MachairWind Offshore Windfarm

Appendix 19.2 Blue Carbon Assessment

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GLOSSARY OF ACRONYMS

Term	Definition
CEA	Cumulative Effects Assessment
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
DDV	Drop-Down Video
ECC	Export Cable Corridor
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EUNIS	European Nature Information System
GHG	Greenhouse Gas
GIS	Geographic Information System
GW	Gigawatts
IAC	Inter-Array Cable
IC	Inorganic Carbon
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
MarLIN	Marine Life Information Network
O&M	Operation and Maintenance
OAA	Option Agreement Area
OC	Organic Carbon
OnTDA	Onshore Transmission Development Area
OSP	Offshore Substation Platform
UK	United Kingdom
UXO	Unexploded Ordnance
WDA	Windfarm Development Area
WTG	Wind Turbine Generator

GLOSSARY OF TERMS

Term	Definition
Blue carbon	The term for carbon captured by the world's ocean and coastal ecosystems.
Blue carbon assessment	Assessment of the potential impacts of the WDA infrastructure and associated activities on blue carbon habitats and the release of stored carbon, or changes to carbon sequestration rates caused by disturbance or loss of seabed habitat / sediments.
Blue carbon habitat	Coastal and marine ecosystems that capture, store, and sequester organic carbon
Cable protection	Protective measures to minimise the effects of scour and hazards along the offshore cables (e.g. to prevent cable exposure or snagging of vessel anchors or fishing gear), as well as for protecting these cables at infrastructure crossing points.
Carbon stock	The total amount of carbon stored within an ecosystem at a specific point in time.
Cumulative Effects Assessment	Assessment of likely significant effects resulting from the incremental change caused by other past, present and reasonably foreseeable projects / activities together with the Project. This is separate to combined effects arising between the Project's separate Development Areas.
Development Area	Application boundary for consenting purposes which, for the Project, consists of a Windfarm Development Area, Offshore Export Cable Corridor, and Onshore Transmission Development Area. Separate consent and marine licence applications will be submitted for each Development Area where applicable.
Embedded mitigation measure	Mitigation measures, including industry good practice measures, that are directly incorporated into the design for the MachairWind Windfarm Development Area to avoid or reduce environmental effects.
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed development over and above the existing circumstances (or 'baseline').
Environmental Impact Assessment (EIA) Regulations	A collective term referring to The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Greenhouse gas	A gas in the Earth's atmosphere that traps heat by absorbing and emitting infrared radiation, a process known as the greenhouse effect. Also known by the collective shorthand "carbon".
Inter-array cables (IACs)	Armoured cable containing electrical and fibre optic cores which link the wind turbine generators to each other and to the offshore substation platform(s).
Landfall	The area from Mean Low Water Springs to a transition bay(s), where the offshore export cable(s) come ashore.
MachairWind Offshore Windfarm	An offshore windfarm capable of exporting around 2 GW of renewable energy to the National Electricity Transmission System. MachairWind Offshore Windfarm comprises three Development Areas: • The Windfarm Development Area (WDA) – located on the west coast of Scotland to the northwest of Islay and west of Colonsay; • The Offshore Export Cable Corridor – a preliminary boundary extending from the WDA to mean high water springs at a landfall location near Girvan, South Ayrshire; and • The Onshore Transmission Development Area – a preliminary boundary which extends landward from mean low water springs and includes the land required for the landfall of the offshore export cable(s) and their route up to but not including the proposed high voltage direct current switching station which will be developed and constructed by Transmission Owner, ScottishPower Transmission. Separate consent and licence applications will be submitted for each Development Area.

Term	Definition
Mean High Water Springs (MHWS)	The average, over a year, of the heights of two successive high waters during those periods of 24 hours (once every fortnight) when the range of the tide is greatest.
Mean Low Water Springs (MLWS)	The average, over a year, of the heights of two successive low waters during those periods of 24 hours (once every fortnight) when the range of the tide is greatest.
Offshore cables	The collective term for all offshore cables i.e. IACs, offshore substation platform link cables, offshore export cables and associated fibre optic cables.
Offshore ECC infrastructure	The offshore transmission infrastructure located within the boundary of the Offshore Export Cable Corridor, namely the offshore export cable(s).
Offshore export cable	Armoured cable containing electrical cores between the offshore substation platform(s) and landfall. Offshore export cables will include bundled fibre optic cables. The offshore export cables are subject to Marine Licence applications under the Marine (Scotland) Act 2010. The portion of the offshore export cable(s) located within the WDA is assessed as part of this MachairWind WDA EIA and a marine licence application to construct, alter or improve this portion has been submitted alongside the WDA application. A separate marine licence application will be submitted for the portion of the offshore export cable(s) from the WDA boundary to mean high water Mean High Water Springs.
Offshore Export Cable Corridor (ECC)	The preliminary boundary extending from the WDA to mean high water springs near Girvan, South Ayrshire and within which the offshore export cable(s) will be located. A separate marine licence application will be submitted for the offshore export cable(s) located within the Offshore ECC.
Offshore Substation Platform (OSP)	An offshore platform with a fixed foundation located within the WDA which houses electrical equipment such as transformers, switchgear, protection and control systems, and enables the windfarm's renewable electricity to be collected via inter-array cables and exported to the National Electricity Transmission System via offshore export cables.
Offshore Substation Platform (OSP) link cables	Electrical cables which link OSPs (if more than one OSP is required). These cables will include fibre optic cores or bundled fibre optic cables. OSP link cables will be wholly located within the WDA.
Onshore Transmission Development Area (OnTDA)	The preliminary boundary which extends landward from mean low water springs and includes the land required for the landfall of the offshore export cable(s) and their route up to but not including the proposed high voltage direct current switching station which will be developed and constructed by Transmission Owner, ScottishPower Transmission. This Transmission Owner is responsible for consenting the high voltage direct current switching station. Onward connections to the National Electricity Transmission System will be consented by National Grid Electricity Transmission and ScottishPower Transmission. Where relevant, these are considered as part of cumulative effects assessment in the EIA. The Transmission Owner is responsible for consenting the high voltage direct current switching station and onwards connections to the National Electricity Transmission System. Where relevant, these are considered as part of cumulative effects assessment in the EIA.
OnTDA infrastructure	The onshore transmission infrastructure, for which the Applicant is responsible, that is located primarily within the OnTDA, up to mean low water springs, and includes but is not limited to: landfall(s), onshore export cables, transition joint bays, telecom/SCADA infrastructure including vehicular access, joint bays, link boxes and temporary construction compounds. The OnTDA infrastructure will be subject to a planning application under the Town and Country Planning (Scotland) Act 1997.
Operational life	The operational life is the expected length of time from final commissioning of the WDA until the cessation of commercial operations. This is anticipated to be 35 years.

