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RENEWABLES

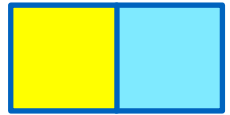
# East Anglia ONE North and East Anglia TWO Offshore Windfarms

## Onshore Substations Update Clarification Note

Applicants: East Anglia ONE North Limited and East Anglia TWO Limited  
Document Reference: ExA.AS-11.D3.V1  
SPR Reference: EA1N\_EA2-DWF-ENV-REP-IBR-001141

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Revision: Version 01  
Author: Royal HaskoningDHV

Applicable to **East Anglia ONE North** and **East Anglia TWO**



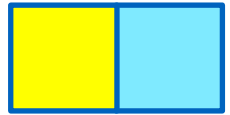
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<b>Rev</b>	<b>Date</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Approved by</b>
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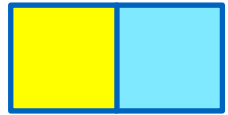
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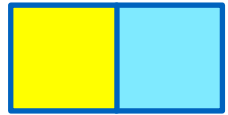
## Glossary of Acronyms

BAP	Biodiversity Action Plan
DCO	Development Consent Order
ES	Environmental Statement
HGV	Heavy Goods Vehicle
OLEMS	Outline Landscape and Ecological Management Strategy
OLMP	Outline Landscape Management Plan
SuDS	Sustainable Drainage System



## Glossary of Terminology

Applicants	East Anglia ONE North Limited / East Anglia TWO Limited
East Anglia ONE North project	The proposed project consisting of up to 67 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia TWO project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
National Grid substation	The substation (including all of the electrical equipment within it) necessary to connect the electricity generated by the proposed East Anglia ONE North project to the national electricity grid which will be owned by National Grid but is being consented as part of the proposed East Anglia ONE North project Development Consent Order.
National Grid substation location	The proposed location of the National Grid substation.
Onshore substation	The East Anglia ONE North substation and all of the electrical equipment within the onshore substation and connecting to the National Grid infrastructure.
Onshore substation location	The proposed location of the onshore substation for the proposed East Anglia ONE North project.



# 1 Introduction

1. This clarification note has been prepared by East Anglia TWO Limited and East Anglia ONE North Limited (the Applicants). It provides clarification on changes that have been made to elements of the East Anglia ONE North and East Anglia TWO projects (the Projects) as they are presented in their Development Consent Order (DCO) applications (the Applications). In particular, this clarification note details changes that have been made to the parameters of the onshore substations and National Grid substation and provides the reasoning behind these changes.
2. This document is applicable to both the East Anglia ONE North and East Anglia TWO DCO applications, and therefore is endorsed with the yellow and blue icon used to identify materially identical documentation in accordance with the Examining Authority's procedural decisions on document management of 23<sup>rd</sup> December 2019 (PD-004). Whilst this document has been submitted to both Examinations, if it is read for one project submission there is no need to read it for the other project submission.

## 1.1 Purpose

3. Since submission of the Applications, the Applicants have been refining the design of the onshore substations through engagement with the supply chain and design teams.
4. This clarification note outlines the following changes:
  - Reduction in the footprint of each of the onshore substations and their resulting relocation (as summarised in the **Project Update Note** (REP2-007) submitted at Deadline 2);
  - Lowering of the finished ground levels at the locations of the eastern onshore substations and National Grid substation (as summarised in the **Project Update Note for Deadline 3** (document reference ExA.AS-6.D3.V1); and
  - Reduction in the maximum heights of the buildings and external equipment at both onshore substations (as summarised in the **Project Update Note for Deadline 3** (document reference ExA.AS-6.D3.V1).
5. The reasoning behind these changes and a high-level review of their potential environmental benefits is also provided. More detailed information, including any updated assessment conclusions will be submitted at Deadline 4.



## 2 Onshore Substation Footprints

6. As set out in the **Project Update Note** (REP2-007) submitted at Deadline 2, since submission of the Applications the Applicants have undertaken engagement with the supply chain and design teams regarding the design of the onshore substations and as a result the maximum footprint of each onshore substation has now been reduced from 190m x 190m (as set out in **Table 6.27** of **Chapter 6 Project Description** of the Environmental Statement (ES) (APP-054)) to 190m x 170m. This represents an approximate 10% reduction in the footprint of each onshore substation. A comparison of the reduced footprints to those considered within the ES is shown on **Figure 1** in **Appendix 1**.

### 2.1 Environmental Considerations

7. The reduction in footprints has also facilitated the micrositing of the onshore substations to optimise their positioning relative to the surrounding environment. The following sections provide an overview of the potential benefits for some key environmental disciplines.

