Onshore Substation Site Drainage and Water Supply Design Report

codling wind park

MOTT MACDONALD

Codling Wind Park Onshore Transmission Infrastructure

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June 2024

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June 2024

Issue and Revision Record

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Contents

1	Introduction	1
2	Proposed Development	2
3	Storm Water Drainage Proposal	3
3.1	Storm Water Discharge Options	3
3.2	Storm Water Collection System	3
3.3	Storm Water Network Design and Modelling	4
3.3.1	Network Descriptions	4
3.3.2	Pipe Sizing	5
3.3.3	Storage Requirements	5
4	Foul Water Proposal	9
4.1	Foul Water Collection and Disposal Options	9
4.2	Foul Water Solution	9
5	Potable Water Requirements	10
5.1	Estimated On-site Water Demand	10
5.2	Available Supply and Proposed Connection	10
6	Pre-planning Consultation	11
6.1	Storm Water	11
6.2	Foul Water and Potable Water	11
	Appendices	12
A.	Key Design Drawings	13
B.	Storm Water Calculations	14
C.	Foul Water Calculations	20
D.	Potable Water Calculations	21

1 Introduction

Codling Wind Park Limited (CWPL) is proposing to develop the Codling Wind Park (CWP) Project which is located in the Irish Sea, off the east coast of Ireland between Greystones and Wicklow.

The proposed onshore transmission infrastructure (OTI) for the CWP Project is situated within the Poolbeg Peninsula and includes transition joint bays (TJBs), onshore export cables, an onshore substation, and Electricity Supply Board Networks (ESBN) network cables to connect the onshore substation to the Poolbeg 220kV substation.

This report forms part of the Planning Application submitted on behalf of CWPL and summarises the storm water and foul water drainage proposals for the proposed onshore substation development, as well as the proposed potable water supply proposals.

This report should be read in conjunction with all other drawings and reports which accompany the application.

2 Proposed Development

The onshore substation will be located on the south bank of the River Liffey, on land reclaimed in c. 1998. To the south of the site is the Pigeon House Road. The location of the proposed substation site on the bank of the Liffey and the local extents of the indicative planning application boundary (red line) are shown in Figure 2.1 below.

Figure 2.1: Location of the proposed onshore substation

It is envisaged that as part of this development, new storm/foul water drainage and potable water services will be installed to cater for the entirety of the site.

Storm water is proposed to be collected on site and discharged via new outfall pipes to the adjacent River Liffey Estuary. Storm water quantities will vary with rainfall.

The onshore substation buildings will not generally be manned, although regular maintenance checks are anticipated. As a result, foul water loading and discharges associated with the new site will be minimal.

Similarly, the potable water demand will be low as it will only be required to supply basic welfare facilities (toilet and wash hand basin) which are proposed to be located within both the Electricity Supply Board (ESB) building and the EirGrid Gas Insulated Switchgear (GIS) building.

3 Storm Water Drainage Proposal

3.1 Storm Water Discharge Options

The proposed development will increase the impermeable area of the site and hence increase the rate of storm water runoff in a rainfall event. Sustainable drainage principles require that such increases must be carefully managed to ensure that there are no negative impacts on the site itself or properties upstream or downstream which could be affected. With this in mind, the following options for disposal of storm water were considered:

- Discharge to ground via infiltration.
- Direct discharge to the River Liffey Estuary.

The option of discharge to the River Liffey Estuary was considered preferable for the following reasons:

- The existing site consists of made ground reclaimed land where contaminated land might be encountered, with an associated risk of pollutants becoming entrained for an infiltration solution.
- The coastal location of the site means that ground water levels will be heavily influenced by the tides, with an associated risk of capacity being significantly reduced during high tide events for an infiltration solution.
- The coastal location of the site means that the receiving water body (River Liffey Estuary/Irish Sea) has a (relatively) infinite volume so there is no need to restrict runoff rates or provide large attenuation ponds or tanks for a direct discharge solution.

3.2 Storm Water Collection System

Due to the nature of the proposed development (a remotely operated electrical substation on a physically constrained site), it is considered unsuitable for green/blue roof solutions and the majority of nature-based drainage solutions. As a result, a traditional underground storm collection system is proposed for the site.

The new storm water collection system will drain runoff from all new buildings, structures, hard standing areas and access roads which will be located at the site. The collection system will be divided into four discrete networks to minimise the depth of pipe installation and, consequently, reduce the risk of the system being affected by high tides.

Each network will have its own dedicated outfall and, since the site is located on the south bank of the River Liffey Estuary, each of these outfalls will be placed along the northern boundary of the development site. These outfalls will be fitted with non-return valves (NRVs) to ensure that there is no ingress of seawater into the drainage system at times when the tide level is higher than the level of the outfall.

While NRVs will prevent water from the estuary entering the network, they can also introduce the risk of flooding <u>within</u> the site if an extreme rainfall event occurs while the NRVs are sealed from the outside due to a high tide event occurring at the same time. This situation is commonly referred to as ‘tide-locking’ and is discussed in more detail in Section 3.3.

As outlined in Section 3.1, the development site is located adjacent to a tidally influenced water body which has a relatively infinite volume. As a result, the impact of discharging storm water runoff at an increased rate will be negligible and there will be no measurable impact on properties either upstream or downstream. This approach is in line with guidance included in

Volume 2 (New Development) of the Greater Dublin Strategic Drainage Study (GDSDS), which states:

"Developments that are proposed at the downstream end of a catchment, by definition, do not have to be concerned with worsening the river state downstream. In this situation, it may not be necessary to provide either 'long term' storage or attenuation storage."

"Where there is little downstream to be concerned about with respect to flooding (discharging to the estuary or sea), criteria on flow rates and volumes of discharge are of little relevance. Water quality is the only issue needing to be addressed (primarily sedimentation)."

Regarding water quality, the following measures are proposed to help improve the quality of discharges from the site and reduce the risk of impacting the receiving environment:

- All networks will include a silt trap chamber (catch-pit manhole) upstream of the outfall point to help remove any settleable solids which may have become entrained in rainfall runoff (e.g. silt, grit, dust, litter etc.).
- All networks will include a Class 1 **bypass** oil/fuel interceptor upstream of the outfall point to remove any hydrocarbons which may have become entrained in runoff from on-site vehicle use.
- All oil/fuel interceptors will include a high-level alarm linked to the site telemetry/SCADA system to notify site operators when the storage capacity of the units is approaching full.
- All networks will include an emergency shut-off valve (penstock) chamber upstream of the outfall point to prevent discharges during maintenance of the interceptors and silt traps, or in the unlikely event of a significant oil or fuel spillage occurring on site.
- The drainage system serving the transformer area adjacent to the EirGrid GIS building will include the following additional measures:
  - Each transformer will be contained within a bund fitted with an oil-sensitive bund pump unit which will cease to operate if oil is detected in the storm water.
  - A Class 1 **full retention** oil/fuel interceptor will be located on the drainage system immediately downstream of the transformer bunds.

The proposed layout for the storm water collection system including manholes, pipes, outfalls and water quality control elements is shown on drawing 229101147-MMD-01-XX-DR-C-2201 in Appendix A, and further information relating to the design of the system is included in Section 3.3 below.

