Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Outline Operational Drainage Plan (Onshore Substation)

August 2022
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Title: **Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects** **DCO Application** **Outline Operational Drainage Plan (onshore substation)**		
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Date:	Classification	
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Prepared by:		
J. Murphy & Sons Limited		
Approved by:		Date:
Sarah Chandler, Equinor		August 2022

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Glossary of Acronyms

AOD	Above Ordnance Datum
BS	British Standard
DCO	Development Consent Order
DEL	Dudgeon Extension Limited
DEP	Dudgeon Offshore Wind Farm Extension Project
EIA	Environmental Impact Assessment
ES	Environmental Statement
HDD	Horizontal Directional Drill
HVAC	High-Voltage Alternating Current
Km	Kilometre
NG	National Grid
ODP	Outline Drainage Plan
SEL	Scira Extension Limited
SEP	Sheringham Shoal Offshore Wind Farm Extension Project

Glossary of Terms

Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation. 220 – 230kV.
Onshore Substation	Compound containing electrical equipment to enable connection to the National Grid.
Outline ODP	Outline Operational Drainage Plan
Order limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
The Applicant	Equinor New Energy Limited

1 OUTLINE OPERATIONAL DRAINANGE PLAN (ONSHORE SUBSTATION)

1.1 Background

1. Equinor New Energy Limited ('the Applicant') is seeking a Development Consent Order (DCO) for the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP) (hereafter collectively referred to as 'the Project' or 'SEP and DEP').
2. As the owners of SEP and DEP, Scira Extension Limited (SEL) and Dudgeon Extension Limited (DEL) are the named undertakers that have the benefit of the DCO. References in this document to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP.
3. The SEP and DEP wind farm sites are located in the southern North Sea, 15.8 kilometres (km) and 26.5km from the coast respectively at their closest point. SEP and DEP will be connected to the shore by offshore export cables to a landfall point at Weybourne, on the North Norfolk coast. From there onshore export cables will transport power over approximately 60km to a new high voltage alternating current (HVAC) onshore substation near the existing Norwich Main substation. The onshore substation will be constructed to accommodate the connection of both SEP and DEP to the transmission grid. A full project description is given in the Environmental Statement (ES), **Chapter 4 Project Description** (document reference 6.4).

1.2 Introduction

4. This Outline Operational Drainage Plan (ODP) forms part of a set of documents that support the DCO application submitted by the Applicant to the Planning Inspectorate for consent to construct and operate the Project.
5. This Outline ODP is provided as part of the DCO application to define the basis of design for the operational drainage required at the onshore substation site associated with SEP and DEP.
6. A final ODP will be produced prior to construction of SEP and DEP and will be in accordance with the content of this Outline ODP and the final design of the Project. The ODP is secured by Requirement 17 of the **Draft DCO** (document reference 3.1), which states:

> *"In the event of scenario 1 or scenario 2, each of Work Nos. [15A and 15B] must not commence until a written plan for drainage during operation of the relevant work, has been submitted to and approved by the relevant planning authority, following consultation with the relevant sewerage and drainage authorities, lead local flood authority and the Environment Agency.*
>
> *In the event of scenario 3 or scenario 4, Work No. [15C] must not commence until a written plan for drainage during operation of the relevant work, has been submitted to and approved by the relevant planning authority, following consultation with the relevant sewerage and drainage authorities, lead local flood authority and the Environment Agency.*

Each operational drainage plan must accord with the principles for the relevant work set out in the outline operational drainage plan, and must include a timetable for implementation.

Each operational drainage plan must be implemented as approved"

7. This Outline ODP should be read in conjunction with the other following documents:
   - Flood Risk Assessment (Appendix 18.2 to **ES Chapter 18 Water Resources and Flood Risk** (document reference 6.18)); and
   - Onshore Substation Drainage Strategy (Annex 1 to the Flood Risk Assessment described above).
8. The Onshore Substation Drainage Strategy identified two viable options to manage surface water drainage at the onshore substation site:
   - Attenuation combined with infiltration; and
   - Attenuation with onward connection to foul sewer network.
9. For both options it is has been conservatively assumed that half of the total substation platform will be impermeable. An area of 30,500m^2 has therefore been adopted. Preliminary substation layouts indicate the actual impermeable area will be less than 50%.
10. To provide a worst-case the longest potential access road that could be accommodated at the site has been adopted. The impermeable surface has been taken as the 6.0m wide bitumen bound running surface over the full length of the road from where it ties into the existing National Grid (NG) access road, an area of 4,500m^2 has been adopted.
11. The bridleway midway along the access road is the highest elevation. It is anticipated water from the access road south of the bridleway will be collected in a filter drain running south along the road verge and tie into a catch pit immediately upstream of the oil separator.
12. North of the bridleway two options are possible. Option 1 collects water from the access road in a filter drain, running north along the road verge, connecting into an oil separator before passing under the existing NG access road and connecting into the existing NG substation site drainage for discharge through their outfall. Alternatively, Option 1 could have an independent outfall, which discharges into the same location as NG's existing outfall but does not require any connection into NG's existing drainage system.
13. NG's drainage system (or outfall location) would need to accommodate water drained from approximately 2,340m^2 of access road that runs north of the bridleway. As a worst-case scenario, if a 1 in 5 year storm is considered for a 5 minute period then the NG system would need to accommodate an additional 78.6 l/s and 23.5m^3 over a 5 minute period. Paved areas under 4,000m^2 can be designed using a flat rate of rainfall method to BS EN 16933-2. Refer to **Appendix C** for calculations associated with anticipated surface water run off flows/volumes for the section of access road north of the bridleway.

