



East Anglia THREE Appendix 21.2 Flood Risk Assessment

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21.2 FLOOD RISK ASSESSMENT

21.2.1 Project Description

- 1. The proposed East Anglia THREE project is the second project to be developed within the East Anglia Zone, in the southern North Sea off the coast of East Anglia. The proposed East Anglia THREE project consists of 172 wind turbines with an installed generating capacity of up to 1,200 megawatts (MW). It would comprise offshore wind turbines and offshore electrical platforms, and offshore and onshore export cables taking power to an onshore substation. The western boundary of the proposed East Anglia THREE site is approximately 69km from the port of Lowestoft.
- 2. East Anglia THREE Limited (EATL) is currently considering both a High Voltage Direct Current (HVDC) and a Low Frequency Alternating Current (LFAC) electrical solution for the proposed East Anglia THREE project. It is proposed that offshore export cables from the project would make landfall near Bawdsey in Suffolk and the 37km long onshore cable route would continue from this point to the substation(s) location adjacent to an existing National Grid substation near Bramford.
- 3. The proposed East Anglia THREE project would install the cables within ducts that would be installed as part of the East Anglia ONE cable installation. Activities to facilitate the export cable installation would include installation of haul road at locations along the onshore cable route, creation of construction consolidation sites, excavations and backfilling at junction bay locations, construction of jointing bays, cable pulling between jointing bays, and construction of a substation(s).

21.2.2 Aim of the Flood Risk Assessment

- 4. This Flood Risk Assessment (FRA) has been produced in accordance with the National Planning Policy Framework (NPPF) published in March 2012, and associated guidance from the Planning Practice Guidance: Flood Risk and Coastal Change (PPG), updated in March 2014.
- 5. The flood risk principles within the NPPF are to avoid inappropriate development in areas at risk of flooding and, wherever possible, to direct development away from areas of highest risk. Local authorities should steer development to Flood Zone 1 (low risk), and only consider development in, sequentially, Flood Zones 2 and 3 if there are no appropriate and reasonably available sites in an area of lower flood risk.
- Most planning applications for new development will need to be accompanied by a FRA. The FRA should be appropriate to the scale, nature and location of the development. The assessment should demonstrate to the decision-maker how flood



risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its users.

7. This FRA defines the existing flood risk at the location of the substation(s) and along the onshore cable route and assesses the flood risk to the development and surrounding areas. The FRA identifies and assesses the risks from all sources of flooding to and from the development, including estimating the impact of future climate change. This assessment is then used to inform the identification of flood risk mitigation measures where appropriate.

21.2.3 Project and Site Description

21.2.3.1 Existing Site Description

- 8. The offshore export cables from the proposed East Anglia THREE project would make landfall near Bawdsey in Suffolk and the 37km long onshore cable route would continue from this point to the substation(s) location adjacent to an existing National Grid substation near Bramford located at NGR: TM 095 463. The total area for the substation(s) compound would be approximately 3.04ha.
- 9. The substation(s) compound would be directly bounded the East Anglia ONE converter station, landscaping and bunding, open agricultural land and the existing Bramford Substation close by to the south.
- 10. There are five existing overhead line circuits originating from the northern boundary of the National Grid substation. These circuits consist of one 132kV overhead line running to the north, two 400kv overhead lines running to the north-east, and one to the north which are located adjacent to the eastern boundary of the East Anglia THREE substation. One further circuit runs south of the East Anglia THREE substation, on a westerly then the south-westerly trajectory.

21.2.3.2 Drainage

11. The area surrounding the substation(s) compound contains a number of surface water features including a number of ponds and surface drains. These are possibly associated with water retention and drainage for irrigation and agricultural purposes.

21.2.3.3 Geology and Groundwater

12. The underlying bedrock geology of the wider Suffolk area is principally Cretaceous Chalk. This is generally overlain by Tertiary and Quaternary deposits apart from locations in the north-west of the county. In central parts of the county the Cretaceous Chalk is generally overlain by Tertiary London Clay, whereas in the eastern coastal regions the overlying strata a formed from areas of The Crags (Red



Crag and Caroline Crag marine deposits). There is also evidence of Quaternary Till (boulder clay) over the majority of the county, with areas of Glacial Gravels to be found to the east.

