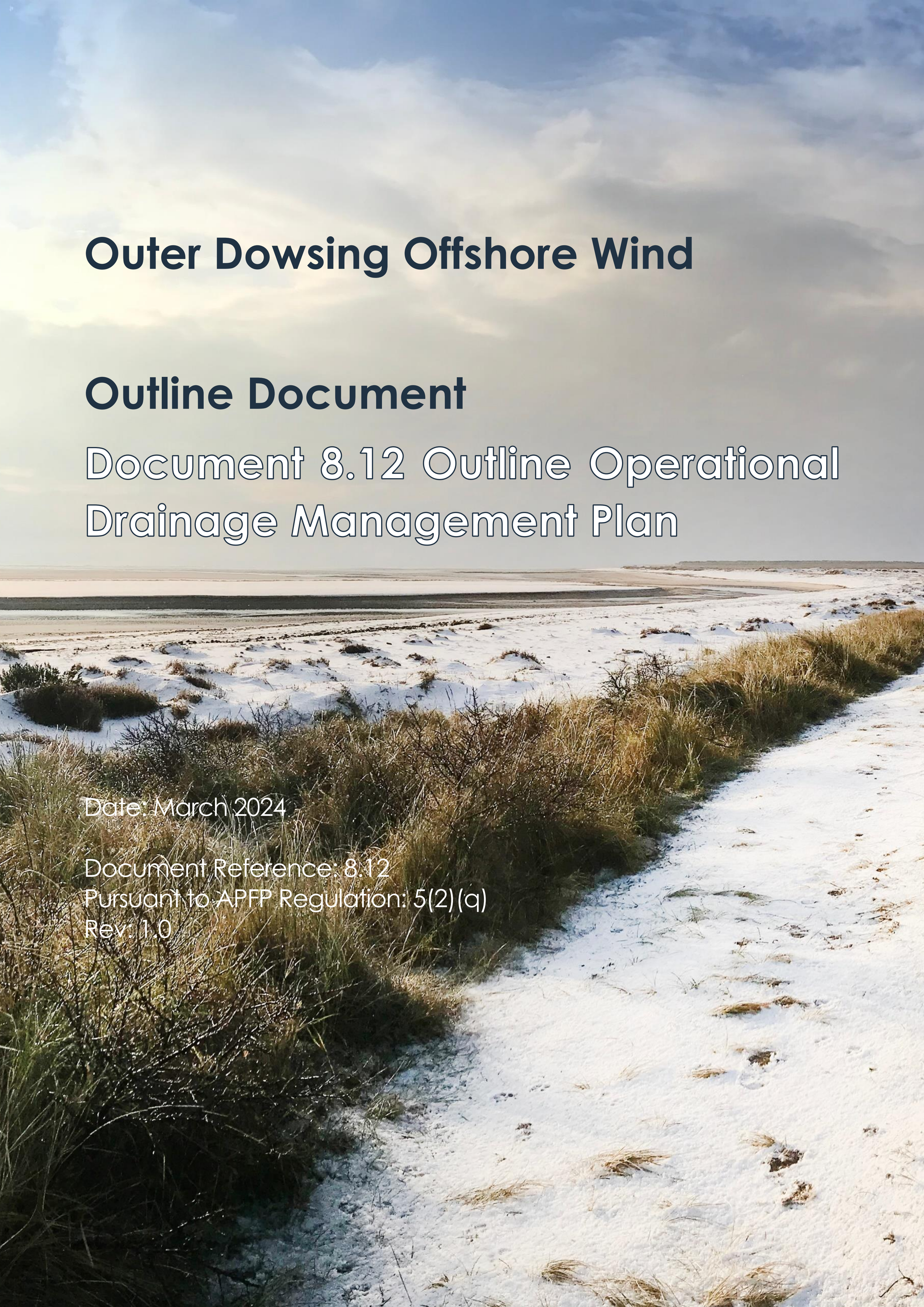


Outer Dowsing Offshore Wind

Outline Document

Document 8.12 Outline Operational Drainage Management Plan

Date: March 2024

Document Reference: 8.12
Pursuant to APFP Regulation: 5(2)(q)
Rev: 1.0

Company:	**Outer Dowsing Offshore Wind**			Asset:	**Whole Asset**	
Project:	**Whole Wind Farm**			Sub Project/Package:	Whole Asset	
Document Title or Description:	Outline Operational Drainage Management Plan					
Internal Document Number:	PP1-ODOW-DEV-CS-PLA-0025			3rd Party Doc No (If applicable):	N/A	
Outer Dowsing Offshore Wind accepts no liability for the accuracy or completeness of the information in this document nor for any loss or damage arising from the use of such information.						
Rev No.	**Date**	**Status / Reason for Issue**	**Author**	**Checked by**	**Reviewed by**	**Approved by**
1.0	March 2024	DCO Application	SLR	GoBe	Shepherd and Wedderburn	Outer Dowsing

Table of Contents

Table of Tables

Table of Figures

Table of Plates

Acronyms & Terminology

Abbreviations / Acronyms

Abbreviation / Acronym	Description
AEP	Annual Event Probability
AOD	Above Ordnance Datum
BGS	British Geological Survey
CIRIA	Construction Industry Research and Innovation Association
DCO	Development Consent Order
IDB	Internal Drainage Board
LLFA	Lead Local Flood Authority
NPPF	National Planning Policy Framework
ODMP	Operational Drainage Management Plan
ODOW	Outer Dowsing Offshore Wind
OnSS	Onshore Substation
PPG	Planning Practice Guidance
SPZ	Source Protection Zone
SuDS	Sustainable Drainage Systems

Terminology

Term	Definition
400kV cables	High-voltage cables linking the OnSS to the NGSS.
400kV cable corridor	The 400kV cable corridor is the area within which the 400kV cables connecting the onshore substation to the NGSS will be situated.
Baseline	The status of the environment at the time of assessment without the development in place.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the sensitivity of the receptor, in accordance with defined significance criteria.
Export cables	High voltage cables which transmit power from the Offshore Substations (OSS) to the Onshore Substation (OnSS) via an Offshore Reactive Compensation Platform (ORCP) if required, which may include one or more auxiliary cables (normally fibre optic cables).
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Landfall	The location at the land-sea interface where the offshore export cables and fibre optic cables will come ashore.
Mitigation	Mitigation measures are commitments made by the Project to reduce and/or eliminate the potential for significant effects to arise as a result of the Project. Mitigation measures can be embedded (part of the project design) or secondarily added to reduce impacts in the case of potentially significant effects.
Offshore Export Cable Corridor (ECC)	The Offshore Export Cable Corridor (Offshore ECC) is the area within the Order Limits within which the export cables running from the array to landfall will be situated.

