

East Anglia THREE

Chapter 4

Site Selection and Alternatives

Environmental Statement

Volume 1

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4 SITE SELECTION AND ALTERNATIVES

4.1 Introduction

1. This chapter presents the main stages in the site selection process for the proposed East Anglia THREE project, and the alternatives considered by East Anglia Offshore Wind (EAOW). EAOW were responsible for the initial site selection including identification of the location of offshore windfarm and associated cable corridor, and East Anglia THREE Limited (EATL) have been responsible for specific site selection activities for the proposed East Anglia THREE project including refining the red line boundary and micro-siting.
2. Site selection for the proposed East Anglia THREE project has been guided driven by five key factors:
 - The selection of the East Anglia Zone (and subsequent award of the Zonal Development Agreement to EAOW);
 - The Zone Appraisal and Planning (ZAP) process which identified areas of least constraint for windfarms within the Zone;
 - The grid connection agreement between EAOW and National Grid in November 2010, which confirmed Bramford, Suffolk as the grid connection point, and therefore enabled identification of offshore and onshore cable corridors and the Onshore Substation Location. The National Grid process for the identification of grid connection location is covered by the Connection and Infrastructure Options Note (CION) Process (National Grid 2015).
 - The site selection process and consideration of alternatives for the consented East Anglia ONE project which included consideration of two further projects, specifically in relation to the onshore cable route, landfall, offshore cable corridor and Onshore Substation Location; and
 - Consultation and technical investigations which led to site specific refinement of the East Anglia THREE windfarm site, Offshore and onshore cable routes and Onshore Substation Location.
3. The process of refining wider areas of search to determine the final site selection was an iterative one, requiring both environmental and engineering input at an increasingly detailed scale, and was widely consulted upon at every stage.
4. Each stage of the iterative site selection process is shown in *Diagram 4.1* below, and is described in more detail throughout this chapter.