#### 2.1.1 Landscape and Visual Amenity

8. Reducing the footprints of the onshore substations allows for the western boundary of the westernmost substation to be relocated 40m to the north-east. This in turn allows for retention of an established woodland area (of around 2,700m<sup>2</sup> in area (0.27ha)) which would have previously been removed. This woodland will provide additional visual screening of the onshore substations and National Grid substation in views from the south and west.
9. Relocation of the westernmost onshore substation also creates an open area immediately south of the retained woodland. The Applicants have submitted an updated **Outline Landscape and Ecological Management Strategy** (OLEMS) (an updated version has been submitted at Deadline 3, document reference 8.7) to the Examinations at Deadline 3. The updated **OLEMS** includes additional post-construction screening woodland on this open area, further screening views from the south and south-west. Additionally, the onshore substations will be located slightly further from receptors to the west and south-west, including those in the village of Friston.
10. The Applicants have provided a selection of updated photomontages based on the reduced footprints in the **Updated Photomontages Clarification Note** (document reference ExA.AS-16.D3.V1), along with a high-level review of the potential landscape and visual benefits. More detail, including any required assessment updates, will be submitted at Deadline 4.



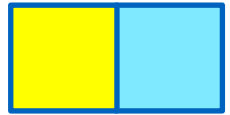
### 2.1.2 Onshore Ecology

11. As noted in **section 2.1**, the reduced onshore substation footprints allow for the retention of an area of semi-natural broadleaved woodland and areas of dense scrub. Although no evidence of protected species was noted within this area during the Extended Phase 1 Habitat Survey undertaken pre-application, there are habitats present that provide suitable opportunities for nesting birds that will no longer be lost.
12. The reduced onshore substation footprints remain on arable land. As presented in **section 22.6.1.2** of **Chapter 22 Onshore Ecology** of the ES (APP-074), arable land is typically of low ecological value due to the homogeneity of the habitat, as well as farming practises and the presence of insecticides and herbicides within crops. From an ecological perspective, it is considered that the additional post-construction screening woodland in the open area created by the footprint reductions is preferable to the existing arable land, augmenting the habitats provided by the retained semi-natural broadleaved woodland. In these locations the onshore substations will not result in the loss of arable field margins, a Priority Habitat in both the UK Biodiversity Action Plan (BAP) and Suffolk Local BAP.
13. While an updated **OLEMS** (an updated version has been submitted at Deadline 3, document reference 8.7) has been submitted at Deadline 3, the ecological mitigation measures previously identified remain unchanged and will subsequently be implemented to ensure compliance with industry and legal guidance afforded to onshore ecological receptors.

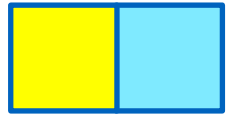
### 2.1.3 Hydrology, Hydrogeology and Flood Risk

14. The revised onshore substation locations remain within Flood Zone 1 and compliant with the National Planning Policy Framework, being located in an area at the lowest risk from fluvial flooding. Similarly, there will continue to be a low risk of flooding to the onshore substations from groundwater and sewers, and no risk of reservoir, canal, tidal or coastal flooding.
15. The revised onshore substation locations are in an area primarily at low risk of surface water flooding (i.e. outside the extent of the 1 in 1,000 year surface water flooding event). The substations will be further from the existing surface water flood extent to the south and west (see **Figure 2** in **Appendix 1**). This is likely to reduce their potential for altering flow paths and affecting conveyance for surface water.
16. There will be a decrease in hardstanding and impermeable surfaces at each onshore substation of approximately 3,800m<sup>2</sup> (0.38ha). This in turn will reduce the volume of runoff during rainfall events. The volume of attenuation storage that needs to be provided during an extreme event will also reduce, and furthermore





there will be a small increase in the potential area available (within the DCO Order limits) for further refinement of landscaping, Sustainable Drainage System (SuDS) and surface water drainage features. The area of semi-natural broadleaved woodland to be retained also has the potential to act as natural storage.



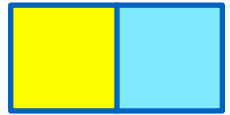
### 3 Finished Ground Levels

17. Since submission of the Applications, the Applicants have carefully reviewed engineering considerations at the onshore substation and National Grid substation locations (as summarised in the **Project Update Note for Deadline 3** (document reference ExA.AS-6.D3.V1). In particular, the estimated finished ground levels have been reviewed and it has been possible to lower these at two of the substation locations.
18. A comparison of the finished ground levels within the Applications and those now proposed is presented in **Table 3.1**.

