BERWICK BANK WIND FARM
ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Volume 2, Chapter 14: Aviation, Military and Communications

EOR0766
EIA Report - Chapter 14
FINAL

Document Status					
Version	**Purpose of Document**	**Authored by**	**Reviewed by**	**Approved by**	**Review Date**
FINAL	Final	Mike Coleman	RPS	RPS	October 2022

Approval for Issue		
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14. AVIATION, MILITARY AND COMMUNICATIONS

14.1. INTRODUCTION

1. This chapter of the Offshore Environmental Impact Assessment (EIA) Report presents the assessment of the likely significant effects (as per the "EIA Regulations") on the environment of the Berwick Bank Wind Farm offshore infrastructure which is the subject of this application (hereafter referred to as "the Proposed Development") on aviation, military and communications. Specifically, this chapter considers the potential impacts of the Proposed Development seaward of Mean High Water Springs (MHWS) during the construction, operation and maintenance, and decommissioning phases.

2. Likely significant effect is a term used in both the "EIA Regulations" and the Habitat Regulations. Reference to likely significant effect in this Offshore EIA Report refers to "likely significant effect" as used by the "EIA Regulations". This Offshore EIA Report is accompanied by a Report to Inform Appropriate Assessment (RIAA) which uses the term as defined by the Habitats Regulations Appraisal (HRA) Regulations.

3. This chapter also assesses the likely significant effects of the Proposed Development on onshore receptors (landward of Mean High Water Springs (MHWS)) during the construction, operation and maintenance, and decommissioning phases.

4. This chapter summarises information contained within volume 3, appendix 14.1.

14.2. PURPOSE OF THIS CHAPTER

5. The primary purpose of the Offshore EIA Report is outlined in volume 1, chapter 1. It is intended that the Offshore EIA Report will provide the Scottish Ministers, statutory and non-statutory stakeholders with sufficient information to determine the likely significant effects of the Proposed Development on the receiving environment.

6. In particular, this Aviation, Military and Communications EIA Report chapter:

   - presents the existing environmental baseline established from desk studies and consultation with stakeholders;
   - identifies any assumptions and limitations encountered in compiling the environmental information;
   - presents the likely significant environmental impacts on aviation, military and communications arising from the Proposed Development and reaches a conclusion on the likely significant effects on aviation, military and communications, based on the information gathered and the analysis and assessments undertaken; and;
   - highlights any necessary monitoring and/or mitigation measures which could avoid, prevent, minimise, reduce or offset the likely significant adverse environmental effects of the Proposed Development on aviation, military and communications.

7. There are considered to be no likely significant additional effects on forms of telecommunication such as interference with cellular telephone service coverage, television scanning telemetry or non-aviation radar, satellite communications (e.g. with offshore oil and gas), maritime communications, Very High Frequency (VHF) radio and/or microwave links or any other forms of cabling (telecommunications and interlinks).

8. This has been supported by the findings of the Infrastructure and Other Users Chapter of the Offshore EIA Report (volume 2, chapter 17) which reports there are no subsea telecommunications cables within the infrastructure and other users study area and no additional communications receptors have been highlighted by stakeholders. During consultation, British Telecom (BT) advised that the Proposed Development would not cause interference to BT's current and presently planned radio network (See Berwick Bank Wind Farm Scoping Opinion (Marine Scotland Licensing and Operations Team (MS-LOT, 2022).

9. Further, reference has been made to other Environmental Statements for other offshore windfarms in the area submitted within the past 11 years (for example, Seagreen (formally known as Alpha and Seagreen Bravo) (Seagreen Wind Energy, 2012 and 2018), Inch Cape (Inch Cape Offshore, 2011 and 2018/2019) and Neart na Gaoithe (NnG) (EMU, 2019). The findings of these assessments also indicate that the Proposed Development would have no likely significant effects on communication infrastructure or services.

14.3. STUDY AREA

10. The aviation, military and communications study area is defined by the range within which aviation receptors; in particular, Air Traffic Control (ATC) and Air Defence (AD) Primary Surveillance Radars (PSRs) could be affected by the Proposed Development. The operating range of these radars can be up to 200 nm (370 km). However, radars were identified for assessment within the aviation, military and communications study area on the basis the Proposed Development could realistically interfere with the base-level coverage of the radar (as this is the determining factor relating to aircraft safety). The extent of the aviation, military and communications study area is limited by the location of the most distant potential aviation receptor.

11. An area of 9 nm around the Proposed Development was also searched to ascertain the potential for interference with helicopters procedures into oil and gas platforms (of which there are none within the aviation, military and communications study area). The aviation, military and communications study area covers airspace designations including low flying areas and military practice areas in the immediate vicinity of the Proposed Development; and, airspace, as necessary, used by fixed-wing aircraft and helicopters on routes which may cross the Proposed Development.

12. The Proposed Development is located approximately 47.4 nm (87.9 km) to the south-east of Aberdeen Airport and 30.9 nm (57.2 km) to the north-east of Ministry of Defence (MoD) Leuchars Station, an active military aerodrome. The aviation, military and communications study area therefore incorporates radar on the north-east coast of England and east coast of Scotland that could potentially detect wind turbines within the Proposed Development array area.

13. The locations of relevant aviation receptors in the surrounding region of the Proposed Development are depicted on an aviation chart at Figure 14.1.

14. To confirm the validity of the aviation, military and communications study area, reference was made to the findings reported for offshore wind farms in close proximity to the Proposed Development, which are listed in Table 14.5. This body of literature assisted in identifying the relevant radars and stakeholders that may be affected. The 2020 Berwick Bank Scoping Opinion (MS-LOT, 2021) and the Berwick Bank Wind Farm Scoping Opinion (MS-LOT, 2022) are considered to further support the appropriateness of the aviation, military and communications study area.

15. The cumulative aviation, military and communications study area includes the area within 50 km of the Proposed Development.

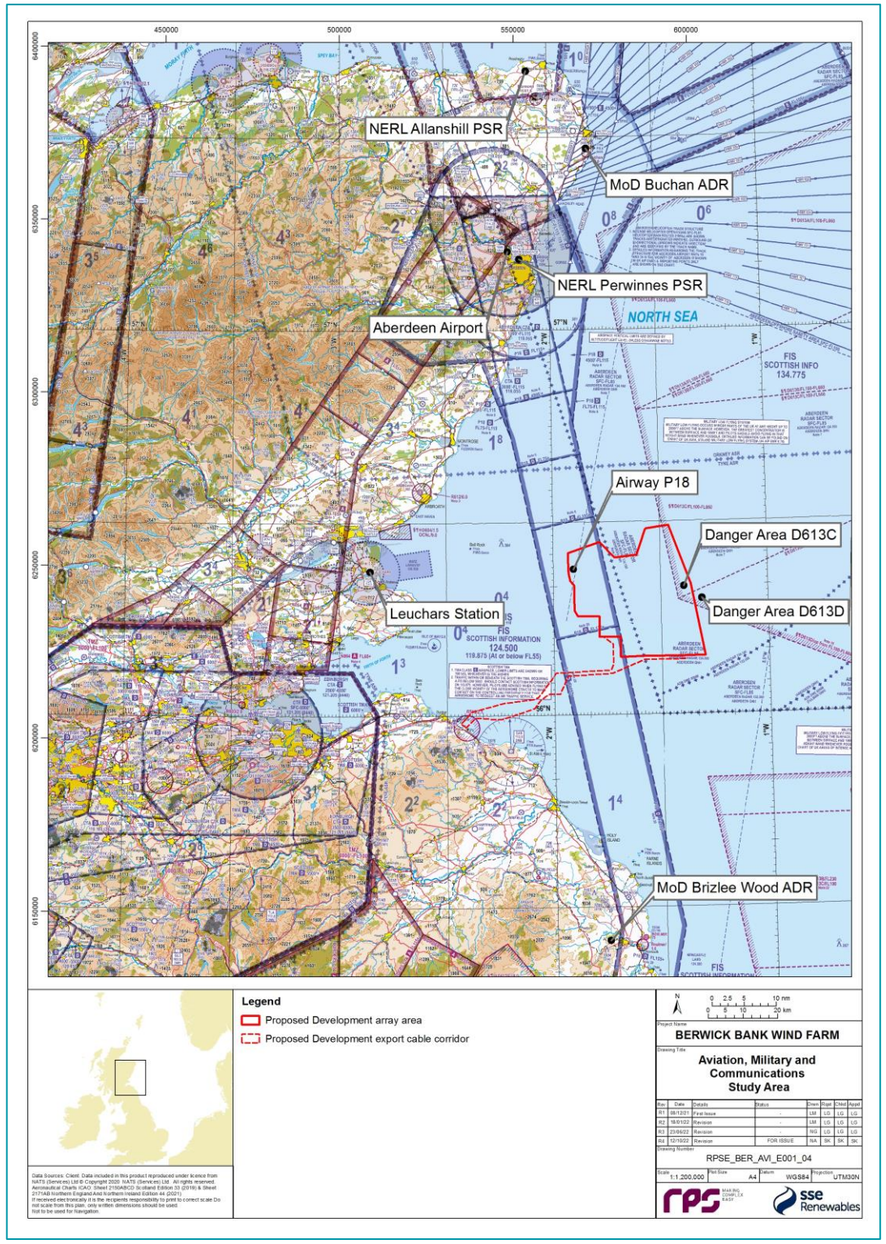

Figure 14.1: Relevant Aviation, Military and Communications Receptors Identified

14.4. POLICY AND LEGISLATIVE CONTEXT

16. Policy and legislation on renewable energy infrastructure is presented in volume 1, chapter 2 of the Offshore EIA Report. Policy and legislation specifically in relation to aviation, military and communications, is contained in the Scottish Planning Policy (SPP) (Scottish Government, 2014) and Scotland's National Marine Plan (Scottish Government, 2015). A summary of the policy provisions relevant to aviation, military and communications are provided in Table 14.1 and Table 14.2, with other relevant legislative provisions set out in Table: These are summarised here with further detail presented in volume 3, appendix 14.1.

Table 14.1: Summary of SPP (Published June 2014) Relevant to Aviation, Military and Communications

Summary of Relevant Policy Framework	How and Where Considered in the Offshore EIA Report
Aviation and Defence	
Proposals for energy infrastructure developments should always take account of spatial frameworks for wind farms and heat maps where these are relevant. Considerations will vary relative to the scale of the proposal and area characteristics but are likely to include impacts on aviation and defence interests and seismological recording (Scottish Government, 2014).	Aviation stakeholders have been consulted and details of this engagement are set out in Table 14.3. The likely significant effects of the construction, operation and maintenance and decommissioning phases of the Proposed Development have been assessed in section 14.11, including likely significant effects on MoD operations. Designed in measures are discussed in section 14.10

Table 14.2: Summary of Scotland's National Marine Plan (Published March 2015) Relevant to Aviation, Military and Communications.

