

East Anglia ONE North Offshore Windfarm

Appendix 4.1

**Red/Amber/Green (RAG) Assessment
for Onshore Substations Site Selection
in the Sizewell Area**

Preliminary Environmental Information

Volume 3

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Scottish Power Renewables & National Grid Onshore Substations

Red / Amber / Green (RAG) Assessment for onshore
substations site selection in the Sizewell area

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1 Introduction

1. ScottishPower Renewables (SPR) is intending to develop the proposed East Anglia ONE North and proposed East Anglia TWO offshore windfarms (EA1N and EA2, “the Projects”) and associated electricity transmission assets. Current proposals are for the Projects to connect at onshore substations in the vicinity of Sizewell and Leiston, Suffolk, in line with the revised grid connection location (previously at Bramford, Suffolk).
2. The onshore element comprises all infrastructure landward of the Mean High Water Mark (MHW) including the onshore joint transition bays (two per project), buried cable systems, two onshore substations, and one National Grid onshore substation. The SPR onshore substations will connect into the National Grid substation, to be consented as part of the proposed East Anglia TWO project.
3. The site selection process is intended to be undertaken in three phases. This site selection RAG assessment represents the first phase of these three phases. The three phases of the site selection process are as follows:
 - **Phase 1:** definition of the onshore study area
 - **Phase 2:** identification of preferred zone(s) for substation sites
 - **Phase 3:** identification of preferred sites for substation location (within preferred zone(s))
 - **Phase 4:** identification of preferred cable route

1.1 Purpose of this report

4. This report describes the site selection work associated with identifying a preferred zone(s), for potential onshore substations and National Grid infrastructure, within a defined ‘Onshore study area’, and provides recommendations for further work for the micrositing of the onshore infrastructure within that zone.
5. This report does not consider the process of the onshore cable corridor routeing – this will be captured in a subsequent cable routeing optioneering exercise. Similarly, this report does not consider the site selection work undertaken to define the onshore transition bay (landfall) – this is captured in the Wardell Armstrong Landfall Location Options Review.
6. Other elements of the site selection process, such as the selection of construction accesses and further refinements to the design as a result of the Environmental Impact Assessment process are not captured within this report.

2 Data Sources

7. Targeted data collection and consultation will be required to be undertaken throughout this site selection process following identification of a preferred zone, to progress micrositing of the SPR onshore substations and the NG substation. Surveys and targeted consultation will be undertaken as part of the Scoping and Preliminary Environmental Information Report processes to inform the site selection work.

3 SPR Onshore Substations Site Selection

3.1 Introduction

8. This section describes the site selection process undertaken to identify a potential location for the onshore substations within the onshore study area.
9. A review of planning policy guidance was undertaken as part of the Sizewell Site Selection Strategy when defining the Onshore study area. This guidance has further informed site selection and the Red-Amber-Green (RAG) assessment.
10. The Connection and Infrastructure Options Note (CION) Process is the mechanism used by National Grid to evaluate the potential transmission options required. This leads to the identification and development of the most efficient, coordinated and economical connection point in line with National Grid's legal obligation to develop and maintain an efficient, coordinated and economical system of electricity transmission. An important element of this assessment is the cost that will be passed on to electricity consumers (the public and businesses) as a result of the works which will be required to ensure a network connection that can accommodate the project. As part of the economic assessment, the CION considers the total life cost of the connection – assessing both the capital and projected operational costs to the onshore network (over a project's lifetime) to determine the most economic and efficient design option.
11. In addition to the considerations placed upon the project by the CION Process, the National Policy Statement for Energy (NPS-EN1) states that: *“applicants are obliged to include in the Environmental Statement, as a matter of fact, information about the main alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into the account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility... alternative proposals which mean the necessary development could not proceed, for example because the alternative proposals are not commercially viable or alternative proposals for sites would not be physically suitable, can be excluded on the grounds that they are not important and relevant to the [Secretary of State's] decision”*.
12. Similarly, National Grid's guidelines on siting and design (the Horlock rules) state that: *“consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects”*.
13. Furthermore, The Electricity Act, 1989 (EA89) states that: *“it shall be the duty of a licence authorising him to transmit electricity to develop and maintain an efficient, co-ordinated and economical system of electricity distribution; and to facilitate competition in the supply and generation of electricity.”* The same is applicable to the holder of a licence authorising them to transmit electricity. This includes Offshore Transmission Operators (OFTO) who will take over SPR's electrical connection after it is constructed.

14. Considering the requirements of the CION Process, NPS-EN1, the Horlock Rules and EA89, the study area was required to prepare an economic and efficient solution for the onshore substation site selection, that considered the environmental, amenity, cultural, local context, land use and site planning constraints, resulting in the following aims:
- Onshore substations as close to the existing National Grid overhead lines as possible
 - Onshore SPR and National Grid substations as close as possible to each other to meet an efficient and economic system (co-location)
15. Within these aims, the CION Process, NPS-EN1, the Horlock Rules (see **Appendix A**) and EA89, as well as SPR project team decisions, identified a number of objectives that set a framework of site selection principles which this site selection process will adhere to:
- The cable corridor / route (and therefore consideration of substation & landfall siting) should be kept as straight and as short as practicable – in line with the Electricity Act and National Policy Statements
 - Avoid direct significant impacts to internationally and nationally designated areas (SACs, SPAs, SSSIs, etc.)
 - Minimise significant impacts to the special qualities of the AONB
 - Avoid mature woodland
 - All other environmental constraints are to be considered on a case-by-case basis (with consideration of appropriate mitigation)
 - Avoid residential titles (including whole garden) where possible
 - Minimise physical interaction with land and assets owned by EDF (following engagement with EDF)
 - Minimise disruption to landowners, services, road users and residents during construction
 - Minimise the number and length of HDDs
 - Minimise the number of crossings of assets (OFTO and utilities) (assessed on a case-by-case basis)
16. To meet the above criteria, the Sizewell Initial Constraints Reporting proposed an initial search area comprising a buffer of 500m either side of the overhead line route into Sizewell. Selection of 500m was considered sufficient to co-locate two onshore substations (190m footprint x 2 – see **Section 3.3** for 'Technical considerations'). A project decision was made that the search area should not preclude looking further than immediately adjacent to the overhead lines, and consequently the search area was expanded to a 1km buffer either side of the overhead line route into Sizewell. This was to ensure that any potential options, at a less economic and efficient distance from the overhead line, would still be captured and considered in the event that optimal solutions within 500m did not arise in a particular area.
17. The onshore study area was extended westward following consultation with Suffolk County Council (July, 2017) to look further west by potentially crossing Aldeburgh Road. This area was previously excluded due to the potential interaction with residential titles. A project decision was made to extend the onshore study area to capture the tension pylon north of Grove Wood, doubling the westward extent of the onshore study area in

proximity to the overhead lines. This land use similarity indicated that a step-change in the acceptability and availability of potential sites would be unlikely to occur with an arbitrary expansion of the search area. However, it was acknowledged that the search area should be large enough to ensure that a robust variety of alternative sites were identified and considered. Whilst it was identified that Aldeburgh Road would potentially act as a significant constraint, and that extension westwards would be counter to the achievement of economy and efficiency, the onshore study area was proposed for extension. The reason for extending as far as the Grove Wood tension pylon is that this more substantial pylon may not require such extensive modification to facilitate SPR's connection as other 'straight-through' pylons to the east. It was considered that inclusion of areas extending as far of this pylon would allow a comprehensive assessment of the relative impacts of substation connections immediately to the east, where other benefits might be outweighed by lesser modification of the main existing pylons.

18. Review of the initial search area (1km buffer of the overhead lines) considered land use, environmental constraints and existing residential areas. Land use throughout this area is broadly similar, with large scale arable fields separated by scattered properties and small settlements.
19. This buffer defined in the process above was then modified to suit field boundaries. This exercise was a desk-based GIS analysis supported by validated shapefiles and layers providing the boundary for the onshore study area. The following areas were then excluded (in terms of possibly locating onshore substations):
 - Residential properties & titles (gardens);
 - International and national nature conservation designation sites (Special Protected Area and Site of Special Scientific Interest); and
 - Any areas listed as Flood Zone 3.
20. The final onshore study area is shown in **Figure 3.1** where a review of zones for suitable areas for the onshore substations was undertaken.
21. Consultation with Suffolk County Council in July 2017 also indicated that an appropriate buffer should be applied to residential properties with respect to the potential for noise impacts. A target conservative buffer of 250m was agreed by the project team and applied within initial site selection. The buffer of 250m is deemed conservative at this stage as the substations are committed to reducing all potential operational noise impacts to below limits that are audible due to embedded mitigation (harmonic filters). The onshore study area was subdivided into zones based on available space for two onshore substations, whilst minimising interaction with the 250m buffer on residential properties.
22. Site visits of those identified zones were conducted in July and August 2017 by RHDHV and OPEN (landscape consultants). These visits were primarily to provide an understanding of the baseline landscape character and to check the capacity for the landscape in these areas to accommodate potential onshore substation locations. For the purposes of the RAG assessment, two substations have been assumed to be co-located within each of these zones. The pairs of onshore substations, to seek co-location, are shown on **Figure 3.2**, creating a total of sixteen potential onshore

substation locations for RAG assessment. These locations have been arrived at by considering each zone, identifying the optimum location within the zone, and then identifying a second location (suffix (a)), that could be used for a co-located substation.

3.2 Methodology

23. A Red / Amber / Green (RAG) methodology has been used to inform site selection. This is considered appropriate to compare a number of sites for similar infrastructure, given the ability to capture and classify the main differentiating issues in 3 fundamental categories. A RAG assessment of this type enables a clear and direct comparison between each site.
24. Development considerations captured within the RAG assessment include archaeology / heritage, ecology, landscape, hydrology and hydrogeology, engineering, community, landscape and visual, property and planning. These were assessed by a team of specialists comprising engineers, Environmental Impact Assessment (EIA) consultants, landscape, archaeology and ecological experts throughout the site selection process. This was undertaken using the RAG system which ranks the influence of the consideration on future development, either using defined parameters, professional judgement, or assessing the issue relative to the other potential options.
25. These development considerations were presented to the Site Selection Expert Topic Group (ETG) comprising of Suffolk County Council, Suffolk Coastal and Waveney District Council, Natural England, Historic England, the Environment Agency and the Suffolk Coast and Heaths AONB. Development considerations were agreed through an iterative process of discussion and review resulting in those presented in **Appendix B**.
26. RAG is a standard assessment tool used in the pre-EIA process to assess the potential risks to proposed development options.
27. Each development consideration is given a score of Red / Amber / Green. These scores indicate the adverse or positive attributes to development respectively. The specific definition of each Red / Amber / Green category is appended in **Appendix B**. Each scoring criteria was presented, reviewed and agreed with the Site Selection ETG. It should be noted that if a site is awarded a Red score, this will not necessarily prevent an option being taken forward as preferred into the next stage if, overall, it performs better than others.
28. The surveys and desk-based investigations undertaken to date and the performance of the options relative to one another, along with professional judgement, have influenced the criteria of the Red / Amber / Green as well as the scores given. Information about the considerations is provided within the individual cells of the RAG assessment tables.
29. The method presents all the identified development considerations equally, i.e. there is no weighting of different development considerations relative to each other. Whilst any weighting is not incorporated in the RAG assessment findings, professional judgement, specific guidance and feedback through the consultation process is taken into consideration to inform decisions.

3.3 Technical considerations

30. The design, layout and final location of the potential onshore substations and associated infrastructure is subject to ongoing assessment and will be dependent on land availability, environmental and technical constraints, landowner negotiations and consultation with stakeholders. Information on the likely design parameters and space requirements that have been used in this site selection process include:

- A footprint of up to 3.61 hectares (ha) for the electrical apparatus required for each substation – in an optimised footprint shape of 190x190m.
- Structures will be up to 18m tall.
- Each substation will require land for temporary construction works (e.g. laydown areas, construction compound and access track)

31. An indicative example of a typical HVAC plan for an 800MW substation is shown on **Plate 3.1**.

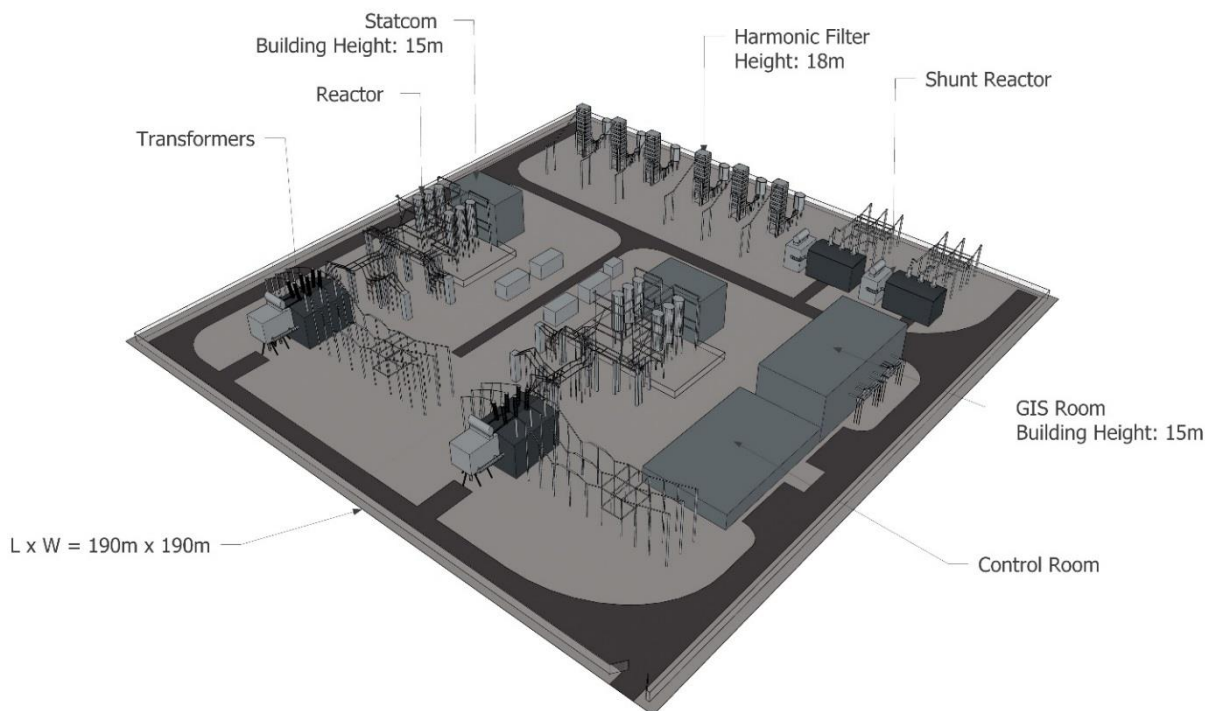


Plate 3.1: HVAC 190x190m substation model for 800MW

3.4 Assessment

32. Feedback from the previous East Anglia ONE and East Anglia THREE developments indicated that onshore substations for different projects, accessing the same national grid connection point, should preferably be located together. However, a process was undertaken to identify a preferred location in which to locate a single onshore substation so that all potential onshore substation locations could be assessed individually under the RAG scoring system. The development considerations were:

- Archaeology;
- Ecology and nature conservation;
- Landscape and visual;
- Hydrogeology and flood risk;
- Engineering and design;
- Community;
- Property; and
- Planning

33. The RAG assessment has been undertaken for each of the onshore substation site options individually (1, 1a, 2, 2a, 3, 3a, 4, 4a, 5, 5a, 6, 6a, 7, 7a, 8 and 8a). Criteria selected for the RAG assessment are based on criteria for judging landscape capacity and sensitivity, for example proximity to valued landscapes, landscape character susceptibility, visual sensitivity/presence of visual receptors and opportunities to utilise existing features (such as woodlands) for screening and mitigation. Each criterion is given a score of Red / Amber / Green, indicating the relative scale of adverse or beneficial attributes to siting development, of the nature proposed, in each location. RAG assessment scores are based on professional judgement, desk study and a field survey visit to each site location.
34. The methodology for undertaking the RAG assessment is summarised in **Section 3.2** with further detail contained within **Appendix B**. A summary of the RAG assessment's findings is presented in **Table 3.1** with further descriptions provided in **Appendix C**. Constraints identified at each potential onshore substation location are also presented on **Figure 3.3 to Figure 3.10**.

Substation Option (from east to west)	4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)
Archaeology																
Proximity to National Designations – SMs, Grade 1 Listed Buildings	<500m but screened by woodland	<500m but screened by woodland							<500m but screened by woodland	<500m of Listed Building	<500m but screened by woodland	<500m but screened by woodland	<500m but screened by woodland	<500m but screened by woodland		
Proximity to Regional Designations – Local Historic Environment Records, grade II Listed Buildings	<500m but screened by woodland	<500m but screened by woodland	<500m of HER monument	<500m of HER monument		<500m of HER monument		<500m but screened by woodland	<500m but screened by woodland	<500m of HER record	<500m of HER record	<500m of HER record	<500m of HER monument	<500m of HER monument	<500m of HER monument	<500m of HER monument
Ecology																
Proximity to National Designations – SSSI / SPA	<500m to SPA / SSSI	<500m to SPA / SSSI			<500m to SPA / SSSI	<500m to SPA / SSSI	<500m to SPA / SSSI	<500m to SPA / SSSI							<500m to SPA / SSSI	<500m to SPA / SSSI
Proximity to Local Designations – Local Nature Reserves (LNR) / Suffolk County Wildlife Site															<500m to Sizewell Belts Nature Reserve	<500m to Sizewell Belts Nature Reserve
Proximity to mature woodland	<500m to mature woodland	<500m to mature woodland	<500m to mature woodland	<500m to mature woodland	<500m to mature woodland	<500m to mature woodland	<500m to mature woodland	<500m to mature woodland	Cable route requires removal of mature woodland	Cable route requires removal of mature woodland	Cable route requires removal of mature woodland	Cable route requires removal of mature woodland	Cable route requires removal of mature woodland	Cable route requires removal of mature woodland	<500m to mature woodland	<500m to mature woodland
Landscape – see Appendix C Table C.1 for explanation of RAG scoring																
Potential to affect the special qualities of the AONB																
Proximity to Special Landscape Areas (SLA)																
Landscape character and sensitivity to development																
Opportunity to utilise existing features for screening																
Visual sensitivity to development																
Hydrology / hydrogeology																
Proximity to licenced abstraction points				<50m to abstraction												
Presence of potentially contaminated land																
Source Protection Zone									Within SPZ2	Within SPZ2	Within SPZ2	Within SPZ2	Within SPZ2	Within SPZ2		
Proximity to fluvial flood risk		<500m to FZ3									<500m to FZ3	<500m to FZ3	<500m to FZ3	<50m to FZ3	<500m to FZ3	<500m to FZ3
Engineering																
Site efficiency					Limited co-location potential	Limited co-location potential							Limited co-location potential	Limited co-location potential		

Substation Option (from east to west)	4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)
Highway access (construction and operational)	Access via Aldringham	Access via Aldringham	Access via Aldringham	Access via Aldringham	Access via Aldringham	Access via Aldringham	Access via Sizewell Gap Road	Access via Sizewell Gap Road							Access via Sizewell Gap Road	Access via Sizewell Gap Road
Proximity to high voltage electrical transmission infrastructure (overhead lines)	>500m to OHL				>1km to OHL	>1km to OHL	>500m to OHL				>500m to OHL		>500m to OHL			
Community																
Presence of residential properties	Properties <250m but screened by woodland		Properties within 50m	Properties within 50m	Properties <250m but screened by woodland		Properties within 250m	Properties within 50m	Properties <250m but screened by woodland			Properties <250m but screened by woodland		Properties within 250m		
PRoW / National trails (NT)			Public bridleway <100m	Public bridleway <100m	Public footpath <100m			Public bridleway <100m		Crosses public footpath	Public footpath <100m	Public footpath <100m				Crosses public footpath
Agricultural Land Classification	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3		ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	
Sensitive land uses (schools and hospitals)				School <250m												
Property																
Number of landowners															Proposed Sizewell C reptile mitigation land	Proposed Sizewell C reptile mitigation land
Planning																
Current planning applications or knowledge of other developments																
SCORE	1 red 9 yellow 13 green	1 red 9 yellow 13 green	1 red 10 yellow 12 green	2 red 11 yellow 10 green	4 red 6 yellow 13 green	4 red 6 yellow 13 green	4 red 5 yellow 14 green	5 red 5 yellow 13 green	1 red 2 yellow 20 green	1 red 5 yellow 17 green	1 red 8 yellow 14 green	1 red 7 yellow 15 green	1 red 8 yellow 14 green	2 red 8 yellow 13 green	1 red 9 yellow 13 green	1 red 9 yellow 13 green
ZONE SCORE	2 red 18 amber 26 green		3 red 21 amber 22 green		8 red 12 amber 26 green		9 red 10 amber 27 green		2 red 7 amber 37 green		2 red 15 amber 29 green		3 red 16 amber 27 green		2 red 18 amber 26 green	

Table 3.1: RAG assessment table of development considerations for the fourteen potential onshore substation locations

*Note: Consultation with Suffolk Wildlife Trust identified that Grove Wood woodland should be identified as a Local Wildlife Site. This would result in an additional Amber score for 7 and 7a as these two sites would be within 500m. This would result in a zone score of 2 red, 9 amber and 35 green for Zone 7. This is not reflected in the table as this consultation response was received post-publication. This update does not alter the conclusions of this document or the site selection process.

