November 2025

Drummarnock Wind Farm

Additional Information Report

Drummarnock Wind Farm Limited

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Contents

Contents

Tables

Technical Appendices

Non-Technical Summary

This Additional Information (AI) report 'AI Report' re-assesses aspects of the submitted Environmental Impact Assessment (EIA) Report for Drummarnock Wind Farm (the 'Proposed Development') submitted to Stirling Council in August 2024 (the '2024 EIA Report') (Reference: 24/00494/FUL).

The requirement for AI has arisen due to layout changes made in response to planning responses from consultees, such as the Scottish Environment Protection Agency (SEPA) and NatureScot during the planning application consultation for the Proposed Development.

The design changes made to the Proposed Development consist of:

- Removal of Borrow Pit 1 (BP01);
- The expansion in area of Borrow Pits 2 and 3/4 (BP02 and BP03/BP04); and
- Removal of a short section of track previously connecting to the removed BP01.

These design changes assessed in the AI Report, will be referred to onwards as the 'Amended Design'

As the majority of the environmental effects reported in the submitted 2024 EIA Report are unaffected by the proposed changes to the Proposed Development, only those assessments affected by the design changes are reported here. Unless otherwise stated in this AI Report, the content of the 2024 EIA Report remains valid.

Ecology

As described in the 2024 EIA Report, the Proposed Development Site inherently lacks opportunities for degraded peat restoration, because of the combination of low quality of peat within the Site and the limited existing artificial drainage. This makes aligning the peat restoration ratio with the NatureScot (2023) guidance challenging. On site, 21.5ha of priority peatland restoration will occur, to address the 10.4ha lost to the Proposed Development.

In addition to priority peatland restoration, 41.3ha of heathland and wetland creation will occur on-site, which reflects an increase of 28.5ha of these habitats compared to the measures contained in the 2024 EIA Report.

BP01 has been removed and now there is no impact upon the cited M6 flush. A revised Peat Management Plan (PMP) (Technical Appendix 2) has been produced which reflects these changes.

No new watercourse crossings other than those already submitted within the 2024 EIA Report, are proposed.

Ornithology

The bird interests of the Proposed Development Site have been assessed using current NatureScot and Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines. Pre-application, scoping and post-scoping consultation was undertaken with Stirling Council and NatureScot.

A comprehensive suite of bird surveys was undertaken at the Proposed Development Site which has informed the impact assessment. These surveys were undertaken during 2019 to 2021 and included flight activity surveys, breeding wader and raptor surveys, along with targeted surveys for black grouse. Following a data review and consultation with NatureScot, it was agreed that a second

year of non-breeding season surveys was not required. This is because it is unlikely that the Proposed Development will have a significant effect on any qualifying species for the Firth of Forth Special Protection Area (SPA)/Ramsar site or the Slammannan Plateau SPA.

Following the design amendments to the borrow pits (i.e. the removal of BP01 and slight increases in the areas of BP02 and BP03/BP04), there are no changes to the conclusions of the 2024 EIA Report for ornithology. After mitigation, no significant effects are anticipated.

Hydrology, Geology and Hydrogeology

Ground Water Dependent Terrestrial Ecosystem (GWDTE)

The removal of BP01 results in the avoidance of direct and indirect loss of highly groundwater dependent M6 GWDTE and moderately groundwater dependent MG10a habitat in and around the central wetland. With this reduced effect on GWDTE, the revised predicted effect on GWDTE is Minor for Construction, and negligible for Operation and Decommissioning.

The extension of BP02 and BP03/BP04 will not affect any moderate or highly dependent GWDTE.

The Peat Management Plan (PMP) (Technical Appendix 2) and Peat Landslide Hazard Risk Assessment (PLHRA) (Section 5.2.1) have been revised to reflect the removal of BP01.

Peat

The revised PMP proposes BP02 and BP03/BP04 be restored as permanent peat stores. All are located in the western undulating peat covered uplands area of the Proposed Development Site as opposed to the lower eastern elevations with minimal peat, where BP01 was located. A peat balance will be achieved and there will be no excess peat. There will be no waste disposal activities taking place on site for any material.

The PMP adopts a set of borrow pit peat reuse design principles to ensure conditions for permanent wet sustainable peat bodies will develop in the restored borrow pits.

The predicted residual effect on peat loss and disturbance remains Minor and not significant.

Private Water Supply (PWS)

A Private Water Supply Assessment (PWSA) for Muirpark PWS has been undertaken and the details of which can be found in Technical Appendix 5.

The assessment concluded that no Proposed Development infrastructure is located within the PWS source catchment, and as such Muirpark PWS is not hydrologically connected.

Surface Water

The mitigation to avoid silt runoff into the Bannock Burn and thereby ensure that eutrophication in North Third reservoir is not exacerbated is re-emphasised and explained. The lack of hydrological connectivity between the Proposed Development and Buckieburn reservoir, and with Swanswater Fishery is also explained.

The absence of Drinking Water Protected Areas (DWPA) within the catchments drained by the Proposed Development is explained and confirmed. The location and name of the Craigengelt abstraction referred in the responses by Scottish Water is unclear, as the published SEPA reservoir list identifies the reservoir at Craigengelt as Buckieburn Reservoir, which is not used for public water supply and does not have a DWPA.

The reservoir and DWPA which supply Carron Valley Water Treatment Works (WTW) is the Carron Valley Reservoir, for which there is a large DWPA. This is not hydrologically connected to the Proposed Development and has been scoped out of further assessment.

Climate Change and Carbon Balance

Following the removal of BP01 and a small section of track, as well as an expansion in area of BP02 and BP03/BP04, the carbon balance calculations have been re-assessed through the use of the offline Scottish Government Carbon Calculator (Version 2.14.2).

The results of the carbon balance assessment indicate the Proposed Development contributes a moderate (positive) effect to climate change and national and international targets to combat climate change. An iterative design approach was taken for the wind farm layout to avoid siting infrastructure in areas of peat where possible, in order to minimise disturbance of peat soils and associated carbon releases.

1. Introduction

In July 2024, Drummarnock Wind Farm Limited ('the Applicant') submitted a planning application (Ref. No: 24/00494/FUL) to Stirling Council (SC) seeking planning permission under the Town and Country Planning (Scotland) Act 1997 (as amended) ('the Planning Act') for the construction and operation of an electricity generating station known as Drummarnock Wind Farm (the 'Proposed Development').

The application included an Environmental Impact Assessment Report (2024 EIA Report), prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations).

This addendum to the 2024 EIA Report contains additional environmental information that has been collated to supplement the information submitted as part of the EIA and Planning Application (24/00494/FUL) and summarises the latest updates to the Proposed Development.

1.1 The Applicant

The Applicant, Drummarnock Wind Farm Limited, is a subsidiary of EDP Renewables (EDPR). Drummarnock Wind Farm is being developed by Wind2 on behalf of EDPR

EDPR is a global leader in the renewable sector, generating over 90% of its energy from renewable sources. EDPR is currently present in the UK and internationally in four main regions across the globe (Europe, North America, South America and Asia Pacific). EDPR aims to be Net-Zero by 2040

EDPR has an office in Edinburgh and, through its joint venture with ENGIE (Ocean Winds), recently completed construction on the 882MW Moray West Offshore Wind Farm, which has the capability of supplying approximately 50% of Scotland's domestic electricity demand. Further information on EDPR can be found on its corporate website at https://www.edpr.com/en

Wind2 is a specialist onshore wind farm developer, founded in 2016. The company has staff based in the Highlands, Perthshire, Edinburgh and Aberdeenshire, as well as Wales and in various locations throughout England, with significant expertise in renewable energy and a track record of successfully developing onshore wind farms throughout the UK. Further information on Wind2 can be found on its website at https://wind2.co.uk.

