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## 20. TELECOMMUNICATIONS AND BROADCASTING

### 20.1. Introduction

- 20.1. This chapter assesses the potential impacts on telecommunications and broadcasting arising from the construction, operation and maintenance ('O&M') and decommissioning phases of the offshore Turbine Area of the proposed Navitus Bay Wind Park Project ('the Project').
- 20.2. For details of the Project description used within this assessment refer to Chapter 2, Navitus Bay Wind Park Project.
- 20.3. Wind turbines have the potential to affect wireless communication systems and television reception in their vicinity. As with any large structure, wind turbines have the potential to obstruct and reflect electromagnetic waves. Such impacts, if left unmitigated, could cause a disturbance to properties nearest to the offshore Turbine Area.
- 20.4. The systems that have been considered include wireless microwave links, which are used by mobile phone service providers as a backbone for their networks, and wireless Ultra High Frequency ('UHF') telemetry links that are often used by utility companies and terrestrial television broadcast services.
- 20.5. The potential for adverse effects on marine communication and navigation systems including Very High Frequency ('VHF') direction, Automatic Identification System ('AIS'), Navigational Telex ('NAVTEX') and Global Positioning Systems ('GPS') is assessed within the Navigation Risks Assessment and reported within Chapter 17, Shipping and Navigation.
- 20.6. A combination of stakeholder consultation, advanced computer modelling and site surveys has ensured that the potential impacts associated with this Project are understood. The results of this assessment are described within this chapter.

### 20.2. Legislation, Policy and Guidance

- 20.7. There is no international, national or local legislation regarding the assessment of wireless communication links or television interference due to proposed wind farm developments.

#### 20.2.1. Guidance

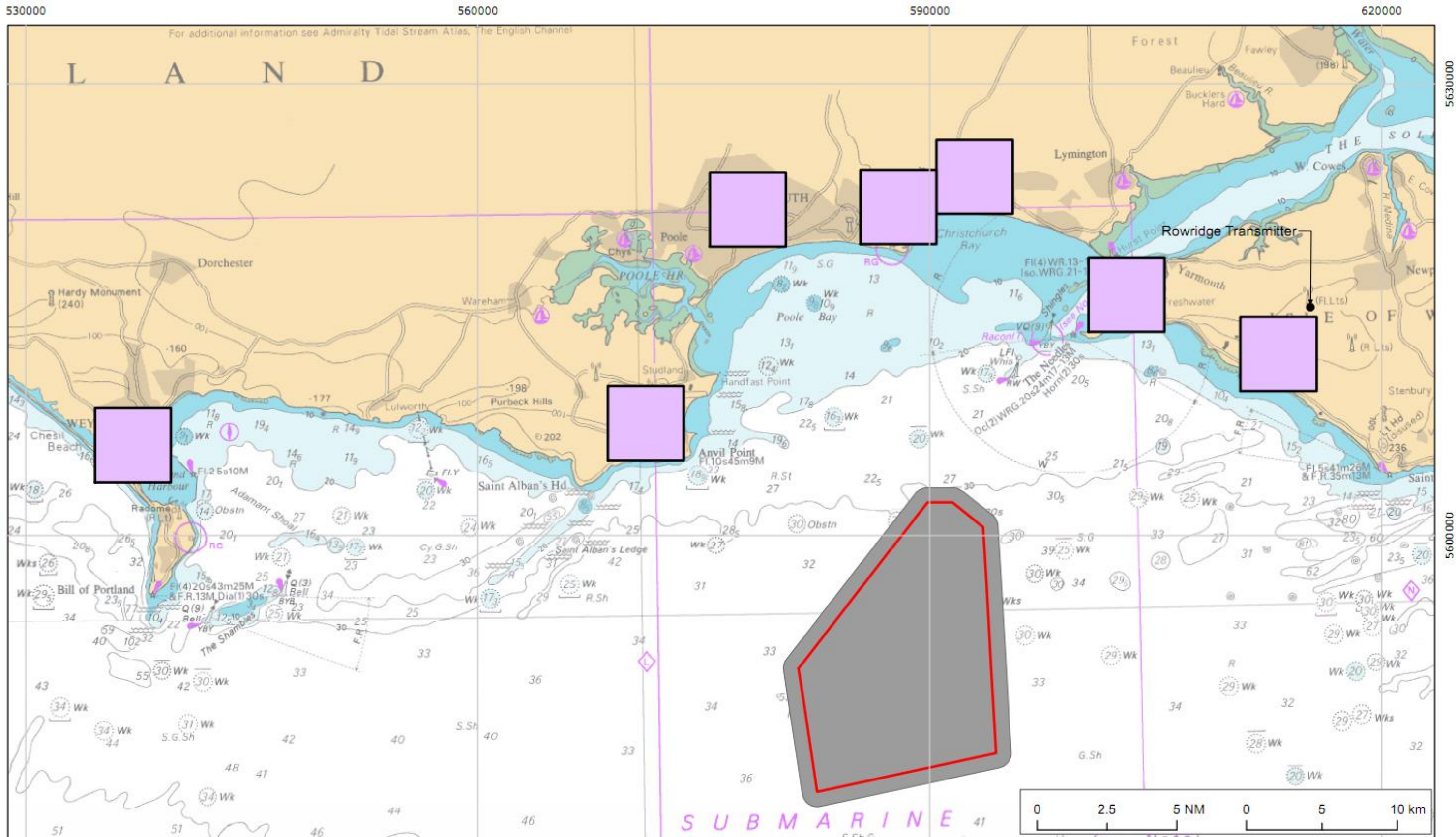
- 20.8. A number of industry recognised guidance documents do exist, including the following:
  - Ofcom (2009). Tall Structures and their Impact on Broadcast and other Wireless Services. London: Office of Communications ('Ofcom'). This document is the recommended method for assessing microwave links, which is considered conservative and is accepted by numerous operators;
  - Peter Swan *et al.* (2009). Calculation of the Clearance Zone Version 3.1, Joint Radio Company Limited. This paper describes the assessment of UHF telemetry links.