**Table 3.1 Comparison of Finished Ground Levels**

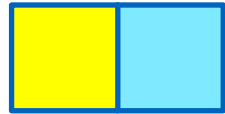
Substation Location	Level on which Application Photomontages are based (Chapter 29 (APP-077))	Revised Finished Ground Level (Estimated)
Onshore substation – east	20.7m Above Ordnance Datum (AOD)	18.7m AOD
Onshore substation – west	18.2m AOD	18.2m AOD
National Grid substation	18.9m AOD	18.2m AOD

19. To determine the revised estimated finished ground levels, while remaining cognisant of engineering constraints, it has been necessary to achieve a balance between the potential environmental impacts, ensuring that the benefits that can be secured for one discipline do not create result in adverse impacts for another.
20. Regarding landscape and visual amenity, **Figure 29.13** to **Figure 29.45** of the ES (photomontages) (APP-404 to APP-437) are based on finished ground levels identified in the second column of **Table 3.1**. Lowering the ground levels of the westernmost onshore substation (by 2m) and the National Grid substation (by 0.7m) will contribute to a reduction in visibility and the resulting visual effects, particularly for the easternmost onshore substation. The Applicants have provided a selection of updated photomontages based on the revised finished ground levels in the **Updated Photomontages Clarification Note** (document reference ExA.AS-16.D3.V1), along with a high-level review of the potential landscape and visual benefits. More detail, including any required assessment updates, will be submitted to the Examinations at Deadline 4.
21. Greater landscape and visual benefits may be achievable by further lowering the finished ground levels; however it is considered that this could have some adverse consequences. In particular, lower ground levels may lead to elements



of the Projects potentially interacting with groundwater. For example, lower ground levels would require a deepening of the SuDS ponds. Should these ponds become too deep they could be subjected to an inflow of groundwater that would prevent the opportunity for infiltration. Additionally, there is a surface water flow route within the northern boundary of the National Grid substation where further lowering of the ground levels could increase the potential for surface water flooding. Similarly, depending on how excavation materials are used on site, increased ground levels and slopes outside the substation footprints could lead to accelerated surface water runoff.

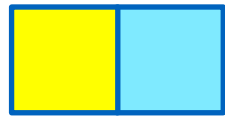
22. In determining the revised finished ground levels, the Applicants have also been cognisant of the potential traffic and transport impacts of exporting excess spoil from site. Assuming a single heavy goods vehicle (HGV) can carry 10m<sup>3</sup> (assumed topsoil density of 0.67t/m<sup>3</sup> and subsoil density of 2t/m<sup>3</sup>), various possible finished ground levels have been interrogated to ensure the optimal options for securing landscape and visual benefits have been selected without adversely increasing the number of HGV movements that will be required during construction.
23. In response to the 1.0.21(b) of the **Examining Authority First Written Questions** (PD-018), **Table 3.2** demonstrates the implications of lowering the finished ground levels within the Applications by up to 3m in 0.5m increments.



**Table 3.2 Implications of Lowering Finished Ground Levels up to 3m in 0.5m Increments**

Substation Location	Finished Ground Level	Notes	Approximate Cut Requirements for Substation Complex (m <sup>3</sup> )	Approximate Fill Requirements for Substation Complex (m <sup>3</sup> )	Approximate Balance (m <sup>3</sup> )	Approximate HGV Movements Required (two-way <sup>1</sup> )
Onshore substation – east	20.7m AOD	As per photomontages in the Applications	18,528	97,310	78,782 (fill to be imported)	3,939
Onshore substation – west	18.2m AOD	As per photomontages in the Applications				
National Grid substation	18.9m AOD	As per photomontages in the Applications				
Onshore substation – east	20.2m AOD	As per photomontages in the Applications MINUS 0.5m	26,110	87,881	61,771 (fill to be imported)	3,089
Onshore substation – west	18.2m AOD	As per the Deadline 3 photomontages / photomontages in the Applications (no change)				

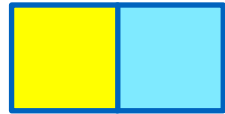
<sup>1</sup> A two-way movement represents the inbound (laden trip from source) and the outbound unladen trip (back to source). For example, 20 two-way movements comprise 10 laden trips from source and 10 outbound unladen trips back to source. The calculation of HGV movements assume that no surplus excavation materials will be re-used on site.