4 National Grid Substation Site Selection

4.1 Introduction

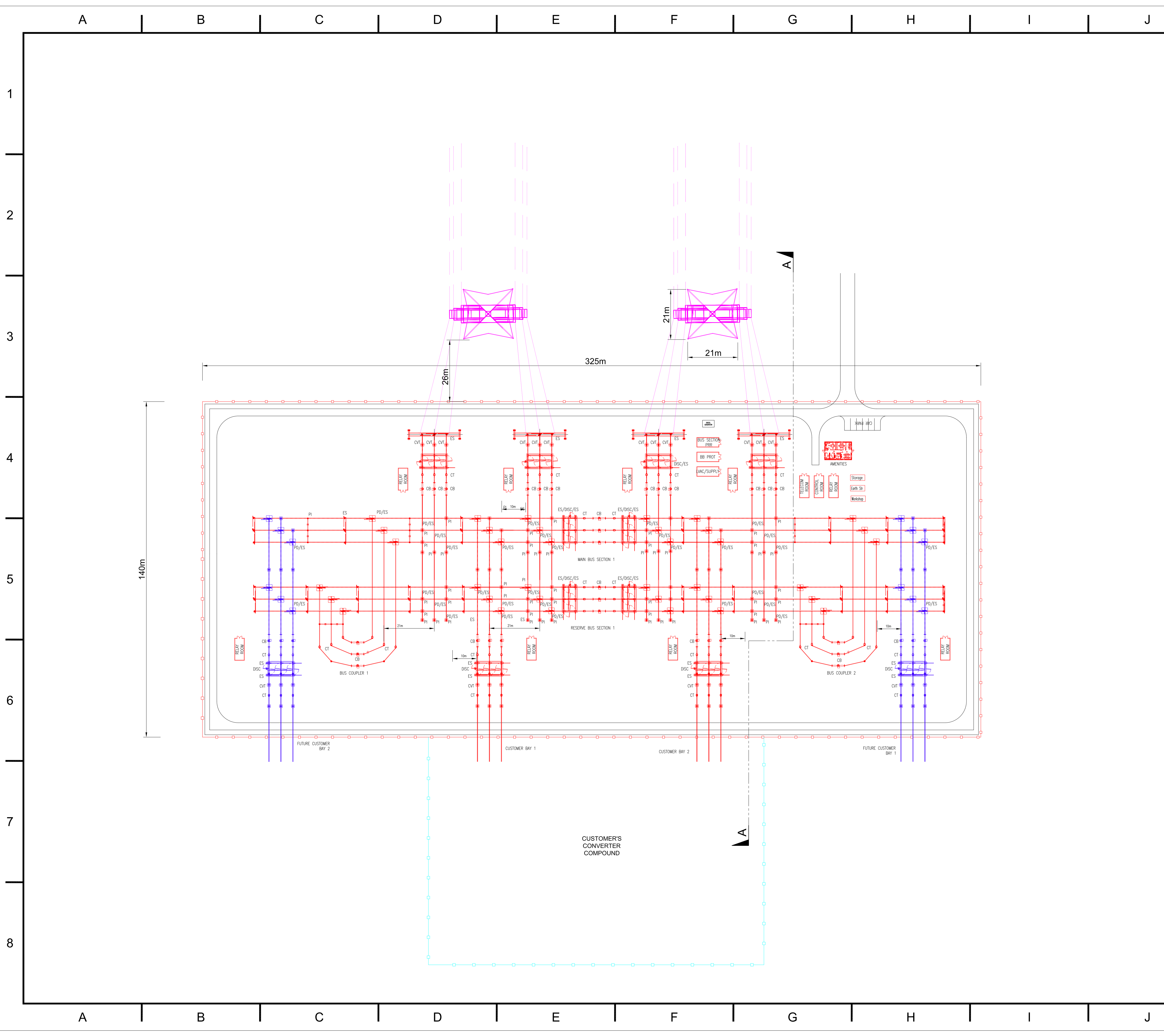
35. This section describes the site selection process undertaken to identify a potential location for the National Grid (NG) substation within the onshore study area. SPR's decision to include the National Grid infrastructure asset, so that all works associated with the offshore wind farm are consented within the same application for development consent, requires its location to be similarly considered through a robust site selection process and included in this RAG assessment.
36. The onshore study area for the NG substation is the same as for the SPR onshore substation – as shown in **Figure 3.1**.
37. For the purposes of the RAG assessment, the NG substation has been co-located within each of the previously identified zones within the onshore study area where possible. Four potential locations were identified which respond to the legislative requirement to identify economic and efficient locations:
- NG substation as close to the existing overhead lines as possible; and
 - NG substation as close as possible to the other onshore substation assets to provide an efficient and economic system (co-location).
38. Two co-located options for the NG substation (outside of the exclusion areas of residential properties & titles, nature conservation designation sites, Flood Zone 3 and 250m buffer from residential properties) were deemed to be too far from the existing overhead lines to be efficiently co-located with the SPR onshore substation locations. However, these options were included under the assumption that underground cable routing with a sealing end compound could be installed as a potential infrastructure option to facilitate the connection.
39. The RAG assessment has been undertaken for each of the National Grid substation option individually (NG1, NG2, NG4, NG5, NG6, NG7 and NG8). Criteria selected for the RAG assessment are based on criteria for judging landscape capacity and sensitivity, including proximity to valued landscapes, landscape character susceptibility, visual sensitivity/presence of visual receptors and opportunities to utilise existing features (such as woodlands) for screening and mitigation. Each criterion is given a score of Red / Amber / Green, indicating the relative scale of adverse or beneficial attributes to siting development, of the nature proposed, in this location. RAG assessment scores are based on professional judgement, desk study and a field survey visit to each site location.
40. The seven potential locations for the NG substation are shown on **Figure 4.1**.

4.2 Methodology

41. The methodology follows the RAG assessment methodology presented in **Section 3.2**.

4.3 Technical considerations

42. The design assumptions made for site selection of the NG substation were obtained through consultation with National Grid in August 2017.
43. The design, layout and final location of the potential NG substation and associated infrastructure is subject to ongoing assessment and will be dependent on land availability, environmental and technical constraints, landowner negotiations and consultation with stakeholders. Information on the likely design parameters and space requirements that have been used in this site selection process include:
- A footprint of up to 4.55 ha for the electrical apparatus required (based on an Air Insulated Switchgear (AIS) substation with an optimised footprint of 140x325m).
 - Outdoor equipment approximately 13m in height.
 - Gantry footprints are known but these requirements are not necessary in this process due to the requirement to locate adjacent to existing infrastructure (overhead power lines)
 - Each substation will require land for temporary construction works (e.g. laydown areas, construction compound and access track)
44. An indicative example of a 400kV substation layout is shown in **Plate 4.1**, with a cross-section shown in **Plate 4.2**.



NOTES

1. This drawing is for development purposes only
2. Generator connection is assumed to be at 400kV. For a different connection voltage, transformers will be required, increasing site footprint.
3. Size of customer's converter station TBC - assumed size from Dudgeon converter station
4. Generator connection is assumed via AIS busbar (alternative option to use HV cable).
5. Layout based on double busbar AIS with live tank circuit breakers.
6. Size and location of new towers are indicative and to be confirmed pending overhead line design.

LEGEND

- New HV plant
- OHL equipment
- Future equipment
- National Grid Compound fence
- Customer's compound fence

DRAFT

00 Issued for Information	IW	SA	DC	24/08/17
Rev Description	Cr'd	Ch'd	App'd	Date

nationalgrid

Master Scheme No: - Sub-Scheme No: N/A Site: LEISTON 400kV SUBSTATION
 Scheme Name: LEISTON 400kV SUBSTATION

Document Title: LEISTON 400kV SUBSTATION SUBSTATION LAYOUT

Created by: IW	Date: 24/08/2017	Checked by: SA	Date: 24/08/2017	Approved by: DC	Date: 24/08/2017
Development Eng:	Document Type: DRAWING	Scale: 1:750	Format: A1	Sheet(s): 1	Rev: 00

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A B C D E F G H I J K L

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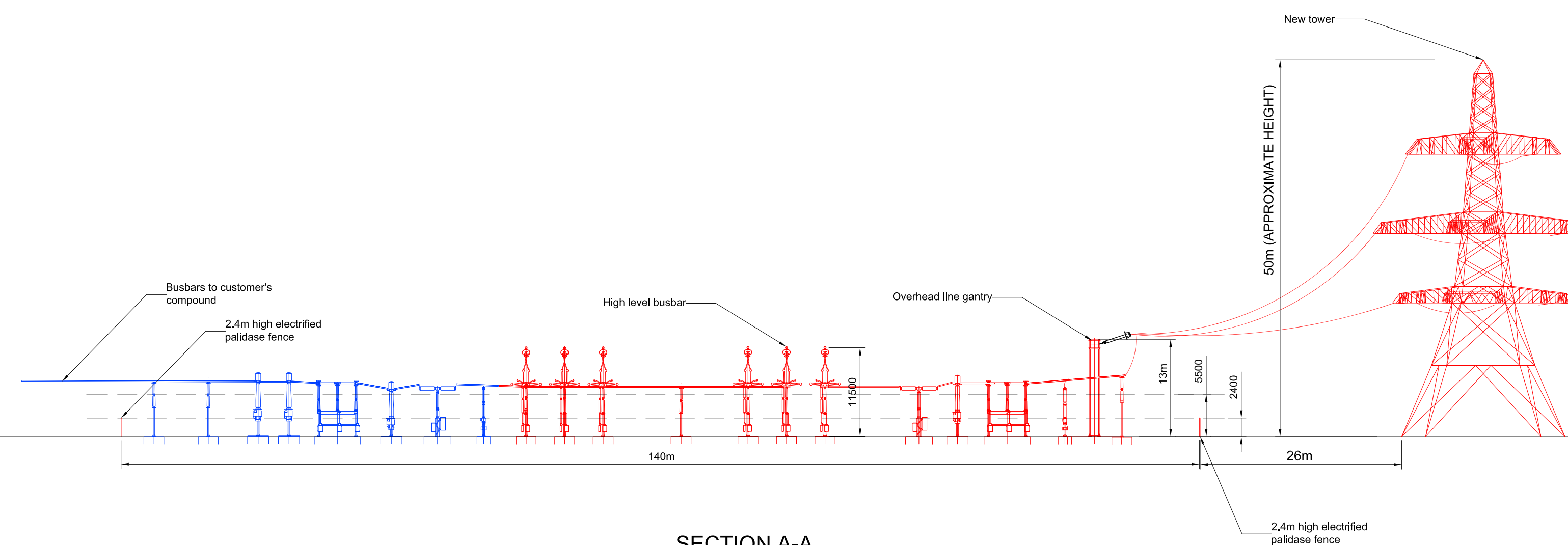
8

NOTES

1. This drawing is for development purposes only
2. All dimensions are in millimeters, unless otherwise stated.
3. Size and location of new towers are indicative and to be confirmed pending overhead line design.

LEGEND

- New equipment (National Grid)
- New equipment (customer)



SECTION A-A

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00	ISSUED FOR INFORMATION	MS	IW	DC	23.08.2017
Rev	Description	Cre'd	Chk'd	App'd	Date

nationalgrid

Master Scheme No: Sub-Scheme No: Site: LEISTON 400KV SUBSTATION
 Scheme Name: LEISTON SUBSTATION

Document Title: LEISTON 400KV SUBSTATION
 TYPICAL SUBSTATION ELEVATION

Created by: MS	Date: 23.08.2017	Checked by: IW	Date: 23.08.2017	Approved by: DC	Date: 23.08.2017
Development Eng: DWG	Document Type: DWG	Scale: 1:500	Format: A1	Sheet(s): 1 of 1	Rev: 00

National Grid Drawing Number:
 Originator Drawing Number:

A B C D E F G H I J K L

4.4 Assessment

45. Using the criteria presented in **Appendix B**, a RAG assessment was undertaken for four NG substation location options. A summary of the RAG assessment is presented in **Table 4.1**, with additional information provided in **Appendix D**.
46. The following development considerations were assessed:
- Archaeology;
 - Ecology and nature conservation;
 - Landscape and visual;
 - Hydrogeology and flood risk;
 - Engineering and design;
 - Community;
 - Property; and
 - Planning
47. NG1 and NG5 were deemed to be too far from the existing overhead lines to be efficiently co-located with the SPR onshore substation locations. However, these options were included under the assumption that underground cable routeing with a cable sealing end could be installed as a potential infrastructure option to facilitate the connection following further information obtained from National Grid. There was not enough land availability adjacent to 3 and 3a to include an NG3 National Grid substation option so there is no National Grid substation associated with Zone 3.
48. Constraints identified at each potential NG AIS substation location are also presented on **Figure 4.2 to Figure 4.5**

National Grid Substation Options (by relevant Zone)	NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Archaeology							
Proximity to National Designations – SMs, Grade 1 Listed Buildings)		<500m to Heritage Coast		<500m to Listed Buildings	<500m but screened by woodland	<500m but screened by woodland	
Proximity to Regional Designations – Local Historic Environment Records, grade II Listed Buildings	<500m to HER monument	<500m to HER monument	<500m to HER monument	<500m to HER monument	<500m to HER monument	<500m to HER monument	<500m of HER monument
Ecology							
Proximity to National Designations – SSSI / SPA	>500m to SSSI / SPA	>500m to SSSI / SPA	>500m to SSSI / SPA				<500m to SPA / SSSI
Proximity to Local Designations – Local Nature Reserves (LNR) / Suffolk County Wildlife Site							<500m to Sizewell Belts Nature Reserve
Proximity to mature woodland / Environmental Stewardship scheme	<500m to mature woodland	<500m to mature woodland	<500m to mature woodland	Cable route requires removal of mature woodland	Cable route requires removal of mature woodland	Cable route requires removal of mature woodland	<500m to mature woodland
Landscape – see Appendix D for explanation of RAG scoring							
Potential to affect the special qualities of the AONB							
Proximity to Special Landscape Areas (SLA)							
Landscape character and sensitivity to development							
Opportunity to utilise existing features for screening							
Visual sensitivity to development							
Hydrology / hydrogeology							
Proximity to licenced abstraction points							
Presence of potentially contaminated land							
Source Protection Zone					Within SPZ2	Within SPZ2	
Proximity to fluvial flood risk					<500m to FZ3	<500m to FZ3	<500m to FZ3
Engineering							

National Grid Substation Options (by relevant Zone)	NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Highway access (construction and operational)	Access via Aldringham	Access via Sizewell Gap Road	Access via Aldringham				Access via Sizewell Gap Road
Proximity to high voltage electrical transmission infrastructure (overhead lines)			Requirement for sealing end compound + >1km cable			Requirement for sealing end compound + >500m cable	
Community							
Presence of residential properties		Properties within 250m		Properties within 250m	Properties within 250m	Properties within 250m	
PRoW / National trails (NT)	Public footpath <100m	Public bridleway <100m	Public footpath <100m	Crosses public footpath	Crosses public footpath		
Agricultural Land Classification	ALC Zone 2 or 3		ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3	ALC Zone 2 or 3
Sensitive land uses (schools and hospitals)							
Property							
Number of landowners				2 or more landowners		2 or more landowners	
Planning							
Current planning applications or knowledge of other developments							Proposed Sizewell C reptile mitigation land
SCORE	1 red 9 amber 12 green	4 red 7 amber 11 green	4 red 7 amber 11 green	1 red 9 amber 12 green	3 red 6 amber 13 green	1 red 9 amber 12 green	1 red 8 amber 13 green

Table 4.1: RAG assessment table of development considerations for the seven potential NG AIS substation locations

*Note: Consultation with Suffolk Wildlife Trust identified that Grove Wood woodland should be identified as a Local Wildlife Site. This would result in an additional Amber score for NG7 as this site would be within 500m. This would result in a zone score of 1 red, 10 amber and 11 green for Zone 7. This is not reflected in the table as this consultation response was received post-publication. This update does not alter the conclusions of this document or the site selection process.

5 Conclusions and Recommendations

49. The preferred site(s) in which to locate one SPR onshore substation are **7** or **7a** which are shown in **Figure 3.4**. These options are also the preferred sites for co-location, giving a preference due to:
- Potential to screen visual impacts via setting within existing woodland
 - Outwith the AONB
50. Risks with this option include:
- Requirement to utilise the Aldeburgh Road woodland as a crossing point to cable route across the Aldeburgh Road – requiring removal of woodland
51. Other sites shown to be scoring well (fewer than three red scores) in the RAG assessment are **4**, **4a**, **6**, **6a** and **8** and **8a** (shown in **Figure 3.2**). It is recommended that further investigation of these sites is also included through the micro-siting exercise.
52. The preferred sites in which to locate one NG AIS substation are **NG4**, **NG7**, **NG5** and **NG8**, which are shown in **Figure 4.1**. It is recommended that those SPR substation sites that are identified as favourable to take forward for further investigation are also investigated for feasibility of siting the National Grid substation (Option E1, Option E1a, Option W2, Option W2a and Option EDF and Option EDFa).
53. This report does not provide a recommendation for preferred co-location of SPR substations and a NG substation as the issue of cumulative impact and capacity of the landscape to accommodate three substation sites of the size proposed is not considered in the RAG assessment – the relative merits of each site is assessed individually, to inform which areas to explore further as part of the site search. The RAG assessment does not consider the combined effect / suitability of co-locating three substation sites for EA1N, EA2 and NG AIS together in one location. This would require a different scoring/RAG assessment.
54. A more specific landscape capacity study will be undertaken during the next stage of the site search, in order to consider the cumulative impact and capacity of the landscape in the study area to accommodate the three substations. This capacity study will consider, for example, whether it is preferable / of less impact to locate the three sites together in a consolidated location, or if a more dispersed pattern is preferable, for example with the NG substation located separately from the EA1N / EA2 substations

Appendix A – Horlocks Rules

Table A.1 Horlock Rules (National Grid, 2006) used by national Grid for site selection exercises for substations

Overall systems Options and Site Selection	
1	In the development of system options including new substations, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum.
Amenity, Cultural or Scientific Values of Sites	
2	The siting of new NGC substations, sealing end compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections.
3	Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable.
Local Context, Land Use and Site Planning	
4	The siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum.
5	The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum.
6	The land use effects of the proposal should be considered when planning the siting of substations or extensions.
Design	
7	In the design of new substations or line entries, early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum.

8	Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation.
9	The design of access roads, perimeter fencing, earthshaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings.
Line Entries	
10	In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance.
11	The inter-relationship between towers and substation structures and background and foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal towers on prominent ridges should be minimised by siting towers against a background of trees rather than open skylines.

