Our Ref: DKH/SF/210865/00001
Your Ref: EN010084

CRS
CharlesRussell
Speechlys

For the attention of: Kate Mignano - Case Manager

The Planning Inspectorate
Temple Quay House
2 The Square
Bristol
BS1 6PN

Charles Russell Speechlys LLP
One London Square
Cross Lanes Guildford Surrey
GU1 1UN UK

T: +44 (0)1483 252525
F: +44 (0)1483 252550
DX: 2436 Guildford

charlesrussellspeechlys.com

david.haines@crsblaw.com
D: +44 (0)1483 250026
F: +44 (0)1483 250030

By Post and Email
thanetextension@pins.gsi.gov.uk

28 May 2019

Dear Sirs

Application by Vattenfall Wind Power Limited for an Order Granting Development Consent for the Thanet Extension Offshore Wind Farm

We write with reference to the above, and attach for the attention of the Examining Authority the comments on the Applicant's Deadline 5 Submissions prepared on behalf of Ramac Holdings (Trading) Limited.

Yours faithfully

[redacted]

Charles Russell Speechlys LLP

WKS/289382891.1

RAMAC HOLDINGS (TRADING) LTD

COMMENTS ON

THE APPLICANT'S DEADLINE 5 SUBMISSIONS

Introduction

1. Ramac Holdings (Trading) Ltd ("**Ramac**") attended the Compulsory Acquisition Hearings on 21st February 2019 and 18th April 2019. On both occasions it raised concerns about the selection of its land for the onshore substation; the proposed siting of the substation within its landholding and the extent of the land take. Indeed, those same objections were raised by Ramac in its first response to pre-application consultation, some 18 months ago in January 2018. Even at this late stage in the examination, none of those concerns have been satisfactorily addressed by the Applicant.

2. The Applicant has indicated to the ExA a number of times that it intends to enter into an agreement with Ramac that will allow Ramac to withdraw its objection. Unfortunately despite the best efforts on behalf of Ramac, and with only two weeks left until the close of the examination, no such agreement has been reached.

3. A joint statement submitted at Deadline 6 between Ramac and the Applicant records the continued negotiation between the parties. Both parties are hopeful that an agreement can be reached which allows Ramac to withdraw its objection. Unless and until agreement is reached, Ramac maintains its objection and respectfully invites the ExA to take these representation into account.

Chronology of Ramac's concerns and representations

<u>First Compulsory Acquisition Hearing, 21 February 2019</u>

4. At CAH1 Ramac expressed concerns about the Applicant's justification for the compulsory acquisition of Ramac's land (and principally that land comprised in Work No.13 (the onshore substation)) was inadequate.

5. Both the assessment of alternatives and the justification for the land take in the application documents were entirely unsatisfactory. Reference was made to the following documents:

   i) The Statement of Reasons purported to provide a "*description of route, works and plots and general justification for extent of the Order lands*" from page 20. Paragraphs 7.5.17 – 7.5.21 (page 22) of the Statement of Reasons purports to provide a justification for the extent of land required for works 12, 13, 14 and 15 on Ramac's landholding. Those paragraphs provide no justification for the extent of the land take. As to alternatives, the Statement of Reasons says that the selection of the landfall, onshore cable corridor and substation location is "*set out in detail*" in the ES (SoR paragraph 7.21, page 26). Unfortunately that is not the case.

   ii) The ES addresses alternatives in Chapter 4. Paragraph 4.1.7 sets out the six stages of the site selection process. It was only at stage 5 of that process that any consideration was given to the location of the substation (see page 4-38). Paragraphs 4.10.5 – 4.10.8 explain only in the briefest terms the move away from the Richborough Energy Park and says that the next area of search was Richborough Port. There is no explanation of why Richborough Port was determined to be the most reasonable alternative to the Energy Park. Nor is there is explanation at all of why the particular area identified Work 13 was selected.

   iii) The Consultation Report submitted by the Applicant indicates that Ramac had raised concerns about site selection and land take in its pre-application consultation response. The Consultation Report Appendices (document 5.1.1) set out the concerns raised by Ramac and the Applicant's response to each and every one of them was simply "*Land ownerships are still under consultation with all relevant parties and will be taken forward in the Post-Consent phase*". The Applicant made no attempt to engage with the substance of Ramac's concerns.

iv) Ramac expressed concern at the lack of substantive engagement at the Preliminary Meeting. Following that meeting, the Applicant provided a document entitled "Consolidated Response to Ramac consultation questions" (which is appended to Ramac's Written Representation). The Applicant's purported responses were entirely inadequate. In particular:

a. In response to Ramac's question 9(3) about whether the Applicant was in fact seeking more land than was reasonably required for the substation, the Applicant said that the justification for the extent of the land required was fully set out in the Statement of Reasons. Plainly that was not correct.

b. In response to Ramac's question 8(3) about whether AIS was required rather than GIS, which would have a smaller footprint, the Applicant said "*We have retained the option for both GIS and Air Insulated Switchgear (AIS) solutions. This is to retain technical and commercial flexibility during detailed design phase.*" The desire of the Applicant to retain flexibility is not a compelling reason in the public interest justifying the acquisition of land by compulsion. Had there been any technical reason for selecting AIS over GIS one would have expected the Applicant to mention that in this response. Any more recent attempts to justify the use of AIS should be read in that context.

c. In response to Ramac's question 8(5) and (6) regarding the proposed footprint of the substation, the Applicant's response was that "*Current sizes/footprints constitute a worst credible case*" and "*Current sizing is a worst credible case to all for future detailed design*". While it may be appropriate in the context of environmental assessment to assess the worst case scenario, it is certainly not appropriate in the compulsory acquisition context to acquire land on a worst case basis. The Applicant should seek to take by compulsion as little land as possible. More recently, the Applicant has attempted to move away from its earlier responses and claim that in fact GIS and AIS would require similar footprints. Ramac does not accept that to be correct. Furthermore, if that was the justification for the land

take, it is extraordinary that no such explanation was offered in response to Ramac's repeatedly raised concerns.

6. At CAH1, the ExA asked the Applicant to provide a submission that "*goes back to the starting point of went Ramac's representations*", including a clear explanation for the route selection and an explanation of why the substation had to be located on the Work 13 land; an explanation for the rejection of Richborough Energy Park; a justification for the extent of land take to accommodate the substation; an explanation of why GIS could not be used and if so, whether that smaller footprint substation could be accommodated at Richborough Energy Park or on the southern part of Ramac's landholding, which would be preferable to Ramac (if acquisition of any of Ramac's land can be justified at all).

