



Morven Hawthorn Pit Grid Connection Project

Preliminary Environmental Information Report

Volume 1, Annex 2.1: Onshore EMF Compliance
Statement

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Glossary

Term	Meaning
Alternating Current (AC) connection cables	AC cables that will connect the proposed onshore land substation to the National Grid Hawthorn Pit Substation.
the Applicant	The legal entity making the applications for consent; Morven Offshore Wind Limited (MvOWL).
Blue Onshore Land Substation (LSS) Option Area	Proposed location option for the onshore LSS, located west of the A19 and south of the access road to the Jade Business Park.
Blue Onshore Land Substation (LSS) Option Area	Proposed location option for the onshore LSS, located west of the A19 and south of the access road to the Jade Business Park.
Electromagnetic Field (EMF)	Electromagnetic fields (EMF) comprise a frequency spectrum encompassing static and low frequency fields radio waves, microwaves, infrared, visible light, ultraviolet, x-rays and gamma rays. At higher frequencies, electric and magnetic fields are coupled together and referred to as electromagnetic fields; as the frequency decreases, the coupling decreases and they are described in terms of separate electric and magnetic fields.
Environmental Impact Assessment (EIA)	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Green Onshore LSS Option Area	Proposed location option for the onshore LSS, located between Jade Business Park (Spring Rd, Murton, Seaham SR7 9DR) and the National Grid Hawthorn Pit Substation.
Marine Directorate Licensing Operations Team (MD-LOT)	The part of the Scottish Government's Marine Directorate responsible for assessing and administering applications for marine licences and Section 36 consent (offshore) in Scotland.
Maximum Design Scenario (MDS)	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the MHPGC Project.
MHPGC Project Scoping Report	A Scoping Report for the MHPGC Project, scoping the likely significant effects of the project on the environment, was submitted and accepted by Planning Inspectorate (PINS) and submitted to the Scottish Ministers, via the Marine Directorate – Licencing Operations Team (MD-LOT) in February 2025.
MHPGC Project Scoping Opinions	Separate scoping opinions received from PINS (on behalf of the Secretary of State) and MD-LOT (on behalf of the Scottish Ministers) in response to the MHPGC Project Scoping Report. The MHPGC Project Scoping Opinions contain the range of issues that PINS, and MD-LOT in consultation with statutory stakeholders, have identified should be considered within the EIA process.

Term	Meaning
Morven Branxton Area Grid Connection Project (hereafter 'MBAGC Project')	The Morven Branxton Area Grid Connection Project will be comprised of the offshore export cable in Scottish waters from the Morven North or the Morven South Offshore Substation Platforms, the onshore export cable and the onshore land substation in the vicinity of Branxton in East Lothian, Scotland.
Morven Hawthorn Pit Grid Connection Project	The MHPGC Project is comprised of the offshore export cables in Scottish and English waters from the Morven North or the Morven South offshore substation platform(s) (OSP), landfall, onshore export cables, the onshore LSS and AC connection cables. Also referred to in this report as the MHPGC Project, for ease of reading.
Morven North Offshore Wind Array Project (hereafter 'Morven North')	The Morven North Offshore Wind Array Project which includes the wind turbines and foundations, Offshore Substation Platforms and foundations, inter-array and interconnector cables and associated infrastructure located within the Morven North Boundary.
Morven South Offshore Wind Array Project (hereafter 'Morven South')	The Morven South Offshore Wind Array Project, which includes the wind turbines and foundations, Offshore Substation Platforms and foundations, inter-array and interconnector cables and associated infrastructure located within the Morven South Boundary.
National Grid Hawthorn Pit Substation	The National Grid substation at Hawthorn Pit, County Durham, which the AC connection cables will connect into from the Onshore Land Substation.
Offshore substation platforms (OSPs)	OSP(s) comprise the support structure, topside and electrical components used for collecting the electricity generated by the wind turbine generators, in Scottish waters, for the passage or transmission to landfall. These OSP(s) can be divided into two types: • HVAC collector substations; • HVDC converter substations.
Operations and maintenance phase (O&M)	The operational and maintenance phase of the MHPGC Project.
Planning Inspectorate (PINS)	The PINS is an executive agency of the UK Government responsible for administering and examining DCO applications for NSIPs in England. PINS manages the application process, oversees consultation and examination, and makes a recommendation to the relevant Secretary of State (SoS) on whether consent should be granted.
MHPGC Project Preliminary Environmental Information Report (PEIR)	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.