Term	Definition
Option Agreement Area (OAA)	The seabed area awarded to ScottishPower Renewables in January 2022 through the Scotwind leasing round.
Scour protection	Protective measures to avoid sediment being eroded away from the base of the wind turbine generator foundations as a result of the flow of water.
The Project	MachairWind Offshore Windfarm including all its Development Areas and associated infrastructure.
WDA infrastructure	The offshore generation and transmission infrastructure located within the WDA including but not limited to: WTGs, WTG fixed foundations (and associated scour protection), OSP(s), OSP fixed foundations (and associated scour protection), IACs, OSP link and offshore export cable(s) and their associated external cable protection (insofar as these are located within the WDA) and fibre optic cables.
Wind Turbine Generator (WTG)	A wind turbine generator which converts wind energy into electrical energy. Each wind turbine generator is a complex system composed of a high number of components. Typically, the main components include the rotor assembly (composed of three blades and a hub); the nacelle (containing a generator, shaft and gearbox, power electronic converter and transformer); and the tower (containing lifting equipment and the switchgear).
Windfarm Development Area (WDA)	The application boundary within the OAA where consent will be sought for the proposed WDA infrastructure. The WDA infrastructure is subject to Section 36 consent and marine licence applications (generation and transmission) which are being applied for separately from the Offshore ECC infrastructure and OnTDA infrastructure.

1 BLUE CARBON ASSESSMENT

1.1 INTRODUCTION

1. This appendix presents the Blue Carbon Assessment for the MachairWind Windfarm Development Area (WDA) and its associated infrastructure, which assesses the potential effects on blue carbon habitats and the release of stored carbon caused by disturbance or loss of seabed habitat/sediments. This appendix should be read in conjunction with **Chapter 19 Greenhouse Gas (GHG) Assessment**.

1.2 CONSULTATION

2. The Applicant consulted with NatureScot and MD-LOT via email on the underlying methodology for the Blue Carbon Assessment on 27 November 2025. MD-LOT had no comments on the methodology. Feedback received from NatureScot, and the Applicant's response to that feedback, is provided in **Table 1.1** below.

Table 1.1 Feedback received from NatureScot regarding the blue carbon assessment methodology

ID	NatureScot Comment	Applicant Response
1	*Study area* It states within the technical note that the blue carbon assessment will use outputs from the benthic ecology chapter to characterise the blue carbon habitats and types of sediment within the WDA. We advise that the study area for the blue carbon assessment should be the same as the study area for the benthic ecology assessment and that the blue carbon assessment should expand on the information and assessment conducted for benthic ecology, as well as making links to the physical processes chapter where appropriate.	The Study Area for the Blue Carbon Assessment is confined to the WDA as described in **Section 1.3.1.** While the benthic ecology Study Area presented in **Chapter 8 Benthic Ecology** was defined by a tidal excursion extending in all directions from the WDA based on publicly available information, the Blue Carbon Assessment is limited to the WDA to align with the specific scope of the assessment, which is focused solely on the WDA.
2	*Baseline characterisation* It is noted that site-specific benthic survey data, along with publicly available datasets and scientific literature, will be used to establish the current extent and state of blue carbon ecosystems. This will involve mapping and quantifying the existing carbon stocks in both the habitats and underlying sediment – we are content with this approach.	The Applicant acknowledges NatureScot's agreement with the proposed approach for the use of site-specific benthic survey data. The baseline information used to inform the Blue Carbon Assessment is outlined in **Section 1.4.**
3	*Assessment approach* In relation to the construction phase, it is noted that the assessment will consider the proposal's impact on blue carbon habitats and release of blue carbon quantitatively, with the operational and maintenance phase and decommissioning phase impacts assessed qualitatively – we are content with this approach. For mapping and quantifying existing carbon stocks in the underlying sediment, we advise that (OC) Smeaton et al. (2020) OC density values by Folk sediment type should be used, in combination with the site-specific benthic survey data. We acknowledge that Table 5 in Smeaton et al. (2020) includes OC densities collected from inshore and fjordic sediments, so these samples are likely to have skewed the averages to be higher than likely for offshore sediments.	The methodology applied for the Blue Carbon Assessment is outlined in **Section 1.3.3**. In line with the approach proposed to NatureScot, the construction phase assessment includes a quantitative assessment of potential impacts on blue carbon habitats and associated blue carbon release. Additionally, for the decommissioning phase, potential impact has been assessed qualitatively. However, for the operation and maintenance (O&M) phase, a quantitative assessment was undertaken. This represents a refinement of the approach previously presented to NatureScot through consultation. The change in approach reflects the availability of appropriate data and information about activities, enabling a quantitative assessment. For the quantification of existing carbon stock in the underlying sediments, OC density values have been used as advised by NatureScot. Additionally, the Blue Carbon Assessment has utilised tables to present information

ID	NatureScot Comment	Applicant Response
	We advise that the assessment should be transparent and use tables where appropriate to clearly display the quantitative breakdown for calculating total carbon stocks over areas / extents of different sediment types. Carbon densities vary with sediment type so where data is available to suggest variable sediment type, the associated carbon density will change. Most sedimentary carbon stocks are calculated for the surficial 10 cm as this is where the majority of the evidence has been collected to date. However, assessments should also acknowledge that there will be additional disturbance to carbon that is buried deeper from foundations etc. The vulnerability and recoverability of blue carbon should be considered when assessing the sensitivity, magnitude and overall significance of any impact. In general, we have assessed that *'The receptor is deemed to be of high vulnerability, low recoverability, and high value. The sensitivity of the receptor is therefore, considered to be high'.* This is because sediment accumulation on the seabed can be very low and therefore recovery is slow. In addition, we advise that for conversion of carbon stocks to CO_2 emissions, a factor of 3.67 should be used. It is not appropriate for inorganic carbon (IC) stocks to be converted to CO_2 emissions. Regarding the decommissioning phase, it is noted that although the decommissioning strategy is unknown at this stage, it is anticipated that all infrastructure above the seabed, except for scour protection and cable protection will be removed where feasible. Just to highlight the current policy position in Scotland whereby there is a presumption for full removal of all infrastructure.	where appropriate. **Section 1.3.4.2.4** outlines that consideration for the sedimentary carbon stock in the top 10 cm and also acknowledges the potential for additional disturbance to carbon buried deeper as advised. The vulnerability and recoverability of blue carbon have been considered in the Blue Carbon Assessment as outlined in **Section 1.3.4.2.1.** As outlined in **Section 1.5.2.1.2,** to convert carbon stocks to carbon dioxide (CO_2) emissions, a factor of 3.67 has been used by multiplying the value of carbon stock loss for OC (OC) by 44/12 to convert to units of CO_2 equivalent (CO_2e). For the decommissioning phase, **Section 1.5.4** highlights the current anticipated approach, which is in line with NatureScot's guidance.
4	Cumulative impacts We advise that the assessment should consider the cumulative impacts of disturbance from other projects, including on longer-term carbon buried deeper.	As outlined in **Section 1.6,** cumulative assessment for blue carbon was not considered to be required based on the conclusions in Section 8.12 of **Chapter 8 Benthic Ecology**.