3.3 Storm Water Network Design and Modelling

3.3.1 Network Descriptions

As mentioned in Section 3.2, the collection system will be divided into four discrete networks, and a brief description of each is provided below:

Network 1: this network will serve the main compound area including the GIS building, statcom buildings, harmonic filter compound, bunded transformers and part of the site access road. Approximately 7,820 m^2 of existing unpaved 'brownfield' area will be replaced by impermeable surfaces here, all of which will drain to Network 1. In addition, approximately 4,680 m^2 of brownfield area will be resurfaced but remain permeable and also contribute to this network.

Network 2: this network will serve the area around the ESB building and associated access and hardstanding areas. Approximately 2,110 m^2 of existing 'brownfield' area will be replaced by impermeable surfaces here, all of which will contribute to this network.

Network 3: this network caters solely to the proposed eastern access road. This network will drain approximately 160 m^2 of what is currently a compacted gravel access track, but which is proposed to be replaced with new impermeable asphalt surfacing. Due to the existing topography approximately 650 m^2 of existing ‘greenfield’ area will also contribute to this network.

Network 4: this network caters solely to the proposed western access road and will drain approximately 220 m^2 of new asphalt surfacing.

3.3.2 Pipe Sizing

Storm water pipe sizes and slopes were determined using the ‘MicroDrainage’ hydraulic modelling package using the following design criteria for initial pipe sizing;

- Return period: 1 in 2 years
- M5-60: 16.8mm
- Ratio, r: 0.3
- Time of entry: 4 minutes
- Max. hourly rainfall: 75mm
- Minimum fluid velocity: 1m/s
- Additional flow: +20% uplift for climate change
- Gross area: 1.56ha
- Equiv. impermeable area: 1.03ha

Once initial pipe sizing was complete, simulations were run for rainfall events of varying durations and return periods of 1 in 30 and 1 in 100 years with a ‘free discharge’ condition at the outfalls to confirm if the capacity of individual pipes was sufficient.

Where excessive surcharging or flooding was identified, pipes were upsized to reduce this to acceptable limits.

3.3.3 Storage Requirements

As stated in Section 3.2, no restriction of discharge rates or provision of attenuation storage is proposed as the impact of discharging storm water runoff to a tidally influenced water body such as the River Liffey Estuary will be negligible.

However, the need for storage to prevent flooding in the event of networks becoming ‘tide locked’ needs to be established to ensure that site serviceability requirements are met.

Volume 2 (New Development) of the GDSDS recommends the following for design of drainage systems:

- 1 in 30-year event: no flooding on site except where specifically planned flooding is approved.
- 1 in 100-year event: no internal property flooding. Planned flood routing and temporary flood storage accommodated on site for short high intensity storms. Floor levels at least 500mm above maximum river level and adjacent on-site storage retention. No flooding of adjacent urban areas. Overland flooding managed within the development.

As outlined in Section 3.3.2, simulations were carried out using a ‘free discharge’ condition at the outfalls (i.e. where the water level in the receiving body is set below the invert level of the outlet pipe at all times) in order to size the network. This exercise confirmed that the above serviceability criteria would be met for low tide events.

In order to assess the performance of the networks during high tide events, a simplified joint probability assessment was undertaken for a combination of rainfall and tidal events. The assessment approach used was informed by guidance provided in Volume 5 (Climate Change) of the GDSDS, which states:

"The assessment of the level of service where high tides coincide with rainfall requires an understanding of the joint probability as discussed in Chapter 2. However a clear understanding of the underlying statistics and appropriate methodology is not generally within the experience of many engineers and therefore a pragmatic and conservative set of assumptions needs to be applied to make sure that the coincidence of these events occurring is considered."

The document goes on to state that a joint probability return period of 1 in 30 years is an appropriate minimum for assessment of tide-related flooding in drainage systems, and it recommends that the following combinations are used for simplified assessment:

- MHWS tide with 30 year drainage
- 1 year river with 1 year drainage
- 5 year tide with 0.25 year drainage

In addition, since large parts of the proposed development in this case can be classified as critical and/or highly vulnerable infrastructure, it was considered prudent to also assess the performance of the networks using a joint probability return period of 1 in 100 years.

This more conservative assessment was informed by the 'modestly correlated' tide and rainfall combinations with a 1 in 100 year joint return period from Table D3 of Volume 5 of the GDSDS:

Joint return period	20 year	50 year	100 year	200 year	500 year
Modestly correlated (20)	CFrp=14.04	CFrp=17.17	CFrp=20	CFrp=23.29	CFrp=28.49
Event combination 1	5, 0.08	5, 0.24	5, 0.6	5, 1.32	5, 4
Event combination 2	2, 0.2	2, 0.6	2, 1.4	2, 3.3	2, 10
Event combination 3	1, 0.4	1, 1.2	1, 2.8	1, 6.6	1, 20
Event combination 4	0.5, 0.8	0.5, 2.4	0.5, 6	0.5, 13.2	0.5, 40

For clarity, 'Event combination 1' in the above table provides a joint return period of 1 in 100 years by combining a 1 in 5 year tidal return period with a 1 in 0.6 year rainfall return period.

In order to obtain tide level values for the return periods listed within the table shown above, it was necessary to interpolate between known values from existing studies.

In this regard, predicted high tide levels were obtained from drawing '09LIF_EXCCD_F1_06' of the Eastern CFRAM Study for the nearest node to the site:

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 0.5% AEP	Flow (m³/s) 0.5% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
E0924C0012	2.67	N/A	3.11	N/A	3.34	N/A
E0924C0013	N/A	N/A	3.11	N/A	3.34	N/A
E0924C0014	2.67	N/A	3.11	N/A	3.34	N/A

A +1m uplift for climate change was then added in line with the recommendations of the Strategic Flood Risk Assessment for the Dublin City Development Plan (2022–2028), which states the following in relation to the area Dublin Port South of the Liffey from Tom Clarke Bridge:

"Within this area it is essential that the impact of sea level rise by 0.5m for ordinary sites and 1.0m for critical/ highly vulnerable infrastructure and high risk chemical sites is carried out as detailed in this SFRA."

Once this +1m allowance is included, the predicted high tide values increase to the following:

CFRAM predicted high tide values incl. +1m for climate change		
Return Period (1:X)	AEP (%)	Tide Level (mOD)
10	10.0%	3.67
200	0.5%	4.11
1000	0.1%	4.34

Interpolating between these, the following high tide values were determined for the return periods required by Event Combinations 1 to 4:

Interpolated high tide values for required event combinations		
Return Period (1:X)	AEP (%)	Tide Level (mOD)
5	20%	3.57
2	50%	3.44
1	100%	3.34
0.5	200%	3.23

With regard to rainfall quantities for the corresponding events, these were automatically generated within the MicroDrainage hydraulic model for the networks. However, since the MicroDrainage software does not allow non-whole integers to be used, the rainfall return periods were rounded up, providing a slightly more conservative assessment. The table below summarises the interpolated tide levels and the corresponding rainfall return periods which were used in MicroDrainage to assess the effects of tide-locking for the 1 in 100 year scenario:

Parameters used in MicroDrainage to assess tide-locking for the 1 in 100 year joint probability scenario				
Event Combination	Joint Probability (1 in X)	Tidal Return Period (1:X)	Tide Level (mOD)	Rainfall Return Period (1:X)
1	100	5	3.57	1
2	100	2	3.44	2
3	100	1	3.34	3
4	100	0.5	3.23	6

Simulations with varying storm durations were run in MicroDrainage using the above criteria for all four event combinations. These simulations were initially run with 'static' high tide values where the water level at each outfall was set at the required high tide level for the entire duration of the storm event. Since tides typically vary from high to low over the course of approximately six hours, this would be considered an extremely conservative approach. However, it is a useful exercise from an engineering design perspective because positive results (no flooding) for such a conservative assessment would negate the need to examine the network using a dynamic tide analysis.