Acronyms

Unit	Meaning
AC	Alternating Current
DECC	Department of Energy and Climate Change

Unit	Meaning
DESNZ	Department Energy Security & Net Zero
EIA	Environmental Impact Assessment
ELF	Extremely Low Frequency
EMF	Electromagnetic Fields
EnBW	Energie Baden-Württemberg AG
ES	Environmental Statement
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
ICNIRP	International Commission on Non-Ionizing Radiation Protection
JNBP	JERA Nex bp Limited
LSS	Land Substation
MBAGC	Morven Branxton Area Grid Connection
MD-LOT	Marine Directorate – Licensing Operations Team
MDS	Maximum Design Scenario
MHPGC	Morven Hawthorn Pit Grid Connection
MvOWL	Morven Offshore Wind Limited
NPS	National Policy Statement
O&M	Operations and Maintenance
OSP	Offshore Substation Platform
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
SoS	Secretary of State
TJB	Transition Joint Bay
UK	United Kingdom

Units

Unit	Meaning
cm	Centimetre
GHz	Gigahertz
GW	Gigawatts
kHz	Kilohertz
kVm ⁻¹	Kilo volts per meter
Vm ⁻¹	Volts per meter
μT	Microtesla

1 Introduction

- 1.1.1.1 This Electromagnetic Fields (EMF) Compliance Statement has been produced in support of the application for the Morven Hawthorn Pit Grid Connection Project (hereafter 'MHPGC Project').
- 1.1.1.2 Morven Offshore Wind Limited (MvOWL) is a joint venture between JERA Nex bp Limited (JNBP) and Energie Baden-Württemberg AG (EnBW) (hereafter, the Applicant). The Applicant has been awarded a seabed option under the 2021/22 ScotWind Leasing Round for the Morven Option Lease Agreement Site (hereafter, Morven Site) covering an area of approximately 860km², located wholly within Plan Option Area E1, identified in the Scottish Government's Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020).
- 1.1.1.3 Since then, the site has been defined for further development, separating the Morven Site into two projects two array sites; Morven North Offshore Wind Array Project (hereafter, Morven North) and the Morven South Offshore Wind Array project (hereafter, Morven South), which would be located off the coast of Aberdeenshire in the North Sea, with a combined potential generating capacity of 3 gigawatts (GW) which is enough to power the equivalent of around 3 million United Kingdom (UK) homes.
- 1.1.1.4 The MHPGC Project is comprised of the offshore export cable in Scottish and English waters from the Morven North or the Morven South offshore substation platforms (OSPs), the onshore export cable in England and the onshore land substation (LSS) in England. It should be noted that the OSPs are included as part of Morven North and Morven South and, as such, do not form part of the MHPGC Project. Details of the offshore and onshore components necessary for the construction, operation and maintenance (O&M) and decommissioning of the MHPGC Project are set out in **Volume 1, Chapter 2: Project Description, of the Preliminary Environmental Information Report (PEIR)**.
- 1.1.1.5 This Technical Report applies to onshore components and provides an overview of EMFs; guidelines pertaining to EMFs; how MHPGC Project onshore infrastructure has been designed with regard to EMF resulting in the anticipated negligible effect; and the Applicant's commitment to comply with EMF exposure public health protection standards guidelines.

