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## Methodology Statement for Visualisations

The viewpoint assessment is illustrated by a range of visualisations, including photographs and photomontages, which accord with SNH's Visual Representation of Wind Farms Version 2.2 (SNH, 2017). In the absence of detailed guidance on the production of photomontages for non-wind farm developments, the Landscape Institute (LI) in its Advice Note 01/11 makes the following comment:

- “Scottish Natural Heritage’s Visual representation of windfarms: good practice guidance states that the guidance may also be applicable to other forms of development or within other locations. The LI endorses this guidance and strongly advises members to follow this where applicable in preference to any other guidance or methodology.”

Chapter 6 EIA Methodology Section 6.4, ‘The Project Design Envelope’, explains how the project EIA will be based on the ‘Rochdale Envelope’ approach, as supported by The Planning Inspectorate Advice Note Nine (The Planning Inspectorate, 2018). For the purposes of this project ‘The Project Design Envelope’ and the ‘Rochdale Envelope’ are synonymous. The Rochdale Envelope presents the parameters of the project which represent the worst case assumption. This ensures the DCO application covers the maximum possible extent of the project. Visualisations in Figures 29.23 to 29.34 therefore present a Rochdale Envelope approach, marked by a blue dashed 3D box around the computer-generated model, indicating the maximum possible extent of the project. This ensures that the LVIA considers the worst case assumption in respect of both the National Grid substation extension and the onshore project substation.

In respect of Scenario 1, the location of the 250m x 300m footprint of the onshore project substation is fixed. The Rochdale envelope marks this fixed position and the onshore project substation is represented by the model which occupies this envelope.

The design of the National Grid substation extension is represented by a computer-generated model, indicating the worst case assumption. It is set within the parameters of the Rochdale Envelope marked by a 3D box in the visualisation. This ensures that if any modifications to the design are made, these will occur within the parameters or the worst case assumption assessed.

The design of the onshore project substation will be further developed within the parameters set by the Rochdale Envelope. The computer-generated model included in the visualisations provides an indicative representation of the worst case assumption within the Rochdale Envelope and this has formed the basis of the LVIA. Those aspects of the design that would not change include the footprint of the development (250m x 300m), the maximum height of the buildings (19m), the maximum height of the lightning protection masts (25m) and the general infrastructure of indoor converter halls and outdoor electrical infrastructure. The computer-generated model has been included in the photomontages to give an impression of the general appearance and character of the onshore project substation, set within the parameters of the Rochdale envelope.

Visualisations of energy developments have a number of limitations when using them to form a judgement on the effects of this type of development. These include:

- A visualisation can never show exactly what the energy development will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- The images give a reasonable impression of the scale of the energy developments and the distance from the viewpoint and, whilst they have been produced to accord with best practice guidance, can never be 100% accurate;
- The viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;
- To form the best impression of the impacts of the development these images are best viewed in the field at the viewpoint location shown; and
- The visualisations must be printed at the right size to be viewed properly (A1 width) and viewed at a comfortable viewing distance.

The photographs used to produce the photomontages have been taken using Canon EOS 5D and 6D Digital SLR cameras, with a fixed lens and a full-frame (35mm negative size) CMOS sensor. The photographs are taken on a tripod with a pano-head at a height of approximately 1.5m above ground.

To create the baseline panorama, the frames are individually cylindrically-projected and then digitally joined to create a fully cylindrically-projected panorama using Adobe Photoshop or PTGui software. This process avoids the wide-angle effect that would result should these frames be arranged in a perspective projection, whereby the image is not faceted to allow for the cylindrical nature of the full 360-degree view but appears essentially as a flat plane. The visualisations should be viewed flat at a comfortable arm’s length.

53.5-degree field of view frames have been used to assist interpretation of the likely effects of the project. They show an enlarged image of the development, which is considered authentic in conveying the likely actual scale that would be experienced on site. For some viewpoints two or three 53.5 degree frames have been included to illustrate the full extent of the project. A 90-degree baseline photograph frame has also been included to illustrate the wider context of the views experienced from each viewpoint.

These images are each printed on paper 841 x 297 mm (half A1), which provides for a relatively large-scale image. Tonal alterations are made using Adobe software to create an even range of tones across the photographs once joined.