21.2.3.4 Proposed Project

- 21.2.3.4.1 Main Onshore Activities
- 13. There are two approaches for the construction of the proposed East Anglia THREE project:
 - Single Phase a single phase (up to 1200MW installed in a single construction period); or
 - Two Phased two phases of up to 600MW each, with the start date of each phase of works separated by no more than 18 months).
- 14. Ducts (including all horizontal directional drilling (HDD) operations) for the onshore cables for the proposed East Anglia THREE project will be installed during the construction of East Anglia ONE.
- 15. Therefore, under the Single Phase approach, for construction of the proposed East Anglia THREE project the following works would be required:
 - If the short duct method if used at the landfall, a ramp would be required to access the beach;
 - Creation of one transition bay compound near to the landfall location;
 - Installation of one transition bay compound to connect the offshore shore export cables and the onshore export cables;
 - Installation of up to two jointing bays (assuming up to two cables are jointed in each bay) at up to 62 locations along the cable route;
 - Creation of one jointing bay construction compound at up to 62 locations along the onshore cable route, each with a hardstanding area of 775m² within a compound of 3,740m².
 - Construction Consolidation Sites (CCS) seven sites covering an aggregated area of up to 1.32ha;
 - Access via existing roads and tracks and therefore haul road is required only where joints are placed in remote areas. A maximum of 18.05km of 5.5m width





haul road is required. Temporary track matting may be required if ground conditions are very poor;

- Transport to site, cable pulling and jointing at up to 124 (each with 2 cables so 248 joints) jointing bays;
- Installation of up to 248 kiosks for cable maintenance; and
- Up to 300m of open trenching for cables from the end of pre-installed ducts to the substation(s);
- One substation within a 3.04ha compound;
- Up to 235m of open trenching for cables from the substation(s) to ducts preinstalled by National Grid; and
- Reinstatement of land.
- 16. Under a Two Phased approach the following works would be required:
 - If the short duct method if used at the landfall, a ramp would be required to access the beach;
 - Creation of two transition bay compounds (one during each Phase) near to the landfall location;
 - Installation up to two transition bay compounds (one during each Phase) each to house up to two joints between the offshore export cables and the onshore export cables;
 - Creation of two jointing bay construction compounds (one during each Phase) at up to 62 locations along the onshore cable route;
 - Installation of up to two jointing bays (assuming two cables are jointed in each bay in each in Phase 1 and two jointed in each bay in Phase 2) at up to 62 locations along the cable route, each with a hardstanding area of 775m² within a compound of 3400m²;
 - CCS seven sites covering an aggregated area of up to 1.32ha;
 - Access via existing roads and tracks and therefore haul road is required only where joints are placed in remote areas. A maximum of 18.05km (of 5.5m width) haul road is required. Temporary track matting may be required if ground conditions are very poor. As a worst case scenario, it is assumed that all haul





road will be removed and the ground reinstated on completion of Phase 1 and will be replaced and then removed again during Phase 2;

- Transport to site, cable pulling and jointing at up to 124 (62 during Phase 1 and 62 during Phase 2) (each with 2 cables so 248 joints) jointing bays;
- Installation of up to 248 kiosks for cable maintenance; and
- Up to 300m of open trenching for cables from the end of pre-installed ducts to the substation(s);
- Up to two substation(s) within a 3.04ha compound;
- Up to 235m of open trenching for cables from the substation(s) to ducts preinstalled by National Grid; and
- Reinstatement of land.
- 17. Full details of the Single Phase and Two Phased approaches are provided within Chapter 5 Description of the Development.
- 18. The final routeing of cables connecting into the substation is not known at the current time. Therefore the pre-installed ducts will end just beyond the western boundary of the screening trees and bunding installed by East Anglia ONE to the east of the East Anglia THREE substation. Therefore the final stretch of cables will be open trenched from the end of the ducts to the substation. This will be a maximum distance of 300m. Likewise, National Grid will install ducts to connect into the existing Bramford substation but these will end at the boundary of the National Grid land, therefore EATL will need to open trench up to the end of these ducts, a distance of up to 235m. In both cases the cables would be laid directly into trenches.
- 19. As discussed in Chapter 5 Description of the Development (section 5.6.6.2.2) East Anglia THREE Limited (EATL) will investigate opportunities to leave haul road in place between projects and/or phases to further minimise impacts, this would be dependent upon the agreement of individual landowners and the approval of the local planning authorities. EATL consider that for flood risk it would be more disruptive for all receptors to install and remove haul road twice under the Two Phased approach due to the increased disturbance to the ground, than to leave it in situ. In addition, given that locations where haul road would be left in place is dependent upon individual landowner decisions and local authority approval, at this stage it is not possible to determine where this may occur and which receptors would be affected. Therefore, this potential case is not assessed independently as it



is considered that the impacts of leaving the haul road in situ between phases falls within the magnitude of effects assessed under the two construction approaches presented.