Summary of Relevant Policy Framework	How and Where Considered in the Offshore EIA Report
Chapter 15: Defence 1	
To maintain operational effectiveness in Scottish waters used by the armed services, development and use will be managed in these areas: • Naval areas including bases and ports: Safety of navigation and access to naval bases and ports will be maintained. The extent to which a development or use interferes with access or safety of navigation, and whether reasonable alternatives can be identified, will be taken into account by consenting bodies. Proposals for development and use should be discussed with the Ministry of Defence (MoD) at an early stage in the process. • Firing Danger Areas: Development of new permanent infrastructure is unlikely to be compatible with the use of Firing Danger Areas by the MoD. Permitted activities may have temporal restrictions imposed. Proposals for development should be discussed with the MoD at an early stage in the process. • Exercise Areas: Within Exercise Areas, activities may be subject to temporal restrictions. Development and use that either individually or cumulatively obstructs or otherwise prevents the defence activities supported by an exercise area may not be permitted. Proposals for development and use should be discussed with the MoD at an early stage in the process.	MoD has been consulted and details of this engagement are set out in Table 14.4. The likely significant effects of the construction, operation and maintenance and decommissioning phases of the Proposed Development have been assessed in section 14.11, including likely significant effects on MoD operations. Designed in measures are discussed in section 14.10.

Summary of Relevant Policy Framework	How and Where Considered in the Offshore EIA Report
Communications: Navigations and surveillance including radar: Development and use which causes unacceptable interference with radar and other systems necessary for national defence may be prohibited if mitigation cannot be determined. Proposals for development and use should be discussed with the MoD at an early stage in the process.	
Chapter 15: Defence 2	
For the purposes of national defence, the MoD may establish by-laws for exclusions and closures of sea areas. In most areas this will mean temporary exclusive use of areas by the MoD. Where potential for conflict with other users is identified, appropriate mitigation will be identified and agreed with the MoD, prior to planning permission, a marine licence, or other consent being granted.	MoD has been consulted and details of this engagement are set out in Table 14.4. The likely significant effects of the construction, operation and maintenance and decommissioning phases of the Proposed Development have been assessed in section 14.11, including likely significant effects on MoD operations. Designed in measures are discussed in section 14.10
Chapter 15: Defence 3	
The established code of conduct for managing fishing and military activity detailed in the documents 'Fishing Vessels Operating in Submarine Exercise Areas'155 and 'Fishing Vessel Avoidance: The UK Code of Practice Fishing Vessel Avoidance'156 will be adhered to.	MoD has been consulted and details of this engagement are set out in Table 14.4The likely significant effects of the construction, operation and maintenance and decommissioning phases of the Proposed Development have been assessed in section 14.11, including likely significant effects on MoD operations. Designed in measures are discussed in section 14.10.

Table 14.3: Summary of Civil Aviation Act 1982 Relevant to Aviation, Military and Communications

Summary of Relevant Legislative Framework	How and Where Considered in the Offshore EIA Report
Civil Aviation Publication (CAP) 393: Air Navigation: The Order and the Regulations Article 223: Lighting of Wind Turbine Generators in UK Territorial Waters	
Contains the Air Navigation Order (ANO) 2016 and Regulations made under the order. Defines the Rules of the Air regarding civil aviation in the United Kingdom (UK) and provides regulations for installation of aviation lighting on offshore wind turbines.	Aviation marking and lighting requirements are discussed in section 14.10.

14.5. CONSULTATION

17. A summary of the key issues raised during consultation activities undertaken to date specific to aviation, military and communications is presented in Table 14.5, together with how these issues have been considered in the production of this Aviation, Military and Communications EIA Report chapter. Further detail is presented within volume 1, chapter 5 Where assessments have departed from scoping advice, or further communications with consultees took place after the publication of the Berwick Bank Wind Farm Scoping Opinion (MS-LOT, 2022), these communications are audited in the Audit Document for Post-Scoping Discussions (volume 3, appendix 5.1) that accompanies the Application. The Audit Document provides the Applicant's reasoning for any deviation from scoping advice.

Table 14.4: Summary of Consultation of Relevance to Aviation, Military and Communications

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
Relevant Consultation Undertaken to Date			
9 March 2021	Representation of MoD dated October 2020 for the 2020 Berwick Bank Scoping Opinion (MS-LOT, 2021).	MoD stated that the report identifies that the wind turbines have the potential to affect and be detectable to, the PSR at Leuchars Station and the AD radars at Royal Air Force (RAF) Brizlee Wood and RAF Buchan. The impact on these radars will need to be taken into account in the progression of any application for this scheme. The MoD agrees with this. The impact on these radars will need to be mitigated and it will be for the applicant to provide appropriate technical mitigation(s).	The Applicant accepts that mitigation will be required for the Leuchars Station, Brizlee Wood and Buchan ATC radar. Potential impacts on military ATC radar systems and mitigation requirements are assessed in section 14.11.
9 March 2021	Representation of MoD dated October 2020 for the 2020 Berwick Bank Scoping Opinion (MS-LOT, 2021).	Impact on military low flying has been scoped in and the applicant states in the Scoping Report that they are committed to lighting and charting the wind turbines. In the interests of air safety, the MoD would request that the development be fitted with MoD accredited aviation safety lighting in accordance with the Civil Aviation Authority (ANO, 2016).	The Applicant accepts that MoD accredited aviation safety lighting will need to be installed; see Table 14.11. Impacts on military low flying are assessed in section 14.11
9 March 2021	National Air Traffic Services (NATS Safeguarding) representation (dated October 2020) for the 2020 Berwick Bank Scoping Opinion (MS-LOT, 2021).	The Scottish Ministers highlight the representation by NATD which predicts that the Proposed Development is likely to cause the generation of false primary plots and also a reduction in the Perwinnes radar's probability of detection for real aircraft.	The Applicant has commenced discussions with NATS to establish appropriate mitigation for adverse impact on the Perwinnes ATC radar. Impacts on civilian ATC radar systems are assessed in section 14.11.
9 March 2021	NATS Safeguarding representation (dated October 2020) for the 2020 Berwick Bank Scoping Opinion (MS-LOT, 2021).	NATS advised that the Proposed Development will likely have significant adverse impacts on ATC operations at both Prestwick Centre and Aberdeen Offshore.	The Applicant has commenced discussions with NATS to establish appropriate mitigation for adverse impact on the Perwinnes ATC radar. Impacts on civilian ATC radar systems are assessed in section 14.11.
9 March 2021	JRC representation (dated October 2020) for the 2020 Berwick Bank Scoping Opinion (MS-LOT, 2021).	The Scottish Ministers agree with the impacts detailed and scoped in, however advise that the representations from the Joint Radio Company (JRC), the Scottish Borders Council, BT, MoD and NATS must be fully addressed by the Applicant.	The Applicant agrees that representations from the JRC, the Scottish Borders Council, BT, MoD and NATS must be fully addressed in the Offshore EIA Report. Impacts on these receptors are assessed in section 14.11. Any deviations from scoping advice are audited in the Audit Document for Post-Scoping Discussions (volume 3, appendix 5.1) that accompanies the Application.
9 March 2021	2020 Berwick Bank Scoping Opinion (MS-LOT, 2021)	The Scottish Ministers do not agree with the Developer's proposal to scope out potential impacts on civil airport patterns and procedures due	The NATS representation refers to impact on ATC radar and not civil airport patterns and procedures (i.e. Instrument Flight Procedures (IFPs)). In an email dated 9 May 2022 between

Date	Consultee and Type of Consultation	Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Chapter
		to the presence of obstacles and advise the impacts from this must be assessed in the Offshore EIA Report. This view takes into account the NATS representation and objection to the Proposed Development.	the Applicant and NATS on this question, NATS confirmed that their concerns only relate to Perwinnes. Consequently, this issue is not addressed further in this chapter. Details of further correspondence on this issue are contained later in this table.
Consultation on the Proposed Development			
11 June 2021		Initial meeting with NATS to discuss potential aviation mitigation solutions for impact on civilian ATC radar systems.	Impacts on civilian ATC radar systems are assessed in section 14.11.
28 July 2021	NATS - meeting	Follow up meeting with NATS to discuss potential aviation mitigation solutions for impact on civilian ATC radar systems.	Impacts on civilian ATC radar systems are assessed in section 14.11.
3 September 2021	NATS - meeting	Follow up meeting with NATS to discuss potential aviation mitigation solutions for impact on civilian ATC radar systems.	Impacts on civilian ATC radar systems are assessed in section 14.11.
12 November 2021	BT representation (November 2021) for the Berwick Bank Wind Farm Scoping Opinion (MS-LOT, 2022);	BT reported that the Proposed Development would not cause interference to BT's current and presently planned radio network.	The Applicant's assessments in terms of communications also indicated that the Proposed Development would have no likely significant effects on communication infrastructure or services as discussed in section 14.2.
19 November 2021	NATS representation (November 2021) for the Berwick Bank Wind Farm Scoping Opinion (MS-LOT, 2022);	NATS reiterated their response of 9 March 2021 that the development would generate an unacceptable level of clutter on their Primary Radar infrastructure.	The Applicant has commenced discussions with NATS to establish appropriate mitigation for adverse impact on the Perwinnes ATC radar. Potential impacts on civilian ATC radar systems are assessed in section 14.11.
19 November 2021	MoD - representation (November 2021) for the Berwick Bank Wind Farm Scoping Opinion (MS-LOT, 2022)	MoD reiterated their response of 9 March 2021 that the wind turbines have the potential to affect ATC radar at Leuchars Station and the AD radars at RAF Brizlee Wood and RAF Buchan. They further advised that the Brize Proposed Development may also affect the operation of the ATC radar at RAF Spadeadam Deadwater Fell.	The Applicant agrees that impacts on these radars will need to be taken into account in the progression of any application for this scheme. Potential impacts on military ATC radar and mitigation requirements are assessed in section 14.11.
9 May 2022	Email correspondence – between the Applicant and NATS	The Applicant sought confirmation from the NATS on whether they had any concerns with regards to impacts from the Proposed Development on civil airport patterns and procedures. The NATS confirmed that they had no concerns with this regard.	The Applicant is satisfied that NATS have no concerns with regards the potential impacts on civil airport patterns and procedures.
26 May 2022	Email correspondence - between the Applicant and MS-LOT	The Applicant sought to clarify MS-LOT's advice on civil airport patterns and procedures via emails sent to MS-LOT on 26 May, 4 June and 6 July 2022. On 07 July, Marine Scotland advised the Applicant to justify in the EIA, why the impacts on civil airport patterns and procedures should not be included therein.	A full account of the correspondence between the Applicant and MS-LOT on this issue is provided in the Audit Document for Post-Scoping Discussions (volume 3, appendix 5.1). Details of further correspondence on this issue are contained later in this table.
22 August 2022	2020 Berwick Bank Scoping Opinion (MS-LOT, 2021)	MS-LOT has considered the information provided and advises that the position adopted in the Berwick Bank Wind Farm Scoping Opinion (MS-LOT, 2022); (and also the 2020 Berwick Bank Scoping Opinion (MS-LOT, 2021) with respect to civil airport patterns and procedures remains unchanged. In adopting this position, MS-LOT considered not only the content of the NATS representation but also the lack of representation made by the Civil Aviation Authority (CAA). MS-LOT is continuing to look into civil aviation strategically but, at this time, there is not sufficient evidence to scope this out.	Following representations from MS-LOT, additional consultation was sought with the CCA to confirm that no civil airport patterns and procedures would be affected by the Proposed Development. The CAA has subsequently confirmed in writing (email 13 October 2022) that it was '*satisfied that the proposed Berwick Bank Offshore Wind Farm does not impact any civil aerodrome IFP and would have no concerns or issues if this was scoped out of the Berwick Bank EIA.* ' Consequently, this impact has been scoped out of further assessment. The Applicant is thereby satisfied that it has sufficient basis and evidence to scope the potential impact of Berwick Bank on 'Civil Airport Patterns and Procedures out of the Offshore EIA. In doing so the Applicant has considered confirmation from both CAA and NATS that they are not concerns about this impact as a result of the Proposed Development.