1.2 The Project Team

This report has been prepared by Atmos Consulting with assistance from the same team of independent experts from the original 2024 EIA report. All are suitably qualified and competent experts in their field, as is required under the EIA Regulations.

1.3 Purpose of this Report

This Report has been produced in response to the changes in design of the Proposed Development after comments made by the Scottish Environment Protection Agency (SEPA) and NatureScot during the planning application consultation process.

In their response of 10 September 2024, SEPA stated:

> *"The National Vegetation Classification (NVC) survey identified Borrow Pit 01 as MG10a and M6 habitat and were described by ATMOS as being 'moderate' and 'high' GWDTE classes. In the preliminary Borrow Pit Appraisal report (Technical Appendix 3-1) BP01 was described as 'The area of preliminary BP01 was observed to dip gently to the southwest and level out to the west where the low-lying area became a saturated bog.' The criteria for selection was stated to be to not locate them within any moderate/high risk GWDTE's. We request that borrow pit BP01 be relocated due to the presence of GWDTE unless it can be shown that these are not groundwater dependent."*

In their response of 12 September 2024, NatureScot observed that the proposed peatland loss to restoration ration fell below their guideline value of 1:10 and stated that:

> *"While we note that opportunities on-site for peatland restoration are considered to be limited, we would therefore advise that the applicant look towards off-site opportunities for providing restoration that can meet the recommendations set out in our peatland guidance and to include this in the Outline Habitat Management Plan."*

In addition, NatureScot also references Policy 3b of the National Planning Framework (NPF4) and advise that;

> *"…the proposal include further biodiversity enhancement measures and firm commitments in order to reach the level set out within the planning framework."*

NatureScot also advises that;

> *"…areas of deep peat be avoided in line with the mitigation hierarchy…"*

In seeking to address these comments, the Applicant has modified the design of the Proposed Development. This report assesses the Amended Design, and serves as an update to the 2024 EIA Report.

As the majority of the environmental Effects reported in the 2024 EIA Report are unaltered by the Amended Design of the Proposed Development, only those assessments affected by the design changes are reported here. Unless otherwise stated in this AI Report, the content of the 2024 EIA Report remains valid.

1.4 Structure of Report

This report is structured as follows:

- Summary of Design Changes;
- Updates to 2024 EIA Report Chapters (Volume 2):
  - Chapter 6: Ecology;
  - Chapter 7: Ornithology;
  - Chapter 8: Hydrology, Geology and Hydrogeology; and
  - Chapter 13: Climate Change and Carbon Balance.
- Also included is an update to the Peat Hazard Landslide Risk Assessment, found in Section 5.2.1.

In addition, the following related amended Technical Appendices are included separately as stand-alone documents. These replace their equivalents in the 2024 EIA Technical Appendices in their entirety:

- Technical Appendix 1: Preliminary Borrow Pit Appraisal;
- Technical Appendix 2: Peat Management Plan; and
- Technical Appendix 3: Outline Habitat Management Plan; and
- Technical Appendix 4: Carbon Calculator.
- Technical Appendix 5: Private Water Supply Assessment, has been included now that the location of the Muirpark PWS has been identified.

The following revised figures are included, referenced as appropriate within this Report. These figures also replace their equivalents in the 2024 EIA Report:

- Figure 1-2 Site Layout;
- Figure 6-7 Habitat Management Plan;
- Figure 7-1-9 Wader Territories;
- Figure 7-1-10 Black Grouse Survey Results;
- Figure 8-1 Water Features;
- Figure 8-2a Superficial Geology;
- Figure 8-2b Bedrock Geology;
- Figure 8-3 Peat;
- Figure 8-4 NVC;
- Figure 8-5a Potential GWDTE within 250m of Infrastructure;
- Figure 8-5b Assessed GWDTE within 250m of Infrastructure; and
- Figure 8-6 Private Water Supplies.

1.5 Contact Details

Electronic copies of this AI Report will be available to view at the following locations:

- On Stirling Council Planning Portal at https://pabs.stirling.gov.uk/online-applications/ and
- The Applicant's website at: www.drummarnockwindfarm.co.uk

Hard copies can be purchased by contacting the Applicant at: Wind2 at info@wind2.co.uk

Charges for hard copies are:

- £150 for a paper hard copy of this AI Report;
- £30 for a link or USB with access to all digital documents, including the still valid assessments in the 2024 EIA Report.

2. Description of Development

This section provides a description of the Proposed Development and highlights the changes in design from what was presented in Chapter 3: Description of Development of the 2024 EIA Report:

The Proposed Development consists of 4 turbines up to a maximum 180m tip height with an indicative electricity export capacity of approximately 30MW and associated infrastructure.

The associated infrastructure includes:

- New access tracks;
- Construction of turbine foundations, crane hardstandings and storage areas;
- Underground cabling;
- One onsite substation which would accommodate 33KV equipment to collect electricity from the site. The substation compound would include a control and metering building;
- Construction compound;
- Up to three borrow pits; and
- Up to six watercourse crossings.

The Proposed Development included the provision for 6.59km of new access tracks, which includes two onsite access options (Option A and Option B). However, only one of these onsite access options will be constructed, and therefore of the 6.59km of proposed new tracks, a maximum of up to 5.8km would be constructed, dependent upon the access option utilised.

However, to ensure a robust and comprehensive assessment, the EIA has assessed the full 6.59km to support the full appraisal of both access options.

The layout changes made to the Proposed Development when compared to the 2024 EIA Report are the removal of BP01 and a short section of track which connected it to the rest of the access tracks. The total length of access track assessed for the purpose of the EIA however, remains at 6.59km, due to rounding.

In addition to the removal of BP01, BP02 and BP03/BP04 have been expanded in area so that the total aggregate volume which can be obtained from the borrow pits remains unchanged from the 2024 EIA Report.

All other elements of the Proposed Development remain unchanged. A revised Preliminary Borrow Pit Appraisal (Technical Appendix 1) has been undertaken and is reported in an update to Technical Appendix 3-1 in the 2024 EIA Report.

The amendments to the location and size of borrow pits as detailed in this section are presented in an updated site layout figure (Figure 1-2 Site Layout).

3. Chapter 6: Ecology

This section of the AI Report evaluates the effects of the Amended Design of the Proposed Development on ecology. It supplements Chapter 6 of the 2024 EIA Report, which should be read in conjunction with this section and associated EIA Technical Appendices.

In order to capture changes to habitat compensation and enhancement prescriptions and area measurements a revised version of the Habitat Management Plan has been produced; as per Technical Appendix 3.

3.1 Assessment of Design Amendment Effects

The following has been re-assessed as a result of the design amendments:

- Construction Effects: Priority and Non-Priority Peatland Loss and Enhancement.

No further design amendments have been made to the wider development, and as such the following assessment of effects remain unchanged from the 2024 EIA Report:

- Construction and Decommissioning Effects:
  - Sedimentation or other pollution of watercourses;
  - Secondary effects on sensitive habitats through siltation/pollution/spread of invasive species;
  - Inadvertent killing, injuring or disturbance of fauna during construction; and
  - Disturbance to fauna due to vehicular traffic, operating plant, and the presence of construction workers.
- Operational Effects:
  - Death, injury to bats from collision with wind turbines and displacement of bats from commuting routes by presence of infrastructure;
  - Minor pollution events connected to machinery used for maintenance; and
  - Inadvertent killing, injuring or disturbance of fauna from the movement of Operational plant.

3.2 Assessment of Effects

3.2.1 Construction Effects

The effects of the removal of BP01 and the short section of track from the Proposed Development, as well as the increase in the area of BP02 and BP03/BP04 have been assessed below. See Technical Appendix 1 Preliminary Borrowpit Appraisal which assesses changes to the Proposed Development included in the EIA based on removal of one borrow pit, and expansion of the three remaining borrow pits.

