HEFS AEP event.

The comprehensive and detailed design of the surface water system, ground levels, finished slab levels, and Sustainable Drainage Systems (SuDs) measures, is to mitigate pluvial flood risk to the Proposed Development and ensure that the Proposed Development does not increase the pluvial flood risk to neighbouring properties.

For further information regarding potential options in relation to flood risk, refer to Section 5.1.

## 5. Conclusion

The Site-Specific Flood Risk Assessment for the Proposed Development at Tarbert and all associated works was undertaken in accordance with the requirements of “The Planning System and Flood Risk Management – Guidelines for Planning Authorities” to demonstrate that the Proposed Development will:

- Not increase flood risk elsewhere and, if practical, will reduce overall flood risk
- Include measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible; and
- Include measures to ensure that residual risk to the area and/or development can be managed to an acceptable level.

**The Stage 1 – Flood Risk Identification** determined possible risk of flooding to the Proposed Development from coastal/tidal and pluvial sources. Coastal/tidal flood risk is considered due to CFRAM flood extends for low and medium probability.

The proximity of a reservoir deemed the Proposed Development at risk of flooding however if the asset is monitored and maintained adequately, the risk of reservoir flooding will remain low.

**The Stage 2 – Initial Flood Risk Assessment** has shown that the Proposed Development, based on the coastal CFRAM flood maps, to currently be in Flood Zone A and also for the future scenario extents, as a result the risk of coastal flooding is considered to be high. The Proposed Flood Defence Scheme for the Proposed Development will require measures to provide resilience against future climate change scenarios. At present, the proposed flood defence scheme will protect the power station at a level of +4.8mAOD. This will allow for a freeboard of 0.2m during a 0.1% HEFS AEP event.

The Justification test is required and must quantify the flood risk at the Proposed Development, and where necessary, mitigate the flood risk. To manage the risk of coastal flooding, the Tarbert Power Station Surface Water Drainage Strategy report sets out the detailed design of the site layout, flood defence measures, ground and finished slab levels, and use of resilient materials to help mitigate the flood risk to the Proposed Development.

Suitable drainage systems (as set out in the Surface Water Drainage Strategy) are to be provided and designed to manage any surface water to reduce pluvial flood risk. The comprehensive and detailed design of the surface water system, ground levels, finished slab levels, and SuDs measures will mitigate pluvial flood risk to the Proposed Development and ensure no pluvial flood risk increase to neighbouring properties.

### 5.1 Next Steps

The findings from the Stage 2 FRA provides several options for the design team and client to consider:

**Option 1: Do Nothing / Relocate** – Due to the high flood risk it could be deemed unfeasible to proceed with the Proposed Development given the current ground levels. If possible, an alternative location with a lower flood risk should be considered if Option 2 and/or Option 3 are deemed unfeasible.

**Option 2: Develop Local Flood Mitigations** – As stated in Section 3.5.1, a flood defence scheme was proposed as part of the OCGT development which received planning permission in 2010 with plans to implement in the immediate future. At present the 2010 proposed flood defence scheme will protect the site during a 0.1% HEFS AEP event. The revised flood defence proposal (see Section 3.5.2) protects the proposed development to +7.54 m ODP (+4.83 mAOD Malin Head) which

is also higher than the 0.1% HEFS AEP event level. Due to the source of flooding being tidal/coastal, there is no measurable offset and as no other properties are within the vicinity, it is not anticipated that the proposed flood defence scheme will increase flood risk elsewhere.

It must be noted that the flood defence(s) proposed within the scheme are only effective if adequately maintained, therefore it is recommended a maintenance regime is implemented to ensure flood resilience is maintained. The regime should include visual inspection on a regular basis and after any significant flood events.

It should be noted that if the Proposed Flood Defence Scheme is constructed to protect the Proposed Development it would still be considered to be within Flood Zone A, as flood zoning policy assumes no defences are in place. Therefore, if this option was progressed the flood risk, including potential breach situations, is to be quantified, and understood by the developer to ensure that the Proposed Development is developed and operated safely.

**Option 3: Tarbert OCGT Flood Mitigation** – Upon review of the CFRAM outputs, it is estimated that the Proposed Development will flood during a 0.5% AEP event due to peak tidal levels. Therefore, it is recommended that the infrastructure is elevated and/or sealed to 5.2 mAOD (0.1% HEFS AEP level plus 0.6m freeboard) to mitigate water ingress during present day and climate change events. This recommended level is based on the highly vulnerable nature of the Proposed Development. The End User should review this and confirm their appetite to flood risk in order to ensure any final defence level or ground raising level is appropriate for the Proposed Development.

## 6. References

- [EPA Maps](#) – Hydrometric Gauges (EPA, 2023) Last accessed online June 2023
- Flood Risk Assessment – Proposed Power Plant at Tarbert, Co. Kerry (Mott MacDonald, October 2009)
- Flood Defence Strategy - Tarbert Power Plant (Mott MacDonald, April 2010)
- [OPW Flood Info](#) – Flood Maps (OPW, 2023) Last accessed online July 2023
- [The Planning System and Flood Risk Management – Guidelines for Planning Authorities](#) (Environment, Heritage and Local Government, November 2009) Last accessed online June 2023
- [Shannon Catchment-based Flood Risk Assessment and Management](#) (CFRAM) Study Hydraulics Report Unit of Management 24 (OPW, 2016) Last accessed online July 2023

