# Galloper Wind Farm Project

Response to Development Consent Order
Part 3 Requirement 25
Surface and Foul Water Drainage – Enabling Works Stage
June 2013
Document Reference – GWF R25 070613

Galloper Wind Farm Limited

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| Date/initials approval | |  | |

## CONTENTS

# 1 INTRODUCTION

## 1.1 General

1.1.1 This document relates to the proposed Galloper Wind Farm (GWF) project, to be constructed off the coast of Suffolk, and associated infrastructure to connect to the national electricity transmission system at Sizewell, Suffolk. It forms part of a series of submissions to Suffolk Coastal District Council in response to requirements set out in Part 3 of the Galloper Wind Farm Order 2013.

1.1.2 The Galloper Wind Farm Order 2013 was made by on the 24th of May 2013, having received a direction from the Secretary of State for Energy, following an examination by the National Infrastructure Directorate of the Planning Inspectorate.

1.1.3 Section 2 of this document sets out the relevant Requirement being addressed, whist Section 3 sets out GWFL's interpretation of this Requirement and provides the relevant information. The drainage strategy document has been updated to include the design of the relevant drains.

1.1.4 The drainage details have been prepared in accordance with the Flood Risk Assessment (FRA) submitted with the application (Document 6.5, October 11) and to implement the Surface Water Drainage Strategy.[i]

1.1.5 At this time, GWFL in particular needs to discharge the Requirements associated with the commencement of the Enabling Works to the north of Sizewell Gap, to allow the provision of a site ready for mobilisation of National Grid works in January 2014, construction of the Galloper substation is likely to start later in 2014. The National Grid works consist of the transmission compound, sealing end compounds, transmission cable corridors, construction areas and permanent access road and that all trees will need to be cleared from these areas and platforms prepared for the transmission compound and sealing end compounds. This submission relates to the temporary and permanent drainage measures that will be implemented during the 'Enabling Works' stage which will be undertaken during 2013 and 2014. This includes temporary drainage arrangements for the enabling works stage and also the creation of the permanent 'primary drainage system' for the substation areas.

1.1.6 Other drainage works will be undertaken within the areas of the NGET and Galloper substation compounds during the 'Construction Works' stage and details will be submitted for approval in advance of the planned start in January 2014 and May 2014 respectively. These drains will be designed as part of the detailed design of these areas.

1.1.7 The work elements that GWFL will need to have complete during the Enabling stage are listed below:

- Transmission compound platform preparation

- Sealing end compound platform preparation
- Permanent access road
- Enabling works (including construction compounds)
- Transmission cable corridor site preparation

## 2 DCO PART 3 REQUIREMENT

### 2.1 Requirement 25 – Surface and Foul Water Drainage

2.1.1 The Draft DCO states:

1) Neither the connection works nor the transmission works shall commence until in relation to the relevant works written details of the surface and (if any) foul water drainage system (including means of pollution control) have, after consultation with the relevant sewerage and drainage authorities, been approved by the relevant planning authority.

2) The surface and foul water drainage system must be constructed in accordance with the approved details unless otherwise agreed by the relevant planning authority.

2.1.2 This document sets out the proposed temporary drainage arrangements for the Enabling Works phase of the project and permanent elements that will be installed during the enabling works.

# 3 PROPOSED ENABLING WORKS DRAINAGE ARRANGEMENTS

## 3.1 General

3.1.1 The following sections outline the intended drainage proposals for the Enabling Works phase of the project. These proposals are in accordance with previously submitted environmental reports, the draft Construction Code of Practice, SUDS and appropriate national Guidance and Standards. The proposals are in accordance with the drainage described in the ES Surface Water Drainage Strategy document.

## 3.2 Surface Water Runoff

3.2.1 A primary surface water drainage strategy has been developed, that was contained in Appendix B of the FRA and has been updated and attached as Appendix 1 to this document. This includes the use of dry swales along the access road, filter drains along the inside toe of the earthwork landform and soakaways within the substation compounds. This system will be designed to be effected in controlling silt laden run-off water arising during the construction works as well as providing the permanent drainage system for the site.