14. Option 2 collects water from the access road in a filter drain which runs to the south towards to the new substation drainage system; to accommodate the changes in elevation the drain will need to be laid at a deeper elevation.

1.3 Infiltration

1.3.1 Basis of outline design

15. Soakaway testing undertaken in trial pits during the Phase 1 ground investigations reported very low permeability rates which suggested an infiltration solution may not be possible.

16. To explore the full potential of a drainage solution by infiltration a Geophysical survey was undertaken in the substation field and in surrounding fields as shown in Figure 1:

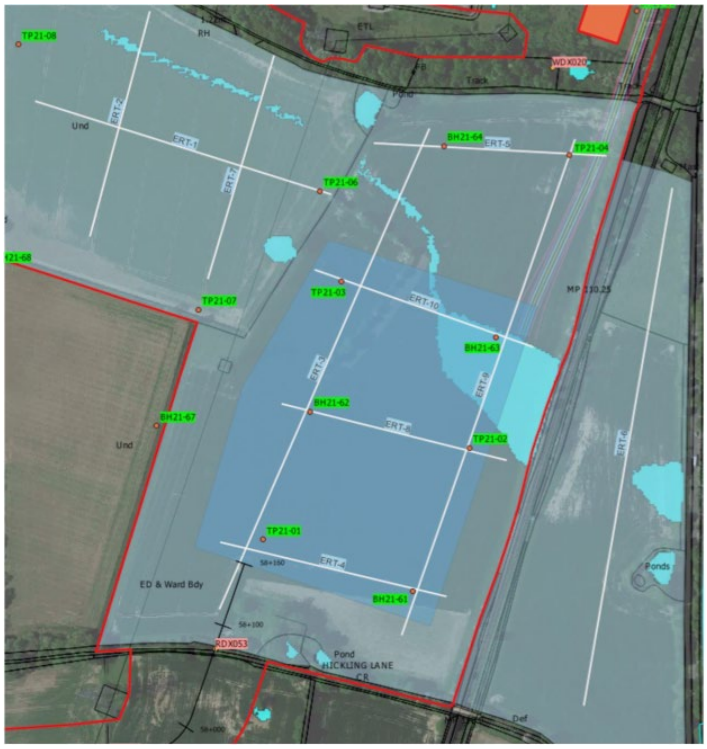


Figure 1 – Extent of Geophysical Survey

Key to Figure 1: Transparent Light Blue Shade = Electromagnetic Survey Area

White Lines = Electrical Resistivity Survey

17. The results of the survey identified a historic river channel that had been infilled with granular deposits to a depth of approximately 10m as shown by the brown polygon in Figure 2 below:

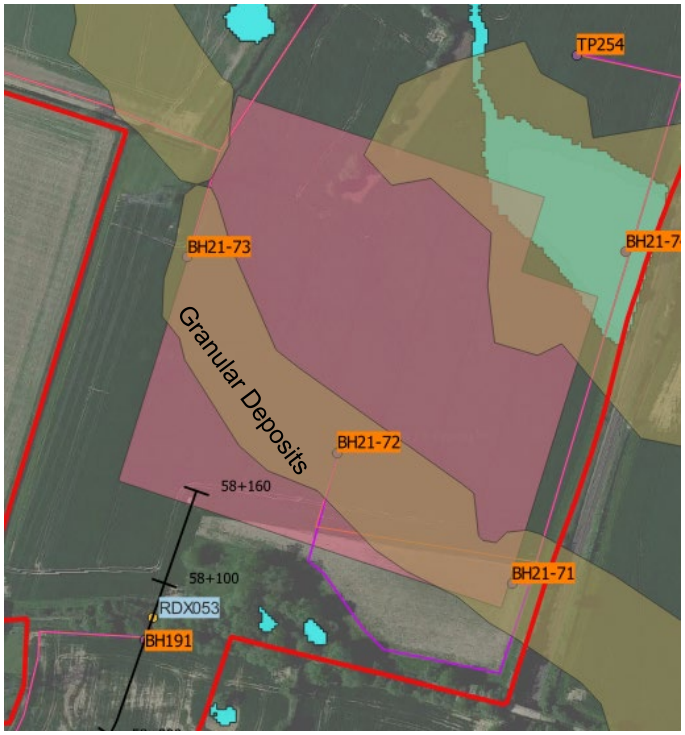


Figure 2 – Area Indicating Granular Deposits (Brown)