Appendix B – RAG Assessment Criteria

Table B.1: Definitions of RAG for development considerations – SPR onshore substations and NG AIS substation

Consideration	Criteria	Source / survey
Archaeology		
Proximity to National Designations (SMs, grade 1 Listed Buildings)	Amber = <500m Green = >500m (or <500m but screened)	MAGIC
Proximity to Regional Designations – Local Historic Environment Records, grade II Listed Buildings	Amber = <500m Green = >500m (or <500m but screened)	MAGIC
Ecology		
Proximity to National Designations – SSSI / SPA	Amber = <500m Green = >500m	MAGIC
Proximity to Local Designations – Local Nature Reserves (LNR) / Suffolk County Wildlife Site	Amber = <500m Green = >500m	MAGIC
Proximity to mature woodland	Red = Encroaching into woodland Amber = <500m Green = >500m	OPEN site selection desk based assessment / site visit
Landscape		
Potential to affect the special qualities of the AONB	Red = Higher potential identified Amber = Moderate Green = Lower	OPEN site selection desk based assessment / site visit
Proximity to Special Landscape Areas (SLA)	Amber = If present within the sector, local authority level policy applies Green = Absent	OPEN site selection desk based assessment / site visit
Landscape character and sensitivity to development	Red = Higher identified sensitivity Amber = Moderate Green = Lower	OPEN site selection desk based assessment / site visit
Opportunity to utilise existing features for screening	Amber = Reduced identified opportunity Green = Assessment identified opportunity	OPEN site selection desk based assessment / site visit
Visual sensitivity to development	Red = Higher identified sensitivity	OPEN site selection desk based assessment / site visit

Consideration	Criteria	Source / survey
	Amber = Moderate Green = Lower	
Hydrology / hydrogeology		
Proximity to licenced abstraction points	Red = <50m Amber = <100m Green = >100m	Environment Agency
Presence of potentially contaminated land	Amber = Present Green = Absent	Envirocheck
Source Protection Zone	Red = Sector falls within Inner zone Amber = Sector falls within the Outer zone Green = Outside all zones	Environment Agency
Proximity to fluvial flood risk	Red = <50m Amber = <500m Green = No flood risk	Environment Agency
Engineering		
Site efficiency	Amber = No identified ability to co-locate substation and NG asset Green = Option to co-locate	SPR engineering team
Highway access (construction and operational)	Red = Major constraints identified in regards to gaining access Amber = Minor constraints to gaining access Green = No constraints to access	OS 10k colour raster mapping
Proximity to high voltage electrical transmission infrastructure (overhead lines)	Red = >1km Amber = 500m – 1km Green = <500m	OS 10k colour raster mapping
Community		
Presence of residential properties	Red = Residential properties within 50m Amber = Properties located within close proximity (<250m) Green = No residential properties within 250m	OS 10k colour raster mapping
PRoW / National trails (NT)	Amber = PRoW / NT within close proximity of (<100m), or crossing site	ERoY database

Consideration	Criteria	Source / survey
	Green = No trails within 100m of site	
Agricultural Land Classification	Red = Grade 1 Amber = Grades 2 and 3 Green = Grades 4 and 5	Natural England
Sensitive land uses (schools and hospitals)	Red = Within 50m Amber = Within close proximity (<250m) Green = None present within 250m	EDUdatabase
Property		
Number of landowners	Amber = > 1 landowner at site Green = Site within one landownership	SPR land team
Planning		
Current planning applications or knowledge of other developments	Amber = Presence of other proposed developments which may affect siting Green = No proposed developments	SPR land team

Appendix C Descriptive text to support landscape RAG assessment for SPR substations

Table C.1 Descriptive text to support landscape RAG assessment presented in Table 3.1

Substation Option (from east to west)		4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)
Landscape																	
Criteria	Why this criteria?																
Proximity to the Suffolk Coast & Heaths AONB	AONB is an indicator of potential national landscape (scenic) value.	Just outside AONB (<500m)	Just outside AONB (<500m)	Just outside AONB (<500m)	Just outside AONB (<500m)	Within AONB	Within AONB	Within AONB	Within AONB	Outside AONB (2.8km)	Outside AONB (3 km)	Outside AONB (3.3km)	Outside AONB (3.1km)	Outside AONB (2.4km)	Outside AONB (2.4km)	Within AONB	Within AONB
Potential to affect the special qualities of the AONB	Special qualities of the AONB are the qualities against which landscape effects of development would be measured.	Potential to affect setting of characteristic/distinctive sandlings forests at Aldringham Common. Clear juxtaposition of substation with forests at the edge of AONB. Potential effect on visual interest in this pattern of land cover. Potential for development adjacent to forests to affect sense of enclosure and isolation that they create. Potential effects on	Potential to affect setting of characteristic/distinctive sandlings forests at Aldringham Common. Clear juxtaposition of substation with forests at the edge of AONB. Potential effect on visual interest in this pattern of land cover. Potential for development adjacent to forests to affect sense of enclosure and isolation that they create. Potential effects on	Limited perceived juxtaposition of site with forests/habitats in AONB, due to separation from the edge of AONB by overhead lines and woodland shelterbelt, between site and AONB boundary. Potential effects on network of local access routes (Aldringham Walks) through areas of Sandling heaths to the east within AONB, and access to semi-natural landscape	Limited perceived juxtaposition of site with forests/habitats in AONB, due to separation from the edge of AONB by overhead lines and woodland shelterbelt, between site and AONB boundary. Potential effects on network of local access routes (Aldringham Walks) through areas of Sandling heaths to the east within AONB, and access to semi-natural landscape	Likely significant effects on some special qualities of the AONB, within localised area. Including effects on - setting of characteristic sandlings heath and forests; potential visual effect on the interest of this landcover at Aldringham Walks/to north of Thorpene ss; potential effects on network of local and strategic access routes (including	Likely significant effects on some special qualities of the AONB, within localised area. Including effects on - setting of characteristic sandlings heath and forests; potential visual effect on the interest of this landcover at Aldringham Walks/to north of Thorpene ss; potential effects on network of local and strategic access routes (including	Likely significant effects on some special qualities of the AONB, within localised area. Including effects on - setting of characteristic sandlings heath and forests; potential visual effect on the interest of this landcover at Aldringham Walks/to north of Thorpene ss; potential effects on network of local and strategic access routes (including	Likely significant effects on some special qualities of the AONB, within localised area. Including effects on - setting of characteristic sandlings heath and forests; potential visual effect on the interest of this landcover at Aldringham Walks/to north of Thorpene ss; potential effects on network of local and strategic access routes (including	Special qualities of AONB unlikely to be affected	Special qualities of AONB unlikely to be affected	Special qualities of AONB unlikely to be affected	Special qualities of AONB unlikely to be affected	Special qualities of AONB unlikely to be affected	Special qualities of AONB unlikely to be affected	The local character of the AONB in this location is substantially influenced by energy infrastructure, including the adjacent Sizewell Power Station, Greater Gabbard and Galloper substations, and overhead electrical power lines, which traverse the edge of the site. These energy generation and transmission installations have a notable influence	The local character of the AONB in this location is substantially influenced by energy infrastructure, including the adjacent Sizewell Power Station, Greater Gabbard and Galloper substations, and overhead electrical power lines, which traverse the edge of the site. These energy generation and transmission installations have a notable influence

Substation Option (from east to west)	4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)	
Landscape																	
Criteria	Why this criteria?																
	network of local access routes through the forests and access to semi-natural landscape	network of local access routes through the forests and access to semi-natural landscape	in this area.	in this area.	Suffolk Coastal Path) and access to semi-natural landscape ; proximity to coast may result in effects on views of coastal landforms/ open sea views; proximity to Thorpe Ness, potential effects on sense of place of resort village, important in identity of AONB.	Suffolk Coastal Path) and access to semi-natural landscape ; proximity to coast may result in effects on views of coastal landforms/ open sea views; proximity to Thorpe Ness, potential effects on sense of place of resort village, important in identity of AONB.	Suffolk Coastal Path) and access to semi-natural landscape ; proximity to features with long established connection to landscape /community (Sizewell Hall).	Suffolk Coastal Path) and access to semi-natural landscape ; proximity to features with long established connection to landscape /community (Sizewell Hall).								on the perceived landscape and scenic quality of the AONB locally. The intrinsic landscape and scenic qualities that are characteristic of the wider AONB, and define its special qualities, have less influence in this area of the AONB. Development of the substations in this zone will likely result in significant effects on some of the special qualities of the AONB, as a result of increasing the influence large-scale electrical infrastructure, its prominence and	on the perceived landscape and scenic quality of the AONB locally. The intrinsic landscape and scenic qualities that are characteristic of the wider AONB, and define its special qualities, have less influence in this area of the AONB. Development of the substations in this zone will likely result in significant effects on some of the special qualities of the AONB, as a result of increasing the influence large-scale electrical infrastructure, its prominence and

Substation Option (from east to west)	4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)
Landscape																
Criteria	Why this criteria?															
Landscape character and sensitivity to development	<p>Within Estate Sandlands LCA - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Strongly rural landscape, so developments that could be accommodated in visual terms can still have a profound effect on the character. Probably the least sensitive of LCAs covering land within AONB (in comparison to coastal levels, fens and dunes etc.) due to agricultural/arable land use,</p>	<p>Within Estate Sandlands LCA - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Strongly rural landscape, so developments that could be accommodated in visual terms can still have a profound effect on the character. Probably the least sensitive of LCAs covering land within AONB (in comparison to coastal levels, fens and dunes etc.) due to agricultural/arable land use,</p>	<p>Within Estate Sandlands LCA - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Strongly rural landscape, so developments that could be accommodated in visual terms can still have a profound effect on the character. Existing character has been influenced, at this location, by presence of overhead lines traversing the edge of the site and Sizewell Power Station in the</p>	<p>Within Estate Sandlands LCA - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Distinctive mosaic of the Sandlings landscape (heaths/plantations) is more evident in parts of this LCA that are within the AONB. Strongly rural landscape, so developments that could be accommodated in visual terms can still have a profound effect on the character. Probably the least sensitive</p>	<p>Within Estate Sandlands LCA (within AONB) - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Distinctive mosaic of the Sandlings landscape (heaths/plantations) is more evident in parts of this LCA that are within the AONB. Strongly rural landscape, so developments that could be accommodated in visual terms can still have a profound effect on the character. Probably the least sensitive</p>	<p>Within Estate Sandlands LCA - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Distinctive mosaic of the Sandlings landscape (heaths/plantations) is more evident in parts of this LCA that are within the AONB. Strongly rural landscape, so developments that could be accommodated in visual terms can still have a profound effect on the character. Existing character has been influenced, at this</p>	<p>Within Estate Sandlands LCA - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Distinctive mosaic of the Sandlings landscape (heaths/plantations) is more evident in parts of this LCA that are within the AONB. Strongly rural landscape, so developments that could be accommodated in visual terms can still have a profound effect on the character. Existing character has been influenced, at this</p>	<p>Within Estate Sandlands LCA - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Distinctive mosaic of the Sandlings landscape (heaths/plantations) is more evident in parts of this LCA that are within the AONB. Strongly rural landscape, so developments that could be accommodated in visual terms can still have a profound effect on the character. Existing character has been influenced, at this</p>	<p>Within Estate Sandlands LCA - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Distinctive mosaic of the Sandlings landscape (heaths/plantations) is more evident in parts of this LCA that are within the AONB. Strongly rural landscape, so developments that could be accommodated in visual terms can still have a profound effect on the character. Existing character has been influenced, at this</p>	<p>Within Ancient Estate Claylands LCA - consisting gently rolling heavy clay plateaux with ancient woodlands and parklands, with a farmed enclosure pattern, estate influences and medium-large scale. Less distinctive/valued attributes in comparison to Estate Sandlands to the east. Character of LCA has been subject to change, partly due to relationship to the A12. Intrusion of suburbanisation and industrial agricultural buildings.</p>	<p>Within Ancient Estate Claylands LCA - consisting gently rolling heavy clay plateaux with ancient woodlands and parklands, with a farmed enclosure pattern, estate influences and medium-large scale. Less distinctive/valued attributes in comparison to Estate Sandlands to the east. Character of LCA has been subject to change, partly due to relationship to the A12. Intrusion of suburbanisation and industrial agricultural buildings.</p>	<p>Within Ancient Estate Claylands LCA - consisting gently rolling heavy clay plateaux with ancient woodlands and parklands, with a farmed enclosure pattern, estate influences and medium-large scale. Site and immediate surrounds have a distinctive local character; rectory woodlands, deciduous woods, avenues and poplar trees around Knodishall Church give distinct sense of place.</p>	<p>Within Ancient Estate Claylands LCA - consisting gently rolling heavy clay plateaux with ancient woodlands and parklands, with a farmed enclosure pattern, estate influences and medium-large scale. Site and immediate surrounds have a distinctive local character; rectory woodlands, deciduous woods, avenues and poplar trees around Knodishall Church give distinct sense of place.</p>	<p>Located within the Estate Sandlands LCA, which has medium-high susceptibility to changes resulting from the substations. This LCA is considered to have a slightly lower susceptibility to change arising from the substations (than the Ancient Estate Claylands LCA to the west), due to the 'degraded' character and influence of existing energy transmission/generation influences in the baseline (Sizewell Nuclear Power Station and</p>	<p>Located within the Estate Sandlands LCA, which has medium-high susceptibility to changes resulting from the substations. This LCA is considered to have a slightly lower susceptibility to change arising from the substations (than the Ancient Estate Claylands LCA to the west), due to the 'degraded' character and influence of existing energy transmission/generation influences in the baseline (Sizewell Nuclear Power Station and</p>	

Substation Option (from east to west)	4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)	
Landscape																	
Criteria	Why this criteria?																
	large scale, simple and regular land cover pattern and extensive tree cover.	large scale, simple and regular land cover pattern and extensive tree cover.	backdrop. Moderate sensitivity due to agricultural/arable land use, simple and regular land cover pattern and extensive tree cover.	backdrop. Moderate sensitivity due to agricultural/arable land use, simple and regular land cover pattern and extensive tree cover.	of LCAs covering land within AONB (in comparison to coastal levels, fens and dunes etc.) due to agricultural/arable land use, large scale, simple and regular land cover pattern and extensive tree cover, however site is located in coastal area of LCA, relatively close to dunes/cliffs LCA to east.	of LCAs covering land within AONB (in comparison to coastal levels, fens and dunes etc.) due to agricultural/arable land use, large scale, simple and regular land cover pattern and extensive tree cover, however site is located in coastal area of LCA, relatively close to dunes/cliffs LCA to east.	location, by presence of overhead lines traversing the edge of the site and Sizewell Power Station in the backdrop. Probably the least sensitive of LCAs covering land within AONB (in comparison to coastal levels, fens and dunes etc.) due to agricultural/arable land use, simple and regular land cover pattern and extensive tree cover.	location, by presence of overhead lines traversing the edge of the site and Sizewell Power Station in the backdrop. Probably the least sensitive of LCAs covering land within AONB (in comparison to coastal levels, fens and dunes etc.) due to agricultural/arable land use, simple and regular land cover pattern and extensive tree cover.	Grove Wood is an ancient woodland, high value/sensitivity to physical effect of development.	Grove Wood is an ancient woodland, high value/sensitivity to physical effect of development.					overhead lines). It does, however, have a relatively higher value, due to it being part of the nationally protect landscape of the AONB. There is a landscape character rationale/siting logic for the substations to be located as close as possible to Sizewell Power Station in order to consolidate development and avoid dispersing effects into the wider landscape, or areas closer to communities further inland where there would likely be more visual impact.	overhead lines). It does, however, have a relatively higher value, due to it being part of the nationally protect landscape of the AONB. There is a landscape character rationale/siting logic for the substations to be located as close as possible to Sizewell Power Station in order to consolidate development and avoid dispersing effects into the wider landscape, or areas closer to communities further inland where there would likely be more visual impact.	

Substation Option (from east to west)	4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)
Landscape																
Criteria	Why this criteria?															
landscape design proposals that integrate the development with the landscape.	mitigation option for substantial areas of woodland planting to embed entire substation in a large area of woodland. Potential to change management of hedgerow field boundary along B1353 to allow higher hedge screening, supplemented with further planting.	mitigation option for substantial areas of woodland planting to embed entire substation in a large area of woodland. Potential to change management of hedgerow field boundary along B1353 to allow higher hedge screening, supplemented with further planting.	Leiston; and tree line along lane/PRO W to the west. Potential mitigation option for planting new shelterbelts/tree clumps to partially screen visibility of substation; and by planting close to the receptor (Leiston/Sizewell Gap Road) along Grimsey's Lane.	Leiston; and tree line along lane/PRO W to the west. Potential mitigation option for planting new shelterbelts/tree clumps to partially screen visibility of substation; and by planting close to the receptor (Leiston/Sizewell Gap Road) along Grimsey's Lane.	Thorpene ss). Potential mitigation option for planting new woodlands to connect existing plantations to north and south of site; to partially screen visibility of substation; and by planting close to the receptors e.g. along Suffolk Coastal Path, or to north of Thorpene ss.	from east/south (e.g. Thorpene ss). Potential mitigation option for planting new woodlands to connect existing plantations to north and south of site; to partially screen visibility of substation; and by planting close to the receptors e.g. along Suffolk Coastal Path, or to north of Thorpene ss.	and east (e.g. Suffolk Coastal Path). Potential mitigation option for planting new woodlands to connect existing plantations to north and south of site; to partially screen visibility of substation; and by planting close to the receptors e.g. along Suffolk Coastal Path. Potential for heathland establishment around substation site - ecological zone as contrast with the technological substation.	Coastal Path). Potential mitigation option for planting new woodlands to connect existing plantations to north and south of site; to partially screen visibility of substation; and by planting close to the receptors e.g. along Suffolk Coastal Path. Potential for heathland establishment around substation site - ecological zone as contrast with the technological substation.	the visual impact. Potential mitigation option to plant new woodland to south to connect to existing Grove Wood; and new shelterbelts to north to screen views from Moor Farm. Strong hedgerow field boundaries to south - option to modify management to retain these boundary features at a higher height. Roadside hedgerow planting along Grove Road.	the visual impact. Potential mitigation option to plant new woodland to south to connect to existing Grove Wood; and new shelterbelts to north to screen views from Moor Farm. Strong hedgerow field boundaries to south - option to modify management to retain these boundary features at a higher height. Roadside hedgerow planting along Grove Road.	elterbelts and provide further screening in views from Knodishall Church/Saxmundham Road.	elterbelts and provide further screening in views from Knodishall Church/Saxmundham Road.	Strong hedgerow field boundaries, potential to change management to increase height.	Church, Coldfair Green and Leiston. Strong hedgerow field boundaries, potential to change management to increase height.	north/north-east within Sizewell land e.g. Rookyard Wood likely to provide further screening and backdrop. The setting of Sizewell Power Station amongst Rookyard Woods/Sizewell Bents provides mitigation and integration of the infrastructure in a semi-natural context. Hedgerow field boundaries to west / south-west may provide further screening. Landform forms 'bowl' around Broom Covert, with rising ground to the west likely to provide landform	north/north-east within Sizewell land e.g. Rookyard Wood likely to provide further screening and backdrop. The setting of Sizewell Power Station amongst Rookyard Woods/Sizewell Bents provides mitigation and integration of the infrastructure in a semi-natural context. Hedgerow field boundaries to west / south-west may provide further screening. Landform forms 'bowl' around Broom Covert, with rising ground to the west likely to provide landform

Substation Option (from east to west)	4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)	
Landscape																	
Criteria	Why this criteria?																
																screening of development in views from Leiston/Sizewell Gap Road. Landscape mitigation could to consider the potential to provide enhancements of the AONB landscape , for example, through extension of the local biodiversity network, forestry planting to expand the characteristic Sandlings Forests of the AONB and improvements to the amenity value of the land around the substations, with potential linkages to the EDF estate as	screening of development in views from Leiston/Sizewell Gap Road. Landscape mitigation could to consider the potential to provide enhancements of the AONB landscape , for example, through extension of the local biodiversity network, forestry planting to expand the characteristic Sandlings Forests of the AONB and improvements to the amenity value of the land around the substations, with potential linkages to the EDF estate as