20. During the operational phase, routine maintenance works would be required along the onshore cable route. However, access would be made at jointing bay locations via kiosks.

21.2.3.4.2 Embedded Mitigation Measures

- 21. The proposed East Anglia THREE project would include a series of mitigation measures that are embedded into the proposed East Anglia THREE project in order to minimise or entirely remove potential impacts on surface, ground water and flood risk receptors. The main measures include:
 - The jointing bays will be located at least 10m from surface watercourses;
 - The jointing bays will have a maximum depth of 2.5m. This will minimise intrusion into the groundwater bodies and minimise impacts on groundwater;
 - The substation(s) will incorporate a sustainable drainage system (SuDS) to attenuate any increases in flow volumes resulting from a change in land use and surface water runoff potential to increase flood risk; and
 - Any foul drainage arising from the substation(s) site will not be discharged to surface waters.

21.2.4 National Planning policy

21.2.4.1 National Planning Policy Framework (2012) and Planning Practice Guidance: Flood Risk and Coastal Change (2014)

- 22. Published in 2012, the NPPF set out the requirements for FRAs. Further to this, the 2014 release of Planning Practice Guidance in support of the NPPF includes detailed flood risk guidance, including the Sequential and Exception Tests, climate change allowances and development classifications. The information contained in the new Planning Practice Guidance, together with the NPPF and the British Standard BS 8533-2011 form the basis of flood risk documentation. Due consideration has also been given to the Flood and Water Management Act, 2010, discussion in section 3.2 below.
- 23. The NPPF sets out the criteria for development and flood risk by stating that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. However, where development is



necessary in areas at risk of flooding, the development must be made safe and must not increase flood risk elsewhere (paragraph 100 of the NPPF). The key definitions that come from Section 1 of the Planning Practice Guidance: Flood Risk and Coastal Change (DCLG, 2014) are:

- "Areas at risk of flooding" for fluvial (river) and sea flooding means land within Flood Zones 2 and 3 or land within Flood Zone 1 that has critical drainage problems and has been notified to the local planning authority by the Environment Agency; and
- "Flood risk" is a combination of the probability and consequences of flooding from all sources, including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.

21.2.4.2 Flood and Water Management Act 2010

- 24. The Flood and Water Management Act combines and progresses principals from three previously published UK Government papers: Future Water (2008); Making Space for Water (2008) and the Pitt Review (2008).
- 25. In conjunction with the Environment Agency's strategic role in flood risk management, the Act gives Local Authorities responsibility, as Lead Local Flood Authorities (LLFAs) for managing flood risk from groundwater, surface water, and ordinary watercourses in their areas. In particular, the Act emphasises the importance of understanding the impacts of surface water flooding and ensuring effective management of surface water runoff.

21.2.5 Local Guidance and Consultation

21.2.5.1 Suffolk County Council Preliminary Flood Risk Assessment

26. The Suffolk Preliminary Flood Risk Assessment (PFRA) (Suffolk County Council 2011) provides information on past and future flood risk from local sources of flooding, except Main River and Reservoir, which are covered by the Environment Agency, and sub-standard performance of the adopted sewer network, which is under the remit of water authority.

21.2.5.2 Mid Suffolk District Council Strategic Flood Risk Assessment

27. Mid Suffolk District Council commissioned Scott Wilson Consulting to undertake the 2008 Strategic Flood Risk Assessment. The 2009 Strategic Flood Risk Assessment (SFRA) used the most up-to-date information available at the time of writing. The SFRA update considered all sources of flooding within the Mid Suffolk District, including fluvial, pluvial, groundwater, canal, reservoir and sewer flooding.



28. The SFRA provides general guidance on flood risk assessment for any development proposals within the Mid Suffolk District. This includes specifying that all sites within Flood Zones 2 and 3 will require a detailed FRA in accordance with NPPF, with reference to the updated SFRA. The FRA should demonstrate that the development is protected to the 1% annual probability event and is safe during the design flood event, including an allowance for climate change.