Priority and Non-Priority Peatland Loss and Enhancement

Priority Peatland Loss

The difference between priority peatland loss demonstrated in the 2024 EIA Report and the AI Report is shown in Table 1 below. Figures are rounded to the nearest 10th of a hectare.

Table 1: Priority Peatland Loss Comparison Between 2024 EIA Report and AI Report Priority Peatland Communities (in Hectares)

NVC Vegetation Community	Total loss (EIA)	Total loss (AI)
M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire	9.6	9.8
M20 *Eriophorum vaginatum* Blanket and raised mire	0.4	0.4
M25 *Molinia caerulea – Potentilla erecta* mire*	0.2	0.2
TOTAL	**10.2**	**10.4**

*Is based on 50cm depth or more and Includes M23/M25 and M25a/M23 mosaics.

By reducing the number of borrow pits from four to three but increasing the area of these to accommodate peat volumes required to be held there (and tie-in with suitable surrounding habitat (i.e. peat or peaty soils) a slight increase in loss of priority peatland has occurred.

This small increase in loss is due to, and counterbalanced by, the removal of BP01 from the layout to avoid direct and indirect loss of highly groundwater dependent M6 GWDTE and moderately dependent MG10a GWDTE, in response to the SEPA holding objection.

NatureScot (2023)[1] peatland guidance recommends a 1:10 loss/compensation ratio with additional enhancement of 10% of the baseline assessment of the extent of priority peatland habitat. However, given the low quality peat within the Site (Class 3-5), combined with few drains available for restoration in mire of 0.5m or deeper peat ,15.9ha was intended for restoration as target Blanket Bog habitat in the 2024 EIA Report.

Given the limited opportunities for onsite restoration, an additional area of 5.6ha has been subsequently identified upon which to improve the existing impoverished blanket bog (M19/M25 mosaic); by thinning *Molinia caerulea* purple moor-grass and adding grips to rewet. This is shown in Figure 6.7. Through these amendments 21.5ha of priority peatland compensation is proposed at the Site, ratio of 1:2.06 under the NatureScot (2023) guidance. [2]

We note the following factors relevant to the justification of creating less than the guidance ratio, as recommended by guidance (NatureScot, 2025[3]) and described by NatureScot (2023[4]). Whilst all peatland is an important habitat wherever it occurs, the peatland on the Proposed Development Site is generally of low quality, with the better examples (e.g. M19 blanket bog) limited in extent.

It is this type of peatland, on upland fringe set within an agricultural context, which is suited for wind farm development, as opposed to more remote sites with larger tracts of quality peatland. As noted in the NatureScot 2023 guidance: "*Peatland cannot be created in areas where it doesn't already exist".* The lack of erosion features to restore is the main impediment to a larger compensation ratio.

The peatland on the Proposed Development Site is degraded but the cessation or limitation of grazing (as required under heathland and wetland creation prescriptions for this scheme) does not count towards the compensation ratio.

The Proposed Development commits to the long term management of the degraded peatlands which are present, linking existing peatland habitats and improving their quality and extent.

[1] Advising on peatland, carbon-rich soils and priority peatland habitats in development management.

[2] Within the 2024 EIA Report, the ratio was 1:1.5 based on 15.9ha of restoration and creation.

[3] NatureScot (2025). https://www.nature.scot/doc/naturescot-pre-application-guidance-onshore-wind-farms

[4] NatureScot (2023) Advising on peatland, carbon-rich soils and priority peatland habitats in development management | NatureScot

Whilst 1:2.06 is below the guidance ratio, NatureScot does acknowledge the difficulties around the compensation requirements and that the Peat Expert Advisory Group (PEAG) have been considering the ratio requirement and mitigation/compensation solutions developers can use to meet it.

Enhancement

In order to address the loss of Priority Peatland as a result of the Proposed Development, on-site enhancement measures are proposed. However, the land within the ownership of Muirpark Farm, where the Proposed Development is located is limited in its potential to produce Priority Peatland gains and to engage with off-site restoration as suggested in the NatureScot response is not appropriate in this instance.

The Proposed Development Site is upland fringe on poor peat as opposed to a more remote location with higher quality peat where impacts could be much greater (in terms of baseline impacts and larger infrastructure connection required to connect to the grid (e.g. more cables and tracks impacting higher quality areas of peat).

As part of the design amendments, further biodiversity enhancements are proposed as set out in Table 2 which include heathland and wet grassland creation for bird species (Short-eared owl Asio flammeus – heathland, upland waders – wet grassland). It is noted the Proposed Development Site is also constrained by the extensive, recently planted, Forestry Grant Scheme in the east of Muirpark Farm.

The habitat measures as described in the 2024 EIA Report remain the same but their extents have increased in this AI Report as per Table 2 below.

Table 2: On-site Priority Peatland and Non Priority Peatland Enhancement Update

Measure	Total Gain in hectares (2024 EIA Report)	Total Gain in hectares (AI Report)
Priority peat (10m buffer on drains)	7.1	7.1
Bog restoration/creation	8.8	14.4
Heathland creation	6.2	25.5
Wetland creation	6.6	15.8
TOTAL	**28.7**	**62.8**

The updated extents for the Amended Design are shown in Figure 6-7. These extents have been revised in an updated version of the Habitat Management Plan (HMP) which accompanies this AI Report in Technical Appendix 3.

The revised HMP includes the original commitment from the HMP submitted as part of the EIA for bat box installation on trees and a bridge adjacent the southern boundary of the Proposed Development Site, and around the farm. In total this will comprise a minimum of 10 boxes.

The revised Outline HMP is contained in Technical Appendix 3 and sets out the detail of the proposed habitat creation.

3.3 Summary of Changes to the Significance of Effects

There are no changes to any of the significance of effects predicted for ecology, to those presented in the 2024 EIA Report.

4. Chapter 7: Ornithology

Chapter 7 of the Environmental Impact Assessment (EIA) Report assesses the potential impacts of the application layout of the Proposed Development on ornithology.

This section of the AI Report evaluates the effects of the Amended Design of the Proposed Development on ornithology. It supplements Chapter 7 of the 2024 EIA Report which should be read in conjunction with this chapter and associated EIA Technical Appendices.

In order to update the graphic information previously issued with the 2024 EIA Report, a series of revised figures have been produced for the Amended Design as follows, which supersede the relevant EIA Figures:

- Figure 7-1-9 Wader Territories; and
- Figure 7-1-10 Black Grouse Survey Results.

4.1 Assessment of AI Design Amendment Effects

The following effects considered in the 2024 EIA Report have been reassessed as a result of the design amendments.

- Construction Effects: Habitat Loss and Disturbance/Displacement; and
- Operational Effects: Habitat Loss and Modification, and Disturbance/Displacement.

No design amendments have been made to the Turbine Layout, therefore the following assessment of effects remain unchanged from the 2024 EIA Report:

- Barrier Effect; and
- Collision with Wind Turbines.

4.2 Assessment of Effects

4.2.1 Construction Effects

The effects of the removal of BP01 from the Proposed Development and the increase in the area of BP02 and BP03/BP04 have been assessed using survey data collected from 2020.

Habitat Loss

Within the total area of the Proposed Development Site (217.2ha), the direct permanent loss of habitats which have potential value to support important ornithological features amounts to 7.9ha in the AI Report (7.9ha in the 2024 EIA Report), with a further indirect loss due to drying effects of 7.5ha (7.3ha in the 2024 EIA Report).

Compared with the previous area of habitat loss of 15.2ha in the 2024 EIA Report (7.1% of the total area), this now amounts to 15.5ha (7.1%) with the Amended Design. These habitats include priority peatland communities (10.2ha) and dry heath (3.8ha). There are minor discrepancies in totals due to rounding.

Specifically with regard to Borrow Pits, the combined area of these has reduced from 3.27ha to 3.17ha (i.e. a reduction in area of 3%).