Term	Definition
Offshore Substation (OSS)	A structure attached to the seabed by means of a foundation, with one or more decks and a helicopter platform (including bird deterrents), containing— (a) electrical equipment required to switch, transform, convert electricity generated at the wind turbine generators to a higher voltage and provide reactive power compensation; and (b) housing accommodation, storage, workshop auxiliary equipment, radar and facilities for operating, maintaining and controlling the substation or wind turbine generators.
Onshore Export Cable Corridor (ECC)	The Onshore Export Cable Corridor (Onshore ECC) is the area within which, the export cables running from the landfall to the onshore substation will be situated.
Onshore substation (OnSS)	The Project's onshore HVAC substation, containing electrical equipment, control buildings, lightning protection masts, communications masts, access, fencing and other associated equipment, structures or buildings; to enable connection to the National Grid.
Outer Dowsing Offshore Wind (ODOW)	The Project.
The Project	Outer Dowsing Offshore Wind, an offshore wind generating station together with associated onshore and offshore infrastructure.
Receptor	A distinct part of the environment on which effects could occur and can be the subject of specific assessments. Examples of receptors include species (or groups) of animals or plants, people (often categorised further such as 'residential' or those using areas for amenity or recreation), watercourses etc.

Reference Documentation

Document Number	Title
6.3.24	Hydrology and Flood Risk
6.3.24.3	Flood Risk Assessment: Onshore Substation / Operation
8.19	Onshore Design Principles Statement