This initial exercise indicated no flooding for Networks 1 or 2 but significant flooding for Networks 3 and 4. These results were not surprising as ground levels within the EirGrid and ESB compounds are proposed to be raised to approximately 5.0 mOD which is well above the tide levels being considered, This means that the storm water collection networks (1 and 2) which will serve these compound areas will be able to drain (at least in part) to the River Liffey Estuary at all times. Similarly, results indicating flooding for Networks 3 and 4 were not surprising as these networks will drain the proposed new access roads which are required to have much lower ground levels (approx. 3.3-3.7 mOD) due to the need to tie in with existing roads in the area.

Since the results from the initial simulations using static tide levels indicated significant (and potentially unrealistic) volumes of flooding, a second batch of simulations was run using a dynamic profile for the tide/water level at each outfall. In this assessment, a six-hour storm event was run with the tide rising from low tide to the relevant peak level (as per the event combination being considered) and falling back to low tide again over the course of the rainfall event.

This more refined (and realistic) assessment indicted that no flooding would occur for any of Networks 1 to 4 and it is anticipated therefore that a 1 in 100 year site serviceability requirement can be achieved without the need for additional, dedicated storage being provided on the storm water drainage networks and such storage is not therefore proposed as part of the planning stage design.

It should be noted that the joint probability assessment carried out above uses a simplified approach (as advocated by the GDSDS) for what is an extremely complex interaction between climate and hydrology, and further refinement may therefore be required at the detailed design stage. A summary of the hydraulic modelling results is included in Appendix B.

4 Foul Water Proposal

4.1 Foul Water Collection and Disposal Options

Foul water loading from the proposed development site will be minimal as it is anticipated that the site will be unstaffed/operated remotely for the majority of time. The only sources of wastewater on site will be basic welfare facilities (toilets and wash hand basins). Although the proposed development site is located in close proximity to the Ringsend Wastewater Treatment Plant (WwTP), records do not show any public sewers in close proximity to the site.

Due to the low level of loading anticipated at the site, and the lack of a nearby public sewer to connect to, a sealed holding tank is proposed for the site.

4.2 Foul Water Solution

Separate gravity collection systems will be used to collect foul water from each of the EirGrid GIS and ESB buildings and discharge this to sealed holding tanks.

Each tank will be fitted with a high-level alarm linked to the site telemetry/SCADA system to notify site operators when the storage capacity of the units is approaching full. Periodic emptying of the tanks will be carried out by a licensed wastewater disposal company.

Design guidelines from the Irish Water Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03) have been used to estimate the peak foul loading rates for the proposed development and summary calculations are provided in Appendix C.

The foul water design flow has been estimated as 0.0039 litres/sec (peak) or 552 litres per week. This calculation applies separately to each of the two buildings and their corresponding individual foul networks.

The peak week loading rate is considered to be a suitable design flow rate for pipe sizing. However, as this is very low, minimum pipe sizes and slopes as required by the Building Regulations will apply. Therefore, the on-site foul sewers have been designed to be a minimum 100 mm diameter pipe, with a minimum gradient of 1:60 which meets the requirements of Technical Guidance Document H of the Building Regulations.

The layout of the proposed foul water sewer design is shown on drawing 229101147-MMD-01-XX-DR-C-2201 in Appendix A.

5 Potable Water Requirements

5.1 Estimated On-site Water Demand

Potable water demand at the new buildings will be minimal as it is required to supply basic welfare facilities (toilet and wash hand basin) only. Separate service connections are proposed for each of the EirGrid GIS and ESB buildings.

It is estimated that the typical water demand rate will be approximately 0.00148 litres/sec (peak) or 217.5 litres/week for each building. This has been calculated based on design guidelines from the Irish Water Code of Practice for Water Infrastructure (IW-CDS-5020-03), and a copy of the calculation and assumptions is included in Appendix D.

5.2 Available Supply and Proposed Connection

The closest water source, an existing 300mm diameter watermain, is located within Pidgeon House Road directly to the south of the site.

Subject to final approval by Uisce Éireann, it is proposed that the site compound will be supplied by a new 200 mm watermain which will be supplied from the existing 300 mm watermain. Smaller service connections (approx. 25 mm diameter) will be taken from this pipeline to supply the buildings while the watermain will be looped around the compound to provide an emergency supply for fire-fighting.

An Uisce Éireann compliant 'boundary box', which will include a water meter and shut off valve is proposed to be provided on the service connection to each building. These boundary boxes will be located just outside the entrance to the gated site.

The layout of the proposed water supply design is indicated on drawing 229101147-MMD-01-XX-DR-C-2202 in Appendix A.

6 Pre-planning Consultation

6.1 Storm Water

Mott MacDonald held a meeting (online via Microsoft Teams) with Dublin City Council (DCC) to discuss storm water drainage for the substation site on 11 October 2022. The aim of this engagement was to inform DCC about the proposed onshore development, and to confirm at an early stage if the proposal to discharge storm water to the River Liffey at an unrestricted rate would be acceptable.

During the discussions, DCC advised that they had no objection in principle to an unrestricted discharge from the site, but that a final decision would be made only upon receipt and review of a formal application for planning consent.

In addition, DCC advised that the following should be given specific consideration as part of the storm water design proposals:

- Treatment of storm water prior to discharge.
- Flood risk associated with high tides (tide-locking) and the potential need for storage/attenuation to reduce this risk.

With regard to treatment prior to discharge, Section 3.2 above summarises key features (catch-pits, interceptors, shut-off valves) incorporated in the substation drainage design to capture and remove pollutants which may become entrained in storm water runoff.

With regard to flood risk associated with tide-locking, Section 3.3.3 above summarises how a simplified joint probability assessment was undertaken, and that this assessment has indicated that storm water storage will not be required to mitigate the effects of tide-locking at the substation site.

6.2 Foul Water and Potable Water

Mott MacDonald prepared and submitted a pre-connection enquiry to Uisce Éireann on 22 August 2023. This application confirmed to Uisce Éireann that a connection to the public sewer is not being sought, but that a connection to the public water supply is required for the onshore substation.

On 23 January 2024, a 'Confirmation of Feasibility' (COF) letter was received from Uisce Éireann stating that:

"Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water connection for a Multi/Mixed Use Development of 2 unit(s) at CWP Onshore Substation, Pidgeon House Road, Dublin, Co. Dublin, (the Development). Based upon the details provided we can advise the following regarding connecting to the networks;