18. As part of Phase 2 ground investigation (ongoing), the three boreholes BH21-71, BH21-72 & BH21-73 shown in Figure 2 had fall head permeability tests installed to determine infiltration rates and borehole soakaway tests have been undertaken in groundwater monitoring installations. These rates will be used to calculate the soakaway storage volumes for the substation platform.

19. The footprint of the substation will be approximately 6.1Ha. Figure 3 below shows the footprint. This footprint accommodates a substation orientated either north-south or east-west.

Figure 3 – Substation Footprint

20. The anticipated volume of water to be managed during 1 in 100 year flood event over the substation and access road surface area has been calculated using Tekla® Tedds software which is based on BRE Digest 365 and the Wallingford Procedure (Volume 4). Rainfall parameters in Tedds are based on those stated in the Wallingford Procedure. A 40% allowance for climate change has been allowed and a conservative soil infiltration rate has been used of $1x10^{-4}$ m/s. Actual permeability rates recorded during soakaway tests ranged from $4.84x10^{-4}$ m/s to $5.4x10^{-4}$m/s. It has been assumed 50% of the substation access road and platform surface area is impermeable and will accumulate water during the storm event.

21. A soakaway design has been developed and a required storage volume calculated to manage surface water from the substation and access road. Please refer to **Appendix A** for the soakaway volume calculation and drawing C282-MU-Z-XD-00118-01_F02 for the soakaway layout and cross section included in **Appendix D**.

1.3.2 Description of solution

22. The soakaway solution works by collecting the surface water drainage in a modular crate system, buried under the platform. The outfall drainage pipe is connected to the inlet of the soakaway crates and water is allowed to accumulate in the voids that exist within the crates. At the same time as water accumulates, it is also infiltrated into the surrounding ground as all sides of the crates are open. The crates are sized to ensure the open voids that exist within them have sufficient volume to accommodate the water that will accumulate during a 1 in 100 year storm event whilst taking consideration of infiltration rates. Initial sizing of the soakaway volume is based on an assumed soil infiltration rate of $1x10^{-4}$ m/s however initial results from the fall head tests indicate the expected infiltration rate will be higher at a value closer to $5x10^{-4}$ m/s, which means the soakaway crate volume will be on the conservative side. The final report confirming these test results is ongoing. Soakaway testing to BRE Digest 365 will be required once the substation platform is constructed to confirm the initial results and assumptions used in the design are acceptable.
23. Pollution control will be managed by incorporating a class 1 oil separator upstream of the soakaway crate inlet. Class one separators are designed to achieve a concentration of less than 5mg/l of oil under standard test conditions and are suitable for discharging to the environment. Any water collected from car parks, access roads and hard standing areas with potential for oil contamination will be required to connect into the oil separator before flowing into the soakaway.
24. In a storm event water collected from roof tops may bypass the oil separator and connect downstream into the next catch pit before flowing into the soakaway.
25. The platform level is 28.23m Above Ordnance Datum (AOD). The finished ground level (formation level) following any earthworks is 475mm lower at 27.775m AOD. It is anticipated that the soakaway crates will be buried with a minimum cover of 1.2m to platform level to ensure any vehicles/equipment located above do not adversely impact the structure.
26. To ensure heavy loads (from transformers etc) are not directly located above the soakaway units, they will be positioned adjacent to (and within) the site boundary limits where there is higher potential for an access road to be located once the final site layout is confirmed. To maintain the required soakaway volume and keep to the site boundary limits, the soakaway crates have been positioned on the east and west sides of the site. The drainage design within the substation will ensure 50% of water collected is routed to the east soakaway and 50% to the west. A single soakaway may be possible once substation layouts have been confirmed later in the Project.
27. Access will be maintained to all catch pits located upstream of the soakaway to ensure any silt/deposits can be removed as part of a maintenance programme. Access will be maintained to the oil separator unit so routine maintenance can be performed.
28. An indicative layout of the soakaway design and upstream treatment is indicated on drawing C282-MU-Z-XD-00118-01_F02. Included in **Appendix D.**

1.4 Connection to Foul Sewer

29. The nearest location to connect to a foul sewer has been identified approximately 700m south of the substation site. The existing sewer is 150mm diameter and is noted as a foul sewer, the invert level of the tie into the existing Anglian Water foul sewer is between 22.64m AOD and 22.34m AOD further investigations are required to accurately determine the invert level at the tie in location. A gravity solution is proposed.