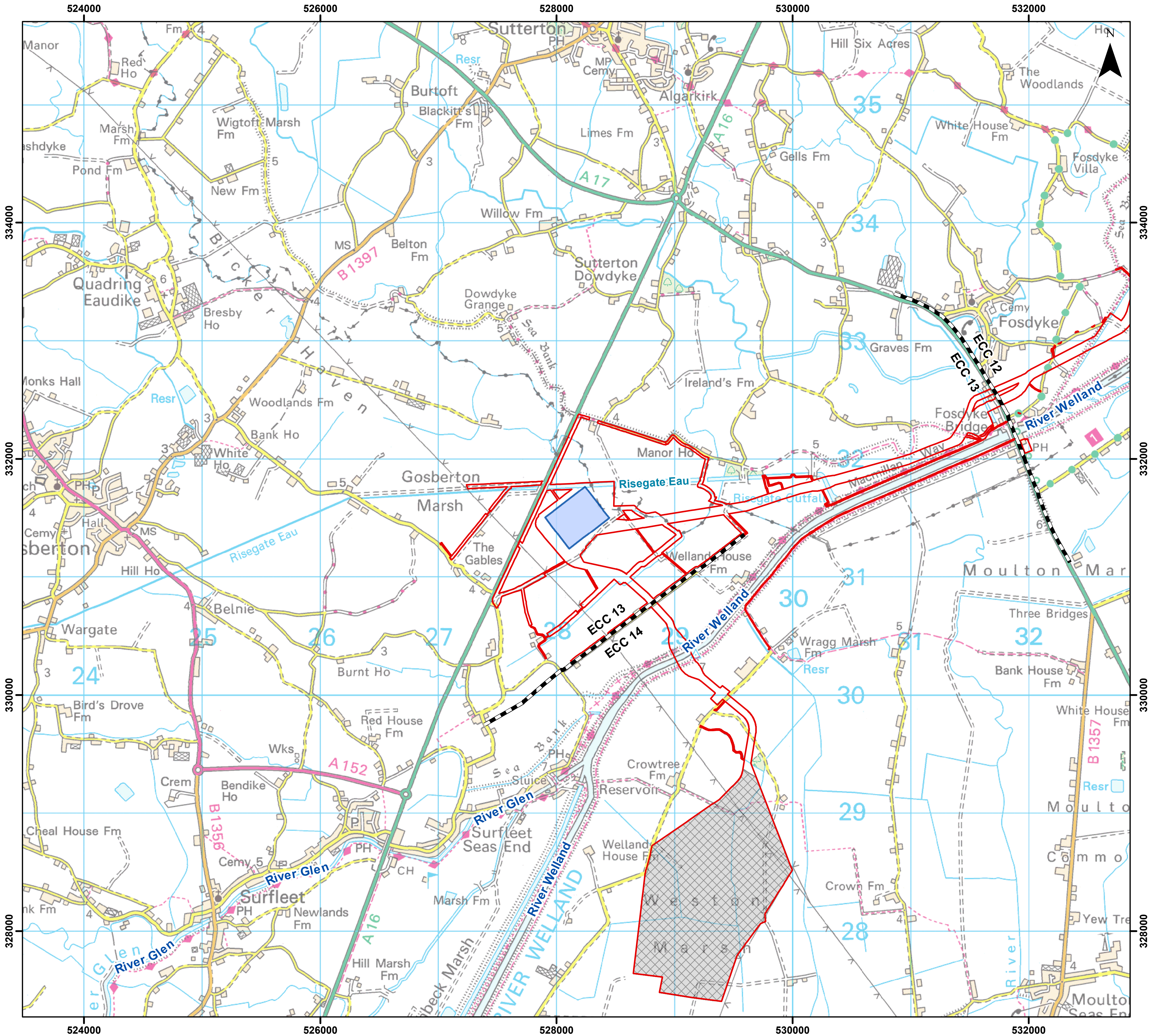
1 Introduction

1. This Outline Operational Drainage Management Plan (ODMP) (document reference 8.12) is provided for the proposed operation of the onshore substation (OnSS) for Outer Dowsing Offshore Wind (ODOW) (the “Project”). The proposed OnSS is located on land off the A16 at Surfleet Marsh, Lincolnshire (the “Site”).
2. This Outline ODMP has been prepared in accordance with guidance presented within the National Planning Policy Framework (NPPF)[1] and its associated Planning Practice Guidance (PPG)[2], taking due account of current best practice documents relating to assessment of flood risk published by the British Standards Institution BS8533[3].

1.1 Context and Site Location

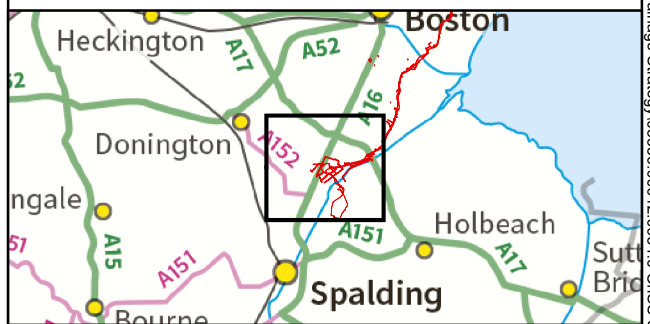
3. The Project is a proposed offshore windfarm located approximately 54km off the Lincolnshire Coast. It is anticipated to generate renewable electricity equivalent to the annual electricity consumption of over 1.6 million households.
4. Cables will connect the turbines to the offshore substation platforms, and then export the power generated to shore by export cables. The offshore Export Cable Corridor (ECC) will make landfall at Wolla Bank, to the south of Anderby Creek. From landfall, the onshore ECC is proposed to run to the OnSS connection point at Surfleet Marsh.
5. The proposed OnSS is located within the South Holland District of Lincolnshire, approximately 6.2km to the northeast of Spalding and 3.4km east of Gosberton, centred on National Grid Reference TF 28175 31504. The Site itself occupies an area of approximately 28ha and comprises greenfield land currently used for arable agriculture.
6. The Site is bound by arable greenfield land on all sides, with the A16 approximately 70m to the west and Risegate Eau immediately to the north. There are a large number of watercourses in the wider local area, primarily comprising open field drains and ditches. Most notably, in addition to Risegate Eau, Bicker Creek is located approximately 55m to the north, on the opposite side of Risegate Eau and immediately to the east of the Site. The River Welland, the primary source of flood risk to the local area, is located approximately 1.3km to the southeast of the Site.
7. The site location, including the boundary for the proposed OnSS Site is shown in Figure 1.

1 National Planning Policy Framework: Communities and Local Government (March 2012, updated December 2023)
2 Planning Practice Guidance: Communities and Local Government – Flood Risk and Coastal Change (March 2014, updated August 2022)
3 BS8533:2017, Assessing and managing flood risk in development: Code of Practice (December 2017)



Legend

- Order Limits
- Onshore Segment Break
- Onshore Substation (OnSS) Footprint
- Connection Area



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Outline Plans
Outline Operational Drainage Management Plan

Site Location Plan
Figure 1

OUTER DOWSING OFFSHORE WIND

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Revision: 0.1

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1.2 Background and Aims

8. The aim of the Outline ODMP is to demonstrate that, through development of the Site, adequate drainage can be provided to ensure that the OnSS remains free from flooding from surface water and does not exacerbate the risk of surface water flooding locally or elsewhere.

2 Baseline Context

2.1 Local Hydrology

9. Figure 2 identifies the local watercourses relevant to the site, with these watercourses described in further detail in the following sub-sections.