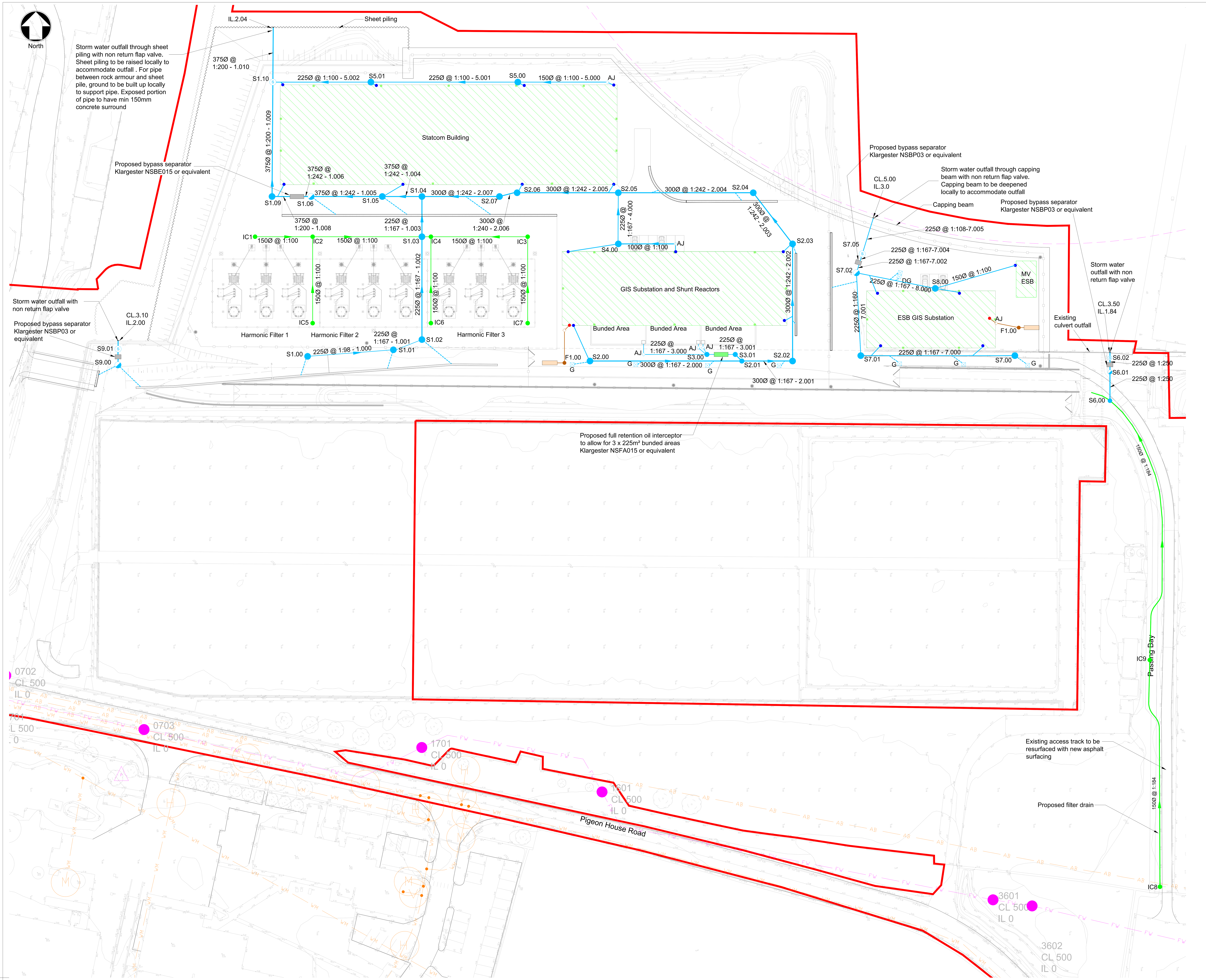
- *Water Connection - Feasible without infrastructure upgrade by Irish Water*

This letter does not constitute an offer, in whole or in part, to provide a connection to any Uisce Éireann infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann."

While the COF letter does not constitute a connection offer, it is a very good indication that it will be possible for a water supply to be obtained from Uisce Éireann for the substation site.

Appendices

A. Key Design Drawings



Proposed Site Plan.
Scale 1:500

1:500 0 25m 50m

Notes

1. For Planning purposes only. Not for construction.
2. All dimensions are in metres.
3. All levels are in metres relative to Ordnance Datum at Malin Head.
4. Do not scale off this drawing. Use figured dimensions only. All dimensions to be checked on site.
5. All storm water components to comply with the requirements of the Greater Dublin Regional Code of Practice for Drainage Works.
6. Layout and size of drainage elements subject to minor changes pending detailed design.

Key to Symbols

- Application Site Boundary
- Indicates Location of Palisade Fence
- Indicates Location of Chainlink Fence
- Indicates High Water Mark
- Existing Watermain
- Existing Watermain (abandoned)
- Existing Foul Sewer
- Existing Foul Manhole
- Proposed Storm Water Carrier Pipe
- Proposed Filter Drain and Inspection Chamber
- Proposed Heavy Duty Linear Drainage Channel
- Proposed Gully / Drainage Channel Connection
- S1.01 Proposed Storm Water Manhole
- G Proposed Gully
- AJ Proposed Armstrong Junction
- Proposed Rain Water Downpipe
- Proposed Silt Trap Chamber
- S Proposed Emergency Shut-off Valve Chamber
- Proposed Bypass Fuel/Oil Interceptor
- Proposed Full Retention Oil/Fuel Interceptor
- Proposed Wastewater Sewer
- Proposed Soil Vent Pipe for WC
- Proposed Wastewater Storage Tank
- Proposed UG HV Cabling

Safety, Health and Environmental Information

References

229101147-MMD-01-XX-DR-C-2010 - Onshore Development Area Site Layout Plan
229101147-MMD-01-XX-DR-C-2200 - Below Ground Drainage and Watermain Layout
229101147-MMD-01-XX-DR-C-2202 - Below Ground Watermain Layout
229101147-MMD-01-XX-DR-C-2210 - Typical Drainage Details - Sheet 1 of 2
229101147-MMD-01-XX-DR-C-2211 - Typical Drainage Details - Sheet 2 of 2

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P6	21/06/2024	Issued for Planning	CHC	DMY	DMN
P5	06/10/2023	Issued for Client Review	ERN	DMY	DMN
P4	30/06/2023	Issued for Review	M.O'F.	DMY	DMN
P3	10/03/2023	Issued for Review	ERN	DMY	DMN
P2	03/02/2023	Issued for Review	ERN	DMY	DMN
P1	09/12/2022	Issued for Review	ERN	DMY	DMN

