Rampion Offshore Wind Farm

ES Section 15 – Telecommunications

RSK Environmental Ltd **Document 6.1.15**

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Revision A

E.ON Climate & Renewables UK Rampion Offshore Wind Limited

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15 TELECOMMUNICATIONS

15.1 Introduction

15.1.1 The purpose of this section of the Environmental Statement (ES) is to provide an understanding of the baseline telecommunications environment local to the proposed Rampion Offshore Wind Farm (the Offshore Project) and to consider the possible direct or indirect effects that construction and operation of the proposed offshore elements of the Project could have on this environment. The assessment has considered fixed links, Marine and VTS Radar, Marine Radio and various other radio systems. The section also details methods by which any impacts identified can be mitigated.

Telecommunications Impact Assessment

Systems Considered

15.1.2 The impact assessment considers the potential impacts of the Offshore Project on the following communication systems:

- Communication Fixed Links;
- Very High Frequency (VHF) radio systems;
- Global Positioning Systems (GPS)
- Radio Communications;
- Automated Identification Systems (AIS);
- Mobile Telephones;
- Marine Communications;
- Marine and Vessel Traffic Service (VTS) Radar;
- Television Reception.

15.2 Legislation and Policy Context

15.2.1 The systems assessed within this chapter include those used for communications systems aboard vessels and for various navigation purposes. The potential impact of the Project on these systems therefore needs to be considered and the guidance within the Legislative and Policy framework with regard to navigation and shipping has therefore been consulted.

National Policy Statements (NPS)

15.2.2 NPS provide the primary basis on which the Secretary of State is required to make its decision.

15.2.3 The National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3) dated July 2011 makes reference to the potential impact of offshore wind developments on Navigation and shipping. Relevant sections from EN-3 relating to the systems assessed within this chapter are given below.

15.2.4 Paragraph 2.6.147 states that *offshore wind farms will occupy an area of the sea and therefore it is inevitable that there will be some impact on navigation in and around the area of the site. This is relevant to both commercial and recreational users of the sea … ….to ensure safety of shipping; it is Government policy that wind farms should not be consented where they would pose unacceptable risks to navigational safety after mitigation measures have been adopted.*

15.2.5 Paragraph 2.6.148 states that *Impacts on navigation can arise from the wind farm or other infrastructure and equipment creating a physical barrier during construction and operation. The presence of the wind turbines can also have impacts on communication and shipborne and shore-based radar systems.*

15.2.6 Paragraph 2.6.153 states that *Applicants should establish stakeholder engagement with interested parties in the navigation sector early in the development phase of the proposed offshore wind farm and this should continue throughout the life of the development including during the construction, operation and decommissioning phases. Such engagement should be taken to ensure that solutions are sought that allow offshore wind farms and navigation uses of the sea to successfully co-exist.*

15.2.7 Paragraph 2.6.154 states that *Assessment should be underpinned by consultation with the MMO, Maritime and Coastguard Agency (MCA), the relevant General Lighthouse Authority, the relevant industry bodies (both national and local) and any representatives of recreational users of the sea, such as the Royal Yachting Association (RYA), who may be affected.*

15.2.8 Paragraph 2.6.174 states that *Mitigation measures will include site configuration, lighting and marking of the projects to take account of any requirements of the General Lighthouse Authority and also the provision of an acceptable Active Safety Management System.*

Wind Turbines and Radio Systems

15.2.9 Ofcom, the UK communications regulator, provides a safeguarding service for microwave communications links and radio telemetry links. The British Broadcasting Corporation (BBC) provides an online tool for determining the effects of wind turbines on terrestrial television services. There is however little formal legislation with regard to the potential impacts of wind farm developments on radio systems such as these.

15.2.10 It is, however, considered best practice to establish what the implications could be for radio systems operating in the area, and this has been carried out for the Offshore Project to the extent possible.