2.1.1 River Welland

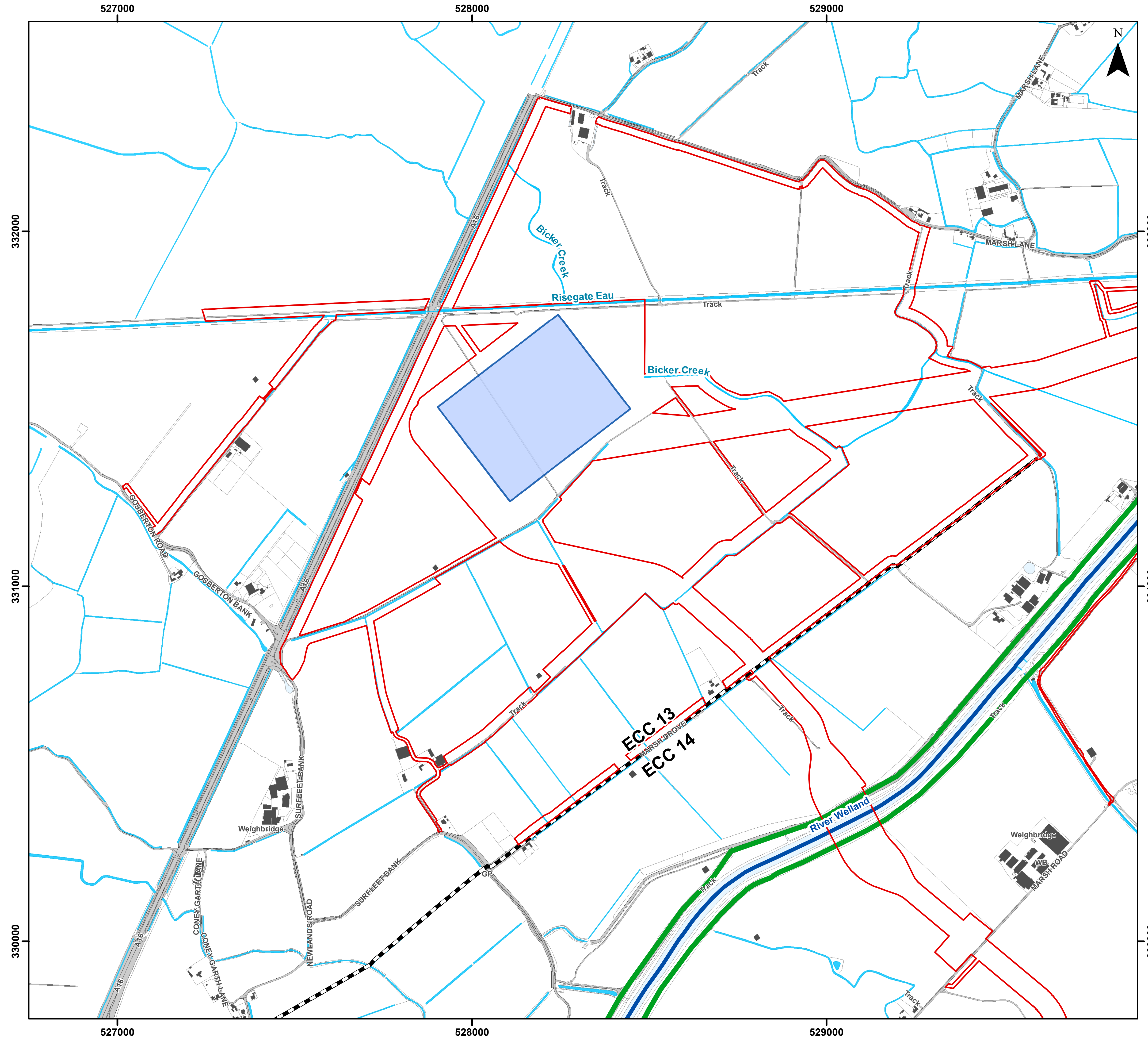
10. The River Welland is an Environment Agency Main River which flows from southwest to northeast approximately 1.25km to the southeast of the Site. The river discharges into The Wash and subsequently the North Sea approximately 14.3km to the northeast of the Site and is tidally influenced for an approximate 22km reach from the tidal limits imposed by Fulney Lock and the Coronation Channel sluice at Spalding.

2.1.2 Risegate Eau

11. Risegate Eau is an open drain which is classed as an ordinary watercourse and falls under the responsibility of Welland and Deepings Internal Drainage Board (IDB). The drain, which lies approximately 25m to the north of the Site at its closest point, runs from west to east, connecting the South Forty Foot Drain and several other IDB drains to the River Welland via a pumping station. The primary purpose of the drain and those connecting to it is to serve as a surface water drainage receptor from surrounding agricultural land.

2.1.3 Bicker Creek

12. Bicker Creek is an Ordinary Watercourse which runs generally from northwest to southeast. Prior to the construction of Risegate Eau, the Bicker Creek flowed immediately adjacent to the north-eastern boundary of the OnSS site. Since the construction of Risegate Eau, Bicker Creek now ends approximately 55m north of the OnSS site and no longer flows continually as a single watercourse and primarily acts as a surface water drainage ditch. The watercourse commences again immediately to the east of the Site before ending at the River Welland flood defence having been straightened for use as a field drainage ditch with no positive outfall to the river.



Legend

- Order Limits
- Onshore Segment Break
- Onshore Substation (OnSS) Footprint
- Environment Agency Rivers and Sea Flood Defence
- Statutory Main River
- Minor Watercourse
- Waterbody

Sources:
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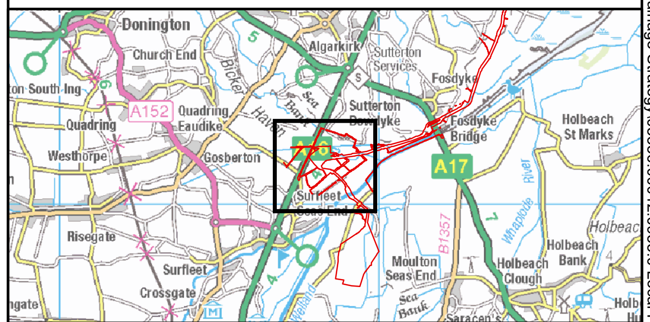

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Outline Plans
Outline Operational Drainage Management Plan

Local Hydrology
Figure 2

OUTER DOWSING OFFSHORE WIND

Date: 06/03/2024
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Revision: 0.1

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2.2 Site Topography

13. The topography of the Site and wider local area has been reviewed using site-specific LiDAR data obtained by ODOW. The Site and wider local area are shown to be essentially flat, with only minor variations from a general ground level of approximately 3.65m AOD. Further afield from the Site, ground levels remain very flat, with a slight fall in a south-easterly direction towards the River Welland.

2.3 Geological and Hydrogeological Features

2.3.1 Geology

14. The National Soil Resources Institute[4] Soilscapes dataset indicates the Site to be situated on soils categorised as Soilscape 21: *Loamy and clayey soils of coastal flats with naturally high groundwater.*

15. The British Geological Survey (BGS) Geology of Britain mapping[5] indicates the Site is situated upon bedrock geology comprising Oxford Clay Formation – Mudstone, and superficial deposits comprising Tidal Flat Deposits – Clay and Silt.

2.3.2 Hydrogeology

16. The Environment Agency Aquifer Designation Map[6] identifies the bedrock at the site location as Unproductive Strata: these are geological strata with low permeability that have negligible significance for water supply or river base flow.
17. The superficial deposits at the site location are also identified as Unproductive Strata.
18. The Site is not located within a Source Protection Zone (SPZ) associated with groundwater abstractions.