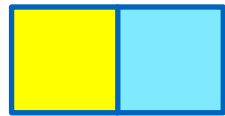
**Onshore Substations Update Clarification Note**  
15<sup>th</sup> December 2020

Substation Location	Finished Ground Level	Notes	Approximate Cut Requirements for Substation Complex (m <sup>3</sup> )	Approximate Fill Requirements for Substation Complex (m <sup>3</sup> )	Approximate Balance (m <sup>3</sup> )	Approximate HGV Movements Required (two-way <sup>1</sup> )
National Grid substation	18.9m AOD	As per photomontages in the Applications (no change)				
Onshore substation – east	19.7m AOD	As per photomontages in the Applications MINUS 1.0m	39,412	84,171	44,759 (fill to be imported)	2,238
Onshore substation – west	18.2m AOD	As per the Deadline 3 photomontages / photomontages in the Applications (no change)				
National Grid substation	18.9m AOD	As per photomontages in the Applications (no change)				
Onshore substation – east	19.2m AOD	As per photomontages in the Applications MINUS 1.5m	55,708	83,456	27,748 (fill to be imported)	1,387

**Onshore Substations Update Clarification Note**  
15<sup>th</sup> December 2020



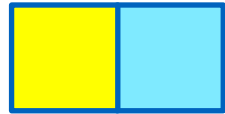
Substation Location	Finished Ground Level	Notes	Approximate Cut Requirements for Substation Complex (m <sup>3</sup> )	Approximate Fill Requirements for Substation Complex (m <sup>3</sup> )	Approximate Balance (m <sup>3</sup> )	Approximate HGV Movements Required (two-way <sup>1</sup> )
Onshore substation – west	18.2m AOD	As per the Deadline 3 photomontages / photomontages in the Applications (no change)				
National Grid substation	18.9m AOD	As per photomontages in the Applications (no change)				
Onshore substation – east	18.7m AOD	As per photomontages in the Applications MINUS 2.0m	72,998	74,390	1,392 (fill to be imported)	70
Onshore substation – west	18.2m AOD	As per the Deadline 3 photomontages / photomontages in the Applications (no change)				
National Grid substation	18.7m AOD	As per photomontages in the Applications (no				



## Onshore Substations Update Clarification Note

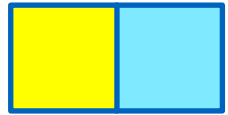
15<sup>th</sup> December 2020

Substation Location	Finished Ground Level	Notes	Approximate Cut Requirements for Substation Complex (m <sup>3</sup> )	Approximate Fill Requirements for Substation Complex (m <sup>3</sup> )	Approximate Balance (m <sup>3</sup> )	Approximate HGV Movements Required (two-way <sup>1</sup> )
		change) MINUS 0.2m				
Onshore substation – east	18.7m AOD	As per photomontages in the Applications MINUS 2.0m	75,856	53,887	21,969 (cut to be exported)	1,098
Onshore substation – west	18.2m AOD	As per the Deadline 3 photomontages / photomontages in the Applications (no change)				
National Grid substation	18.2m AOD	As per the Deadline 3 photomontages.				
Onshore substation – east	18.2m AOD	As per photomontages in the Applications MINUS 2.5m	92,866	53,887	38,979 (cut to be exported)	1,949
Onshore substation – west	18.2m AOD	As per the Deadline 3 photomontages / photomontages in				



Substation Location	Finished Ground Level	Notes	Approximate Cut Requirements for Substation Complex (m <sup>3</sup> )	Approximate Fill Requirements for Substation Complex (m <sup>3</sup> )	Approximate Balance (m <sup>3</sup> )	Approximate HGV Movements Required (two-way <sup>1</sup> )
		the Applications (no change)				
National Grid substation	18.2m AOD	As per the Deadline 3 photomontages.				
Onshore substation – east	17.7 AOD	As per photomontages in the Applications MINUS 3.0m	127,780	31,690	96,090 (cut to be exported)	4,805
Onshore substation – west	17.7 AOD	As per photomontages in the Applications MINUS 0.5m				
National Grid substation	17.7 AOD	As per photomontages in the Applications MINUS 1.2m				



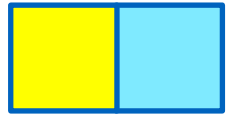


## 4 Building and Equipment Parameters

24. Through engagement with the supply chain, the Applicants can now commit to a reduction of the maximum building and external equipment parameters at the onshore substations (as summarised in the **Project Update Note for Deadline 3** (document reference ExA.AS-6.D3.V1). Together with the lowered estimated finished ground levels, it is considered that these revised parameters will contribute considerably to a reduction in visibility and the resulting visual effects.
25. A comparison of the parameters for key equipment and building within the Applications and those now proposed is presented in **Table 4.1**. The Applicants have provided a selection of updated photomontages based on the revised finished ground levels in the **Updated Photomontages Clarification Note** (document reference ExA.AS-16.D3.V1), along with a high-level review of the potential landscape and visual benefits. More detail, including any required assessment updates, will be submitted to the Examinations at Deadline 4.