1.3 SCOPE OF THE ASSESSMENT

1.3.1 Study Area

3. The Study Area for the Blue Carbon Assessment is limited to the WDA. The WDA covers a 448 km^2 area located off the west coast of Scotland. The MachairWind Offshore Windfarm including all of its Development Areas and associated infrastructure (the Project), including the Offshore Export Cable Corridor (ECC) and Onshore Transmission Development Area (OnTDA) are outside the scope of this Blue Carbon Assessment and will be considered separately in their individual Environmental Impact Assessment (EIA) Reports (EIAR) where applicable.

4. The Blue Carbon Assessment considers the following:

- The impact of the WDA infrastructure on blue carbon habitats; and
- The release of emissions associated with the disturbance of sediments resulting in the release of blue carbon.

5. The key components of the WDA infrastructure are set out in **Chapter 3 Project Description**. The infrastructure listed in **Section 1.3.4.2** has the potential to disturb the seabed and habitats containing blue carbon, and therefore the installation of this infrastructure was considered as part of the assessment.

1.3.2 Realistic Worst-Case Scenario

6. The realistic worst-case scenarios for the Blue Carbon Assessment are summarised in **Table 1.2**. These scenarios are based on the design of the WDA as described in **Chapter 3 Project Description**.

Table 1.2 Realistic worst-case scenarios for blue carbon impacts on climate change

Impact	Realistic Worst-Case Scenario	Rationale
Construction		
Blue carbon loss	**<u>Temporary Physical Disturbance and Habitat Loss</u>** **Seabed preparation disturbance area prior to foundation installation (Wind Turbine Generators (WTGs) and Offshore Substation Platforms (OSPs)) = 1,590,956 m^2** Worst-case WTG foundation type for total area = suction bucket jacket Worst-case OSP foundation type for total area = gravity base structure (GBS) Maximum number of WTGs = 144 Maximum number of OSPs = 2 Maximum area of seabed preparation per WTG = 10,677.78 m^2 Maximum area of seabed preparation for total WTG foundations = 1,537,600.32 m^2 Maximum area of seabed preparation per OSP = 26,678 m^2 Maximum area of seabed preparation for total OSP foundations = 53,356 m^2 Maximum footprint area of preparation for all foundations = 1,590,956 m^2 **Offshore cables temporary disturbance = 15,140,000 m^2** Maximum seabed route length of inter-array cables (IAC) trenches = 521 km Maximum length of OSP link cable trenches = 136 km Maximum length of offshore export cable route trenches (within the WDA) = 100 km Maximum total length of all offshore cable trenches = 757 km Maximum width of seabed affected during cable installation (including spoil heaps) = 20 m	The blue carbon loss related to the total area of physical disturbance and habitat loss, caused by seabed preparation and installation of infrastructure on and in the seabed. There is uncertainty regarding the remineralisation potential for the potentially disturbed sediment. Therefore, although all disturbed blue carbon reserves have remineralisation potential, a conservative estimate has been taken.

Impact	Realistic Worst-Case Scenario	Rationale
	Maximum total footprint of temporary seabed disturbance from installation of all offshore cables within the WDA = 15,140,000 m2 **Construction vessel footprints = 630,720 m^2** Jack-up vessel footprint – WTG and OSP installation: 3,600 m^2 footprint per WTG (x 144) and OSP installation (x 2) = 525,600 m^2 Anchoring footprint – WTG and OSP installation: 360 m^2 footprint per WTG (x 144) and OSP (x 2) installation x 2 for maximum number of operations per foundation installation = 105,120 m^2 **Sandwave levelling = 8,023,400 m^2** Total area disturbed during sandwave levelling / dredging (m^2) for IACs = 8,023,400 m^2 **Total temporary seabed disturbance/loss footprint from seabed preparation for WTG/OSP foundations, offshore cable installation and sandwave levelling = 25,385,076 m^2** **Permanent Habitat Loss** Maximum footprint of suction bucket jacket WTG foundations including scour protection = 5,496,530.51 m^2 (38,170.35 m^2 x 144 WTGs) Maximum footprint area for two OSP GBS foundations including scour protection = 270,000 m^2 Maximum cable trench lengths: • IAC = 521 km (based on seabed route length) • OSP link trenches = 136 km • Offshore export cable trench lengths in the WDA = 100 km Offshore cable protection width for all offshore cables where cables are unable to be buried due to ground conditions or for IACs on approach to WTGs = 13 m	

Impact	Realistic Worst-Case Scenario	Rationale
	Maximum IAC protection area (ground conditions) = 677,300 m^2 Maximum IAC protection (unburied cable on approach to WTG) = 93,600 m^2 Maximum IAC protection (combined ground conditions and unburied cable on approach to WTG) = 770,900 m^2 Maximum offshore export cable protection area within the WDA due to ground conditions = 65,000 m^2 Maximum OSP link cable protection area (unburied cable) = 176,800 m^2 Maximum OSP link cable protection area (crossings): • Maximum width of cable protection at crossings = 18 m • Maximum length of cable protection at crossings = 250 m per crossing • Maximum number of OSP link cable crossings required = 2 • Maximum area of OSP link cable crossing protection = 9,000 m^2 Maximum area cable protection material (all sources) for OSP Link cables = 185,800 m^2 Total area of cable protection within WDA for all offshore cables = 1,021,700 m^2 **Total worst-case area subject to permanent habitat loss = 6,788,230.51 m^2**	
O&M		
Blue carbon loss	Cable Repair / Replacement • Assuming a maximum 5 m jetting disturbance width for all repair / replacement and reburial events. • IAC repair / replacement: Assuming 10 repair / replacement events over 35-year operational life with 10,000 m of cable replaced per event = total IAC repair / replacement footprint of 500,000 m^2 • OSP Link Cables repair / replacement: Assuming 4 repair / replacement events over 35-year operational life with 1,000 m of cable replaced per event = total OSP Link Cables repair / replacement footprint of 20,000 m^2 • Offshore export cable(s) (within the WDA) repair / replacement: Assuming 2 repair / replacement events over 35-year operational life with 2,000 m of cable replaced per event = total offshore export cable(s) (within the WDA) repair / replacement footprint of 20,000 m^2 Cable Reburial • Assuming a maximum 5% of the length of each cable could require reburial over the 35-year operational life. • Assuming a maximum 5 m jetting disturbance width for all repair / replacement and reburial events;	The blue carbon loss is related to the total area of temporary physical disturbance and habitat loss caused by vessel activity and cable repair, replacement and reburial associated with O&M. There is uncertainty regarding the remineralisation potential for the potentially disturbed sediment. Therefore, although all disturbed blue carbon reserves have remineralisation potential, a conservative estimate has been taken.