15.3 Scoping and Consultation

15.3.1 Initial consultation on the Project was carried out via the Rampion Offshore Wind Farm Scoping Document (E.ON/RSK, 2010). Responses received are presented in the Infrastructure Planning Commission (IPC) Scoping Opinion report (IPC, 2011). There were no specific comments relating to offshore communication in the responses to scoping from consultees.

15.3.2 Further consultation took place to establish the baseline conditions regarding the types of communications around the Offshore Project site. These consultations are described in Table 15.1. The information drawn from the consultations and other research was presented in a Draft ES and subject to stakeholder consultation.

15.3.3 Full details of the consultation process and associated outcomes, including comments on the Draft ES can be found in the Consultation Report (Document 5.1). There were no comments directly relating to telecommunications issues.

15.4 Assessment Methodology

Establishment of Baseline Environment

Communications Fixed Links

15.4.1 Ofcom was consulted to obtain the operator and link ID for any communication links operating in the area. The Project site coordinates were provided to Ofcom to ensure that all relevant links could be identified. Consultation was also undertaken with the Joint Radio Company (JRC), Atkins Global and Southern Water all of whom operate UHF Telemetry Links. Table 15.1 shows the results of this consultation.

Table 15.1: Radio link consultation responses

Party	Contact	Summary
Ofcom	Spectrum.LicensingEnquiries@ofcom.org.uk	3/10/11 – Link information requested from Ofcom 5/10/11 – Information received - no links
JRC	windfarms@jrc.co.uk	5/10/11 – Link information requested 18/10/11 – Response received – no links
Arqiva	windfarms@arqiva.com	5/10/11 – Link information requested

	Jack.Fitzsimons@arqiva.com tim.shergold@arqiva.com	24/10/11 – Response received regarding microwave links – No objection 25/10/11 – Response received regarding re-broadcast links – Unlikely to impact
Atkins	windfarms@atkinsglobal.com	5/10/11 – Link information requested 25/10/11 – Chased for a response
Southern Water	Tyson, Brian <Brian.Tyson@southernwater.co.uk>	13/10/11 – Southern Water confirmed no objection [to the Project]

Other Systems

15.4.2 Other systems which were considered in this assessment include:

- VHF radio systems: such systems are used for a wide range of communication systems including emergency services such as the fire service, police service and the ambulance service. For emergency services, analogue shore-based radio communications service has been largely replaced by Terrestrial Trunked Radio (TETRA) systems.

- Global Positioning System (GPS): this system relies on signals from geostationary satellites and triangulates these to determine the location of the receiver. These can be used on board any vessel for location/navigation purposes.

- Radio Communications: these transmit radio programs on medium wave, long wave and VHF Frequency Modulated (FM) bands. The shipping forecast provides weather reports for the seas around the British Isles and is broadcast on BBC Radio 4 Long Wave.

- Automated Identification Systems (AIS): this is a tracking system, which involves sending data via radio communication from ship to ship and also from ships to AIS stations. The system integrates VHF transmissions with a positioning system such as a GPS, relaying information on the identity, position, course and speed of vessels. The purpose of AIS is to assist in collision avoidance and it can be integrated with marine radar.

- Mobile Telephones: The UK has a number of digital mobile telephone networks with mobile telephones regularly being used by the majority of businesses, public and boat users. The radio communications path is typically between mobile handset and the nearest fixed base station, which for the Rampion project is on the mainland or the Isle of Wight.

- Marine Communications – Long Range Identification and Tracking (LRIT): a satellite communications system for reporting ship locations four times a day.

- Marine Communications – Ship Security Alerting System (SSAS): SSAS is carried over other ship radio systems. LRIT can be one of these systems and is noted above. SSAS can also be carried over other marine radio systems.

- Marine Communications – VHF Radio: most vessels carry on-board VHF radios for communication with other vessels and/or the port authorities.

- Marine and VTS Radar: Vessel Traffic Services (VTS) use shore-based VTS radar to monitor a ship's position, heading and velocity for the purpose of collision avoidance. Information from this radar system is monitored in a control room by operators who can communicate with the vessels in the vicinity via radio.

- Television (TV): signals are broadcast from land-based transmitters on the mainland and the Isle of Wight.