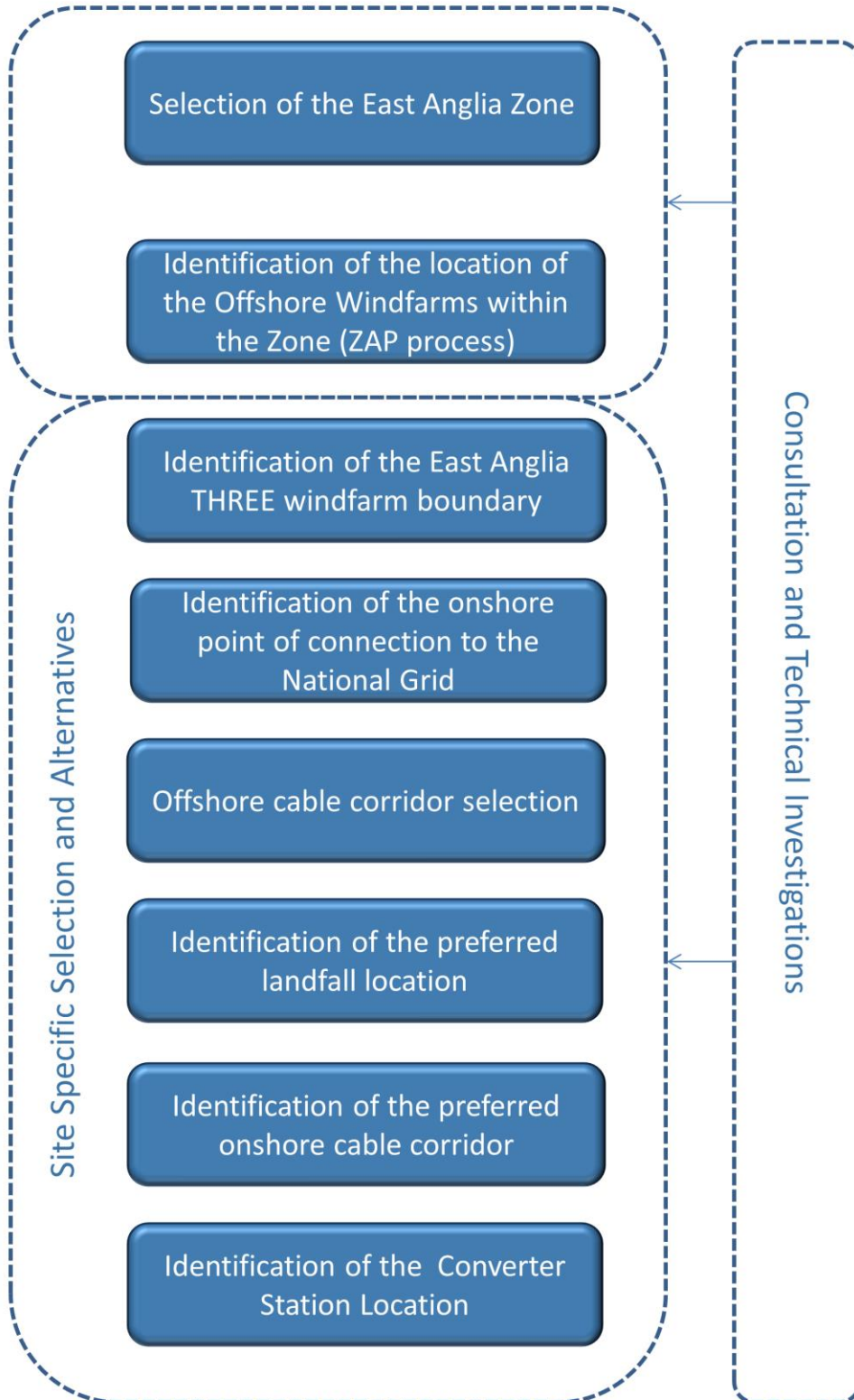


Diagram 4.1 The Site Selection Process

4.2 Identification of Round 3 Zones within the United Kingdom (UK)

5. The East Anglia Zone was identified as a suitable area offering ‘potential for offshore wind’ by The Crown Estate as part of the Round 3 Offshore Wind Zone tendering process in 2008. In their briefing note titled ‘Round 3 Offshore Wind Site Selection at National and Project Levels’ (The Crown Estate 2008), The Crown Estate explain the zone selection process which is summarised below.
6. The Crown Estate Round 3 zones were the subject of the Offshore Energy Strategic Environmental Assessment (OESEA) undertaken in 2008 and 2009 (The Department of Energy and Climate Change (DECC) 2009). The OESEA was prepared to assess the implications of further rounds of offshore wind farm leasing in the UK Renewable Energy Zone and the territorial waters of England and Wales, as well as the implications of other industry activities. The results of this strategic level analysis showed that the zones represent suitable ‘areas of opportunity’ for offshore windfarm projects, and have the ability to deliver the required capacity of energy from offshore wind within acceptable environmental limits. It was, however, recognised that there may be many local or regional constraints to the development of offshore windfarm projects within the zone boundaries.
7. The Crown Estate used their Marine Resource System (MaRS) Geographic Information System (GIS) tool to identify suitable areas for offshore windfarm development. The Round 3 zones were identified in an iterative process that took account of a number of constraints imposed by existing or future use of the sea and included consultation with a range of stakeholders (The Crown Estate 2012).
8. The finalised Round 3 zones identified by The Crown Estate in 2009, were then selected following the completion of a three stage iterative process involving consultation with a range of stakeholders.
9. The Crown Estate as competent authority for the Round 3 Plan has undertaken a full Habitats Regulations Assessment (HRA) at a planning level, which included an Appropriate Assessment (AA) for those sites where likely significant effects could not be excluded at screening stage. Outcomes of the plan level HRA are to be taken into consideration by developers as part of the process of zone and project development.
10. EAOW bid for the East Anglia Zone as part of the Round 3 tender process as they considered that on balance, considering the level of environmental and technical constraints present, as well as the potential capacity, good opportunities for development were likely.