Impact	Realistic Worst-Case Scenario	Rationale
	• IAC reburial: Assuming 28,600 m of cable reburied over 35-year operational life = total IAC reburial footprint of 143,000 m² • OSP link cables reburial: Assuming 6,800 m of cable trench reburied = total OSP link cables reburial footprint of 34,000 m² • Offshore export cable(s) (within the WDA) reburial: Assuming 5,000 m of cable trench reburied over 35-year operational life = total offshore export cable(s) (within the WDA) reburial footprint of 25,000 m² <u>Jack-up Vessel Footprints</u> • Anticipated number of jack-up events over 35-year operational life = 292. • Jack-up vessel footprint = 1,800 m². • One jack-up event per maintenance activity. • Total footprint = 525,600 m² <u>Totals</u> • Cable repair or replacement = 540,000 m² • Cable remedial reburial = 202,000 m² • Jack-up vessel footprint = 525,600 m² • Overall, assuming a maximum of 1,267,600 m² of cable repaired/replaced and reburied and jack-up vessel footprints over the 35-year operational life **Maximum area disturbed per year on average = <u>36,217 m²</u>**	
Decommissioning		
Blue carbon loss	A decommissioning programme will be developed at a later stage. It is recognised that legislation and industry practices change over time. However, the decommissioning programme will consider relevant legislation, and existing good industry practice, as outlined in Section 3.6.15 of **Chapter 3 Project Description**. The worst-case scenario assumes the full removal of all above-seabed infrastructure (excluding scour protection and cable protection) and the removal of all offshore cables. However, the assessment of blue carbon during the decommissioning phase was undertaken qualitatively, as detailed in **Section 1.2.** The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed upon with the regulator.	Specific details and activity data surrounding decommissioning activities are not known at this stage. Information derived from literature is used in the absence of alternative data and is considered the best available data at the time of the assessment.

1.3.3 Assessment Methodology

1.3.3.1 Existing Data Sources

7. **Table 1.3** sets out the information and data sources that have been used to inform the Blue Carbon Assessment.

Table 1.3 Summary of key datasets and information sources used to inform Blue Carbon Assessment

Dataset	Description	Citation
NatureScot (previously Scottish Natural Heritage)	Assessment of Blue Carbon Resources in Scotland's Inshore Marine Protected Area Network.	Burrows, et al., 2017
NatureScot (previously Scottish Natural Heritage)	Assessment of Carbon Budgets and potential blue carbon stores in Scotland's coastal and marine environment.	Burrows, et al., 2014
NatureScot (previously Scottish Natural Heritage)	Scottish Blue Carbon – a literature review of the current evidence for Scotland's blue carbon habitats.	Cunningham & Hunt, 2023
Scottish Government	Re-Evaluating Scotland's Sedimentary Carbon Stocks.	Smeaton, et al., 2017
Smeaton et al.	Marine Sedimentary Carbon Stocks of the United Kingdom's Exclusive Economic Zone.	Smeaton, et al., 2021a
Smeaton et al.	Supporting documentation: Sediment type and surficial sedimentary carbon stocks across the United Kingdom's Exclusive Economic Zone and the territorial waters of the Isle of Man and the Channel Islands.	Smeaton, et al., 2021b
The Scottish Parliament and Scottish Natural Heritage's Blue Carbon Reports	Research on the blue carbon potential of Scotland's coastal and marine environment, including the carbon sequestration rate by habitats.	Scottish Parliament, 2021
The Wildlife Trusts, World Wide Fund, and the RSPB	The United Kingdom's Blue Carbon inventory: Assessment of Marine Carbon Storage and Sequestration Potential in the United Kingdom's (UK's) Seas (Including Within Marine Protected Areas).	Burrows, et al., 2024

1.3.3.1.1 Site-specific Survey Data

8. The Blue Carbon Assessment was informed by **Chapter 8 Benthic Ecology** and supported by site-specific survey data. This includes the third-party benthic survey outlined in **Appendix B Third-Party**

Benthic Subtidal Survey Interpretative Report (Briggs, 2024[1]) of the Scoping Report, which overlaps with the Option Agreement Area (OAA) which was submitted with the Project's Scoping Report. This survey was conducted to supplement the Project's site investigation survey data and has been used to characterise the WDA.

9. An additional site investigation survey was undertaken across the OAA by Fugro on behalf of the Project. The site investigation included geophysical surveys, grab sampling, transects of Drop-Down Video (DDV) and water samples for environmental DNA analysis. The outputs from this site investigation survey are outlined in Appendix C Contaminants Survey Report (Fugro, 2023a[2]), Appendix D MachairWind 2023 Benthic Characterisation Report (Fugro, 2023b[3]) and Appendix E Environmental DNA Survey Interpretative Report (Fugro, 2023c[4]) previously submitted alongside the Scoping Report.

10. In 2025, a geophysical survey was conducted and included deployment of a vessel-mounted multibeam echosounder for bathymetric data acquisition, towed side scan sonar, shallow sub-bottom profiler, magnetometry and high-resolution seismic acquisition. The 2025 geophysical survey report is outlined **Appendix 8.1 2025 Habitat Assessment Report**.

11. The survey data are supplemented by carbon figures from Smeaton et al. (2021b), which are discussed further in **Section 1.4.1.1.**

1.3.3.1.2 Assumptions and Limitations

12. The assumptions made in the Blue Carbon Assessment are set out in **Table 1.4**.

Table 1.4 Assumptions and limitations of the Blue Carbon Assessment

Assumption / Limitation	Further Detail / Discussion
Uncertainty regarding the remineralisation potential for the potentially disturbed sediment in the blue carbon assessment.	As not all disturbed blue carbon reserves have remineralisation potential, a worst-case scenario has been adopted, which assumes that 100% of disturbed sedimentary carbon ends up as CO_2 flow to the atmosphere.

1.3.4 Impact Assessment Methodology

1.3.4.1 Scope

13. **Table 1.5** sets out the impacts that have been scoped into and out of the WDA EIAR, in line with the Scoping Opinion.

[1] Appendix B - Third-Party Benthic Subtidal Survey
[2] Appendix C - Contaminants Survey Report
[3] Appendix D - MachairWind 2023 Benthic Characterisation
[4] Appendix E - Environmental DNA Survey Interpretative

Table 1.5 Potential impacts scoped in and out of the EIA for the Blue Carbon Assessment

Potential Impact	Construction		O&M		Decommissioning	
	WDA Scoping Report	WDA Scoping Opinion	WDA Scoping Report	WDA Scoping Opinion	WDA Scoping Report	WDA Scoping Opinion
Blue Carbon	x	✓*	x	✓*	x	✓*
*In the WDA Scoping Opinion, NatureScot advised that consideration should be given to blue carbon.						

1.3.4.2 Blue Carbon Assessment

14. The main threat to long-term carbon storage is any disturbance to sediment top layers, for example, installation of static IACs or foundations. Resuspension of sediment allows rapid consumption of buried carbon by organisms, reducing the carbon burial rate and blue carbon storage. The assessment has therefore been undertaken to assess the effects of the WDA infrastructure on blue carbon habitats and sediments, including:

- Direct blue carbon benthic habitat loss/disturbance as a result of WDA infrastructure; and
- Direct blue carbon loss through potential CO_2 emissions from disturbed sediments.

15. These impacts are likely a result of the following activities:

- Installation of:
  - WTGs and associated fixed foundations and scour protection;
  - OSPs and associated fixed foundations and scour protection;
  - IACs and associated cable protection;
  - OSP link cables and associated cable protection; and
  - The portion of the offshore export cable(s) located within the WDA, and associated cable protection.
- Seabed preparation (i.e. boulder clearance, unexploded ordnance (UXO) clearance and pre-sweeping).