14.6. METHODOLOGY TO INFORM BASELINE

14.6.1. DESKTOP STUDY

18. Information on aviation, military and communications within the aviation, military and communications study area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 14.5.

19. The desktop review was conducted using comprehensive aviation documentation and charts to identify potential aviation receptors during the construction, operation and maintenance, and decommissioning phases of the Proposed Development (section 14.16). Supporting information was also drawn from a review of data sources; in particular, the UK Integrated Aeronautical Information Package (UK IAIP) and consultee responses and data sources as outlined in Table 14.4: and Table 14.5.

Table 14.5: Summary of Key Desktop Reports

Title	Source	Year	Author
Seagreen Alpha/Bravo Environmental Statement	Seagreen Wind Energy	2012	Seagreen Wind Energy
Inch Cape Offshore Wind Farm Environmental Statement	Inch Cape Offshore Wind Limited	2013	Inch Cape Offshore Wind Limited
Seagreen Alpha/Bravo Scoping Report	Seagreen Wind Energy	2017	Seagreen Wind Energy
Revised Design Inch Cape Offshore Transmission Works Scoping Report	Inch Cape Offshore Wind Limited	2017	Inch Cape Offshore Wind Limited
Revised Design NnG Offshore Wind Farm Scoping Report	NnG Offshore Wind Farm Limited	2017	NnG Offshore Wind Farm Limited
Revised Design Inch Cape Offshore Transmission Works Environmental Statement	Inch Cape Offshore Wind Limited	2018	Inch Cape Offshore Wind Limited
NnG Offshore Wind Farm Environmental Statement	NnG Offshore Wind Farm Limited	2018	NnG Offshore Wind Farm Limited
Environmental Statement- Seagreen Alpha and Bravo Offshore Wind Farms	Seagreen Wind Energy	2018	Seagreen Wind Energy
Seagreen Offshore Windfarm Airspace Change Proposal Regulatory Decision	Seagreen Wind Energy	2019	Seagreen Wind Energy
2020 Berwick Bank Scoping Report	SSER	2020	SSER
Berwick Bank Wind Farm Offshore Scoping Report	SSER	2021	SSER

20. The desktop study provided the baseline characterisation to enable the assessment of potential impacts on the following aviation receptors:

- Civil Airport Patterns and Procedures;
- Military Aerodrome Patterns and Procedures;
- Civil ATC Radar;
- Military ATC Radar;
- Military AD Radar;
- Low Flying (including Search and Rescue (SAR) operations);
- Helicopter Main Routes (HMRs);
- Offshore Helicopter Installations (oil and gas platforms); and
- Met Office Radar.

14.6.2. SITE-SPECIFIC SURVEYS

21. No site-specific surveys have been undertaken to inform the EIA for aviation, military and communications. No radar modelling has been carried out on the basis the data collected from existing data sources coupled with ongoing consultation and mitigation discussions with relevant stakeholders are considered appropriate and sufficient to inform the assessment of likely significant effects for the Proposed Development.

14.7. BASELINE ENVIRONMENT

14.7.1. OVERVIEW OF BASELINE ENVIRONMENT

22. The desktop review was undertaken to characterise the existing baseline conditions within the aviation, military, and communications study area. In terms of aviation, the baseline environment is influenced by the airspace, within which it is important to identify the locations of relevant radar receptors, such as ATC radar and AD systems, as well as any potential aviation stakeholders. A summary of the current baseline environment for aviation, military and communications follows and should be read in conjunction with Figure 14.1.

Airspace structure

23. In the UK Flight Information Region, airspace is classified as A to G in accordance with International Civil Aviation Organisation (ICAO) standards (there is no airspace designated as Class B or Class F in the UK). Airspace Classes A, C, D and E are variants of controlled airspace within which aircraft generically require an ATC clearance to operate. The Proposed Development is situated in an area of Class G uncontrolled airspace which is established from the surface up to Flight Level (FL) 115 (11,500 ft) which is the base of Airway P18 which is Class D controlled airspace.

24. Airway P18 is primarily used by commercial aircraft routing to, and from, Aberdeen Airport. The airway is active from FL 115 (11,500 ft) to FL 195 (19,500 ft) in the north-west section of the Proposed Development and from FL 155 (15,500 ft) to FL 195 (19,500 ft) in the south-west section. The north-eastern portion of the Proposed Development overlaps the lateral boundaries of Danger Areas D613C and D613D. These Danger Areas are activated periodically from FL 100 (10,000 ft) to FL 660 (66,000 ft) for military air combat training and supersonic flight. Within Class G and D airspace, the following ATC rules apply:

- Class G airspace - any aircraft can operate in this area of uncontrolled airspace without any mandatory requirement to be in communication with, or receive a radar service from, any ATC unit. Pilots of aircraft operating under Visual Flight Rules (VFR) in Class G airspace are ultimately responsible for seeing and avoiding other aircraft and obstructions; and
- Class D airspace is established from FL 115 (11,500 ft) to FL 195 (19,500 ft). All aircraft operating in this airspace must be in receipt of an air traffic service from National Air Traffic Services En-Route PLC (NERL) or military controllers located at the NERL Area Control Centre.

Aviation operations

25. Within the airspace environment described above, military and civilian aviation operations take place as described in paragraphs 26 to 29.

<u>Military aviation</u>

26. In terms of military aviation, MoD Leuchars Station is located approximately 30.9 nm (57.22 km) to the south-west of the Proposed Development. Located at Leuchars Station is an ATC radar which is used to provide navigational services to aircraft inbound to and outbound from the aerodrome. In addition, Leuchars Station is responsible for navigational services to transitory military and civil aircraft operating within a 40 nm radius of the aerodrome, up to 9,500 ft, from Monday to Friday between 0900 and 1700 hrs. RAF Spadeadam is an Electronic Warfare Training Facility operated by MoD to provide training to aircrew in detecting and countering hostile radar threats associated with surface to air guided weapon

systems. Located The Deadwater Fell ATC radar is located at Spadeadam is approximately 59.6 nm (110.5 km) to the south-west of the Proposed Development.

27. MoD also operate two AD radars at Remote Radar Head (RRH) Buchan, approximately 60.0 nm (111.1 km) to the north of the Proposed Development, and at RRH Brizlee Wood, located 44.2 nm (82.0 km) to the south of the Proposed Development. These radars are used in support of training exercises on an almost daily basis. AD units, using radar data supplied from Buchan and Brizlee Wood, are also responsible for navigation services and support to aircraft activity within restricted airspace involving air combat training and supersonic flight, as well as providing radar data to intercept aircraft illegally infringing UK airspace.

Civil aviation

28. Regarding civil aviation, NERL operate two ATC radars to the north north-west of the Proposed Development; Perwinnes ATC radar at approximately 46 nm (85 km) and Allanshill ATC radar at approximately 74 nm (137 km). These radars are used to support civilian ATC radar and en route operations for aircraft operating on civilian air routes and for aircraft arriving and departing to/from Aberdeen Airport.

29. The airspace is also used by helicopters transiting to/from Aberdeen Airport and oil and gas installations in the North Sea. Navigational services for helicopters operating from Aberdeen Airport are provided using radar feeds from the Allanshill and Perwinnes ATC radar. These helicopters normally fly at 1,500 ft or above; however, depending on weather conditions, they may fly at less than 1,500 ft.

14.7.2. FUTURE BASELINE SCENARIO

30. The EIA Regulations ((The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017)), require that a "a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without development as far as natural changes from the baseline scenario can be assessed with reasonable effort, on the basis of the availability of environmental information and scientific knowledge" is included within the Offshore EIA Report.

31. An assessment of the future baseline conditions has been carried out assuming that the Proposed Development does not come forward. As aviation stakeholders assess impacts on a case-by-case basis and in chronological order, for aviation, military and communications, there are no future baseline environment changes expected to affect the Proposed Development.

14.7.3. DATA LIMITATIONS AND ASSUMPTIONS

32. The data used in this chapter are detailed in section 14.6. The data used are the most up to date publicly available information which can be obtained from the applicable data sources as cited. Data has also been provided through consultation as detailed in section 14.5. It is considered that the data employed in the assessment are robust and sufficient for the purposes of the assessment of effects presented.

14.8. KEY PARAMETERS FOR ASSESSMENT

14.8.1. MAXIMUM DESIGN SCENARIO

33. The maximum design scenarios identified in Table 14.6 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the details provided in volume 1, chapter 3 of the Offshore EIA Report. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different infrastructure layout), to that assessed here, be taken forward in the final design scheme.

