



London Array Onshore Substation

Design and Landscaping Submission

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Contents

1 Submission Context

2 Design Information

Appendix I – Figures

Appendix II – Architects Concept Document

Appendix III - Soft Landscaping Proposal

1 Submission Context

Introduction

- 1.1 In August 2007 London Array Ltd (London Array) was granted planning permission to construct an onshore electricity substation and associated works at Cleve Hill in Graveney, within the jurisdiction of Swale Borough Council.
- 1.2 Planning permission was awarded to London Array by the Secretaries of State for DCLG and DBERR following a public inquiry. Amongst other things, consideration of the design and landscaping of the substation development was a key part of the planning appeal and inquiry process. London Array presented two alternative design concepts to the Planning Inspector at the public inquiry and in his report to the Secretaries of State the Planning Inspector confirmed that the design principles presented in the Supplementary Environmental Information (SEI) should be taken forwards into construction.
- 1.3 Since planning permission has been granted, London Array and National Grid have appointed contractors to complete the detailed design and to construct the associated parts of the London Array Onshore Substation. The process has incorporated consideration of the points raised in the planning inspectors report and the detailed engineering requirements of the substation.
- 1.4 This submission is intended to present the detailed design of the various aspects of the substation development and in doing so to discharge conditions 2, 15 and 16 of the Town and Country Planning Permission which are stated below;

Condition 2 -

No works of construction of the substation buildings and structures shall take place until there has been submitted to the local planning authority a scheme which accords with the design principles set out in the Updated Substation Design Brief with particular reference

to Figures 1 – 9 of the Supplementary Environmental Information (November 2006); and the local planning authority shall have approved the following elements of the scheme:-

- i. external design, appearance and dimensions of all buildings and structures which are to be retained following the commissioning of the development*
- ii. details of the colour and surface finishes to be used in respect of those buildings and structures referred to in (i) above; and*
- iii. phasing of the works included in the scheme*

Condition 15 –

No development shall take place until full details of both the hard and soft landscape works have been submitted to and approved in writing by the local planning authority and these works shall be carried out as approved. These details shall include the proposed finished levels or contours; means of enclosure; car parking and other vehicle and pedestrian access and circulation areas; hard surfacing materials and an implementation programme.

Condition 16 –

Soft landscape works shall include planting plans, written specifications (including cultivation and other operations associated with tree, shrub, plant and grass establishment); schedules of trees, shrubs and plants, noting species, tree shrub and plant sizes and proposed numbers/densities where appropriate.

2 Design Information

Design Principles

- 2.1 The design principles of the Updated Design as they were presented in the Supplementary Environmental Information are included below -
- 2.1.1 Each of the modular individual substation elements, transformers, auxiliary service enclosures (including diesel generators and fire equipment), reactors and switchgear building will receive a modular treatment to break up the apparent mass of the development as seen from the Saxon Shore Way.
 - 2.1.2 There will be a visual link, for recreational and educational purposes, between the onshore development and the energy being generated by the offshore wind farm.
 - 2.1.3 The main substation compound will be aligned to place its northern-most perimeter perpendicular to views from the point where the cables will go under the Saxon Shore Way.
 - 2.1.4 The northern elevation will consist of a line of modules, utilising the concrete transformer "fire walls" to contain the transformer and auxiliary service enclosures.
 - 2.1.5 The northern elevation will provide the necessary safety and security requirements without the need for an additional fence
 - 2.1.6 The reactor compounds will comprise elliptical enclosures arranged flexibly and independently of the main substation compound.
 - 2.1.7 The National Grid switchgear building will be clad with different metal panels from those used for the auxiliary service enclosure modules.
 - 2.1.8 The final design of the substation to be approved by the Council (pursuant to an appropriate condition) will present a coordinated approach to the modular schemes and visual effects.
- 2.2 In general these principles have been maintained and the application of them has developed with the detailed design of the substation. The following page clarifies where the application of these principles differs to what was presented in the SEI and in which cases the design principles were found to no longer apply.

Development of the Design Principles

- 2.3 As stated in paragraph 2.1.1, a modular treatment has been applied to the individual substation elements and to the treatment of the north elevation. This is best described in Figures 1 and Figure 3 (Appendix I) which show the substation compound plan and an elevation of the north elevation.
- 2.4 As stated in paragraph 2.1.2, a visual link has been developed which links the onshore development to the energy being generated offshore. Whereas the Supplementary Environmental Information used the example of flashing lights and rotating panels to provide the visual link the design proposed here recognises that the same principle could be achieved in a way which is much more subtle and sympathetic to the landscape. The North Elevation now incorporates alternative sequences of fixed panel and fin elements. The fin elements are orientated at different angles to each other, this gives a viewer walking along the Saxon Shore Way brief glimpses into the substation which change as the viewer continues on their journey. The resultant effect of this is the impression of movement. The details of this design are shown in Figures 1, 3 and 4 and the evolution of the design concept has been described in Appendix II.
- 2.5 As stated in paragraph 2.1.3, the main substation has been aligned to ensure that its northern-most face is perpendicular to the location that the cables will go under the Saxon Shore Way.
- 2.6 As stated in 2.1.4, the northern elevation has been designed so that it consists of a series of modules. The change in module is consistent with the change in functionality of the engineering equipment that is located immediately behind it. This is best shown in Figures 1, 2 and 4.
- 2.7 A fire deluge system is included on the substation site and the London Array engineering team has concluded that this is sufficient fire protection for its equipment thus "fire-walls" are not included between the transformer modules. In addition to this the auxiliary service buildings have been combined into one building which is no longer located immediately behind the north elevation and so has not been associated with its design.
- 2.8 As stated in 2.1.5, the design of the north elevation incorporates the necessary safety and security features without the need for an additional fence.
- 2.9 As stated in 2.1.6, the reactor compounds comprise elliptical enclosures arranged flexibly and independently of the main substation compound.
- 2.10 The auxiliary service buildings are no longer part of the north elevation. However the modular treatment of the north elevation does contrast to the metal panels used to clad the National Grid switchgear building as is required in paragraph 2.1.7. The auxiliary