Habitat loss effects are assessed for the important species breeding within the study area originally assessed within the 2024 EIA Report, (i.e., lapwing, common snipe, curlew and short-eared owl).

- Lapwing
  - One lapwing territory was located within 500m of the Proposed Development infrastructure in 2020, plus a second was located within 500m of the access track only (Figure 7-1-9). The removal of BP01 (c.330m at its closest point) from the design means that the closest Borrow Pit to a lapwing territory is now BP02 (c.430m at its closest point). With a potential foraging range size (e.g., >1000m² (GWCT)) and the amount of alternative habitat available for nesting and foraging, it is considered that the conclusion in the 2024 EIA Report of no significant effect on the conservation status of lapwing in terms of direct habitat loss remains unchanged.
- Curlew
  - Two curlew territories were located within 500m of Proposed Development infrastructure in 2020, previously ranging between 150m and 450m from the proposed infrastructure. The increase in area of BP03 means that one curlew territory now lies within 125m (Figure 7-1-9). However, the potential effects of direct habitat loss on curlew due to the development are not considered to be significant compared to the species' overall territory size (core range of 1km, with maximum range up to 2km). With the amount of alternative habitat available for nesting and foraging, it is considered that the conclusion in the 2024 EIA Report of no significant effect on the conservation status of curlew in terms of direct habitat loss remains unchanged.
- Common Snipe
  - A maximum of one snipe territory was recorded within 500m of the Proposed Development infrastructure in 2020, plus a second within 500m of the access track only (Figure 7-1-9). The removal of BP01 (c.380m at its closest point) from the design means that the closest Borrow Pit to a snipe territory is now BP02 (c.480m at its closest point). Habitat suitable for nesting and foraging snipe (wet bog and grassland) is common within the Proposed Development Site. Due to the wide availability of suitable habitat, it is considered that the conclusion in the 2024 EIA Report of no significant effect on the conservation status of snipe in terms of direct habitat loss remains unchanged.
- Short-eared Owl
  - The conclusion of the 2024 EIA Report was that direct loss of potential short-eared owl nesting and foraging habitat would occur, with the entire area of the Proposed Development being potentially suitable. However, the magnitude of predicted habitat loss was considered negligible within the context of a pair's foraging range (core range of 2km extending out to 5km). Compared to the overall habitat available locally and in the wider NHZ, the loss would be negligible. Therefore, this conclusion remains unchanged i.e., there would be no significant effect on the conservation status of short-eared owl in terms of direct habitat loss.

Disturbance/ Displacement

During the construction phase of the Proposed Development, the potential effects of associated noise and visual disturbance could lead to the temporary displacement or disruption of breeding and foraging birds.

The level of impact would depend on the timing of potentially disturbing activities, the extent of displacement (both spatially and temporally) and the availability of suitable habitats in the surrounding area for displaced birds to occupy.

Potential effects are likely to be greatest during the breeding season (predominantly between March and August, depending on the species under consideration) and behavioural sensitivity to the effects would vary between species.

Construction disturbance can be readily mitigated by avoiding sensitive areas through the implementation of appropriately defined buffer zones and by timing construction activities to avoid periods where sensitive species are present (if and where possible), such as the breeding season.

A range of good practice measures were therefore proposed to mitigate for potential construction disturbance effects (Section 7.5.1 of the 2024 EIA Report).

Disturbance/displacement effects are assessed for the important species breeding within the study area originally assessed within the 2024 EIA Report, (i.e., lapwing, common snipe, curlew and short-eared owl).

- Lapwing
  - As stated in the 2024 EIA Report, there is a lack of absolute evidence regarding construction disturbance in the scientific literature (although there have been previously reported minimum disturbance distances for lapwing (108 m +/- 110 m) in the breeding season). One lapwing territory was located within 500m of the Proposed Development infrastructure in 2020, plus a second was located within 500m of the access track. The removal of BP01 (c.330m at its closest point) from the design means that the closest Borrow Pit to a lapwing territory is now BP02 (c.430m at its closest point).
  - In the worst-case scenario, there is the potential for nesting lapwing to occur at a closer distance. As concluded in the 2024 EIA Report, the temporary displacement of one to two pairs of lapwing, is considered potentially significant for the local population. Therefore, any nesting attempts by lapwing would be safeguarded under a BPP (Bird Protection Plan) to ensure disturbance is avoided. A minimum disturbance-free buffer of 300m is considered appropriate for this species.
  - With the implementation of the good practice measures, it is concluded that there will be no significant effect on the conservation status of lapwing in terms of disturbance/ displacement during construction.
- Curlew
  - As stated in the 2024 EIA Report, a buffer zone of 200-300m is suggested to protect nesting curlew. Some evidence indicates possible declines of curlew of about 40% within a 620m buffer of construction work[5].
  - Two curlew territories were identified within 500m of the Proposed Development infrastructure in 2020, one of which was 320m from the nearest proposed turbine location and 125m from BP03 (previously c.160m). This is likely to be within the range of the active disturbance distance for this species. Therefore, there is the potential for temporary disturbance of nesting curlew caused by construction activities.
  - In the worst-case scenario of the temporary displacement of two pairs of curlew, this is considered potentially significant for the local population. Therefore, any nesting attempts by curlew would be safeguarded under a BPP to ensure disturbance is avoided. A minimum disturbance-free buffer of 300m is considered appropriate for this species.

[5] Pearce-Higgins, J.W., Stephen, L., Douse, A. and Langston, R. H. W. (2012). Greater Impacts of Wind Farms on Bird Populations During Construction Than Subsequent Operation: Results of a Multi-site and Multi-species Analysis. Journal of Applied Ecology 49, 386–394.

  - With the implementation of the good practice measures, it is concluded that there will be no significant effect on the conservation status of curlew in terms of disturbance/displacement during construction.
- Common Snipe
  - As stated in the 2024 EIA Report, a buffer zone of 300m is suggested to protect nesting snipe. One snipe territory was identified within 500m of the Proposed Development infrastructure in 2020, plus a second within 500m of the access track. This is likely to be at or beyond the upper limit of the active disturbance distance for this species. In the worst-case scenario however, there is the potential for nesting snipe to occur at a closer distance, therefore there is the potential for temporary disturbance caused by construction activities.
  - In the worst-case scenario of the temporary displacement of one to two pairs of snipe, this is considered potentially significant for the local population. Therefore, any nesting attempts by snipe would be safeguarded under a BPP to ensure disturbance is avoided. A minimum disturbance-free buffer of 300m is considered appropriate for this species.
  - With the implementation of the good practice measures, it is concluded that there will be no significant effect on the conservation status of snipe in terms of disturbance/ displacement during construction.
- Short-eared Owl
  - As stated in the 2024 EIA Report, a buffer zone of 300-500m is suggested to protect nesting short-eared owl. One potential territory was identified within the Proposed Development site in 2020.
  - In the worst-case scenario of the temporary displacement of one pair of short-eared owls, this is considered potentially significant for the regional population. Therefore, any nesting attempts by short-eared owl would be safeguarded under a BPP in compliance with legislative requirements to avoid disturbance to the sites of specially protected birds.
  - With the implementation of the good practice measures, it is concluded that there will be no significant effect on the conservation status of short-eared owl in terms of disturbance/ displacement during construction.

4.2.2 Operational Effects

Habitat Modification

Habitat modification was assessed in the 2024 EIA Report with regard to habitat enhancement proposals. This has been updated in the AI Report with the Habitat Management Plan found in Technical Appendix 3, with further habitat enhancement. For all species considered, the creation and management of wet grassland, peatland restoration and enhancement, and heathland creation (all in areas away from the influence of the turbines) are considered to have likely positive benefits for the important ornithological features.