15.4.3 Information on the presence of such systems in the vicinity of the Project site is included in Section 15.5.

Identification and Assessment of Impacts and Mitigation Measures

15.4.4 The sensitivity/importance of each system is evaluated in terms of the categories listed in Table 15.2. The sensitivity/importance of each system has been categorized based on the function performed by the system. For example, a fixed link that provides a connection between two mobile network broadcast towers ensures the signal is reliable in a particular region. A fixed link therefore has a regional sensitivity/importance.

15.4.5 With regard to microwave fixed links, Ofcom has a recommended assessment method, which is used as part of standard practice within the UK. Assessment of such links was not required for the Rampion project because there are no active links crossing the Offshore Project Site. There is no formal guidance for assessment methodology regarding the other radio systems and television signals. All analysis has been based on previous experience of such systems and considerations of first principles.

Table 15.2: Sensitivity/Importance

Category	Description
International	A system of international importance
National	A system of national importance
Regional	A system of regional importance
County	A system which is important at county level
Borough	A system which is important at borough level

Category	Description
Local	A system of local importance

15.4.6 The magnitude of any potential impact is evaluated according to the categories shown in the table below.

Table 15.3: Magnitude of Impact

Magnitude	Definition
Substantial	Impact has the potential to entirely or almost entirely disrupt the system
High	Impact has the potential to cause a significant effect on the system's performance
Moderate	Impact has the potential to cause a noticeable impact on the system
Minor	Impact has the potential to cause a small impact on the system
Negligible	No significant impact on the system are anticipated

15.4.7 The table below shows the significance of the impact based on the importance of the system and the magnitude of the impact itself.

Table 15.4: Significance of Impact

	Sensitivity/Importance					
Magnitude	**International**	**National**	**Regional**	**County**	**Borough**	**Local**
Substantial	Major	Major	Major	Major/Moderate	Moderate	Moderate
High	Major	Major	Major/Moderate	Moderate	Moderate	Minor
Moderate	Major	Major/Moderate	Major/Moderate	Moderate	Minor	Minor
Minor	Moderate	Moderate	Moderate	Minor	Minor	Minor
Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

15.4.8 An assessment has also been made of the significance of residual impacts, i.e. those remaining after mitigation.

Uncertainty and Technical Difficulties Encountered

15.4.9 There is limited information with regard to the impacts of wind turbines on some of the marine radio/radar systems. The available information is based on trials undertaken and has been used when assessing impacts in this section.

15.5 Environmental Baseline

15.5.1 Consultation has been undertaken with Ofcom to establish the operational links in the vicinity of the Offshore Project. The Project Site boundary was provided to Ofcom at the consultation stage (the boundary provided for consultation was broader than that currently proposed). Baseline surveys have not been undertaken as they are not considered necessary. None of the stakeholders consulted raised an objection to the Project. The locations of the relevant infrastructure considered as part of the assessment are shown in Table 15.5.

Table 15.5: Infrastructure Considered

Infrastructure	Location(s)	Source
Fixed link ends	None present	Consultation with Ofcom, the JRC and Atkins
Television transmitters	The nearest main transmitters are Midhurst, Heathfield and Rowridge.	Ofcom, Digital Switchover Transmitter Details, Meridian Region issue 3.0, 2012
VHF radio systems	Numerous possible mainland locations for fixed base stations	It is known that the UK has numerous base stations for VHF equipment
GPS satellites and receivers	Satellites are in orbit, receivers can be on board vessels or on the mainland	Nature of the system
Medium wave transmitters	Located on the mainland, the nearest transmitters are thought to be Southwick and Chichester	Information on transmitter locations is publically available
FM transmitters	The nearest transmitter is thought to be Rowridge (Isle of Wight)	Transmitter location is publically available, e.g. Ofcom, Digital Switchover Transmitter Details, Meridian Region issue 3.0, 2012
Short wave transmitters	There are fixed transmitters on the mainland and transmitters can also be located on vessels	Nature of the system
AIS	Transmissions are from one vessel to another and can also be from a vessel to an AIS station	Nature of the system
Mobile phones	Fixed stations are on the Isle of Wight and the mainland, mobile phones themselves can be on land or on board vessels	Nature of the system
LRIT	Transmitters are located on board vessels, receiver is a	Nature of the system