2 EMFs

- 2.1.1.1 All electrical systems, including natural processes and living organisms generate EMF. Public exposure to power-frequency EMFs comes from a range of sources including household wiring and appliances, low-voltage distribution power lines or underground cables, and high-voltage transmission power lines or underground cables.
- 2.1.1.2 Typical residential exposure to power-frequency magnetic fields is in the range of 0.01 microtesla (μT) to 0.2 μT . Low-voltage distribution circuits, household wiring and electrical appliances are typically the main sources of residential exposure. Household appliances can sometimes generate higher magnetic fields, albeit typically for a short duration while in use. Examples of magnetic field strengths from household appliances in operation are 6 μT to 2,000 μT at 3cm distance from a hairdryer in use, or 2 μT to 20 μT at 30cm from a vacuum cleaner or microwave.
- 2.1.1.3 The earth's natural (static) magnetic field varies between about 30 μT at the equator and 60 μT in high latitudes and is approximately 50 μT in the UK. The earth's static atmospheric electric field at ground level is normally about 100 volts per meter (Vm^{-1}) in fine weather and may rise to many thousands of volts per metre during thunderstorms.
- 2.1.1.4 The strength of the magnetic field decreases rapidly horizontally and vertically with distance from source. EMF effects diminish rapidly with distance, often requiring only a few metres, or less, to reach background levels. Objects such as trees, buildings and earth will reduce the strength further still.

3 EMF Public exposure guidelines and policy

- 3.1.1.1 Whilst there are no statutory regulations in the UK with regard to public exposure to EMF, the UK Government has adopted the following guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), 'ICNIRP Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic And Electromagnetic Fields (1-100 kHz)' (ICNIRP, 2010), that updates the, 'ICNIRP Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic And Electromagnetic Fields (Up To 300 GHz)' (ICNIRP, 1998).
- 3.1.1.2 These guidelines, specify reference levels that should not be exceeded to ensure public health protection, taking into account various scenarios and potentially more vulnerable groups.
- 3.1.1.3 National Policy Statement (NPS) for Energy (EN-5) sets out the UK Government's policy for Electricity Networks Infrastructure (Department Energy Security & Net Zero (DESNZ), 2025). Paragraph 2.9.50 in reference to the ICNIRP guidelines states:
- 3.1.1.4 *"The reference levels are such that compliance with them will ensure that the basic restrictions are not reached or exceeded. Exceeding the reference levels does not necessarily mean that the basic restrictions will not be met; this would be a trigger for further investigation into the specific circumstances".*
- 3.1.1.5 The Applicant consideration of EMF-related requirements in NPS EN-5 is presented in **Table 3.1**.
- 3.1.1.6 In 2012, the then UK Government's Department of Energy and Climate Change, now DESNZ, published, 'Power Lines: Demonstrating compliance with EMF public exposure guidelines- A voluntary Code of Practice' (Department of Energy and Climate Change (DECC), 2012). The public health protection guideline reference level specified in this document for power frequency magnetic field exposure is 360µT and for electric field exposure it is 9kVm⁻¹.
- 3.1.1.7 The Applicant will comply with both the ICNIRP guidelines (2010, 1998) and the UK Government's voluntary Code of Practice on public exposure guidelines.

Table 3.1: Summary of the NPS EN-5 policies relevant to this annex

Summary of relevant NPS EN-5 provisions	How and where considered in the PEIR
NPS EN-5	
EN-5 Paragraph 2.11.9: This NPS does not repeat the detail of the ICNIRP 1998 guidelines on restrictions or reference levels. The government has developed with the electricity industry a Code of Practice, 'Power Lines: Demonstrating compliance with EMF public exposure guidelines – a voluntary Code of Practice', published in February 2011 that specifies the evidence acceptable to show compliance with ICNIRP 1998 guidelines and is also in line with the terms of the 1999 EU Council Recommendation on EMF exposure.	The MHPGC Project will adopt the ICNIRP guidelines (2010, 1998) and the UK Government's voluntary Code of Practice on EMF public exposure (DECC, 2012).
EN-5 Paragraph 2.11.12: Where the applicant cannot demonstrate that the line will be compliant with the Electricity Safety, Quality and Continuity Regulations 2002, with the exposure guidelines as specified in the Code of Practice on compliance, and with the policy on phasing as specified in the Code of Practice on optimal phasing then the Secretary of State should not grant consent.	The MHPGC Project will be compliant with Electricity Safety, Quality and Continuity Regulations 2002.