3.2.2 Galloper Wind Farm Ltd will construct the primary drainage system as part of the Enabling Works, such that all site local drainage systems are connected or discharged into the primary system either directly or via an interceptor system where risk of contamination is identified.

3.2.3 Surface water from Contractors' Compound will be discharged into the primary drainage system via an interceptor system, in combination with manholes, gullies, and soakaways, during the Enabling Works.

## 3.3 Foul Water Drainage System (Temporary)

3.3.1 An on-site system for foul effluent drains, including an on-site effluent tank, shall be provided for the temporary contractors facilities. Foul drainage from the temporary Contractor's compound welfare facilities shall be directed to a temporary surface mounted effluent tank to be provided by the Enabling Works Contractor and subsequently adopted by the Electrical Contractor for the duration of the construction period.

3.3.2 Details of the permanent foul drainage system will be submitted for approval in advance of the commencement of the construction stage of the work.

3.3.3 All foul effluent drains shall be equipped with suitable oil catchments facilities to prevent oil entering the effluent tank. The tank must be located within the site boundary but accessible for periodic emptying by mobile unit/vehicle. No foul discharge will be made to public sewer, watercourse or soakaway.

3.3.4 Drainage and plumbing will be to BS8310, BS3402 and BS1244 and the system shall be designed assuming permanent occupation

## 3.4 Oil Contaminated Drainage System

3.4.1 A temporary oil storage facility, (for use during the enabling and construction phases) will be provided on site with adequate bunding to ensure that oil contamination is prevented from entering the drainage system. Water from oil contaminated areas shall be directed through an oil interceptor prior to discharge into the main drain.

3.4.2 Drainage external to the buildings (including water drainage) will be of PVC or an equivalent material. Drainage from open-air tank bunds shall not be discharged directly into the oily water run-off system, but shall be directed to it via manual start, auto stop pumps.

3.4.3 The details of the remainder of the permanent drainage system, being the parts within the two substation compounds, will be submitted for approval in advance of the commencement of the construction of these stages. These details will include the permanent pollution prevention measures that will be incorporated into the drainage design for the oil filled transformers and any other areas where there is a potential for oil to enter the drainage system.

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[i] Galloper Wind Farm Project: Flood Risk Assessment 2011. Available on-line from the Planning Inspectorate website

http://www.galloperwindfarm.com/pdfs/Flood_Risk_Assessment.pdf

Appendix 1: Technical Note, Rev E

Appendix A: Geotechnical Engineering Ltd Correspondence
Appendix B: Illustrative surface water layout drawing
Appendix C: Micro drainage calculations

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| **Job Name:** | ***Galloper Wind Farm*** |
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| **Subject:** | ***Drainage Strategy*** |
| **Prepared By:** | C. Brown / *J.Share* |

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## Introduction

This technical note details the surface water and foul drainage strategies for the Galloper Wind Farm Substation site. It was designed in accordance with PPS25 (original concept 2011), Sewers for Adoption 7th Edition, CIRIA C165 Infiltration Drainage and CIRIA C697 The SUDS Manual. It was designed for rainfall event of 1 in 2 year, 1 in 30 year, 1 in 100 year + 20% climate change.

The proposed development consists of four compounds (the Galloper Wind Farm Substation, a transmission compound and two Sealing End compounds), underground cabling, a 6m wide access road and an earthwork landform which is designed to minimise the visual and acoustic impact of the proposed development on the surrounding area.

The greenfield site, which is located approximately 0.60km to the west of the village of Sizewell, Suffolk, next to a similar substation development (the Greater Gabbard Offshore Wind Farm substation), is currently not served by any formal surface water or foul drainage networks.