### 20.3. Assessment Methodology

#### 20.3.1. Study area

- 20.9. Experience from wind farm developments suggests that the integrity of wireless communication links (wireless microwave (mobile phone services)/UHF links) are only at risk if they pass within a few hundred metres of a wind turbine. For the purpose of this assessment and to ensure that all potentially affected links are analysed, links are considered if they pass within a kilometre of the Turbine Area.
- 20.10. For TV interference issues, severe interference is most often experienced within 5 km of a wind farm development. However, interference can occur at greater distances than this. In the case of large offshore developments, such as this Project, it is usual to consider the nearest coastal residential areas to the Project. Therefore, the study area has considered locations around Totland and Moortown on the west of the Isle of Wight, Christchurch, Highcliffe, Bournemouth, Swanage and Weymouth. The study area for this assessment is presented in Figure 20.1.





<b>Legend</b> <div><div></div> Turbine Area</div> <div><div></div> Wireless Communications Study Area</div> <div><div></div> TV Interference Study Area</div>		<b>Scale @A3</b> 1:250,000	<b>Coordinate System:</b> WGS 1984 UTM Zone 30N			<b>Navitus Bay Development Ltd</b> <b>Telecommunications and Broadcasting</b> <b>Study Area</b> 
		<b>Date:</b> 15/08/2013	<b>Datum:</b> WGS 1984			
		<b>Ref. No.:</b> 0210130612288/01	<b>Data Source</b> SeaZone OS			
		<b>Fig. No.:</b> Figure 20.1				
		<b>Author:</b> CG				
		<b>Rv.No.:</b> 01		<b>Checked:</b> NDU		

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### 20.3.2. Consultation

- 20.11. This section details the consultation which has informed the assessment to date, which has helped shape both the assessment methodology and the scope of the assessment.
- 20.12. The following consultation was undertaken with Ofcom, JRC, Atkins Global and Arqiva:
- Consultation with Office of Communications ('Ofcom') provided details of link operators that have licensed microwave links in the vicinity of the site;
  - Consultation with the Joint Radio Company ('JRC') detailed safeguarding of UHF telemetry links and microwave links on behalf of various utilities;
  - Consultation with Atkins Global detailed safeguarding of UHF telemetry links on behalf of various utility companies;
  - Consultation with Arqiva who are responsible for providing the BBC's and ITV's transmission network and can operate both microwave links and UHF re-broadcast links between its transmission sites;
  - Desk based modelling of potential TV interference areas;
  - A television baseline survey to quantify the current reception quality in areas where interference could occur.
- 20.13. Table 20.1 summarises the extent of consultation undertaken to date.