# Appendix A Topographic Surveys



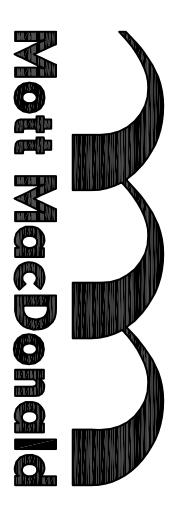
Notes

- 1. ALL LEVELS IN METRES ABOVE POOLBERG ORDNANCE DATUM

Key to symbols

Reference drawings

Rev	Date	Drawn	Description	CHK'd	App'd
1	08/12/09	SK	Levels Relative to Poolberg Ordnance Datum	DM	PD
-	30/10/09	SK	Levels Relative to Malin Ordnance Datum	DM	PD



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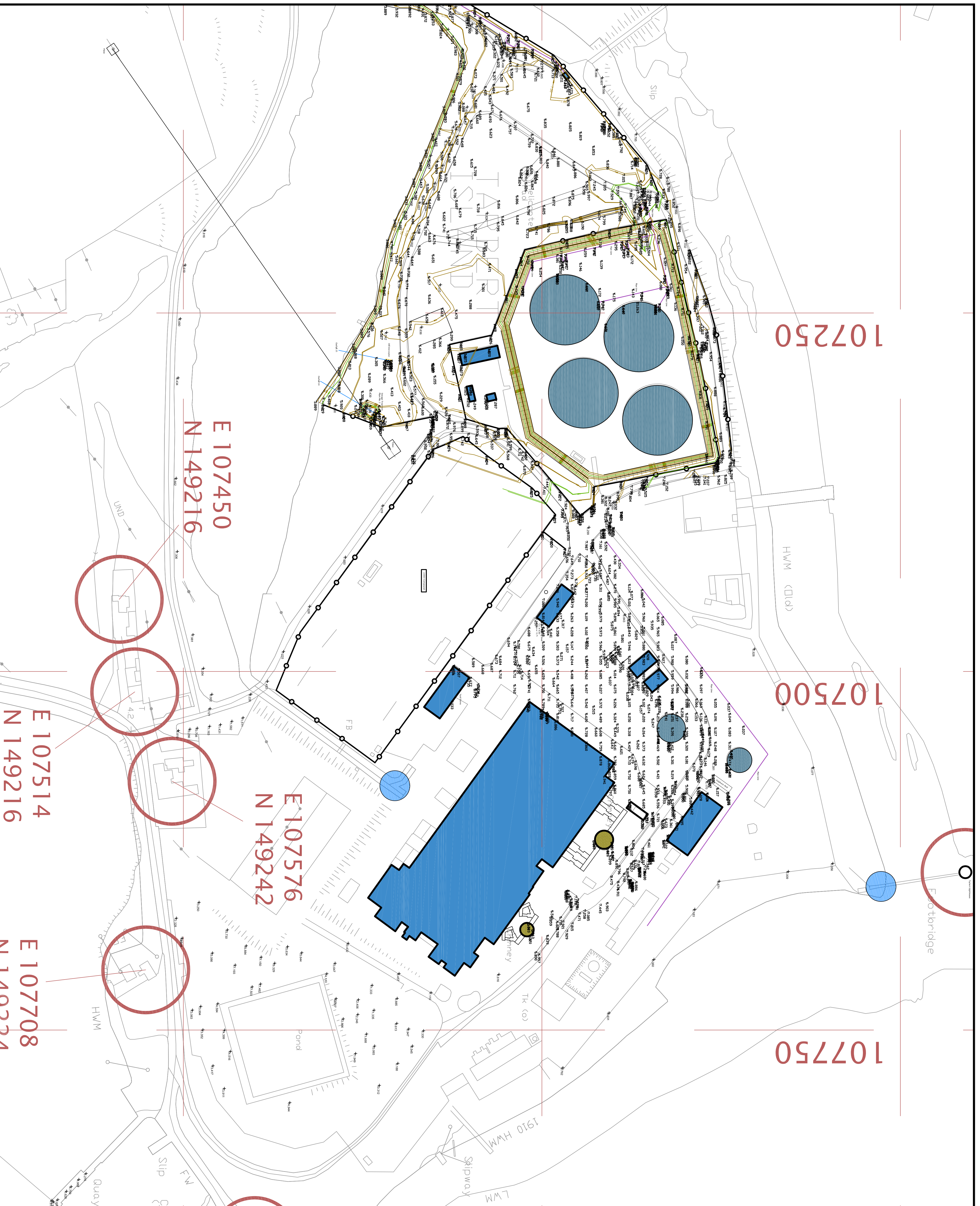
**Client**  
 Endesa Ireland Ltd.  
 5th Floor  
 3 Grand Canal Plaza  
 Grand Canal Street Upper  
 Dublin 4, Ireland