30. The proposed scheme to connect has the attenuation tank located beneath (and within) the substation footprint, the outfall exits the attenuation tank in a southerly direction existing the substation platform by way of a horizontal directional drill (HDD). At the end of the HDD, the pipeline is laid at a fall of approximately 1:120 to a manhole / spill chamber parallel to the existing sewer where the water will overspill into a new manhole on the existing main.

31. For the purposes of determining the required attenuation volumes, a Greenfield run off rate of 15l/s has been adopted. If further discussions determine a run off rate lower than 15l/s is required, then the volume of the attenuation tank can be increased as there is sufficient area under the platform to accommodate this.

32. A total area of impermeable surface where rainwater can be captured in the drainage system has been determined as 35,000m^2 (30,500m^2 from the substation footprint and 4,500m^2 from the access road).

33. Calculations have been undertaken using Tekla® Tedds for the 1:100 year storm event plus 40% for climate change which indicate 2,610m^3 of water needs to be held in storage ahead of discharge. Copies of the calculation are included in **Appendix B**. It should be noted that a climate change allowance of plus 20% (as detailed within the **Flood Risk Assessment** (document reference 5.3)) is applicable at this site. However, this outline drainage plan has considered plus 40% to build in contingency in the outline design.

34. At this stage of the Project the substation design has not progressed to accurately determine the amount of impermeable surfaces that will link in to the drainage system. At this stage 50% of the total substation area has been assumed to be impermeable along with the impermeable surface of the longest access road solution. The drainage system has been designed with conservatism considering the design is at an early phase. There is scope for the final volume of the attenuation tank to modified and confirmed during detailed design should flow rates into Anglian Water foul sewer be restricted below 15l/s.

1.4.1 Description of solution

35. Surface water from the impermeable areas is collected in the drainage system, the captured water is all channelled through a Class 2 oil separator / petrol & diesel interceptor before collection in a buried tank which discharges to an Anglian Water foul sewer. A plan view of the proposed solution is shown on drawing C282-MU-Z-XD-00122-01_F02. included in **Appendix D**.

36. In a storm event, water will be attenuated in a tank buried within the substation footprint. The tank is likely to be comprised of modular buried units sized with adequate capacity for the maximum anticipated volumes of storm water. The attenuation tank will be connected to the outfall pipeline which is proposed to be 225mm diameter.

37. The outfall pipeline will run beneath the substation platform to the southernmost edge where a HDD will be undertaken to complete the crossing from the substation platform, under Hickling lane and the SEP and DEP onshore export cables. At the southern end of the crossing the pipeline will be laid in open cut at nominal cover at a gradient in the region of 1:120.

38. A new manhole will be constructed offline adjacent to the existing water main between existing manhole 7301 and Anglian Water pumping station. The manhole will include a wet well, spill chamber and overflow weir to allow water to be discharged into a new manhole constructed on the existing Anglian Water combine sewer.

39. The discharge rate into the outfall pipeline will be controlled by a flow control unit located on the downstream side of the attenuation tank, the unit will ensure that the discharge into the pipeline does not exceed the agreed discharge rate. The discharge rate is higher than the required self-cleaning flow rate so silt build up in the pipeline is not anticipated.

40. Pollution control will be undertaken with a Class 2 oil interceptor located on the upstream side of the attenuation tanks ensuring that all water is treated to achieve a concentration of less that 100mg/l prior to attenuation and discharge.

41. The proposed substation platform is to be constructed with a finished surface level of 28.23m AOD which is approximately 5.5m above the invert level of the existing main. Except for the section of outfall pipeline proposed for installation by HDD, all pipe will be laid with an approximate fall of 1:120.

42. Long term maintenance requirements include cleaning and desilting of the oil separator / petrol & diesel interceptors as required. It is recommended telemetry is included in the systems to send a warning when maintenance is required. Lifting of the manhole covers and inspection of chambers should be undertaken as part of a programmed maintenance schedule, it is anticipated that annual inspections will be required. Pipework has been designed to accommodate a self-cleaning velocity however de-silting of and wet wells may be periodically required.