*(31st May 2013 ) : Following completion of the detailed design for the drainage strategy, PBA are now able to provide more information on the actual size of the drainage components together with extracts of drawings from the final scheme.*

*PBA have also responded to specific points raised by the Environment Agency in their letter dated 16th May 2013.*

## Surface Water Strategy

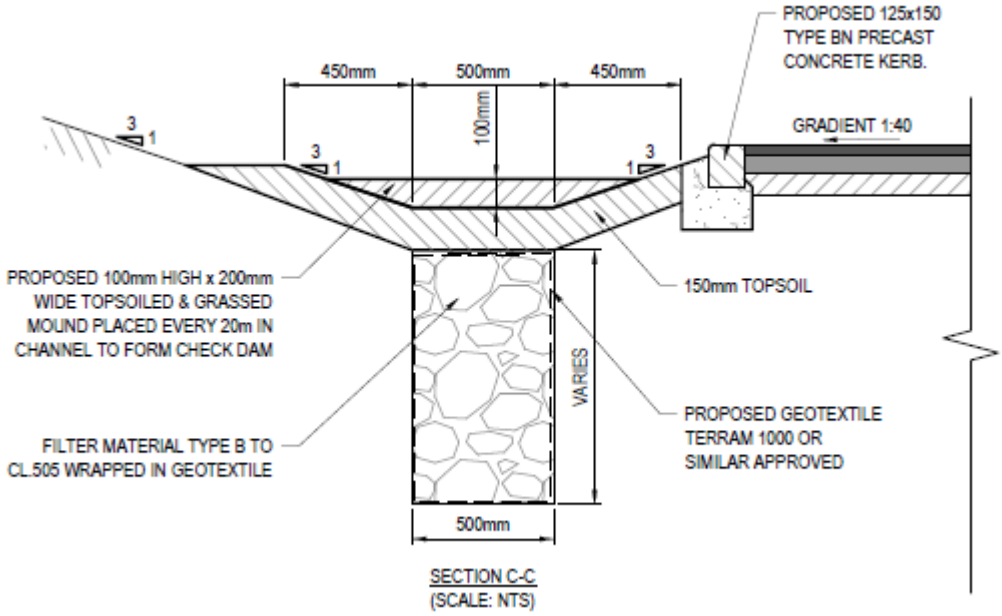
The surface water drainage strategy for the development will mimic the existing drainage regime and discharge all the surface water runoff generated by the development to ground via infiltrating Sustainable Drainage Systems (SuDS).

Infiltration tests carried out for the neighbouring Great Gabbard Offshore Wind Farm substation site in accordance with BRE Digest 365 by Geotechnical Engineering Ltd have confirmed that ground conditions across the site are suitable for such techniques with the poorest calculated infiltration rate ($1x10^{-5}$m/s) proposed for use within the design. The finished ground levels for the site will lie no lower than 8.0m AOD while previous geotechnical reports suggest that groundwater is present at approximately 1.5m AOD. Therefore, maintenance of a 1m unsaturated zone between the bottom of any infiltration devices and the water table can be readily achieved. Refer to Geotechnical Engineering Ltd. correspondence dated 14th May 2008 a copy of which is contained in Appendix A.

Based on the information provided by Geotechnical Engineering Ltd. a surface water drainage strategy has been developed that includes the use of dry swales along the access road, filter drains along the inside toe of the earthwork landform and soakaways within the substation compounds.

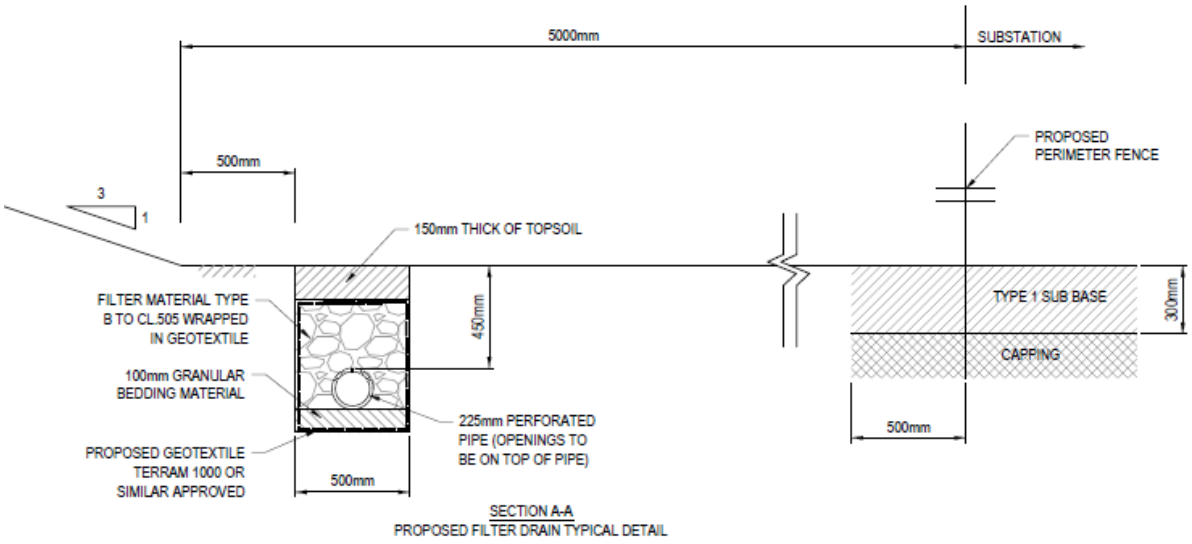
Dry swales consist of a vegetated conveyance channel, designed to include a filter bed of prepared soil that overlays an infiltration trench. The trench provides additional treatment and storage capacity ensuring that the swale does not become boggy during periods of wet weather. Dry swales have been proposed for use alongside the extension to the access road to the substation compounds as they are effective at removing hydrocarbons from runoff and providing storage during larger rainfall events.