Infrastructure	Location(s)	Source
	communications satellite	
SSAS	Transmitters are located on board vessels, receiver is a communications satellite	Nature of the system

15.6 Assessment of Potential Impacts

15.6.1 To comply with the principles of a Rochdale envelope assessment (see Section 5), worst-case scenarios have been considered in the assessment of impacts to communication systems. The actual impacts of the Project on communication links are therefore likely to be lower than the scenarios considered in this impact assessment. The components of the design of the marine part of the project that could influence the magnitude of impacts are:

- Height of turbines (highest turbines creating the greatest potential for impact); and
- Extent of the turbine array (the widest extent creating the greatest potential for impact).

15.6.2 For fixed links, the assessment process involved consultation with Ofcom, the JRC, Atkins Global and any subsequently identified stakeholders. No active links were identified that could be affected and so no further analysis of such links has been required.

15.6.3 For other radio systems and GPS, assessment of potential impact was ascertained by consideration of the following: 1. The system description; 2. The location of the relevant infrastructure; 3. Whether the system is safeguarded by Ofcom; 4. Whether the signal would pass through the wind turbines; 5. What the interference scenarios would be (e.g. geometry of receiver and transmitter relative to the turbines); 6. Whether interference caused by the Project would be greater than other sources of interference that the system is subject to; 7. The technical capability of the system for resolving interference; 8. The operational processes for resolving the interference; 9. The overall operational impact; 10. Whether the operator has been known to object to wind farms in the past; and 11. Information from other sources and external trials regarding wind farm interference effects for the system.

15.6.4 For marine radar and VTS radar, the radar impacts associated with wind turbines were considered including Target Spreading, Side-lobe Detection and Multiple Reflections. Published information regarding external trials was considered.

15.6.5 For impacts on television communication, detailed modeling of impacts was not required based on the location of the wind farm and previous experience of interference due to wind developments. Any issues caused by the Offshore Project would be in the backscatter (the reflection of waves) zone, where impacts are considered less likely. This, combined with the distance between the turbines and receiving aerials, is considered acceptable.

15.6.6 The assessment has considered the maximum turbine tip height of 210m above Lowest Astronomical Tide (LAT) as this represents the worst-case scenario. In practice for many of the systems assessed within this chapter, moderate alterations to the number and size of the turbines installed within the project site are unlikely to significantly affect the conclusions of the analysis. However, the worst-case scenario is likely to be caused by the largest turbines (rather than a greater number of smaller turbines) as these will have the maximum shadow zone and reflecting cross-section. The significance of this impact has been determined in accordance with the tables above. The impacts during construction and decommissioning are due to the presence of large metallic structures such as cranes and the components of the turbines themselves. In many ways these impacts are similar to those caused by operational turbines, because large cranes can potentially block and reflect radio signals in the same way that wind turbines do. In general, the impact of cranes is expected to be less than that of the turbines as many of the potential impacts are associated with the large rotating turbine blades.

15.6.7 The potential impacts during operation are of greatest importance, as any impacts during construction or decommissioning will be equal to or less significant than those associated with the operational phase of the Project.

15.6.8 It should be noted that some systems, such as GPS, provide a service available all over the world. As such, these systems could be described as being of international importance. However, in the context of the Project, the impacts to be considered are those caused by the turbines. Therefore, the importance of each system has been defined with this in mind.

Construction

15.6.9 Potential Impacts: Fixed Links. Consultation has revealed that no fixed links are operational in the vicinity of the Offshore Project site. Therefore, no impacts on such links are anticipated, and the magnitude of potential impact is considered negligible.

