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VATTENFALL

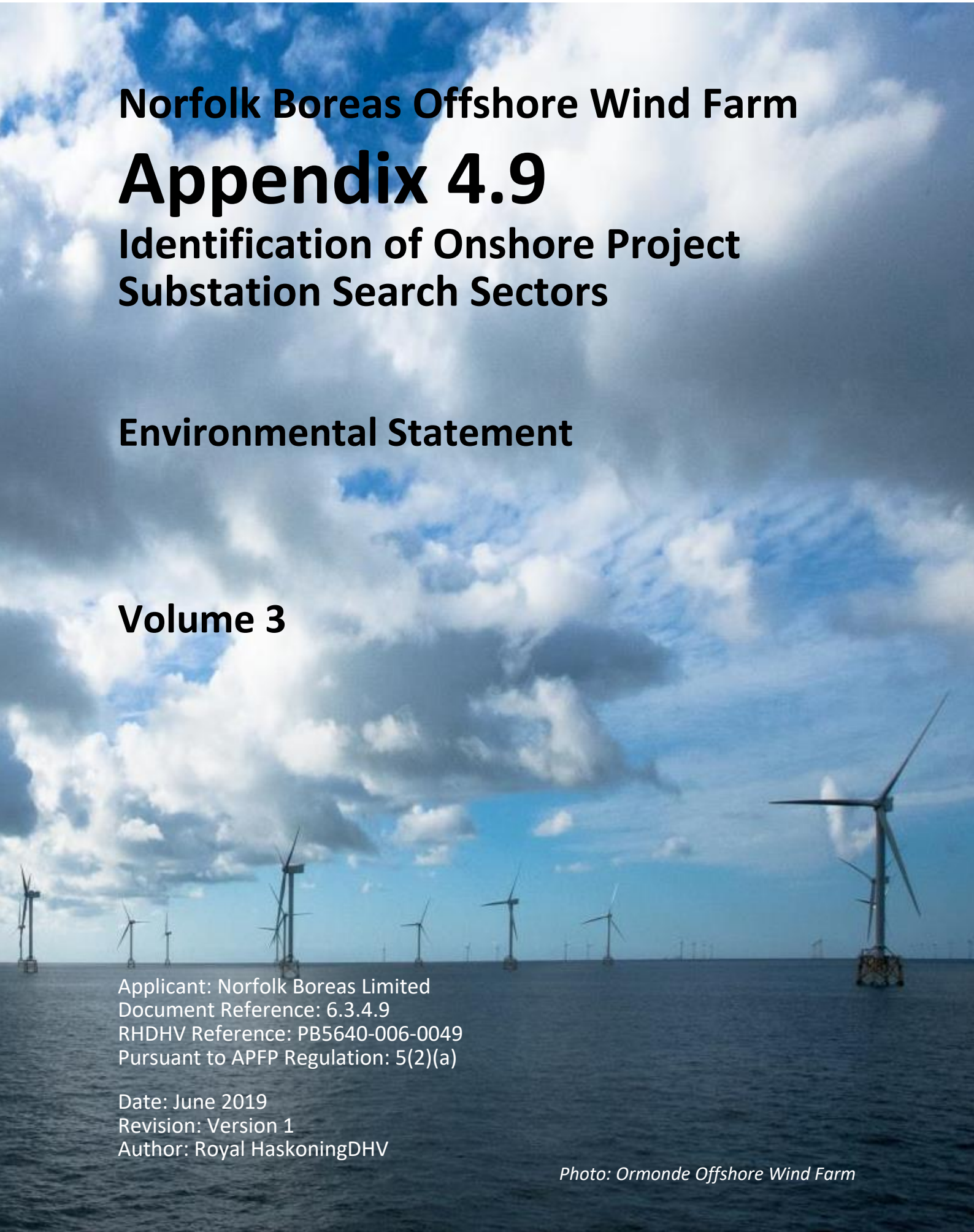
Norfolk Boreas Offshore Wind Farm

Appendix 4.9

Identification of Onshore Project Substation Search Sectors

Environmental Statement

Volume 3



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REPORT

Onshore Project Substation Search Sectors

Client: Norfolk Vanguard Limited and Norfolk Boreas Limited

Reference: PB5640.001.019

Revision: 0.1/Final

Date: 27 April 2016

Royal HaskoningDHV

Enhancing Society Together

HASKONINGDHV UK LTD.