11. Note that since the adoption of the East Offshore Marine Plan (HM Government 2014) the East Anglia Zone is covered by two policies; WIND1, which covers projects brought forward from Round 3 Offshore Wind Zone for agreement for lease (i.e. East Anglia ONE, and the proposed East Anglia THREE and East Anglia FOUR projects), and WIND2, which covers the rest of the East Anglia Zone. These policies take account of the work undertaken by The Crown Estate in identifying the Round 3 zones. WIND1 states that developments other than offshore windfarms:

“.....should not be authorised unless they can clearly demonstrate that they will not compromise the construction, operation, maintenance, or decommissioning of the Offshore Wind Farm”.

4.3 Zone Appraisal and Planning (ZAP)

12. The ZAP Process was introduced by The Crown Estate as a non-statutory strategic approach to zone design and project identification for each of the Round 3 zones. The main aims of the ZAP process are to:
- Optimise the development opportunity within the East Anglia Zone through identification of the most technically and environmentally suitable development sites;
 - Assess cumulative and in-combination impacts across the entire zone and in relation to other nearby offshore windfarm developments and marine activities; and
 - Encourage wider stakeholder engagement at a strategic level to help inform the longer term development strategy.
13. The initial ZAP process for the East Anglia Zone comprised two key elements:
- Zonal Technical Appraisal (ZTA) – focusing on the key physical characteristics of the Zone e.g. water depth and sea bed geology; and
 - Zonal Environmental Appraisal (ZEA) – focusing on key environmental, social and economic characteristics of the Zone.
14. As part of the ZAP process, EAOW established an expert panel of key consultees to provide valued input into the various stages of the process. The members of this panel were:
- Marine Management Organisation (MMO);

- Joint Nature Conservation Committee (JNCC) – also representing the interests of Natural England;
 - Civil Aviation Authority (CAA);
 - Maritime and Coastguard Agency (MCA); and
 - Trinity House.
15. The Crown Estate also participated as an observer.
16. The ZTA utilised data from zonal geophysical and geotechnical surveys, as well as from publicly available hydrographic and geological, to better understand the technical constraints within the zone. This included:
- Geological information and identification of distinct geological zones;
 - Geotechnical design parameters;
 - Identification of sea bed risks such as gas blanking and sea bed mobility; and
 - Known metocean information.
17. The ZEA utilised zonal data from environmental surveys (for example, ornithological surveys and benthic surveys) and desk-based assessments of publicly available and historical information. The key environmental constraints considered in the ZEA were:
- International Maritime Organisation (IMO) Deep Water Routes;
 - Oil and gas platforms and pipelines;
 - Active sub-sea cables;
 - Civil and military radar coverage and helicopter main routes;
 - Benthic habitats (including those listed in Annex I of the Habitats Directive);
 - Seascape and visual amenity;
 - Commercial fisheries activity;
 - Fish ecology;
 - Ornithology;

- Conservation designations;
 - Shipping and navigation;
 - Marine archaeology;
 - Physical processes; and
 - Underwater noise.
18. From the review of the initial ZEA baseline in combination with technical constraints considered in the ZTA, 11 potential Development Areas were identified as the least constrained parts of the Zone. These 11 areas comprised 3,243km² of the total Zone area of 6,037 km².

4.4 Site Specific Selection and Alternatives

4.4.1 East Anglia THREE Windfarm Boundary

19. The 11 potential development areas described above were further assessed by EAOW in order to prioritise a short list for preferred development. A direct comparison of the environmental sensitivity of all 11 areas was made using a high-level assessment of those constraints listed in paragraph 16. The most developable areas, i.e. those with the least number of potential issues and the lowest potential sensitivity were then identified.
20. As a result of this assessment of development potential, and on the basis of the initial ZAP process, three projects were considered to have relatively low sensitivity. These were, East Anglia ONE and the proposed East Anglia THREE and FOUR projects. East Anglia TWO was considered to have slightly greater sensitivity and therefore was not prioritised for development at that stage. Therefore, the proposed East Anglia THREE project was selected as part of the second phase of development within the East Anglia Zone to follow the development of East Anglia ONE.
21. Following the ZAP process the East Anglia THREE boundary has been refined through preliminary discussion with stakeholders to minimise impacts further. Information on the pre-application consultation that has been undertaken can be found in the Consultation Report submitted as part of the Development Consent Order (DCO) application.
22. All boundaries of conservation areas (e.g. Natura 2000) known at the time of the ZAP were specifically avoided through the boundary selection process. The resultant East Anglia THREE site was considered to be least sensitive. The East Anglia THREE site

boundary was amended in 2014 to allow for a 2nm buffer on the Deep Water Route to the East of the windfarm, this boundary is shown in *Figure 1.1*.