**Table 20.1 Consultation Summary**

Organisation and Date	Summary of response	Where addressed
Ofcom November 2011	No links identified.	Refer to the Impact Assessment section for details
JRC November 2011	Response received for 10 km radius of the Turbine Area. No concerns raised.  Revised response received for 15 km radius of the Turbine Area. No concerns raised.	Refer to the Impact Assessment section for details
Arqiva November 2011	Response regarding microwave radio links. No concerns raised.  Response regarding re-broadcast and microwave links. No concerns raised.  Further response received regarding re-broadcast links. No concerns raised.	Refer to the Impact Assessment section for details
Atkins Global November 2011	Atkins confirmed that they had forwarded the enquiry to Wessex Water.	Refer to the Impact Assessment section for details
Wessex Water November 2011	Awaiting response as of 08/08/13.	Refer to the Impact Assessment section for details
Bournemouth & West Hampshire Water Plc. Feb 2012 and August 2013	They operate VHF (173 MHz) and UHF (458 MHz) unlicensed point to point telemetry links along the south coast from Bournemouth to Southampton Water. The communication paths do not travel across the water at any point.	Refer to the Impact Assessment section for details

- 20.14. Atkins Global confirmed that none of the companies they are contracted to responded directly on links in the area. They advised of two companies (Wessex Water and Bournemouth and West Hampshire Water) that operate in the region. Significant effort has been made to obtain a response from these companies but no response has been received to date.

### 20.3.3. Scope of the assessment

- 20.15. For wireless communication links, including microwave (mobile phone) links and UHF telemetry links, consultation was carried out to ascertain whether wireless links were active in the study area.
- 20.16. Regarding TV interference issues, a desk based assessment was carried out to ascertain areas where interference may occur due to the Turbine Area. A baseline reception survey has been undertaken to establish the current reception quality and the transmitter used in each area. This has enabled consideration of the likely impacts the Turbine Area would have on TV reception. It also provides a basis for investigating any subsequently reported issues.
- 20.17. The potential for impacts on marine communication and navigation systems including VHF Direction, AIS, NAVTEX and GPS is assessed within Chapter 17, 'Shipping and Navigation'. Moreover, a Navigation Risk Assessment was completed which identified impacts with a clear pathway to receptors as part of the Formal Safety Assessment (FSA) process. Through this process effects on communication and position fixing systems were scoped out of the assessment.

### 20.3.4. Impact assessment methodology

- 20.18. To determine potential impacts of the Project on telecommunications and broadcasting equipment, the 'sensitivity of a receptor' of these activities (Table 20.2) was considered in the context of the 'magnitude of effect' (Table 20.3).

#### ***Sensitivity of a receptor***

- 20.19. Each potentially affected receptor/service is assigned sensitivity based on its tolerance, recoverability and importance. Table 20.2 shows the sensitivity categories that have been adopted. These are based on professional judgement.

**Table 20.2 Sensitivity Categories**

Sensitivity	Definition
High	Receptor has no capacity to accommodate interference.
Medium	Receptor has low capacity to accommodate interference.
Low	Receptor has some capacity to accommodate interference.
Imperceptible	Receptor has substantial capacity to accommodate interference.

- 20.20. Wireless communication links and TV broadcast services have some capacity to tolerate interference effects due to the nature of the systems which operate in a dynamic environment. Therefore they are of low sensitivity.

#### ***Magnitude of effect***

- 20.21. Each identified effect is assigned a magnitude category based on its extent, duration and frequency. Table 20.3 shows the magnitude of effect categories that have been considered within the assessment.

**Table 20.3 Magnitude Categories**

Magnitude	Definition
High	Receptor/service is rendered unusable.
Medium	Significant change caused to receptor/service.
Low	Some change caused to the receptor/service.
Imperceptible	No (or almost no) change caused to the receptor/service.

#### ***Impact significance***

- 20.22. Impact significance takes into account the sensitivity of a receptor and the magnitude of effect and is derived using the EIA methodology as set out in Chapter 3. The process is guided by the Impact Assessment Matrix illustrated in Figure 20.2. Project specific impacts that have either a major or moderate significance are considered to have a significant impact on telecommunications and broadcasting.

		Sensitivity of a receptor			
		High	Medium	Low	Imperceptible
Magnitude of effect	High	Major	Major OR Moderate	Moderate OR Minor	Negligible
	Medium	Major OR Moderate	Moderate  Minor	Minor	Negligible
	Low	Moderate OR Minor	Minor	Minor	Negligible
	Imperceptible	Negligible	Negligible	Negligible	Negligible

Figure 20.2 Impact Assessment Matrix

20.3.5. Limitations and embedded mitigation

- 20.23. Wessex Water, and Bournemouth and Hampshire Water via Atkins Global have not responded to consultation to date. However, based on the location of the Turbine Area it is unlikely that any operators are utilising fixed links in the area. If there are operational links that have not been identified to date it is likely that these would be onshore and therefore would not be affected by the Turbine Area.
- 20.24. No embedded mitigation has been identified in relation to this assessment.