Applicant's Deadline 3 submissions

7. At Deadline 3, in purported response to the request from the ExA, the Applicant provided a "Report Addressing Oral Submissions by Ramac Holdings Ltd at Compulsory Acquisition Hearing 1" (Appendix 6 to the Applicant's Deadline 3 submissions).

8. That Report was extremely high-level and preliminary in nature and appeared to be an exercise in retro-fitting: justifying the proposed site and the extent of land-take after the event. Plainly that is the wrong way round. An applicant seeking powers of compulsory acquisition must seek to achieve its aims in a proportionate manner. That involves giving thought, prior to the application for compulsory acquisition powers about how to acquire the minimum amount of land necessary to deliver its scheme and the selection, where possible, of land that minimises disruption to the owner. As Ramac has repeatedly made clear, it would prefer to accommodate the substation on land at the south of its landholding or indeed on land to the north, at Baypoint Club. The location of Work 13 at the centre of its landholding causes maximum disruption to Ramac.

9. Examples of the inadequacies of the report include:

i) The assertion, unsupported by technical analysis, that GIS would have little or no space saving benefit compared to AIS (Section 2.2);

ii) The suggestion, unsupported by any noise assessment, that the Baypoint Club and South Richborough Port Land would be unsuitable locations given the proximity of noise sensitive receptors. There does not appear to have been any consideration of whether a GIS substation could adequately mitigate any noise concerns that may have been identified, had a noise appraisal of alternative sites been carried out;

iii) The suggestion that the Baypoint Club would be unsuitable as a result of potential flood risk without supporting flood risk assessment or analysis of land available outside Flood Zone 3;

iv) The suggestion, unsupported by any ecological appraisal or assessment of potential mitigation measures, that Baypoint Club would be unsuitable given its proximity to SAC/SPA;

v) The rejection of the BCA Fleet land (Zone 2) on the basis of "potential" bat roosts without any appraisal of the actual existence of such roosts or consideration of mitigation measures that could adequately address that concern;

vi) The rejection of South Richborough Port Land on the basis of alleged increased cost, with no assessment of the costs increase associated with this location or the consequential implications for the viability of the project;

vii) The absence of any consideration of whether a GIS substation could be accommodated at Baypoint Club; South Richborough Port or indeed Richborough Energy Park.

Second Compulsory Acquisition Hearing, 18 April 2019

10. At CAH2 Ramac reiterated its concern that the Applicant had not properly considered alternatives for the onshore substation, including South Richborough Port or Baypoint Club and had not justified the extent of the proposed land take.

11. Ramac's technical expert, Mr Thorogood of Hurley Palmer Flatt, explained that he could see no reason to reject GIS technology and expressed the view that the use of

GIS over AIS was likely to result in a significant reduction in the footprint of the onshore substation and therefore the land take required to accommodate it.

12. Ramac expressed its disappointment that the Applicant had provided no technical analysis as to why that would not be possible to use GIS technology or any assessment of the comparative requirements of GIS or AIS. Notwithstanding the fact that Ramac has questioned the use of AIS and the extent of land take since January 2018, the Applicant was not able to provide a technical justification for its proposed use at the CAH1 in February 2019 and did not present any satisfactory technical evidence to justify its position at CAH2 in April 2019 (the Applicant's expert did not attend the hearing, being unavailable on the day) . Ramac reiterated its view that the Applicant's desire to retain maximum flexibility did not constitute a compelling case in the public interest sufficient to justify the acquisition of Ramac's land by compulsion.

13. The ExA made the following observations at CAH2 in respect of the Ramac land subject to compulsory acquisition: "*We remain unclear as to the precise justification for the proposed permanent acquisition of this extent of land. It is quite a large amount of land. Here or at Deadline 5 we would like a considered justification for the full extent of the land take that deals with the concern that there is a possible over-acquisition here.*"

14. The Applicant promised that a technical report was under preparation which would explain the necessity for AIS over GIS. The ExA made it clear that the report should have regard to other made DCOs and explained that "*Before we accept that additional space is required here, we will need to understand why that is*". The ExA made it clear that the full justification for the extent of land take would have to be submitted by Deadline 5 or there would be "*natural justice issues*".

Deadline 5 submissions

15. At Deadline 5 the Applicant has submitted a technical report which seeks to provide a technical justification for the type and size of the onshore substation (Annex B to Appendix 1 to Deadline 5 submission: Applicant's response to ExQ2.3.3).

16. In answer to the ExA's 2WQ 2.3.7 and 2.3.8 it has purported to justify the rejection of other plots within Ramac's landholding to accommodate the onshore substation.

17. Ramac remains of the view that the Applicant has failed, even at this late stage of the examination process, to adequately justify the selection of the land comprised in Work No. 13 or the extent of the land take proposed.

Response to Deadline 5 submissions

18. The report submitted by the Applicant at Annex B confirms that in fact the Applicant may decide to use GIS technology instead of AIS technology, but claims that the space-saving from use of GIS is likely to be minimal because a multi-storey GIS substation is *"not practical for a wind farm"* and is *"less practical from an environmental and construction perspective"* (paragraph 16).

19. Despite the explicit request from the ExA to justify the rejection of GIS by reference to other made DCOs, the Applicant has failed to provide any such comparisons.

20. Ramac's expert, Mr Thorogood has reviewed the Applicant's technical report. His expert report is attached to this submission. In his view, the equipment identified in the Applicant's Annex B could all be accommodated on a 3 acre footprint. The Applicant proposes an 8.5 acre site for the substation. There is no justification for the extent of the land take proposed to accommodate Work No. 13 in circumstances where the substation could be accommodated on a site of around one third that size.

21. As to the location of the substation, Ramac has repeatedly explained that it would prefer for the substation to be accommodated on land at the South of Richborough Port if it is to have any land acquired at all. There is c11 acres of land available in that plot of land which could well accommodate a substation, even on the enlarged footprint proposed by the Applicant. Mr Thorogood's report shows how the substation could be comfortably accommodated on the land at the South of the Richborough Port site.

22. The Applicant suggests that noise considerations mean that land at South Richborough Port is not appropriate for the substation. However, it has provided no

assessment of the noise impacts of the substation on the nearest sensitive receptor at Stonar Cottage to support its assertions. Nor has it considered noise mitigation measures that could be employed to reduce noise levels at Stonar Cottage. Mr Thorogood's report indicates that as a result of noise attenuation, even without additional noise mitigation, sound levels at Stonar Cottage are likely to be within acceptable limits. Potential noise impacts would therefore not preclude the location of the substation at South Richborough Port, which would be a much more acceptable and less intrusive result for Ramac.