4.4.2 Consideration of alternatives

23. Consideration of alternative solutions has been limited to those which would deliver the same overall objective as the proposed East Anglia THREE project. These are detailed in Chapter 3 Policy and Legislative Context and include tackling climate change through the reduction of emissions, securing national energy supply and the promotion of competitive energy markets in the UK and abroad to encourage sustainable economic growth and improve productivity. Achieving these objectives will be challenging, even if the full potential of the offshore wind Round 3 zones and the other sites awarded by The Crown Estate is realised. Therefore, in the case of offshore wind, the consideration of alternatives to meet the project objectives should only consider alternative locations for offshore wind renewable energy developments and alternative forms of energy generation are excluded.
24. A robust programme of strategic and national level assessment has led to the selection of the Round 3 zones for offshore wind and within the zones, a process of Zonal Appraisal and Planning was conducted to identify the Project within the Zone, which includes consideration of resource and technical and environmental constraints. Therefore, EAOW concludes that due consideration of alternatives has been undertaken, in line with Government Policy and targets for renewable energy generation.

4.4.3 Grid Connection Location

25. In order to provide the most suitable grid connection offer to EAOW in 2009 and 2010, National Grid considered possible connection points both within the East Anglia area and across south-east England (National Grid 2015). This process identified the existing Bramford substation as the most suitable site to connect East Anglia ONE on an efficient and economic basis while also considering environmental and technical factors. National Grid also confirmed that this connection point could provide up to 3.6GW capacity; enough to connect the East Anglia ONE project and a further 2.4GW (or two 1.2GW projects). This connection location has therefore been selected for the proposed East Anglia THREE project.

4.4.4 East Anglia THREE Offshore Cable Corridor

26. The process of onshore cable route and offshore cable corridor selection for the proposed East THREE project was driven through the site selection process for the East Anglia ONE project.

27. The East Anglia THREE offshore cable corridor comprises two main parts. The first part is essentially the East Anglia ONE offshore cable corridor. This was identified through an initial broad area of search, with environmental and technical constraints then analysed to refine this in combination with consultation with relevant stakeholders. Further information on the pre-application consultation that has been undertaken can be found in the East Anglia THREE Consultation Report submitted as part of the DCO application.
28. The second part, which comprises the connection from the East Anglia THREE site to the East Anglia ONE offshore cable corridor, was defined through consideration of environmental and technical constraints.
29. Feedback from the Preliminary Environmental Information Report (PEIR) consultation (Phase IIa) as well as further internal workshops which reviewed slope analysis carried out on site specific bathymetry data, and wreck data from the magnetometer data were used to refine the route further. This was completed to only include the most likely route options (in terms of cost and engineering constraints) and in order to allow options for the export cables for the proposed East Anglia FOUR project to follow a similar route to Bramford, to inform the finalisation of the offshore cable corridor for the proposed East Anglia THREE project.
30. The offshore cable corridor is shown in *Figure 1.1*.