**Table 4.2 Comparison of Onshore Substation Equipment / Building Parameters**

Equipment / Building	Height on which Application Photomontages are based (Chapter 29 (APP-077))	Revised Maximum Height	Notes
Harmonic filters	18m	14m	4m reduction in maximum height achieved
Lightning protection masts	25m	20m	5m reduction in maximum height achieved
Statcom building	15m	12m	3m reduction in maximum height achieved
GIS building	15m	14m	1m reduction in maximum height achieved



## 5 Revised Onshore Substation Layouts

26. The combination of reduced footprints and lowered ground levels has necessitated a minor rearrangement of the onshore substation layout. **Plate 5.1** and **Plate 5.2** provide a comparison of the 3D model used with the Applications and that based on the updates presented in this clarification note.
27. As noted, the Applicants have provided a selection of updated photomontages based on the revised finished ground levels in the **Updated Photomontages Clarification Note** (document reference ExA.AS-16.D3.V1); these are based on the 3D model presented as **Plate 5.2**. More detail, including any required assessment updates, will be submitted to the Examinations at Deadline 4.

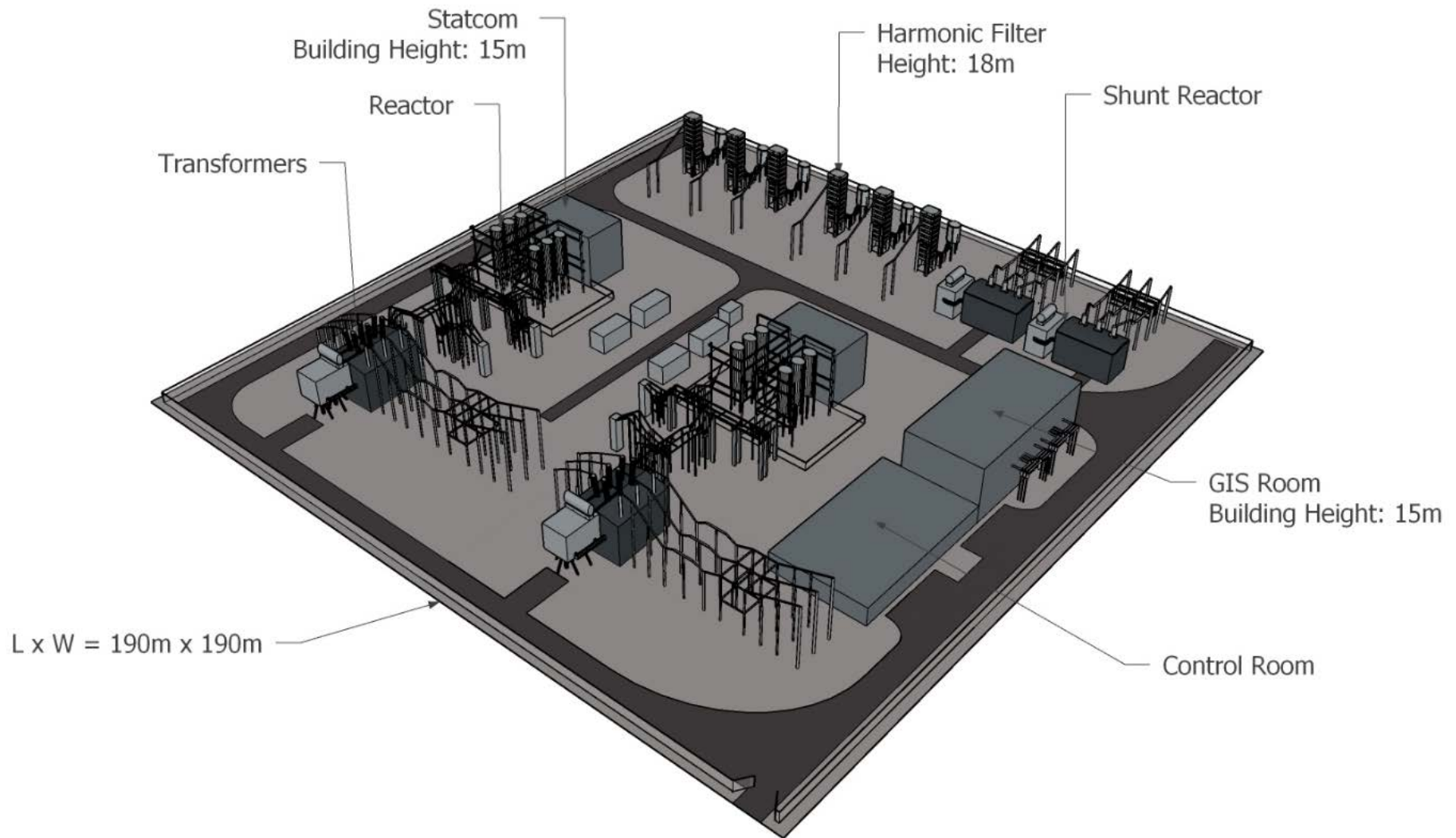
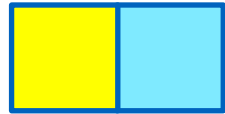