Substation Option (from east to west)	4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)	
Landscape																	
Criteria	Why this criteria?																
																part of a wider vision for this part of the AONB.	part of a wider vision for this part of the AONB.
Visual sensitivity to development	Judgement of the visual sensitivity of each site, in terms of its general visibility and potential scope to mitigate the visual effects of any change that might take place. Visibility will be a function particularly of the landform and of the presence of potentially screening	Proximity/visibility of site(s) either side of B1353 road to Thorpene ss. Key approach to AONB, coast road to Thorpene ss, passing through Sandlings Forest at Aldringham Common. Numerous footpaths/railheads through these local forested areas. Landform of site offers opportunities to enclose developm	Proximity/visibility of site(s) either side of B1353 road to Thorpene ss. Key approach to AONB, coast road to Thorpene ss, passing through Sandlings Forest at Aldringham Common. Numerous footpaths/railheads through these local forested areas.	Main visual sensitivity is the proximity of site to edge of Leiston. Potential residential views from south-east edges of Leiston, from local school on this edge and from PRowS that extend from Leiston into the rural areas on its edge. Land is fairly flat and open, large scale, with visual amenity influenced	Main visual sensitivity is the proximity of site to edge of Leiston. Potential residential views from south-east edges of Leiston, from local school on this edge and from PRowS that extend from Leiston into the rural areas on its edge. Land is fairly flat and open, large scale, with visual amenity influenced	Main visual sensitivity is the proximity of the site immediately next to Suffolk Coastal Path. Potential visibility from residences on northern edges of Thorpene ss.	Main visual sensitivity is the proximity of the site immediately next to Suffolk Coastal Path. Potential visibility from residences on northern edges of Thorpene ss.	Main visual sensitivity is the proximity of the site immediately next to Suffolk Coastal Path; Aldringham Walks that form local ProW network to the west and the location of the site near to Sizewell Hall, which is enclosed by woodland but there would be views from the main access road.	Main visual sensitivity is the proximity of the site immediately next to Suffolk Coastal Path; Aldringham Walks that form local ProW network to the west and the location of the site near to Sizewell Hall, which is enclosed by woodland but there would be views from the main access road.	Locally highly visible from Grove Road to the south; PRow to the west of the site; and from Moor Farm/Little Moor Farm to north. Flat land, well contained by woodlands in views from wider landscape. Site located in a 'bowl' with rising landforms around it that contain visibility. Existing overhead lines have a strong	Locally highly visible from Grove Road to the south; PRow to the west of the site; and from Moor Farm/Little Moor Farm to north. Flat land, well contained by woodlands in views from wider landscape. Site located in a 'bowl' with rising landforms around it that contain visibility. Existing overhead lines have a strong	Site is well contained by woodland belt to the north, with limited visibility of site from Saxmundham Road to the north or from Pattle's Farm to west. Strong hedgerow and field boundary trees around whole site; further woodland shelterbelt to south-east (Rectory Woodland). Proximity of Knodishall Church	Site is well contained by woodland belt to the north, with limited visibility of site from Saxmundham Road to the north or from Pattle's Farm to west. Strong hedgerow and field boundary trees around whole site; further woodland shelterbelt to south-east (Rectory Woodland). Proximity of Knodishall Church	Sites located in relatively large scale area with limited access, with few/if any PRow available to walk close to the site. Proximity of Coldfair Green to south and Leiston to east raises visual sensitivity, but set-back at relative distance with intervening field boundaries and shelterbelts/tree clumps	Sites located in relatively large scale area with limited access, with few/if any PRow available to walk close to the site. Proximity of Coldfair Green to south and Leiston to east raises visual sensitivity, but set-back at relative distance with intervening field boundaries and shelterbelts/tree clumps	Public Right of Way (ProW) passes along northern boundary of this land, between Sandy Lane and Leiston Common, from where there would be open/immediate views of development in close proximity. Broom Covert forms area with locally distinctive character of heath/grassland	Public Right of Way (ProW) passes along northern boundary of this land, between Sandy Lane and Leiston Common, from where there would be open/immediate views of development in close proximity. Broom Covert forms area with locally distinctive character of heath/grassland

Substation Option (from east to west)	4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)
Landscape																
Criteria	Why this criteria?															
g land cover, especially trees and woodland. It will also be a reflection of the numbers of people/sensitivity of receptors who are likely to perceive the landscape and any changes that occur in it, whether they are residents, road users, walkers or visitors.	ent. Located on land near to restored tip on eastern edges of Aldringham.		by existing overhead lines, Sizewell in the backdrop, and pig farming. Potential for views from walks into AONB from the east.	by existing overhead lines, Sizewell in the backdrop, and pig farming. Potential for views from walks into AONB from the east.					influence on existing visual amenity. No visibility from Manor Farm. Limited visibility from Friston to south due to woodland to north of Friston and strong hedgerows in fields to south of site.	influence on existing visual amenity. No visibility from Manor Farm. Limited visibility from Friston to south due to woodland to north of Friston and strong hedgerows in fields to south of site.	and several large residential properties near the site raises visual sensitivity. Locally distinctive character and visibility from ProW along east side of site.	and several large residential properties near the site raises visual sensitivity. Locally distinctive character and visibility from ProW along east side of site.	providing screening. Hill Farm is located close by to the south. Potential visibility from Knodishall Church area to the west, although woodland shelterbelts provide screening.	providing screening. Hill Farm is located close by to the south. Potential visibility from Knodishall Church area to the west, although woodland shelterbelts provide screening.	habitat along this walk, however, existing visual amenity is much influenced by the presence of both Greater Gabbard and Galloper electrical substations nearby, and also overhead electrical lines and Sizewell Power Station. Although Sizewell Gap Road follows the perimeter of this land, views into the site are very limited due to the established woodland belts which are planted along the road. These woodlands also provide screening of the site in views from the	habitat along this walk, however, existing visual amenity is much influenced by the presence of both Greater Gabbard and Galloper electrical substations nearby, and also overhead electrical lines and Sizewell Power Station. Although Sizewell Gap Road follows the perimeter of this land, views into the site are very limited due to the established woodland belts which are planted along the road. These woodlands also provide screening of the site in views from the

Substation Option (from east to west)		4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)	
Landscape																		
Criteria	Why this criteria?																	
																	settlement of Leiston to the west. Visual amenity on the western edges of Leiston is influenced by the existing industrial park on its outskirts. No views of the site are likely from the village of Sizewell or Sizewell Beach. Users of the Suffolk Coastal Path which passes nearby are visually sensitive, however this section of the walk is already substantially influenced by energy infrastructure, reducing sensitivity over this stretch of the path. Numerous PRoW	settlement of Leiston to the west. Visual amenity on the western edges of Leiston is influenced by the existing industrial park on its outskirts. No views of the site are likely from the village of Sizewell or Sizewell Beach. Users of the Suffolk Coastal Path which passes nearby are visually sensitive, however this section of the walk is already substantially influenced by energy infrastructure, reducing sensitivity over this stretch of the path. Numerous PRoW

Substation Option (from east to west)	4 (Fig3.3)	4a (Fig3.3)	3 (Fig3.4)	3a (Fig3.4)	1 (Fig3.5)	1a (Fig3.5)	2 (Fig3.6)	2a (Fig3.6)	7 (Fig3.7)	7a (Fig3.7)	6 (Fig3.8)	6a (Fig3.8)	5 (Fig3.9)	5a (Fig3.9)	8 (Fig3.10)	8a (Fig3.10)	
Landscape																	
Criteria	Why this criteria?																
																lead from settled areas into the AONB's 'Aldringham Walks', to the south, which may have views of the site. Several local dwellings such as Halfway Cottages, Crown Farm, Home Farm and those at Sandy Lane are likely to be visually sensitive.	lead from settled areas into the AONB's 'Aldringham Walks', to the south, which may have views of the site. Several local dwellings such as Halfway Cottages, Crown Farm, Home Farm and those at Sandy Lane are likely to be visually sensitive.

Appendix D Descriptive text to support landscape RAG assessment for NG AIS substation

Table D.1 Descriptive text to support landscape RAG assessment presented in Table 4.1

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
Proximity to the Suffolk Coast & Heaths AONB	AONB is an indicator of potential national landscape (scenic) value.	Just outside AONB (<500m)	Within AONB	Within AONB	Outside AONB (3 km)	Outside AONB (3.1km)	Outside AONB (2.4km)	Within AONB

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
Potential to affect the special qualities of the AONB	Special qualities of the AONB are the qualities against which landscape effects of development would be measured.	Potential to affect setting of characteristic/distinctive sandlings forests at Aldringham Common. Clear juxtaposition of substation with forests at the edge of AONB. Potential effect on visual interest in this pattern of land cover. Potential for development adjacent to forests to affect sense of enclosure and isolation that they create. Potential	Likely significant effects on some special qualities of the AONB, within localised area. Including effects on - setting of characteristic/distinctive sandlings heath and forests; potential visual effect on the interest of this landcover at Aldringham Walks; potential effects on network of local and strategic access routes	Likely significant effects on some special qualities of the AONB, within localised area. Including effects on - setting of characteristic/distinctive sandlings heath and forests; potential visual effect on the interest of this landcover at Aldringham Walks/to north of Thorpeness; potential effects on network of local and	Special qualities of AONB unlikely to be affected	Special qualities of AONB unlikely to be affected	Special qualities of AONB unlikely to be affected	The local character of the AONB in this location is substantially influenced by energy infrastructure, including the adjacent Sizewell Power Station, Greater Gabbard and Galloper substations, and overhead electrical power lines, which traverse the edge of the site. These energy generation and transmission installations have a notable influence on the perceived landscape and scenic quality of the AONB locally. The intrinsic

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
		effects on network of local access routes through the forests and access to semi-natural landscape.	(including Suffolk Coastal Path); proximity to features with long established connection to landscape/community (Sizewell Hall).	strategic access routes (including Suffolk Coastal Path) and access to semi-natural landscape; proximity to coast may result in effects on views of coastal landforms/open sea views; proximity to Thorpeness, potential effects on sense of place of resort village, important in identity of AONB.				landscape and scenic qualities that are characteristic of the wider AONB, and define its special qualities, have less influence in this area of the AONB. Development of the substations in this zone will likely result in significant effects on some of the special qualities of the AONB, as a result of increasing the influence large-scale electrical infrastructure, its prominence and visual complexity of man-made features in this part of the AONB.

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
								<p>However, the effect would also be to consolidate development in an area which is already influenced by this form of development, thereby concentrating and intensifying effects in this area (while avoiding a wider spatial extent of effect and/or effects on the special qualities of the AONB that are experienced in other areas). The site affords opportunities to consolidate development in an area where the scenic qualities of the AONB have been</p>

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
								influenced by infrastructure influences and would avoid dispersal of landscape and visual effects into other areas of the AONB.
Proximity to Special Landscape Areas (SLA)	SLA designation is identified in SCDC LDP and is an indicator of potential local landscape (scenic) value	Not in SLA	Not in SLA	Not in SLA	Not in SLA	Not in SLA	Not in SLA	Not in SLA

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
Landscape character and sensitivity to development	Identification of the LCA in which development is located and an initial judgement about the sensitivity of the site in this LCA (in terms of its overall character, its quality and condition) and any individual landscape elements that are sensitive to development	Within Estate Sandlands LCA - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Strongly rural landscape, so developments that could be accommodated in visual terms can still have a profound effect on the character. Probably the least sensitive of LCAs covering land	Within Estate Sandlands LCA - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Distinctive mosaic of the Sandlings landscape (heaths/ plantations) is more evident in parts of this LCA that are within the AONB. Strongly rural landscape, so developments that could be	Within Estate Sandlands LCA (within AONB) - landscape of large geometric agricultural fields, estate farms, irrigated arable crops, plantation woodlands and remnant heathland. Distinctive mosaic of the Sandlings landscape (heaths/ plantations) is more evident in parts of this LCA that are within the AONB. Strongly rural landscape, so developments	Within Ancient Estate Claylands LCA - consisting gently rolling heavy clay plateaux with ancient woodlands and parklands, with a farmed enclosure pattern, estate influences and medium-large scale. Less distinctive/valued attributes in comparison to Estate Sandlands to the east. Character of LCA has been subject to change, partly due to	Within Ancient Estate Claylands LCA - consisting gently rolling heavy clay plateaux with ancient woodlands and parklands, with a farmed enclosure pattern, estate influences and medium-large scale. Site and immediate surrounds have a distinctive local character; rectory woodlands, deciduous woods, avenues and	Within Ancient Estate Claylands LCA - consisting gently rolling heavy clay plateaux with ancient woodlands and parklands, with a farmed enclosure pattern, estate influences and medium-large scale. Character of LCA has been subject to change, partly due to relationship to suburban edges of Leiston and industrial agricultural buildings.	Located within the Estate Sandlands LCA, which has medium-high susceptibility to changes resulting from the substations. This LCA is considered to have a slightly lower susceptibility to change arising from the substations (than the Ancient Estate Claylands LCA to the west), due to the 'degraded' character and influence of existing energy transmission/generation influences in the baseline (Sizewell

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
		within AONB (in comparison to coastal levels, fens and dunes etc.) due to agricultural/ arable land use, large scale, simple and regular land cover pattern and extensive tree cover.	accommodated in visual terms can still have a profound effect on the character. Existing character has been influenced, at this location, by presence of overhead lines traversing the edge of the site and Sizewell Power Station in the backdrop. Probably the least sensitive of LCAs covering land within AONB (in comparison to coastal levels,	that could be accommodated in visual terms can still have a profound effect on the character. Probably the least sensitive of LCAs covering land within AONB (in comparison to coastal levels, fens and dunes etc.) due to agricultural/ arable land use, large scale, simple and regular land cover pattern and extensive tree cover, however site is located in coastal area	relationship to the A12. Intrusion of suburbanisation and industrial buildings. Adjacent woodland has value/sensitivity to physical effect of development.	poplar trees around Knodishall Church give distinct sense of place.	Areas to west of site around Knodishall Church have a distinctive local character/ sense of place.	Nuclear Power Station and overhead lines). It does, however, have a relatively higher value, due to it being part of the nationally protect landscape of the AONB. There is a landscape character rationale/siting logic for the substations to be located as close as possible to Sizewell Power Station in order to consolidate development and avoid dispersing effects into the wider landscape, or areas closer to

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?		fens and dunes etc.) due to agricultural/arable land use, simple and regular land cover pattern and extensive tree cover.	of LCA, relatively close to dunes/cliffs LCA to east.				communities further inland where there would likely be more visual impact. Broom Covert forms area with locally distinctive character of heath/grassland habitat.

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
Opportunity to utilise existing features for screening and modify/mitigate visual impacts	Scope for mitigating potential visual impacts and likelihood that changes could be mitigated, for example through utilising existing woodland features to screen development, potential to plant trees to screen development, or create appropriate landscape design proposals that integrate the development with the landscape.	Located in fairly open agricultural fields, with no immediate woodland cover to utilise for screening. Large areas of plantation to east and south of site provide a backdrop - 'Sandlings' plantations within AONB. These are likely to restrict views of site from the east (within AONB) and provide backdrop in views from west (Aldringham/B 1353). Potential	Scrub/heathland vegetation to west and east, with 'Sandlings' plantations forming backdrop in wider area within AONB. These are likely to restrict views of site from the south/south-west (within AONB) and provide backdrop in views from north and east (e.g. Suffolk Coastal Path). Potential mitigation option for planting new woodlands to connect	Scrub vegetation to south. Gappy hedgerow field boundaries. Existing areas of mature plantation woodland further to north-east - 'Sandlings' plantations within AONB. These are likely to restrict views of site from the west and north (within AONB) and provide backdrop in views from east/south (e.g. Thorpeness). Potential mitigation	Siting relates to existing shelterbelt woodland to north, which provides some opportunity to screen and contain development, together with strong hedgerow on southern field boundary. Opportunities to design locally appropriate planting scheme to reduce the visual impact. Potential mitigation option to plant new woodland to south to	Woodland shelterbelts to north, east and south, well contained by woodland belt to north. Strong hedgerow field boundaries around whole site and rectory woodland to the south-east. Potential mitigation option for new woodland shelterbelt planting to connect existing woodland clumps/shelterbelts and provide further screening in	Limited woodland cover in area near to site, however strong hedgerow field boundaries provide structure and partial screening. Potential mitigation option for new woodland shelterbelt planting to connect existing woodland clumps/shelterbelts and provide further screening in views from Knodishall Church,	Established woodlands planted to west and south, along Lover's Lane / Sizewell Gap Road, provide opportunity to screen and contain development in views from Leison and Sizewell Gap Road. Large areas of woodland to north/north-east within Sizewell land e.g. Rookyard Wood likely to provide further screening and backdrop. The setting of Sizewell Power Station amongst Rookyard Woods/Sizewell

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
		mitigation option for shelterbelt planting to connect to wider woodland mosaic. Potential to change management of hedgerow field boundaries to allow higher hedge screening, supplemented with further planting.	existing plantations to north and south of site; to partially screen visibility of substation; and by planting close to the receptors e.g. along Suffolk Coastal Path. Potential for heathland establishment around substation site - ecological zone as contrast with the technological substation.	option for planting new woodlands to connect existing plantations to north and south of site; to partially screen visibility of substation; and by planting close to the receptors e.g. along Suffolk Coastal Path, or to north of Thorpeness.	screen views from Friston.	views from Knodishall Church/Saxmundham Road.	Coldfair Green and Leiston. Strong hedgerow field boundaries, potential to change management to increase height.	Bents provides mitigation and integration of the infrastructure in a semi-natural context. Hedgerow field boundaries to west / south-west may provide further screening. Landform forms 'bowl' around Broom Covert, with rising ground to the west likely to provide landform screening of development in views from Leiston/Sizewell I Gap Road. Landscape mitigation could to consider the potential to provide enhancements of the AONB

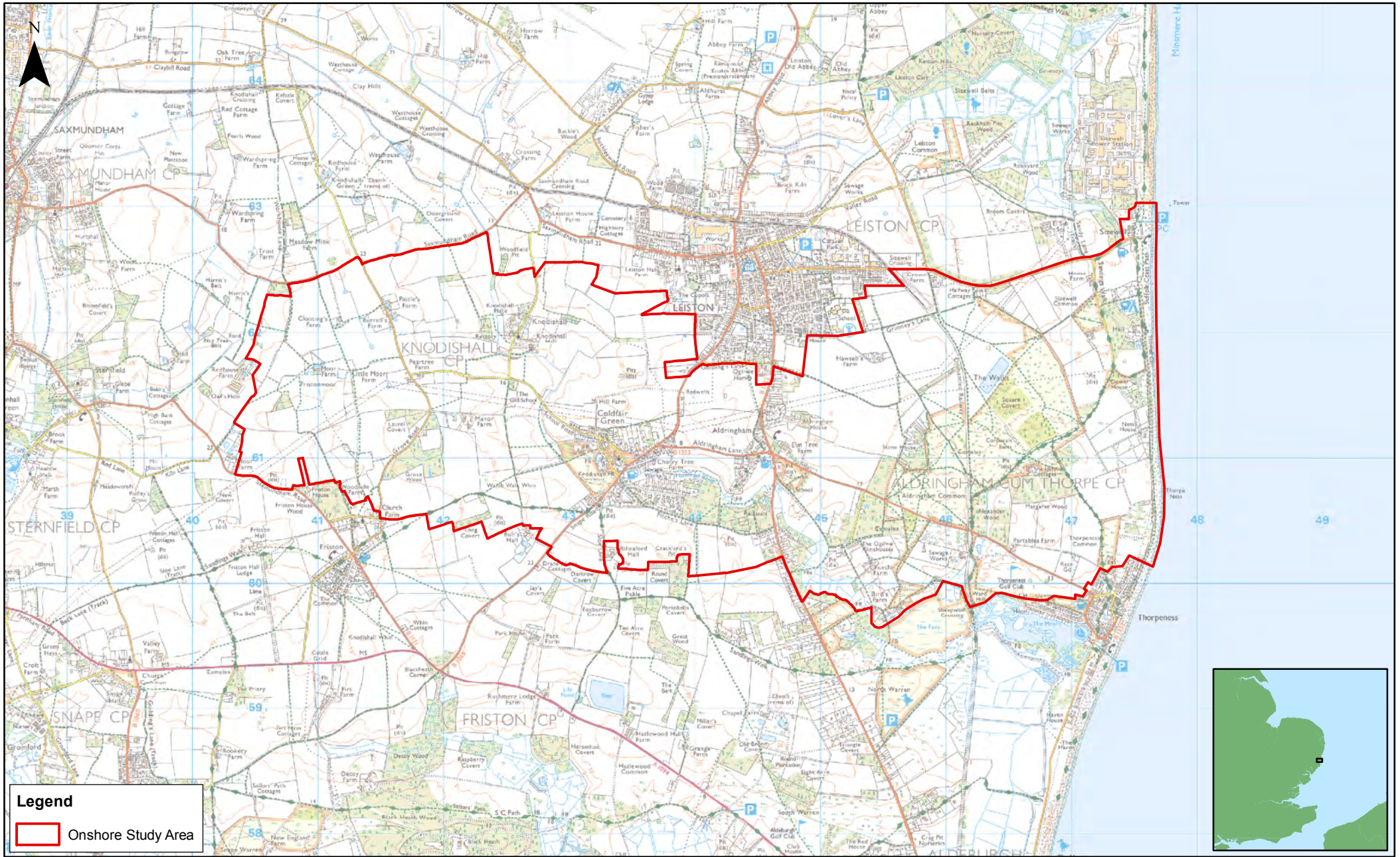
National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							landscape, for example, through extension of the local biodiversity network, forestry planting to expand the characteristic Sandlings Forests of the AONB and improvements to the amenity value of the land around the substations, with potential linkages to the EDF estate as part of a wider vision for this part of the AONB.