Table 14.6: Maximum Design Scenario Considered for Each Impact as Part of the Assessment of Likely Significant Effects on Aviation, Military and Communications

Potential Impact	Phase[1]			Maximum Design Scenario	Justification
	C	O	D		
Potential impact on low flying (including SAR helicopter operations) due to presence of obstacles (cranes, stationary wind turbines, offshore substation platforms (OSP)/Offshore convertor station platform)	✓	✓	✓	**Construction Phase** • installation of up to 307 wind turbines with maximum tip height up to 355 m above Lowest Astronomical Tide (LAT); and • offshore construction may take place over a period of up to 96 months. **Operation and Maintenance Phase** • presence of up to 307 wind turbines with maximum tip height up to 355 m above LAT; and • operation and maintenance phase up to 35 years. **Decommissioning Phase** Anticipated to be generally the same as construction.	These parameters represent the maximum design scenario for height of infrastructure and associated installation equipment within the Proposed Development, which has the greatest potential for obstruction to air traffic.
Potential impact on NERL ATC radars due to presence of wind turbines	×	✓	×	**Operation and Maintenance Phase** • presence of up to 307 wind turbines with maximum tip height up to 355 m above LAT; and • operation and maintenance phase up to 35 years.	These parameters represent the maximum design scenario for height of infrastructure and associated maintenance equipment within the Proposed Development which has the greatest potential for interference with radar systems.
Potential impact on Military ATC radars due to presence of wind turbines	×	✓	×	**Operation and Maintenance Phase** • presence of up to 307 wind turbines with maximum tip height up to 355 m above LAT; and • operation and maintenance phase up to 35 years.	These parameters represent the maximum design scenario for height of infrastructure and associated maintenance equipment within the Proposed Development which has the greatest potential for interference with radar systems.
Potential impact on Military AD radars due to presence of wind turbines	×	✓	×	**Operation and Maintenance Phase** • presence of up to 307 wind turbines with maximum tip height up to 355 m above LAT; and • operation and maintenance phase up to 35 years.	These parameters represent the maximum design scenario for height of infrastructure and associated maintenance equipment within the Proposed Development which has the greatest potential for interference with radar systems.

[1] C = Construction, O = Operation and maintenance, D = Decommissioning

14.8.2. IMPACTS SCOPED OUT OF THE ASSESSMENT

34. On the basis of the baseline environment and the project description outlined in volume 1, chapter 3 of the Offshore EIA Report, a number of impacts are proposed to be scoped out of the assessment for aviation, military and communications. These have been agreed with key stakeholders through consultation as discussed in volume 1, chapter 5. Otherwise these impacts were proposed to be scoped-out in the Berwick Bank Wind Farm Offshore Scoping Report (SSER, 2021a) and no concerns were raised by key consultees. Where discussions with consultees took place after the publication of the Berwick Bank Wind Farm Scoping Opinion (MS-LOT, 2022), these are audited in the Audit Document for Post-Scoping Discussion (volume 3, appendix 5.1).

35. These impacts are outlined, together with a justification for scoping them out, in Table 14.7

Table 14.7: Impacts Scoped Out of the Assessment for Aviation, Military and Communications (tick confirms the impact is scoped out)

Potential Impact	Phase[2]			Justification
	C	O	D	
Impact of wind turbines on civil airport patterns and procedures	✓	✓	✓	The Proposed Development is outside the consultation distance for airport IFPs. However, following representations from MS-LOT, additional consultation was sought with the CCA to confirm that no civil airport patterns and procedures would be affected by the Proposed Development. The CAA subsequently has confirmed in writing (email 13 October 2022) that airport patterns and procedures would not be affected by the Proposed Development. Consequently, this impact has been scoped out of further assessment.
Impact of wind turbines on military aerodrome patterns and procedures	×	×	×	The Proposed Development is outside the consultation distance for military aerodrome IFPs. Consequently, no military aerodrome patterns and procedures would be affected by the Proposed Development and this impact has been scoped out of further assessment.
Impact of wind turbines on HMRs	✓	✓	✓	The nearest HMR is approximately 35.7 nm (66.0 km to the north-east of the Proposed Development. Consequently, no HMRs and procedures would be affected by the Proposed Development and this impact has been scoped out of further assessment.
Impact on offshore helicopter installations (oil and gas platforms)	✓	✓	✓	No oil and gas platforms are located within 9 nm (17 km) of the Proposed Development, this is the distance at which the CAA recommend that wind farm developers consult with offshore helicopter installation operators. As no oil and gas platforms are located within the vicinity of the Proposed Development, no helicopter procedures into offshore helicopter installations would be affected by the Proposed Development and this impact has been scoped out of further assessment.
Impact on meteorological radar systems	✓	✓	✓	The presence of wind turbines can create challenges to meteorological radars due to the rotating blades. Impacts to meteorological radars range from contamination of the quality of the radar data to loss of meteorological data altogether. More specifically, the presence of wind turbines in Radar Line of Sight (RLOS) can create significant types of interference to weather radar data. However, wind turbines need to be in RLOS and in the beam of the radar at its lowest elevation to have an impact on meteorological radars. Given that the nearest meteorological radar is located 43 nm (80 km) to the west, the Proposed Development will not have any adverse impact on any meteorological radars and this impact has been scoped out of further assessment.

[2] C = Construction, O = Operation and maintenance, D = Decommissioning

14.9. METHODOLOGY FOR ASSESSMENT OF EFFECTS

14.9.1. OVERVIEW

36. The aviation, military and communications assessment of effects has followed the methodology set out in volume 1, chapter 6 of the Offshore EIA Report. Specific to this Aviation, Military and Communications EIA chapter, the following guidance documents have also been considered and referenced in section 14.16:

- CAA (2019). CAP 670, Air Traffic Services Safety Requirements (Issue 3, 7 June 2019);
- CAA (2016). CAP 764 - CAA Policy and Guidelines on Wind Turbines (Version 6, February 2016);
- CAA (2017). CAP 774 - The UK Flight Information Services (Version 3, 25 May 2017);
- CAA (2021). CAP 032 - UK Integrated Aeronautical Information Package (2021);
- Military Aviation Authority (MAA) (2018). MAA Regulatory Publication 3000 Series: Air Traffic Management Regulations (21 September 2018);
- MAA (2019). Manual of Military Air Traffic Management (30 September 2019);
- MoD (2021). UK Military Aeronautical Information Publication (2021);
- UK Government (2016). Marine Guidance Note 543: Offshore Renewable Energy Installations - Guidance on UK Navigational Practice, Safety and Emergency Response Issues (19 August 2016); and
- CAA (2021). Visual Flight Rules Chart (CAA, 2021).

37. In addition, the aviation, military, and communications assessment of effects has considered the legislative and policy framework set out in volume 1, chapter 3.

14.9.2. CRITERIA FOR ASSESSMENT OF EFFECTS

38. The process for determining the significance of effects is a two-stage process that involves defining the magnitude of the potential impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in volume 1, chapter 6 of the Offshore EIA Report.

39. The criteria for defining magnitude in this chapter are outlined in Table 14.8. In determining magnitude within this chapter, each assessment considered the spatial extent, duration, frequency and reversibility of impact and these are outlined within the magnitude section of each assessment of effects (e.g. a duration of hours or days would be considered for most receptors to be of short term duration, which is likely to result in a low magnitude of impact).

Table 14.8: Definition of Terms Relating to the Magnitude of an Impact

Magnitude of Impact	Definition
High	Total loss of ability to carry on activities and/or impact is of extended physical extent and/or long term duration (i.e. total life of Proposed Development and/or frequency of repetition is continuous and/or effect is not reversible for Proposed Development).
Medium	Loss or alteration to significant portions of key components of current activity and/or physical extent of impact is moderate and/or medium term duration (i.e. operational period) and/or frequency of repetition is medium to continuous and/or effect is not reversible for Proposed Development phase.
Low	Minor shift away from baseline, leading to a reduction in level of activity that may be undertaken and/or physical extent of impact is low and/or short to medium term duration (i.e. construction period) and/or frequency of repetition is low to continuous and/or effect is not reversible for Proposed Development phase.
Negligible	Very slight change from baseline condition and/or physical extent of impact is negligible and/or short term duration (i.e. less than two years) and/or frequency of repetition is negligible to continuous and/or effect is reversible.

40. The criteria for defining sensitivity in this chapter are outlined in Table 14.9.

Table 14.9: Definition of Terms Relating to the Sensitivity of the Receptor

Value (Sensitivity of the Receptor)	Description
Very High	Receptor, or the activities of the receptor, is of very high value to the local, regional or national economy and/or the receptor or the activities of the receptor, is vulnerable to impacts that may arise from the Proposed Development and/or recoverability is slow and/or costly.
High	Receptor, or the activities of the receptor, is of high value to the local, regional or national economy and/or the receptor or the activities of the receptor, is generally vulnerable to impacts that may arise from the Proposed Development and/or recoverability is slow and/or costly.
Medium	Receptor, or the activities of the receptor, is of moderate value to the local, regional or national economy and/or the receptor or the activities of the receptor, is somewhat vulnerable to impacts that may arise from the Proposed Development and/or has moderate to high levels of recoverability.
Low	Receptor, or the activities of the receptor, is of low value to the local, regional or national economy and/or the receptor or the activities of the receptor, is not generally vulnerable to impacts that may arise from the Proposed Development and/or has high recoverability.
Negligible	Receptor, or the activities of the receptor, is of negligible value to the local, regional or national economy and/or the receptor or the activities of the receptor, is not vulnerable to impacts that may arise from the Proposed Development and/or has high recoverability.

41. The significance of the effect upon aviation, military and communications is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 14.10.

42. In cases where a range is suggested for the significance of effect, there remains the possibility that this may span the significance threshold (i.e. the range is given as minor to moderate). In such cases the final significance is based upon the author's professional judgement as to which outcome delineates the most likely effect. Where professional judgement is applied to quantify final significance from a range, the assessment will set out the factors that result in the final assessment of significance. These factors may include the likelihood that an effect will occur, data certainty and relevant information about the wider environmental context.

43. For the purposes of this assessment:

- a level of residual effect of moderate or more will be considered a 'significant' effect in terms of the EIA Regulations; and
- a level of residual effect of minor or less will be considered 'not significant' in terms of the EIA Regulations.

44. Effects of moderate significance or above are therefore considered important in the decision-making process, whilst effects of minor significance or less warrant little, if any, weight in the decision-making process.

Table 14.10: Matrix Used for the Assessment of the Significance of the Effect

Sensitivity of Receptor	Magnitude of Impact: Negligible	Low	Medium	High
Negligible	Negligible	Negligible to Minor	Negligible to Minor	Minor
Low	Negligible to Minor	Negligible to Minor	Minor	Minor to Moderate
Medium	Negligible to Minor	Minor	Moderate	Moderate to Major
High	Minor	Minor to Moderate	Moderate to Major	Major
Very High	Minor	Moderate to Major	Major	Major

14.10. MEASURES ADOPTED AS PART OF THE PROPOSED DEVELOPMENT

45. As part of the project design process, a number of measures have been proposed to reduce the potential for impacts on aviation, military and communications (see Table 14.11). As there is a commitment to implementing these measures, they are considered inherently part of the design of the Proposed Development and have therefore been considered in the assessment presented in section 14.11 (i.e. the determination of magnitude and therefore significance assumes implementation of these measures). These measures are considered standard industry practice for this type of development.