Summary of relevant NPS EN-5 provisions	How and where considered in the PEIR
EN-5 Paragraph 2.11.13: Undergrounding of a line would reduce the level of EMFs experienced, but high magnetic field levels may still occur immediately above the cable. It is the government's policy that power lines should not be undergrounded solely for the purpose of reducing exposure to EMFs.	As detailed in the Volume 1, Chapter 2: Project Description, of the PEIR , the Applicant has committed to undergrounding the entire onshore export cable route and the Alternating Current (AC) connection cables (CoT27) to minimise potential impacts on local communities and avoid, where possible, key environmental and engineering constraints. It can be confirmed that the power lines are not to be undergrounded solely for the purpose of reducing exposure to EMFs. Furthermore, the MHPGC Project will adopt the ICNIRP guidelines (2010,1998).
EN-5 Paragraph 2.11.14: In order to avoid unacceptable adverse impacts of EMFs from electricity network infrastructure on communication, navigation and surveillance infrastructure, the Secretary of State will take account of statutory technical safeguarding zones defined in accordance with Planning Circular 01/03, or any successor, when considering recommendations for DCO applications. More detail on this issue can be found in Section 5.5 of EN-1.	Impacts to aviation (military and civil) and radar associated with the MHPGC Project are considered insignificant and scoped out of assessment in the PEIR and Environmental Statement (ES) in accordance with the PINS Scoping Opinion (ID 5.3.1, ID 5.3.2, ID 5.3.3, ID 5.3.4, ID 5.3.5, ID 5.3.6) and MD-LOT Scoping Opinion (Section 5.15.2). There are no safeguarded assets designated within Durham County Council's administrative area (as referenced in Planning Circular 01/2003) and therefore there is no need to take further consideration of this matter.
EN-5 Paragraph 2.11.15: Where a statutory consultee on the safeguarding of technical facilities identifies a risk that the EMF effect of electricity network infrastructure would compromise the effective and safe operation of such facilities, the potential impact and siting and design alternatives will need to have been fully considered as part of the application.	Justification for the location of the MHPGC Project, including the design and/or environmental constraints considered is provided in Volume 1, Chapter 3: Site Selection and Consideration of Alternatives, of the PEIR .

- 3.1.1.8 In 2020, the ICNIRP published "2020: Guidelines for limiting exposure to electromagnetic fields (100 kHz to 300 GHz)". The MHPGC Project infrastructure is categorised as Extremely Low Frequency (ELF) elements (1Hz and 3kHz). The 2020 guidelines are, therefore, not concerned with the frequencies relevant to the MHPGC Project power transmission infrastructure.

4 Consultation

- 4.1.1.1 A Scoping Report for the MHPGC Project was issued to the Planning Inspectorate (PINS) and Marine Directorate Licensing Operations Team (MD-LOT) in February 2025 (RPS, 2025). Following consultation with the appropriate statutory bodies, PINS (on behalf of the Secretary of State (SoS)) and MD-LOT both provided Scoping Opinions in March 2025 (PINS, 2025; MD-LOT, 2025, respectively).
- 4.1.1.2 The Environmental Impact Assessment (EIA) Scoping Report proposed that the construction and decommissioning stages, and operational infrastructure are unlikely to generate significant levels of radiation, including EMF, and the infrastructure would be designed to reduce EMF emissions, comply with current guidance, or be inaccessible to the general public. Therefore on this basis it was scoped out for all phases of the MHPGC Project. The PINS response therefore agrees that the actual effects of EMF can be scoped out of further assessment (in accordance with the PINS Scoping Opinion ID 5.2.18). Only the PINS scoping remains relevant to this document as it solely considers EMF issues relating to onshore infrastructure.
- 4.1.1.3 However, in line with good practice the Applicant has made the following commitment, CoT02, (see **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR**):
- 4.1.1.4 *An EMF Compliance Statement will be prepared and submitted with the application for development consent. The Applicant will design the MHPGC Project to ensure compliance with relevant electromagnetic field (EMF) exposure public health protection standards, where appropriate, as specified in the International Commission on Non-ionizing Radiation Protection (ICNIRP) publication 'Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic And Electromagnetic Fields (Up To 300 Ghz) (ICNIRP,1998)', 'Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic And Electromagnetic Fields (1-100 kHz)' (ICNIRP, 2010), and the Department for Energy and Climate Change publication 'Power Lines: Demonstrating compliance with EMF public exposure guidelines A voluntary Code of Practice (2012).*
- 4.1.1.5 This annex seeks to provide further detail on this topic, including the commitment to comply with EMF exposure public health protection standards guidelines set out in **Section 3**, above and in **Volume 4, Chapter 2: Human health, of the PEIR**.