21.2.6 Consultation

29. Consultation has been undertaken with the Environment Agency throughout the development of the East Anglia ONE project and the proposed East Anglia THREE project and specific detail of the relevant consultation for this FRA can be located in section 21.2 of Chapter 21 of the Environmental Statement and *Appendix 21.1*.

21.2.7 Potential Sources of Flooding to the Substation(s) Compound

21.2.7.1 Vulnerability Classification

30. In terms of flood risk and vulnerability Table 2 of the NPPF Technical Guidance classifies the type of development planned at the substation(s) compound site as 'Essential Infrastructure' (details in *Table 21.2.1* below). Table 3 of the Guidance indicates that developments of this classification are considered to be appropriate in Flood Zones 1 and 2, as shown in *Table 21.2.1* below. The application of the Sequential Test should guide development to Flood Zone 1 first, then Flood Zone 2 and finally Flood Zone 3. The following section of this report identifies how the flood risk at the substation has been assessed, and confirms that the flood risk Sequential Test has been appropriately applied.

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable	
Zone 1	✓	✓	~	✓	✓	
Zone 2	✓	✓		~	✓	
Zone 3a	Exception Test Required	✓	×	Exception Test Required	✓	
Zone 3b Functional Floodplain	Exception Test Required	~	×	×	×	

Table 21.2.1 Flood Risk Vulnerability and Flood Zone 'Compatibility' (Table 3, NPPF Technical Guidance)

✓ Development is appropriate × Development should not be permitted



31. The Technical Guidance that supports the NPPF states that there are a number of sources of flooding which need to be considered within a FRA. The potential sources of flooding to the substation compound are discussed in the sections below.

21.2.7.2 Fluvial and Tidal Flood Risk

32. The Environment Agency's Flood Map for Planning (Rivers and Sea) (Environment Agency 2014b) has been used to assess the current risk of flooding at the Onshore Substation compound, as shown in *Figure 21.2.1*. As the site is a considerable distance inland, the site is presumed not to be at tidal flood risk from the sea. Further, the whole site is located within Flood Zone 1, low probability. The entire site is therefore defined as an area which has a less than 1 in 1,000 annual probability of river flooding, i.e. less than 0.1% annual exceedance probability.

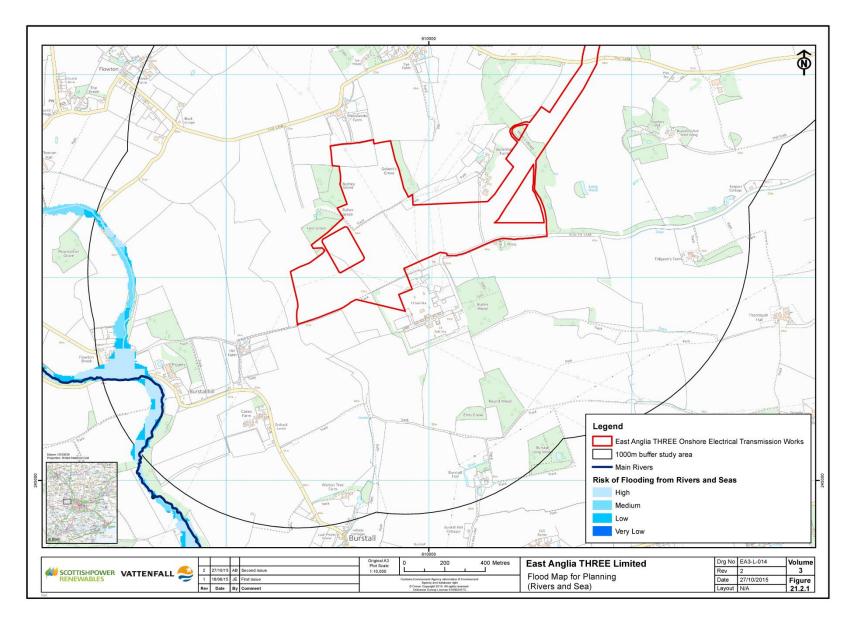
21.2.7.3 Surface Water

- 33. Surface water flooding occurs when rainwater does not drain away through the normal drainage systems or soak into the ground, and instead lies on or flows over the ground. This source of flooding can be caused by local runoff from hillslopes or impermeable areas, especially after periods of very wet weather or intense rainfall.
- 34. *Figure 21.2.2* shows the substation(s) compound is not affected by the areas shown to be at risk of surface water flooding.