20.4. Baseline Environment

- 20.25. The following section details the baseline data gathering methodology for the assessment and data sources used.

20.4.1. Data Sources

- 20.26. Information obtained from third party sources is outlined in Table 20.4.

Table 20.4 Data Sources		
Organisation	Data requested	Data received
Office of Communications ('Ofcom')	Link end coordinates and the frequency of wireless links in the study area.	Data obtained, as per the request.
JRC	Link end coordinates and the frequency of wireless links in the study area.	Data obtained, as per the request.
Atkins Global (latterly Wessex Water and Bournemouth and West Hampshire Water)	Link end coordinates and the frequency of wireless links in the study area.	Awaiting response at the time of publication
Arqiva	Link end coordinates and the frequency of wireless links in the study area.	Data obtained, as per the request.

- 20.27. The location of relevant TV transmitters has been determined based on desk based resources, such as the BBC website and other coverage maps.
- 20.28. The computer modelling, which defines the areas where there is potential for TV interference, was based on transmitter data from the BBC website and Ofcom publications.
- 20.29. The terrain data used for the modelling is Ordnance Survey Panorama data, at 50 m resolution.
- 20.30. No information on future wireless links has been received from consultees to date.



#### **20.4.2. TV Baseline reception survey**

- 20.31. The survey found that in the areas of Weymouth and Moortown, where interference has been predicted with regard to the Rowridge transmitter, homes are already reliant on alternative transmitters (the Brightstone relay transmitter and the Weymouth relay transmitter respectively). In other areas, including Bournemouth and Harmans Cross (near Swanage), a minority of homes are reliant on relay transmitters (the Westbourne relay transmitter and the Corfe Castle relay transmitter respectively). In the majority of surveyed locations, the signals from the Rowridge transmitter were strong and of good quality.
- 20.32. Overall, the survey allowed the exclusion of some areas with regard to interference concerns because the affected transmitter (Rowridge) is not being relied on.

#### **20.4.3. Microwave links and UHF telemetry links**

- 20.33. Ofcom guidelines recommend an exclusion zone, which takes the form of an elliptical shape around the link path within which no turbine should be located. The size of the exclusion zone is based on a parameter called the Second Fresnel Zone ('SFZ') and is frequency dependent. Observation of the exclusion zone ensures no degradation of the signal due to diffraction losses.
- 20.34. The JRC has a methodology for the assessment of impact on UHF telemetry links. The lower frequency used for such links, when compared to microwave link technology, means they can be affected by reflection issues as well as diffraction loss issues.
- 20.35. Exclusion zones and analysis of reflection issues have not been necessary for the purposes of this assessment as there are no links in the area.
- 20.36. Through consultation with operators, no microwave links and UHF telemetry links were identified within the study area and this is scoped out of the following assessment.

### **20.5. Impact Assessment**

#### **20.5.1. Realistic Worst Case Scenario**

- 20.37. Relevant parameters defining the 'Rochdale Envelope' have been used to describe the potential realistic worst case scenarios for each potential effect on telecommunications and broadcasting (Table 20.5). In this case, the worst case parameter underpinning the assessment is the maximum height of turbines.

Table 20.5 Realistic Worst Case Scenario for Telecommunications and Broadcasting		
Potential effect	Realistic worst case scenario	Rationale
Construction		
TV Interference due to diffraction losses and reflection effects from cranes and turbine components causing small temporary impact (interference or freezing of the picture) in the identified areas	Maximum of 136 x 8 MW turbines with maximum tip height of 200 m	Greatest magnitude of impact results from maximum turbine height.
Operation and maintenance		
TV Interference due to intermittent freezing or disappearance of the picture in the identified areas	Maximum of 136 x 8 MW turbines with maximum tip height of 200 m	As above.
Decommissioning		
TV Interference due to diffraction losses and reflection effects from cranes and turbine components causing small temporary impact (interference or freezing of the picture) in the identified areas, but significantly smaller than impacts during O&M	Maximum of 136 x 8 MW turbines with maximum tip height of 200 m	A full decommissioning plan will be agreed with the relevant government department at the point of decommissioning.