16. It is acknowledged that the Applicant is exploring nature inclusive design and enhancement measures, as detailed in **Chapter 3 Project Description** and the **Nature Positive Plan**. The measures detailed in the **Nature Positive Plan** have the potential to lead to ecological benefits, including the potential for blue carbon capture and storage during the O&M phase of the WDA.

17. It is however worth noting that the worst-case scenario adopted to calculate GHG emissions from the decommissioning of the WDA infrastructure assumes the complete removal of all above-seabed infrastructure and cables. This has the potential result in habitat loss and disturbance of seabed sediments during the decommissioning phase. Therefore, any blue carbon storage benefits resulting from the implementation of nature inclusive design could be temporary if there is disturbance during decommissioning. Consequently, further consideration of the positive effect on blue carbon habitats and storage from the WDA over its lifetime is not considered in the assessment presented in **Section 1.5.**

1.3.4.2.1 Blue Carbon Habitats – Assessment Methodology

18. The Blue Carbon Assessment evaluates the potential loss of carbon sequestrating or donating habitats associated with each phase of the WDA infrastructure. The assessment builds upon the methodology and results presented in **Chapter 8 Benthic Ecology,** the 2025 geophysical survey

outlined in Appendix **8.1 2025 Habitat Assessment Report** and outputs from the third-party survey and site-specific surveys detailed in **Section 1.3.3.1.1**.

19. The assessment was informed by data in the Marine Life Information Network (MarLIN) database, which offers comprehensive data on UK marine species and habitats. It provides detailed information on species distribution, sensitivity, and ecology, which helps assess the impacts of offshore activities. Information from the third-party benthic survey outlined in **Appendix 8.1 2025 Habitat Assessment Report,** provided details on the sediment types identified in the WDA. Sediment types are compared to literature that evaluates Scotland's sedimentary carbons stocks (Smeaton et al., 2020) to identify potential blue carbon habitats.

1.3.4.2.2 Definitions of Sensitivity and Magnitude

20. The assessment combines the sensitivity of each identified blue carbon habitat (the receptors) with the impact magnitude to determine the overall significance of effect. Sensitivity and magnitude criteria have been derived using professional judgement and the MarLIN database, as detailed in **Table 1.6** and **Table 1.7.**

21. The sensitivity of a receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected, and is defined by the following factors:

- Adaptability – the degree to which a receptor can avoid, adapt to or recover from an effect.
- Tolerance – the ability of a receptor to accommodate temporary or permanent change.
- Recoverability – the temporal scale over which and extent to which a receptor will recover following an effect.

Table 1.6 Definition of sensitivity levels for Blue Carbon Assessment

Sensitivity	Definition
High	Receptor has very limited or no capacity to accommodate physical or chemical changes or influences, with a low ability to recover or adapt. The receptor has a very high carbon stock or sequestration rates.
Medium	Receptor has a limited or low capacity to accommodate physical or chemical changes or influences, with a low ability to recover or adapt. The receptor has a moderate carbon stock or sequestration rates.
Low	Receptor has a limited tolerance to accommodate physical or chemical changes or influences or will be able to recover or adapt. The receptor has a low carbon stock or sequestration rates.
Negligible	Receptor is generally tolerant of and can accommodate physical or chemical changes or influences, without the need to recover or adapt. The receptor has a negligible carbon stock or sequestration rates.

22. The magnitude and probability of an impact occurring is established through consideration of:

- Scale or spatial extent (small scale to large scale or a few individuals to most of the population);
- Duration (short term to long term);
- Likelihood of impact occurring;
- Frequency; and
- Nature of change relative to the baseline.

Table 1.7 Definition of magnitude levels for the Blue Carbon Assessment

Sensitivity	Definition
High	The impact occurs over a large spatial extent, resulting in widespread, long-term, or permanent changes in baseline conditions. It is very likely to occur and/or will occur at a high frequency or intensity, leading to the loss of resource and/or quality of the resource and permanent or irreplaceable change, which is likely to occur.
Medium	The impact occurs over a local to medium extent with a short- to medium-term change to baseline conditions. It is likely to occur at a moderate frequency or intensity, leading to a minor loss of, or alteration to, a resource and/or quality of the resource. This results in a long-term but reversible change, that is likely to occur.
Low	The impact is localised and short-term, leading to a detectable change in baseline conditions or a noticeable effect on a small proportion of a receptor population. It is unlikely to occur or may occur at a low frequency or intensity, resulting in a very minor loss of, or alteration to, a resource and/or quality of the resource. This causes a noticeable short- to medium-term but reversible change, that could possibly occur.
Negligible	The impact is highly localised and short-term, with full rapid recovery expected, resulting in very slight or imperceptible changes to baseline conditions. It is very unlikely to occur; if it does, it will be at a very low frequency or intensity. This leads to a temporary or intermittent very minor loss of, or alteration to, a resource and/or quality of the resource. The change is short-term, intermittent, and reversible, and is unlikely to occur.

23. The magnitude levels for assessment on blue carbon habitats are determined based on the impacts assessed in **Chapter 8 Benthic Ecology**.

1.3.4.2.3 Effect Significance

24. The potential significance of an effect is determined by combining the predicted magnitude of the impact with the sensitivity of the receptor, as defined in **Table 1.8** and **Table 1.9**, respectively of **Chapter 5 EIA Methodology**. Impacts are considered to be significant in the context of EIA regulations if they are assessed as ‘moderate’ or above. The blue carbon impact assessment matrix and effect significance description are shown in **Table 1.8** and **Table 1.9,** respectively.

Table 1.8 Blue Carbon impact assessment matrix

Sensitivity	Adverse Magnitude			
	High	Medium	Low	Negligible
High	Major	Major/Moderate	Moderate	Minor
Medium	Moderate/Major	Moderate	Minor/Moderate	Minor
Low	Moderate	Minor/Moderate	Minor	Negligible/Minor
Negligible	Minor/Moderate	Minor	Negligible/Minor	Negligible

Table 1.9 Definitions of effect significance

Effect Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level.

Effect Significance	Definition
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.

1.3.4.2.4 Blue Carbon Loss – Assessment Methodology

25. The assessment also identifies and, where possible, quantifies the blue carbon stock that may be lost or disturbed as a result of the construction of the WDA infrastructure and activities such as cable repair and reburial during the O&M phase.

26. The calculations for the release of blue carbon from disturbed sediments have been undertaken using a combination of publicly available data and scientific literature (i.e. Smeaton *et al.,* 2021a; 2021b).

27. For sediment carbon content calculations, OC content data was extracted from Smeaton *et al.,* (2021b) and overlaid with the location of the WDA. Further information on this database is provided in **Section 1.4.1.1**. Not all disturbed blue carbon reserves have remineralisation potential; therefore, a conservative approach was adopted, which assumes 100% of disturbed sedimentary OC ends up as a CO_2 flow to the atmosphere, and that the total area of the WDA would be disturbed. It is not appropriate to convert IC to units of CO_2e, as IC in blue carbon ecosystems is not readily released as CO_2 to the atmosphere during ecosystem degradation (Turrell *et al.*, 2023). Therefore, only the release of OC in sediments in the WDA was considered in the assessment.