Appendix A – Soakaway Volume Calculations

Tekla Tedds J Murphy & Sons Ltd	Project Equinor				Job no.	
	Calcs for				Start page no./Revision 1	
	Calcs by K	Calcs date 23/06/2022	Checked by	Checked date	Approved by	Approved date

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Norwich
Impermeable area drained to the system	A = **35000.0** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.410**
5-year return period rainfall of 60 minutes duration	M5_60min = **20.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **40** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **1600** mm
Width of pit	w = **15000** mm
Length of pit	l = **110000** mm
Percentage free volume	V_{free} = **95** %
Soil infiltration rate	f = **100.**$\times 10^{-6}$ m/s
Wetted area of pit 50% full	a_{s50} = l × d + w × d = **200000000** mm^2

Table equations

Inflow (cl.3.3.1)	I = M100 × A
Outflow (cl.3.3.2)	O = a_{s50} × f × D
Storage (cl.3.3.3)	S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.38;	10.5;	1.92;	20.2;	708.27;	6.00;	702.27
10	0.53;	14.7;	1.99;	29.3;	1025.01;	12.00;	1013.01
15	0.64;	17.8;	2.01;	35.9;	1255.74;	18.00;	1237.74
30	0.81;	22.6;	2.02;	45.6;	1596.60;	36.00;	1560.60
60	1.00;	28.0;	1.99;	55.6;	1946.28;	72.00;	1874.28
120	1.20;	33.7;	1.94;	65.4;	2288.31;	144.00;	2144.31
240	1.43;	40.1;	1.89;	75.8;	2653.32;	288.00;	2365.32
360	1.59;	44.4;	1.85;	82.4;	2883.76;	432.00;	2451.76
600	1.77;	49.5;	1.81;	89.7;	3141.10;	720.00;	2421.10
1440	2.20;	61.6;	1.73;	106.6;	3732.29;	1728.00;	2004.29

Required storage volume S_{req} = **2451.76** m^3

Soakaway storage volume S_{act} = l × d × w × V_{free} = **2508.00** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume t_{s50} = S_{req} × 0.5 / (a_{s50} × f) = 17hr 1min 35s

PASS - Soakaway discharge time less than or equal to 24 hours

Appendix B – Sewer Connection Volume Calculations

Tekla Tedds J Murphy & Sons Ltd	Project Equinor				Job no.	
	Calcs for				Start page no./Revision 1	
	Calcs by K	Calcs date 23/06/2022	Checked by	Checked date	Approved by	Approved date

Attenuation Design

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	Norwich
Impermeable area drained to the system	A = **35000.0** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.410**
5-year return period rainfall of 60 minutes duration	M5_60min = **20.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **40** %

Anglian Water allowable discharge into existing sewer =15 l/s

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.38;	10.5;	1.92;	20.2;	708.27;	4.50	703.77
10	0.53;	14.7;	1.99;	29.3;	1025.01;	9.00	1016.01
15	0.64;	17.8;	2.01;	35.9;	1255.74;	13.50	1242.24
30	0.81;	22.6;	2.02;	45.6;	1596.60;	27.00	1569.60
60	1.00;	28.0;	1.99;	55.6;	1946.28;	54.00	1892.28
120	1.20;	33.7;	1.94;	65.4;	2288.31;	108.00	2180.31
240	1.43;	40.1;	1.89;	75.8;	2653.32;	216.00	2437.32
360	1.59;	44.4;	1.85;	82.4;	2883.76;	324.00	2559.76
600	1.77;	49.5;	1.81;	89.7;	3141.10;	540.00	2601.1
1440	2.20;	61.6;	1.73;	106.6;	3732.29;	1296.00	2436.29

Required storage volume S_{req} = **2601.1** m^3

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free}$ = **2508.00** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{a50} = S_{req} \times 0.5 / (a_{a50} \times f)$ = 17hr 1min 35s

PASS - Soakaway discharge time less than or equal to 24 hours

Appendix C – Discharge Calculations for North Section of Access Road

MURPHY
WORLD-CLASS INFRASTRUCTURE

Calculation sheet

Project	Project/ contract reference	
EQUINOR		
Section/ design	Design reference	Revision
By [redacted] Date 28/7/22	Checked Date	Page of

EQUINOR SITE RUN-OFF.