Plate 5.1: 3D model of the easternmost onshore substation as considered in ES (Plate 29.1 (APP-077))

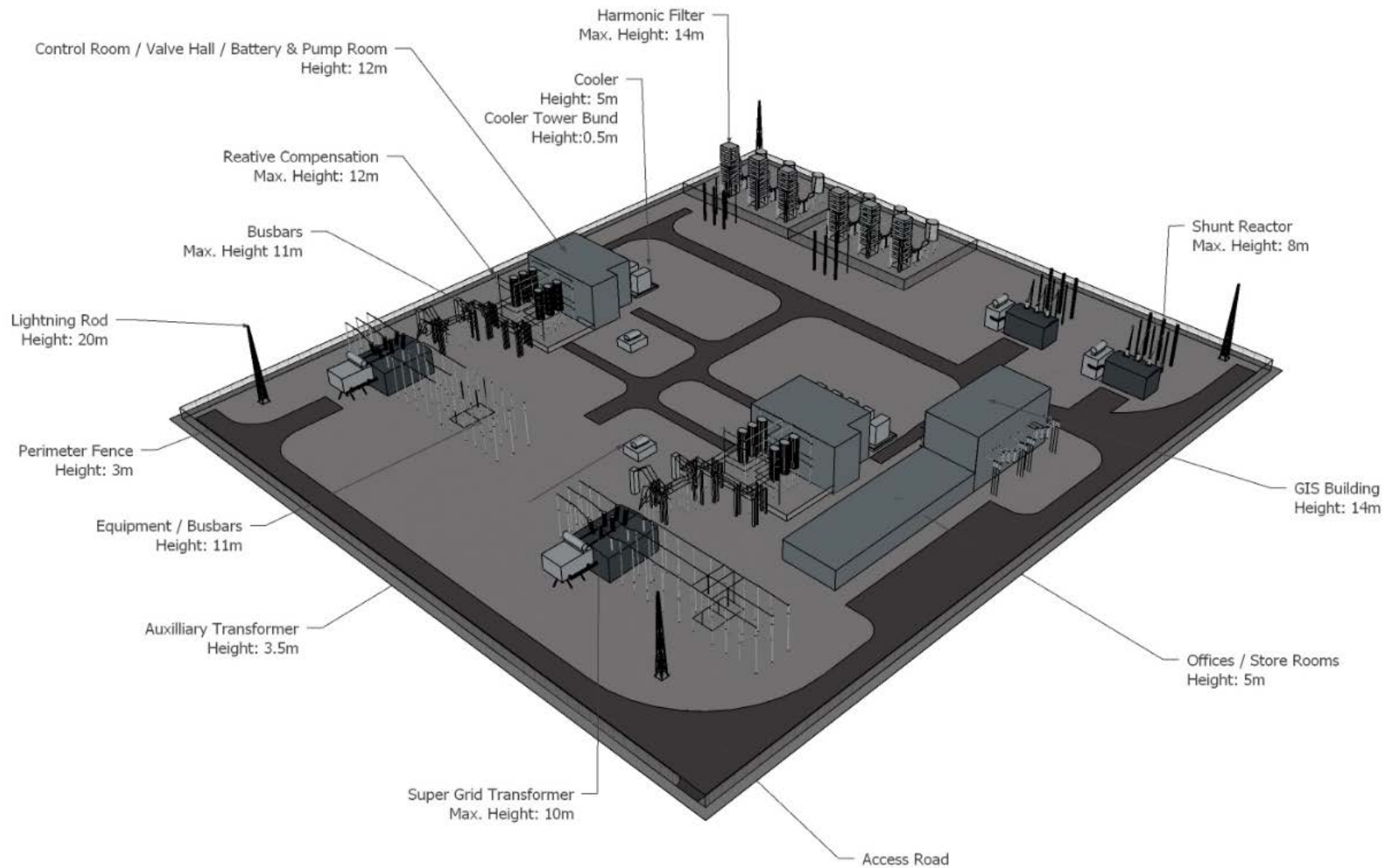