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
Visual sensitivity to development	Judgement of the visual sensitivity of each site, in terms of its general visibility and potential scope to mitigate the visual effects of any change that might take place. Visibility will be a function particularly of the landform and of the presence of potentially screening land cover, especially trees and woodland. It will also be a reflection of the numbers of people/sensitivity of receptors who are likely to perceive the landscape and any changes that	Proximity/visibility of site from Aldringham and Leiston to the west/north-west and B1353 road to Thorpeness to the south, and dwellings to the east at Stone House. PRow passes on north edge of site, connecting Leiston/Aldringham with numerous footpaths/trail heads through AONB Sandlings Forests to the east.	Main visual sensitivity is the proximity of the site to Suffolk Coastal Path; Aldringham Walks that form local ProW network to the west; visibility from Sizewell Gap Road to the north; and the location of the site near to Sizewell Hall, which is enclosed by woodland but there would be views from the main access road.	Main visual sensitivity is the proximity of the site immediately next to Suffolk Coastal Path. Potential visibility from residences on northern edges of Thorpeness.	Locally highly visible from PRow that passes through the site, and farms at Moor Farm, Redhouse Farm and Saxmundham Road. Existing overhead lines have a strong influence on existing visual amenity. Limited visibility from Friston to south due to woodland to north of Friston and strong hedgerows in fields to south of site.	Site is well contained by woodland belt to the north, with limited visibility of site from Saxmundham Road. Strong hedgerow and field boundary trees around site and extent of scattered tree cover generally create intimate landscape. Proximity of Knodishall Church and several large residential properties near the site raises visual sensitivity. Locally	Sites located in relatively large scale area with limited access, with few/if any PRow available to walk close to the site. Proximity of Coldfair Green to south and Leiston to east raises visual sensitivity, but set-back at relative distance with intervening field boundaries and shelterbelts/tree clumps providing screening. Hill	Public Right of Way (ProW) passes along northern boundary of this land, between Sandy Lane and Leiston Common, from where there would be open/immediate views of development in close proximity. Broom Covert forms area with locally distinctive character of heath/grassland habitat along this walk, however, existing visual amenity is much influenced by the presence of both Greater Gabbard and Galloper

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
	occur in it, whether they are residents, road users, walkers or visitors.					distinctive character and visibility from ProW along east side of site and high visibility from minor road to immediate south of site.	Farm is located close by to the south. Potential visibility from Knodishall Church area to the west, although woodland shelterbelts provide screening.	electrical substations nearby, and also overhead electrical lines and Sizewell Power Station. Although Sizewell Gap Road follows the perimeter of this land, views into the site are very limited due to the established woodland belts which are planted along the road. These woodlands also provide screening of the site in views from the settlement of Leiston to the west. Visual amenity on the western edges of Leiston is influenced by the existing

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
								<p>industrial park on its outskirts. No views of the site are likely from the village of Sizewell or Sizewell Beach. Users of the Suffolk Coastal Path which passes nearby are visually sensitive, however this section of the walk is already substantially influenced by energy infrastructure, reducing sensitivity over this stretch of the path. Numerous PRoW lead from settled areas into the AONB's 'Aldringham Walks', to the south, which may have</p>

National Grid Substation Options (by relevant Zone)		NG4 (Fig4.2)	NG2 (Fig4.3)	NG1 (Fig 4.6)	NG7 (Fig4.4)	NG6 (Fig4.5)	NG5 (Fig 4.7)	NG8 (Fig4.8)
Landscape								
Criteria	Why this criteria?							
								views of the site. Several local dwellings such as Halfway Cottages, Crown Farm, Home Farm and those at Sandy Lane are likely to be visually sensitive.



Legend

Onshore Study Area



Rev	Date	By	Comment
0	30/01/2018	AB	First Issue.

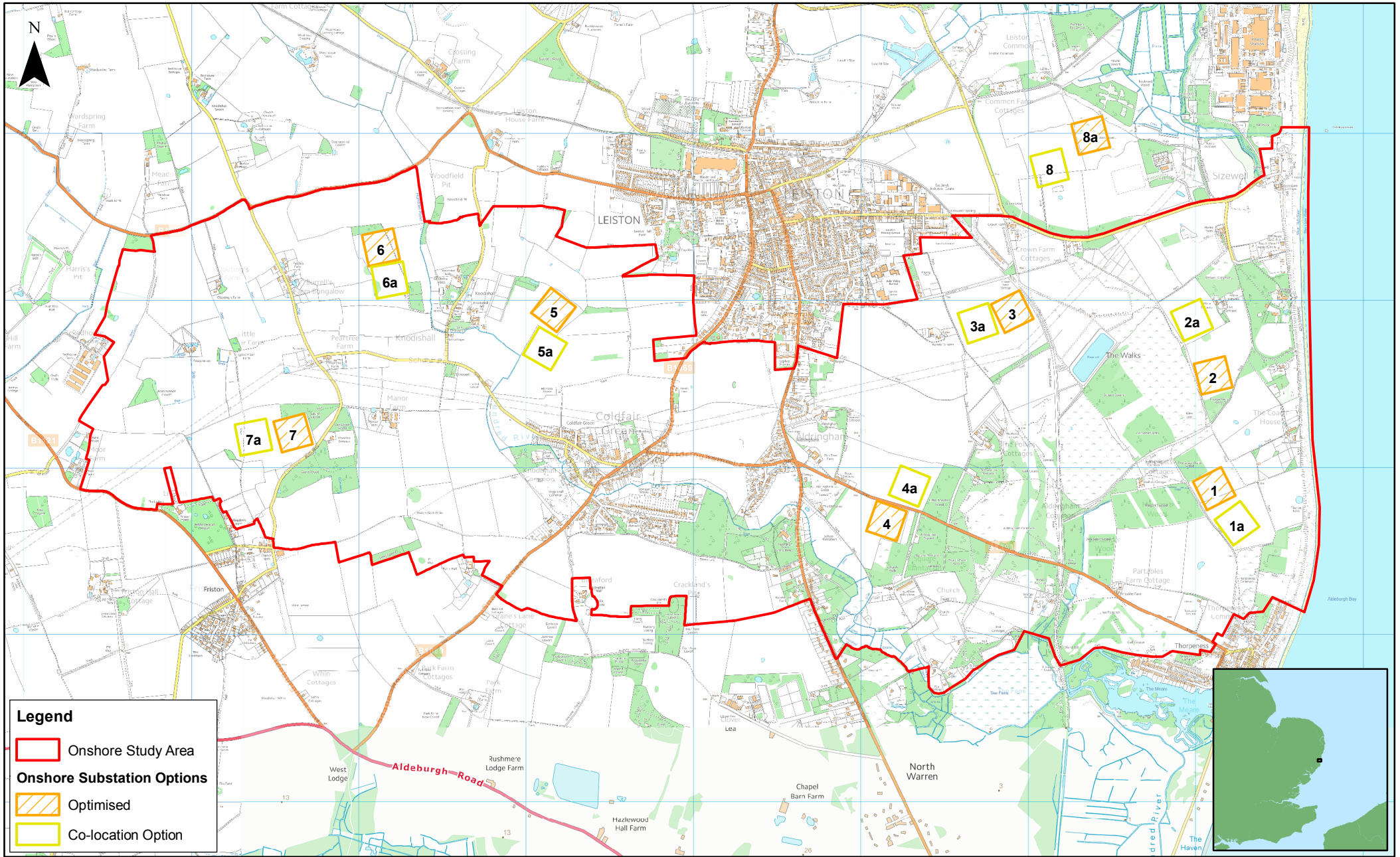
Prepared:	Checked:	Approved:
AB	PW	XX

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1:40,000
Scale @ A3

East Anglia ONE North and TWO		Drg No	xxxx
Onshore Site Selection Study Area		Rev	0
		Date	30/01/18
		Figure	3.1
		Coordinate System:	BNG
		Datum:	OSGB36



Legend

- Onshore Study Area
- Onshore Substation Options**
- Optimised
- Co-location Option



2	03/12/2018	FC	Second Issue.	Prepared:	FC
1	30/01/2018	AB	First Issue.	Checked:	PW
Rev	Date	By	Comment	Approved:	XX

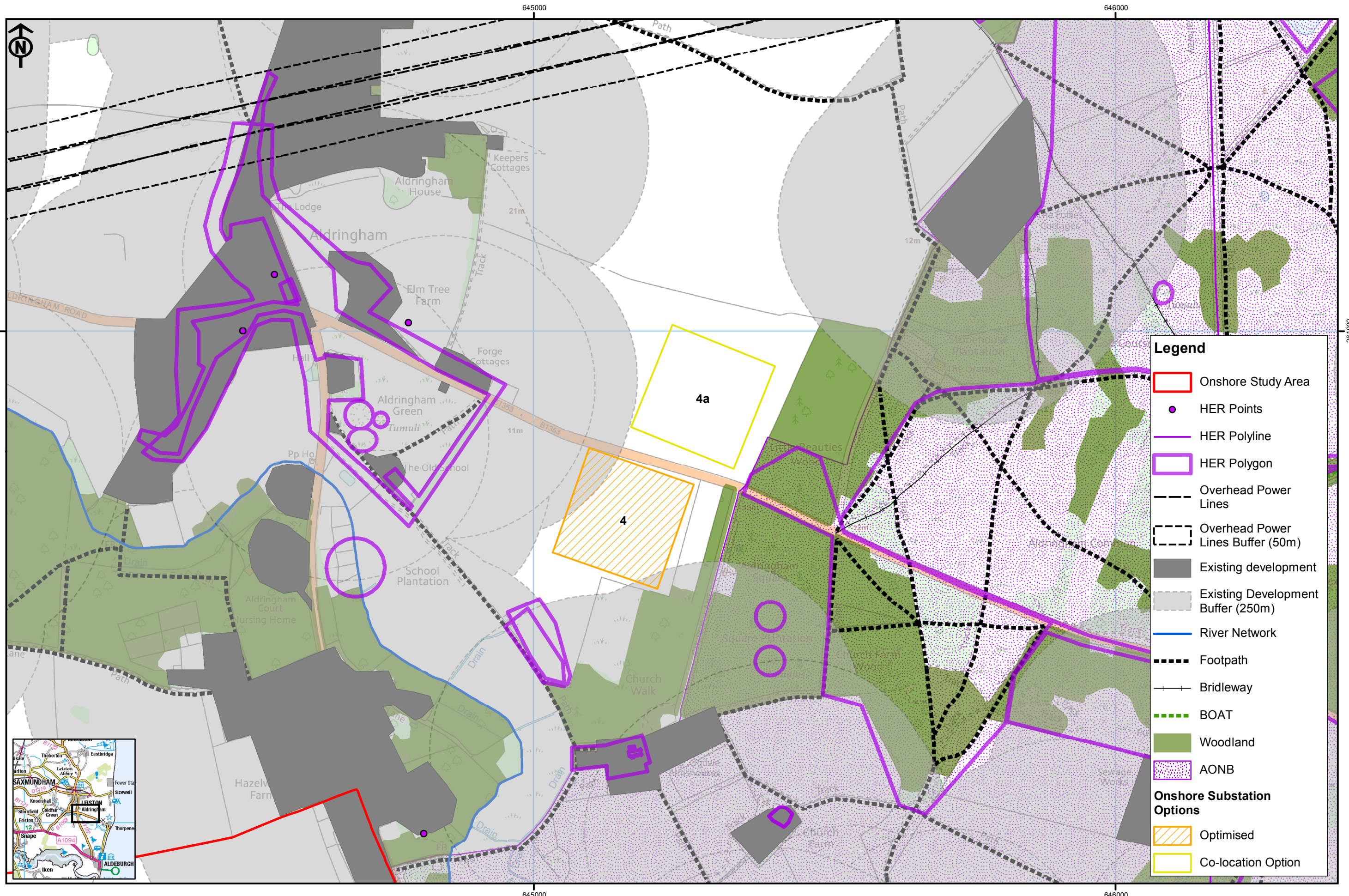
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Scale @ A3

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East Anglia ONE North and TWO
Onshore Substation Options - Overview

Drg No	xxxx	Coordinate System: BNG Datum: OSGB36
Rev	2	
Date	03/12/18	
Figure	3.2	

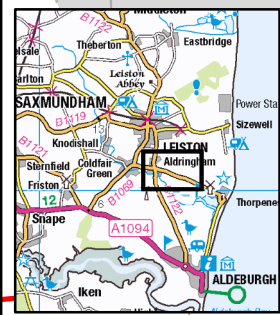


Legend

- Onshore Study Area
- HER Points
- HER Polyline
- HER Polygon
- Overhead Power Lines
- Overhead Power Lines Buffer (50m)
- Existing development
- Existing Development Buffer (250m)
- River Network
- Footpath
- Bridleway
- BOAT
- Woodland
- AONB

Onshore Substation Options

- Optimised
- Co-location Option



2	03/12/18	FC	Second issue
1	30/01/18	AB	First issue
Rev	Date	By	Comment

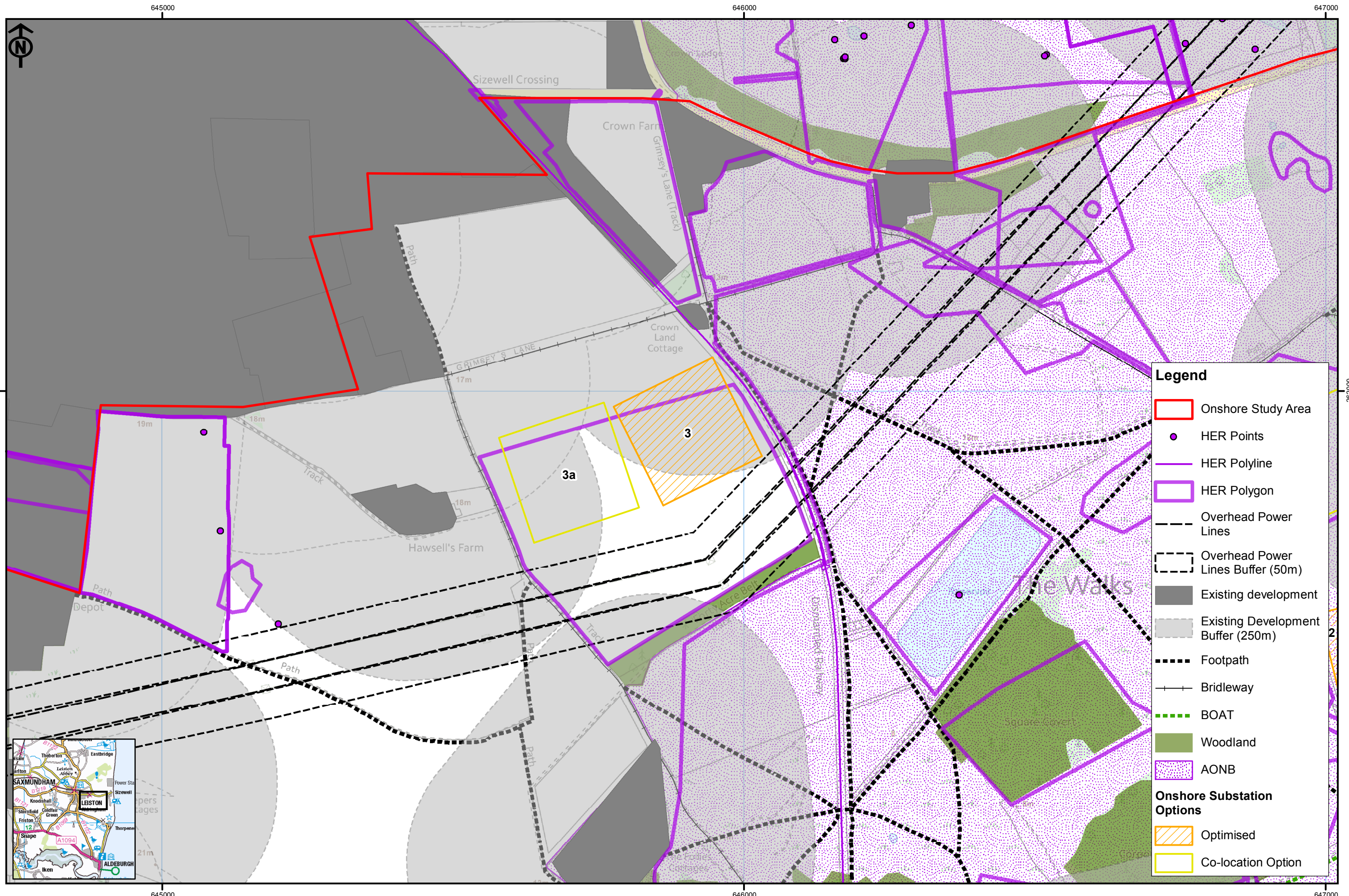
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East Anglia ONE North & East Anglia TWO
 Onshore Substation Options - Zone 4 Constraints

Drg No	xxxxxx	Volume	x
Rev	2	Date	03/12/2018
Date	03/12/2018	Figure	3.3
Layout	N/A		

Ref.



Legend

- Onshore Study Area
- HER Points
- HER Polyline
- HER Polygon
- Overhead Power Lines
- Overhead Power Lines Buffer (50m)
- Existing development
- Existing Development Buffer (250m)
- Footpath
- Bridleway
- BOAT
- Woodland
- AONB

Onshore Substation Options

- Optimised
- Co-location Option



Rev	Date	By	Comment
2	03/12/18	FC	Second issue
1	30/01/18	AB	First issue

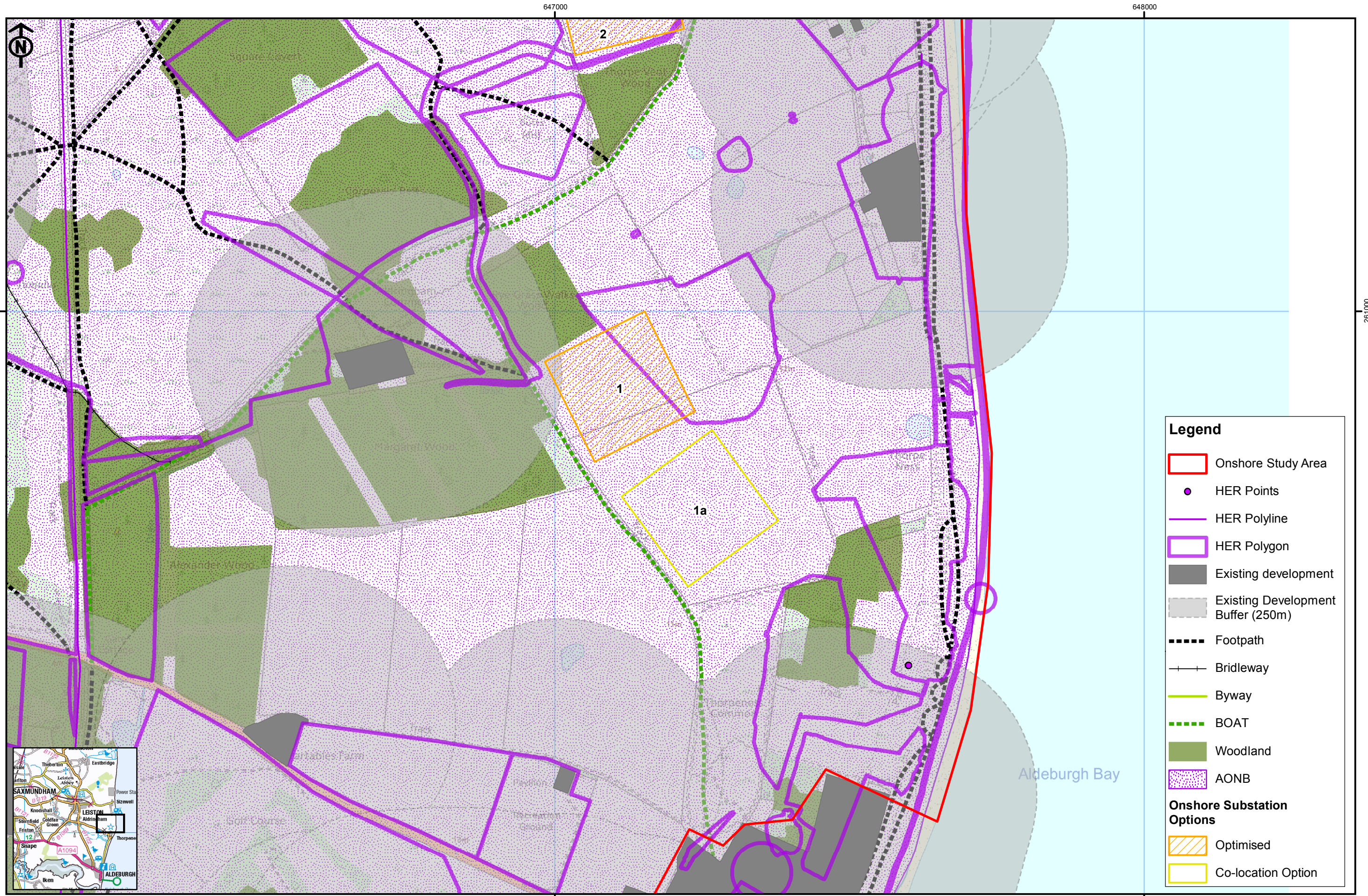
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East Anglia ONE North & East Anglia TWO
Onshore Substation Options - Zone 3 Constraints