## 20.5.2. Impact Assessment - Television interference

### **Construction**

- 20.38. Any impact on TV interference due to construction would be due to diffraction and reflection of the TV signal from turbine components and large cranes. Generally, impacts during construction are significantly smaller than impacts during the operational and maintenance phase. Given the low level of impact that is expected during the operational phase, it is considered highly unlikely that any impact would occur during construction. Furthermore, it should be noted that such impacts would be temporary in nature. The sensitivity of this receptor is considered **low** and the magnitude of effect is considered **imperceptible**. The overall impact significance is considered **negligible** and, therefore, **Not Significant**.

### **Operation and maintenance**

- 20.39. Desk based modelling has identified that minor interference to signals from the Rowridge transmitter could occur in the areas of Bournemouth, Swanage, Moortown and Weymouth.
- 20.40. The baseline reception survey revealed that the areas of Moortown and Weymouth are not reliant on the Rowridge transmitter. Homes in Moortown appeared to be reliant on the Brightstone relay transmitter and homes in Weymouth appeared to be reliant on the Weymouth relay transmitter. TV signals in these areas would therefore not be affected by the proposed Turbine Area.
- 20.41. Minor interference could occur in the areas of Bournemouth and Swanage. It should be noted that some homes in or around these areas already appear to be reliant on relay transmitters.
- 20.42. The assessment is conservative; in particular when consideration is given to the distance between the Turbine Area and the receptors and that no receptors exist in the forward scatter region. The sensitivity of this receptor is considered **low** and the magnitude of effect also considered **low**. The overall impact significance is considered **minor** and therefore **Not Significant**. The effects on any residence affected by the development could be mitigated, as described in Potential Mitigation section.

### **Decommissioning**

Any impact on TV interference due to decommissioning would be due to diffraction and reflection of the TV signal from turbine components and large cranes. Generally, impacts during decommissioning would be significantly smaller than impacts during the operational and maintenance phase. Given the low level of impact that is expected during the operational phase, it is considered highly unlikely that any impact would occur during decommissioning. Furthermore it should be noted that such impacts would be temporary in nature; and by the decommissioning phase mitigation is likely to have been installed already. The sensitivity of this receptor during decommissioning is considered **low** and the magnitude of effect is considered **imperceptible**. The overall impact significance is considered **negligible** and, therefore **Not Significant**.

## 20.6. Potential Mitigation

- 20.43. The assessment has identified the potential for minor interference to signals from the Rowridge transmitter. Where an impact arises which is proven attributable to the Turbine Area, mitigation would be provided. This could include the installation of satellite TV to upgrade the reception at affected homes. It is likely that if any impacts do occur these would be minor and on a small scale.
- 20.44. Mitigation measures are being identified in discussion with relevant statutory consultees which will seek to minimise predicted impacts.

## References

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- Peter Swan et al., 2009, Calculation of the Clearance Zone Version 3.1, Joint Radio Company Limited.



## Glossary

TERM	DEFINITION
<b>Backscatter Region</b>	This is the area in front of a wind turbine when viewed from the direction of a transmitter. If a wind turbine is located due east of a transmitter, the area immediately to the west of the turbines is the backscatter region.
<b>Carrier to Interference Ratio</b>	This is a quantity that describes the strength of the direct (wanted) signal from a transmitter to a receiver relative to the strength of an interfering (unwanted) signal. The higher this quantity the better the performance of the system (in the context of interference from other sources/objects such as wind turbines).
<b>Diffraction</b>	This is a weakening or fading of an electromagnetic signal due to the presence of a physical object obstructing its path.
<b>Fixed Link</b>	A wireless radio link between two fixed antennae. Such links can be in any frequency range, including microwave links and UHF telemetry links.
<b>Forward Scatter Region</b>	This is the area behind a wind turbine when viewed from the direction of a transmitter. If a wind turbine is located due east of a transmitter, the area immediately to the east of the turbines is the forward scatter region.
<b>Second Fresnel Zone</b>	SFZ is recommended by Ofcom guidelines as an exclusion zone associated with a wind farm.
<b>Ultra High Frequency</b>	UHF is the frequency band within the radio spectrum used by, among others, utility companies and television broadcast services.

## Abbreviations

TERM	DEFINITION
<b>JRC</b>	Joint Radio Company
<b>km</b>	Kilometre
<b>m</b>	Metre
<b>MW</b>	Megawatt
<b>TV</b>	Television
<b>UHF</b>	Ultra High Frequency