REQUEST TO DETERMINE RUN-OFF VOLUME FOR SITE ROAD TO NG SITE TOTALLING 2340 m^2

PAVED AREAS UNDER 4000 m^2 CAN BE DESIGNED USING FLAT RATE OF RAINFALL METHOD TO BS EN 16933-2 - DRAIN AND SEWER SYSTEMS OUTSIDE BUILDINGS - DESIGN. (CLAUSE NA. 4.2.2)

IF A SMALL AMOUNT OF PONDING ON THE HARSTANDING CAN BE TOLERATED DURING HEAVY RAINFALL AND FOR A FEW MINUTES AFTERWARDS

A FLAT RATE OF 0.014 L/s/m^2 (APPROXIMATELY 50mm/hr) MULTIPLIED BY CCAC (CLIMATE CHANGE ALLOWANCE) THIS IS BASED UPON A 1 IN 1 YEAR 5 MINUTE STORM. (CLAUSE NA 4.2.2) - NOTE FOR SITE LOCATION USE 0.016 L/s/m^2 (FIGURE NA.3)
IF PONDING CANNOT BE TOLERATED, A 1 IN 5 YEAR 5 MINUTE STORM IS USED, RATE = 0.024 L/s/m^2. (FIGURE NA.3)

1 IN 1 YEAR - FLOW RATE = $2340 \times 0.016 \times 1.4 = 52.4$ L/s

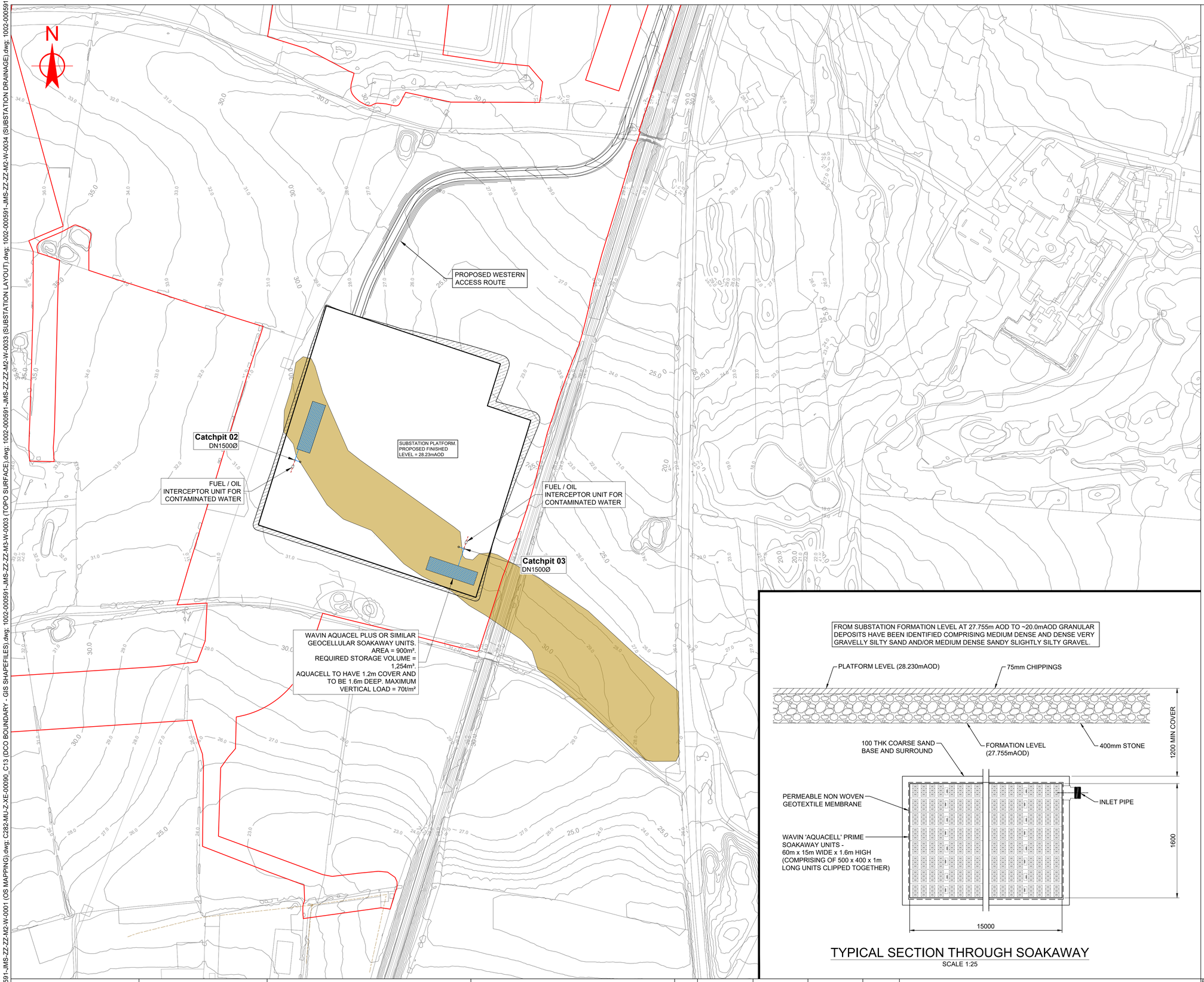
(WATER VOLUME = $\frac{52.4 \times 60 \times 5}{1000} = 15.7 m^3$.)