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Client

CODLING WIND PARK

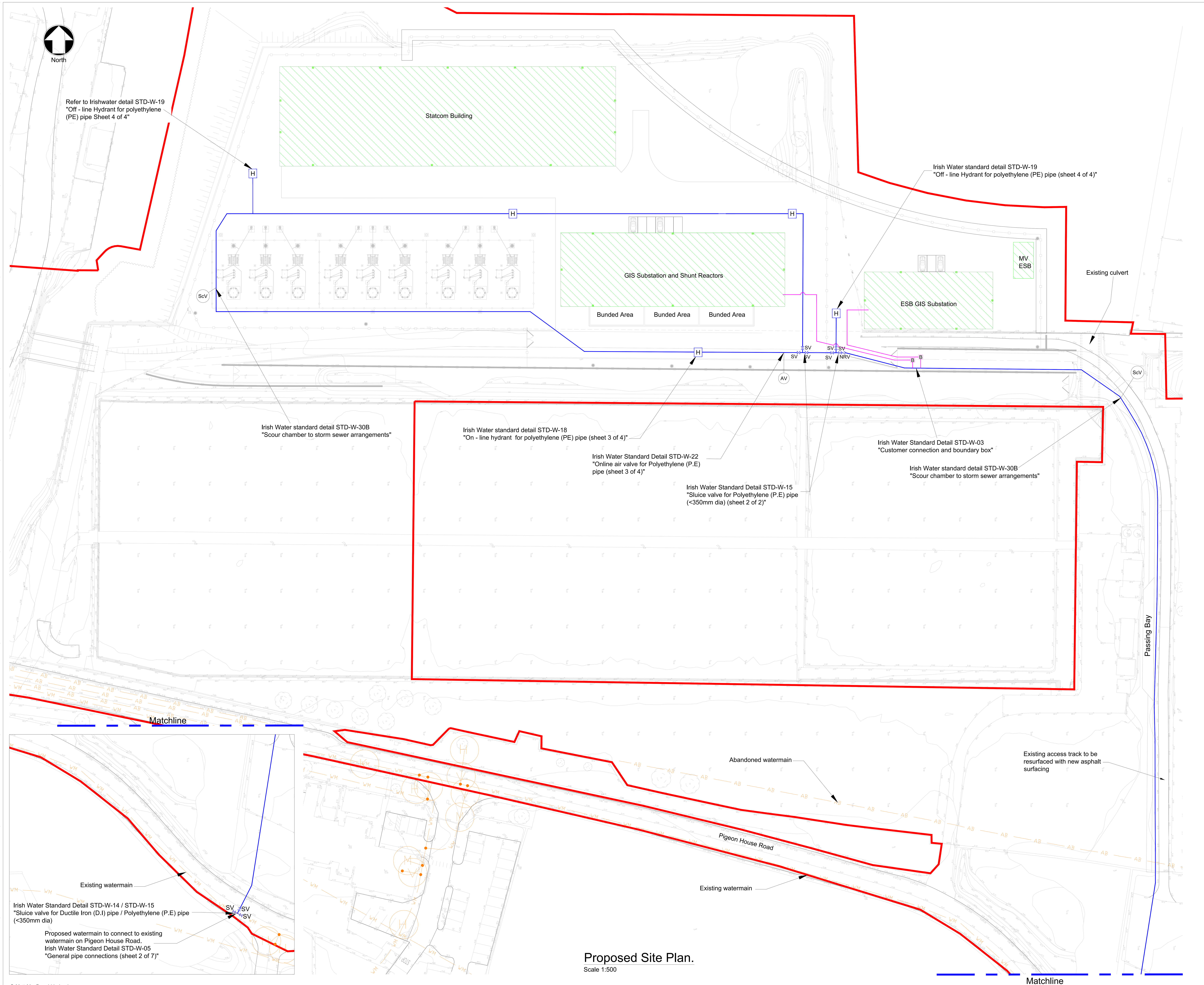
Title

Onshore Substation Site Below Ground Drainage Layout

CWP Drawing Number
CWP-E13-MMD-ONS-DR-C-2201-01

Scale at A1	MM Status	MM Rev	MM Security
1:500	PRE	P6	STD

MM Drawing Number
229101147-MMD-01-XX-DR-C-2201



Notes

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2. For Planning purposes only. Not for construction.
3. All dimensions are in metres.
4. All levels are in metres relative to Ordnance Datum at Malin Head.
5. Do not scale off this drawing. Use figured dimensions only. All dimensions to be checked on site.
6. All watermain components to comply with Irish Water standards and specification requirements.
7. Layout and size of water supply elements subject to minor changes pending detailed design.

Key to Symbols

- Application Site Boundary
- Indicates Location of Palisade Fence
- Indicates Location of Chainlink Fence
- Existing Watermain
- Existing Watermain (abandoned)
- Proposed Watermain
- Proposed Potable Water Service Connection
- B Proposed Boundary Box Type Water Meter
- H Proposed Hydrant
- SV Proposed Sluice Valve
- NRV Proposed Non Return Valve
- AV Proposed Air Valve
- ScV Proposed Scour Valve
- Proposed UG HV Cabling

Safety, Health and Environmental Information

References

229101147-MMD-01-XX-DR-C-2010 - Onshore Development Area Site Layout Plan
229101147-MMD-01-XX-DR-C-2200 - Below Ground Drainage and Watermain Layout
229101147-MMD-01-XX-DR-C-2201 - Below Ground Drainage Layout
229101147-MMD-01-XX-DR-C-2210 - Typical Drainage Details - Sheet 1 of 2
229101147-MMD-01-XX-DR-C-2211 - Typical Drainage Details - Sheet 2 of 2

Rev	Date	Description	Drawn	Ch'k'd	App'd
P6	21/06/2024	Issued for Planning	CHC	DMY	DMN
P5	06/10/2023	Issued for Client Review	ERN	DMY	DMN
P4	30/06/2023	Issued for Review	M.O'F.	DMY	DMN
P3	10/03/2023	Issued for Review	ERN	DMY	DMN
P2	03/02/2023	Issued for Review	ERN	DMY	DMN
P1	09/12/2022	Issued for Review	ERN	DMY	DMN

codling wind park

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Client

CODLING WIND PARK

Title

Onshore Substation Site
Below Ground Watermain Layout

CWP Drawing Number
CWP-E13-MMD-ONS-DR-C-2202-01

Scale at A1	MM Status	MM Rev	MM Security
1:500	PRE	P6	STD

MM Drawing Number
229101147-MMD-01-XX-DR-C-2202

B. Storm Water Calculations

Joint Probability Analysis Results:

Network 1 (EirGrid Compound)

Event Combination 1

1 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	S1.00	60 minute 1 year Winter I	5.000	3.852	0.052	0.000	0.05		2.2	SURCHARGED
1.001	S1.01	60 minute 1 year Winter I	5.000	3.850	0.296	0.000	0.09		2.8	SURCHARGED
1.002	S1.02	60 minute 1 year Winter I	5.000	3.848	0.344	0.000	0.07		2.6	SURCHARGED
1.003	S1.03	60 minute 1 year Winter I	5.000	3.845	0.510	0.000	0.15		4.9	SURCHARGED
2.000	S2.00	60 minute 1 year Winter I	5.000	3.904	-0.196	0.000	0.06		5.0	OK
3.000	S3.00	60 minute 1 year Winter I	5.000	3.902	0.002	0.000	0.07		2.1	SURCHARGED
3.001	S3.01	60 minute 1 year Winter I	5.000	3.901	0.048	0.000	0.07		2.0	SURCHARGED
2.001	S2.01	60 minute 1 year Winter I	5.000	3.901	0.064	0.000	0.10		7.4	SURCHARGED
2.002	S2.02	60 minute 1 year Winter I	5.000	3.900	0.148	0.000	0.16		10.6	SURCHARGED
2.003	S2.03	60 minute 1 year Winter I	5.000	3.895	0.278	0.000	0.20		12.0	SURCHARGED
2.004	S2.04	60 minute 1 year Winter I	5.000	3.888	0.345	0.000	0.25		16.5	SURCHARGED
4.000	S4.00	60 minute 1 year Winter I	5.000	3.876	0.701	0.000	0.04		1.4	SURCHARGED
2.005	S2.05	60 minute 1 year Winter I	5.000	3.874	0.784	0.000	0.20		13.1	SURCHARGED
2.006	S2.06	60 minute 1 year Winter I	5.000	3.861	0.888	0.000	0.30		14.2	SURCHARGED
2.007	S2.07	60 minute 1 year Winter I	5.000	3.855	0.903	0.000	0.26		16.5	SURCHARGED
1.004	S1.04	60 minute 1 year Winter I	5.000	3.839	0.976	0.000	0.21		20.1	SURCHARGED
1.005	S1.05	60 minute 1 year Winter I	5.000	3.830	1.013	0.000	0.22		23.4	SURCHARGED
1.006	S1.06	60 minute 1 year Winter I	5.000	3.756	1.021	0.000	0.27		24.0	SURCHARGED
1.007	PI Inlet	15 minute 1 year Summe	5.000	2.727	0.000	0.000	0.24		25.3	SURCHARGED*
1.008	PI Outlet	15 minute 1 year Summe	5.000	2.707	0.082	0.000	0.20		21.5	SURCHARGED*
1.009	S1.09	120 minute 1 year Summ	5.000	3.618	1.018	0.000	0.19		23.8	SURCHARGED
5.000	AJ	15 minute 1 year Winter I	5.000	3.916	-0.109	0.000	0.17		2.9	OK
5.001	S5.00	120 minute 1 year Summ	5.000	3.633	-0.160	0.000	0.08		3.8	OK
5.002	S5.01	120 minute 1 year Summ	5.000	3.622	0.089	0.000	0.16		7.6	SURCHARGED
1.010	S1.08	120 minute 1 year Summ	5.000	3.602	1.167	0.000	0.38		31.0	SURCHARGED