2 Abbey Gardens
Great College Street
London
SW1P 3NL
Industry & Buildings
VAT registration number: 792428892

+44 207 2222115 **T**
info.london@uk.rhdhv.com **E**
royalhaskoningdhv.com **W**

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Project name: Norfolk Vanguard and Norfolk Boreas
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Author(s): Alex Hampson

Drafted by:	Alex Hampson
Checked by:	Amy Harrower
Date / initials:	20/04/2016 AH
Approved by:	Alistair Davison
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Classification
Project related

1 Introduction

The purpose of this report is to present the outcomes of the initial environmental risk assessment process that has been carried out by Royal HaskoningDHV as part of the Norfolk Vanguard and Norfolk Boreas substation site selection process.

2 Risk Assessment Methodology

2.1 Study area refinement

Before the initial environmental risk assessment was undertaken, in this stage of the process, the study area was further refined from the 3km buffer around the grid connection point at Necton. The refinement process was guided by the overarching principles to avoid existing settlements; as such the settlements of Necton, Ivy Todd and Little Fransham were removed from the study area, and can be seen in Plate 1. The principle to place project electrical infrastructure in close proximity to the existing Necton National Grid substation (the projects connection point) was also considered.

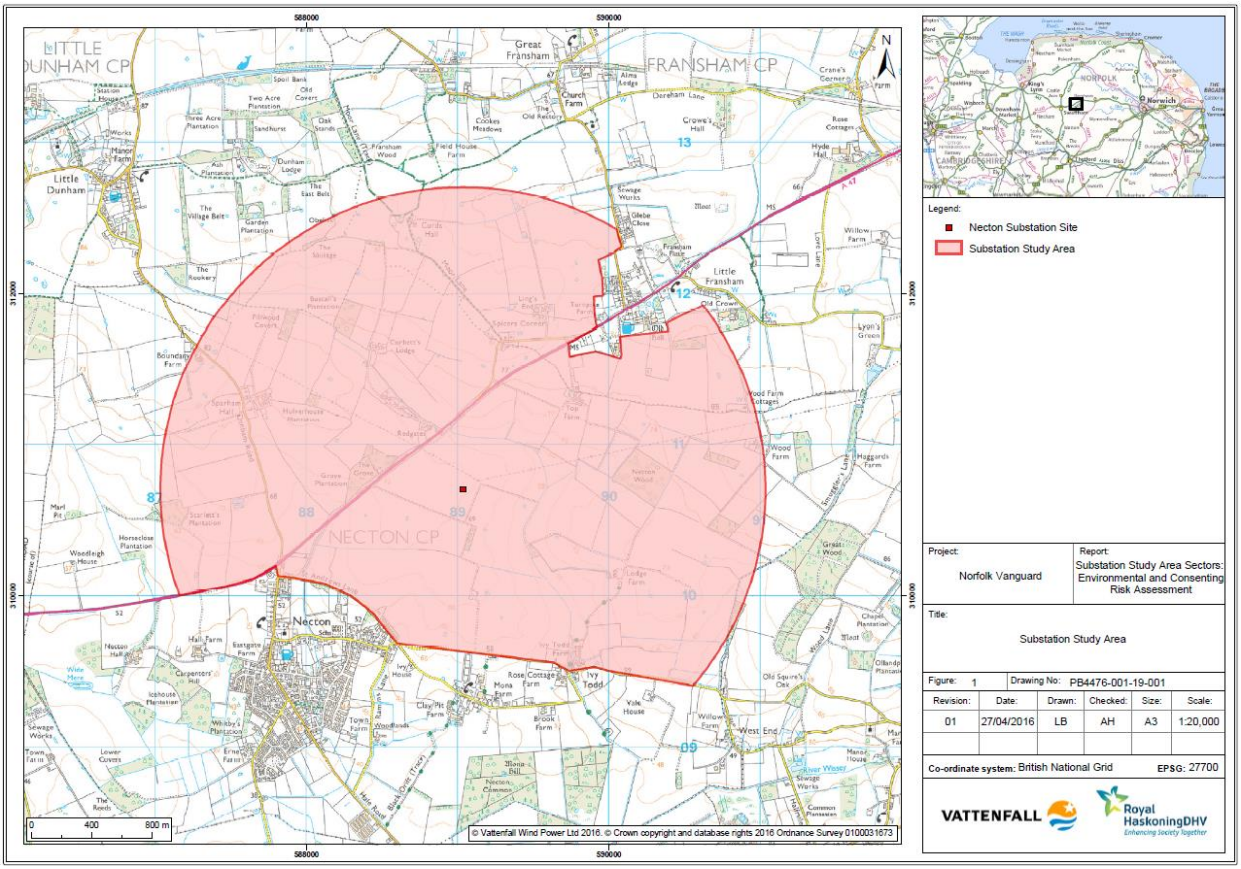

Plate 1 Substation Study Area

Once this area had been refined, the study area was split into sectors based upon the hard infrastructure present. This included the A47 travelling north-east to south-west across the study area, and the high voltage overhead lines which run north-east to west. These features created four sectors within this study area, S1, S2, S3 and S4, and can be seen in Plate 2.

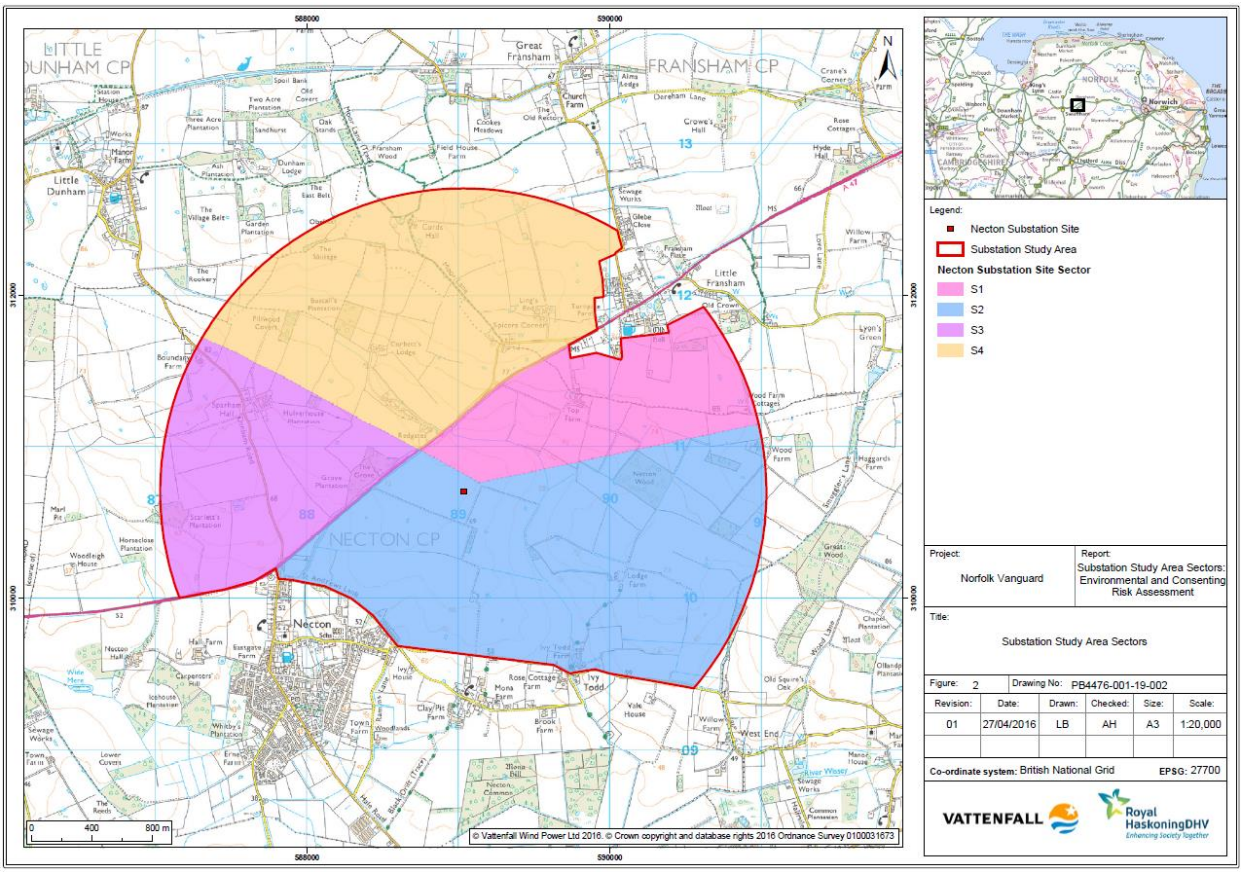

Plate 2 Substation Study Area Sectors

This environmental risk assessment has been carried out on the four substation sectors identified. Development considerations used for this risk assessment exercise have been divided in to the following categories to aid mapping, discussion and assessment:

- Populated areas;
- Infrastructure and utilities;
- Archaeology and cultural heritage (Scheduled Monuments);
- Terrestrial Designations (RAMSAR, Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Country Wildlife Sites (CWS), Local Nature Reserves (LNR), National Nature Reserves (NNR), Sites of Special Scientific Interest (SSSI), Areas of Outstanding Natural Beauty (AONB) and National Parks);
- Land Use/type (Ancient woodland);
- Hydrological features (Main Rivers and ditches);
- Flood Risk Zones;
- Public Rights of Way;
- Land Quality (active and historic landfill data);
- Proximity to existing infrastructure; and
- Existing screening opportunities (e.g landform or vegetation).

It should be noted at this stage of the site selection process for the substation, the assessment does not take into account any consultation feedback, landscape and visual impact work or noise modelling, and is based upon desk studies only. These development considerations found within the substation study area sectors have been identified and are shown on Plate 3.

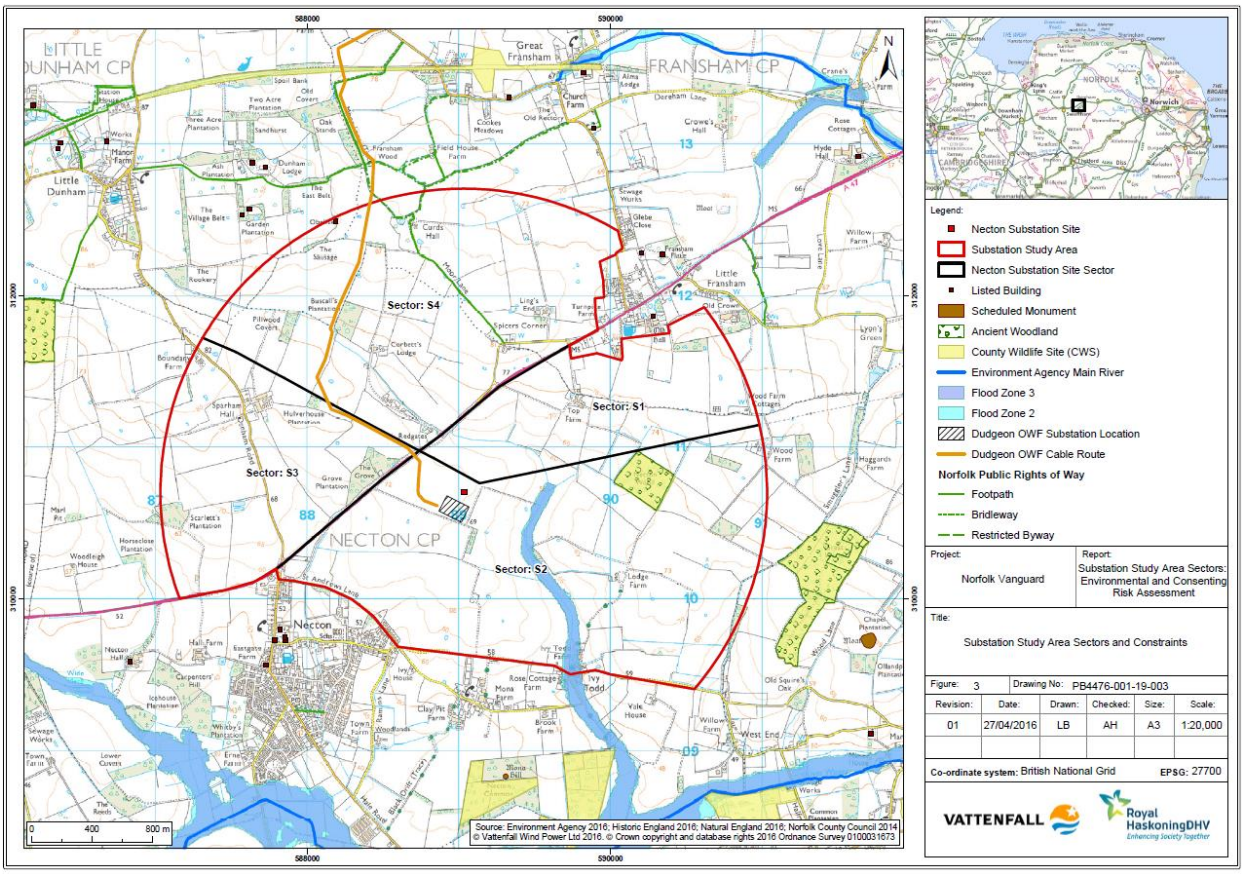

Plate 3 Substation Study Area Sectors

Following this, a risk classification was attributed to each element based on a qualitative assessment and expert judgement. The classification system used is shown in Table 1. Table 2 presents the findings of the assessment, followed by a short description of the initial findings.

Table 1 Classification for development considerations

Grey	Hard constraint / unacceptable risk to the environment
Red	Major risk to the environment
Amber	Minor risk to the environment
Green	Consideration unlikely to pose risk to the environment
Purple	Potential benefit
White	Limited benefit

Table 2 Substation Study Area Sectors Initial Risk Assessment

Topic	Considerations	S1	S2	S3	S4
Sector Area		134.1Ha 1.3km²	367.5ha 3.7km²	167.1Ha 1.7km²	293.1Ha 2.9km²
International Nature Conservation Designated Sites (Terrestrial)	SACs, SPAs or RAMSARs	None present	None present	None present	None present
National Nature Conservation Designated Sites (Terrestrial)	SSSIs, Ancient Woodlands, National Nature Reserves, RSPB Reserves	None present	1 x Ancient Woodland (Necton Wood)	None present	None present
National Landscape Designations	AONB, The Broads National Park	None present	None present	None present	None present