Disturbance/ Displacement

Disturbance/displacement effects during Operation were considered in the 2024 EIA Report for species in the breeding season, within the relevant parts of the study area, i.e. in proximity to the proposed wind turbines. As such, the assessment concentrates on the important ornithological features that are potentially vulnerable to disturbance/displacement based on the survey data (lapwing, snipe, curlew and short-eared owl). The conclusions for these species are unchanged from the 2024 EIA Report.

4.3 Summary of Changes to the Significance of Effects

Due to the Amended Design, the removal of BP01 results in increases in distances from each lapwing and snipe territory identified in baseline surveys to the nearest borrow pit (now BP02). The nearest lapwing territory is 430m from BP02, and the nearest snipe territory is 480m from BP02.

The increase in the area of BP03/BP04 results in this being approximately 35m closer to the nearest curlew territory within the Proposed Development than originally assessed.

These differences are minor in scale and do not change the conclusions of the 2024 EIA Report for ornithology.

When considered along with the implementation of good practice measures and proposed habitat enhancement measures, there are no significant effects predicted for ornithology.

5. Chapter 8: Hydrology, Geology and Hydrogeology

Chapter 8 of the 2024 EIA Report assesses the potential impacts of the application layout of the Proposed Development on Hydrology, Geology and Hydrogeology.

This section of the AI Report evaluates the effects of the Amended Design of the Proposed Development on Hydrology, Geology and Hydrogeology. It supplements Chapter 8 of the EIA Report which should be read in conjunction with this chapter and associated EIA Technical Appendices.

The topics addressed, by their nature, cross over with Ecology (Section 3) and the two sections should be read together.

In order to update the graphic information previously issued with the EIA Report, a series of revised figures have been produced for the Amended Design as follows, which supersede the relevant EIA Figures:

- Figure 8-1: Water Features;
- Figure 8-2a: Superficial Geology;
- Figure 8-2b: Bedrock Geology;
- Figure 8-2-8 PLHRA Likelihood;
- Figure 8-3: Peat;
- Figure 8-4: NVC;
- Figure 8-5a: Potential GWDTE;
- Figure 8-5b: Assessed GWDTE; and
- Figure 8-6: Private Water Supplies.

5.1 Assessment of Design Amendment Effects

The updated Proposed Development description is detailed in Section 2. The revised layout is shown in Figure 1-2. In summary, the layout changes relevant to this hydrology and hydrogeology section are:

- The easternmost borrow pit BP01 has been removed entirely. The reason is to avoid potential impact of BP01 on the integrity of highly groundwater dependent M6 Groundwater Dependent Terrestrial Ecosystem (GWDTE);
- The remaining borrow pits, BP02, BP03 and BP04, will be expanded in area in order to produce the same amount of aggregate as the four previously; and
- A small amount of spur track which was connecting the BP01 to the rest of the development has been removed.

The following effects considered in the EIA Report have been re-assessed as a result of the design amendments:

- Construction Effects: Groundwater Dependent Terrestrial Ecosystems.

No design amendments have been made to the Turbine Layout, therefore the following assessment of effects remain unchanged from the 2024 EIA Report:

- Surface Water
- Groundwater
- Peat
- Private Water Supplies; and

- Public Water Supplies.

5.2 Assessment of Effects

5.2.1 Construction Effects

The effects of the removal of BP01 and the short section of track from the Proposed Development, as well as the increase in the area of BP02 and BP03/BP04, have been assessed below. It has been carried out by receptor, in accordance with the approach taken in the 2024 EIA Report.

See Figure 1-2 and Technical Appendix 1 Borrow Pit Appraisal for more information.

GWDTE

The National Vegetation Classification (NVC) distribution of vegetation communities is shown on Figure 8-4 NVC, overlain with the layout shown on the Amended Design. Similarly, those vegetation communities assessed as high or moderately dependent upon groundwater and within a 250m buffer of infrastructure are shown on Figure 8-5b: Assessed GWDTE, with the revised layout.

BP01

On the previous 2024 EIA layout, a 100m x 25m strip of high dependency M6 habitat at BP01 would have been lost from the central wetland on the saddle boundary between the undulating peat and peaty soil covered uplands area in the west and the lower elevations with minimal peat in the east, considered the most valuable wetland on the Proposed Development Site.

Also, under the 2024 EIA Report layout, a large area of moderately dependent MG10 habitat which covers much of the remaining borrow pit area would have been lost. Parts of this habitat drained into the adjacent low lying highly groundwater dependent M6 central wetland also and would have caused a further indirect effect. These predicted effects on GWDTE in relation to BP01 contributed to the Moderate and Significant predicted effect due to direct and indirect loss of highly dependent GWDTE during construction.

In recognition of the SEPA holding objection and that the stated criteria for selection of borrow pits was ‘to not locate borrow pits within any moderate/high risk GWDTE’ (Technical Appendix 3-1), the Applicant has removed BP01 from the layout. This removes any predicted effect on GWDTE, as shown on Figure 8-5b Assessed GWDTE within 250m of Infrastructure.

BP02

BP02 is now, following the removal of BP01, the new easternmost borrow pit. With the removal of BP01, this borrow pit will be extended as shown in Figure 1-2 Site Layout. Even with the extension in area, BP02 will not affect any highly or moderately dependent GWDTE, as shown on Figure 8-5b Assessed GWDTE within 250m of Infrastructure.

BP03 and BP04

BP03 and BP04 are the two westernmost borrow pits. They are contiguous and straddle the track between turbine 4 and turbine 1. With the removal of BP01, both borrow pits will also be extended in area as shown in Figure 1-2 Site layout. Even with the expansion in area, BP03 and BP04 do not contain any highly or moderately dependent GWDTE and there will be no further predicted effect on GWDTE, as shown on Figure 8-5b Assessed GWDTE within 250m of Infrastructure.

M9

SEPA, in their consultation response, noted positively that 'The GWDTE mitigation measures suggested in a previous consultation are included in the design mitigation'. SEPA did however query the location of M9 GWDTE as it was not included in the assessed GWDTEs of Figure 8-5b, and noted that M9 base rich mire communities are rare in Scotland and should be protected. The M9 location, occurrence and characteristic, their protection, and the absence of any predicted effect are explained below.

The M9 occurrence is located at Grid Reference: NS 74697 87412. This is circa 190m East of Watercourse crossing 4. It is very small in area, circa 35m x 13m only. This is the reason why, although present and marked on Figure 8-4: NVC with its own key, it is difficult to find. It is also marked on Figure 8-5b Assessed GWDTE within 250m of Infrastructure, as highly groundwater dependent, it is difficult to observe on the figure due to its size and it merges with the adjacent highly dependent M35.

The M9 is on a slightly raised small spur at the head of a small east-west watercourse valley trending west at the northern base of Drummarnock Hill. There is an existing rough track passing over it. The remainder of the valley is mapped as a circa 110m x 10m wide M35 community, also assessed as highly groundwater dependent. The valley lies between 90 and 150m east of watercourse crossing 4. The M9 is roughly halfway along the valley. Either side of the valley is MG10 mesotrophic grassland, considered moderately groundwater dependent.

Although JNCC (2001) describes M9 as 'characteristic of soft, spongy peats kept permanently moist by at least moderately base-rich and calcareous waters', there is no peat at this location. JNCC continues 'M9 waters and substrates always have a pH above 5 and usually above 6. It is commonest in wetter parts of topogenous mires in hollows or old peat workings, but also around springs, laggs of raised mires and mowing marshes'. The M9 occurs here as the M9b sub-community, a rather species poor mire community which does not contain the rich assemblage seen in M9a sub-communities. It is on the Scottish Biodiversity List under the lowland and upland flush.

JNCC (2001) describes the neighbouring M35 as typical of spring-heads and as rills, fed by circumneutral and quite oligotrophic waters which are typically rather base and nutrient poor with growth often submerged in the shallow waters, with a floating or shortly emergent canopy.