5 MHPGC Project onshore electricity infrastructure

- 5.1.1.1 The onshore transmission infrastructure associated with the MHGPC Project, specifically the Onshore Export Cable and the AC Connection Cables will generate EMFs when in operation. These will comply with the guidelines discussed in **Section 3**, above. The onshore electrical infrastructure would not be energised during construction or decommissioning (no electricity transmitted) and therefore there would be no EMFs generated at those times.
- 5.1.1.2 The Applicant has made the following commitment, CoT27, (see **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR**):
- 5.1.1.3 *The onshore export cables and the AC connection cables will be completely buried underground for the entire length of the cable route. No overhead pylons will be installed as part of the MHPGC Project.*
- 5.1.1.4 The onshore export cables will run from the Transition Joint Bay (TJB) to the onshore LSS Location. The AC connection cables will run from the LSS to the National Grid Hawthorn Pit Substation.
- 5.1.1.5 At the PEIR stage, optionality is retained with respect to the location of the LSS, with either the Blue LSS Search Area (adjacent to the A19) or Green LSS Search Area (adjacent to the Jade Business Park) presented. These are described in **Volume 1, Chapter 2: Project Description, of the PEIR**. The options will be refined to a LSS location prior to the application for development consent. The AC Connection Cable represents the principal source of operational EMF. While the High Voltage Direct Current (HVDC) Onshore Export Cable also generates magnetic fields, it comprises a symmetrical monopole arrangement in which equal and opposite currents flow in adjacent conductors, resulting in substantial field cancellation. Consequently, the High Voltage Alternating Current (HVAC) connection cable section is expected to generate higher power-frequency EMF levels than the HVDC cable section. On that basis it is considered that the Maximum Design Scenario (MDS) is that associated with the longest AC Connection Cable route. This arises with the Blue LSS Search Area, due to the greater length of AC connection cable (4.26km) required to the Point of Interconnection with the National Grid.
- 5.1.1.6 Each trench would have a typical depth of approximately 1.8m. Greater burial depths may be required where the route crosses existing infrastructure, such as utilities, or where dictated by site-specific ground conditions.
- 5.1.1.7 The cables would not produce an external EMF at ground level due to the shielding of the cable sheath and burial material.

6 Conclusion

- 6.1.1.1 The Applicant made the decision to underground all onshore electrical cables. As a result, the EMFs they produce are not capable of reaching levels which exceed the public health exposure guideline limits.
- 6.1.1.2 Whilst detailed design and EMF modelling have not yet been completed, as per **Volume 1, Chapter 2: Project Description, of the PEIR**, the magnetic field strength of the cables would be compliant with the international public exposure guideline level of below 360µT. Accordingly, EMF exposure is not expected to pose a risk to public health.
- 6.1.1.3 The Applicant has committed (see **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR**) in CoT02 that in line with NPS EN-5, all onshore electricity infrastructure built as part of the MHPGC Project will be designed to comply with both the ICNIRP (2010, 1998) guidelines and UK Government's voluntary Code of Practice (DECC, 2012) on levels of public exposure, to ensure the threshold for impacts to humans is not met and or exceeded. The Applicant has also made the commitment (CoT27) that the onshore export cable and AC connection cable will be completely buried along the entire route.

7 References

Department for Energy and Climate Change (2012). Power Lines: Demonstrating compliance with EMF public exposure guidelines- A voluntary Code of Practice. Available at:

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ICNIRP. (1998). ICNIRP Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (Up To 300 GHz). International Commission. Available at: [ICNIRPemfgdl.pdf](#) (Accessed: July 2026).

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