**Title**  
 Combined Cycle Gas Turbine (CCGT)  
 Tarbert, Co. Kerry

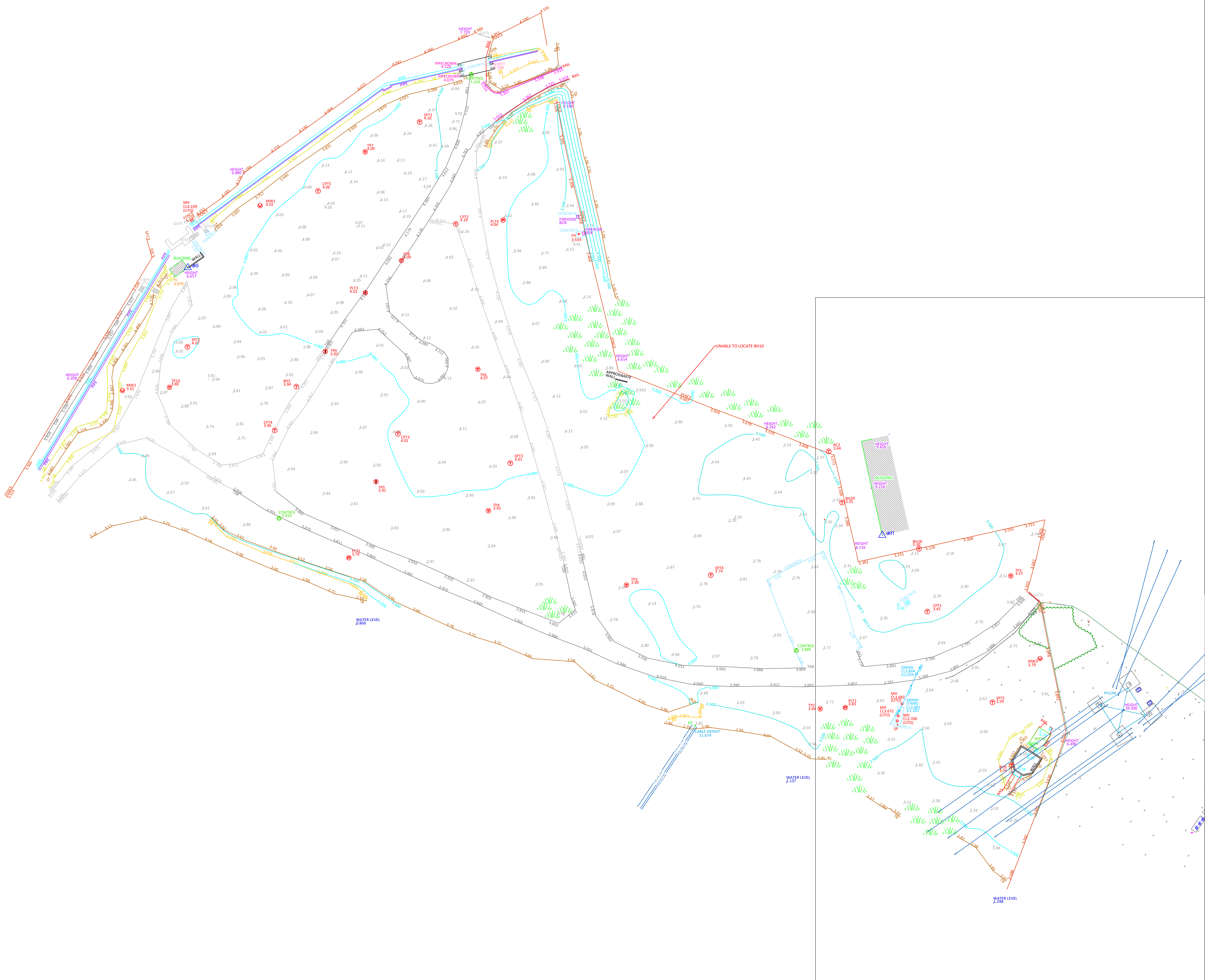
**Site Survey**

Designed	-	Eng check	D Murphy
Drawn	S Kennedy	Coordination	-
Dwg check	-	Approved	P Doyle
Scale at A1	1:1,250	Status	SK
Drawing Number	257554-NK01		



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 P:\Documents\257554-Endesa Project Development\Geographical Surveys\Site\Site Plan\Site Survey Drawing relative to Poolberg Ordnance Datum\Leveling Data\Site 8\_2509\_11\3144\_1605339





### SURVEY LEGEND

AJ	ARMSTRONG JUNCTION
AV	AIR VALVE
BB	BOTTOM OF BANK
BLD	BOLLARD
CATV	CABLE TV
CL	COVER LEVEL
EIR	EIR MANHOLE
ESB	ELECTRICITY SERVICE COVER
FCE	FENCE
FL	FLOOR LEVEL
FH	FIRE HYDRANT
FWAJ	FOUL WATER AJ
FW	FOUL WATER
GAS	GAS SERVICE COVER
GY	GULLY
HYD	HYDRANT
HGE	HEDGE
IC	INSPECTION CHAMBER
IL	INVERT LEVEL
KB	KERB
KBOT	KERB BOTTOM
KBOT	KERB BOTTOM
KBOT	KERB TOP
LS	LAMP STANDARD
LVL	LEVEL
MH	MANHOLE
ME	ROAD EDGE
SB	SLOPE BOTTOM
SC	STOP COCK
SP	SIGNPOST
ST	SLOPE TOP
SV	SLUICE VALVE
SWAJ	SURFACE WATER AJ
SW	SURFACE WATER
TB	TOP OF BANK
TL	TRAFFIC LIGHT
TREE	TREE
TOW	TOP OF WALL
TP	TELEGRAPH POLE
UTO	UNABLE TO OPEN
UTS	UNABLE TO SURVEY
V	VALVE
WLVL	WATER LEVEL
WM	WATER METRE
WV	WATER VALVE
BH	BOREHOLE
MW	MEASUREMENT WELL
TRP	TRIAL PIT
PLT	PLATE PRESSURE TEST

Datum	OSi
Grid System	ITM
Ordnance Survey map ref.	N/A



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Rev.	21-02-23	Updated with SI locations
Rev.	Date	Description
Drawing Title: Topographical survey		
Project: Proposed Development at Tarbert Island, Co. Kerry		
Client: WSP GOLDER	Survey Date: 16-02-23	
Drawing No. 2302-442-01	Sheet No. 1	Drawing Date: 21-02-23
Scale: 1:500 at A1	Drawn by: CR	Issue Date: 21-02-23