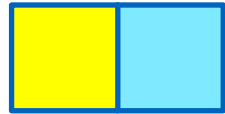
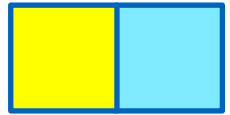
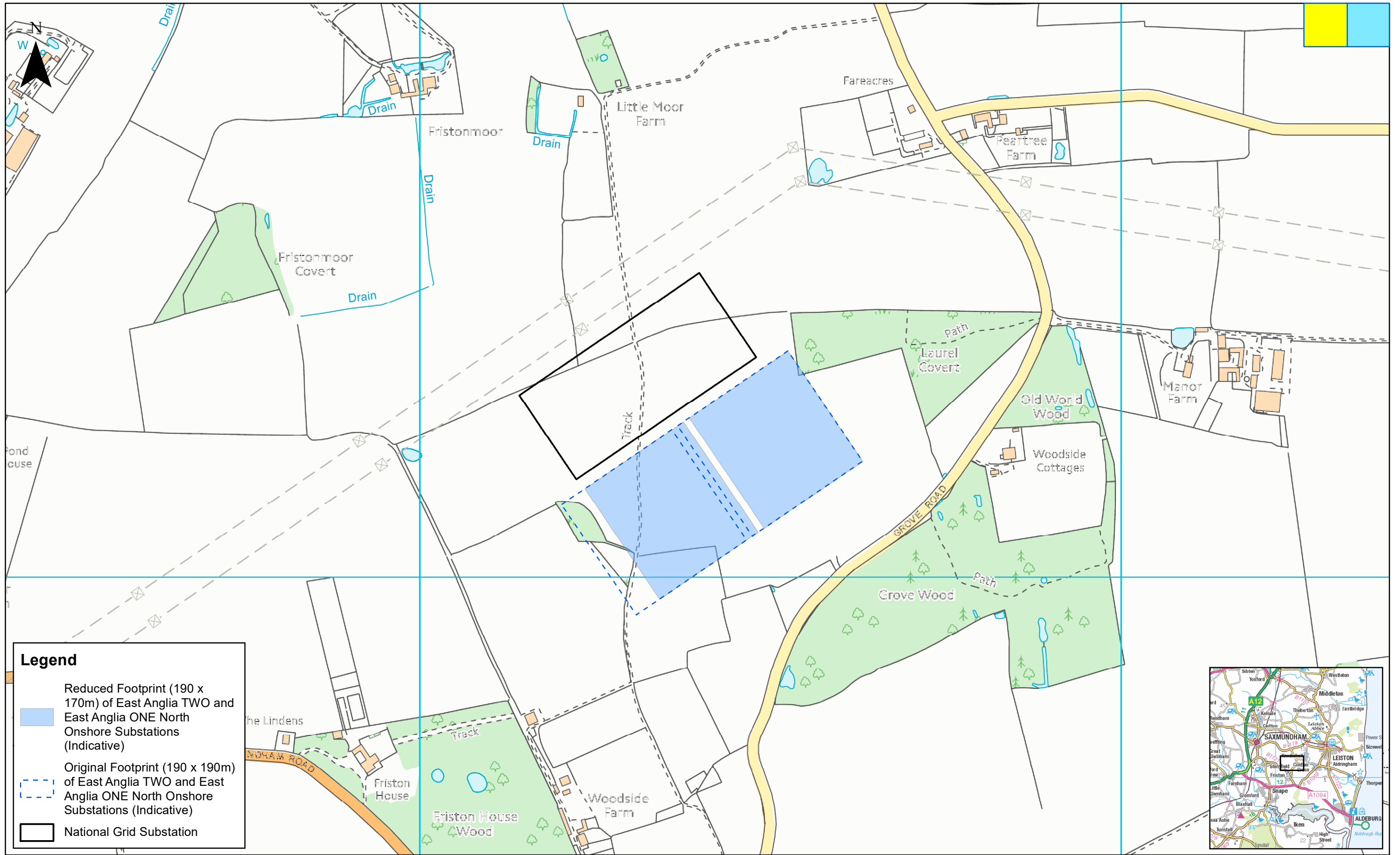