Both the M9 and the M35 are located on thin glacial deposits on the boundary between the Gargunnock Hills Lava Member and the intrusive Midland Valley Sill-Complex. The latter comprises basic alkaline bedrock. It may be the source of the base rich minerals for the shallow subsurface bedrock flow which discharges and collects as the water supply to both the M9 and the M35, forming a slightly base rich spring line. The original Hydrology and Hydrogeology Chapter characterised both the M35 and M9 as highly groundwater dependent and this remains the same.

The M9 is between 30-50m south and above the nearby proposed track and therefore within the 250m infrastructure buffer zone. There will be no direct loss. Given the elevated nature of the M9 at the head of the small valley, there is no hydraulic continuity between the track and the M9. Therefore, there will be no indirect effect on the M9 either. The mitigation works already acknowledged by SEPA for the M35 will also apply to the M9 and will act in a protective, precautionary manner.

Summary of Predicted Effect on GWDTE

Moderate residual effects on GWDTE during construction were originally predicted, due to direct and indirect loss of high and moderate dependency GWDTE. The removal of BP01 has substantially reduced the direct and indirect loss of high dependency M6 in what is considered the most valuable

wetland on the site. The removal of BP01 also avoids a large area of loss of moderately dependent MG10.

It is considered that with the reduced magnitude of effect, the new effect on GWDTE will now reduce to Minor. During Operation and Decommissioning, there will be no further effect of direct or indirect loss of high or moderately dependent GWDTE over that during construction. The magnitude of the predicted effect is No Change. Consequently, the predicted effect during Operation and Decommissioning remains Negligible and therefore Not Significant.

Peat

Peat Landslide Hazard Risk Assessment

SEPA note in their consultation response that 'The Peat landslide risk is deemed low but there is proposed mitigation'.

This section provides the amendment to the original PLHRA (TA8-2) included within the 2024 EIA Report. The updated borrow pit footprints have been reviewed against the previously prepared results. Based on the combined landslide likelihood (from landslide susceptibility and Factor of Safety approaches), there were no substantive areas of overlap between infrastructure and areas of Moderate or higher likelihood terrain within the Proposed Development Site.

Based on this review, a small section of the footwall of BP03 overlaps with a small area of Moderate likelihood (over the last 7m of the borrow pit footprint). Since excavation works for the borrow pit will involve stripping of peat, underlying weathered material and then rock in a downslope direction towards this area (working away from the access track), peat will be removed, or, at worst mobilised locally into the borrow pit floor (towards the north), and will not lead to runout towards Buckie Burn (the only nearby environmental receptor).

It should be noted that the borrow pit footprints are the maximum search areas from which rock will be extracted, and that the 5m excavation depths proposed in each pit could be deepened to reduce footprint extent.

It is recommended that this area is highlighted in the Construction Environmental Management Plan (CEMP) for a watching brief during construction to monitor the stability of the works, the primary receptor being operatives working against the worked face of the borrow pit. If post-consent ground investigation indicates any concerns in this location, then the footprint of the borrow pit should be reduced slightly at this southern limit to avoid the area in question. There is sufficient capacity in the borrow pit footprints to accommodate a reduction in footprint and still enable all peat to be reused (see updated standalone Technical Appendix 2 PMP).

Peat Restoration

SEPA highlighted concerns that peat restoration at BP01 may not tie in with the surrounding MG10 vegetation and questioned whether this would be for disposal of waste rather than ecological benefit and therefore may require a Waste Management Licence. As BP01 has been removed, this is no longer considered to be an issue.

With the removal of BP01, the PMP has been revised (Technical Appendix 2). It identifies a permanent peat excavation volume of 19,803m^3. Peat reuse will now be in borrow pits BP02, BP03 and BP04. All of these borrow pits are located in the undulating peat and peaty soil covered uplands area of the Proposed Development Site in the west, as opposed to the lower elevations with minimal peat (PMP, Plate 8-3-1) and where BP01 was located. There are no other opportunities for reuse or reinstatement within the Proposed Development Site.

BP02 and BP03 will be restored as permanent peat stores with peat only, at 5,024m^3 and 10,774m^3 respectively. BP04 will be reinstated with 4,063m^3 peat in its southern (downslope) section, with soil being placed to 1.5m depth in at its northern (downslope) section end. A peat reuse volume in borrow pits of 19,860m^3 is calculated. Thus a peat balance will be achieved. Acrotelmic and catotelmic peat volumes are also largely balanced.

Borrow pits will be excavated to c. 5m, substantially below ground level over most of their footprints and will therefore naturally collect moisture, increasing their viability as permanent peat stores for materials excavated from infrastructure locations. Careful borrow pit design, which is discussed further below, will ensure the peat stays wet thus maintaining its integrity as a carbon store and peat vegetation.

The design principles adopted for borrow pits in the PMP include lining with impermeable clay from till, reverse incline toward headwall, retention cells, hydrologically calculated and designed berm crests, and a monitoring programme. These will ensure retention of moisture content and permanent sustainable peat bodies.

As such, the reuse of peat in these borrow pits will have an ecological and carbon benefit and will not require waste licencing. There is no requirement therefore to seek unsustainable peat waste disposal opportunities off-site.

Summary of Predicted Effect on Peat

The predicted residual effect on peat loss and disturbance remains Minor. This assessment remains unchanged from the 2024 EIA Report.

Private Water Supply

SEPA recommended in its consultation response that the source location of Muirpark Farm PWS should be confirmed, and, if found to be within prescribed buffers, a bespoke risk assessment undertaken.

Muirpark Farm PWS has now been located and is located within prescribed buffers to an access track and watercourse crossings and is shown on Figure 8-6. A Private Water Supply Assessment (PWSA) for Muirpark PWS has been undertaken and can be found in Technical Appendix 5.

The assessment concluded that no Proposed Development infrastructure is located within the PWS source catchment, and as such Muirpark PWS is not hydrologically connected.

It is proposed that, should the Proposed Development be consented, a suitably worded planning condition be put in place to ensure an Environmental Clerk of Works (EnvCow) is present for the duration of the works, a Drainage Management Plan (DMP) is implemented, regular monitoring during construction is undertaken, a Water Quality Monitoring Plan (WQMP) produced, and contingency supply and emergency procedures are in place.

The predicted residual effect is considered to be low and not significant.

Surface Water Quality

Bannock Burn and North Third Reservoir

In its consultation response, SEPA stated that ‘the North Third Reservoir is downstream of site and has been experiencing an increased number of algal blooms of late. SEPA would require adequate mitigation on site to avoid silt runoff into the Bannock Burn.’

The 2024 EIA Report acknowledged that North Third Reservoir is less than 1km downgradient of the Proposed Development Site and that it is in hydrological connectivity with the Proposed

Development via the Bannock Burn. This connectivity to the Bannock Burn and other surface waterbodies and including North Third Reservoir, contributed to the Major direct, probable, adverse, and medium term predicted effects on surface water, without additional mitigation. This predicted effect included the potential for release of nutrients from the Proposed Development liable to cause eutrophication pollution.

As well as 50m watercourse buffers, the proposed additional mitigation for surface water and pollution prevention includes the following sub plans to the CEMP. These plans will be submitted to and agreed with SEPA before commencing construction. Aspects of these will apply also during Operation and Decommissioning also.

- Pollution Prevention Plan (PPP);
- Drainage Management Plan (DMP); and
- Water Quality Monitoring Programme (WQMP).

It is anticipated that the preparation and implementation of these plans and programmes would be applied as planning conditions should the Proposed Development be consented.

The PPP will reference the extensive guidance and outline protocols for pollution control. It will include reference to cementitious materials, other hazardous substances and prohibited materials. The PPP will address such activities as use and storage, spillage kit and emergency procedures for chemical pollution of surface water, concrete pouring and mixing protocols and use of construction compounds. Inspection and maintenance regimes will be identified for implementation. They will add avoidance of nutrient such as sewage discharge and other anthropogenic pollution to this plan.