21.2.7.4 Groundwater

- 35. Groundwater flooding can occur when water stored beneath the ground reaches the surface and is generally associated with porous strata, e.g. sands and gravels. The emergence of groundwater through springs or seeps often occurs during periods of high groundwater levels.
- 36. As described in section 2.1.2, the underlying bedrock geology of the wider Suffolk area is principally Cretaceous Chalk, and is generally overlain by Tertiary and Quaternary deposits apart from locations in the north-west of the county. The Cretaceous Chalk is generally overlain by Tertiary London Clay in central locations and areas of The Crags (Red Crag and Caroline Crag marine deposits) in the eastern coastal regions. There is also evidence of Quaternary Till (boulder clay) over the majority of the county, with areas of Glacial Gravels to be found to the east.
- 37. The Chalk bedrock is designated as a Principal Aquifer, although the East Suffolk Catchment Flood Management Plan (Environment Agency 2009) summarised that groundwater flooding is not a significant risk in East Anglia.



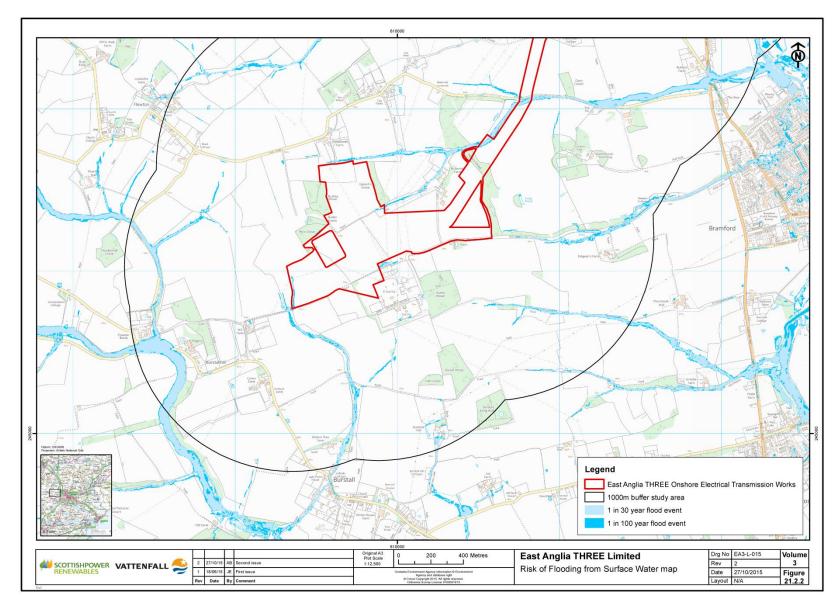


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21.2.7.5 Reservoirs

38. The Environment Agency's 'Risk of Flooding from Reservoirs' map (Environment Agency (2014e) identifies that the substation(s) compound is not at risk of reservoir flooding. Therefore this source of flooding is not considered to be an issue at the site.

21.2.7.6 Sewers

39. Given the rural nature of the site and that there is no property requiring sewerage in the vicinity it has been presumed that there is no risk of sewer flooding to the site.

21.2.7.7 Climate Change Impacts

- 40. Climate change may increase peak rainfall intensity and river flow, which could result in more frequent and severe flood events. Changes in the spatial extent of flooding are likely to be negligible in narrower floodplains, but can be dramatic in very flat areas. This means that a site currently in a lower risk zone could in future be in a higher risk zone due to climate change. The NPPF Technical Guidance outlines that an increase of 20% and 30% should be made to peak river flows and rainfall intensities respectively.
- 41. Given the potential sources of flooding outlined in above, the only aspect of climate change likely to impact the site (in flood risk terms) is an increase in the duration and intensity of rainfall events. The risk of flooding from all potential sources outlined above will be amplified as a result of the predicted increase in rainfall.
- 42. The NPPF Technical Guidance recommends the following increase in rainfall intensity and peak river flow to allow for climate change:

peak river flow							
Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115			
Peak rainfall intensity	+5%	+10%	+20%	+30%			
Peak river flow	+10%	+20%					

Table 21.2.2 Recommended national precautionary sensitivity ranges for peak rainfall intensity andpeak river flow

43. The impact of climate change on the 1% annual exceedance probability (AEP) flood event, in the current situation, is provided in *Table 4.2* above. However, as outlined previously, the 1% AEP fluvial flood event does not affect the site. Therefore, consideration of this event on the proposed development is not discussed further within this report. Consideration of climate change will need to be given in the design of any suitable SuDS schemes.