Event Combination 2

2 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	S1.00	60 minute 2 year Winter I	5.000	3.976	0.176	0.000	0.05		2.5	SURCHARGED
1.001	S1.01	60 minute 2 year Winter I	5.000	3.974	0.419	0.000	0.09		3.0	SURCHARGED
1.002	S1.02	60 minute 2 year Winter I	5.000	3.972	0.468	0.000	0.08		3.0	SURCHARGED
1.003	S1.03	60 minute 2 year Winter I	5.000	3.968	0.633	0.000	0.16		5.3	SURCHARGED
2.000	S2.00	60 minute 2 year Winter I	5.000	4.050	-0.050	0.000	0.08		6.0	OK
3.000	S3.00	60 minute 2 year Winter I	5.000	4.048	0.148	0.000	0.08		2.5	SURCHARGED
3.001	S3.01	60 minute 2 year Winter I	5.000	4.047	0.194	0.000	0.08		2.3	SURCHARGED
2.001	S2.01	60 minute 2 year Winter I	5.000	4.046	0.209	0.000	0.12		8.4	SURCHARGED
2.002	S2.02	60 minute 2 year Winter I	5.000	4.043	0.291	0.000	0.18		11.6	SURCHARGED
2.003	S2.03	60 minute 2 year Winter I	5.000	4.035	0.418	0.000	0.21		13.0	SURCHARGED
2.004	S2.04	60 minute 2 year Winter I	5.000	4.026	0.483	0.000	0.25		16.2	SURCHARGED
4.000	S4.00	60 minute 2 year Winter I	5.000	4.010	0.835	0.000	0.04		1.3	SURCHARGED
2.005	S2.05	60 minute 2 year Winter I	5.000	4.008	0.918	0.000	0.24		15.4	SURCHARGED
2.006	S2.06	60 minute 2 year Winter I	5.000	3.990	1.017	0.000	0.37		17.4	SURCHARGED
2.007	S2.07	60 minute 2 year Winter I	5.000	3.983	1.031	0.000	0.33		20.7	SURCHARGED
1.004	S1.04	60 minute 2 year Winter I	5.000	3.961	1.098	0.000	0.26		25.0	SURCHARGED
1.005	S1.05	60 minute 2 year Winter I	5.000	3.914	1.097	0.000	0.29		31.0	SURCHARGED
1.006	S1.06	60 minute 2 year Winter I	5.000	3.821	1.086	0.000	0.37		31.9	SURCHARGED
1.007	PI Inlet	15 minute 2 year Summe	5.000	2.727	0.000	0.000	0.29		30.8	SURCHARGED*
1.008	PI Outlet	15 minute 2 year Summe	5.000	2.707	0.082	0.000	0.23		24.3	SURCHARGED*
1.009	S1.09	30 minute 2 year Winter I	5.000	3.560	0.960	0.000	0.24		29.7	SURCHARGED
5.000	AJ	15 minute 2 year Winter I	5.000	3.921	-0.104	0.000	0.21		3.5	OK
5.001	S5.00	15 minute 2 year Winter I	5.000	3.634	-0.159	0.000	0.19		9.2	OK
5.002	S5.01	30 minute 2 year Winter I	5.000	3.526	-0.007	0.000	0.30		14.3	OK
1.010	S1.08	30 minute 2 year Winter I	5.000	3.494	1.060	0.000	0.50		40.4	SURCHARGED

Event Combination 3

3 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	S1.00	60 minute 3 year Winter I	5.000	3.939	0.139	0.000	0.06		2.7	SURCHARGED
1.001	S1.01	60 minute 3 year Winter I	5.000	3.935	0.380	0.000	0.10		3.2	SURCHARGED
1.002	S1.02	60 minute 3 year Winter I	5.000	3.931	0.427	0.000	0.09		3.2	SURCHARGED
1.003	S1.03	30 minute 3 year Winter I	5.000	3.926	0.591	0.000	0.31		10.4	SURCHARGED
2.000	S2.00	60 minute 3 year Winter I	5.000	4.093	-0.007	0.000	0.08		6.6	OK
3.000	S3.00	60 minute 3 year Winter I	5.000	4.089	0.189	0.000	0.08		2.6	SURCHARGED
3.001	S3.01	60 minute 3 year Winter I	5.000	4.087	0.234	0.000	0.09		2.5	SURCHARGED
2.001	S2.01	60 minute 3 year Winter I	5.000	4.087	0.250	0.000	0.13		9.1	SURCHARGED
2.002	S2.02	60 minute 3 year Winter I	5.000	4.082	0.330	0.000	0.18		12.0	SURCHARGED
2.003	S2.03	60 minute 3 year Winter I	5.000	4.071	0.454	0.000	0.21		13.0	SURCHARGED
2.004	S2.04	60 minute 3 year Winter I	5.000	4.059	0.516	0.000	0.27		17.7	SURCHARGED
4.000	S4.00	60 minute 3 year Winter I	5.000	4.038	0.863	0.000	0.04		1.6	SURCHARGED
2.005	S2.05	60 minute 3 year Winter I	5.000	4.036	0.946	0.000	0.31		20.1	SURCHARGED
2.006	S2.06	60 minute 3 year Winter I	5.000	4.003	1.030	0.000	0.48		22.7	SURCHARGED
2.007	S2.07	60 minute 3 year Winter I	5.000	3.994	1.042	0.000	0.43		26.8	SURCHARGED
1.004	S1.04	30 minute 3 year Winter I	5.000	3.919	1.056	0.000	0.30		28.8	SURCHARGED
1.005	S1.05	30 minute 3 year Winter I	5.000	3.848	1.031	0.000	0.32		34.7	SURCHARGED
1.006	S1.06	30 minute 3 year Winter I	5.000	3.758	1.023	0.000	0.41		36.0	SURCHARGED
1.007	PI Inlet	15 minute 3 year Summe	5.000	2.727	0.000	0.000	0.29		31.6	SURCHARGED*
1.008	PI Outlet	15 minute 3 year Summe	5.000	2.707	0.082	0.000	0.24		25.3	SURCHARGED*
1.009	S1.09	30 minute 3 year Winter I	5.000	3.496	0.896	0.000	0.29		36.9	SURCHARGED
5.000	AJ	15 minute 3 year Winter I	5.000	3.923	-0.102	0.000	0.23		3.8	OK
5.001	S5.00	15 minute 3 year Winter I	5.000	3.638	-0.155	0.000	0.21		10.2	OK
5.002	S5.01	15 minute 3 year Winter I	5.000	3.455	-0.078	0.000	0.42		20.3	OK
1.010	S1.08	15 minute 3 year Winter I	5.000	3.417	0.982	0.000	0.49		39.6	SURCHARGED