23. Nor is there any reason to prevent cable alignment being re-designed to serve a substation at South Richborough Port. While there may be some increased costs associated with the cabling, the Applicant has not provided any assessment of what those additional costs would be or whether they would have any impact on the viability of the project. Mr Thorogood's view is that the additional costs of the cabling would be *de minimis* in the context of the wider project costs.

24. As to access arrangements, there is an existing access into the site which could be widened if necessary. Ramac would be happy to cooperate with the Applicant should such widening works be required.

Conclusion

25. In conclusion, Ramac does not consider that the Applicant has demonstrated a compelling case in the public interest for the compulsory acquisition of its land. It has failed adequately to consider alternative options that would have fewer impacts on Ramac's landholding and operations. It has failed to justify the use of AIS over GIS technology or to demonstrate that all of the land comprised in Work No. 13 is necessary to deliver the substation. Its proposed interference with Ramac's interests is not proportionate in that the same infrastructure could be delivered on a smaller plot and in an alternative location more favourable to Ramac.

26. Even if the ExA finds that there is a need for the proposed wind farm such that the DCO should be made, Ramac invites the ExA to refuse the Applicant powers of compulsory acquisition over its land. The effect of that decision would be to require the Applicant to enter into a voluntary agreement with Ramac as to the location of the

substation, which Ramac would be willing to accommodate on other parts of its landholding.

[redacted]

Charles Russell Speechlys LLP

Solicitors for Ramac Holding (Trading) Li

28 May 2019

Hurley Palmer Flatt

RAMAC HOLDINGS (TRADING) LTD - RICHBOROUGH PORT

ASSESSMENT OF VATTENFALL PROPOSALS FOR THANET OFFSHORE WIND FARM

LCY12315R/2.1 28th May 2019

1.0 Introduction

This note has been prepared to consider the impact to RAMAC on the proposed offshore wind farm proposed by Vattenfall, in particular the landing of the cables and subsequent substation that will be required to raise the voltage level from 66kV or 132kV to 400kV to allow direct connection and transmission to the National Grid.

There are three main aspects that concern RAMAC, they are:

1) The site area required for the proposed substation
2) The substation location and,
3) The landing of the cables to the substation.

To some extent these three aspects are related, but to enable easier analysis they are considered individually from section 3.0 onwards. I confirm I have specifically considered the evidence filed at Deadline 5 and attended the CAH2 hearing and gave evidence on the 18th April 2019.

2.0 Summary of Key Points

In my consideration of Vattenfall's proposals, including specifically Annex B to Appendix 1 to Deadline 5 submission, I have considered a range of technical factors that should be taken into account, the key points to note are:

- Vattenfall's proposals for the substation are based on a traditional open compound arrangement on a single level. No consideration is given to basing it on a multi-storey arrangement with GIS switchgear. Vattenfall argue that their substation is not typical and has more components than a DNO's substation; I would not disagree with this, it is understood that additional components are required to allow the system to function. However, this does not stop Vattenfall considering how these components could be designed to be within a building and so then reduce the footprint required. In my opinion, this is certainly possible and feasible for this project.
- In my review of the components that are required for Vattenfall's substation, I have assessed them in terms how these could be incorporated into a multi-storey building, I have estimated that this could be as little as 35% of their current land requirements.
- In terms of location, Vattenfall have assumed a location with no real consideration of alternatives, either by the use of alternative AIS arrangements or combining with a multi-storey/GIS arrangement.
- The argument that noise may be a factor in limiting the number of locations is disputed, there are many measures that can used to reduce noise levels to acceptable levels required by the Local Authority.

In summary, I do not agree with the evidence put forward by Vattenfall. Further explanation of the points and my expert opinion follow in the sections below.

3.0 Sub-station Area

Vattenfall in their documentation have identified a substation area of 215m x 160m (c.8.6 acres) as advised in Table 1.3 of Volume 3, Chapter 1 of their Preliminary Environmental Information Report. Below, in figure 1, is an extract from the same document noted as Figure 1.15 and is titled as an "Indicative Layout of the Onshore Substation".

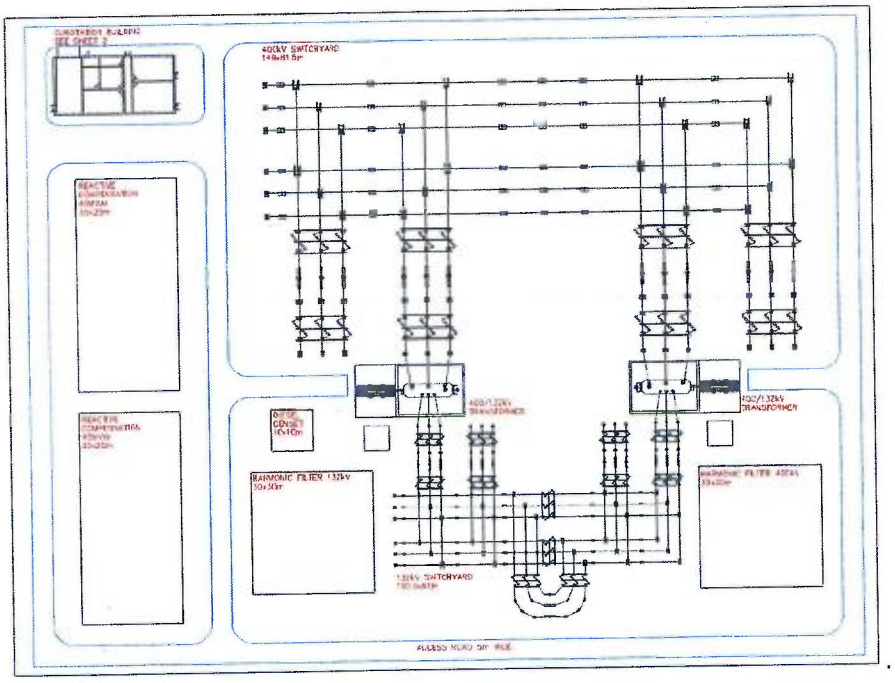


Figure 1 – Extracted Figure 1.15

Also noted in the same documents are the components within the substation, shown in Section 1.5.74 and repeated in Table 1 below. Although not specifically noted in the above document, it has been later confirmed by Vattenfall that their substation scheme is based upon Air Insulated Switchgear (AIS) as opposed to Gas Insulated Switchgear (GIS).