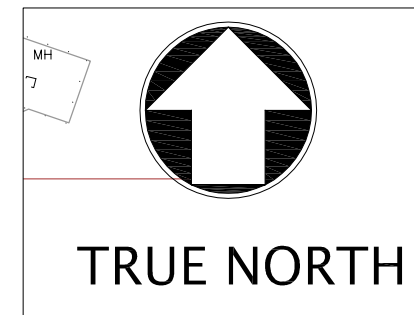
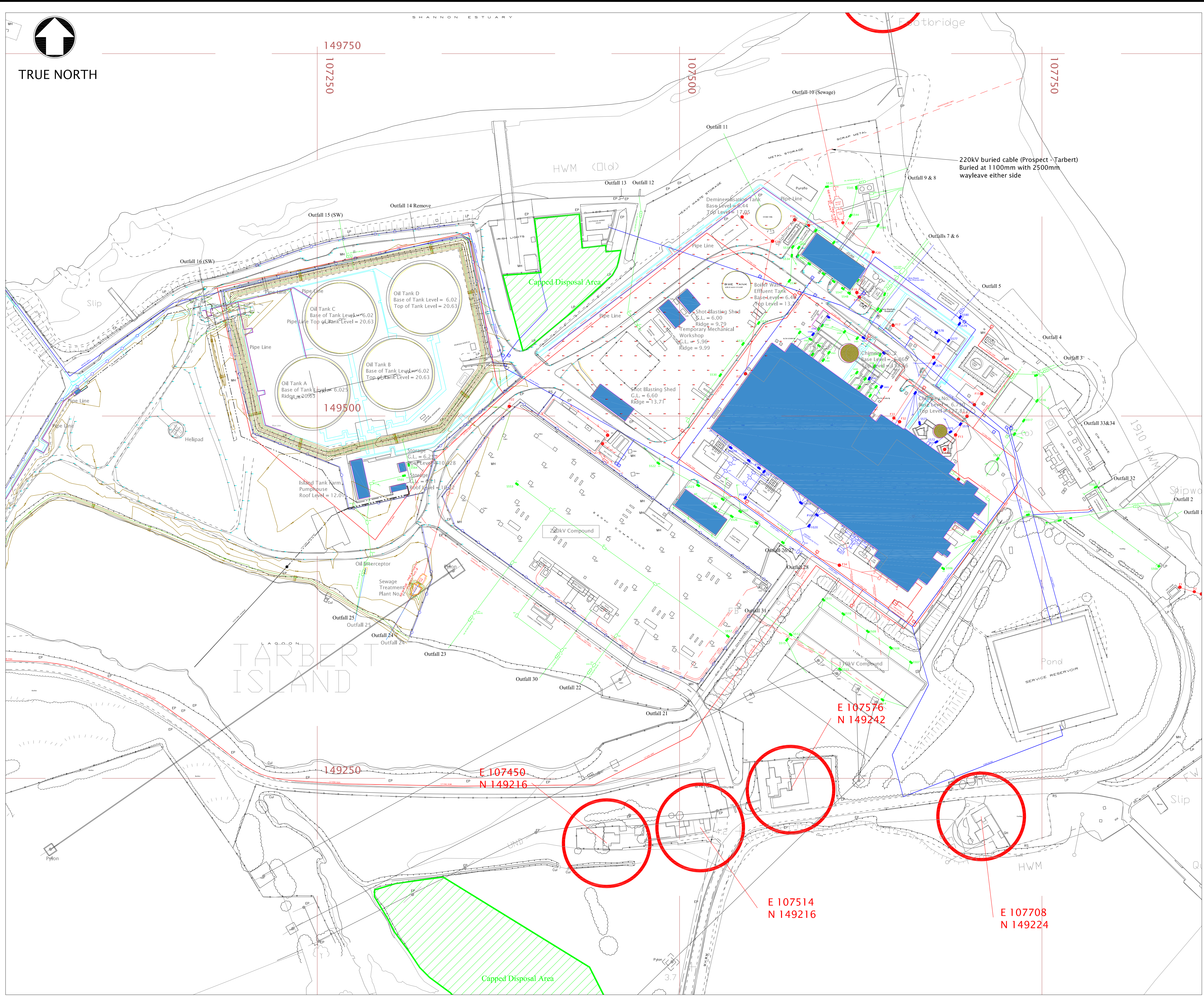
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# Appendix B Utilities Information