15.6.10 Potential Impacts: VHF Radio systems. Wind turbines and other large metallic reflectors such as cranes can affect the quality of radio signals that pass through them due to signal blocking and/or reflection of the wanted signal. Assessment has found that there may be minor effects for offshore users. No effects are anticipated for onshore users. Overall, the magnitude of potential impact is considered negligible.

15.6.11 Potential Impacts: GPS. Wind turbines and other large metallic reflectors such as cranes could potentially affect GPS by blocking/reflection of the wanted signal from the satellites to the receiver. Assessment has found that there may be extremely minor effects for offshore users in close proximity to the wind farm. No effects are anticipated for onshore users. Overall, the magnitude of potential impact is considered negligible.

15.6.12 Potential Impacts: Radio Communications. Radio signals can be degraded by the presence of wind turbines and other large metallic reflectors such as cranes due to blocking and/or reflection of the wanted signal. This can reduce the quality of the received signal. Assessment has shown that there may be extremely minor effects for offshore users in close proximity to the wind farm. No effects are anticipated for onshore users. Overall, the magnitude of potential impact is considered negligible.

15.6.13 Potential Impacts: AIS. Wind turbines and other large metallic reflectors such as cranes have the potential to disrupt AIS by disrupting VHF radio signals due to blocking and/or reflection of the wanted radio signal. The potential effects on GPS by the turbines also have the potential to impact on AIS. Assessment has found that there may be minor effects for offshore users in close proximity to the wind farm. Overall, the magnitude of potential impact is considered negligible.

15.6.14 Potential Impacts: Mobile Telephony. Wind turbines and other large metallic reflectors such as cranes can affect mobile telephony by blocking/reflection of the wanted signal. This can potentially cause a weakening of the reception and affect the quality of phone calls. Assessment has shown potential effects for offshore users in proximity to the wind farm are likely. No effects are anticipated for onshore users. Overall, the magnitude of potential impact is considered negligible.

15.6.15 Potential Impacts: Marine Communications – LRIT. Wind turbines and other large metallic reflectors such as cranes have the potential to degrade an LRIT transmission due to blocking of the wanted signal. Assessment has found that interference would be unlikely and that LRIT is designed to cope with occasional missed transmissions. The magnitude of potential impact is considered negligible.

15.6.16 Potential Impacts: Marine Communications – SSAS. Wind turbines and other large metallic reflectors such as cranes have the potential to disrupt the radio signals that pass through them due to signal blocking and/or reflection of the wanted signal. Transmissions from satellites could also be blocked under certain conditions. Assessment has found that minor technical effects could occur on ships passing within 500m of the wind turbines. No other effects would be anticipated and the magnitude of potential impact is considered negligible.

15.6.17 Potential Impacts: Marine Communications – VHF Radio. Wind turbines and other large metallic reflectors such as cranes have the potential to degrade the quality of VHF radio transmissions due blocking and/or reflection of the wanted signals. Any impacts on such systems would be the same as those for VHF radio systems discussed above (section 15.6.13). The magnitude of potential impact is considered negligible.

15.6.18 Potential Impacts: Marine Radar and VTS Radar. Wind turbines and other large metallic reflectors such as cranes can cause effects to these radar systems in the following ways:

- Radar Impact 1 – Target Spreading and Side-lobe Detection. The large mono-static radar cross-section (RCS) of wind turbines and other large metallic reflectors such as cranes means that they may be detected across the entire main beam. There is also a risk of the turbines being detected through the side-lobes. This means that the wind turbines will be displayed as large 'smears' on the radar display, impeding detection of genuine targets (ships) significantly.

- Radar Impact 2 – Vessel Structure Effects. For radar mounted on board a vessel, the ship's metallic structure may affect the radar beam's strength and shape. This can lead to further beam spreading or even mirror images of the wind farm being shown on the radar display due to reflections from the ship itself. The extent of such effects will be sensitive to the ship's construction.

- Radar Impact 3 – Multiple Reflections. This effect occurs when reflections from a target (ship) are reflected multiple times from the wind turbines and other large metallic reflectors such as cranes. The result of this is numerous 'ghost' targets displayed in line with the target. These effects are more likely if the target is close to the wind farm. The radar specifications and range will also have a bearing on the magnitude of this issue.