1 IN 5 YEAR - FLOW RATE = $2340 \times 0.024 \times 1.4 = 78.6$ L/s

(WATER VOLUME = $\frac{78.6 \times 60 \times 5}{1000} = 23.5 m^3$)

Appendix D – Drawings

- C282-MU-Z-XD-00118-01_F02 – Substation Outline Drainage Plan – Infiltration Method
- C282-MU-Z-XD-00122-01_F02 – Substation Drainage – Sewer Connection Plan and Long Section



NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM.
3. EXISTING GROUND LEVELS ARE TAKEN FROM 2014 LiDAR SURVEY DATA.
4. RECESSED STEEL MANHOLE COVERS TO COMPLY WITH BS EN1449:1991 AND GALVANISED TO COMPLY WITH BS EN ISO 1461.
5. ALL BELOW GROUND PIPEWORK TO BE Ø225 NOMINAL SIZE POLYPIPE 'POLYSEWER' TO WIS 4-35-01. TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
6. FUEL / OIL INTERCEPTOR TO BE OPERATED AND MAINTAINED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
7. SOAKAWAY UNIT LOCATIONS ARE INDICATIVE AND WILL BE CONFIRMED IN CONJUNCTION WITH THE FINAL SUBSTATION LAYOUTS AT DETAILED DESIGN.

LEGEND:

- PROPOSED SURFACE WATER PIPEWORK
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED FUEL / OIL PIPEWORK
- PROPOSED FUEL / OIL INTERCEPTOR
- PROPOSED GEOCELLULAR SOAKAWAY UNIT
- EXISTING GRANULAR SOILS
- PROPOSED CUT
- PROPOSED FILL
- DCO BOUNDARY

FROM SUBSTATION FORMATION LEVEL AT 27.755m AOD TO ~20.0mAOD GRANULAR DEPOSITS HAVE BEEN IDENTIFIED COMPRISING MEDIUM DENSE AND DENSE VERY GRAVELLY SILTY SAND AND/OR MEDIUM DENSE SANDY SLIGHTLY SILTY GRAVEL.

TYPICAL SECTION THROUGH SOAKAWAY

SCALE 1:25

MURPHY
WORLD-CLASS INFRASTRUCTURE

J. MURPHY & SONS LTD
Hiview House, Highgate Road, London NW5 1TN

equinor

-
-

0 50 100 1:2000 200m

REV	DRAWN	CHK	APP.	DATE	REVISION COMMENTS
F02	L.EDGE	M.PERKINS	J.CURRAN	27/07/22	SOAKAWAY DETAILS ADDED
F01	S.LYONS	M.PERKINS	J.CURRAN	01/07/22	ISSUED FOR INFORMATION

Project:	SHERINGHAM SHOAL & DUDGEON WINDFARM ONSHORE CABLE FEED
Revision:	F02
Suitability:	-
Scale @ A1:	1:2000
Sheets:	1 OF 1
Internal Proj.Ref:	1002-000591
Dwg Title:	SUBSTATION OUTLINE DRAINAGE PLAN INFILTRATION METHOD
Dwg No:	C282-MU-Z-XD-00118-01
Purpose of Issue:	FOR INFORMATION
Client Ref Number:	-

Plotted: 28/07/2022 11:58 AM
Attached Xrefs: 1002-000591-JMS-ZZ-ZZ-M2-W-0001 (OS MAPPING).dwg; C282-MU-Z-XE-00090_C13 (DCO BOUNDARY - GIS SHAPEFILES).dwg; 1002-000591-JMS-ZZ-ZZ-M2-W-0033 (SUBSTATION LAYOUT).dwg; 1002-000591-JMS-ZZ-ZZ-M2-W-0034 (SUBSTATION DRAINAGE).dwg; 1002-000591-JMS-ZZ-ZZ-M3-W-0003 (TOPO SURFACE).dwg; 1002-000591-JMS-ZZ-ZZ-M2-W-0001 (OS MAPPING).dwg; C282-MU-Z-XE-00090_C13 (DCO BOUNDARY - GIS SHAPEFILES).dwg; 1002-000591-JMS-ZZ-ZZ-M3-W-0003 (TOPO SURFACE).dwg