2.3.3 Existing Site Drainage

19. The existing OnSS site is comprised entirely of greenfield land utilised for arable agriculture, with surface water runoff drained in line with the prevailing topography, gradually flowing towards an existing field drainage ditch located to the southeast. This field drainage ditch connects to a wider network of field drainage ditches which connect to Bicker Creek and Risegate Eau before ultimately discharging to the River Welland.

2.3.4 Flood Risk Classification

20. A Flood Risk Assessment (FRA) for the OnSS is provided as document reference: 6.3.24.3. This FRA notes that, while the Site is located within Flood Zone 3, the presence of flood defences in the local area and along the Lincolnshire coastline renders this risk as residual, meaning that this risk would only be realised in the event of the overtopping or breach of the defences.

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[4] Soilscapes map, http://www.landis.org.uk/soilscapes/ [Accessed September 2023].
[5] British Geological Survey, Geoindex, http://mapapps.bgs.ac.uk/geologyofbritain/home.html? [Accessed December 2023].
[6] Magic Map Application, managed by Natural England, delivered by Landmark: https://magic.defra.gov.uk/MagicMap.aspx [Accessed December 2023].

21. The OnSS and associated equipment is to be raised above platform level to provide the necessary level of protection for the 0.1% AEP plus climate change for the worst-case breach scenario.

3 Planning Policy and Guidance

3.1 Development Proposals

22. The OnSS will contain the electrical components for controlling and transforming the power exported through the onshore cables to 400kV and to adjust the power quality factors, as required, to meet the GB NGESO Grid Code for supply to the NG.
23. Grading, earthworks, and drainage will be undertaken initially within the footprint of the OnSS. Foundations will then be installed which will either be ground-bearing or piled, based on the prevailing ground conditions.
24. The proposed building substructures will be predominantly composed of steel and cladding materials although brick/block-built structures are sometimes employed. The structural steelwork is likely to be fabricated and prepared off site and delivered to site for erection activities. The steelwork may be erected with the use of cranes. Cladding panels (typically composite) may be delivered to site ready to erect and be fixed to the steelwork. In addition, there could be unhoused equipment, such as different switchgear and protective devices, grid transformers, shunt reactors, dynamic reactive compensation equipment, harmonic filters, and water tanks.
25. The onshore electrical infrastructure facilities will be required throughout the lifetime of the Project. The detailed design of the OnSS will take place post-consent, but further information regarding the design principles can be found in the Design Principles Statement (document reference 8.19).
26. With reference to the NPPF, utility infrastructure, including infrastructure for electricity supply and generation, storage, and distribution systems, are classified as an *'Essential Infrastructure'* development type.

3.2 Climate Change

27. Climate change is recognised as a factor which requires consideration due to its effects on flood risk. In accordance with the NPPF, flood risk is to be considered throughout the lifetime of the development and therefore, consideration must be given to the potential impacts of climate change.
28. Guidance from the Environment Agency[7] was published in February 2016, with the latest update in May 2022, which sets out the expected increases to peak river flows, rainfall intensity, sea levels, offshore wind speed, and extreme wave heights due to the impacts of climate change. Consideration of the expected increases due to climate change are outlined below based on the anticipated lifetime of the development.
29. The climate change allowance guidance acknowledges that there is considerable uncertainty with respect to the absolute level of change that is likely to occur. As such, the document

[7] Flood risk assessments: climate change allowances, https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances [Accessed December 2023].

provides estimates of possible changes that reflect a range of different emission scenarios, over different epochs.

30. This Outline ODMP accounts for anticipated changes in peak rainfall intensity over the anticipated lifetime of development.

3.2.1 Anticipated Lifetime of Development

31. The NPPF practice guidance classifies land uses into five categories. Utilities infrastructure, such as the OnSS, is classified as *'Essential Infrastructure'*. The proposed OnSS has an anticipated development lifetime of 35-years and therefore falls within the 2070s epoch in relation to climate change allowances.

3.2.2 Peak Rainfall Intensity

32. The guidance from the Environment Agency states that the Central allowances for both the 1 in 30-year (3.3% AEP) and 1 in 100 year (1% AEP) events should be assessed, with the OnSS being designed in order to ensure that the development is safe from surface water flooding and that there is no increase in flood risk elsewhere during the 1% AEP event plus an allowance for climate change. In this instance, as per Table 3.1, peak rainfall intensity for *'Essential Infrastructure'* within the Welland Management Catchment is expected to increase by 25% during the 3.3% AEP event and 25% during the 1% AEP event.

Table 3.1 Peak Rainfall Intensity Allowances

Management Catchment	Annual Exceedance Probability (%)	Allowance Category	Total potential change anticipated for the 2050s	Total potential change anticipated for the 2070s
Welland Management Catchment	3.3	Upper End	35%	35%
		Central	20%	25%
	1	Upper End	40%	40%
		Central	20%	25%

4 Outline Surface Water Drainage Strategy

33. This Outline ODMP sets out high level principles for managing surface water on the Site in line with best practice and the requirements of Lincolnshire County Council as the Lead Local Flood Authority (LLFA).
34. This strategy is intended to demonstrate that, given the nature and quantum of development proposed, it will be feasible to drain the Site in line with planning requirements using the proposed methodology.

4.1 Key Principals of Surface Water Management

4.1.1 Overview

35. The current best practice guidance, The SuDS Manual (CIRIA Report C753)[8], promotes sustainable water management through the use of Sustainable Drainage Systems (SuDS). This guidance defines four main components of SuDS which are referred to as the 'four pillars of SuDS design', as depicted in Plate 4.1.