*31st May 2013 : Following completion of the detailed design a cross section through swales alongside the permanent access road is shown below. Typical depth of swale is 1m but this does vary :-*



Filter drains consist of an infiltration trench which incorporates a perforated pipe within its base. The pipe provides additional storage and conveyance if required. They have been proposed for the internal toe of the landform that will surround the compound as they are effective at accepting overland sheet flow and treating runoff by vegetative filtering and promoting the settlement of particulate pollutants.

*31st May 2013 : The cross section through the filter drain at the toe of the landscape mound / perimeter of the substation compounds is detailed below :-*




The main compound areas will be drained via piped networks and trapped gullies which collect the surface water runoff generated by the development's hard standing areas and discharge it to ground via cellular soakaways. In accordance with best practice all surface water runoff generated from hard standing areas within the main compounds other than roofs will pass through a class 1 bypass separator before being discharged to ground to remove any hydrocarbon pollutants present in the runoff.

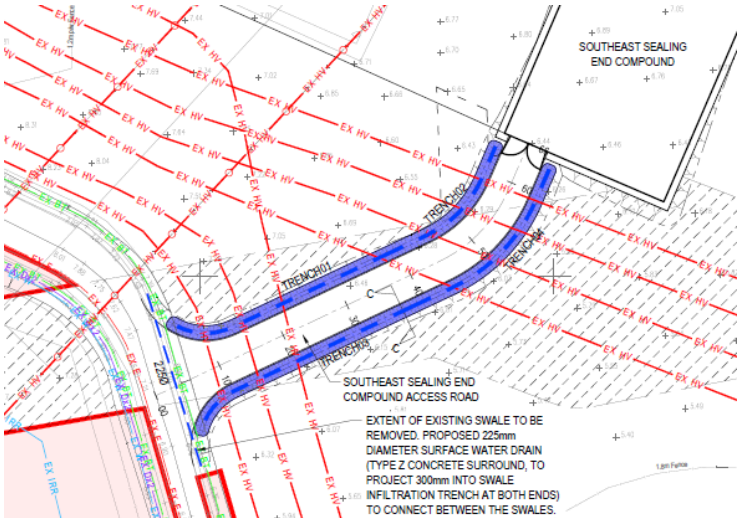
While the internal layout of the substation compounds are still to be finalised, similar developments, such as the existing neighbouring Greater Gabbard Offshore Wind Farm substation, have a level of impermeability of approximately 35-45%. These impermeable areas include the concrete maintenance road which provides access to the bunded transformer plinths and the control building. The remainder of the site (approximately 55-65%) will be made up of a gravel layer approximately 0.1m deep.

In accordance with the requirements of Part 2 and Section 4.8 of the National Policy Statement for Energy (EN-1) a 20% allowance for climate change has been calculated based on the predicted life expectancy of the development and the latest UK Climate Projections as defined by Planning Policy Statement 25: Development and Flood Risk (PPS25).