Drg No	xxxxxx	Volume	x
Rev	2	Figure	3.4
Date	03/12/2018		
Layout	N/A		

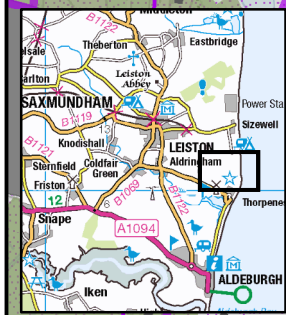


Legend

- Onshore Study Area
- HER Points
- HER Polyline
- HER Polygon
- Existing development
- Existing Development Buffer (250m)
- Footpath
- Bridleway
- Byway
- BOAT
- Woodland
- AONB

Onshore Substation Options

- Optimised
- Co-location Option



Rev	Date	By	Comment
2	03/12/18	FC	Second issue
1	30/01/18	AB	First issue

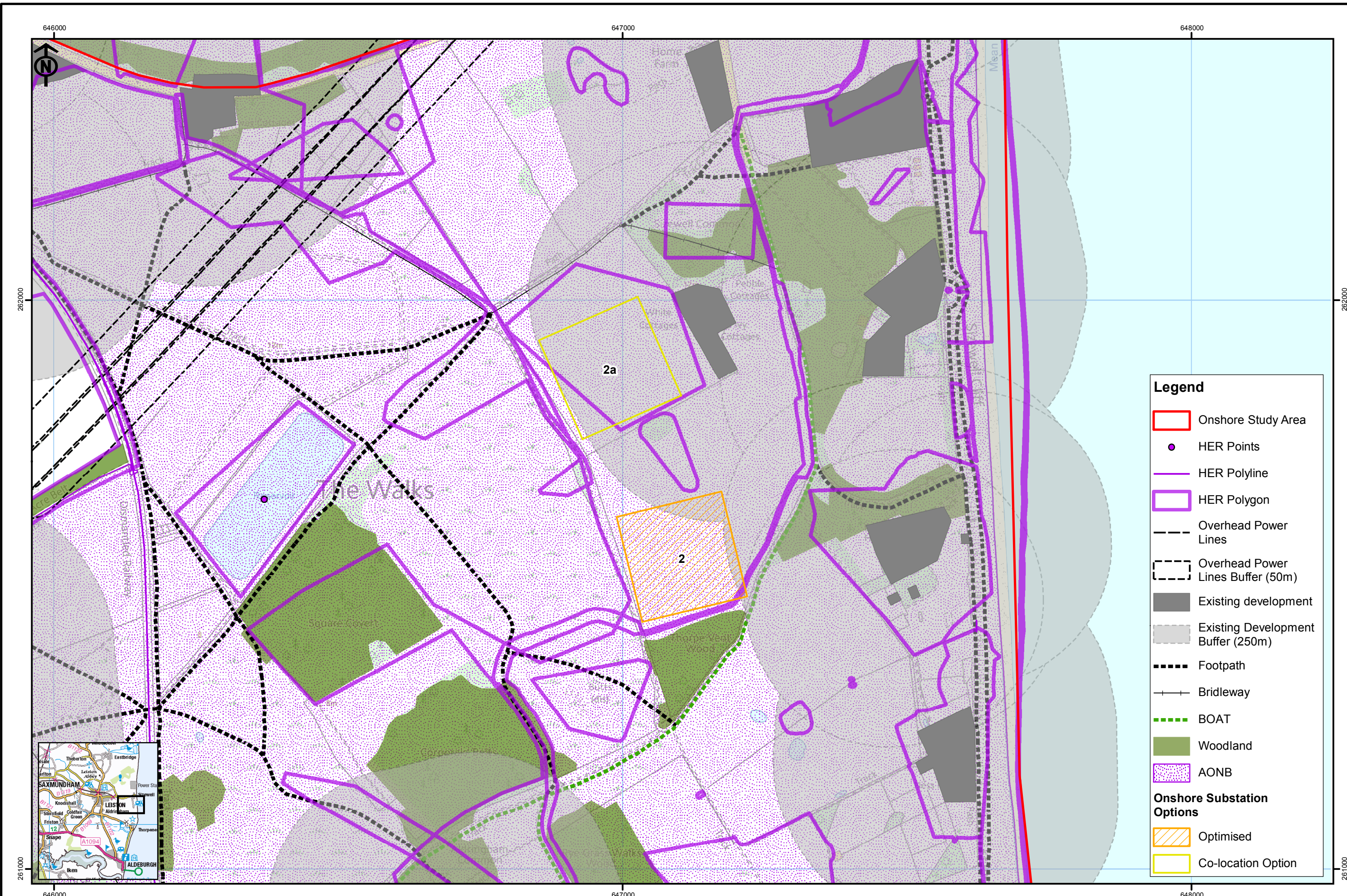
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East Anglia ONE North & East Anglia TWO
Onshore Substation Options - Zone 1 Constraints

Drg No	xxxxxx	Volume	x
Rev	2	Figure	3.5
Date	03/12/2018		
Layout	N/A		

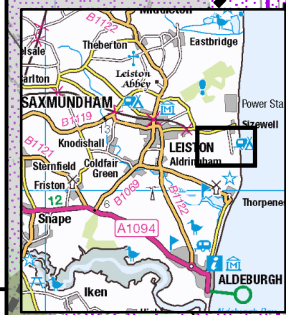


Legend

- Onshore Study Area
- HER Points
- HER Polyline
- HER Polygon
- Overhead Power Lines
- Overhead Power Lines Buffer (50m)
- Existing development
- Existing Development Buffer (250m)
- Footpath
- Bridleway
- BOAT
- Woodland
- AONB

Onshore Substation Options

- Optimised
- Co-location Option



Rev	Date	By	Comment
2	03/12/18	FC	Second issue
1	30/01/18	AB	First issue

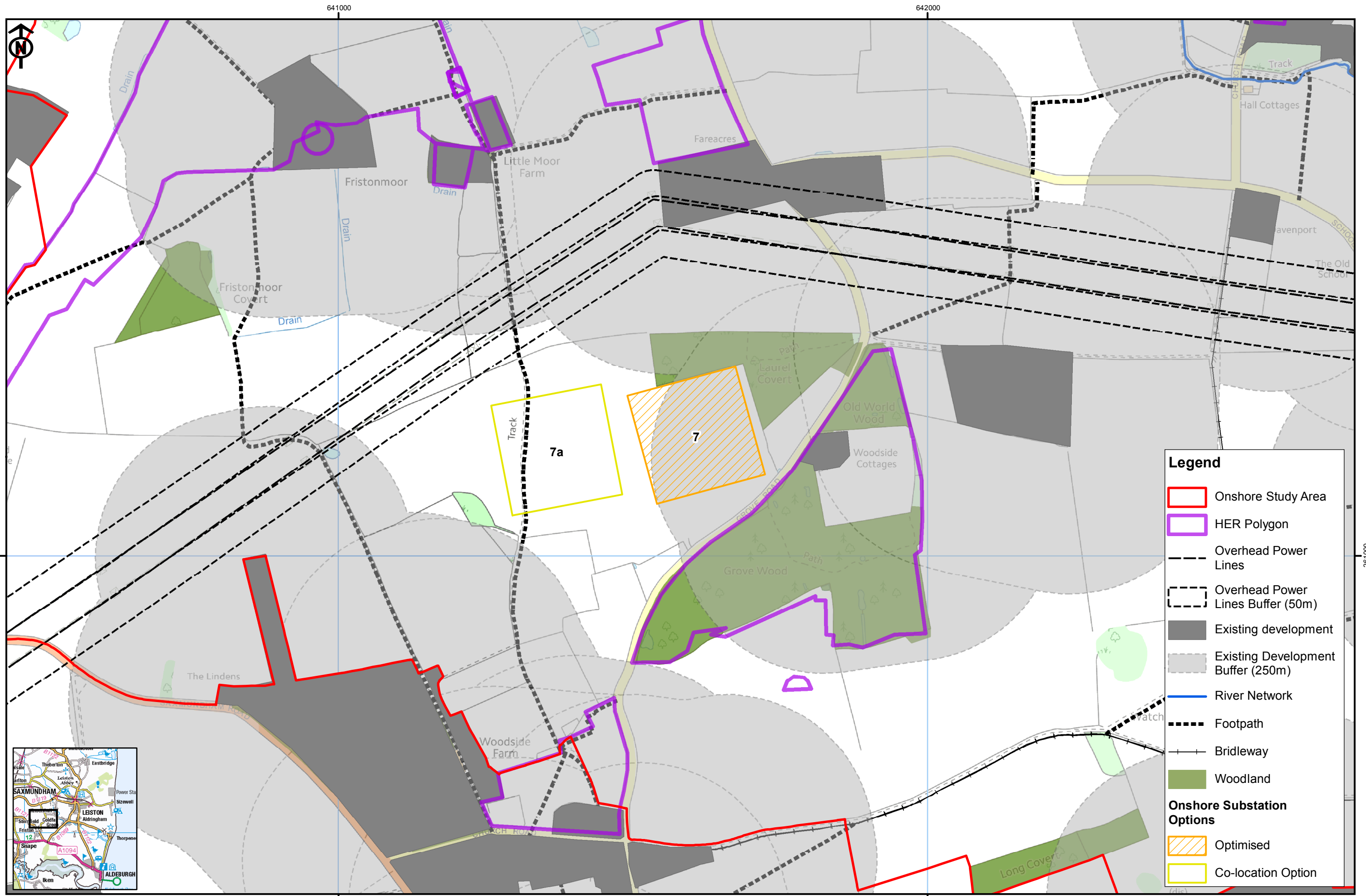
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0 50 100 Metres

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East Anglia ONE North & East Anglia TWO
Onshore Substation Options - Zone 2 Constraints

Drg No	xxxxxx	Volume	x
Rev	2	Date	03/12/2018
Date	03/12/2018	Figure	3.6
Layout	N/A		



Legend

- Onshore Study Area
- HER Polygon
- Overhead Power Lines
- Overhead Power Lines Buffer (50m)
- Existing development
- Existing Development Buffer (250m)
- River Network
- Footpath
- Bridleway
- Woodland

Onshore Substation Options

- Optimised
- Co-location Option



Rev	Date	By	Comment
2	03/12/18	FC	Second issue
1	30/01/18	AB	First issue

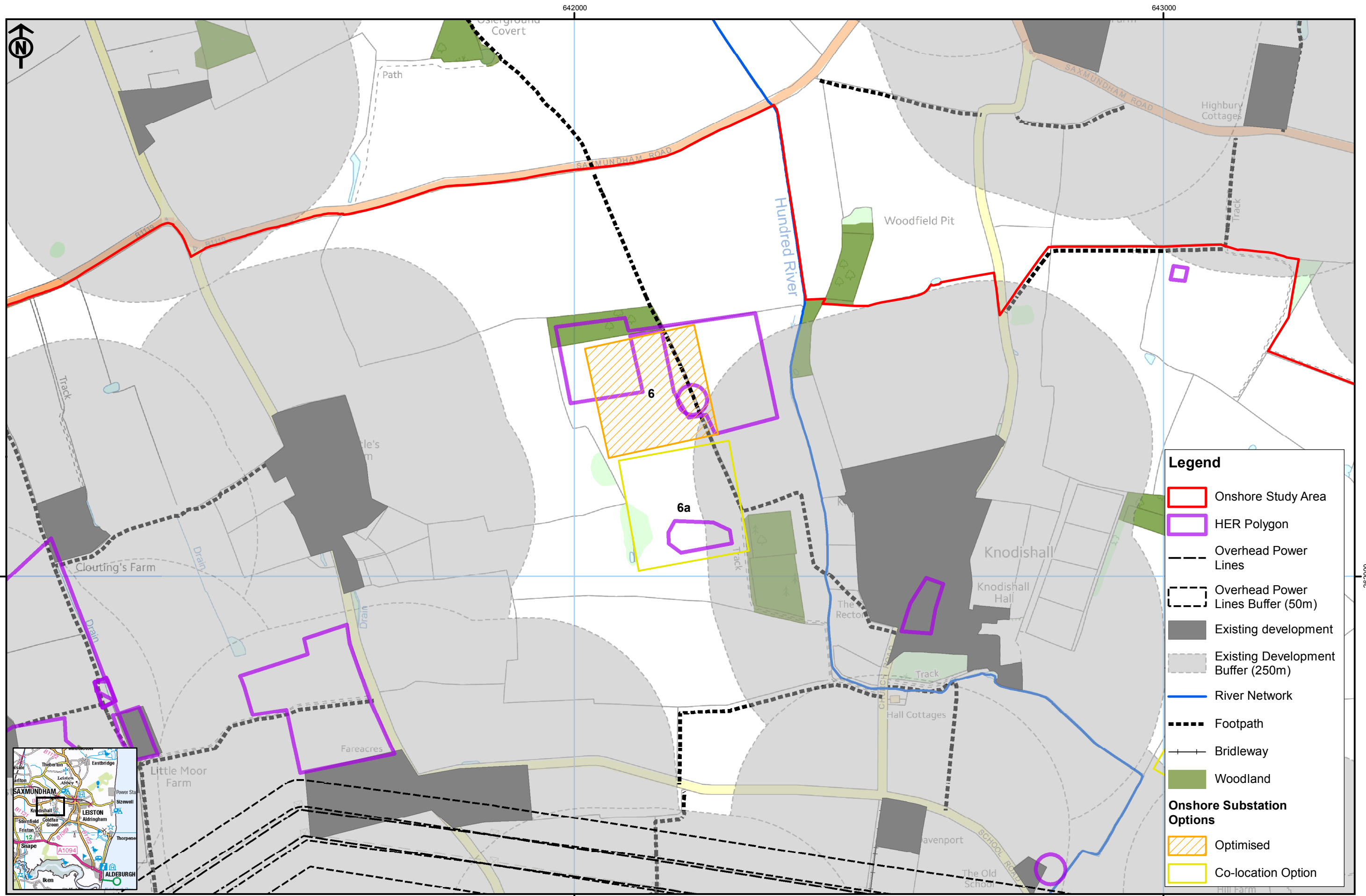
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East Anglia ONE North & East Anglia TWO
Onshore Substation Options - Zone 7 Constraints

Drg No	xxxxxx	Volume	x
Rev	2	Figure	3.7
Date	03/12/2018		
Layout	N/A		

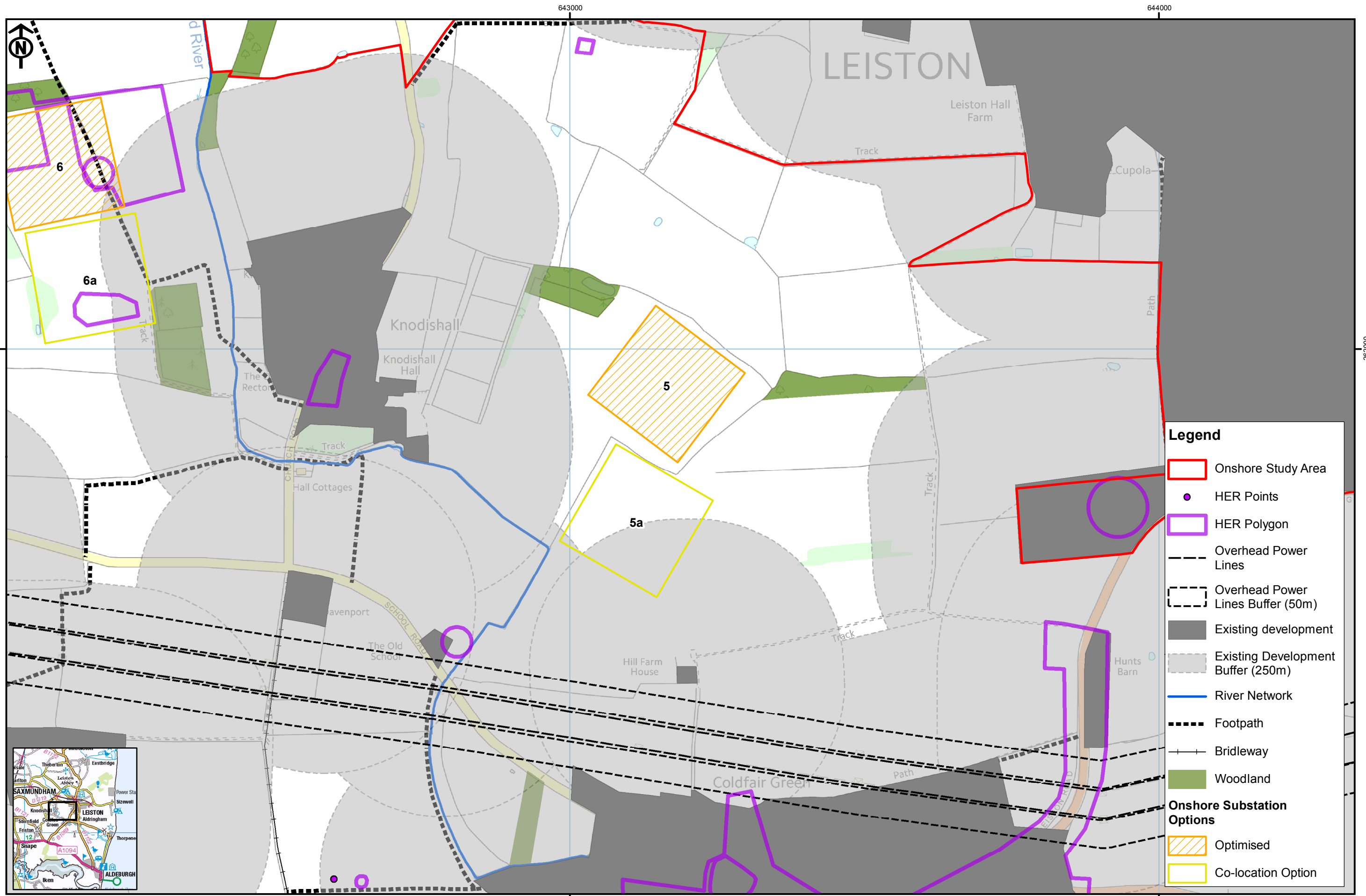


Rev	Date	By	Comment
2	03/12/18	FC	Second issue
1	30/01/18	AB	First issue

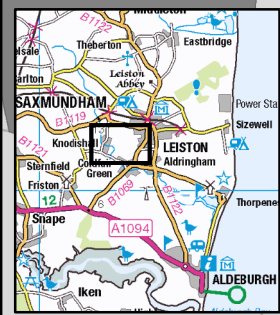
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East Anglia ONE North & East Anglia TWO
 Onshore Substation Options - Zone 6 Constraints

Drg No	xxxxxx	Volume	x
Rev	2	Date	30/01/2018
Date	30/01/2018	Figure	3.8
Layout	N/A		



- Legend**
- Onshore Study Area
 - HER Points
 - HER Polygon
 - Overhead Power Lines
 - Overhead Power Lines Buffer (50m)
 - Existing development
 - Existing Development Buffer (250m)
 - River Network
 - Footpath
 - Bridleway
 - Woodland
- Onshore Substation Options**
- Optimised
 - Co-location Option