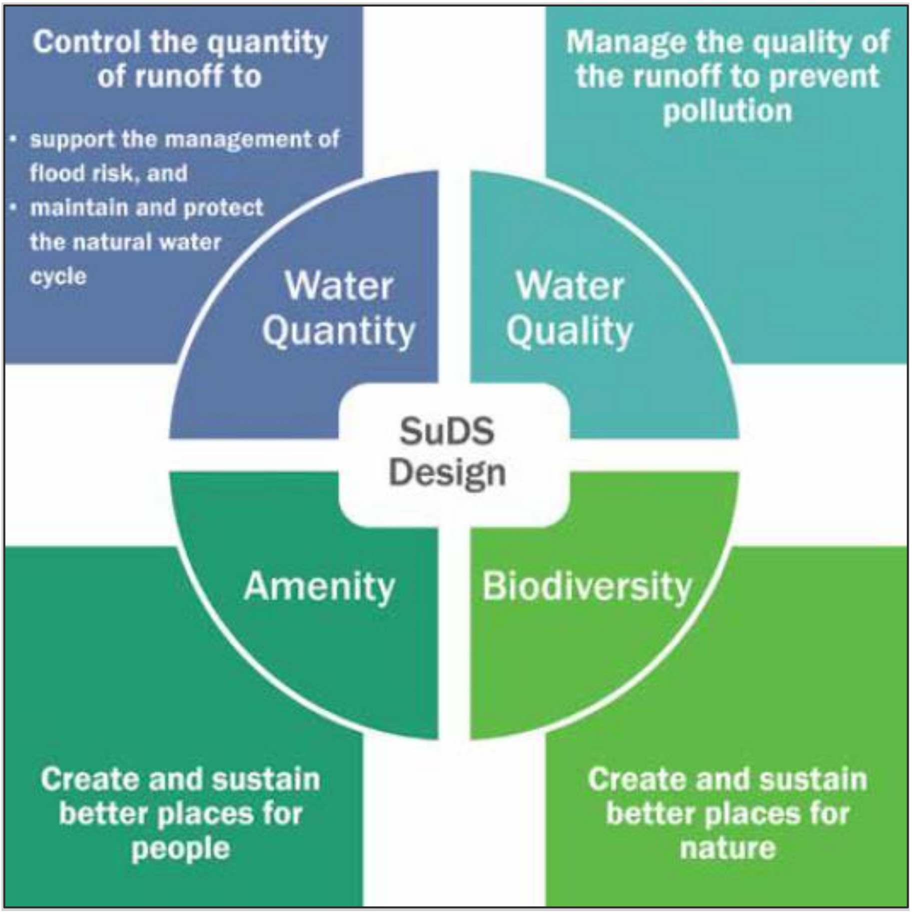

Plate 4.1 Four Pillars of SuDS (extract from CIRIA Report C753)

8 CIRIA (2015). Report C753, The SuDS Manual

36. The SuDS Manual identifies a hierarchy of SuDS for managing runoff, which is commonly referred to as a 'management train'. The hierarchy of techniques is identified as:

- **Prevention** – the use of good site design and housekeeping measures on individual Sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
- **Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting).
- **Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole Site).
- **Regional Control** – management of runoff from several Sites, typically in a retention pond or wetland.

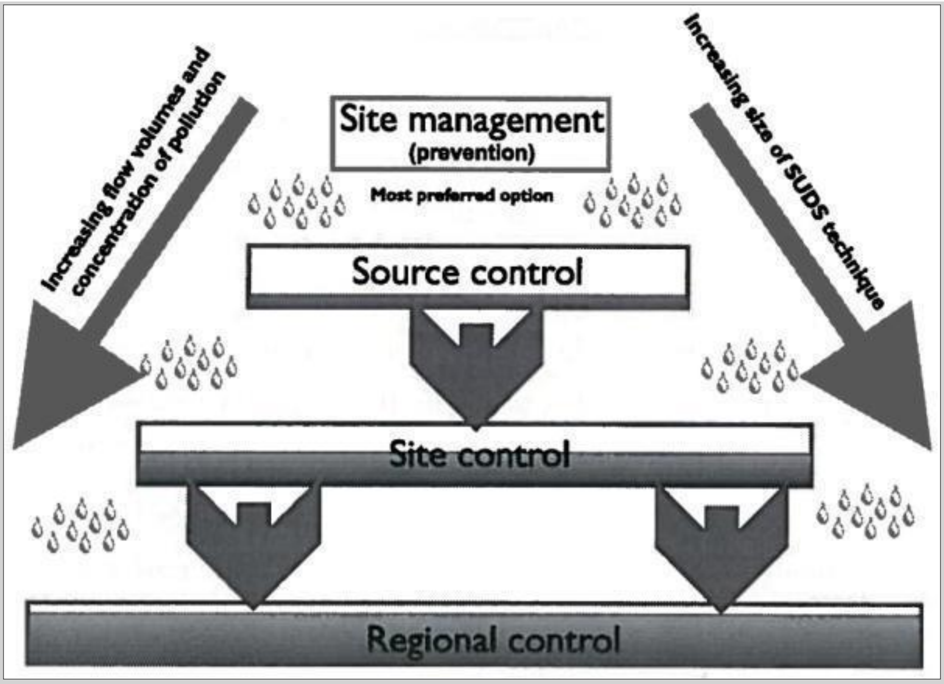

Plate 4.2 SuDS Management Train

4.1.2 National Planning Policy Context

37. Current national planning policy guidance and best practice, namely NPPF and PPG, require development proposals in all Flood Zones to seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of SuDS.

4.2 Existing Surface Water Drainage Regime

38. As discussed in Section 2.2, the existing Site is essentially flat with a very slight fall in a south-easterly direction. Under present conditions, any surface water runoff unable to percolate into the ground will flow gradually until such a point where it does percolate the topsoil layer, or it is intercepted by the network of open field drains to the southeast. Upon entering the field drainage network, surface water is understood to drain towards Bicker Creek and Risegate Eau before eventual discharge to the tidal River Welland.