21.2.7.8 Summary

44. Based on the descriptions in section 5 of the various sources of flood risk, it is clear that the site is not at risk from any potential sources of flooding. Furthermore, the impact of climate change is not perceived to increase the risk of flooding at the site. The substation(s) compound has therefore been sequentially located in relation to the proposed East Anglia THREE project and is outside of known flood risk.

21.2.8 Potential Sources of Flooding to the Onshore Cable Route

21.2.8.1 Onshore Electrical Transmission Works

- 45. The onshore cable route associated with the development is approximately 37km long from the landfall to the substation(s) compound. The route was determined during the development of the onshore electricity transmission works for East Anglia ONE. The ducts for the onshore cables for the proposed East Anglia THREE project will be installed during the construction of East Anglia ONE.
- 46. Therefore, for construction of the proposed East Anglia THREE project, the amount of hardstanding that would be created along the onshore cable route (not including the substation(s) compound) is as follows:
 - During construction:
 - o Single Phase
 - Footprint = area of haul road, maximum 62 x jointing bay compounds (each 3740m² containing 775m² of hardstanding), 1 x transition bay compound, substation(s) compound and 7 CCS = 37.85ha
 - o Two Phased
 - Footprint = area of haul road (laid twice), maximum 124 x jointing bay compounds (each 3400m² containing 775m² of hardstanding), 2 x transition bay compounds, substation(s) compound and 7 CCS = 67.05ha
 - During operation:
 - \circ Up to 248 kiosks (each 0.75m²).

21.2.8.2 Location Descriptions

47. At the time of writing this FRA, the locations of those elements outlined above are indicative, the exact locations have not been confirmed. Therefore, an accurate assessment of the flood risk associated with the sites cannot be undertaken.



However, the alignment of the onshore cable route is known, and it passes through areas of Flood Zones 1, 2 and 3. Therefore, it can be assumed that a proportion of onshore electrical transmission infrastructure may potentially be sited within Flood Zones 2 or 3.

21.2.8.3 Risk within Flood Zones 2 and 3

- 48. The flood risk will arise from infrastructure located in the sites known to be at flood risk within flood zones 2 and 3. These zones will predominantly occur within the tidal flood zones of the tidal reaches of the lower River Deben and the coastal zone close to the landfall. The majority of these zones are defined as Areas Benefiting from Defences (ABDs) and are considered to be protected by the formal flood defences along the River Deben during their construction.
- 49. As the sites will be unmanned with no flood sensitive construction during operation, the main risk will be temporary, during the construction phase as the cable installation and construction of jointing bays is carried out.

21.2.9 Impact on the Local Flooding Regime

- 50. Once in operation, the substation(s) compound will have limited welfare requirements with limited discharge from the site which will be mitigated as described subsequently in section 8.1.2.
- 51. Similarly, in accordance with SuDS design principles and NPPF requirements, the management of surface water runoff will be implemented in order to replicate the natural drainage and hydrological regime so as not to exacerbate flood risk beyond the current site conditions, which is deemed to be of negligible impact.
- 52. The onshore electrical transmission works would have a limited residual footprint and will not be manned so it is considered that they would have no flood risk impact on the local flooding regime during operation.

21.2.10 Flood Risk Management Issues

21.2.10.1 Substation(s) Compound

21.2.10.1.1 Surface Water

53. At the substation(s) compound, the proposed surface water drainage scheme will be designed to meet the requirements of the NPPF by limiting the post development off site run-off to the existing greenfield rate and providing sufficient on site attenuation for rainfall events up to the 1 in 100 year rainfall event, plus a 30% allowance for climate change over the lifetime of the development.