CHAINAGE	GROUND LEVEL WITH SUBSTATION PLATFORM	INVERT OF PIPE	COVER TO INVERT
00.000	28.230	27.504	0.726
10.000	28.230	27.514	0.716
20.000	28.230	27.311	0.919
30.000	28.230	27.104	1.126
40.000	28.230	26.898	1.332
50.000	28.230	26.691	1.539
60.000	28.230	26.485	1.745
70.000	28.230	26.278	1.952
80.000	28.230	26.072	2.158
90.000	28.230	25.865	2.365
100.000	28.230	25.659	2.571
110.000	28.230	25.452	2.778
120.000	28.230	25.264	2.966
130.000	28.230	25.085	3.145
140.000	28.230	24.906	3.324
150.000	28.230	24.798	3.432
160.000	28.230	24.757	3.473
170.000	28.230	24.717	3.513
180.000	30.588	24.676	5.912
190.000	30.978	24.635	6.343
200.000	31.062	24.595	6.467
210.000	31.078	24.554	6.524
220.000	31.063	24.513	6.550
230.000	31.061	24.472	6.588
240.000	31.094	24.432	6.661
250.000	31.266	24.393	6.874
260.000	30.518	24.353	6.165
270.000	30.275	24.314	5.962
280.000	30.058	24.274	5.784
290.000	29.911	24.234	5.676
300.000	29.649	24.195	5.455
310.000	29.380	24.155	5.225
320.000	29.090	24.116	4.974
330.000	28.762	24.076	4.686
340.000	28.332	24.036	4.295
350.000	27.981	23.997	3.984
360.000	27.598	23.957	3.641
370.000	27.210	23.917	3.292
380.000	26.857	23.878	2.979
390.000	26.608	23.749	2.858
400.000	26.262	23.740	2.522
410.000	25.830	23.731	2.099
420.000	25.416	23.107	2.310
430.000	25.017	22.991	2.025
440.000	24.802	22.876	1.926
450.000	24.543	22.761	1.782
460.000	24.341	22.645	1.695
470.000	24.135	22.530	1.605
480.000	23.945	22.415	1.530
490.000	23.710	22.299	1.410
500.000	23.557	22.184	1.373
510.000	23.420	22.069	1.351
520.000	23.365	21.954	1.411
530.000	23.307	21.870	1.437
540.000	23.180	21.787	1.393
550.000	23.104	21.703	1.400
560.000	22.949	21.620	1.329
570.000	22.852	21.536	1.316
580.000	22.786	21.452	1.334
590.000	22.743	21.369	1.374
600.000	22.720	21.285	1.435
610.000	22.680	21.202	1.478
620.000	22.700	21.118	1.582
630.000	22.728	21.034	1.694
640.000	22.806	20.973	1.833
650.000	22.784	20.962	1.823
660.000	22.733	20.950	1.782
670.000	22.952	20.939	2.014
679.445	22.994		

PROFILE - SCALE 1:1000

0 20 50 1:1000 100m

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM.
3. EXISTING GROUND LEVELS ARE TAKEN FROM 2014 LiDAR SURVEY DATA.
4. RECESSED STEEL MANHOLE COVERS TO COMPLY WITH BS EN1449:1991 AND GALVANISED TO COMPLY WITH BS EN ISO 1461.
5. ALL BELOW GROUND PIPEWORK TO BE Ø225 NOMINAL SIZE POLYPIPE 'POLYSEWER' TO WIS 4-35-01. TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
6. FUEL / OIL INTERCEPTOR TO BE OPERATED AND MAINTAINED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
7. ATTENUATION AREA AND PIPE LOCATIONS ARE INDICATIVE AND WILL BE CONFIRMED IN CONJUNCTION WITH THE FINAL SUBSTATION LAYOUTS AT DETAILED DESIGN.

LEGEND:

- PROPOSED SURFACE WATER PIPEWORK
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED FUEL / OIL INTERCEPTOR
- HDD EXTENTS
- PROPOSED ATTENUATION CRATES STORAGE UNIT
- DCO BOUNDARY
- EXISTING FOUL SEWER

MURPHY WORLD-CLASS INFRASTRUCTURE

J. MURPHY & SONS LTD
Hiview House, Highgate Road, London NW5 1TN

equinor

0 20 50 1:1000 100m

REV	DRAWN	CHK	APP.	DATE	REVISION COMMENTS
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
F02	W.SMITH	M.PERKINS	J.CURRAN	02/08/22	CLIENT COMMENTS ADDRESSED
F01	W.SMITH	M.PERKINS	J.CURRAN	26/07/22	ISSUED FOR INFORMATION

Project:	SHERINGHAM SHOAL & DUDGEON WINDFARM ONSHORE CABLE FEED
Revision: F02	Dwg Title: SUBSTATION DRAINAGE - SEWER CONNECTION PLAN & LONG SECTION
Suitability: -	
Scale @ A1: 1:2500	Dwg No: C282-MU-Z-XD-00122-01
Sheets: 1 OF 1	Purpose of Issue: FOR INFORMATION
Internal Proj Ref: 1002-000591	Client Ref Number: -