4.2.1 Development Runoff Rates

39. The OnSS, based upon current indicative design assumptions, will comprise approximately 4.2ha of impermeable surface being introduced on the site, which will be positively drained, within an overall footprint of up to 14.4ha. As the development is proposed to discharge into the Risegate Eau, this will be subject to agreement from Welland and Deepings IDB. As an example, the target attenuated discharge rate for the development will be to control the discharge from the impermeable area to 1.4l/s/ha in line with their guidance, although higher rates are possible, subject to negotiation. Based upon the assumption of a positively drained impermeable area of 4.2ha, this results in a discharge control rate of 5.88l/s for all events up to and including the 1% AEP event plus a 25% allowance for climate change.
40. The discharge from the permeable parts of the site is assumed to be unchanged at 1.4l/s/ha. Therefore, for a 14.4ha site, the overall discharge rate would be 20.16l/s. These parameters have been used for the assumptions of this outline plan. Following the detailed design of the substation, the final arrangements will be agreed with the IDB before the plan is updated and submitted for pre-construction approval.

4.3 Constraints on the Use of SuDS

4.3.1 Geology and Hydrogeology

41. Given the indicated geology of the Site and local area, and the potential for a high water table, as discussed in Section 2.3, the discharge of surface water runoff via infiltration methods is unlikely to be suitable for more than a very small proportion of the required discharge volume . Infiltration testing and water table monitoring will be carried out to inform the detailed design and final plan and infiltration will only be considered as an option if supported by the necessary site data.

4.3.2 Watercourses

42. Risegate Eau is located immediately to the north of the proposed OnSS and is suitably located to receive surface water runoff.

4.3.3 Sewers

43. There are no public sewers within close proximity of the Site and, given the Site's previous use as open greenfield land utilised for arable agriculture, it is understood that there are no existing private sewers within the Site boundary either. Given that the OnSS will be able to discharge surface water runoff to Risegate Eau to the north of the Site, discharge to a sewer network will not be required.

4.3.4 Topography

44. As discussed in Section 2.2, the Site is essentially flat and level with only minor depressions which are associated with the existing arable agriculture land use. The wider local area does comprise a very slight gradient in a south-easterly direction towards the River Welland.

45. The general, ground level on the Site is indicated to be 3.65m AOD. However, to mitigate the residual risk of flooding to the OnSS, the ground is proposed to be raised, forming a platform to a level of 4.2m AOD. This will help maintain the safety of the OnSS equipment, helping it to remain dry during a flood event, but will also facilitate surface water drainage via gravity to Risegate Eau to the north.

4.4 Proposed Discharge Arrangement

46. With reference to the SuDS Manual, the hierarchy of preferred disposal options for surface water runoff from development Sites in decreasing order of sustainability is as follows:

- Infiltration to Ground;
- Discharge to Surface Waters; or
- Discharge to Sewer.

47. Table 4.1 summarises the suitability of disposal methods in the context of the proposed OnSS development.

Table 4.1 Suitability of Surface Water Disposal Methods

Surface Water Disposal Method (in Order of Preference)	Suitability Description	Method Suitable? (Y / N)
Infiltration to Ground	As discussed in Section 2.3, the Site and wider local area are underlain by bedrock geology comprising Oxford Clay Formation – Mudstone, and superficial deposits comprising Tidal Flat Deposits – Clay and Silt. Furthermore, due to the site's proximity to the tidal River Welland, the ground is likely to comprise a high water table, particularly during high tides. As such, discharge of surface water runoff from the OnSS to ground via infiltration is likely to be infeasible.	N
Surface Water Discharge	The existing Site surface water runoff is understood to generally run in a south-easterly direction before spilling into an existing field drainage ditch. On the basis that the proposed OnSS will be situated close to Risegate Eau, and given that the local topography is essentially flat, the preferred method of drainage is to discharge at a restricted rate to Risegate Eau, which falls under the management of Welland & Deepings IDB.	Y
Sewer Discharge	Given that the proposed OnSS development will discharge into an open watercourse (Risegate Eau) and given that there are no public sewers within close proximity to the site, discharge to a sewer network will not be required/possible.	N

4.5 Surface Water Drainage Strategy

48. Impermeable surfaces within the proposed OnSS development will drain surface water via gravity to a swale running along the northern, north-eastern and north-western perimeter of the Site. Based on the current design assumptions, the swale is proposed to be approximately 1.8m in depth, with 1:2 side slopes, and a length of approximately 850m. This provides an approximate storage volume of 6480m^3, with allowance of at least a 300mm freeboard (subject to detailed design). This swale will serve as the primary attenuation feature for the OnSS but will also act as a conveyance feature for surface water runoff draining to the receptor, Risegate Eau. Furthermore, the swale will also satisfy water quality requirements by treating and removing contaminants from runoff prior to discharge, while also encouraging percolation of runoff to the ground.
49. Due to the build-up of the OnSS platform, as part of the potential design additional capacity for surface water attenuation could be provided within the platform for a void stone at approximately 25 – 30%, with natural percolation to the sub-strata.
50. Based on the current assumptions, surface water from the proposed OnSS development impermeable surfaces will discharge to Risegate Eau to the north of the Site. The attenuation measures described would result in a restricted rate of discharge of 1.4l/s/ha (calculated to result in a discharge of 5.88l/s for the current design assumptions) from the impermeable surfaces for all rainfall events up to and including the 1% AEP event with a 25% allowance for climate change. The discharge from the remainder of the site will be assumed to remain at 1.4l/s/ha and will be drained through the same system as the impermeable areas, giving an overall discharge rate of 20.16l/s for the site of 14.4ha.
51. The proposed drainage strategy demonstrates there is sufficient space and capacity on the Site to provide an adequate drainage system to required discharge rates. The strategy presented here will be developed through the detailed design process and the final plan will be subject to relevant approvals and refinement before construction commences.