Table 14.11: Designed in Measures Adopted as Part of the Proposed Development

Measures Adopted as Part of the Proposed Development	Justification
Adherence to CAA (2016). *CAP 393, Air Navigation: The Order and the Regulations (2016)*. This will require approval and implementation of a Lighting and Marking Plan (LMP) which will set out specific requirements in terms of aviation lighting to be installed on the wind turbines. The LMP will be prepared in consultation with the CAA, MoD and Maritime and Coastguard Agency (MCA) and will take into account requirements for aviation lighting as specified in Article 223 of the UK ANO, 2016 and changes to ICAO Annex 14 Volume 2, Chapter 6, paragraph 6.2.4 promulgated in November 2016.	To comply with CAA (2016). *CAP 393, Air Navigation: The Order and the Regulations (2016)* which sets out the mandatory requirements for the lighting of offshore wind turbines, and to ensure appropriate lighting is in place to facilitate aeronautical safety. An outline LMP is provided with the Application (see volume 4, appendix 22).
All structures of more than 91.4 m in height will be charted on aeronautical charts and reported to the Defence Geographic Centre (DGC) which maintains the UK's database of tall structures (Digital Vertical Obstruction File) at least ten weeks prior to construction. Furthermore, any temporary obstacles associated with wind farms which are of more than 91.4 m in height (e.g. construction infrastructure such as cranes and/or meteorological masts) are to be alerted to aircrews by means of the Notice to Airmen (NOTAM) system.	An object which is more than 91.4 m in height is considered to have significance for the en route operations of aircraft in UK airspace.
CAA will be informed of the locations, heights and lighting status of the wind turbines, including estimated and actual dates of construction and the maximum heights of any construction equipment to be used, prior to the start of construction, to allow inclusion on aviation charts and in the UK IAIP.	To comply with CAA (2016): CAP 764 - CAA Policy and Guidelines on Wind Turbines (Version 6, February 2016) which requires the CAA to be notified of the construction and location of wind turbines.

14.11. ASSESSMENT OF SIGNIFICANCE

46. The potential effects arising from the construction, operation and maintenance and decommissioning phases of the Proposed Development are listed in Table 14.6, along with the maximum design scenario against which each effect has been assessed. An assessment of the likely significance of the effects of the Proposed Development on aviation, military and communications receptors caused by each identified impact is given below.

POTENTIAL IMPACT ON LOW FLYING (INCLUDING SAR HELICOPTER OPERATIONS) DUE TO PRESENCE OF OBSTACLES (CRANES, STATIONARY WIND TURBINES AND OSPS/OFFSHORE CONVERTOR STATION PLATFORM).

47. The installation and presence of wind turbines pose physical obstructions to aviation operations carried out in the vicinity of wind farms. Wind turbines can be difficult to see from the air, particularly in poor meteorological conditions, leading to a potential increase in obstacle collision risk. Furthermore, during the construction phase, the presence and movement of installation vessels (with onboard cranes) may also present a potential obstacle collision risk to aircraft operations. In the case of the Proposed Development however, the cranes used during the construction phase are expected to have a maximum operating height of less than 355 m above LAT which is in line with the maximum design scenario in Table 14.6.

Construction Phase

Magnitude of Impact

48. The presence of construction infrastructure, such as installation vessels with cranes, will be alerted to pilots under the NOTAM system (see Table 14.11). The NOTAM will provide details of potential hazards along a flight route, or at a location, that could affect the safety of flight. The cranes will also have appropriate aviation lighting installed.

49. In terms of wind turbines creating physical obstacles, aircraft operating at low levels are required to set a Minimum Safe Altitude (MSA); this is the lowest altitude set in areas to ensure safe separation between

aircraft and known obstacles. The MSA for aircraft operating in Instrument Meteorological Conditions (IMC) (i.e. poor weather conditions), enables aircraft to maintain a minimum of 1,000 ft (305 m) clearance between aircraft and known obstacles. The anticipated maximum tip height of the proposed wind turbines is 355 m (1,165 ft) (above LAT). Therefore, the MSA in the area of the Proposed Development will need to be 2,200 ft (1,165 ft + 1,000 ft rounded to the next 100 ft) in order to maintain at least 1,000 ft (305 m) vertical separation between the wind turbines and aircraft.

50. As detailed in Table 14.11, potential impacts to low flying aircraft operating in the vicinity of the Proposed Development will be managed through the agreement of a LMP with key aviation stakeholders, and notification of the locations, heights and lighting status of the wind turbines to aviation stakeholders for inclusion in appropriate aviation documentation and charts. This will enable aviation operators to set an appropriate MSA over the Proposed Development. If required, the LMP will also cover the lighting and marking details for any construction infrastructure (e.g. cranes and OSPs/Offshore convertor station platform). An outline LMP is provided with the Application (see volume 4, appendix 22).

51. The impact is predicted to be of local spatial extent, short to medium term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be negligible.

Sensitivity of the Receptor

52. Pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. In Visual Meteorological Conditions (VMC) (i.e. good weather conditions), pilots are ultimately responsible for seeing and avoiding obstructions such as wind turbines and will be aware of their presence through the notification procedures set out in Table 14.11.

53. In terms of potential impacts on military low flying operations, MoD recognised as part of relevant consultation to date that the Applicant was committed to lighting and charting the wind turbines and confirmed that, in the interests of air safety, the Proposed Development should be fitted with MoD accredited aviation safety lighting in accordance with the CAA, Air Navigation Order 2016; as set out in Table 14.10. An outline LMP is provided with the Application (see volume 4, appendix 22).

54. In terms of SAR operations, MCA during relevant consultation to date indicated that they would welcome early discussion on the lighting and marking arrangements; furthermore, they requested that MCA should be consulted on the specific layout of the wind turbines with the aim of seeking compatibility with SAR helicopter operations in the event of rescue missions within the Proposed Development; as set out in Table 14.11**.** Consultation will be carried out with MCA on their requirements in relation to wind turbine layout design and SAR lighting and marking and this will continue as wind turbine layout plans are refined prior to construction.

55. Military low flying and SAR helicopter operations are deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Significance of the Effect

56. Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Secondary Mitigation and Residual Effect

57. No aviation, military and communications mitigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 14.10) is considered necessary because the likely effect in the absence of mitigation is of **minor** adverse significance, which is not significant in EIA terms.

Operation and Maintenance Phase

Magnitude of Impact

58. The magnitude of impact is considered to be low, as described in paragraphs 48 to 51.

59. During maintenance periods, it may be necessary to use surface vessels with crane capabilities for replacement of component parts (e.g. wind turbine blades). These temporary obstacles will be addressed under the NOTAM system as discussed in Table 14.11.

60. The impact is predicted to be of local spatial extent, short term duration and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be negligible.

Sensitivity of the Receptor

61. The sensitivity of this receptor is considered to be high as described in paragraphs 52 to 55.

62. All aviation operations are deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Significance of the Effect

63. Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Secondary Mitigation and Residual Effect

64. No aviation, military and communications mitigation are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 14.10) is considered necessary because the likely effect in the absence of mitigation is of **minor** adverse significance, which is not significant in EIA terms.

Decommissioning Phase

65. The effects of decommissioning activities are expected to be the same or similar to the effects from construction. The significance of effect is therefore **minor** adverse, which is not significant in EIA terms

66. No aviation, military and communications mitigation are considered necessary because the likely effect in the absence of mitigation is not significant in EIA terms.

POTENTIAL IMPACT ON NERL ATC RADARS DUE TO PRESENCE OF WIND TURBINES

67. Adverse effects on ATC radar are only possible if the wind turbine blades are moving, therefore this impact is applicable to the operation and maintenance phase only.

68. Wind turbines have been shown to have detrimental effects on the performance of ATC radar and have the potential to affect the provision of radar based air traffic services (ATS). These effects include the desensitisation of radar in the vicinity of the wind turbines, shadowing and the creation of unwanted returns which air traffic controllers must treat as aircraft returns. Unwanted radar clutter can affect the provision of ATS to pilots. Radar clutter (or false radar returns) can confuse air traffic controllers making it difficult to differentiate between aircraft and those radar returns resulting from the detection of wind turbines. Furthermore, the appearance of multiple false targets in close proximity can generate false aircraft tracks and seduce those returns from real aircraft away from the true aircraft position.

Operation and Maintenance Phase

Magnitude of Impact

69. NERL uses ATC radar to support their provision of navigational services to aircraft operating between the UK and mainland Europe and to those overflying the UK FIR. Surveillance data from NERL's Perwinnes ATC radar is used by other air traffic service providers such as Aberdeen Airport who are responsible for the provision of navigational services to aircraft operating on Airway P18.

70. Air traffic controllers are responsible for maintaining typically 5 nm lateral separation between aircraft. Where line of sight to an ATC radar exists, wind turbines may appear as genuine aircraft targets and could mask genuine aircraft responses. The radar may also be desensitised by its clutter processing within the sector containing wind turbines meaning that real aircraft targets may disappear from radar.

71. The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be high.

Sensitivity of the Receptor

72. Desensitisation of ATC radar could result in aircraft not being detected by the radar and therefore aircraft returns not presented to air traffic controllers. Controllers use the radar to separate and sequence aircraft; therefore, maintaining situational awareness of all aircraft movements within the airspace is crucial to achieving a safe and efficient ATS, and the integrity of radar data is central to this process. The creation of unwanted returns displayed on the radar leads to increased workload for both controllers and aircrews. Furthermore, real aircraft returns can be obscured by a wind turbine's radar return, making the tracking of both conflicting unknown aircraft and the controllers' own traffic much more difficult.

73. In their response to relevant consultation to date, NERL confirmed that false primary plots are likely to be generated on the Perwinnes ATC radar which would create a reduction in the radar's probability of detection for real aircraft. Consequently, NERL considered that the impact on the Perwinnes ATC radar would be unacceptable. This was also confirmed by NERL in their response to the Berwick Bank Wind Farm Offshore Scoping Report (SSER, 2021a), see Table 14.4.

74. The impact on NERL's ATC radar systems is deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Significance of the Effect

75. Overall, the magnitude of the impact is deemed to be high and the sensitivity of the receptor is considered to be high. The effect will, therefore, be **major** adverse, which is significant in EIA terms.