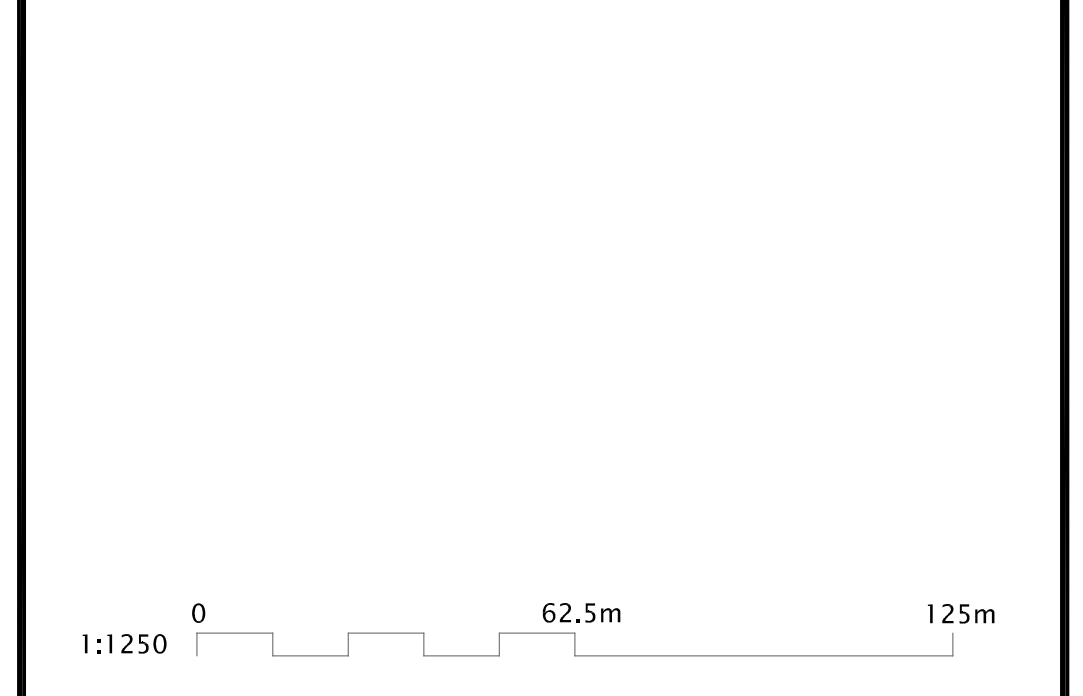








- Notes**
- Ordnance Survey Ireland licence No. EN0034509  
© Ordnance Survey Ireland/Government of Ireland
  - All co-ordinates shown relate to Irish National Grid co-ordinates.
- Reference Drawings:**
- MMP - 2407768E02-T006  
Topographical Survey at Tarbert Island Power Station, Tarbert, Co. Kerry Topographical Survey, Sheet 1 and 2.
  - ESBI - PA619-D100-001  
Site Layout Map Showing Main Site Services
- Legend:**
- SURFACE WATER DRAINS SHOWN THUS: (Green line)
  - PROCESS WATER DRAINS SHOWN THUS: (Blue line)
  - FOUL WATER DRAINS SHOWN THUS: (Red line)
  - WATER MAIN SHOWN THUS: (Blue line)
  - FIREFIGHTING RING MAIN SHOWN THUS: (Red line)
  - OIL PIPELINE SHOWN THUS: (Cyan line)
  - UNDERGROUND CABLES SHOWN THUS: (Dashed red line)
  - CABLE MANHOLES SHOWN THUS: (Square with 'C')
  - PIPE MANHOLES SHOWN THUS: (Square with 'P')
  - VALVE MANHOLES SHOWN THUS: (Square with 'V')
  - SUMP MANHOLES SHOWN THUS: (Square with 'S')
  - MANHOLES SHOWN THUS: (Square with 'M')
  - FOUL MANHOLES SHOWN THUS: (Square with 'F')
  - GULLY SHOWN THUS: (Square with 'G')
  - ARMSTRONG JUNCTION SHOWN THUS: (Square with 'AJ')
  - FIRE HYDRANT SHOWN THUS: (Square with 'H')
  - ELECTRIC CABLE POLE SHOWN THUS: (Square with 'EP')
  - LIGHTING POLE SHOWN THUS: (Square with 'LP')



Rev	Date	Drawn	Description	Ch'k'd	App'd
P4	06/11/09	AV	Issued with Planning Application	BK	BK
P3	09/10/09	AV	Revised as per Endesa Comments	BK	BK
P2	21/08/09	AV	Revised as per Endesa Comments	BK	BK
P1	08/07/09	VF	Issued for Endesa Review	BK	BK

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**Title**

Open Cycle Gas Turbine  
Tarbert, Co. Kerry

Topographical and Buried Services Survey

Designed	-	Eng. Chk.	D. Carr
Drawn	S. Horodecki	Coordination	B. Kinsella
Dwg. Chk.	S. Horodecki	Approved	B. Kinsella
Scale	1:1250	Project	257554
Drawing No	257554/02C/002	CAD file	25755402C002
Status	PRE	Rev	P4

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# Appendix C Proposed Flood Defence