4.4.5 Landfall

31. During development of the East Anglia ONE project, a constraints mapping and engineering feasibility study was conducted to identify the most appropriate location for the East Anglia ONE offshore export cables, and those from two further projects within the Zone, to make landfall. The proposed East Anglia THREE project would therefore utilise the same landfall location.
32. Mapping of constraints at or near the shoreline identified three potential landfall locations based on the following key parameters:
 - Avoiding areas with substantial infrastructure or land use e.g. utilities, housing and coastal defences;
 - Avoiding areas with European, national and local ecological designations; and
 - Avoiding landscape and cultural heritage designations.
33. Possible landfall locations identified were:
 - Bawdsey Cliffs (between the Martello Tower and Bawdsey Manor);

- Between Felixstowe and Felixstowe Ferry; and
 - South of Harwich near Little Oakley.
34. Other potential options such as laying the export cables up one of the nearby river estuaries had been ruled out at an early stage through consultation and technical analysis. Further consultation (subsequent to the constraint mapping study) on the potential landfall location to the south of Harwich resulted in this option being ruled out.
35. An engineering feasibility study was commissioned to review the two remaining cable landfall options in terms of construction and cost. This included a review of beach and sea bed geology, tides and currents, fishing and anchorage interactions, potential access for cable vessels and cable protection requirements. In order to assess the movement and stability of the shoreline and shallow subtidal areas, and the effects of coastal management plans over the next 50 years, a coastal stability study was also commissioned. This study showed that the coast both north and south of the Deben is eroding and that erosion rates are likely to increase over time. The study also highlighted the instability of the sandbanks at the mouth of the Deben Estuary.
36. After taking the constraint mapping, the engineering feasibility study and consultation into account, the eventual landfall location chosen was a small section of the Suffolk coastline near Bawdsey. The site was deemed to be the preferred location for the following reasons:
- The landfall has the potential to accommodate cable requirements for three offshore wind projects to connect at Bramford;
 - The sea off the Bawdsey landfall is relatively sheltered in comparison with the strong tidal movement around the mouth of the Deben close to the Felixstowe Ferry landfall; and
 - There is the potential to avoid impacts on the Site of Special Scientific Interest (SSSI) designation at Bawdsey Cliffs through the use of horizontal directional drilling (HDD).

4.4.6 Onshore Cable Route

37. The onshore cable route for the proposed East Anglia THREE project was selected as part of the site selection work for the East Anglia ONE project. The route was determined during the development of the onshore electricity transmission works for the East Anglia ONE project. The onshore cable route was designed to be of

sufficient width to install cables for two future projects. The proposed East Anglia THREE project would therefore follow the same cable route as the East Anglia ONE project.

38. The East Anglia THREE export cables would be pulled through ducts to be installed during construction of East Anglia ONE project as stated within the East Anglia ONE Offshore Wind Farm Order 2014 (the Planning Inspectorate 2014). Installing the cables required for the East Anglia ONE project and ducts in which to lay cables for the proposed East Anglia THREE project at the same time reduces the amount of disturbance to the local area in terms of noise, dust, construction activity and traffic movements. See Chapter 5 Description of the Development for further details on the onshore cable route construction methods.
39. The East Anglia ONE onshore cable route was identified using an iterative process, and took into account additional infrastructure for the proposed East Anglia THREE project. Further information on the East Anglia ONE Onshore Cable Route site selection process is available in the East Anglia ONE Environmental Statement (ES) (EAOL 2012d). Limited amendments in relation to accesses specifically for the proposed East Anglia THREE onshore cable route have been made and these are detailed in section 4.4.6.1.

4.4.6.1 Amendments to the Onshore Cable Route relating to the proposed East Anglia THREE project

40. The Onshore Cable Route for the proposed East Anglia THREE project takes as its basis the Onshore Cable Route for East Anglia ONE, as described above. However, due to the commitment made to install ducts during construction of the consented East Anglia ONE project there are some minor differences in the area included within the East Anglia THREE red line boundary. The following paragraphs describe these differences.
41. In the original design iteration, it was assumed that all access to the onshore cable route would be made via those access points identified as accesses for East Anglia ONE. This would, in some locations, require the removal of hedgerow and reinstatement of haul road to access isolated locations for jointing pits (i.e. those locations which are far removed from field boundaries adjoining roads). However once the commitment had been made to install ducts for the proposed East Anglia THREE project cables during the construction of the East Anglia ONE project it was possible to further refine these access points as it would no longer be necessary to access all parts of the onshore cable route for the proposed East Anglia THREE project. This refinement of access points, undertaken by the East Anglia THREE

project team, aimed to reduce impacts to both the local community and the environment.