Event Combination 4

6 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	S1.00	30 minute 6 year Winter I	5.000	3.947	0.147	0.000	0.10		4.8	SURCHARGED
1.001	S1.01	30 minute 6 year Winter I	5.000	3.937	0.383	0.000	0.21		6.6	SURCHARGED
1.002	S1.02	30 minute 6 year Winter I	5.000	3.930	0.426	0.000	0.18		6.7	SURCHARGED
1.003	S1.03	30 minute 6 year Winter I	5.000	3.921	0.586	0.000	0.41		13.8	SURCHARGED
2.000	S2.00	30 minute 6 year Winter I	5.000	4.221	0.121	0.000	0.14		11.2	SURCHARGED
3.000	S3.00	30 minute 6 year Winter I	5.000	4.216	0.316	0.000	0.15		4.5	SURCHARGED
3.001	S3.01	30 minute 6 year Winter I	5.000	4.214	0.361	0.000	0.16		4.3	SURCHARGED
2.001	S2.01	30 minute 6 year Winter I	5.000	4.213	0.376	0.000	0.22		15.6	SURCHARGED
2.002	S2.02	30 minute 6 year Winter I	5.000	4.204	0.452	0.000	0.34		22.1	SURCHARGED
2.003	S2.03	30 minute 6 year Winter I	5.000	4.187	0.570	0.000	0.41		25.0	SURCHARGED
2.004	S2.04	30 minute 6 year Winter I	5.000	4.169	0.626	0.000	0.50		33.2	SURCHARGED
4.000	S4.00	30 minute 6 year Winter I	5.000	4.096	0.921	0.000	0.09		3.3	SURCHARGED
2.005	S2.05	30 minute 6 year Winter I	5.000	4.093	1.003	0.000	0.46		29.4	SURCHARGED
2.006	S2.06	30 minute 6 year Winter I	5.000	4.017	1.044	0.000	0.69		32.7	SURCHARGED
2.007	S2.07	30 minute 6 year Winter I	5.000	3.990	1.038	0.000	0.60		37.6	SURCHARGED
1.004	S1.04	30 minute 6 year Winter I	5.000	3.903	1.040	0.000	0.50		48.7	SURCHARGED
1.005	S1.05	30 minute 6 year Winter I	5.000	3.800	0.983	0.000	0.56		59.8	SURCHARGED
1.006	S1.06	30 minute 6 year Winter I	5.000	3.701	0.966	0.000	0.71		62.1	SURCHARGED
1.007	PI Inlet	15 minute 6 year Summe	5.000	2.727	0.000	0.000	0.33		34.9	SURCHARGED*
1.008	PI Outlet	15 minute 6 year Summe	5.000	2.707	0.082	0.000	0.33		35.0	SURCHARGED*
1.009	S1.09	30 minute 6 year Winter I	5.000	3.423	0.823	0.000	0.50		63.0	SURCHARGED
5.000	AJ	15 minute 6 year Winter I	5.000	3.927	-0.098	0.000	0.27		4.5	OK
5.001	S5.00	15 minute 6 year Winter I	5.000	3.650	-0.143	0.000	0.28		13.8	OK
5.002	S5.01	15 minute 6 year Winter I	5.000	3.434	-0.099	0.000	0.58		27.9	OK
1.010	S1.08	15 minute 6 year Winter I	5.000	3.326	0.892	0.000	0.74		60.5	SURCHARGED

Network 2 (ESB Compound)

Event Combination 1

1 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
7.000	7.00	15 minute 1 year Winter I	5.000	3.743	-0.052	0.000	0.30		11.3	OK
7.001	7.01	15 minute 1 year Winter I	5.000	3.721	0.184	0.000	0.21		7.7	SURCHARGED
8.000	8.00	15 minute 1 year Winter I	5.000	3.720	-0.075	0.000	0.33		12.0	OK
7.002	7.02	15 minute 1 year Winter I	5.000	3.706	0.299	0.000	0.65		19.4	SURCHARGED
7.003	PI Inlet	30 minute 1 year Summer	5.000	3.678	0.279	0.000	0.43		19.1	SURCHARGED
7.004	PI Oulet	15 minute 1 year Winter I	5.000	3.645	0.347	0.000	0.66		19.2	SURCHARGED
7.005	7.05	15 minute 1 year Winter I	5.000	3.624	0.338	0.000	0.55		19.2	SURCHARGED

Event Combination 2

2 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
7.000	7.00	15 minute 2 year Winter I	5.000	3.755	-0.040	0.000	0.37		14.2	OK
7.001	7.01	15 minute 2 year Winter I	5.000	3.729	0.191	0.000	0.26		9.6	SURCHARGED
8.000	8.00	15 minute 2 year Winter I	5.000	3.727	-0.068	0.000	0.41		14.8	OK
7.002	7.02	15 minute 2 year Winter I	5.000	3.708	0.301	0.000	0.81		24.1	SURCHARGED
7.003	PI Inlet	15 minute 2 year Winter I	5.000	3.646	0.248	0.000	0.54		23.9	SURCHARGED
7.004	PI Oulet	15 minute 2 year Winter I	5.000	3.574	0.276	0.000	0.83		24.1	SURCHARGED
7.005	7.05	15 minute 2 year Winter I	5.000	3.513	0.227	0.000	0.69		24.1	SURCHARGED

Event Combination 3

3 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
7.000	7.00	15 minute 3 year Winter I	5.000	3.726	-0.069	0.000	0.42		16.1	OK
7.001	7.01	15 minute 3 year Winter I	5.000	3.695	0.157	0.000	0.31		11.5	SURCHARGED
8.000	8.00	15 minute 3 year Winter I	5.000	3.693	-0.102	0.000	0.45		16.5	OK
7.002	7.02	15 minute 3 year Winter I	5.000	3.671	0.264	0.000	0.95		28.3	SURCHARGED
7.003	PI Inlet	15 minute 3 year Winter I	5.000	3.598	0.200	0.000	0.63		28.3	SURCHARGED
7.004	PI Oulet	15 minute 3 year Winter I	5.000	3.500	0.202	0.000	0.98		28.4	SURCHARGED
7.005	7.05	15 minute 3 year Winter I	5.000	3.428	0.142	0.000	0.82		28.5	SURCHARGED

Event Combination 4

6 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
7.000	7.00	15 minute 6 year Winter I	5.000	3.706	-0.089	0.000	0.49		18.9	OK
7.001	7.01	15 minute 6 year Winter I	5.000	3.656	0.119	0.000	0.47		17.4	SURCHARGED
8.000	8.00	15 minute 6 year Winter I	5.000	3.687	-0.108	0.000	0.53		19.3	OK
7.002	7.02	15 minute 6 year Winter I	5.000	3.620	0.213	0.000	1.38		41.3	SURCHARGED
7.003	PI Inlet	15 minute 6 year Winter I	5.000	3.531	0.132	0.000	0.94		41.9	SURCHARGED
7.004	PI Oulet	15 minute 6 year Winter I	5.000	3.414	0.116	0.000	1.46		42.1	SURCHARGED
7.005	7.05	15 minute 6 year Winter I	5.000	3.329	0.043	0.000	1.20		41.9	SURCHARGED

Network 3 (Eastern Access Road)