15.6.19 There is a distinct possibility that a technical impact will occur on both of these radar systems (marine radar and VTS radar). The operational significance of the issue cannot be fully elucidated. The potential impact of the Offshore Project on VTS radar systems will therefore be dependent on the volume of traffic in the area and the proximity of vessels relying on the service to the wind turbines. The magnitude of potential impact for radar issues is considered minor.

15.6.20 Potential Impacts: TV. Wind turbines and other large metallic reflectors such as cranes can affect TV signals principally by two mechanisms. The first is obstruction, where the wanted signal from the transmitter is physically blocked by the wind turbine structure. This is only an issue if the turbines are located in between the transmitter and the receiving aerial, which is not the case for offshore developments. The second is reflection, which means that the wanted signal can arrive at a receiving aerial twice at different times. This is most significant if the path difference between the direct and the reflected signal is small. This is less of an issue in the backscatter region, where the receiver is in between the turbines and the transmitter. In the case of the Offshore Project any effects would be in the backscatter region. The magnitude of potential impact is considered negligible.

15.6.21 Table 15.6 presents a summary of the significance of impacts from the construction phase of the Offshore Project.

Table 15.6: Magnitude of Impact – Construction

System	Importance	Magnitude of Potential Impact	Significance of Impact
Fixed Links	Regional	Negligible	Negligible
VHF Radio System	County	Negligible	Negligible
GPS	Regional	Negligible	Negligible
Radio Communications	Local	Negligible	Negligible
AIS	Regional	Negligible	Negligible
Mobile Telephony	Local	Negligible	Negligible
Marine Communication Systems	Regional	Negligible	Negligible
Marine Radar / VTS Radar	Regional	Minor	Moderate
TV	Borough	Negligible	Negligible

Operation

15.6.22 Potential Impacts: Fixed Links. Consultation has revealed that no fixed links are operational in the vicinity of the project site. Therefore, no impacts on such links are anticipated, and the magnitude of potential impact is considered negligible.

15.6.23 Potential Impacts: VHF Radio systems. Wind turbines can affect the quality of radio signals that pass through them due to signal blocking and/or reflection of the wanted signal. Assessment has found that there may be minor effects for offshore users. No effects are anticipated for onshore users. Overall, the magnitude of potential impact is considered negligible.

15.6.24 Potential Impacts: GPS. Wind turbines could potentially affect GPS by blocking/reflection of the wanted signal from the satellites to the receiver. Assessment has found that there may be extremely minor effects for offshore users in close proximity to the wind farm. No effects are anticipated for onshore users.

15.6.25 External Trials: GPS. The UK Maritime and Coastguard Agency (MCA) together with Qinetiq, conducted trials at the North Hoyle wind farm, (off North Wales), to determine the impact of turbines upon marine communications and navigations systems. Following these trials, the MCA concluded the following regarding GPS: No problems with basic GPS reception or positional accuracy were reported during the trials. Overall, the magnitude of potential impact for GPS is considered negligible.

15.6.26 Potential Impacts: Radio Communications. Radio signals can be degraded by the presence of wind turbines due to blocking and/or reflection of the wanted signal. This can reduce the quality of the received signal. Assessment has shown that there may be extremely minor effects for offshore users in close proximity to the wind farm. No effects are anticipated for onshore users. Overall, the magnitude of potential impact is considered negligible.

15.6.27 Potential Impacts: AIS. Wind turbines have the potential to disrupt AIS due to disruption of VHF radio signals due to blocking and/or reflection of the wanted radio signal. The potential effects on GPS by the turbines also have the potential to impact on AIS. Assessment has found that there may be minor effects for offshore users in close proximity to the wind farm.