28. Utilising the data from Smeaton *et al.* (2021b), an estimate for the mass of OC within the surficial sediments (top 10 cm) of the WDA was calculated. Geographic Information System (GIS) carbon data from Smeaton *et al.* (2021b) was extracted and overlaid with the WDA. The data was then clipped, and the total OC values were summed to calculate the blue carbon stock in the WDA.

29. Blue carbon loss is estimated by calculating the total amount of OC in the top 10 cm of sediment, within areas of seabed take associated with the WDA infrastructure. While it is likely that there will be additional disturbance to carbon buried deeper than 10 cm, most of the available data that has been collected in relation to blue carbon stocks is for the top 10 cm of sediment.

30. The areas of seabed take associated with the WDA infrastructure during construction and O&M are listed in **Table 1.2.** The receptor for the blue carbon loss assessment is the global atmosphere, similarly to the GHG assessment, as outlined in Section 19.5.2.3.1 of **Chapter 19 GHG Assessment**, the global atmosphere is affected by all global sources of GHGs and therefore, it is considered to have high sensitivity to additional emissions.

31. As outlined in Section 19.5.2.4 of **Chapter 19 GHG Assessment,** the impact of GHG emissions is, by nature, global and long-term, with low reversibility. Therefore, the magnitude of impact is not defined, as the effect significance of the blue carbon loss is not determined by the magnitude of the GHG emissions alone. Consequently, the same significance criteria for the GHG assessment, as outlined in Section 19.5.2.4 of **Chapter 19 GHG Assessment**, were adopted for the loss of blue

carbon through sediment disturbance. Additionally, the loss of blue carbon is compared to the carbon stocks in the surficial sediments of Scotland, presented in **Section 1.4.1.1**.

1.3.5 Cumulative Effects Assessment Methodology

32. The Cumulative Effects Assessment (CEA) considers the impacts arising from the activities and infrastructure associated with the WDA, as well as cumulatively with other relevant plans, projects and activities. The general approach to the CEA for climate change includes identifying potential cumulative effects, identifying a short list of plans and projects for consideration and evaluating the significance of cumulative effects. **Chapter 5 EIA Methodology** provides further details on the general approach to CEA. The CEA for the Blue Carbon Assessment is undertaken in line with this approach, drawing on **Chapter 8 Benthic Ecology**.

1.3.6 Transboundary Effects Assessment Methodology

33. The transboundary effect assessment considers the potential for effects to occur as a result of the WDA infrastructure on receptors within one European Economic Area (EEA) state's[5] territory which affects the environment of another EEA state(s). As the receptor for the Blue Carbon Assessment is the global atmosphere, blue carbon loss will therefore have an indirect transboundary effect.

34. For benthic ecology, there is no potential for impacts on transboundary receptors, therefore, transboundary effects are scoped out of the EIA in line with the Scoping Opinion as outlined in Section 8.13 of **Chapter 8 Benthic Ecology.**

1.4 EXISTING ENVIRONMENT

1.4.1 Existing Baseline

35. Blue Carbon is the term for carbon captured by the world's ocean and coastal ecosystems (NOAA, n.d.). The International Union for Conservation of Nature (IUCN) defines blue carbon as “carbon stored in coastal and marine ecosystems” (IUCN, 2017). The Scottish Blue Carbon Forum sets out a broad definition of blue carbon (Scottish Blue Carbon Forum, n.d.) as “the carbon captured and stored in marine and coastal ecosystems that accumulates over long timescales through natural processes.”

36. Plants, calcifying organisms, and sediments store and sequester carbon over short-term and long-term periods, with disturbances to sediment top layers posing a major threat. A carbon stock or store is the quantity of carbon held in a habitat at any given time, and the rate at which the carbon is stored is known as the carbon sequestration rate.

1.4.1.1 OC Storage in Sediments

37. Smeaton et al., (2021a) provided updated figures on marine sedimentary carbon stocks of the UK's Exclusive Economic Zone (EEZ) in 2021, which are the most up to date figures on carbon stored within Scottish marine sediments. As part of this study, a bespoke seabed map of sediment types was devised, based on a modified Folk classification scheme (Folk, 1954) (Kaskela, et al., 2019).

[5] Following the exit of the UK from the EU in December 2020, the UK is no longer an EEA state. However, for the purposes of assessing potential transboundary effects, the approach outlined above has been followed for the WDA.

38. The results of the spatial mapping in Smeaton et al., (2021a) revealed distinct differences in the national and regional sedimentary composition of the UK EEZ. Sand is the dominant sediment type within the UK EEZ. After sand, muddy sediments constitute a large proportion of the seabed, with approximately 75% of all muddy sediments within the UK EEZ being located within Scottish waters.

39. The surficial sediments of Scotland (457,926 km^2) store 382.6 ± 34.2 Mt OC, which is largely as a result of the abundant OC-rich, muddy sediments in Scottish waters. The OC held within Scotland's sediment represent approximately 64% of the total held within the UK EEZ as shown in **Table 1.10**, derived from Smeaton et al. (2021a).

Table 1.10 OC stock in Scotland's EEZ surficial sediments. Source: (Smeaton et al., 2021a)

	Slope and Deep Sea	Fjords	Coastal & Inshore	Outer Shelf	Scotland Total	Percentage of UK Stock
Average OC stock [Mt] ± standard deviation	186.41 ± 20.05	3.92 ± 0.55	41.68 ± 5.05	150.63 ± 8.56	382.64 ± 34.21	64%

1.4.1.2 Blue Carbon Habitats in the WDA

40. As detailed in **Chapter 8 Benthic Ecology**, following a review of the acquired geophysical data and benthic ecology within the survey area outlined in **Appendix 8.1 2025 Habitat Assessment Report**, a total of three Joint Nature Conservation Committee (JNCC) defined habitats were determined to be present within the survey area. Habitats were classified using the JNCC habitat classification.

41. As outlined in Section 8.8.1 of **Chapter 8 Benthic Ecology**, the main habitat identified during the Project's site investigation survey, based on the photographic, macrofaunal and particle size distribution data, was the 'Offshore Circalittoral Sand' (SS.SSa.OSa). Areas with gravelly sand, shell fragments, pebbles and infrequent cobbles were observed and classified as patches of the habitat type 'Offshore Circalittoral Coarse Sediment' (SS.SCS.OCS). Where numerous cobbles and large boulders occurred, the habitat type assigned was 'Echinoderms and Crustose Communities' (CR.MCR.EcCr). A section in the Study Area was classified as a mosaic of SS.SCS.OCS with 'Echinoderms and Crustose Communities' (CR.MCR.EcCr).

42. The two JNCC classification groups identified as habitats that support blue carbon storage or sequestration include, 'Offshore Circalittoral Sand' (SS.SCS.OSa) and 'Offshore Circalittoral Coarse Sediment' (SS.SCS.OCS), which are presented along with their corresponding European Nature Information System (EUNIS) in **Table 1.11**. These habitats were identified as having the potential to contribute to blue carbon storage based on their respective sediment types, which are recognised as important habitats for carbon storage in Smeaton, et al. (2021a) and Burrows, et al. (2024), and were therefore considered in the blue carbon assessment.