Event Combination 1

1 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
6.000	tank	720 minute 1 year Winter	3.500	2.710	0.940	0.000	0.00		0.0	SURCHARGED
6.001	6.00	720 minute 1 year Winter	3.310	2.710	0.953	0.000	0.00		0.0	SURCHARGED
6.002	6.01	720 minute 1 year Winter	3.310	2.710	1.039	0.000	0.00		0.0	SURCHARGED

Event Combination 2

2 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
6.000	tank	720 minute 2 year Winter	3.500	2.931	1.161	0.000	0.00		0.0	SURCHARGED
6.001	6.00	720 minute 2 year Winter	3.310	2.931	1.174	0.000	0.00		0.0	SURCHARGED
6.002	6.01	720 minute 2 year Winter	3.310	2.931	1.260	0.000	0.00		0.0	SURCHARGED

Event Combination 3

3 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
6.000	tank	720 minute 3 year Winter	3.500	3.044	1.274	0.000	0.00		0.0	SURCHARGED
6.001	6.00	720 minute 3 year Winter	3.310	3.044	1.286	0.000	0.00		0.0	FLOOD RISK
6.002	6.01	720 minute 3 year Winter	3.310	3.044	1.373	0.000	0.00		0.0	FLOOD RISK

Event Combination 4

6 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
6.000	tank	720 minute 6 year Winter	3.500	3.230	1.460	0.000	0.00		0.0	FLOOD RISK
6.001	6.00	720 minute 6 year Winter	3.310	3.230	1.473	0.000	0.00		0.0	FLOOD RISK
6.002	6.01	720 minute 6 year Winter	3.310	3.230	1.559	0.000	0.00		0.0	FLOOD RISK

Network 4 (Western Access Road)

Event Combination 1

1 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	240 minute 1 year Winter	4.180	3.332	0.352	0.000	0.02		0.6	SURCHARGED
2.000	3	240 minute 1 year Winter	3.800	3.332	0.682	0.000	0.01		0.2	SURCHARGED
1.001	1	240 minute 1 year Summ	3.200	3.200	0.850	0.000	0.04		0.9	FLOOD RISK*

Event Combination 2

2 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	360 minute 2 year Winter	4.180	3.337	0.357	0.000	0.03		0.6	SURCHARGED
2.000	3	360 minute 2 year Winter	3.800	3.336	0.686	0.000	0.01		0.3	SURCHARGED
1.001	1	360 minute 2 year Summ	3.200	3.200	0.850	0.000	0.07		1.4	FLOOD RISK*

Event Combination 3

3 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	360 minute 3 year Winter	4.180	3.285	0.305	0.000	0.03		0.7	SURCHARGED
2.000	3	360 minute 3 year Winter	3.800	3.284	0.634	0.000	0.01		0.3	SURCHARGED
1.001	1	360 minute 3 year Summ	3.200	3.200	0.850	0.000	0.08		1.6	FLOOD RISK*

Event Combination 4

6 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	360 minute 6 year Summ	4.180	3.234	0.254	0.000	0.04		1.0	SURCHARGED
2.000	3	360 minute 6 year Summ	3.800	3.232	0.582	0.000	0.02		0.4	SURCHARGED
1.001	1	360 minute 6 year Summ	3.200	3.200	0.850	0.000	0.09		1.8	FLOOD RISK*

C. Foul Water Calculations

Project: CWP Poolbeg Onshore Substation & Landfall Planning			MOTT MACDONALD
Calculations for: Wastewater Discharge Estimate at Poolbeg Substation	Divn/Dept: NIS/Water	Job Number: 229101147	
	Calculated by: DRY	Date: 30/11/2022	Sheet Nr
	Checked by: DMY	Date: 09/12/2022	1 of 1

The wastewater loading rate for welfare purposes at the site is expected to be similar to an office or factory type loading. Appendix D of Irish Water's "Code of Practice for Wastewater Infrastructure" indicates that a flow rate of 50 litres per day is typical for an 'Office or Factory without canteen". An allowance for an automatically flushing WC will also be included as per ESB Networks advice.

The following assumptions are made with regard to wastewater loading from the proposed converter station site:

1) Typical attendance rate is 1 day per fortnight by crew of 2 people.
2) Taps incorporate automatic shut-off mechanisms
3) Only 1 x WC on site, no urinals
4) Automatic flushing mechanisms in place for WC which operates twice per day.
5) WC has a cistern volume of 6 Litres

Units		Loading Rate		Totals	
Persons	2	50	l/p/day	100	l/day
Automated flushing	2	6	l/p/day	12	l/day

Average load rate	0.0013	l/s	
Average load rate	112	l/day	
Average load rate	184	l/week	[@ 1 days presence per fortnight]

IW's 'Code of Practice for Wastewater Infrastructure' document requires that peak flows are calculated by multiplying the estimated average flow by an appropriate 'peaking factor'. A peaking factor of 3.0 in line with the 'Trade Wastewater Flow' requirements is considered to be the most applicable value for a non-domestic site such as this. The peak flow rates are therefore estimated as follows:

Peak week load rate	0.0039	l/s	
Peak week load rate	336	l/day	
Peak week load rate	552	l/week	[Assumes staff on site this week]

The above figures represent the total loading as there will be no other sources of wastewater at the proposed substation site.

The peak week loading rate in l/s is considered to be a suitable design flow rate for pipe sizing. However, given the fact this is very low, it is anticipated that minimum pipe sizes and slopes as required by the Building regulations will apply i.e. a minimum pipe size of 100mm and minimum slope of 1:60 as per Table 6 of Technical Guidance Document B.

D. Potable Water Calculations

Project: CWP Poolbeg Onshore Substation & Landfall Planning		Mott MacDonald	
Calculations for: Potable Water Demand Estimate for Poolbeg Substation	Divn/Dept: NIS/Water	Job Number: 229101147	
	Calculated by: DRY	Date: 09/12/2022	Sheet Nr 1 of 1
	Checked by: DMY	Date: 12/12/2022	

The potable water demand for welfare purposes at the site is assumed to be similar to an office type loading. Section 3.28 of Irish Water's "Code of Practice for Water Infrastructure" indicates that a minimum water usage rate of 45 litres per day is typical for an office.

The following additional assumptions are made with regard to water usage for welfare purposes at the proposed site:

1) Typical attendance rate is 1 day per fortnight by crew of 2 people
2) Taps incorporate automatic shut-off mechanisms
3) Only 1 x WC on site, no urinals.
4) Automatic flushing mechanism in place for WC which operates twice per day.
5) WC has a cistern volume of 6 litres

Unit	Nr.	Average Demand		Daily Totals	
Persons	2	45	l/p/day	90	l/day
Auto flush WC	2	6	l/p/day	12	l/day

Average demand	0.00118	l/s	
Average demand	102.0	l/day	
Average demand	174.0	l/week	[@ 1 days staff presence per fortnight]

As per IW's 'Code of Practice for Water Infrastructure', Section 3.7.2 - the average day/peak week demand should be taken as 1.25 times average daily demand

Peak demand	0.00148	l/s	
Peak demand	127.50	l/day	
Peak demand	217.50	l/week	[Assumes staff on site this week]

The above figures represent the total demand as the proposed substation does not require water for any other purpose besides domestic / welfare usage.

For pipe sizing, Section 3.7.2 of Irish Water's COP indicates that "the peak demand for sizing of the pipe network will normally be 5.0 times the average day/peak week demand for Developer use only". This means that water supply pipes should be sized based on the following:

Peak week demand	0.00148	l/s	[As calculated above]
Peaking factor	5.0	-	[As per COP]
Design flow rate	0.00738	l/s	[For pipe sizing]

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