Archaeology and Heritage of national importance	Registered Parks and Gardens, Scheduled Ancient Monuments, World Heritage Sites	None present	None present	None present	None present
Archaeology and Heritage of local importance	Listed Buildings	None present	None present	None present	1 x Grade II Listed Building
Local Nature Conservation Designated Sites	Local Nature Reserves, County Wildlife Sites, Forestry Commission Woodland	None present	1 x County Wildlife Site (Necton Wood)	None present	None present
Main Roads	A Roads	Sector accessible from	Sector accessible	Sector accessible from	Sector accessible from

Topic	Considerations	S1	S2	S3	S4
		A47	from A47	A47	A47
Watercourses	Main rivers and ordinary watercourses	None present	None present	None present	None present
Infrastructure	Buried Gas pipelines, electricity cables Other infrastructure (substations)	Unknown	Dudgeon OWF Cable Route and Substation and National Grid connection point	Dudgeon OWF Cable Route	Dudgeon OWF Cable Route
Settlements	Hamlets/Individual Farm properties within the sector	Wood Farm Cottages, Top Farm	Lodge Farm, Ivy Todd Farm	Sparham Hall	Redgates, Corbetts Lodges, Curds Hall, Spicers Corner and Lings End.
Flood Zones		Not in Flood Zone 2 or 3	Within Flood Zone 2 and 3	Not in Flood Zone 2 or 3	Not in Flood Zone 2 or 3
Land Quality (Potentially Contaminated Land)	Active/Historical landfill data	None present	None present	None present	None present
Land Use	Agricultural Land Classification	Grade 2 - 0.1km² (16.59Ha) Grade 3 – 1.2km² (117.4Ha)	Grade 2 – 0.7km² (70.7Ha) Grade 3 – 2.9km² (296.7Ha)	Grade 2 – 0.1km² (7.36Ha) Grade 3 – 1.6km² (161.6Ha)	Grade 2 – 1.4km² (141.74Ha) Grade 3 – 1.5km² (151.4Ha)
Public Rights of Way (PRoW)	Footpaths, bridleways, SUSTRANs routes	None present	None present	None present	3 X PRoW
Landscape - Infrastructure	Potential to aggregate project substation in close proximity to existing electrical	Limited benefit	Potential benefit	Limited benefit	Limited benefit

Topic	Considerations	S1	S2	S3	S4
	infrastructure				
Landscape - Screening	Existing screening opportunities	Limited benefit	Potential benefit	Potential benefit	Potential benefit
Risk Summary					

Risks for each element of the connection have been summarised using the following standard procedure, and results can be found in Table 3.