2 x three phase shunt reactors – to provide additional reactive power compensation to the windfarm 66 or 132 kV connection;
2 x Static Synchronous Compensators (STATCOM), Static Var Compensator (SVC) or equivalent – to provide variable reactive power to meet NGET technical connection requirements;
2 x 400/ (66 or 132) kV transformers – to convert transmitted 66kV or 132 kV HVAC power to National Grid 400 kV HVAC;
Various ancillary transformers to connect components at lower voltages
Set of harmonic filters – to meet power quality connection requirements; each filter will comprise capacitors, reactors and resistors together with interconnecting conductors;
Control building – housing the main 66 or 132 kV switchboard, SCADA and protection equipment;

400kV and 132 or 66kV switchgear to switch and protect the various components
Associated connections between equipment via overhead busbar and cabling, including buried earthing system
Access roads and fencing – for O&M access to equipment

Table 1 – List of Proposed Substation Equipment

It is understood, and accepted, that all of the above equipment is necessary and fundamental to the function of connecting the proposed windfarm to the National Grid, with many of the components being necessary to meet the criteria for connection to the transmission system operated by National Grid.

The questions that arise regarding the physical size of the substation are:

i) Why has it been assumed that all of the substation components are to be installed on a single level in an open compound, which has the greatest footprint.

ii) What is the basis of the decision to select AIS (air insulated) switchgear in lieu of GIS (gas insulated) switchgear, given that the latter has less of a footprint.

Both of these questions are reviewed in more detail below.

1) Substation Component Arrangement

Vattenfall identify a range of issues to explain why they have arranged all their equipment in an open compound, their primary reasons are described below:

- Majority of the equipment is outdoor type with need to external air for cooling
- Access for delivery and maintenance, particularly for craneage
- Fire / blast control by use of distance to ensure that one item of equipment that is on fire doesn't impact any others.

Each of these primary reasons are considered and commented on as follows:

Discussion on Outdoor/Indoor equipment

Vattenfall have now provided commentary on the various items of equipment included within their substation, identifying those that need to be outdoors and those that are indoor, these are shown in Table 2 below:

Equipment item	Commentary
Shunt reactors	Outdoor
Static Synchronous Compensators	Indoor
400/66 or 132kV transformers	Outdoor

Equipment item (continued)	Commentary (continued)
Ancillary transformers	Outdoor
Harmonic filters	Outdoor
Control building	Indoor
Access roads	Outdoor
400kV and 66 or 132kV Switchgear	Located indoor (GIS) or outdoor (AIS)
Associated connections between equipment	Located indoor (GIS) or outdoor (AIS)
66 or 132kV Switchgear	Located indoor (GIS) or outdoor (AIS)

Table 2 – List of Equipment by Indoor/Outdoor Location

Given the variety of types of equipment with the potential to house some internally in a building or in an open part of a part of a building, it is quite clear to see that a single level open compound is not the only option and that Vattenfall have clearly not demonstrated any other options to just an open compound.

Alternative Arrangements – Multi-storey Building

In our initial assessments, I considered a multi-storey building arrangement which would have reduced the overall footprint from 8.5 acres to circa 2.3 acres; with the additional information provided in Annex B to Appendix 1 to Deadline 5 Submission. It is accepted, in the light of information now submitted, that this may not be achieved to quite that level, nonetheless, it is possible to achieve a significant reduction in the overall footprint required.

In Figures 2a and 2b below, are shown schematic arrangements of how the components noted in Table 2 might be arranged to reduce the footprint; note that all of the components that would have to have "outdoor" access to air and craneage are on the upper level, all other components are on the lower level including all the switchgear which is assumed to now be GIS.

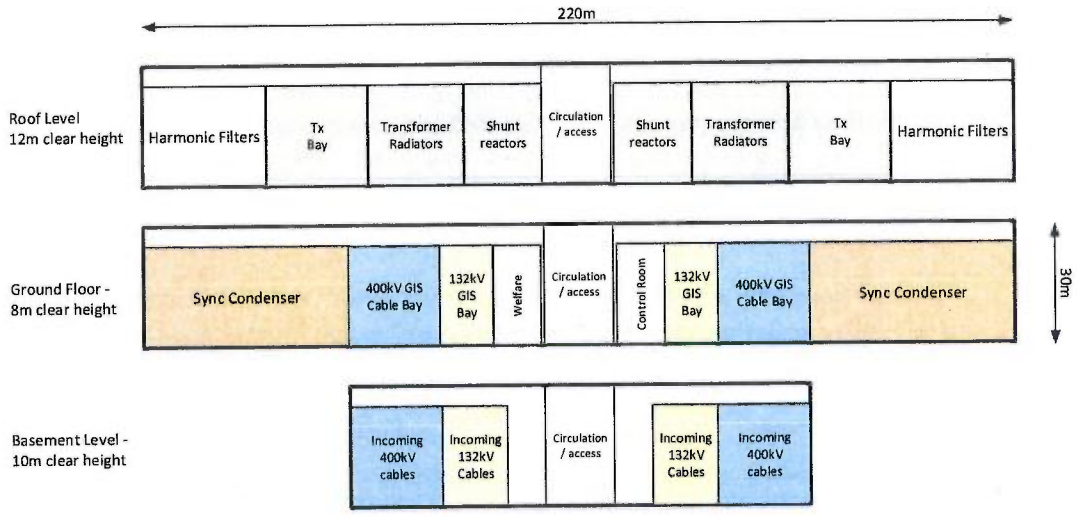
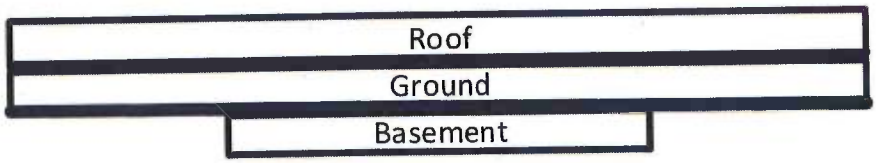


Figure 2a – Multi Storey GIS Building Arrangement – Layout



Indicative Building Section
(overall height 20m above ground)

Figure 2b – Multi Storey GIS Building Arrangement – Long Section

The arrangements shown in Figures 2a and 2b ensure that equipment requiring external access to air and access are provided and allowances for blast and fire walls provided within the structure; given this, all of Vattenfall's primary reasons for having an open compound are shown to have been dealt with within a multi-storey building with a significantly smaller footprint.

The schematic arrangement in Figures 2a and 2b can then be compared in terms of footprint area as follows:

I. **Vattenfall proposal (AIS in open compound)**
Total area required = 34,400sq.m or **8.5 acres**
Maximum height = 14m
Basement = none

II. **Alternative proposal (GIS based in a building, see illustration below in Figures 2a/2b)**
Building footprint required = 220m x 30m = 6,600sq.m
Total Site Footprint required = approx. 12,000sq.m or **3 acres**
(includes 10m area around building)
Maximum height = 20m
Basement = 10m

From the high-level assessment above, it can be seen that there is vast difference in the site footprint required between the two options, even allowing for a 10m fence all around, the site footprint would only be around 35% of the Vattenfall proposal. It is therefore suggested that Vattenfall could and should seriously consider and adopt this option in terms of layout.