15.6.28 External Trials: AIS. The UK Maritime and Coastguard Agency (MCA) together with Qinetiq, conducted trials at the North Hoyle wind farm, (off North Wales), to determine the impact of turbines upon marine communications and navigations systems. Following these trials, the MCA concluded the following regarding AIS: *The Automatic Identification System (AIS) carried aboard MV "Norbay" and monitored by HM Coastguard MRSC Liverpool was fully operational.*

15.6.29 Overall, the magnitude of potential impact on AIS is considered negligible.

15.6.30 Potential Impacts: Mobile Telephony. Wind turbines can affect mobile telephony by blocking/reflection of the wanted signal. This can potentially cause a weakening of the reception and affect the quality of phone calls. Assessment has shown potential effects for offshore users in proximity to the wind farm are likely. No effects are anticipated for onshore users. Overall, the magnitude of potential impact is considered negligible.

15.6.31 Potential Impacts: Marine Communications – LRIT. Wind turbines have the potential to degrade an LRIT transmission due to blocking of the wanted signal. Assessment has found that interference would be unlikely and that LRIT is designed to cope with occasional missed transmissions. The magnitude of potential impact is considered negligible.

15.6.32 Potential Impacts: Marine Communications – SSAS. Wind turbines have the potential to disrupt the radio signals that pass through them due to signal blocking and/or reflection of the wanted signal. Transmissions from satellites could also be blocked under certain conditions. Assessment has found that minor technical effects could occur on ships passing within 500 metres of the wind turbines. No other effects would be anticipated and the magnitude of potential impact is considered negligible.

15.6.33 Potential Impacts: Marine Communications – VHF Radio. Wind turbines have the potential to degrade the quality of VHF radio transmissions due blocking and/or reflection of the wanted signals. Any impacts on such systems would be the same as those for VHF radio systems discussed above (section 15.6.27).

15.6.34 External Trials: Marine VHF Radio. The UK Maritime and Coastguard Agency (MCA) together with Qinetiq, conducted trials at the North Hoyle wind farm, (off North Wales), to determine the impact of turbines upon marine communications and navigations systems. Following these trials, the MCA concluded the following regarding VHF Systems: *The wind farm structures had no noticeable effects on any voice communications system, vessel to vessel or vessel to shore station. These included ship-borne, shore-based and hand held VHF transceivers and mobile telephones.*

15.6.35 The magnitude of potential impact on marine VHF radio is considered negligible.

15.6.36 Potential Impacts: Marine Radar and VTS Radar. Wind turbines can cause effects to radar systems such as these in the same ways as large metallic reflectors (see section 15.6.18).

15.6.37 External Trials – VTS radar and marine radar. The UK Maritime and Coastguard Agency (MCA) together with Qinetiq, conducted trials at the North Hoyle wind farm, (off North Wales), to determine the impact of turbines upon marine communications and navigations systems. These trials found that *"The only significant cause for concern found by the MCA during the trials was the effect of wind farm structures on ship-borne and shore-based radar systems. It was determined that the large vertical extent of the wind turbine generators returned radar responses strong enough to produce interfering side lobe, multiple and reflected echoes. While reducing receiver amplification (gain) would enable individual turbines to be clearly identified from the side lobes - and hence limit the potential of collisions with them - its effect would also be to reduce the amplitude of other received signals such that small vessels, buoys, etc., might not be detectable within or close to the wind farm. Bearing discrimination was also*

reduced by the magnitude of the response and hence the cross range size of displayed echoes".

15.6.38 There is a distinct possibility that a technical impact will occur on both of these radar systems (marine radar and VTS radar). The operational significance of the issue cannot be fully elucidated. The potential impact the Project will have on VTS radar systems will therefore be dependent on the volume of traffic in the area and the proximity of vessels relying on the service to the wind turbines. The magnitude of potential impact for radar issues is considered minor.

15.6.39 Potential Impacts: TV. Wind turbines can affect TV signals principally by two mechanisms (see section 15.6.20). The magnitude of potential impact during operation is considered negligible.