**LEGEND**

- PROPERTY BOUNDARY
- FLOOD DEFENCE
- NEW BUILDING
- NEW ROAD
- ▨ 220KV CABLE EASEMENT
- ⊠ FLOOD GATES

**NOTES**

1. DRAWING IS FOR INDICATIVE PURPOSES ONLY
2. TO BE PRINTED AT A1

**APPROVED FOR ISSUE**

A	ES	GM	PNJ
I/R	DRAWN BY	CHECKED	APPROVED

**ISSUE/REVISION**

P03	03/10/23	REVISED
P02	28/09/23	REVISED
P01	05/09/23	FIRST ISSUE
I/R	DATE	DESCRIPTION

**PROJECT NUMBER**

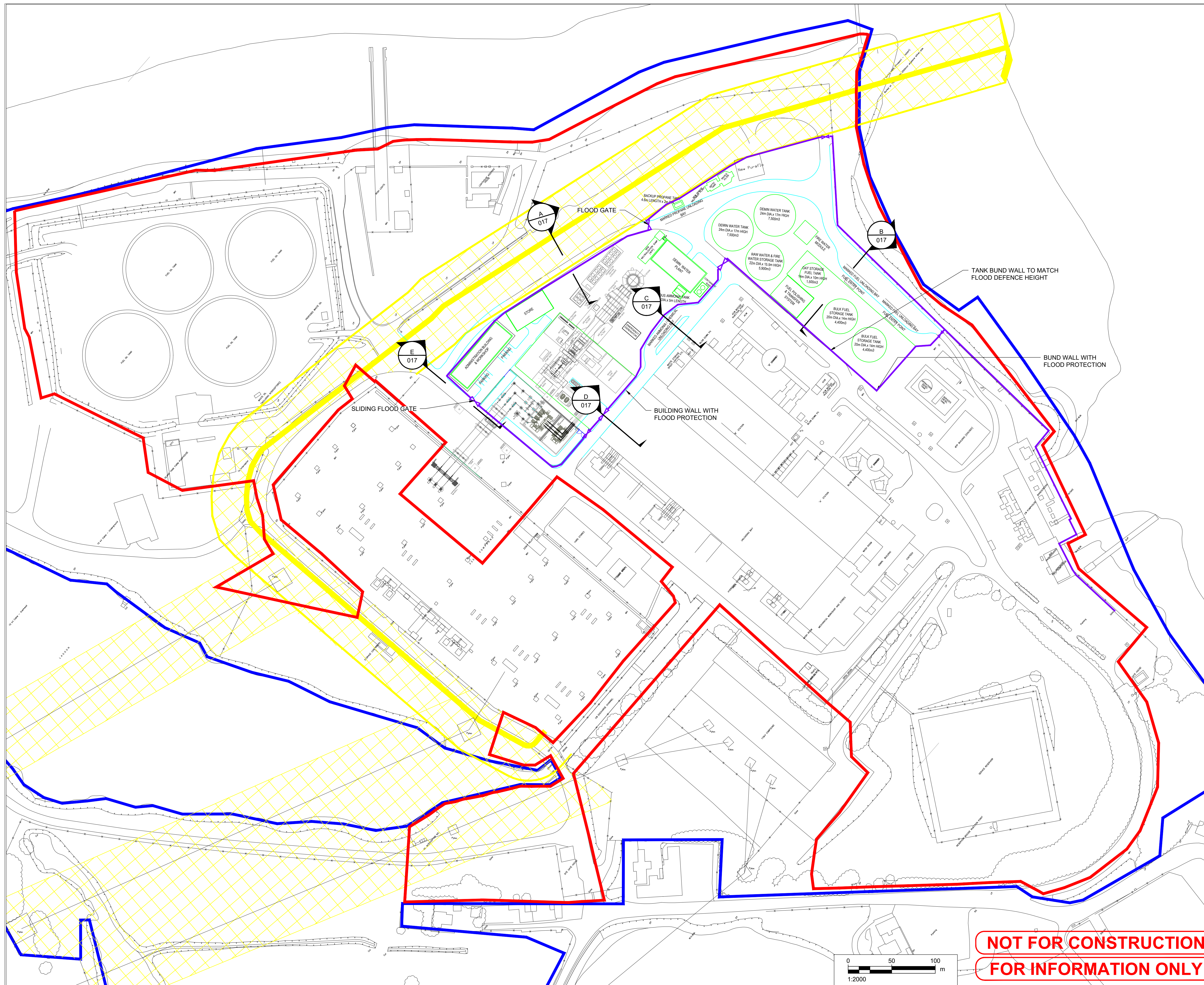
60695232

**SHEET TITLE**

Proposed Flood Defence Layout  
 1:2000

**SHEET NUMBER**

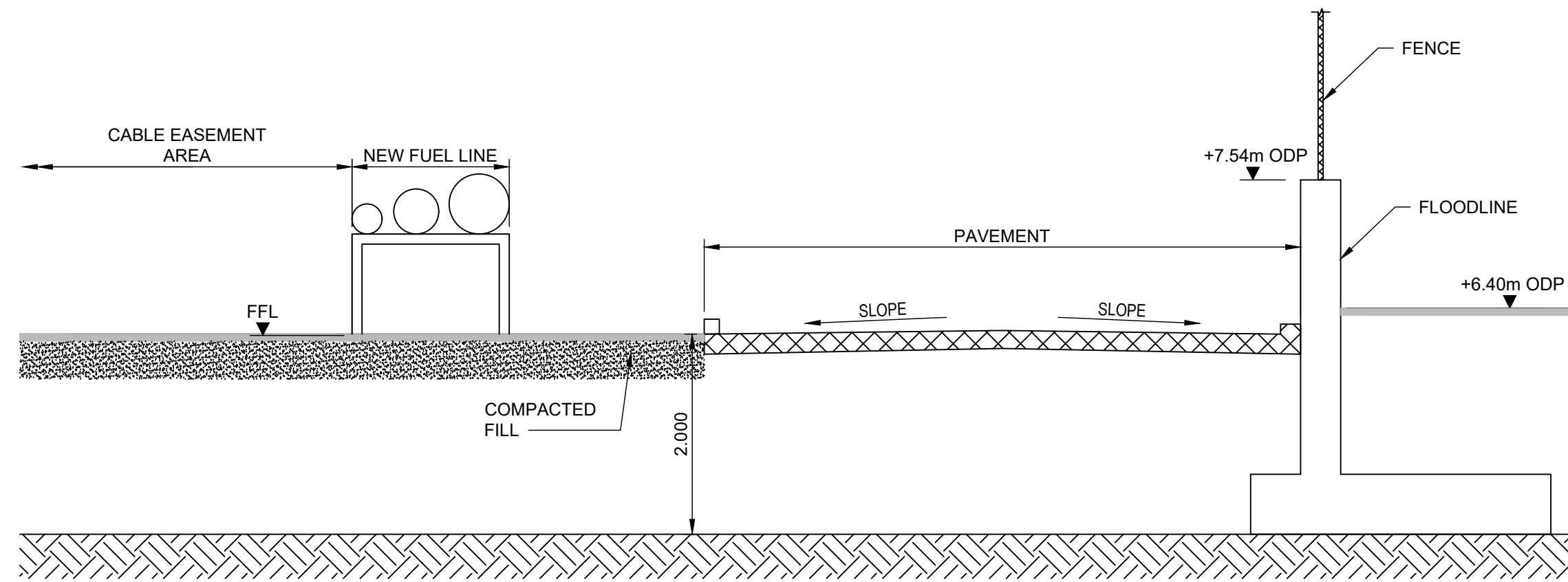
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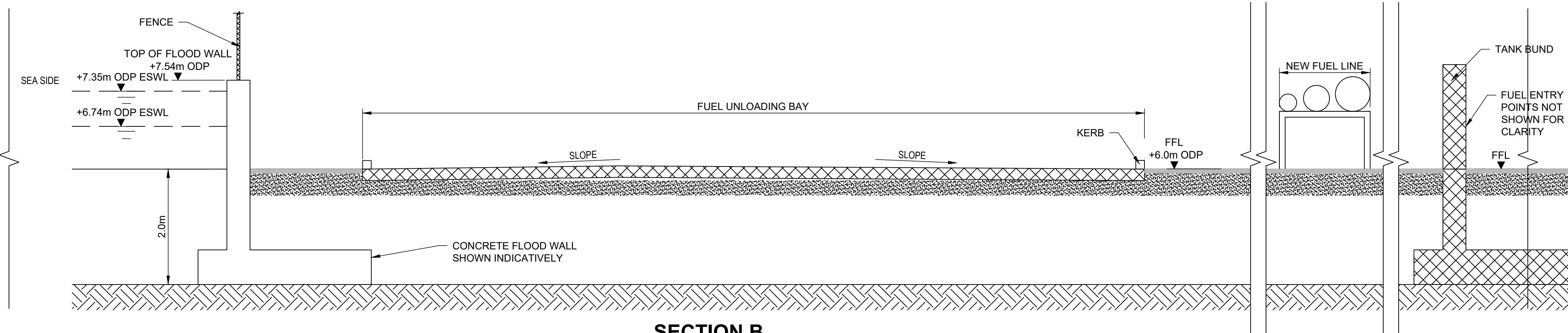
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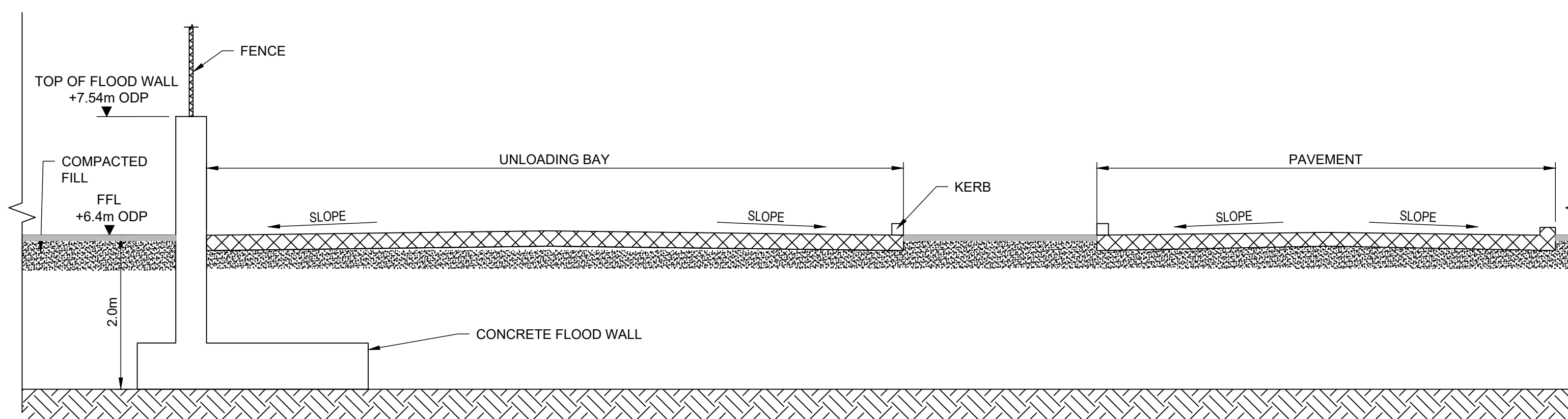