Rev	Date	By	Comment
2	03/12/18	FC	Second issue
1	30/01/18	AB	First issue

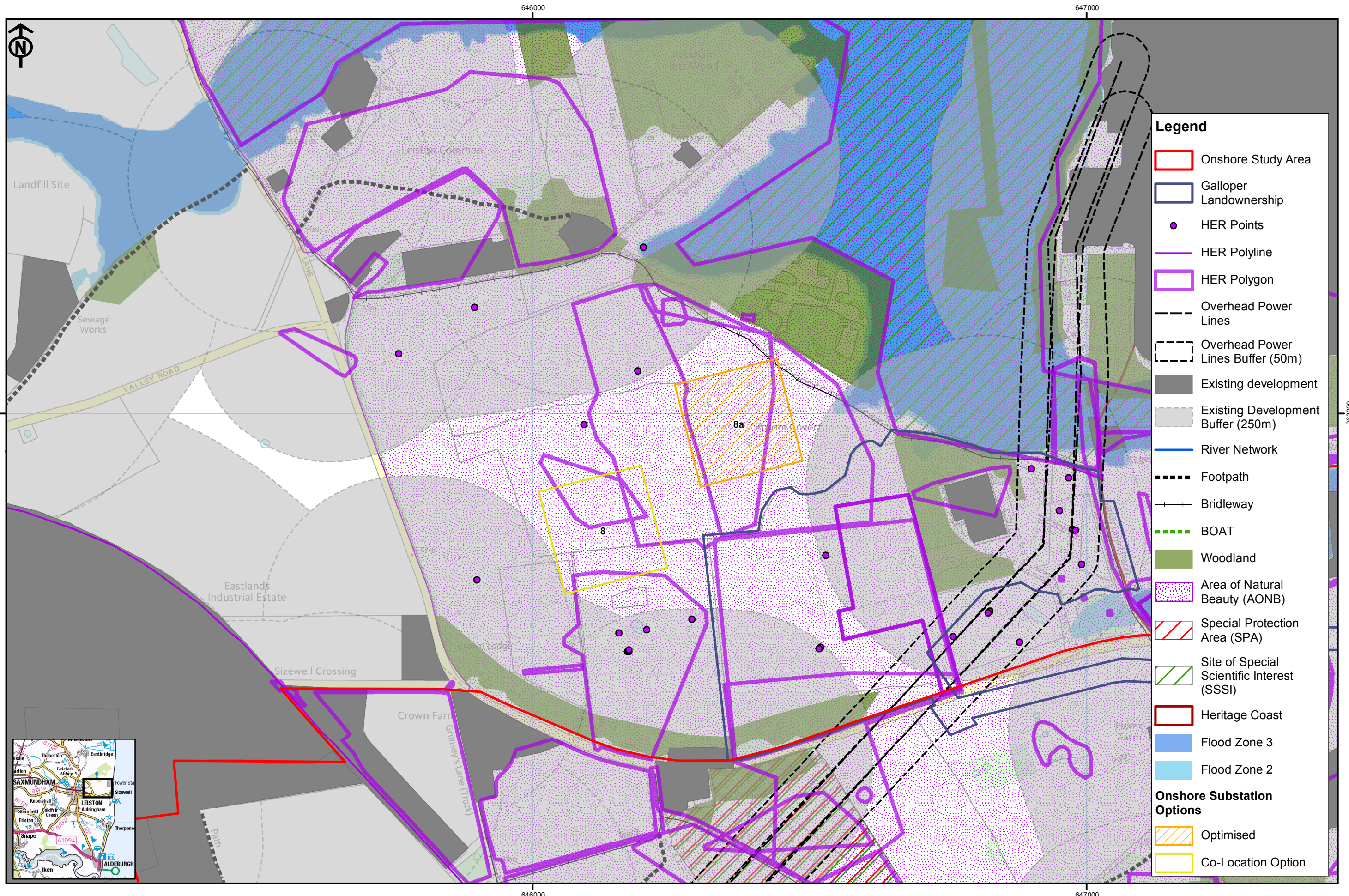
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East Anglia ONE North & East Anglia TWO
Onshore Substation Options - Zone 5 Constraints

Drg No	xxxxxx	Volume	x
Rev	2	Date	03/12/2018
Date	03/12/2018	Figure	3.9
Layout	N/A		

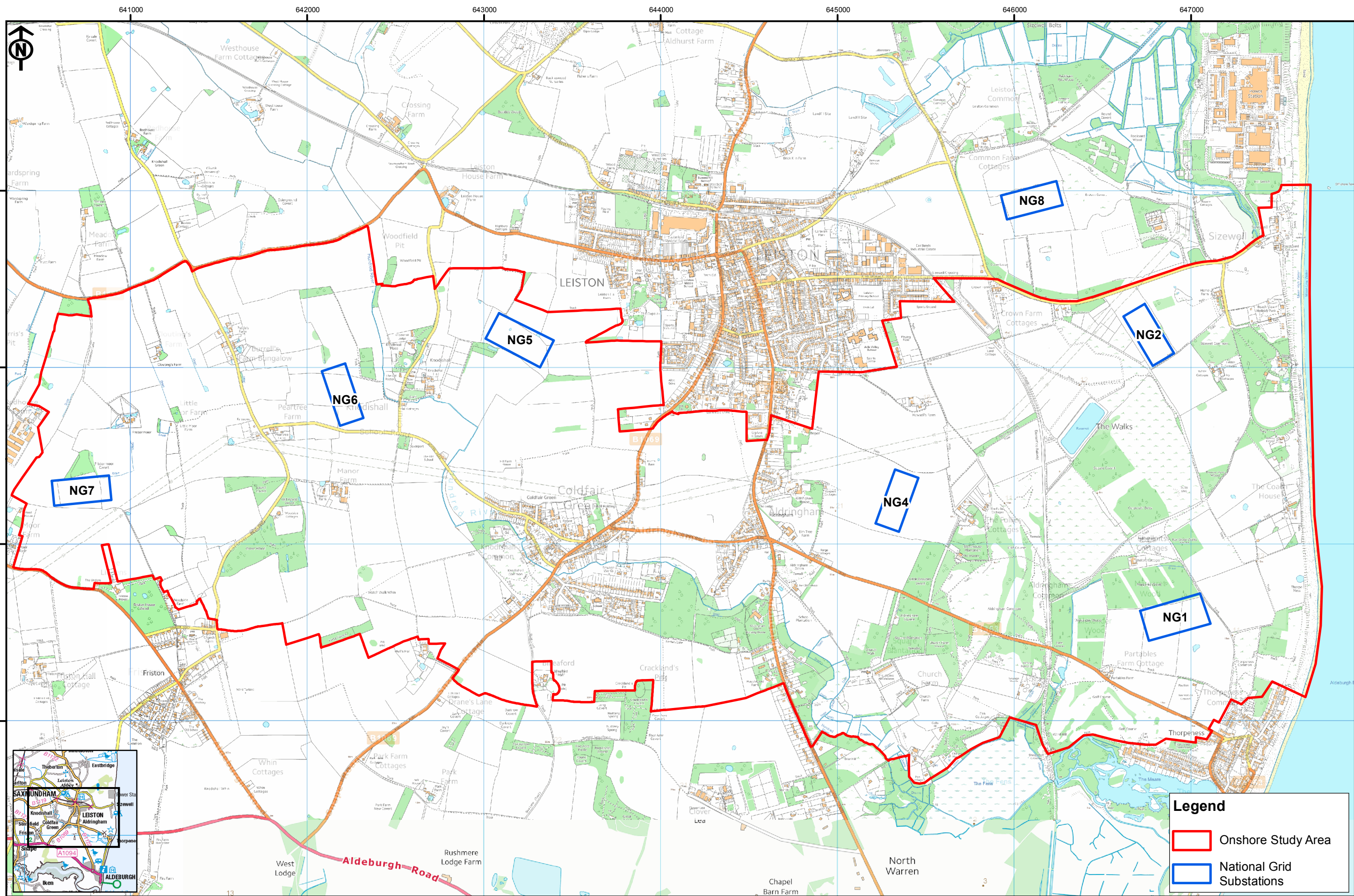


- Legend**
- Onshore Study Area
 - Galloper Landownership
 - HER Points
 - HER Polyline
 - HER Polygon
 - Overhead Power Lines
 - Overhead Power Lines Buffer (50m)
 - Existing development
 - Existing Development Buffer (250m)
 - River Network
 - Footpath
 - Bridleway
 - BOAT
 - Woodland
 - Area of Natural Beauty (AONB)
 - Special Protection Area (SPA)
 - Site of Special Scientific Interest (SSSI)
 - Heritage Coast
 - Flood Zone 3
 - Flood Zone 2
- Onshore Substation Options**
- Optimised
 - Co-Location Option



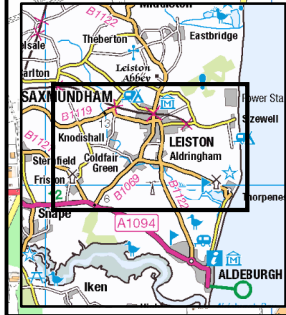
Rev	Date	By	Comment
1	03/12/18	FC	First issue

Drg No	xxxxxx	Volume	x
Rev	1	Figure	3.10
Date	03/12/2018		
Layout	N/A		



Legend

- Onshore Study Area
- National Grid Substations



Rev	Date	By	Comment
3	03/12/18	FC	Third issue
2	16/02/18	KO	Second issue
1	30/01/18	AB	First issue

Original A3 Plot Scale 1:20,000

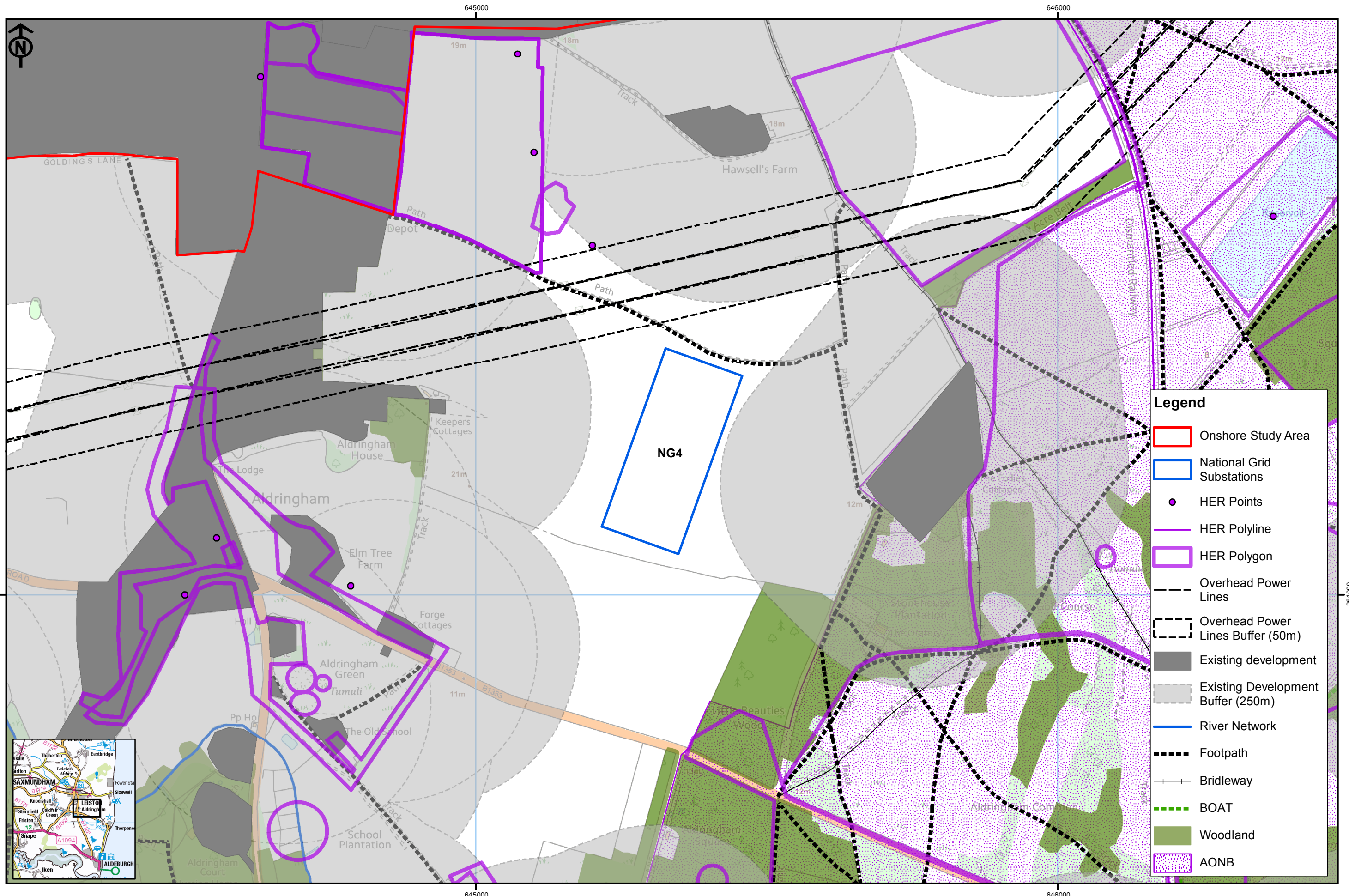
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East Anglia ONE North & East Anglia TWO
National Grid Substation Options - Overview

Drg No	xxxxxx	Volume	x
Rev	3	Figure	4.1
Date	03/12/2018		
Layout	N/A		





- Legend**
- Onshore Study Area
 - National Grid Substations
 - HER Points
 - HER Polyline
 - HER Polygon
 - Overhead Power Lines
 - Overhead Power Lines Buffer (50m)
 - Existing development
 - Existing Development Buffer (250m)
 - River Network
 - Footpath
 - Bridleway
 - BOAT
 - Woodland
 - AONB



Rev	Date	By	Comment
2	03/12/18	FC	Second issue
1	30/01/18	AB	First issue

Original A3 Plot Scale 1:6,000

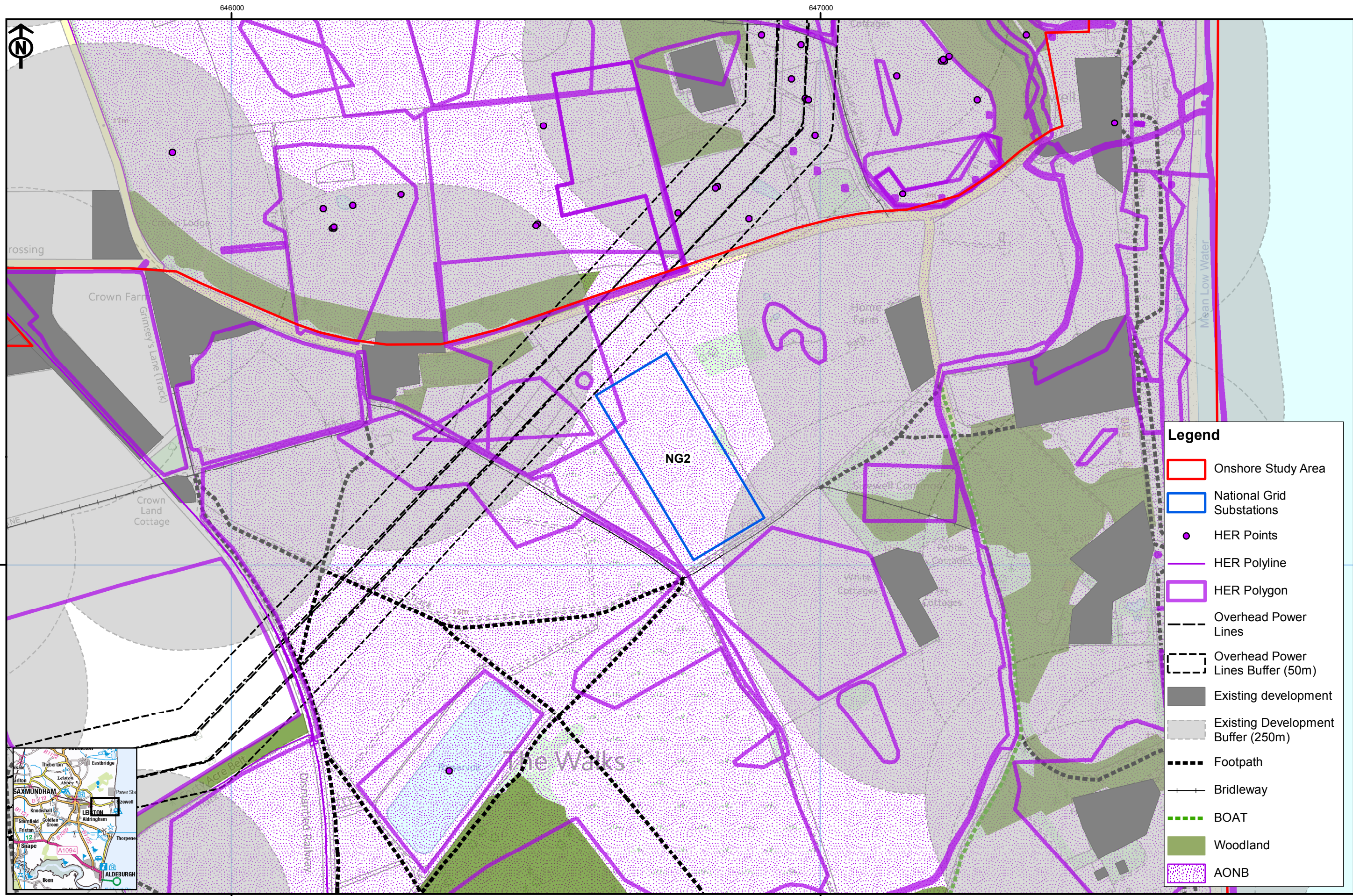
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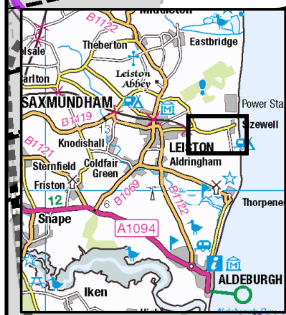
East Anglia ONE North & East Anglia TWO
Onshore Substation Options - NG4 Constraints

Drg No	xxxxxx	Volume	x
Rev	2	Date	03/12/2018
Date	03/12/2018	Figure	4.2
Layout	N/A		





- Legend**
- Onshore Study Area
 - National Grid Substations
 - HER Points
 - HER Polyline
 - HER Polygon
 - Overhead Power Lines
 - Overhead Power Lines Buffer (50m)
 - Existing development
 - Existing Development Buffer (250m)
 - Footpath
 - Bridleway
 - BOAT
 - Woodland
 - AONB



Rev	Date	By	Comment
2	03/12/18	FC	Second issue
1	30/01/18	AB	First issue

Original A3 Plot Scale 1:6,000

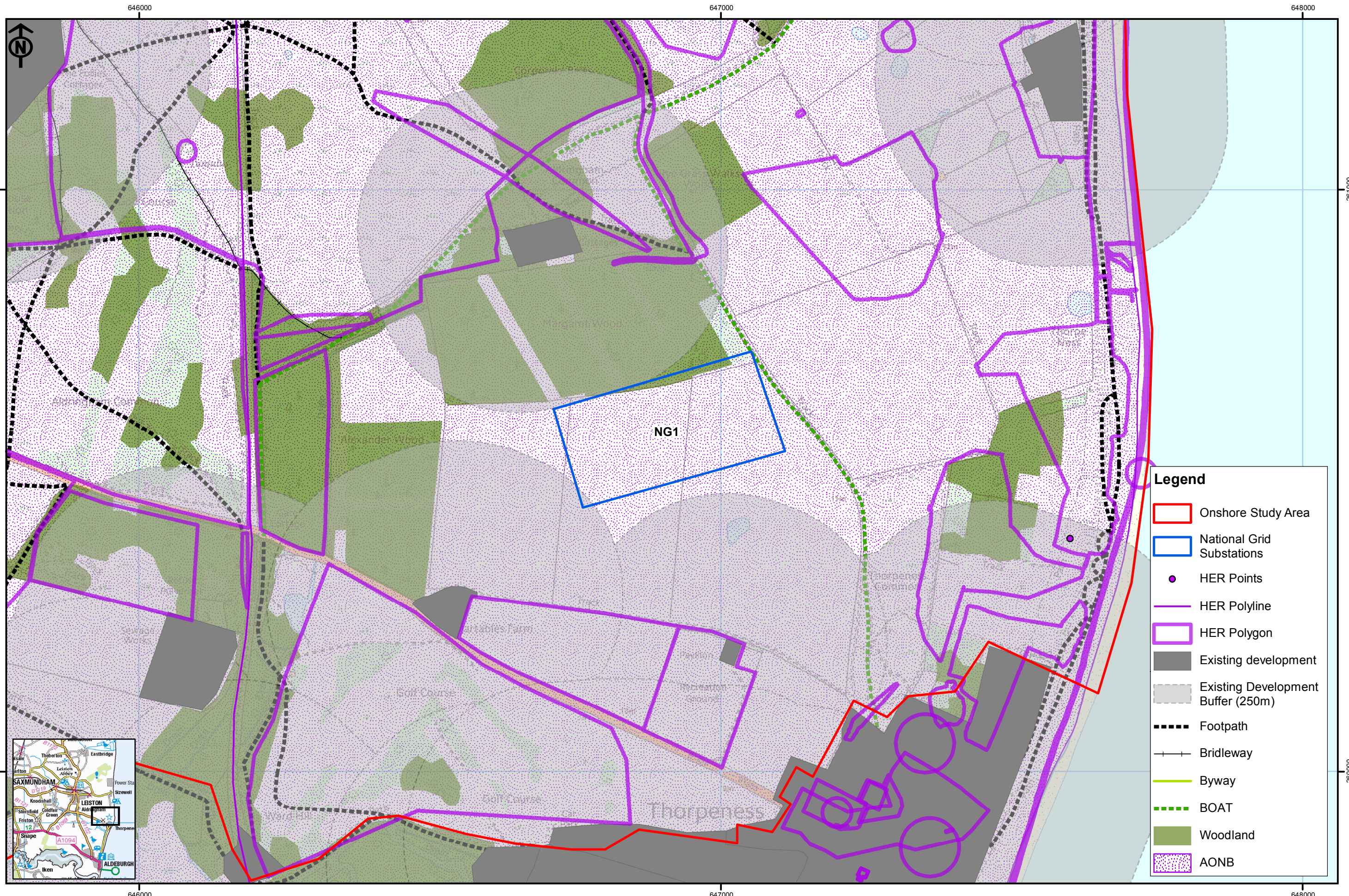
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East Anglia ONE North & East Anglia TWO
Onshore Substation Options - NG2 Constraints