2) AIS vs GIS switchgear types comparison

The issue of why AIS has been assumed rather than GIS as a switchgear type has already been raised to Vattenfall through question and answer process to date. Vattenfall have responded that the difference is not sufficiently material to make a real difference. Whilst I would agree that there are other factors and equipment that can drive the sizing, the selection of switchgear is a key issue, not only in its own footprint but also as an enabler to allow a multi-storey arrangement as shown in Figures 2a and 2b.

The use of GIS is now common place in city centres, primarily due to limited space and the cost of land but there is no reason as to why it can't be applied to other locations. An

example of this already exists nearby at the proposed Nemo interconnector link which has housed a significant number of its components within buildings as well as some external elements. It is recognised that this is likely to be more expensive to build but there are a range of benefits that this provides as outlined below:

Benefits to using GIS within a Purpose Designed Building

- More easily secured with all plant behind walls and/or louvred facades
- Better fire protection and separation
- Easier to terminate cables that are underground into specific purpose made chambers
- Lower acoustic noise with attenuation possible in transformer bays
- Lower magnetic field interference to areas around the substation
- Lower electric fields to areas around the substation
- Lower maintenance costs of switchgear

As noted above, the use of GIS in a purpose made building has already been suggested, however Vattenfall have belittled the idea by advising that the potential reduction in area would be "eroded"; this response is not accepted, it is unfortunate that to date Vattenfall have refused to consider this alternative and to provide an assessment of any sort.

I would recommend the use of GIS as part of an overall strategy to reduce footprint on the selected site with layouts and options generated for consideration in the planning process.

4.0 Sub-station Location

The question has been posed as to why could the Vattenfall substation be located elsewhere in particular the MOJ replacement land of circa 11 acres shown below in green. The current land take requirement is circa 8.6 acres, so although this site is not completely rectangular, it is a larger site. The land is shown in Figure 3 which is Figure 8 from Vattenfall's Appendix 6.

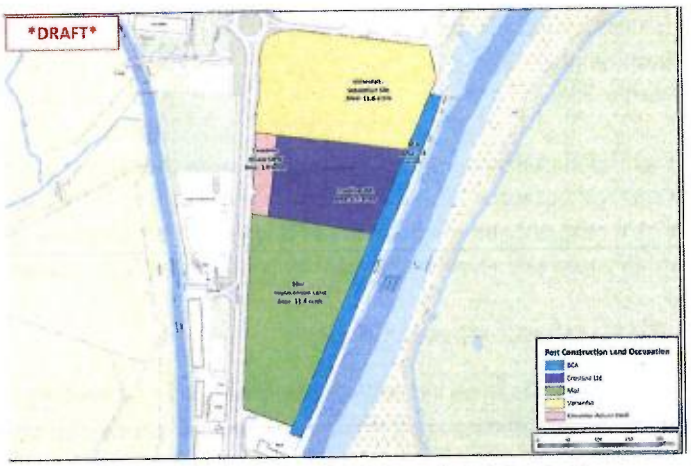


Figure 3 – MOJ Replacement Land Context

Using the land arrangement shown in Figure 3 above, an assessment has been made to see how the components of Vattenfall's proposed AIS substation could be fitted within the site boundary. Figure 4 shows this assessment; it is fairly crude, but it does show that with some reasonable additional design input to the arrangement that the substation could be fitted

within this site. It has been deliberately shown in the northern part of the site for two reasons:

1) To give the greatest noise reduction to the nearest residence (see more below)

2) To minimise the cabling route length to the site (see commentary below).

Vattenfall, in its latest submission in Annex B to Appendix 1 to Deadline 5, have in Section 2.3, Figure 1, including an example Onshore Windfarm Substation Layout. This is very useful, firstly because it demonstrates that other less square arrangements are possible, secondly because the area required appears to be reduced.

We have taken this Google Earth image and re-scaled it and applied it to the MOD replacement land, as shown in Figure 5. We have estimated that the area taken is circa 120m x 250m giving an overall area footprint of 30,000sq.m or 7.5 acres, so around 12% smaller than the footprint that Vattenfall are currently claiming. However what is as important, as shown in Figure 5 is that it fits very well with the MOD replacement land; the question arises as to why this hasn't been considered by Vattenfall?

In addition, the arrangements in Figures 4 and 5 still assume the use of AIS in a single level open compound; if GIS was used then the footprint requirements would be reduced significantly and there would be no issues at all locating in this area.

Other issues to consider

There a number of issues to consider when siting the substation as follows:

a) Noise levels – within the substation, the elements that are likely to emit noise are the transformers, reactors and synchronous machines. On the assumption that the synchronous machines would already be housed in some form of box, the overall sound level for all of these components is likely to be in the order of 70dB at 1m from each item. Most local authorities will expect a maximum to have no more than 30dB at any openable window of a residence particularly where noise levels over night (due to low local traffic and industry activity levels) occur.

   Noise from the substation equipment is usually defined in sound power levels, therefore as such, attenuation due to the direct distance, r, from each unit from the nearest residential property is based on the formula, $10 \times \log(2\pi r2)$. This is based on the sound power radiated from the unit being equally spread over the area of a hemi-sphere.

   Using the typical level of 70dBA at 1m and on the basis that each item of plant has a reasonable size, it is usual to treat each unit as a line source up to a distance of 5m, consequently, the attenuation is based on a reduction of 3dB per doubling of distance up to a point 5m from the unit, and 6dB per doubling of the distance thereafter.