- 54. SuDS design principles will be adopted as prescribed in the NPPF technical guidance. There are some key principles that influence the planning and design process enabling SuDS to mimic natural drainage by:
 - Storing runoff and releasing it slowly (attenuation);
 - Allowing water to soak into the ground (infiltration);
 - Slowly transporting (conveying) water on the surface;
 - Filtering out pollutants; and
 - Allowing sediments to settle out by controlling the flow of the water.
- 55. Run-off from the substation(s) location will be limited, where feasible, through the use of infiltration techniques which can be accommodated within the area of works. Where the proposed run-off rate from the site exceeds the current rate, the additional run-off will be attenuated using SuDS storage techniques. The SuDS principles will be implemented so as to mimic the existing environment at the substation site and will take into account the principles and provisions of the Outline Landscape and Ecological Management Strategy (OLEMS), considering synergies where possible.

21.2.10.1.2 Foul Drainage

- 56. Foul drainage would be collected in either of the following ways:
 - Mains connection discharged to local authority sewer system, if available; or
 - Septic tank located within the substation boundary.
- 57. The preferred method for controlling foul waste would be determined during detailed design and would depend upon the availability and cost of a mains connection and the number of visiting hours' staff would attend site.

21.2.10.2 Onshore Electrical Transmission Works

- 58. As described in section 6.3 it is considered that the construction phase flood risk to sites within flood zones 2 and 3 will be mitigated by the presences of existing defences. It is not considered that surface water runoff during rainfall events will have significant impacts to the sites or on potential flood risk caused by the sites.
- 59. There will be minimal hardstanding impermeable areas (e.g. at the jointing bays or kiosks) during the operation of the proposed East Anglia THREE project and it is not considered necessary to provide runoff mitigation at the sites.





21.2.11 Conclusions

- 60. The site of the substation(s) compound and onshore electrical transmission works associated with the onshore cable route has been assessed for flood risk to the sites, as well as potential flood risk issues that the development could cause to surrounding areas. Flood mitigation measures to reduce the risk of flooding to the site have also been identified. The key conclusions from the FRA are:
 - The proposed use of the site for power generation has an 'Essential Infrastructure' classification in accordance with NPPF.
 - There will be two elements of development, namely, one onshore substation compound (containing up to 2 substations) and secondly onshore cable route and associated infrastructure. These have been assessed as having minimal impact on flood risk following mitigation.
 - As the substation(s) compound is located in wholly within fluvial Flood Zone 1, the proposed development is considered appropriate in accordance with NPPF.
 - The site is not considered to be at risk from any source of flooding.
 - Any increase in surface water runoff as a result of the development needs to be mitigated, therefore the use of SuDS to control runoff and provide attenuation at the site has been considered.
- 61. Based on the information gathered, the proposed mitigation measures, and in line with the guidance provided by the NPPF and PPG: Flood Risk and Coastal Change, it is considered that the proposed development as described is appropriate in terms of flood risk.





21.2.12 References

British Geological Survey (2014) Geology of Britain Viewer Accessed 5 June 2015 on <u>http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html</u>

DCLG (2007) Improving the Flood Performance of New Buildings, Flood Resilient Construction

DCLG (2012) National Planning Policy Framework, Department for Communities and Local Government

DCLG (2014) Planning Practice Guidance – Flood Risk and Coastal Change Accessed 5 June 2015 on http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/

DEFRA (2010) Flood and Water Management Act 2010

Environment Agency (2009) East Suffolk: Catchment Flood Management Plan accessed 5 June 2015 from https://www.gov.uk/government/publications/east-suffolk-catchmentflood-management-plan

Environment Agency (2014a) Interactive Map for Groundwater accessed 5 June 2015 from http://maps.environment-agency.gov.uk

Environment Agency (2014b) Interactive Flood Map for Planning (Rivers and Sea) accessed 5 June 2015 from <u>http://maps.environment-agency.gov.uk</u>

Environment Agency (2014c) Interactive map for Risk of Flooding from Rivers and Sea accessed 5 June 2015 from <u>http://watermaps.environment-agency.gov.uk</u>

Environment Agency (2014d) Interactive map for Surface Water accessed 5 June 2015 from http://watermaps.environment-agency.gov.uk

Environment Agency (2014e) Interactive map for Risk of Flooding from Reservoirs accessed 5 June 2015 from http://watermaps.environment-agency.gov.uk

European Union (2007) EU Floods Directive (2007/60/EC) The Assessment and Management of Flood Risks. Accessed 5 June 2015 from http://ec.europa.eu/environment/water/flood risk/index.htm

HR Wallingford (2014) Greenfield Runoff Estimation for sites. <u>http://www.uksuds.com/greenfieldrunoff_js.htm</u>

Appendix 21.2 Ends Here