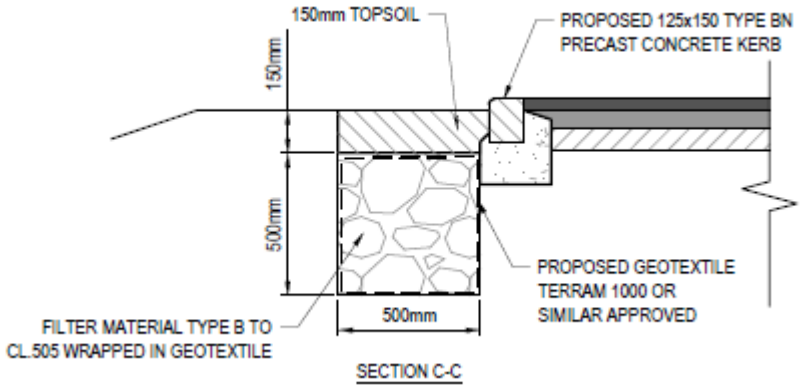
Indicative sizing of the proposed infiltration devices for the 1 in 100yr + 20% climate change allowance rainfall event has been undertaken in MicroDrainage using the calculated infiltration rate of $1x10^{-5}$m/s. In order to demonstrate that the proposed infiltration techniques can be incorporated into the proposed development layout the indicative size and location of the infiltration devices are shown on the concept drawing 25456/003/050 contained in Appendix B, with the accompanying calculations contained in Appendix C.

The two sealing end compounds, which contain no sources of pollution and will have a predominantly gravel finish, will discharge any surface water run-off generated into the gravel prior to infiltration into the ground.

*31st May 2013 : The permanent access road which connects the south-east sealing end compound to the Greater Gabbard access road will have filter trenches running along either side of it. See details below :-*




*Plan : Filter drains*




*Section : Filter drains*

The final surface water drainage scheme will be subject to detailed design of the compound layouts post-consent, however there will be a legal requirement for approval of the drainage scheme by the local planning authority in conjunction with the Environment Agency.

*31st May 2013 : Following receipt of a letter from the Environment Agency(EA), PBA can also confirm that Galloper Wind Farm Ltd are procuring additional infiltration tests as part of the wider ground investigation works to help inform the detailed design of the surface water drainage strategy.*

The routing of overland flow in an extreme rainfall event has also been considered in developing this surface water drainage strategy. Based on the existing drainage catchment and fall of the land surrounding the compound any overland flow generated in an extreme rainfall event will flow from south to north across the site. The proposed levels and layout of the compounds will preserve this overland flood route to the north in extreme rainfall events.

However, any runoff exceeding the capacity of the drainage system would initially be stored within the voids of the gravel base, which covers the majority of the site, prior to infiltration into the ground. If the gravel layer were to become saturated, surface water would be discharged off-site to the north, through the transmission compound and into an existing woodland belt. This capture of any runoff from the substation compounds will prevent any potential contaminants from the leaving the site and minimises the risk of them entering the Sizewell Marshes SSSI which is located approximately 100m to the north of the site.

**Foul Water Strategy**

The foul drainage system will collect all foul water generated by the development in a piped network and convey the flow towards a cesspit which will be emptied as and when required. The cesspit will be fitted with a high level alarm to alert maintenance staff when the pit requires emptying. The cesspit will attenuate all the foul water generated by the development ensuring that effluent cannot enter the ground or groundwater. Annual emptying and cleaning of the cesspit as well as regular visual inspections will be required along with servicing of the high level alarm to ensure that the cesspit continues to operate as designed.

The oil filled transformers will be sited on bunded plinths, with either underground oil containment integral with the foundations or a remote oil containment tank and linking pipe work, in case of leakage or full oil discharge in emergencies. These will be drained by a pumped system which under normal operating conditions will either discharge rainfall run-off to the foul water cesspit or via a class 1 full retention separator into the surface water system, subject to detailed design and the views of the Environment Agency. Should a full discharge of the transformer oil be undertaken then sensors on the pumping apparatus will detect the presence of oil and prevent the pump from operating. The oil would then be drained down by pumping into a mobile tanker and taken off-site for disposal.