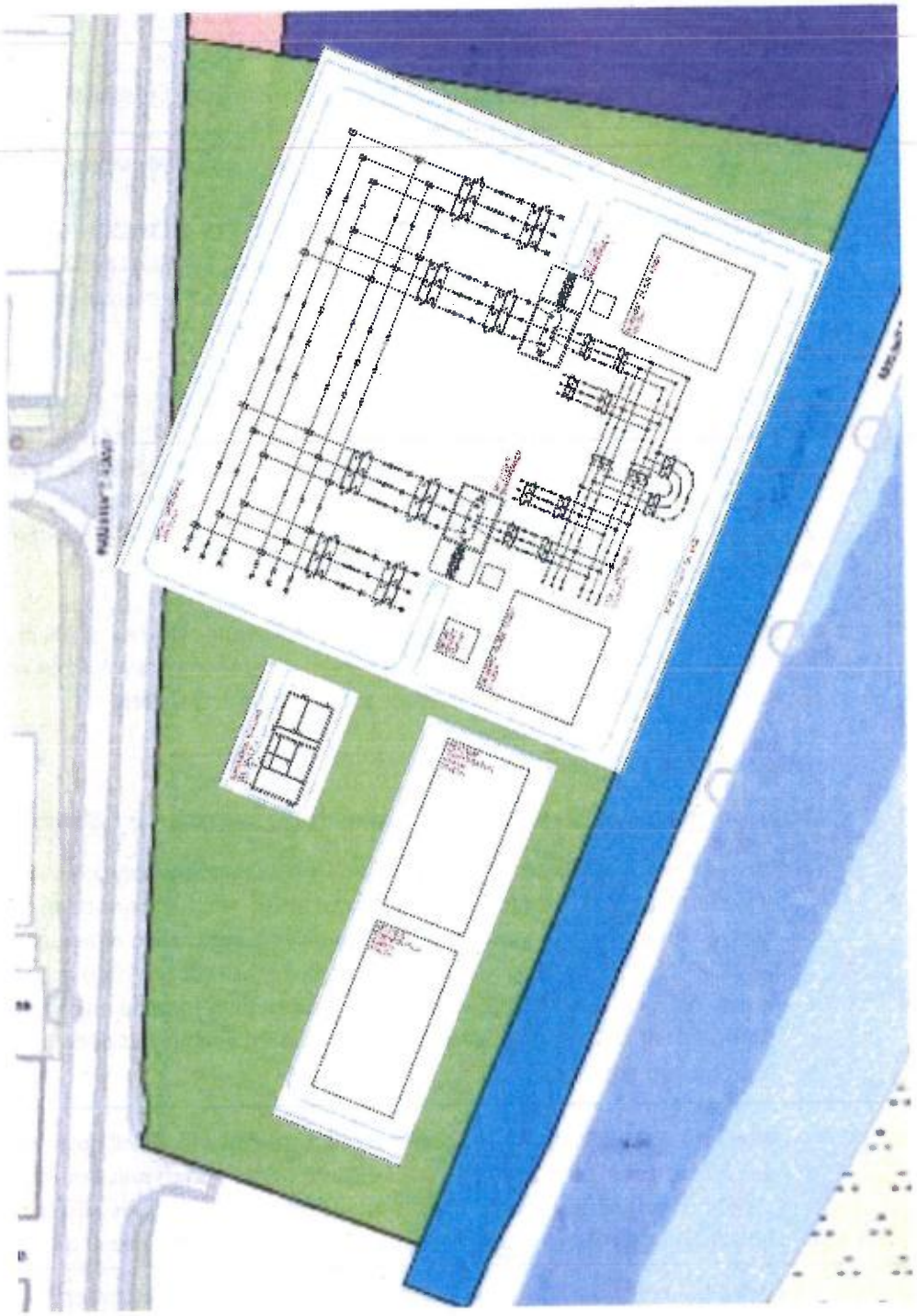


Figure 4 – MOJ Replacement Land Substation Assessment

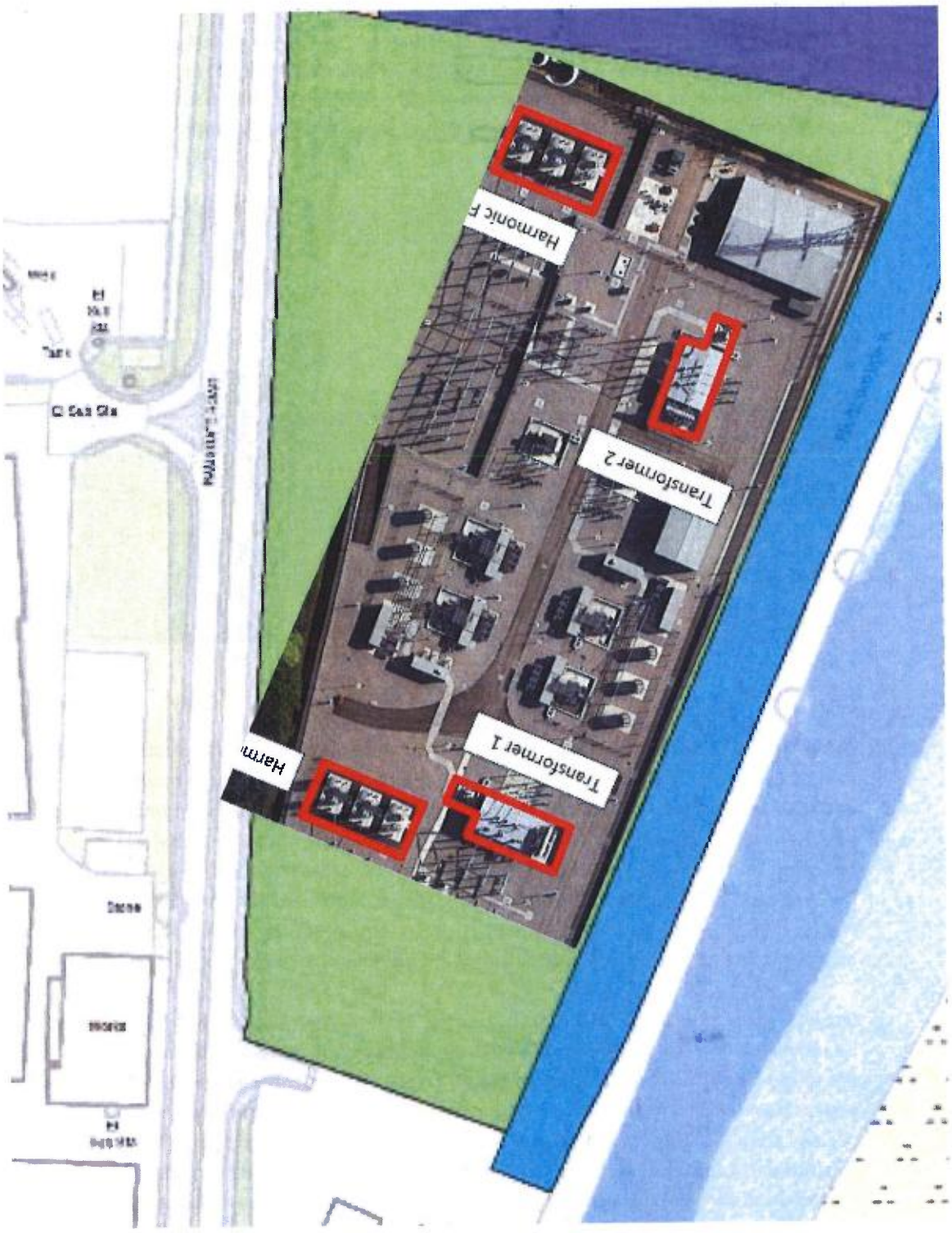


Figure 5 – MOJ Replacement Land - Alternative Substation Layout

The nearest residence to the above site is Stonar Cottage, see photo below in Figure 6, which is estimated to be around 320m. Using the assessment process noted above, it is estimated that there would be an attenuation level of circa 42dB, therefore the reduction of noise emitted by plant will be 70dB – 42dB <30dB and therefore be likely acceptable to the local authority. In any event, it would be possible to install attenuating elements to reduce noise and ensure that the chosen equipment keeps noise emissions to an acceptable level.