3D model views that illustrate the onshore project substation and National Grid substation extension within a computer-generated image of the landform are used in the assessment to present an indicative appearance of the project. These are produced with Visual Nature Studio software and are based on the OS Terrain 5 digital terrain model with a 5m data grid (OS Terrain 5). There are limitations in the accuracy of DTM data so that finer elements of landform may not be picked up precisely and may result in parts of the onshore project substation or National Grid substation extension, being more or less visible than is shown, however, the use of OS Terrain 5 minimises these limitations. Where descriptions within the assessment identify the extent of onshore infrastructure visible, this refers to the illustrations generated and therefore the reality may differ to a degree from these impressions. The modifications to the overhead line, which include an additional tower and an incremental change in the location and height of another tower, are included in the ES photomontages.

Photomontages have been produced for all the representative viewpoints, using Adobe Photoshop software, to provide a realistic image of the appearance of the project. For most views, these include the introduction of the onshore project substation, National Grid substation extension and overhead line modifications, as these are the elements that create the greatest change in views and are likely to be most visible from the surrounding area. The location and scale of the computer-generated model has been verified using markers such as the existing transmission towers, the existing substations, church towers and other fixed built features in the landscape.

The photographs and photomontages used in this assessment are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what will be apparent to the human eye. The assessments are carried out from observations in the field and therefore may include elements that are not visible in the photographs.

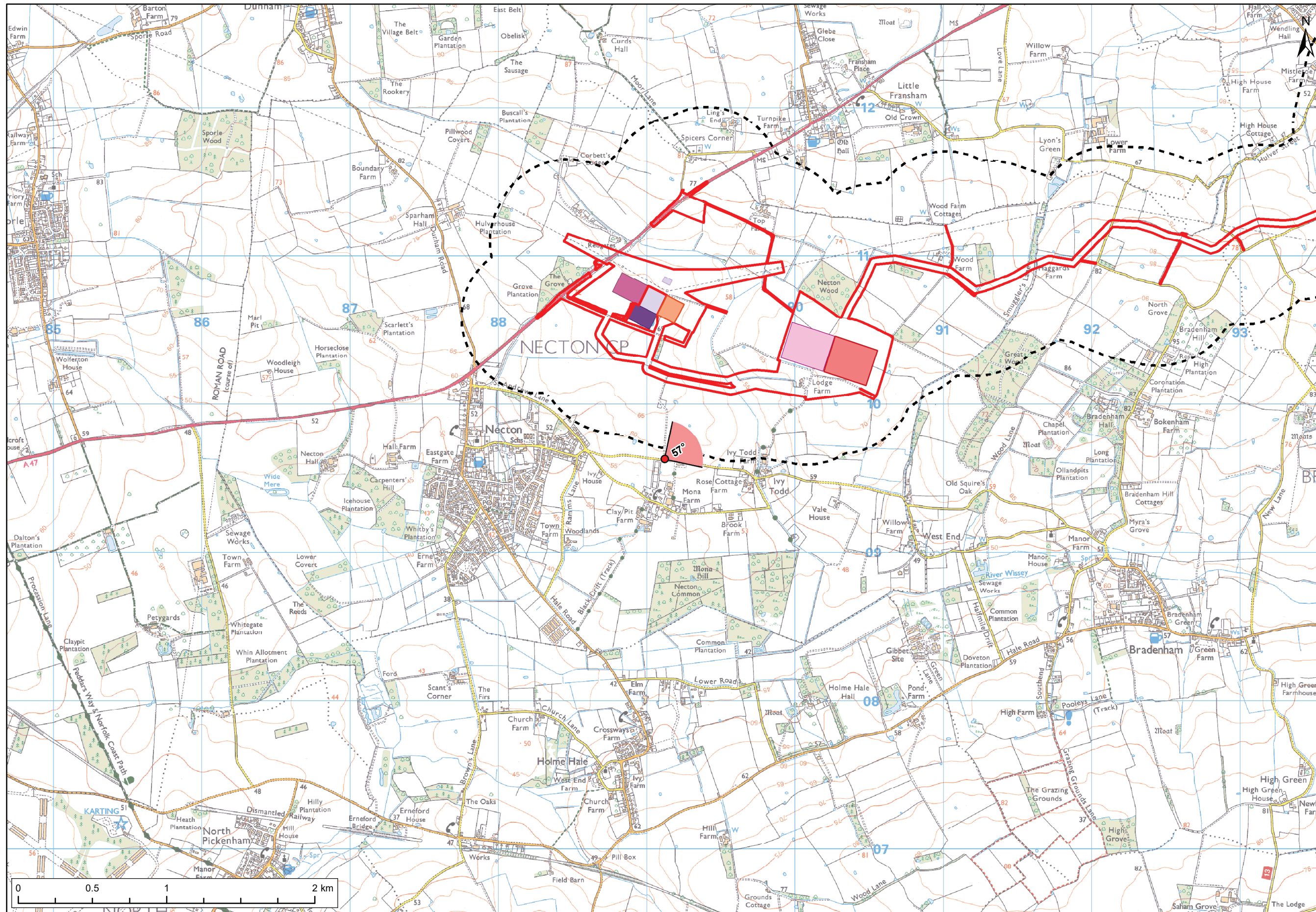
GPS readings and accurate aerial photography have been used to verify viewpoint locations and markers within the OS terrain model, which is referenced to the OS British National Grid co-ordinate system.