The DMP will comprise procedures and detailed methods and measures for the collection and treatment prior to discharge of surface water runoff. This will include runoff from excavated land, material stockpiles, hard standing areas, access tracks, turbine foundations, site compounds, site buildings and borrow pits. It will include details relating to both new and existing field drains. Treated construction runoff will be designed to shed at regular intervals to grassland, blind ditches and/or silt settlement areas, particularly on steep slopes. Adequately sized silt settlement lagoons will be provided in areas of risk. Particular attention will be paid to drainage runoff from borrow pits and roads on steep inclines leading to watercourse crossing points.

The drainage design and management will comply with the Environmental Authorisations (Scotland) Regulations 2018 as amended. Track drainage design will comply with General Binding Rules under the 2018 Regulations for the track drainage. Requirements for Environmental Authorisations will be assessed and the necessary notifications, authorisations and permits as necessary will be sought.

The surface water drainage and treatment will be designed in line with Sustainable Drainage Systems (SuDS) principles and in accordance with the General Binding Rules of the 2018 Regulations. There is a large body of best practice guidance for construction management, drainage design and control for the avoidance and minimisation of this potential effect. This will be incorporated into the DMP.

The extensive mitigation proposed above applies to any hydrologically connected receptor. These mitigations will ensure that North Third reservoir eutrophication which is causing the algal blooms referenced by SEPA will not be exacerbated by silt run off into the Bannock Burn from the Proposed Development.

The residual predicted effect post-mitigation on the North Third reservoir will be Minor and not-significant.

Buckieburn reservoir

The SEPA consultation response noted that: '*The development sits at the top of the Buckie Burn catchment but the developer claims there is no hydrological connectivity. Should pollution reach the Buckie Burn, it will drain down into the Buckieburn Reservoir, where the University of Stirling abstract water for aquaculture purposes at the Niall Bromage Research Unit at Easter Buckieburn*'.

Although the Proposed Development Site drains via multiple east and southeast flowing tributaries into the Buckie Burn, the Buckieburn reservoir is located 1.5 km south and 4 km hydrologically upgradient in the Buckie Burn sub-catchment and is fed by southern tributaries of the Buckie Burn. These southern tributaries of the Buckie Burn which supply Buckieburn reservoir are not connected with the Proposed Development. This can be seen from the surface water catchments shown on the Water Feature plan, Figure 8-1. There is no hydrological connectivity between the Buckieburn reservoir and the Proposed Development. Therefore there is no risk to the Buckieburn reservoir from the Proposed Development.

Auchenbowie/Loch Coulter catchment

The SEPA consultation response noted that: 'Several tributaries of the Auchenbowie Burn also lie within the site. Although Milnholm fishery has now closed, there is an active abstraction from Auchenbowie weir into the lade which feeds the Swanswater recreational fishery at Cultenhove. This water then discharges into the Bannock Burn catchment'. It is assumed SEPA are bringing this to the attention of the Applicant as a sensitive receptor.

It is correct that several tributaries of the Auchenbowie burn lie within the Proposed Development Site as noted in the 2024 EIA Report and Figure 8-1 Water Features. This noted that 1.5km of the proposed eastern access track, two watercourse crossings WC1 and WC2, the substation and the temporary construction compound in the east of the Proposed Development Site are present in the Auchenbowie Burn (Loch Coulter Reservoir to River Carron) waterbody.

The Swanswater Fishery is 4km northeast of the nearest part of the Proposed Development. The area is outwith the bounds of Figure 8-1 Water Features.

Examination of the SEPA Water Classification Hub[6] indicates that the Swanswater Fishery is actually fed by the Sauchie Burn which is part of the Bannock Burn (Source to Sauchie Burn confluence) waterbody. The Sauchie Burn flows north through Cultenhove Dam and then into Swanswater before discharging into the Bannock Burn 800m further east, at least 6km beyond and downstream after it passes through North Third Reservoir.

As such there is no hydrological connectivity between the Auchenbowie/Loch Coulter Catchment and the Proposed Development.

Craigengelt DWPA

Scottish Water note in its consultation response that:

'The proposed activity falls within drinking water catchments where Scottish Water abstractions are located. Scottish Water abstractions are designated as Drinking Water Protected Areas (DWPA) under Article 7 of the Water Framework Directive. Craigengelt supplies Carron Valley Water Treatment Works (WTW) and it is essential that water quality and water quantity in the area are protected. The activity is a sufficient distance from the intake that it is likely to be low risk to water quality. Care should be taken to protect any nearby water courses and in particular care should be taken with any plant and equipment using hydrocarbons. Scottish Water have produced a list of

[6] https://informatics.sepa.org.uk/WaterClassificationHub/

precautions which details protection measures to be taken within a DWPA, the wider drinking water catchment and if there are assets in the area. Please note that site specific risks and mitigation measures will require to be assessed and implemented. We welcome receipt of this notification about the proposed activity within a drinking water catchment where Scottish Water abstractions are located. We should be notified at least 3 months in advance of any work commencing on site. The fact that this area is located within a drinking water catchment should be noted in future documentation. Also, anyone working on site should be made aware of this during site inductions.'

The 2024 EIA Report concluded 'There are no public water supplies in hydrological connectivity and no associated DWPA'. In light of Scottish Water comments, this assessment has been revisited.

It is uncertain what Scottish Water mean by the Graigengelt abstraction serving Carron Valley WTW. The SEPA reservoir map does not recognise any reservoir called Craigengelt, as identified by Scottish Water. It does recognise a reservoir 1.5km south of the Proposed Development and 300m southeast of a hamlet called Craigengelt which is known as Buckieburn Reservoir. Buckieburn Reservoir is not used for public water supply. This may be the reservoir referred to by Scottish Water. It is not used for public water supply and does not have an associated DWPA.

SEPA identify that the reservoir and DWPA in question supplies Carron Valley WTW. There is a large DWPA for the catchment of Carron Valley Reservoir, further to the southeast which does supply Carron Valley WTW. It is possible that this has been confused with Craigengelt and Buckieburn and is the DWPA and reservoir referred to by Scottish Water. This is the nearest DWPA to the Proposed Development. This is shown on the DWPA Scottish River Basin District Surface Water Maps[7] (Map 10 of 22). This is in an entirely different surface water body as shown on SEPA Water Classification Hub.

Scottish Water has confirmed that North Third reservoir and Loch Coulter reservoirs are not in use to supply the public and that their catchments are not DWPA under Article 7 of the Water Framework Directive, nor are shown as DWPA on the Scottish Government maps of surface water DWPAs.

This confirms that the Proposed Development is not located within any DWPA.

Summary of Predicted Effect on Surface Water

The predicted effects on sediment and other pollution of surface watercourses remains Minor.

5.3 Summary of Changes to the Significance of Effects

There are no changes to the significance of effects from the 2024 EIA Report.

[7] https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps

6. Chapter 13: Climate Change and Carbon Balance

Chapter 13 of the 2024 EIA Report assesses the potential impacts of the application layout of the Proposed Development on climate change and carbon balance.

This section of the AI Report evaluates the effects of the Amended Design of the Proposed Development on climate change and carbon balance. It supplements Chapter 13 of the 2024 EIA Report which should be read in conjunction with this section and Technical Appendix 4 Carbon Calculator.

The Carbon Calculator Tool, ('Carbon Calculator') has been developed by the Scottish Government to support the process of determination of onshore wind farm developments in Scotland. The purpose of the tool is to comprehensively assess the predicted carbon impact of the Proposed Development.