- High Risk (Red): e.g. One or more major risk items identified within the element of the connection;
- Medium Risk (Orange): e.g. Three or more minor risk items identified; and
- Low Risk (Green): e.g. Two or less minor risk items identified.

3 Overview and summary of initial assessment findings

Table 3 Environmental Risk Assessment Summary

Substation Study Area Sectors Risk Summary	S1	S2	S3	S4

3.1 Summary

Sector 1 – This is the smallest substation sector (1.3km^2) within the study area and based upon the data sets used in this assessment, represents a low environmental risk. There are no environmental designations present, no fluvial flood risk and only a small number individual properties (Top Farm and Wood Farm Cottages). Using the datasets currently held, no known buried gas pipelines, electricity cables or other infrastructure are present in this sector.

Sector 2 –This is the largest substation sector (3.7km^2) within the study area and based upon the data sets used, presents a low environment risk. Two minor risk features were identified within this substation sector. The first is the presence of a small area of fluvial flood risk (Flood Risk Zones 2 and 3 which cross the middle of the sector). The second is the presence of known infrastructure associated with the Dudgeon OWF cable route and substation. Necton Wood (a CWS and parcel of Ancient Woodland) is located within this sector, however this is not considered as a risk as it represents a potential visual screening opportunity which is considered a benefit from a site selection perspective. The screening afforded by the presence of Necton Wood and the Ancient Woodland would offer opportunities to sensitively site the substation infrastructure using existing screening in the area, which is an important consideration of the site selection process and in accordance with the Horlock Rules (guidelines for the siting and design of substations). The Horlock Rules state "*The siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features....to keep intrusion into surrounding areas to a reasonably practicable minimum."* The National Grid connection point is also located within this sector. Necton village itself is situated on the southern boundary of the sector.

Sector 3 – This is the third largest substation sector (1.7 km^2) within the study area, and based upon the data set held, is classed as having low environment risk. This is characterised in the same way as Sector 1, with no environmental designations present, no fluvial flood risk and only a small number of individual properties. One minor risk feature was highlighted, which was the presence of the Dudgeon OWF cable route passing through this sector. The potential screening afforded by the presence of The Grove Woodland and Scarlett's Plantation could offer opportunities to sensitively site the substation infrastructure using existing screening in the area.

Sector 4 – This is the second largest substation sector (2.9km ^{2}) within the study area, and based upon the data sets held, is classified as having medium environmental risk. This was due to the number of PRoWs cutting through this sector (three identified), along with one Grade II listed building and a greater

number of individual properties (Redgates, Corbetts Lodges, Curds Hall, Spicers Corner and Lings End). The screening afforded by the presence of Pillwood Covert and Buscall's Plantation could offer opportunities to sensitively site the substation infrastructure using existing screening in the area.

Overview

Initial findings from this assessment indicate that there were no known environmental risks classed as being a major risk within the Substation Study Area Sectors, and that sectors S1, S2 and S3 had a lower environmental risk than S4.

S4 had an overall medium risk scoring associated with the relatively larger number of properties, along with PRoW and the presence of the Dudgeon OWF cable route. S1, S2 and S3 were all scored as having low environmental risk. S2 had two benefits associated with reducing landscape and visual impacts by using existing screening of the mature woodland present and by the opportunity to place project electrical infrastructure in close proximity to the existing Necton National Grid substation (the projects connection point). S2, S3 and S4 also have potential benefits of using existing screening afforded by the presence of woodland to sensitively site the substation infrastructure.

Therefore, in conclusion, there is not a large difference from an environmental viewpoint of the three sectors identified using the data sets currently held. Therefore, these three sectors will be taken forward for further consideration.

The key next steps in the site selection process for the project substation will be landscape, visual impact and noise specialist input, along with observations from a site walkover, engineering feasibility and stakeholder consultation feedback which will be considered for all three sectors.