In respect of the onshore project substation and National Grid substation extension, there are twelve representative viewpoints shown in Figures 29.23 to 29.34. Viewpoints 1 to 8 were agreed with Statutory Consultees involved in the LVIA ETG Meetings for Norfolk Vanguard, while Viewpoints 9 to 12 were added in response to comments raised at these meetings and since agreed through the Norfolk Boreas ETG consultation. For the Norfolk Boreas LVIA, Viewpoint 3 has been micro-sited to allow slightly fuller visibility of the project. Visualisations have been prepared to represent Scenario 1 and Scenario 2.

The Scenario 1 figures for each viewpoint show the following;

- Location map of the viewpoint, baseline photograph and computer-generated model;
- Photomontage of Norfolk Boreas and Norfolk Vanguard onshore project substations, National Grid substation extensions and overhead line modifications; and
- Photomontage of Norfolk Boreas and Norfolk Vanguard onshore project substations, National Grid substation extensions, overhead line modifications and mitigation planting (15 years growth) relating to Norfolk Vanguard and Scenario 1 Norfolk Boreas.



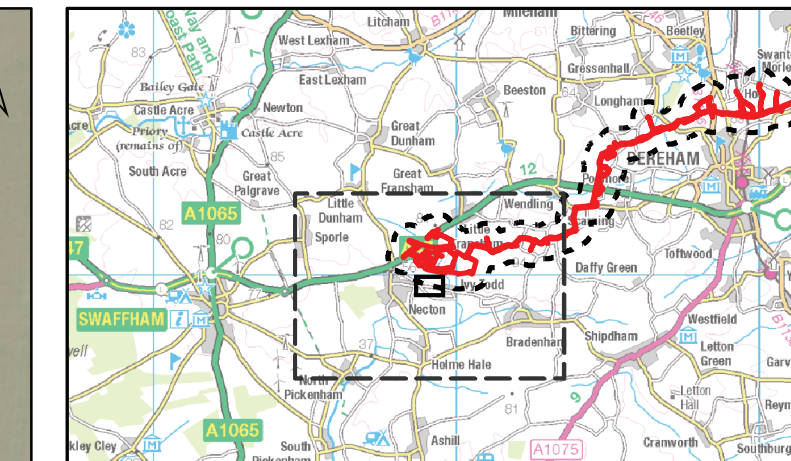


Viewpoint Location Plan Baseline Panorama (90 Degree View)  
Scale: 1:25,000



Viewpoint Location Plan (53.5 Degree View)  
Scale: 1:2,500

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



- Legend:
- Norfolk Boreas onshore red line boundary
  - Study area 500m
  - Onshore project substation**
  - Onshore project substation
  - Norfolk Vanguard**
  - Norfolk Vanguard onshore project substation
  - Norfolk Vanguard National Grid substation extension
  - National Grid**
  - National Grid substation extension
  - National Grid new / replacement overhead line tower
  - Existing substation locations**
  - Dudgeon substation
  - Necton National Grid substation
  - Viewpoint**
  - ▲ 90 degree field of view viewpoint
  - ▼ 53.5 degree field of view viewpoint