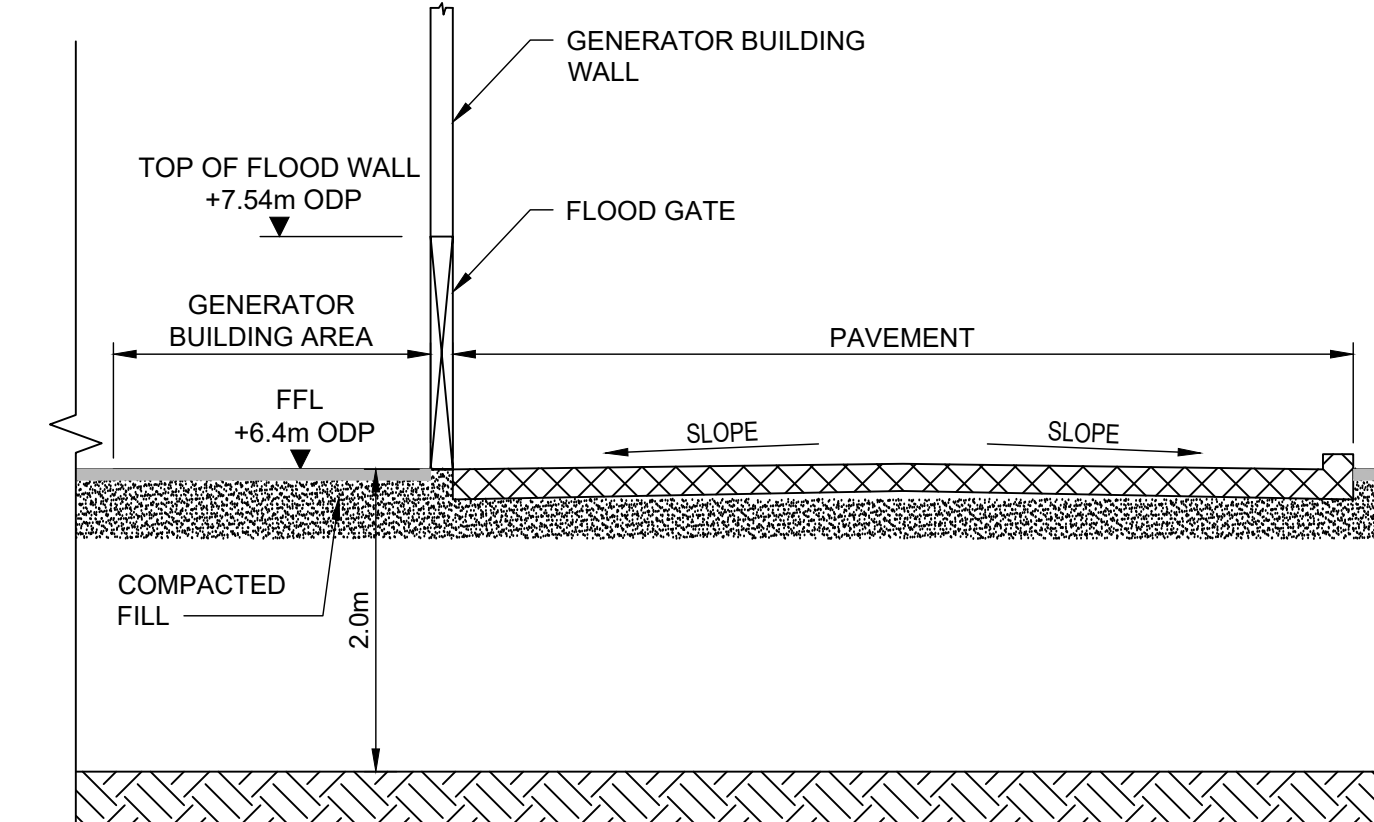
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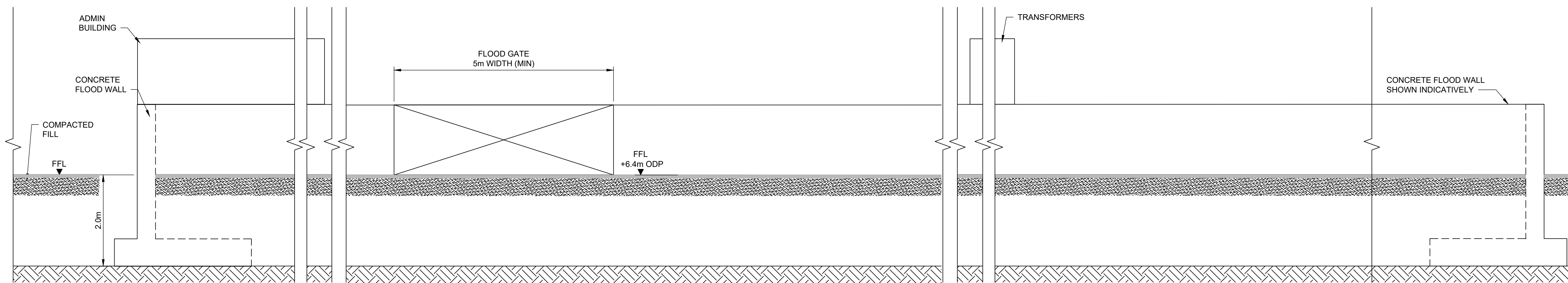
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**SECTION C**  
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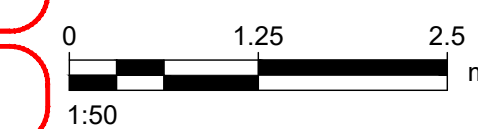


**SECTION D**  
 SCALE 1:50



**SECTION E**  
 SCALE 1:50H 1:200V

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- TO BE PRINTED AT A1.

**LEGENDS:**

ESWL	EXTREME STILL WATER LEVEL
ODP	ORDNANCE DATUM POOLBEG
MHWS	MEAN HIGH WATER SPRINGS
FFL	FINISHED FLOOR LEVEL

**APPROVED FOR ISSUE**

A	ES	GM	PNJ
I/R	DRAWN BY	CHECKED	APPROVED

**ISSUE/REVISION**

P03	03/10/23	UPDATED
P02	28/09/23	UPDATED
P01	05/09/23	FIRST ISSUE
I/R	DATE	DESCRIPTION

**PROJECT NUMBER**

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**SHEET TITLE**

Proposed Flood Defence Sections

**SHEET NUMBER**

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