Table 1.11 Identified Blue Carbon benthic habitats within the WDA

JNCC classification	EUNIS Classification
SS.SCS.OSa Offshore Circalittoral Sand	MD51 Atlantic Offshore Circalittoral Sand
SS.SCS.OCS Offshore Circalittoral Coarse Sediment	MD32 Atlantic Offshore Circalittoral Coarse Sediment

1.4.2 Predicted Future Baseline

43. It is not anticipated that the future Blue Carbon baseline within the WDA with respect to carbon storage and sequestration would differ when compared to the current baseline. Sediment accumulation rates within the Study Area are likely to be low (Diesing et al., 2021), therefore, it is unlikely that there would be any significant changes (positive or negative) to the blue carbon habitats or stocks in the future baseline. Therefore, the future baseline in relation to the Blue Carbon Assessment is assumed to remain the same as the current baseline discussed in **Section 1.4.1**.

1.5 ASSESSMENT OF EFFECT SIGNIFICANCE

1.5.1 Sensitivity

1.5.1.1 Blue Carbon Habitats

44. The sensitivity of the blue carbon habitats was determined by consideration of the OC stores of the sediments identified in the WDA, as presented in **Section 1.4.1**. The assessment of sensitivity presented in **Chapter 8 Benthic Ecology** was also considered, which determined the blue carbon habitats to range from low to medium sensitivity to temporary physical disturbance/habitat loss, while the blue carbon habitats were assessed to have a high sensitivity for permanent habitat loss. The results of the sensitivity analysis are summarised in **Table 1.12**.

Table 1.12 Sensitivity of Blue Carbon habitats to the disturbance of Blue Carbon

Blue Carbon Habitat		Blue Carbon Stock	Sensitivity
JNCC Classification	EUNIS Classification		
SS.SCS.OSa Offshore Circalittoral Sand	MD51 Atlantic Offshore Circalittoral Sand	Moderate (sand or muddy sand)	Medium
SS.SCS.OCS Offshore Circalittoral Coarse Sediment	MD32 Atlantic Offshore Circalittoral Coarse Sediment	Moderate (coarse sand and gravel)	Medium

1.5.1.2 Blue Carbon Loss

45. As with the GHG assessment detailed in Section 19.4.1 of the **Chapter 19 GHG Assessment**, all GHG emissions will affect the same receptor, the global atmosphere, as opposed to directly affecting any specific local receptor and is therefore considered to be of **high sensitivity** to additional emissions.

1.5.2 Construction

1.5.2.1 Magnitude of Impact

1.5.2.1.1 Blue Carbon Habitats

46. The impact of temporary physical disturbance/habitat loss identified in **Chapter 8 Benthic Ecology**, is associated with the construction activities including the installation of the WTG/OSP foundations, offshore cable installation and sandwave levelling. As outlined in Section 8.11.1.2.2 of **Chapter 8 Benthic Ecology**, the impacts on identified blue carbon habitats during the five-year construction period are expected to be temporary, episodic and localised. As a result, the magnitude of impact on the identified blue carbon habitats from the construction phase is considered to be **negligible**.

47. The impact of permanent habitat loss is associated with the footprint of the WDA infrastructure. As outlined in Section 8.11.1.4.2 of **Chapter 8 Benthic Ecology**, the disturbance, although long-term,

is expected to be highly localised to discrete areas throughout the WDA. As a result, the magnitude of impact of permanent habitat loss to the identified blue carbon habitats from the construction phase is considered to be **negligible.**

48. Additionally, the embedded mitigation measures, which are included in **Chapter 8 Benthic Ecology,** will further reduce any potential disturbance or damage. These measures include, but are not limited to, micro-siting to avoid sensitive habitats and reduce localised habitat loss. Impacts are unlikely to affect the long-term functioning of the identified blue carbon habitats.

1.5.2.1.2 Blue Carbon Loss

49. An estimate of the mass of carbon released from sediment disturbance during the construction phase has been calculated using existing survey data, as shown in **Table 1.13**. The potential release of blue carbon was estimated by applying the total seabed take area of approximately 32.2 km^2, which consists of the temporary seabed disturbance/loss footprint of 25,385,076 m^2 (25.4 km^2) and the permanent habitat loss footprint of 6,788,231 m^2 (6.8 km^2), as detailed in **Table 1.2.** This total seabed area represents 7.2% of the total WDA extent of 448 km^2. The estimated blue carbon mass released during the construction phase is shown in **Table 1.13**.

Table 1.13 Blue Carbon loss from sediment disturbance during construction

	Blue Carbon within the WDA (tonnes)	Seabed Take (%)	Blue Carbon Released from Disturbed Sediments (tonnes)	CO_2e (tonnes)[6]
Organic Carbon	1,598,753	7.2%	12,772	46,874

50. The assessment predicted that there could be 12,772 tonnes of OC, which is equivalent to 46,874 tonnes CO_2e, released from the disturbance of sediment associated with the construction of the WDA. This is approximately 3% of the carbon store contained within the surficial sediments in Scotland (see **Table 1.10**).

51. Due to the conservative assumptions adopted (i.e. assuming surficial sediments across the seabed take area of the WDA are liberated), the uncertainty around the ultimate repository of the emitted blue carbon, and implementation of embedded mitigation measures, outlined in **Chapter 8 Benthic Ecology**, construction of the WDA infrastructure is unlikely to affect the long-term function of these sediments.

1.5.2.2 Significance of Effect

1.5.2.2.1 Blue Carbon Habitats

52. The overall effect on blue carbon habitats from loss and disturbance during construction is considered to be **minor adverse**, which is **not significant** in EIA terms.

[6] The carbon stock loss for OC was multiplied by 44/12 to convert to units of CO_2e, where 12 is the atomic mass of carbon and 44 is the molecular mass of CO_2.

1.5.2.2.2 Blue Carbon Loss

53. The overall effect on the loss of blue carbon from sediment disturbance during construction is considered to be **negligible**, which is **not significant** in EIA terms.

1.5.3 O&M

1.5.3.1 Magnitude of Impact

1.5.3.1.1 Blue Carbon Habitats

54. The impact of temporary physical disturbance/habitat loss is associated with O&M activities such as cable repair and reburial during the O&M phase of the WDA infrastructure. As outlined in Section 8.11.1.2.2 of **Chapter 8 Benthic Ecology**, the impacts on identified blue carbon habitats during the 35-year operational lifetime of the WDA infrastructure are expected to be temporary, episodic, localised, and less than those experienced during the construction phase. As a result, the magnitude of impact of temporary physical disturbance/habitat loss to the identified blue carbon habitats from the O&M phase is considered to be **negligible**. As detailed in **Section 1.5.2.1.1**, permanent habitat loss will occur during the construction phase with no additional permanent loss anticipated during the O&M phase. Therefore, the magnitude of impact of permanent habitat loss is not considered during the O&M phase of the WDA infrastructure. Additionally, the embedded mitigation measures which are included in **Chapter 8 Benthic Ecology** will further reduce any potential disturbance or damage from temporary disturbance or habitat loss. Impacts are unlikely to affect the long-term functioning of the identified blue carbon habitats.