Secondary Mitigation and Residual Effect

76. NERL has proven processes and techniques to mitigate the adverse impact of wind turbines on their ATC radars. The Applicant has commenced discussions with NERL about potential mitigation solutions and is likely that the proposed solution will be to use Multi-Radar Tracker (MRT) blanking, which is a technical mitigation solution routinely offered by NERL that removes wind turbines returns from the ATC radar display. However, in combination, NERL are likely to request that the MRT blanking is accompanied by a Transponder Mandatory Zone (TMZ). This provides an added layer of mitigation by ensuring that all aircraft transiting overhead the 'blanked' area carry a serviceable transponder which enables them to be tracked by means of Secondary Surveillance Radar (SSR) without reliance on ATC radar. Implementation of a TMZ requires developers to submit an Airspace Change Proposal (ACP) to the CAA for which a formal airspace change process has to be followed.

77. The Applicant intends to continue negotiations with NERL with the aim of delivering a suitable ATC radar mitigation solution prior to the operation and maintenance phase of the Proposed Development.

78. Once a mitigation solution is implemented, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

POTENTIAL IMPACT ON MILITARY ATC RADARS DUE TO PRESENCE OF WIND TURBINES

79. As explained in paragraph 67, the impact of wind turbines on ATC radar is only applicable to the operation and maintenance phase. The detrimental effect of wind turbines on ATC radar is also explained in paragraph 68.

Operation and Maintenance Phase

Magnitude of Impact

80. RAF ATC units not only provide navigational services to aircraft approaching and departing the aerodrome, but they are also responsible for the provision of such services to any aircraft operating within 40 nm (and sometimes 60 nm). If an offshore wind farm is within the operating range of a military ATC unit, it is possible that the wind turbines will be detectable on ATC radar displays. This direct, permanent effect could hamper the ATC operators' ability to distinguish actual aircraft returns from those created by the wind turbines and degrade the safety and efficiency of the ATS being provided. Air traffic controllers' responsibilities are as described in paragraph 70.

81. The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be high.

Sensitivity of the Receptor

82. Wind turbines within the Proposed Development are highly likely to be visible to the Leuchars Station ATC radar and adversely impact ATC operations. The Proposed Development is also considered to have the potential to affect the operation of the ATC radar at RAF Spadeadam Deadwater Fell. The sensitivity of this receptor is high as described in paragraph 74.

83. In their response to relevant consultation to date, MoD confirmed that it is likely to affect and be detectable to, the ATC radar at Leuchars Station and that this impact would need to be taken into account and mitigated. This was also confirmed by MoD in their response to the Berwick Bank Wind Farm Offshore Scoping Report (SSER, 2021a); see Table 14.4.

84. Military ATC radar systems are deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Significance of the Effect

85. Overall, the magnitude of the impact is deemed to be high and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **major** adverse significance, which is significant in EIA terms.

Secondary Mitigation and Residual Effect

86. The MoD has a recognised process for entering into agreement for ATC radar mitigation. Currently, no enduring radar mitigation solution has been accepted into service by MoD however, an interim solution has previously been negotiated for Seagreen. The Applicant has commenced discussions with MoD regarding the Proposed Development and it is expected that an interim solution will also be acceptable to MoD pending development of an enduring radar mitigation solution. The interim solution is expected to take the form of blanking and TMZ as outlined in paragraph 76 for mitigation of impacts on NERL's ATC radar.

87. The Applicant intends to continue negotiations with MoD with the aim of delivering a suitable ATC radar mitigation solution prior to the operation and maintenance phase of the Proposed Development.

88. Once a mitigation solution is implemented, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

POTENTIAL IMPACT ON MILITARY AD RADARS DUE TO PRESENCE OF WIND TURBINES

89. As explained in paragraph 67, the impact of wind turbines on ATC radar is only applicable to the operation and maintenance phase. The detrimental effect of wind turbines on ATC radar is also explained in paragraph 68.

Operation and Maintenance Phase

Magnitude of Impact

90. The MoD AD organisation is responsible for compiling a Recognized Air Picture (RAPi) to monitor the airspace in and around the UK to launch a response to potential airborne threats. This is achieved through the utilisation of a network of long range radars positioned in various locations around the UK. AD radar resources are used in support of training exercises on an almost daily basis. AD units, using radar data supplied from the network of AD radars, are also responsible for navigation services and support to aircraft activity within restricted airspace within which promulgated activities include air combat training and supersonic flight.

91. Wind turbines within coverage of an AD radar could shield the radar from genuine aircraft targets and/or hide them from AD controllers. These direct and permanent effects would affect the controller's ability to provide a safe service to aircraft in support of training exercises and in using the radar data to monitor the UK RAPi.

92. The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be high.

Sensitivity of the Receptor

93. Wind turbines within the Proposed Development are highly likely to be visible to AD radars located at Brizlee Wood and Buchan which will adversely impact on AD operations. The sensitivity of this receptor is high as described in paragraph 74.

94. In its response to the 2020 Berwick Bank Scoping Report (SSER, 2020); MoD confirmed that the Proposed Development is likely to affect, and be detectable to, the AD radars at Brizlee Wood and Buchan and that this impact would need to be taken into account and mitigated. This was confirmed by MoD in its response to the Berwick Bank Wind Farm Offshore Scoping Report (SSER, 2021a); see Table 14.4.

95. Military AD radar systems are deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Significance of the Effect

96. Overall, the magnitude of the impact is deemed to be high and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **major** adverse significance, which is significant in EIA terms.

Secondary Mitigation and Residual Effect

97. MoD has a recognised process for entering into agreement for AD ATC radar mitigation. A mitigation solution has recently been negotiated for Seagreen and the Applicant has commenced discussions with MoD regarding the Proposed Development. The Applicant intends to continue negotiations with MoD with the aim of delivering a suitable AD ATC radar mitigation solution prior to the operation and maintenance phase of the Proposed Development. The Applicant is also a funding member of the Offshore Wind Industry Council that is working jointly with the MoD, BEIS, The Crown Estate and other developers to develop, assess and procure replacement/additional AD surveillance technology that shall mitigate the impact upon UK-based AD radars.

98. Once a mitigation solution is implemented, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

14.11.2. PROPOSED MONITORING

99. No aviation, military and communications monitoring to test the predictions made within the assessment of likely significant effects on aviation, military and communications is considered necessary.

14.12. CUMULATIVE EFFECTS ASSESSMENT

14.12.1. METHODOLOGY

100. The CEA assesses the impact associated with the Proposed Development together with other relevant plans, projects and activities. Cumulative effects are therefore the combined effect of the Proposed Development in combination with the effects from a number of different projects, on the same receptor or resource. Please see volume 1, chapter 6 for detail on CEA methodology.

101. As stated in section 14.3, the cumulative aviation, military and communications study area includes the area within 50 km of the Proposed Development. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see volume 3, appendix 6.3 of the Offshore EIA Report). Volume 3, appendix 6.4 further provides information regarding how information pertaining to other plans and projects is gained and applied to the assessment. Each project or plan has been considered on a case by case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

102. In undertaking the CEA for the Proposed Development, it is important to bear in mind that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside the Proposed Development. Therefore, a tiered approach has be adopted. This provides a framework for placing relative weight upon the potential for each project/plan to be included in the CEA to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the projects' parameters. The tiered approach which will be utilised within the Proposed Development CEA employs the following tiers:

- tier 1 assessment – Proposed Development (Berwick Bank Wind Farm offshore) with Berwick Bank Wind Farm onshore;
- tier 2 assessment – All plans/projects assessed under Tier 1, plus projects which became operational since baseline characterisation, projects which are under construction and those with consent and submitted but not yet determined;
- tier 3 assessment – All plans/projects assessed under Tier 2, plus those projects with a Scoping Report; and
- tier 4 assessment – All plans/projects assessed under Tier 3, which are reasonably foreseeable, plus those projects likely to come forward where an Agreement for Lease (AfL) has been granted.

103. The specific projects scoped into the CEA for aviation, military and communications, are outlined in Table 14.12

104. As described in volume 1, chapter 3, the Applicant is also developing an additional export cable grid connection to Blyth, Northumberland (The Cambois connection). The Cambois connection has not been scoped into the CEA for aviation, military and communications on the basis this proposed cable installation project will not generate (or contribute to) cumulative effects on aviation, military and communications receptors.

105. The range of potential cumulative impacts that are identified and included in Table 14.12, is a subset of those considered for the Proposed Development alone CEA. This is because some of the potential impacts identified and assessed for the Proposed Development alone, are localised and temporary in nature. It is considered therefore, that these potential impacts have limited or no potential to interact with similar changes associated with other plans or projects. These have therefore been scoped out of the CEA. The cumulative projects identified for aviation, military and communications are presented in Table 14.12.

106. Similarly, some of the potential impacts considered within the Proposed Development alone assessment is specific to a particular phase of development (e.g. construction, operation and maintenance or decommissioning). Where the potential for cumulative effects with other plans or projects only have potential to occur where there is spatial or temporal overlap with the Proposed Development during certain phases of development, impacts associated with a certain phase may be omitted from further consideration where no plans or projects have been identified that have the potential for cumulative effects during this period.

Table 14.12: List of Other Developments Considered Within the CEA for Aviation, Military and Communications

Development	Status [i.e. Application, Consented, Under Construction, Operational]	Closest Distance from Array Area (km)	Distance from Offshore Export Cable Routes (km)	Description of Development	Dates of Construction (If Applicable)	Dates of Operation (If Applicable)	Overlap with the Proposed Development [e.g. Project Construction Phase Overlaps with Proposed Development Construction Phase]
Tier 1							
0 km							
Berwick Bank Wind Farm (onshore aspects)	Application	0 km	0 km	Onshore electricity cables from cable landfall near Skateraw Harbour (from Mean Low Water Springs) to a new onshore electricity substation or converter station; New onshore electricity substation or converter station located in an agricultural field south of the A1;Onshore electricity cables from the substation to the new Branxton Grid Substation (being developed by Scottish Power Transmission); and Associated infrastructure, potentially including (but not limited to) landscaping; parking and servicing areas; drainage infrastructure; and temporary and/or permanent new access tracks/ road, road and junction alterations/improvements.	Commencing in 2024, for approximately 40 months	2028, with energisation commencing in 2026	Screened out as no conceptual or physical effect-receptor pathway
Tier 2							
Tier 1 plus projects which are operational/under construction, consented or submitted							
Inch Cape Offshore Wind Farm	Consented	8	32	Development of up to 72 wind turbines and 784 MW	*2023-2025*	*2026 onwards*	Potential for overlap with Proposed Development construction and operation and maintenance phases
NnG Offshore Wind	Under Construction	16	15	Development of up to 75 wind turbines) and 450 MW	*2022-2023*	*2025 onwards*	Potential for overlap of operational phase of NnG with Proposed Development's construction and operation and maintenance phases
Seagreen 1	Under Construction	8	35	Development of up to 114 wind turbines with no capacity limit	*2022-2024*	*2024 onwards*	Potential for overlap with operational phase of Seagreen 1 and the construction and operation and maintenance phases of the Proposed Development
Seagreen 1A Project	Consented	10	36	Development of up to 36 wind turbines with no capacity limit	*2023 - 2025*	*Q3 2025 onwards*	Potential for overlap of construction and operational phases of Seagreen 1A Project with Proposed Development construction and operation and maintenance phases.
Tier 3							
Tier 2 plus those projects with a Scoping Report							
Nil							
Tier 4							
Tier 3 plus projects likely to come forward where an AfL has been granted							
No plans or projects identified							

14.12.2. MAXIMUM DESIGN SCENARIO

107. The maximum design scenarios identified in Table 14.13 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the details provided in volume 1, chapter 3 of the Offshore EIA Report as well as the information available on other projects and plans (see volume 3, appendix 6.4), to inform a 'maximum design scenario'. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different wind turbine layout), to that assessed here, be taken forward in the final design scheme.