Drg No	xxxxxx	Volume
Rev	2	x
Date	03/12/2018	Figure
Layout	N/A	4.3





- Legend**
- Onshore Study Area
 - National Grid Substations
 - HER Points
 - HER Polyline
 - HER Polygon
 - Existing development
 - Existing Development Buffer (250m)
 - Footpath
 - Bridleway
 - Byway
 - BOAT
 - Woodland
 - AONB



Rev	Date	By	Comment
1	03/12/18	FC	First issue

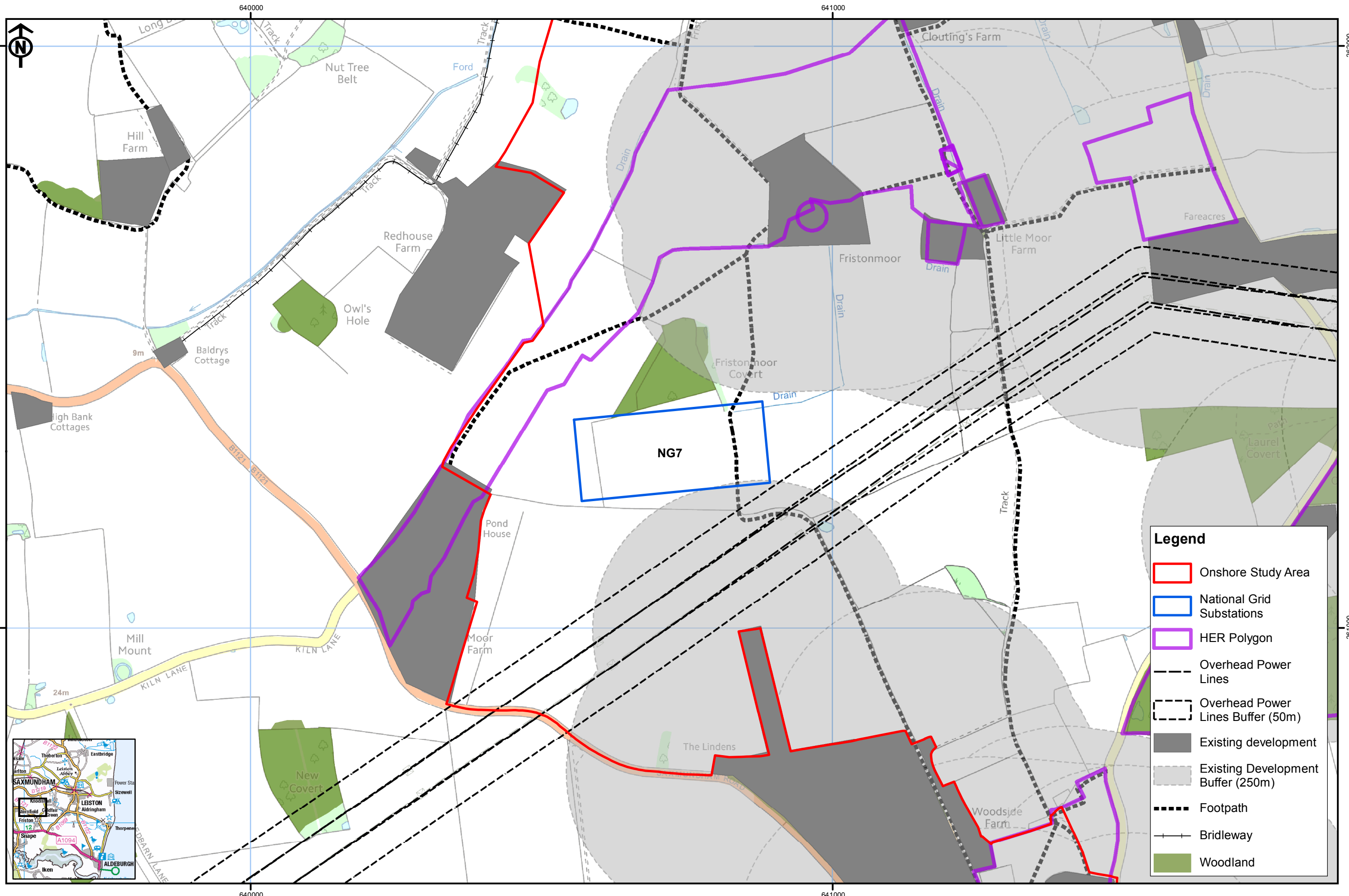
Original A3 Plot Scale 1:6,000

0 50 100 Metres

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East Anglia ONE North & East Anglia TWO
Onshore Substation Options - NG1 Constraints

Drg No	xxxxxx	Volume	x
Rev	1	Figure	4.4
Date	03/12/2018		
Layout	N/A		



Legend

- Onshore Study Area
- National Grid Substations
- HER Polygon
- Overhead Power Lines
- Overhead Power Lines Buffer (50m)
- Existing development
- Existing Development Buffer (250m)
- Footpath
- Bridleway
- Woodland



Rev	Date	By	Comment
2	03/12/18	FC	Scnd issue
1	30/01/18	AB	First issue

Original A3 Plot Scale 1:6,000

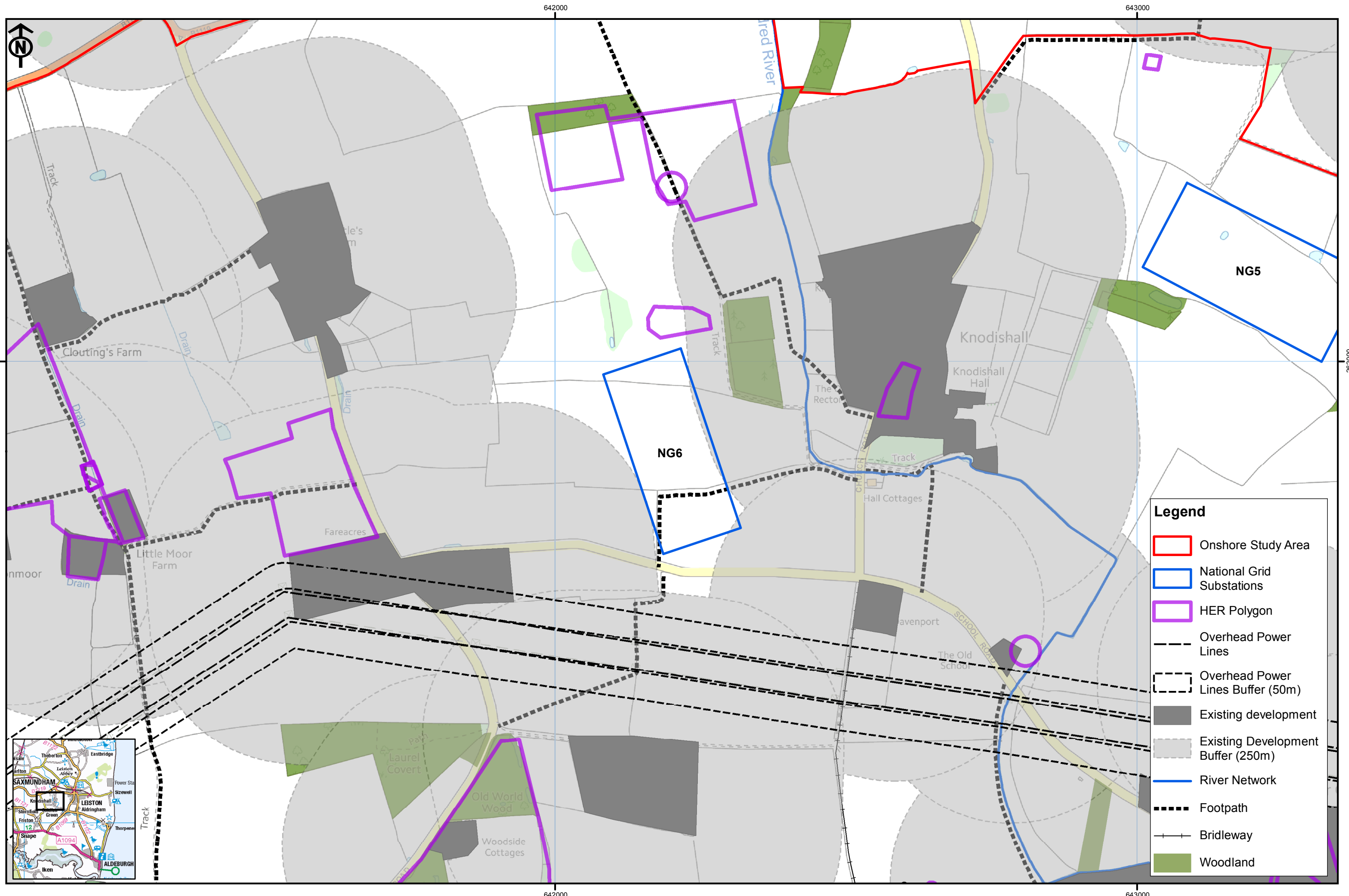
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East Anglia ONE North & East Anglia TWO
Onshore Substation Options - NG7 Constraints

Drg No	xxxxxx	Volume	x
Rev	2	Date	03/12/2018
Date	03/12/2018	Figure	4.5
Layout	N/A		





- Legend**
- Onshore Study Area
 - National Grid Substations
 - HER Polygon
 - Overhead Power Lines
 - Overhead Power Lines Buffer (50m)
 - Existing development
 - Existing Development Buffer (250m)
 - River Network
 - Footpath
 - Bridleway
 - Woodland



Rev	Date	By	Comment
2	03/12/18	FC	Second issue
1	30/01/18	AB	First issue

Original A3 Plot Scale 1:6,000

0 50 100 Metres

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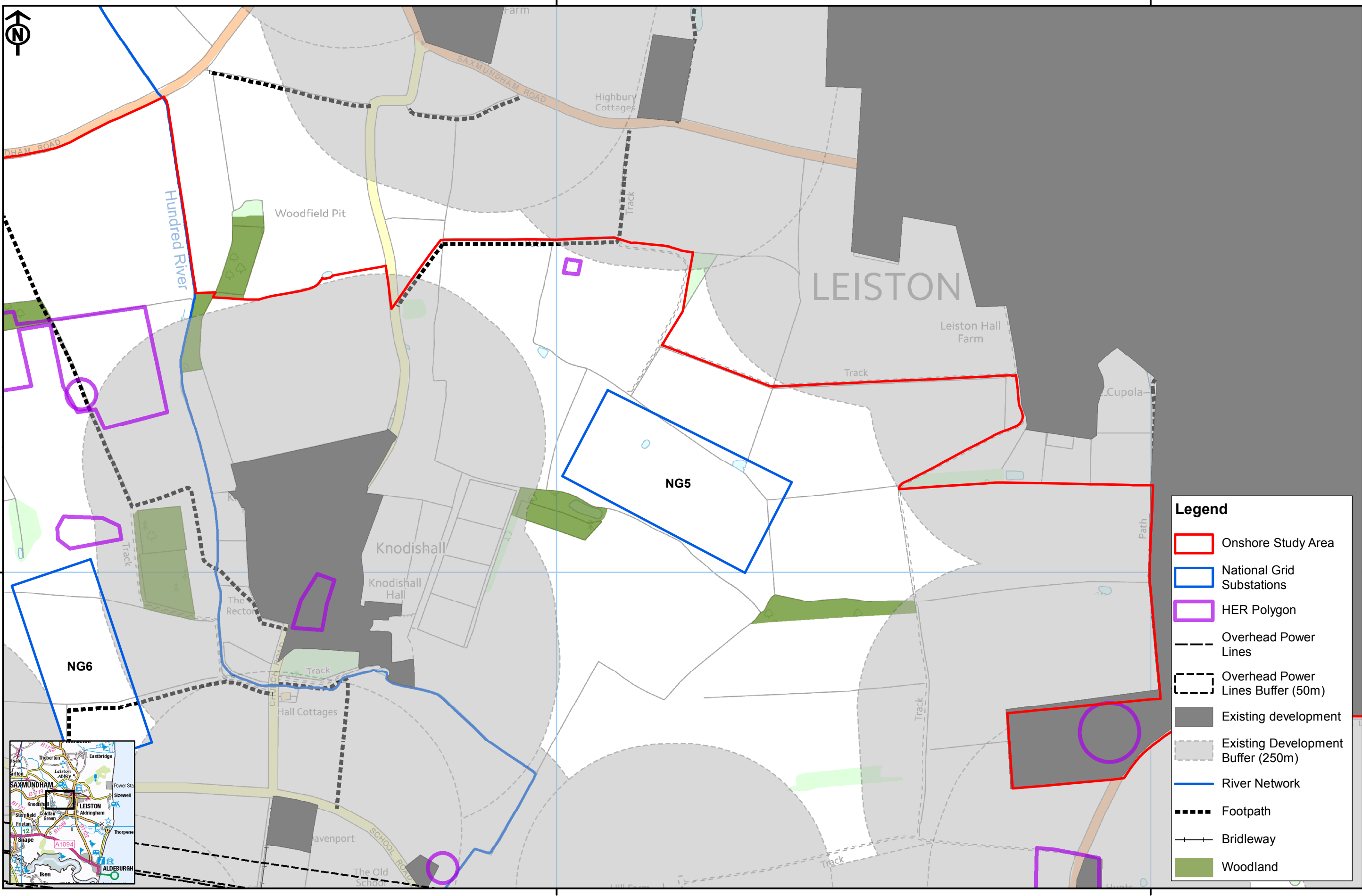
East Anglia ONE North & East Anglia TWO
Onshore Substation Options - NG6 Constraints

Drg No	xxxxxx	Volume	x
Rev	2	Date	03/12/2018
Date	03/12/2018	Figure	4.6
Layout	N/A		



643000

644000



Legend

- Onshore Study Area
- National Grid Substations
- HER Polygon
- Overhead Power Lines
- Overhead Power Lines Buffer (50m)
- Existing development
- Existing Development Buffer (250m)
- River Network
- Footpath
- Bridleway
- Woodland



643000

644000



Rev	Date	By	Comment
1	03/12/18	FC	First issue

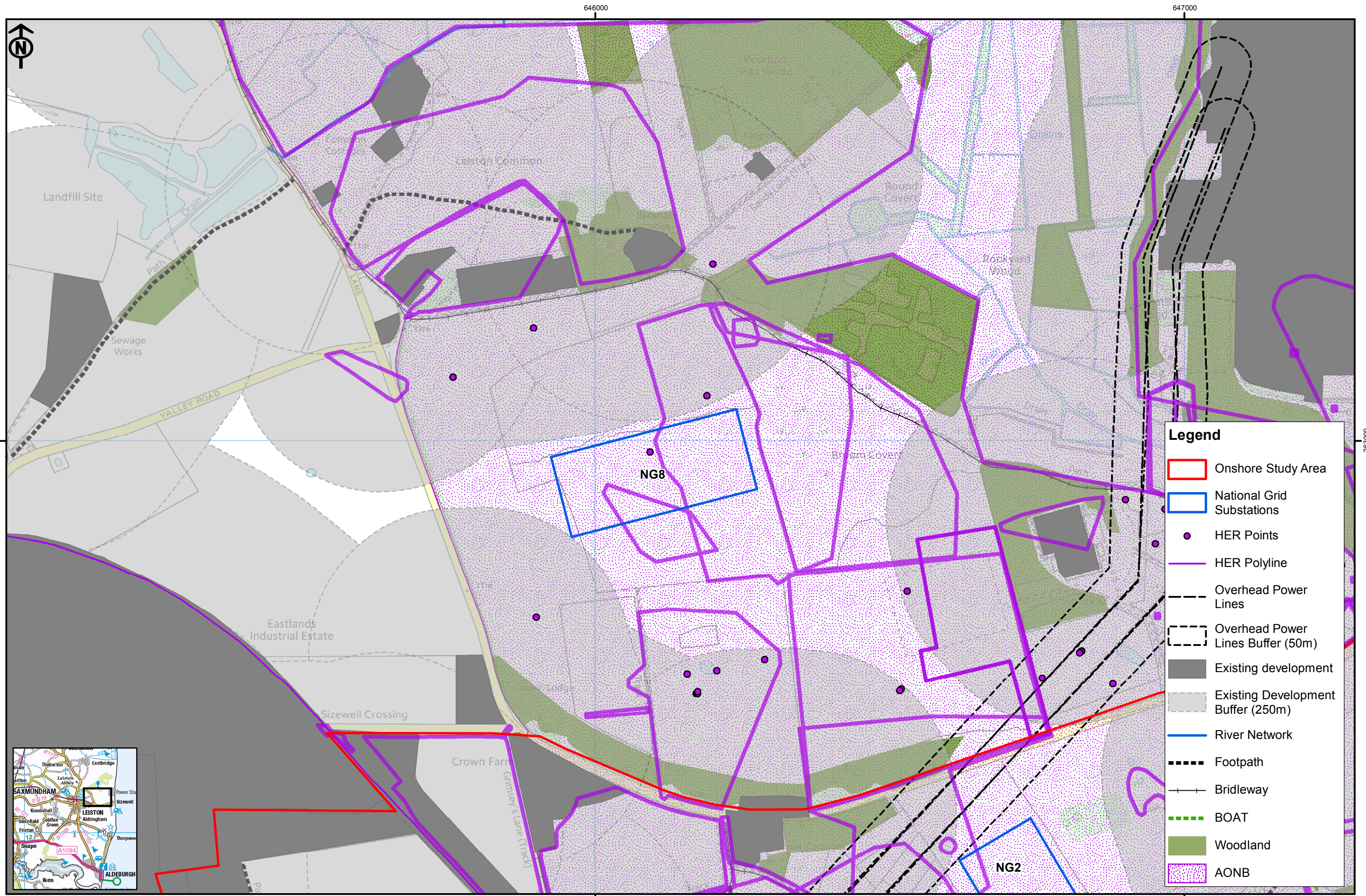
Original A3 Plot Scale 1:6,000

0 50 100 Metres

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East Anglia ONE North & East Anglia TWO
 Onshore Substation Options - NG5 Constraints

Drg No	xxxxxx	Volume	x
Rev	1	Figure	4.7
Date	03/12/2018		
Layout	N/A		



Legend

- Onshore Study Area
- National Grid Substations
- HER Points
- HER Polyline
- Overhead Power Lines
- Overhead Power Lines Buffer (50m)
- Existing development
- Existing Development Buffer (250m)
- River Network
- Footpath
- Bridleway
- BOAT
- Woodland
- AONB



Rev	Date	By	Comment
1	03/12/18	FC	First issue

Original A3 Plot Scale 1:6,000

0 50 100 Metres

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East Anglia ONE North & East Anglia TWO
 Onshore Substation Options - NG8 Constraints

Drg No	xxxxxx	Volume	x
Rev	1	Date	03/12/2018
Date	03/12/2018	Figure	4.8
Layout	N/A		