4.6 SuDS Assessment of Water Quality

52. Due to the potential for surface water runoff to contain pollutants entrained from various hard standing surfaces, and in line with the four pillars of SuDS design discussed in Section 4.1, SuDS can be utilised to remove pollutants from surface water runoff. In order to determine whether the proposed SuDS features will be sufficient in the removal of pollutants from surface water runoff, the SuDS Manual (CIRIA C753) Simple Index Approach is applied.
53. The Simple Index Approach provides a way of quantifying pollution hazard levels based upon the type of contributing hardstanding surface as well as the levels of mitigation based upon type of SuDS components being used.
54. Table 4.2 below provides the land use types for the proposed OnSS development, together with the pollution hazard levels and associated pollution hazard indices as extracted from the SuDS Manual (CIRIA C753).

Table 4.2 Pollution Hazard Indices for Different Land Use Classifications

Land Use	Pollution Hazard Level	Pollution Hazard Indices		
		Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2	0.05
Low traffic roads/surfaces and non-residential car-parking with infrequent change	Low	0.5	0.4	0.4

55. Based upon the above, the worst-case pollution hazard indices for the OnSS are 0.5 (Total Suspended Solids), 0.4 (Metals) and 0.4 (Hydrocarbons).

56. Under the Simple Index Approach, where a single SuDS component is proposed this should be capable of mitigating the worst-case source of pollution and, therefore, the mitigation indices for each pollution type should be equal or greater than the corresponding pollution hazard indices. Where multiple SuDS components are being proposed, the full mitigation indices are applied to the primary component, with subsequent component indices applied with a factor of 50% in order to account for the reduced performance of secondary and tertiary components associated with already reduced inflow concentrations, as below:

57. *Total SuDS Mitigation Index = Mitigation Index$_1$ + (Mitigation Index$_2$ * 0.5) …*

58. Table 4.3 below provides the mitigation indices for the relevant SuDS components being proposed for the development, as extracted from the SuDS Manual (CIRIA C753), with mitigation indices of 0.5 for Total Suspended Solids, 0.6 for Metals and 0.6 for Hydrocarbons. As such, the proposed swale is deemed sufficient in treating surface water from the proposed OnSS before discharge to Risegate Eau.

Table 4.3 SuDS Mitigation Indices for Discharges to Surface Waters

Type of SuDS Component	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Swale	0.5	0.6	0.6

59. Where fuel or oil is likely to be stored at the facility, oil interceptors will be incorporated into the drainage system to reduce the risk of any pollution occurring from spillages by preventing it from being released from the site.

4.7 Operation and Maintenance

60. A full SuDS maintenance plan would be produced as part of the detailed drainage design post-consent and the precise requirement would depend on manufacture specification of the final design. The maintenance of the drainage network would be the responsibility of the site owners and/or operators.

61. An outline of the typical maintenance requirements for the proposed SuDS features is provided below.

4.7.1 Swale

62. The typical maintenance requirements of swales associated with the Outline ODMP are reproduced below as Table 4.4.

Table 4.4 Typical Wetland Maintenance Requirements

Maintenance Schedule	Required Action	Minimum Frequency
Regular Maintenance	Remove litter and debris.	Monthly, or as required
	Inspect marginal and bankside vegetation and remove nuisance plants (for first three years).	Monthly (at start, then as required).
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage.	Monthly.
	Inspect water body for signs of poor water quality.	Monthly (May – October).
	Inspect silt accumulation rates in any inlet and in main body of the swale and establish appropriate silt removal frequencies; undertake contamination testing once some build up has occurred, to inform management and disposal options.	Half yearly.
	Check any mechanical devices, e.g. penstocks, flow restrictions etc.	Half yearly.
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above wetland base; include max 25% of wetland surface).	Annually.
	Remove 25% of bank vegetation from water's edge to minimum of 1m above water level.	Annually.
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract).	Annually.
	Remove sediment from any inlet areas.	Every 1-5 years, or as required.
	Remove sediment and planting from the main body of the swale.	Every 5 years, or as required.
Occasional Maintenance	Remove sediment from the main body of swale when cross sectional volume is reduced by 20%.	With effective pre-treatment, this will only be required rarely, e.g., every 25-50 years.
Remedial Actions	Repair erosion or other damage.	As required.
	Replant, where necessary.	As required.
	Aerate any parts of the swale expected to remain wet when signs of eutrophication are detected.	As required.
	Repair / rehabilitate inlets, outlets and overflows.	As required.

4.8 Exceedance

63. As the proposed surface water drainage system has been designed to attenuate rainfall from all events up to and including the 1% AEP event plus 25% climate change, the likelihood of exceedance flows occurring during the same event is considered minimal.
64. In the event that the drainage system is overcome, and exceedance flows do occur, surface water is expected to flow in a south-easterly direction before being captured by the existing network of field drainage ditches/ Bicker Creek and ultimately draining back towards Risegate Eau and the River Welland.

5 Conclusions

65. This Outline ODMP sets out high level principles for managing surface water runoff from the OnSS.
66. Analysis of potential discharge receptors indicates that discharge to Risegate Eau (open watercourse) is the most preferable option for the site. Formal infiltration to ground is considered infeasible due to the poor permeability of the surrounding geology and a potentially high water table.
67. It is proposed that the site surface water runoff will discharge to Risegate Eau, located immediately to the north of the site.
68. The OnSS surface water discharge from the site will be restricted to a rate of 1.4l/s/ha for all rainfall events up to and including the 1% AEP plus 25% climate change, in accordance with the attenuated discharge rates set out by Welland and Deepings IDB. Attenuation measures will be designed to limit the discharge rate from the impermeable areas to the rate of 1.4l/s/ha. Surface water runoff is proposed to be attenuated by a perimeter swale which will also serve as a conveyance feature while also providing water quality benefits.
69. The strategy presented here will be used to inform the final Operational Drainage Management Plan which will be subject to relevant approvals before construction of the OnSS commences.