42. A list of 59 potential accesses along the onshore cable route was consulted upon within Phase IIb Consultation (see the Consultation Report submitted as part of the DCO application). Where possible, the accesses make use of existing tracks and where necessary the laying of haul road, therefore consultation with the landowners on whose land these tracks and haul road locations were located was required. Of the 21 responses to the Phase IIb consultation received, the majority provided information about the suitability of some of the accesses which had been proposed.
43. Following the consultation, the 59 accesses were reduced to the 38 displayed in *Figure 5.2 – 5.11*. The locations of the accesses have been designed to, as far as possible, reduce the requirement for the laying of haul road. A final consultation was undertaken on these accesses in the Phase III Consultation (see the Consultation Report submitted as part of the DCO application).
44. It is desirable to reduce the requirement for haul road for two reasons. Firstly, the bulk of the materials delivered to and taken off site will be for the creation of the haul road itself. Any reduction in haul road requirement would reduce overall material volumes and therefore vehicle movements. Secondly, if existing tracks could be upgraded to access remote jointing pit locations this would reduce disruption to arable fields (and hedgerows and other sensitive habitats) and potentially provide an upgrade to the local infrastructure.
45. The final onshore cable route, with the amendments discussed above, is the basis for the assessments within this ES and is shown in in *Figure 1.2*. *Figure 4.1* shows the onshore cable route in the context of environmental constraints, while *Figure 4.2* shows the onshore cable route in the context of statutory environmental designations.

4.4.7 Onshore Substation Location

46. The location of the proposed East Anglia THREE substation is influenced by the agreement with the National Grid for the connection of 3.6GW into the existing substation at Bramford.

47. The broad area within which the proposed East Anglia THREE substation¹ would be located was determined during the development of the East Anglia ONE project. Further detail on this is available in the East Anglia ONE ES (EAOL 2012d).
48. The East Anglia ONE converter station site selection process identified two additional converter station locations within close proximity to the East Anglia ONE converter station location. These locations were determined at an early stage of the process, predominantly based on landscape and engineering considerations. These footprints were then assumed for the cumulative landscape assessment for East Anglia ONE.
49. During the Preliminary Environmental Information (PEI) works for East Anglia THREE, EATL reviewed the locations of converter stations assumed for the East Anglia ONE assessment. The East Anglia ONE project has now been granted consent and its converter station location finalised. For the purposes of this assessment, it has been assumed that East Anglia THREE substation will remain at the location identified in the East Anglia ONE assessment. The East Anglia THREE substation location is shown in *Figure 4.4*.

4.5 Summary

50. The site selection process for the East Anglia THREE site and offshore cable corridor was an iterative one involving the consideration of technical constraints and environmental effects through initial zone selection undertaken by The Crown Estate, the ZAP process and further detailed site specific studies conducted by EAOW. These processes involved consultation with a range of stakeholders and the collation of existing and site specific data in order to refine broad areas of search into the boundaries for the proposed East Anglia THREE project.
51. For the onshore electrical transmission works (i.e. landfall, onshore cable route and onshore substation location) the site selection process was undertaken on the basis of the agreed National Grid connection at Bramford and the intention that the East Anglia THREE onshore cable route would follow that identified during the East Anglia ONE project. Each part of the site selection and refinement process has been consulted on to date, and feedback from these consultations has been instrumental in determining the final areas included for the onshore electrical transmission works. With regard to the potential new access locations, the consultation under Section 42, Section 44 and Section 47 of the Planning Act 2008 as well as informal

¹ Note that all of the East Anglia Zone projects were intended to utilise the HVDC solution, which would require a converter station at the grid connection point. Therefore the terminology for site selection refers to converter stations. This has been retained here to prevent confusion when referencing the original consultation. However, as the LFAC solution is now within the Project Design Envelope the grid connection point is now referred to a substation.

consultation by the project team has provided an opportunity for stakeholders to review these locations and provide feedback on them to EATL for consideration for inclusion within this ES.

4.6 References

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Chapter 4 Ends Here