service building itself is clad in the same material and colour as the National Grid Switchgear building.

- 2.11 As stated in paragraph 2.1.8, this submission seeks approval from Swale Borough Council for the final design of the substation that is described in this document and in its appendices.

The Design of the Main Elements of the Substation

- 2.12 More information about the design of the main elements of the substation is included below and in Appendices I and II.

The North Elevation

- 2.13 The design of the North Elevation is shown in Figure 3 and 4.
- 2.14 Modular treatment of the wall comprises a sequence of anodised aluminium fin elements and exposed aggregate panels. These features are 6.6m tall and are mounted on top of a 2.4m base wall which means that the north elevation is 9m tall.
- 2.15 The aluminium fin elements are orientated at different angles along the length of the north elevation to give the viewer the impression of movement as they travel along the Saxon Shore Way.

Reactor Compounds

- 2.16 Six "Reactor Compounds" sit in front of the North Elevation enclosing the electrical equipment which controls the reactive compensation of the substation. These compounds are described in Figure 5.
- 2.17 These compounds sit at a base level of 6.4m AOD and extend to a height of 3.6m. The compounds are arranged so that the export cables arriving at the substation from the offshore wind farm can fit into the spaces between them. This also allows views of the North Elevation can be seen through the spaces between them as the viewer changes their perspective along the Saxon Shore Way.
- 2.18 Figure 5 shows that the perimeter fence surrounding the reactor compound is constructed from a security mesh. The specification of this fence shall be confirmed at a later date.

National Grid Switchgear Building

- 2.19 The National Grid Switchgear Building is shown in Figure 6.
- 2.20 The design of the National Grid Switchgear building has been simplified so that it now stands as a regular block or module within the National Grid compound.

- 2.21 As it is no longer the intention to include lit features in the substation development, the GIS busbars no longer sit behind a screen and are instead arranged regularly and in parallel as they approach and move around the building.

Landscaping

- 2.22 The landscaping and planting proposals is shown in Figure 8
- 2.23 The landscaped bund to the south of the site extends to a height of 17.5m and is intended to screen the substation from views further south.
- 2.24 Woodland planting is proposed on and around the bunds to provide further screening. The bunds will be created from year 1 of the construction programme, as spoil becomes available from the earthworks. A shrub mix is proposed at the edges of the woodland areas with suitable wild flower mixes to be used on all other areas around the site. Proposed planting comprises locally native species mixes.
- 2.25 Appendix III includes a more detailed description of the landscaping and planting proposals.

Auxiliary Service Building

- 2.26 The design presented in the SEI included two auxiliary service buildings which were intended to be used by two former partners in London Array (London Array West and Shell WindEnergy Ltd) for operations and maintenance once the development was constructed. The substation will now be operated as a single entity and will therefore require only one building.
- 2.27 The Auxiliary Services Building is shown in Figure 7

3 Phasing of the Works

- 3.1 The onshore substation development will be constructed in two phases.
- 3.2 Phase 1 will include two-thirds of the electrical equipment and corresponds to the first phase of construction of the offshore wind farm which will have a capacity of 630MW. Phase 1 will also include the full extent of the earthworks, land re-profiling and construction of the North Elevation.
- 3.3 The remaining electrical equipment and the two remaining reactor compounds will be constructed in Phase 2 which will correspond with the second phase of construction offshore. The location of the electrical equipment to be installed in Phase 2 is shown in Figure 2.

Appendix I - Figures I

The Figures which are included in this section show the detailed design of the relevant features of the London Array Onshore Substation

Figure 1	Site Plan and Elevation of Compound
Figure 2	Substation Compound
Figure 3	North Wall Plan and Elevation
Figure 4	Design of North Wall
Figure 5	Reactor Pod Plan and Elevation
Figure 6	National Grid Building Elevations
Figure 7	Auxiliary Services Building Plan and Elevation
Figure 8	Landscape and Planting Proposal
Figure 9	Photomontage - View from Saxon Shore Way

Appendix I - Figures II

Figures 10 - 21 included in this section were taken from a 3D visualisation of the London Array Onshore Substation.

The images provide an interpretation of the final design but should be considered alongside the detailed information included in Appendix I - Figures I

The planting shown in the visualisation is not an accurate representation of the planting proposal, please refer to Figure 8 in Appendix I - Figures I and Appendix III for more detail on the nature of the planting proposal.

Appendix II

Appendix III - Soft Landscaping Proposal