Project:	Report:
Norfolk Boreas	Environmental Statement

Title:	Scenario 1 Viewpoint 1: Ivy Todd Road West
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Figure: 29.23a	Drawing No: PB5640-006-029-023				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	14/02/2019	LA	JP	A3	Multiple
02	21/02/2019	LA	JP	A3	Multiple

Co-ordinate system: British National Grid EPSG: 27700

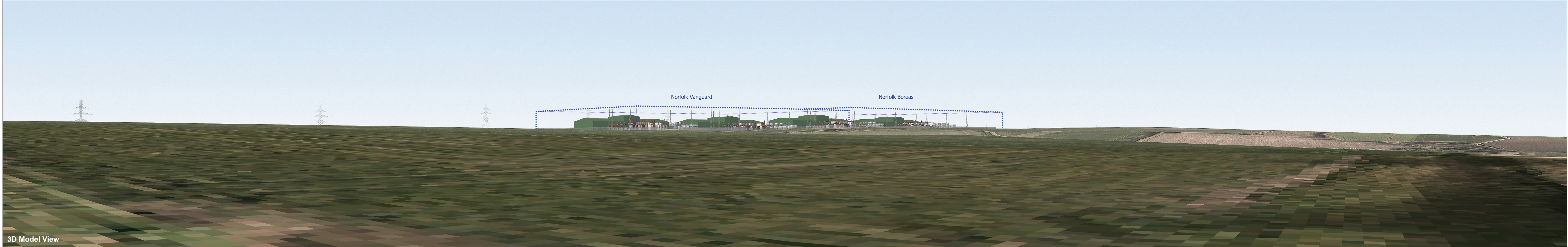






Baseline photograph

This image provides landscape and visual context only



3D Model View

<b>OS reference:</b> 589120 E 309633 N	<b>Horizontal field of view:</b> 90° (cylindrical projection)	<b>Camera:</b> Canon EOS 5D Mark II
<b>Eye level:</b> 60.5 m AOD	<b>Principal viewing distance:</b> 522 mm	<b>Lens:</b> 50mm (Canon EF 50mm f/1.4)
<b>Direction of view:</b> 57°		<b>Camera height:</b> 1.5 m AGL
<b>Nearest substation:</b> 1.04 km		<b>Date and time:</b> 25/01/2018, 12:22:35





Photomontage of the proposed Norfolk Boreas and Norfolk Vanguard HVDC Substations

View flat at a comfortable arm's length

<b>OS reference:</b>	589120 E 309633 N	<b>Horizontal field of view:</b>	53.5° (planar projection)	<b>Camera:</b>	Canon EOS 5D Mark II
<b>Eye level:</b>	60.5 m AOD	<b>Principal viewing distance:</b>	812.5 mm	<b>Lens:</b>	50mm (Canon EF 50mm f/1.4)
<b>Direction of view:</b>	57°	<b>Paper size:</b>	841 x 297 mm (half A1)	<b>Camera height:</b>	1.5 m AGL
<b>Nearest substation:</b>	1.04 km	<b>Correct printed image size:</b>	820 x 260 mm	<b>Date and time:</b>	25/01/2018, 12:22:35





Photomontage of the proposed Norfolk Boreas and Norfolk Vanguard HVDC Substations with mitigation planting (15 years growth)

View flat at a comfortable arm's length

<b>OS reference:</b>	589120 E 309633 N	<b>Horizontal field of view:</b>	53.5° (planar projection)	<b>Camera:</b>	Canon EOS 5D Mark II
<b>Eye level:</b>	60.5 m AOD	<b>Principal viewing distance:</b>	812.5 mm	<b>Lens:</b>	50mm (Canon EF 50mm f/1.4)
<b>Direction of view:</b>	57°	<b>Paper size:</b>	841 x 297 mm (half A1)	<b>Camera height:</b>	1.5 m AGL
<b>Nearest substation:</b>	1.04 km	<b>Correct printed image size:</b>	820 x 260 mm	<b>Date and time:</b>	25/01/2018, 12:22:35

**SCENARIO 1**  
**Figure: 29.23d**  
**Viewpoint 1: Ivy Todd Road West**