Plate 5.2: 3D model of the updated easternmost onshore substation showing reduced footprint and building / equipment parameters



# Appendix 1 Figures





**Legend**

- Reduced Footprint (190 x 170m) of East Anglia TWO and East Anglia ONE North Onshore Substations (Indicative)
- Original Footprint (190 x 190m) of East Anglia TWO and East Anglia ONE North Onshore Substations (Indicative)
- National Grid Substation



Rev	Date	By	Comment
1	16/11/2020	FC	First Issue.

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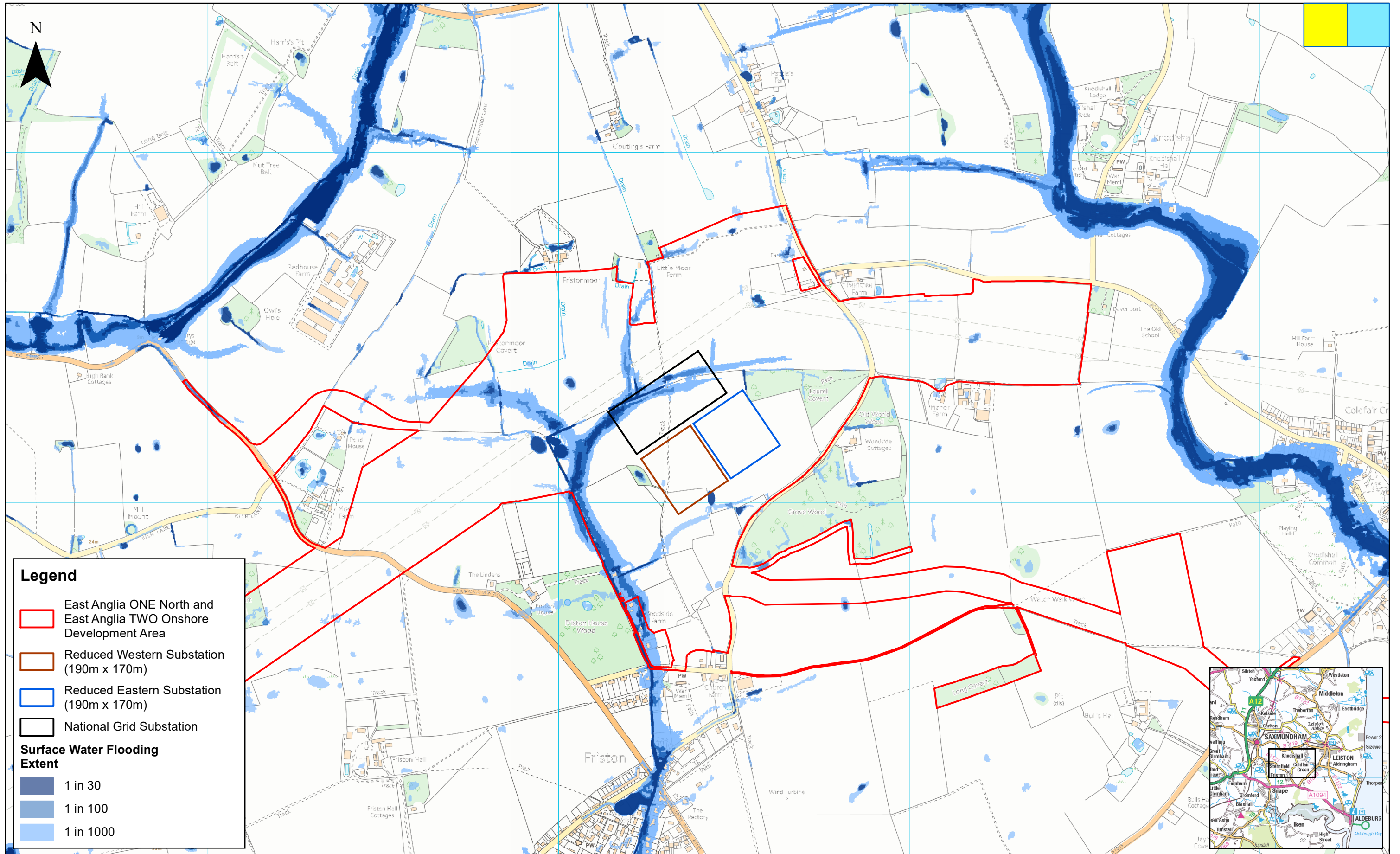
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Prepared: AB  
Checked: BD  
Approved: FM

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**East Anglia ONE North and East Anglia TWO**  
Reduced Footprint of Onshore Substations

Drg No	EA1N-EA2-DEV-DRG-IBR-001233
Rev	1
Date	16/11/20
Figure	1
Coordinate System:	BNG
Datum:	OSGB36



**Legend**

- East Anglia ONE North and East Anglia TWO Onshore Development Area
- Reduced Western Substation (190m x 170m)
- Reduced Eastern Substation (190m x 170m)
- National Grid Substation

**Surface Water Flooding Extent**

- 1 in 30
- 1 in 100
- 1 in 1000



Rev	Date	By	Comment
1	04/12/2020	AB	First Issue.

Prepared: AB  
 Checked: HW  
 Approved: BD

Scale @ A3  
 1:10,000

0 250 500 Metres

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**East Anglia ONE North and East Anglia TWO**

Surface Water Flood Risk

Drg No	EA1N-EA2-DEV-DRG-IBR-001256
Rev	1
Date	04/12/20
Figure	2
Coordinate System:	BNG
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