1.5.3.1.2 Blue Carbon Loss

55. During the O&M phase, routine activities leading to temporary physical disturbance/habitat loss, potentially release blue carbon. As discussed in **Section 1.5.3.1.1**, the impacts are anticipated to be localised. An estimate of the mass of carbon released from sediment disturbance during the O&M phase has been calculated using existing survey data. The potential release of blue carbon was determined by applying the areas of seabed take, which is derived based on the area temporary physical disturbance/habitat loss from the O&M activities such as cable repair and reburial during the O&M phase of the WDA infrastructure. This is a total seabed take over the anticipated 35-year operational life of 1,267,600 m^2 (1.3 km^2) for temporary physical disturbance/habitat loss, as detailed in **Table 1.2**. This total seabed take represents 0.3% of the total WDA extent of 448 km^2. The estimated blue carbon mass released during the construction phase is shown in **Table 1.14.**

Table 1.14 Blue Carbon loss from sediment disturbance during operation and maintenance

	Blue Carbon within the WDA (tonnes)	Seabed Take (%)	Blue Carbon Released from Disturbed Sediments (tonnes)	CO_2e (tonnes)[6]
Organic Carbon	1,598,753	0.3%	503	1,847

56. The assessment predicted that there could be 503 tonnes of OC, which is equivalent to 1,847 tonnes CO_2e, released from the disturbance of sediment associated with the O&M phase of the WDA. This is less than 1% of the carbon store contained within the surficial sediments in Scotland (see **Table 1.10**).

57. Due to the conservative assumptions adopted (i.e. assuming surficial sediments across the seabed take area of the WDA are liberated), the uncertainty around the ultimate repository of the emitted blue carbon, the localised and infrequent O&M activities, and implementation of embedded mitigation measures, outlined in **Chapter 8 Benthic Ecology**, the WDA is unlikely to affect the long-term function of these sediments.

1.5.3.2 Significance of Effect

1.5.3.2.1 Blue Carbon Habitat

58. The overall effect on blue carbon habitats from loss and disturbance during the O&M of the WDA infrastructure is considered to be **minor adverse**, which is **not significant** in EIA terms.

1.5.3.2.2 Blue Carbon Loss

59. The overall effect on the loss of blue carbon from sediment disturbance during the O&M of the WDA infrastructure is considered to be **negligible**, which is **not significant** in EIA terms.

1.5.4 Decommissioning

1.5.4.1 Magnitude of Impact

60. **Chapter 3 Project Description** presents a general approach to decommissioning of the WDA infrastructure. A Decommissioning Programme will be prepared for approval by the Scottish Ministers prior to the construction of the WDA infrastructure. At the time of writing, it is anticipated that all above-ground infrastructure and cables of the WDA infrastructure will be removed, as per **Table 1.2.** However, it is acknowledged that this plan may be updated in the future. The methodology and decommissioning plan will be updated to reflect this and industry best practice at the time of decommissioning.

61. The impacts and emissions from decommissioning are expected to be lower than those from the construction phase, as the process will be more streamlined and less resource-intensive. However, the removal of structures may disturb blue carbon habitats and sediments, potentially leading to the release of stored carbon. Careful planning and execution of decommissioning activities will aim to minimise these disturbances and support the restoration of marine habitats, thereby promoting the re-sequestration of blue carbon.

62. Activities associated with the WDA infrastructure are unlikely to have an impact on the carbon storage potential of the immediate seabed and associated habitats. As such, in accordance with the impacts assessed on benthic habitats in **Chapter 8 Benthic Ecology**, the magnitude of impact on blue carbon habitats and the loss of blue carbon is considered to be **negligible** during decommissioning of the WDA infrastructure.

1.5.4.2 Significance of Effect

63. The overall effect on blue carbon habitats and the loss of blue carbon during decommissioning is considered to be **negligible**, which is **not significant** in EIA terms.

1.6 CEA

64. The impacts of temporary physical disturbance/habitat loss and permanent habitat loss were not assessed as having cumulative effect with other plans, projects and activities in Section 8.12 of **Chapter 8 Benthic Ecology**. Therefore, no additional consideration for cumulative effects is required with respect to blue carbon.

1.7 TRANSBOUNDARY EFFECT

65. As stated in **Section 1.3.4.2.4**, the receptor for the Blue Carbon Assessment is the global atmosphere, and therefore blue carbon emissions have an indirect transboundary effect on climate change. Therefore, transboundary effects are not considered to require specific consideration for the blue carbon assessment.

1.8 INTER-RELATED AND INTERACTING IMPACTS

1.8.1 Inter-relationships

66. The assessment on blue carbon habitats focuses on marine ecosystems and sediments that play a crucial role in carbon sequestration and storage. The health and biodiversity of ecosystems directly influence their capacity to sequester carbon, and so disturbance to these habitats can reduce their effectiveness as carbon sinks. Therefore, there are inter-related effects with **Chapter 8 Benthic Ecology**.

67. **Table 1.15** below provides a summary of the key inter-relationships between climate change and other technical chapters and indicates where those issues have been addressed in relevant chapters.

Table 1.15 Blue Carbon inter-relationships

Topic and Description	Related Chapter(s)	Where Addressed in this Chapter	Rationale
Blue carbon habitats	**Chapter 8 Benthic Ecology**	**Section 1.5**	Ecosystems' health and biodiversity directly influence their capacity to sequester carbon and so disturbances to these habitats can reduce their effectiveness as carbon sinks. The effects in **Chapter 8 Benthic Ecology** have been considered in the blue carbon assessment, and therefore there are no further inter-related effects.

1.8.2 Interactions

68. The GHG impacts identified and assessed to have the potential to interact with blue carbon impacts are presented in Table 19.18, Table 19.19 and Table 19.20 in Section 19.10.2 of **Chapter 19 GHG Assessment.**

69. A lifetime assessment has been undertaken which considers the impact interactions identified and the potential for impacts to affect receptors relevant to GHG emissions across all development phases is shown in Table 19.21 of **Chapter 19 GHG Assessment.**

1.9 POTENTIAL MONITORING REQUIREMENTS

70. The WDA infrastructure is not anticipated to require specific monitoring requirements with respect to GHG emissions.

1.10 SUMMARY

71. The Blue Carbon Assessment evaluated the impact of the WDA infrastructure on the carbon storage potential of the immediate seabed and associated habitats and the loss of blue carbon. The assessment has established that the WDA infrastructure would result in **minor adverse to negligible** effects during the construction, O&M and decommissioning phases, which is **not significant** in EIA terms.

72. **Table 19.22** in **Section 19.12** of **Chapter 19 GHG Assessment** presents the summary of likely significant environmental effects, mitigation, monitoring and residual effects for climate change related to blue carbon.

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