15.6.40 Table 15.7 presents a summary of the significance of impacts from the operational phase of the Project.

Table 15.7: Magnitude of Impact – Operation

System	Importance	Magnitude of Potential Impact	Significance of Impact
Fixed Links	Regional	Negligible	Negligible
VHF Radio System	County	Negligible	Negligible
GPS	Regional	Negligible	Negligible
Radio Communications	Local	Negligible	Negligible
AIS	Regional	Negligible	Negligible
Mobile Telephony	Local	Negligible	Negligible
Marine Communication Systems	Regional	Negligible	Negligible
Marine Radar / VTS Radar	Regional	Minor	Moderate
TV	Borough	Negligible	Negligible

Decommissioning

15.6.41 Similar vessels and marine plant will be required for the decommissioning phase as are proposed for use in construction. It is therefore anticipated that effects on telecommunication systems during the decommissioning phase will be similar to those during construction (all negligible with the exception of marine radar/VTS radar).

15.7 Mitigation Measures

15.7.1 The only issue that has a potential mitigation requirement is Marine Radar due to the potential impacts set out in the sections above. Any mitigation measures for consideration will be discussed with the Maritime and Coastguard Agency (MCA) and Trinity House Lighthouse Service (THLS) during the detailed design phase.

During Construction

15.7.2 No specific mitigation measures are proposed during the construction phase of the Project.

During Operation

15.7.3 Operational changes to vessel transport in the vicinity of the Offshore Project site may be required to accommodate the offshore wind farm and minimise its effect. Any such changes are discussed and assessed in Section 14 - Navigation. However, consultation with navigational interests in the area, including the MCA, have concluded that there is unlikely to be a requirement for specific mitigation in relation to telecommunications associated with any such operational changes. As noted above, discussions will be held with the MCA and THLS during the detailed design phase (most likely to involve the siting of individual or blocks of turbines) to ensure that any effects on radar communication systems are minimised.

During Decommissioning

15.7.4 No particular mitigation is likely to be required during decommissioning of the Project.

15.8 Residual Impacts

15.8.1 Residual impacts are considered unlikely as a result of the Project subject to the relevant mitigation being employed as discussed above. Table 15.8 presents a summary of the residual impacts for telecommunication systems where impacts have been determined as possibly being greater than negligible.

15.9 Cumulative Impacts

15.9.1 Other developments in the area have been considered. However, given the predicted negligible levels of impacts from the Rampion project to telecommunications systems, additive impacts with other developments are not anticipated.

15.10 References

Bacon (2002) D.F. A proposed method for establishing an exclusion zone around a terrestrial fixed radio link outside of which a wind turbine will cause negligible degradation of the radio link performance, Radio Communications Agency.

BBC (2009) The impact of large buildings and structures (including wind farms) on terrestrial television reception.

International Telecommunications Union (1992) Assessment of impairment caused to television reception by a wind turbine, Recommendation ITU-R BT805*.

Ofcom (2012) Digital Switchover Transmitter Details, Meridian Region issue 3.0.

QinetiQ and Marine Coastguard Agency (2004) Results of the electromagnetic investigations and assessments of marine radar, communications and positioning systems undertaken at the North Hoyle wind farm by QinetiQ and the Maritime Coastguard Agency.

Table 15.8: Summary of Potential Impacts, Mitigation Measures and Residual Impacts

Aspect	Impact	Proposed Mitigation Measures	Sensitivity	Magnitude	Residual Impact
Construction Phase					
Marine Radar Issues	Potential impact on radar due to the presence of the turbine components and large cranes may be an issue for the development.	Discussion with the MCA, careful site design and spacing considerations, potential operational changes in the area.	Regional	Minor	Moderate if unmitigated.
Operational Phase					
Marine Radar Issues	Potential impact on radar due to the presence of the turbines may be an issue for the development.	Discussion with the MCA, careful site design and spacing considerations, potential operational changes in the area.	Regional	Minor	Moderate if unmitigated.
Decommissioning Phase					
Marine Radar Issues	Potential impact on radar due to the presence of the turbine components and large cranes may be an issue for the development.	Discussion with the MCA, careful site design and spacing considerations, potential operational changes in the area.	Regional	Minor	Moderate if unmitigated.