Table 14.13: Maximum Design Scenario Considered for Each Impact as part of the Assessment of Likely Significant Cumulative Effects on Aviation, Military and Communications

Potential Cumulative Impact	Phase[3]			Tier	Maximum Design Scenario	Justification
	C	O	D			
Potential impact on low flying (including SAR helicopter operations) due to presence of obstacles (cranes, stationary wind turbines, OSP/Offshore convertor station platform).	✓	✓	✓	2	Maximum design scenario as described for the Proposed Development (Table 14.13) assessed cumulatively with the following other projects/plans: • Inch Cape - 110 wind turbines up to 784 MW to a height of 291 m • NnG - up to 54 x 8 MW wind turbine over a 105 km^2 area • Seagreen 1 - Development of up to 114 wind turbines • Seagreen 1A Project - Development of up to 36 wind turbines	These parameters represent the maximum design scenario for height of infrastructure and associated maintenance equipment within the Proposed Development which has the greatest potential to create obstacles to low flying aircraft
Potential impact on NERL ATC radars due to presence of wind turbines	×	✓	×	2	Maximum design scenario as described for the Proposed Development (Table 14.13) assessed cumulatively with the following other projects/plans: • Inch Cape - 110 wind turbines up to 784 MW to a height of 291 m • NnG - up to 54 x 8 MW wind turbine over a 105 km^2 area • Seagreen 1 - Development of up to 114 wind turbines • Seagreen 1A Project - Development of up to 36 wind turbines	These parameters represent the maximum design scenario which has the greatest potential for interference with NERL ATC radars
Potential impact on Military ATC radars due to presence of wind turbines	×	✓	×	2	Maximum design scenario as described for the Proposed Development (Table 14.13) assessed cumulatively with the following other projects/plans: • Inch Cape - 110 wind turbines up to 784 MW to a height of 291 m • NnG - up to 54 x 8 MW wind turbine over a 105 km^2 area • Seagreen 1 - Development of up to 114 wind turbines • Seagreen 1A Project - Development of up to 36 wind turbines	These parameters represent the maximum design scenario which has the greatest potential for interference with NERL ATC radars
Potential impact on Military AD radars due to presence of wind turbines	×	✓	×	2	Maximum design scenario as described for the Proposed Development (Table 14.13) assessed cumulatively with the following other projects/plans: • Inch Cape - 110 wind turbines up to 784 MW to a height of 291 m • NnG - up to 54 x 8 MW wind turbine over a 105 km^2 area • Seagreen 1 - Development of up to 114 wind turbines • Seagreen 1A Project - Development of up to 36 wind turbines	These parameters represent the maximum design scenario which has the greatest potential for interference with NERL AD radars

[3] C = Construction, O = Operation and maintenance, D = Decommissioning

14.12.3. CUMULATIVE EFFECTS ASSESSMENT

108. An assessment of the likely significance of the cumulative effects of the Proposed Development upon aviation, military and communications receptors is given below.

POTENTIAL IMPACT OF EFFECT ON LOW FLYING (INCLUDING SAR HELICOPTER OPERATIONS) DUE TO PRESENCE OF OBSTACLES (CRANES, STATIONARY WIND TURBINES, OSP/OFFSHORE CONVERTOR STATION PLATFORM).

109. The installation and presence of wind turbines pose physical obstructions to aviation operations carried out in the vicinity of wind farms. Wind turbines can be difficult to see from the air, particularly in poor meteorological conditions leading to a potential increase in obstacle collision risk. Furthermore, during the construction phase, the presence and movement of construction infrastructure (such as cranes) may also present a potential obstacle collision risk to aircraft operations.

Tier 2

Construction phase

Magnitude of impact

110. The installation of wind turbines within the Proposed Development array area, together with the installation of wind turbines associated with the projects identified in Table 14.12 and Table 14.13 may create physical obstacles affecting air traffic. Other projects screened into the assessment include Tier 2 developments at Inch Cape, NnG, Seagreen 1 and Seagreen 1A Project. Inch Cape and Seagreen Project 1A are consented and NnG and Seagreen 1 are currently under construction.

111. The potential effects of the Tier 2 projects are expected to be similar in nature as those described in section 14.11 for the Proposed Development alone (e.g. the MSA in the area of the Tier 2 projects will need to increase in order to maintain at least 1,000 ft vertical separation between the wind turbines and aircraft). However, it is not possible to quantify this impact (e.g. in terms of extent and duration) at this stage, due to the application material not containing specific timelines for completion of construction. As such, a full quantitative assessment is not presented in this CEA. A qualitative assessment is presented at paragraph 109.

112. As detailed in Table 14.11, potential impacts to low flying aircraft operating in the vicinity of the Proposed Development will be managed through the agreement of a LMP with key aviation stakeholders, and through notification of the locations, heights and lighting status of the wind turbines to aviation stakeholders for inclusion in appropriate aviation documentation and charts. An outline LMP has been provided with the Application (see volume 4, appendix 27). The LMP will enable aviation operators to set an appropriate MSA over the Proposed Development. The MCA will be consulted on the final layout of the Proposed Development to ensure compatibility with SAR helicopter operations in the event of rescue missions within the wind farm. Similar measures are likely to apply to the Tier 2 projects as standard for offshore wind developments.

113. The cumulative impact is predicted to be of regional spatial extent, short to medium term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.

Sensitivity of receptor

114. Pilots are obliged to plan their flying activities in advance and to be familiar with any en route obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. Under VFR conditions, pilots are ultimately responsible for seeing and avoiding obstructions such as wind turbines and will be aware of their presence through the notification procedures set out in Table 14.11.

115. The Tier 2 projects will be considered by aircraft operators in conjunction with the potential impact of the Proposed Development. The presence of the Tier 2 project wind turbines will be treated as obstacles to aviation and the details will be required to be included in appropriate aviation related documentation and presented on aviation mapping.

116. All aviation operations are deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Significance of effect

117. Overall, the magnitude of the cumulative effect is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Further mitigation and residual effect

118. No aviation, military and communications mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 14.10) is considered necessary because the likely effect in the absence of mitigation is of **minor** adverse significance, which is not significant in EIA terms.

Operation and maintenance phase

Magnitude of impact

119. The magnitude of impact for the Tier 2 projects is explained in paragraphs 110 to 113.

120. The cumulative impact is predicted to be of regional spatial extent, short term duration and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.

Sensitivity of the receptor

121. The sensitivity of this receptor for the Tier 2 projects is explained in paragraphs 114 to 116.

122. All aviation operations are deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Significance of the effect

123. Overall, the magnitude of the cumulative effect is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Further mitigation and residual effect

124. No aviation, military and communications mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in section 14.10) is considered

necessary because the likely effect in the absence of mitigation is of **minor** adverse significance, which is not significant in EIA terms.

Decommissioning phase

125. The effects of decommissioning activities are expected to be the same or similar to the effects from construction. The significance of effect is therefore **minor** adverse, which is not significant in EIA terms.

POTENTIAL IMPACT ON NERL ATC RADARS DUE TO PRESENCE OF WIND TURBINES

126. As explained in section 14.11, the impact of wind turbines on ATC radar systems is only applicable to the operation and maintenance phase. The detrimental effect of wind turbines on ATC radar systems is also explained in section 14.11.

Tier 2

Operation and maintenance phase

Magnitude of impact

127. The installation of wind turbines within the Proposed Development array area, together with the installation of wind turbines associated with the projects identified in Table 14.12 and Table 14.13, may impact on NERL ATC radar systems. Projects screened into the assessment include Tier 2 developments at Inch Cape, NnG, Seagreen 1 and Seagreen 1A Project. Inch Cape and Seagreen Project 1A are consented and NnG and Seagreen 1 are currently under construction. Once constructed, these Tier 2 projects will contribute up to 132 wind turbines to the Firth of Forth.

128. The potential effects of the Tier 2 projects are expected to be similar in nature as those described in paragraphs 69 to 14.11.71 for the Proposed Development alone because aviation stakeholders assess the impact of each individual wind farm and impacts on radar are always localised around the wind turbines themselves.

129. The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be high.

Sensitivity of the receptor

130. The sensitivity of this receptor is as described in paragraph 72.

131. The Tier 2 will be considered by the Scottish Ministers, following consultation with NERL, in conjunction with the potential impact of the Proposed Development. The presence of the Tier 2 project's wind turbines is likely to create adverse impact on NERL's ATC radars and will need to be mitigated in the same manner as for the Proposed Development.

132. Impact on NERL's ATC radar systems is deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Significance of the effect

133. Overall, the magnitude of the impact is deemed to be high and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **major** adverse significance, which is significant in EIA terms.

Further mitigation and residual effect

134. NERL has proven processes and techniques to mitigate the adverse impact of wind turbines on their ATC radars. The applicants for Tier 2 projects will be expected to negotiate separately with NERL for bespoke mitigation solutions for their individual projects. The likely significant effects of the Proposed Development are considered to be significant (without mitigation) irrespective of the cumulative situation. Mitigation for one project can in some circumstances be deployed to mitigate another however, an assessment of shared mitigation is beyond the scope of this Offshore EIA Report.

135. Once mitigation solutions are implemented, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The likely effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

POTENTIAL IMPACT ON MILITARY ATC RADARS DUE TO PRESENCE OF WIND TURBINES

136. As explained in section 14.11, the impact of wind turbines on ATC radar systems is only applicable to the operation and maintenance phase. The detrimental effect of wind turbines on ATC radar systems is also explained in section 14.11.