Figure 6 – Stonar Cottage

b) Cable Trenches - As noted above, the substation has been shown on the northern part of the site for reasons already given. However, an alternative arrangement could be designed and the southern part of the site could be used; from a cabling point of view whether the substation is in the north or south of the site is not a key technical factor. However, there would be an impact on the cost of the cable trenches, it is estimated that the cost is likely to be in the order of £1,500 per metre or £1.5m per km for each trench, so £3,000 for each metre moved in a southerly direction. In the light of what I expect the overall cost of the project to be, this additional expense would de minimis.

c) Site access – should a substation be located on this land then clearly site access should be provided. The site is located directly onto the Ramsgate Road or A256 as shown in the photo below in Figure 7. The site has an access already, this may need to be widened and sight lines improved, but essentially there is no reason why this existing access cannot be used for both construction traffic and for normal access once the substation is complete. It should also be noted that there is a similar access on the north bound carriageway to enter the industrial units, shown below in Figure 8, so a similar entry format could be provided. RAMAC are prepared to co-operate to ensure that access is adequate and support any upgrading permitted.

Figure 7 – Existing Site Access

Figure 8 – Ramsgate Road Accesses

Given all of the above, it is suggested that this MOJ Replacement Land site should be considered as a viable alternative. In addition, Vattenfall state that their search for sites was limited to sites within 1km suggests that Vattenfall's site searching is incomplete and insufficient. Vattenfall's reports and responses do not make it clear as to why 1km was chosen and why not 2km or more even. I do not consider in my expert opinion there is any justification technically for limited the search to 1km. A significantly more extensive search could and should have been carried out.

There are examples of where the substation linking an offshore windfarm to the 400kV National Grid transmission system has been located a long way from the where the offshore cables have been landed onshore. An example of this is the Rampion Offshore Wind Farm project (see appendix A) located near Shoreham on the South Coast of the UK, it connects to the 400kV transmission system close to Bolney using 150kV circuits which travel around 15 miles inland. This demonstrates that there are many options that could and should be considered rather than just a 1km radius.

5.0 Cable Routing

There are a number of issues that arise regarding how the cabling to the substation could impact the land and routing to the substation.

Trenching arrangements

Vattenfall have advised that they have not yet decided as to whether the circuits from the offshore windfarm will be at 66kV or 132kV (the maximum voltage available to Vattenfall). Vattenfall have therefore shown two indicative versions of cable trenching for these two voltages as shown in Figure 9. The arrangements shown are typically for a DNO or IDNO distributing cables at these voltages. What is not defined are the limitations that will be applied to the land that they cross, such as the Bay Point Sports Club area; the norm is to run along public roads or footpaths. The limitations stem from (understandably) not interfering with the cables and the ability to access the cables should a fault arise. As such, no building structures, piling, concrete slabs should be built above these trenches as these will impede access. However, laying down of roads, car parks, gardens or walkways would be possible as these would still allow access.

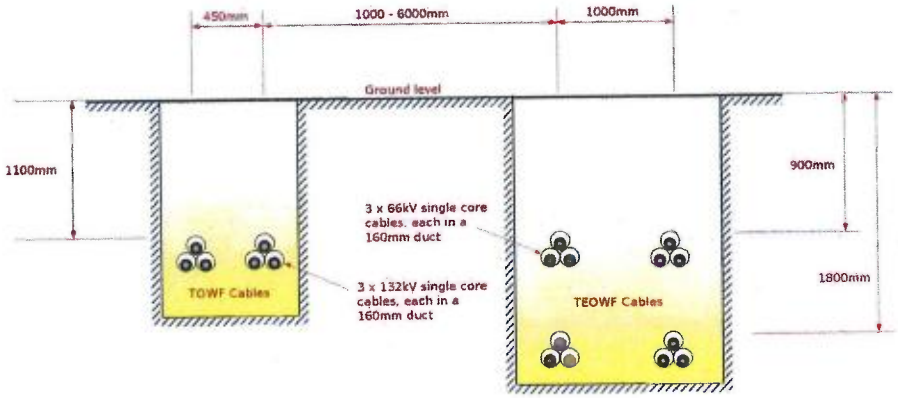


Figure 9 – Indicative trench arrangements for Sandwich Road (extract from Volume 3, Chapter 1, Figure 1.14)

Duct arrangements

Vattenfall have shown ducts in a trefoil arrangement which is a common one. However, no pilot wires are shown in these ducts or additional ducts; I would expect these to be provided for their fault protection systems and are surprised at their omission.

Alternative Routes

It is noted that Vattenfall have proposed horizontal directional drilling (HDD) for parts of their cabling system, in this case from the onshore substation to the National Grid Electricity Transmission point (NGET). HDD is a well-recognised method, used at all numbers of

voltages, from 400V to 400kV and is useful for crossing train lines, rivers, canals, motorways etc to avoid disruption and damage.

From the information submitted so far, Vattenfall do not appear to have considered crossing the River Stour using HDD in order to improve routing and the position for the landing of the offshore cables. I can not see a technical reason to prevent this being carried out and I would recommend that this reviewed and developed further.