Tier 2

Operation and maintenance phase

Magnitude of impact

137. The installation of wind turbines within the Proposed Development array area, together with the installation of wind turbines associated with the projects identified in Table 14.12 and Table 14.13, may on military ATC radar systems. Projects screened into the assessment include Tier 2 developments at Inch Cape, NnG and Seagreen 1 and Seagreen 1A Project. Inch Cape and Seagreen Project 1A are consented and NnG and Seagreen 1 is currently under construction. Once constructed, these Tier 2 projects will contribute up to 132 wind turbines to the Firth of Forth.

138. The potential effects of the Tier 2 projects are expected to be similar in nature as those described in section 14.11 for the Proposed Development alone. The magnitude of impact is as described in paragraphs 80 and 81.

139. The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be high.

Sensitivity of the receptor

140. Wind turbines within the Proposed Development are highly likely to be visible to the Leuchars Station ATC radar and adversely impact on ATC operations. The sensitivity of this receptor is as described in paragraph 82.

141. The Tier 2 projects will be considered by the Scottish Ministers, in consultation with MoD, in conjunction with the potential impact of the Proposed Development. The presence of Tier 2 project wind turbines is likely to create adverse impact on MoD's ATC radars and will need to be mitigated in the same manner as for the Proposed Development.

142. Impact on military ATC radar systems is deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Significance of the effect

143. Overall, the magnitude of the impact is deemed to be high and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **major** adverse significance, which is significant in EIA terms

Further mitigation and residual effect

144. MoD has a recognised process for mitigating the adverse impact of wind turbines on their ATC radar. The Applicants for Tier 2 will be expected to negotiate separately with MoD for bespoke mitigation solutions for their individual projects. The effects of the Proposed Development are considered to be significant (without mitigation) irrespective of the cumulative situation. Mitigation for one project can in some circumstances be deployed to mitigate another however, an assessment of shared mitigation is beyond the scope of this Offshore EIA Report.

145. Once mitigation solutions are implemented, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The likely effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

POTENTIAL IMPACT ON MILITARY AD RADARS DUE TO PRESENCE OF WIND TURBINES

146. As explained in section 14.11, the impact of wind turbines on ATC radar systems is only applicable to the operation and maintenance phase. The detrimental effect of wind turbines on ATC radar systems is also explained above.

Tier 2

Operation and maintenance phase

Magnitude of impact

147. The installation of wind turbines within the Proposed Development, together with the installation of wind turbines associated with the projects identified in Table 14.12 and Table 14.13, may on military AD radar systems. Projects screened into the assessment include Tier 2 developments at Inch Cape, NnG, Seagreen 1 and Seagreen 1A Project. Inch Cape and Seagreen Project 1A are consented and NnG and Seagreen 1 are currently under construction. Once constructed, these Tier two projects will contribute up to 132 wind turbines to the Firth of Forth. The potential effects of the Tier 2 projects are expected to be similar in nature as those described in section 14.11 for the Proposed Development alone. The magnitude of impact is as described in paragraphs 90 to 92.

148. The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be high.

Sensitivity of the receptor

149. Wind turbines within the Proposed Development are highly likely to be visible to AD radars located at Brizlee Wood and Buchan which will adversely impact on AD operations. The sensitivity of this receptor is as described in paragraph 74.

150. The Tier 2 projects will be considered by the Scottish Ministers, following consultation with MoD, in conjunction with the potential impact of the Proposed Development. The presence of Tier 2 project wind turbines is likely to create adverse impact on MoD's AD radars and will need to be mitigated in the same manner as for the Proposed Development.

151. Impact on military AD radar systems is deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Significance of the effect

152. Overall, the magnitude of the impact is deemed to be high and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **major** adverse significance, which is significant in EIA terms.

Further mitigation and residual effect

153. MoD has a recognised process for mitigating the adverse impact of wind turbines on their ATC radar s. The Applicants for Tier 2 will be expected to negotiate separately with MoD for bespoke mitigation solutions for their individual projects. The effects of the Proposed Development are considered to be significant (without mitigation) irrespective of the cumulative situation. Mitigation for one project can in some circumstances be deployed to mitigate another However, an assessment of shared mitigation is beyond the scope of this Offshore EIA Report.

154. Once mitigation solutions are implemented, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The likely effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

14.12.4. PROPOSED MONITORING

155. As per section 14.11.2, no aviation, military and communications monitoring to test the predictions made within the assessment of effects is considered necessary.

14.13. TRANSBOUNDARY EFFECTS

156. A screening of transboundary impacts has been carried out (volume 3, appendix 6.5) and has identified that there were no likely significant transboundary effects with regard to aviation, military and communications from the Proposed Development upon the interests of other European Economic Area (EEA) States.

14.14. INTER-RELATED EFFECTS

157. A description of the likely inter-related effects arising from the Proposed Development on aviation, military and communications is provided in volume 3, appendix 18.1 of the Offshore EIA Report.

158. For aviation, military and communications, the following potential impacts have been considered within the inter-related assessment:

- creation of physical obstacles affecting air traffic; and
- interference with civil and military radar systems.

159. Table 14.14 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operation and maintenance, and decommissioning phases of the Proposed Development and also the inter-related effects (receptor-led effects) that are predicted to arise for aviation, military and communications receptors.

Table 14.14: Summary of Potential Inter-Related Effects for Aviation, Military and Communications from Individual Effects Occurring across the Construction, Operation and Maintenance and Decommissioning Phases of the Proposed Development and from Multiple Effects Interacting Across all Phases (Receptor-led Effects)

Description of Impact	Phase			Likely Significant Effects
	C	O	D	
Potential impact on low flying (including SAR helicopter operations) due to presence of obstacles (cranes, stationary wind turbines)	✓	✓	✓	The scale of effects to civil and military aviation receptors progressively increases during construction as the wind turbines and ancillary structures are installed. Once installed, the infrastructure causing physical obstacles to air traffic will remain constant until the decommissioning phase. The effects on aviation, military and communications are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase. No potential for likely significant inter-related effects therefore predicted for this impact.
Potential impact on NERL ATC radars due to presence of wind turbines	×	✓	×	This effect will only arise during the operation and maintenance phase and as such there will be no interactions between effects across the phases of the Proposed Development. No potential for likely significant inter-related effects therefore predicted for this impact.
Potential impact on Military ATC radars due to presence of wind turbines	×	✓	×	This effect will only arise during the operation and maintenance phase and as such there will be no interactions between effects across the phases of the Proposed Developments. No potential for likely significant inter-related effects therefore predicted for this impact.
Potential impact on Military AD radars due to presence of wind turbines	×	✓	×	This effect will only arise during the operation and maintenance phase and as such there will be no interactions between effects across the phases of the Proposed Development. No potential for likely significant inter-related effects therefore predicted for this impact.
Receptor-led Effects				
Potential exists for spatial and temporal interactions between direct impacts to civil and military aviation and radar. Based on current understanding and expert knowledge, the greatest scope for potential interactions between impacts is predicted to arise from creation of physical obstacles affecting air traffic and interference with civil and military ATC radar systems during the operation and maintenance phase. It is unlikely that effects will act together and that any interactions between effects will be of any greater significance than those already assessed in isolation (i.e. imperceptible to slight adverse significance). Please see volume 2, chapter 20.				

14.15. SUMMARY OF IMPACTS, MITIGATION MEASURES AND MONITORING

160. Information on aviation, military and communications within the aviation, military and communications study area was collected through a desktop review and consultation with the relevant stakeholders.

161. Table 14.15 presents a summary of the assessment of likely significant effects, mitigation measures and significance of residual effects in respect to aviation, military and communications. The impacts assessed include: creation of physical obstacles affecting air traffic, impact on NERL ATC radars, impact on military ATC radars and impact on military AD radars. Overall, it is concluded that there will be no likely significant residual effects arising from the Proposed Development during the construction, operation and maintenance or decommissioning phases.

162. Table 14.16 presents a summary of the potential impacts, mitigation measures and the conclusion of likely significant effects on aviation, military and communications in EIA terms. The cumulative impacts assessed include: creation of physical obstacles affecting air traffic. Overall, it is concluded that there will be no likely residual cumulative effects from the Proposed Development alongside other projects/plans.

163. No potential transboundary impacts have been identified in regard to effects of the Proposed Development.

Table 14.15: Summary of Likely Significant Environmental Effects, Mitigation and Monitoring

Description of Impact	Phase			Magnitude of Impact	Sensitivity of Receptor	Effect	Additional Measures	Significance of Residual Effect	Proposed Monitoring
	C	O	D						
Potential impact on low flying (including SAR helicopter operations) due to presence of obstacles (cranes, stationary wind turbines).	✓	✓	✓	Low	High	Minor	N/A	Minor	Nil
Potential impact on NERL ATC radars due to presence of wind turbines	×	✓	×	High	High	Major	Bespoke radar mitigation following consultation with NERL	Minor	Nil
Potential impact on Military ATC radars due to presence of wind turbines	×	✓	×	High	High	Major	Bespoke radar mitigation following consultation with MoD	Minor	Nil
Potential impact on Military AD radars due to presence of wind turbines	×	✓	×	High	High	Major	Bespoke radar mitigation following consultation with MoD	Minor	Nil

Table 14.16: Summary of Likely Significant Cumulative Environment Effects, Mitigation and Monitoring

Description of Impact	Phase			Measures Adopted as Part of the Proposed Development	Magnitude of Impact	Sensitivity of Receptor	Effect	Additional Measures	Significance of Residual Effect	Proposed Monitoring
	C	O	D							
Potential impact on low flying (including SAR helicopter operations) due to presence of obstacles (cranes, stationary wind turbines).	✓	✓	✓	Designed In measures (i.e. aviation LMP and input into final wind turbine layout)	Low	High	Minor	N/A	Minor	Nil
				Designed In measures (i.e. aviation LMP and input into final wind turbine layout)	Low	High	Minor	N/A	Minor	Nil
Potential impact on NERL ATC radars due to presence of wind turbines	×	✓	×	N/A	High	High	Major	Bespoke radar mitigation following consultation with NERL	Minor	Nil
				N/A	High	High	Major	Bespoke radar mitigation following consultation with NERL	Minor	Nil
Potential impact on Military ATC radars due to presence of wind turbines	×	✓	×	N/A	High	High	Major	Bespoke radar mitigation following consultation with MoD	Minor	Nil
				N/A	High	High	Major	Bespoke radar mitigation following consultation with MoD	Minor	Nil
Potential impact on Military AD radars due to presence of wind turbines	×	✓	×	N/A	High	High	Major	Bespoke radar mitigation following consultation with MoD	Minor	Nil
				N/A	High	High	Major	Bespoke radar mitigation following consultation with MoD	Minor	Nil

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