END

[redacted]

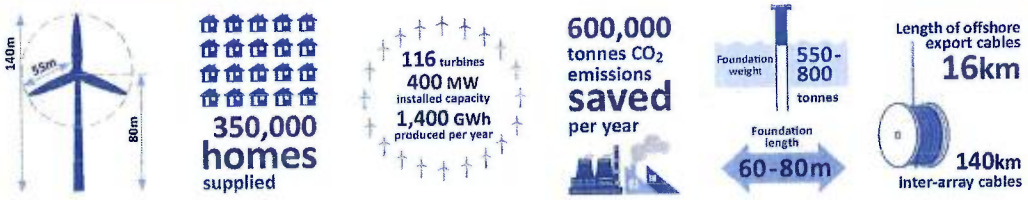
Robert Thorogood
Director
Hurley Palmer Flatt

Appendix A - Rampion Offshore Wind Farm Fact Sheet

Winter 2017/18

Rampion Offshore Wind

The south coast's first offshore wind farm



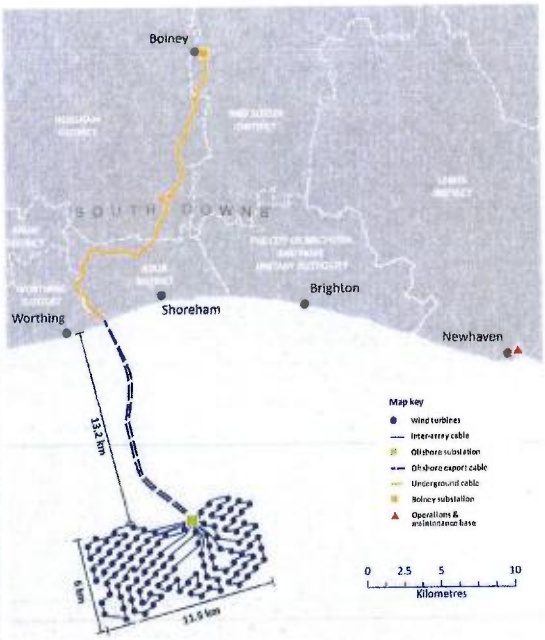
* Based on an average annual domestic household electricity consumption of 3,938 kWh (BEIS).

The Rampion Offshore Wind Farm comprises 116 wind turbines that each sit on top of a foundation fixed into the seabed.

With an installed capacity of 400 megawatts (MW), it will generate 1,400 gigawatt hours (GWh) of green power each year, equal to the amount used annually by around 350,000 UK homes*, or almost half the houses in Sussex. It will reduce CO_2 emissions by nearly 600,000 tonnes a year.

The wind farm site covers 70 square kilometres, so it is larger than the island of Guernsey, and is located in the English Channel between 13 and 20 kilometres off the Sussex coast.

Rampion will be operated and maintained from a purpose-built base at Newhaven Port, and is already acting as a catalyst for the regeneration of the port area.



Construction time frame

Construction of the Rampion Offshore Wind Farm began in 2015 and first generation is due by the end of this year. It will be fully operational in 2018, with the final completion date being largely dependent on logistics and weather during the construction period. Reinstatement of the onshore cable route will be completed in 2018 and monitored for 10 years. The wind farm itself will have a lifespan of 20 to 25 years.

Hurley Palmer Flatt.

Offshore wind farm

Rampion features 116 MHI Vestas 3.45 MW turbines. The turbines are made up of an 80 metre (m) tall tower, a nacelle for the generation equipment, a hub, and three 55m long blades. When vertical, the tip of the turbine blade reaches 140m, which is just taller than the Brighton i360's viewing pod at its top height.

The turbines sit on top of foundations, comprising single steel monopiles and bright yellow transition pieces, designed so they integrate together perfectly. There are 12 rows of 9 to 10 turbines that are connected by array cables taking the power to a single offshore substation. A total of 140 kilometres (km) of array cables are buried in a network under the seabed. Laid end to end, the array cables would stretch from Brighton to London and back.

The wind turbines generate power at 33 kilovolts (kV) and the main role of the offshore substation is to transform this up to 150kV, to reduce any losses as it is transmitted to shore. The 2,000 tonne structure houses the electrical components at the heart of the wind farm including transformers, switchgear and control systems. It sits on a four-leg jacket foundation, fixed into the seabed and weighing around 900 tonnes.

Electricity will be transmitted from the offshore substation along two 16km subsea export cables, which come to shore at the beach, next to Brooklands Pleasure Park in East Worthing.

Rampion name

The Rampion name was entered into a schools' naming competition by Davison High School for Girls, and went on to win the public vote. The logo is a stylised version of the Rampion flower, the county flower of Sussex (right), and uses blue and purple hues in its colour.

Onshore cables and substation

From landfall, 27km of buried onshore cables transport the power to a new onshore substation in Twineham, Mid Sussex. The cables were installed in ducts laid in trenches that were backfilled before the cables were pulled through. Horizontal directional drilling was used at four landmarks along the route – under the A27, the River Adur and A283, railway line, and the A259 and Lancing Beach. By drilling under each of these, traffic and trains were not interrupted, the beach could remain open and environmental impact was minimised. Reinstatement of the land and vegetation along the cable route will continue into 2018.

At the new substation, the electricity will be transformed from 150kV to 400kV and then transmitted to the existing National Grid substation. From there it will enter the national grid for use by homes, businesses and the wider community.

Newhaven Port

A new dedicated operations and maintenance base is now being built at Newhaven Port. This will be home to the 60 newly hired wind turbine technicians, apprentices, engineers, marine workers and administrative staff, who will manage the day-to-day running of the wind farm and ensure it is as efficient as possible.

Rampion's construction management team has also been based at the port, working in temporary facilities at the East Quay. At its peak, 570 workers were employed offshore on the wind farm's construction.

Rampion Offshore Wind

Rampion Offshore Wind Farm
Operations & Maintenance Base, East Quay, Newhaven Harbour, Newhaven, East Sussex, BN9 0BN
rampionoffshore.com | info@rampionoffshore.com

Hurley Palmer Flatt.

BACKGROUND – ROBERT THOROGOOD

1) I, ROBERT THOROGOOD, of Hurley Palmer Flatt, based in London, has been appointed to support RAMAC Holdings in consideration of Vattenfall's proposals for landing of their offshore supplies and connection at Thanet for their proposed offshore wind farm.

2) I have been a Director of Hurley Palmer Flatt since 2004 and have been responsible for the technical compliance and development within the Company.

3) I am a Chartered Engineer and a full Member of the IET, with a BSc (Hons) degree from Imperial College in Electrical and Electronic Engineering.

4) I have been a Consulting Engineer since 1985 working on a variety of projects many of them with large scale power supplies ranging from 11kV to 150kV.

5) I have worked with many different Distribution Network Operators (DNOs) in the UK arranging power connections with open field substations and in-building GIS based arrangements.

6) I have also been involved in arranging power supplies for sites in Ireland (Eirgrid/ESBN), Paris (ERDF) and Stockholm (Vattenfall).

7) Prior to becoming a Consulting Engineer, I worked in industry with Hawker SIddeley (Brush), including the manufacturer, assembly of switchgear, transformers and large rotating machines. I spent several years in the R&D facility for developing switchgear in the range of 3.3kV to 150kV range.

END