The Carbon Calculator calculates the balance of total carbon savings and release over the life of the Proposed Development. The potential carbon savings and release associated with wind farms are:

- Carbon emission savings due to generation (based on displacing emissions from different power sources). The Carbon Calculator is limited to considering displacement of energy generation exported to the electricity grid and although carbon intensive energy for heat and transport will be increasingly decarbonised by electrification and therefore effectively displaced by renewable electricity production, the carbon assessment tool does not take this into account when calculating emission savings:
- Lifetime release associated with manufacture of turbines and construction;
- Loss of carbon from backup power generation;
- Loss and/or saving stored in peatland (by peat removal or changes in drainage); and
- Carbon gains due to proposed habitat enhancements.

The inputs and outputs of the Carbon Calculator are presented with 'Expected' values – the best estimate of the anticipated value, based on the current understanding of the Proposed Development. Alongside 'Minimum' and 'Maximum' values to give a range of possible outputs, dependent on the variables within the model.

Other outputs of the Carbon Calculator include the length of time it will take the carbon savings of the Proposed Development to match the carbon release associated with its lifecycle, this is referred to as the 'payback period'.

Where practicable, site-specific data (such as peat depth, and dimensions of infrastructure) have been used in the assessment.

6.1 Limitations

As the online version of the Scottish Government's Carbon Calculator Tool for wind farms on Scottish peatlands remains unavailable at the time of writing this report, this revised calculation was undertaken using the offline version, 'Scottish Government Windfarm Carbon Assessment Tool – Version 2.14.1' dated 27/01/2023.

This offline version of the Carbon Calculator differs from the online version in the background calculations. It is not clear as to what the differences in these calculations are, as the Carbon Calculator does not allow them to be accessed.

However, it is readily apparent that the online Carbon Calculator does handle the background calculations differently, as the outputs differ greatly when comparing the online version to the offline version, even when using exactly the same input information.

The offline Carbon Calculator is an older version of the tool and likely overestimates effects on carbon emissions and payback time. The more recent online version of the Carbon Calculator was the version used previously in the 2024 EIA Report, and the outputs for the Proposed Development in that assessment are more applicable to real-world values.

However, as the 2024 EIA Report used the online version of the Carbon Calculator, due to the differences in background calculations aforementioned, this impedes direct comparison to the Amended Design layout on the offline version.

As such, for the purposes of a meaningful comparison between the previous Proposed Development layout in the 2024 EIA Report and the Amended Design in this AI Report, both layouts have been re-assessed using the same offline version of the Carbon Calculator.

The offline Carbon Calculator results have been presented in this AI Report for both the Amended Design and the previous 2024 EIA layout to enable direct comparison and to easily see how the changes made in this AI Report have affected the outputs of the Carbon Calculator.

Despite this limitation, the overall assessment of effects remains unchanged by these differences.

6.2 Assessment of Design Amendment Effects

The following effects are considered in the EIA Report and have been re-assessed as a result of design amendments:

- Carbon Displacement and Savings;
- Carbon Releases (Losses);
- Carbon Gains due to improvement of the Proposed Development Site;
- Payback Period; and
- Carbon Intensity.

No further design amendments have been made, therefore the following assessment of effects remain unchanged from the 2024 EIA Report:

- Vulnerability of the Proposed Development to Climate Change;
  - Wind Speed;
  - Precipitation; and
  - Temperature.
- Influence of the Proposed Development on Climate Change:
  - Renewable Energy Generation.

6.3 Assessment of Effects

6.3.1 Carbon Displacement and Savings

A renewable energy development would have maximum potential to save carbon emissions when substituting coal fired generation. However, due to uncertainty in future grid mix and energy policy, it is not possible to define the electricity source for which the Proposed Development would substitute generation.

For this reason, carbon emission savings are calculated by the Carbon Calculator are given for each fuel-mix. The potential annual carbon emission savings for the Amended Design (AI Report) and the EIA 2024 Report layout are provided in Table 3.

It is shown in Table 3 for a grid mix of electricity generation, the Proposed Development is expected to result in an emission saving each year of 36,240 tonnes CO_2 equivalent.

Table 3: CO2 Emission Saving over (tonnes CO2 eq.) due to the Proposed Development

Generation Type	AI Report	2024 EIA	AI Report	2024 EIA	AI Report	2024 EIA
	Expected		Minimum		Maximum	
Coal-Fired electricity Generation	**8,554**	**8,554**	7,699	7,699	9,410	9,410
Grid-mix of electricity generation	**36,240**	**36,240**	32,616	32,616	39,864	39,864
Fossil fuel mix of electricity generation	**59,051**	**59,051**	53,146	53,146	64,956	64,956
Energy output from windfarm over lifetime (40 years) (MWh)	**3,679,200**	**3,679,200**	3,311,280	3,311,280	4,047,120	4,047,120

As noted above, the Carbon Calculator is limited to considering displacement of energy generation exported to the electricity grid; although carbon intensive energy for heat and transport will be increasingly decarbonised by electrification, and, therefore, effectively displaced by renewable electricity, the tool does not take account of this in calculating emission savings.

This is considered to be a positive effect of Moderate significance *i.e.*, a material, but non-fundamental change, alteration of the baseline condition.

6.3.2 Carbon Releases (Losses)

The manufacturing, construction and installation of the wind turbines and associated infrastructure throughout the lifecycle of the Proposed Development has carbon release associated with it, and carbon releases are generated by the requirement for extra capacity to back up wind power generation. Carbon releases are also associated with the excavation of soil organic in peat that occurs during construction.

Carbon emissions are shown in Table 4 and compare the Amended Design with the previous 2024 EIA layout.

Table 4: Total CO2 emissions due to the Proposed Development (tCO2 eq.)

Emission Type	AI Report	2024 EIA	AI Report	2024 EIA	AI Report	2024 EIA
	Expected		Minimum		Maximum	
Emissions due to turbine life (*e.g.*, manufacture, construction, decommissioning)	**26,160**	**26,160**	26,160	26,160	26,160	26,160
Emissions due to backup	**33,744**	**33,744**	33,744	33,744	33,744	33,744
Emissions due to reduced carbon fixing potential	**1,009**	**1,235**	265	337	5,801	6,436
Emissions from soil organic matter	**8,181**	**11,449**	-123	-859	69,789	97,544
Emissions due to DOC & POC leaching	**11**	**3**	0	0	102	63
Emissions due to felling forestry	**0**	**0**	0	0	0	0
Total CO_2 emissions due to wind farm (tCO_2 eq.)	**69,105**	**72,591**	60,046	59,381	135,596	163,947

As a result of the removal of BP01 and the minor track amendment, the Proposed Development's Amended Design will result in a minor reduction in total emissions when compared with the 2024 EIA layout.

This is still considered to be an adverse effect of Minor significance *i.e.*, a slight, detectable, alteration of the baseline condition.

6.3.3 Avoided Carbon Releases due to Improvement of the Proposed Development Site

Table 5 shows the estimated avoided carbon emissions, over the lifetime of the Proposed Development, from improvements to the Proposed Development Site.

Peat reinstatement of the borrow pits will be undertaken during Decommissioning. This will be dependent upon water table levels and borrow pit design and will be refined through further assessment prior to construction.

Due to this, it is assumed for the purpose of the Carbon Calculator there will be no change in the water table depth and therefore no "gain" considered (in terms of the carbon assessment tool methodology).

The total carbon gains are shown in Table 5 and compares the carbon gains of the Amended Design to the 2024 EIA layout. The values are negative numbers because they are atmospheric removals or avoided emissions. It should be noted that the Carbon Calculator is conservative about estimating the gains from restoration, only accounting for changes in the balance of methane to carbon dioxide emissions from the restoration of degraded bogs.

Table 5: Total CO2 due to the Proposed Development (tCO2 eq.)

Emission Type	AI Report	2024 EIA	AI Report	2024 EIA	AI Report	2024 EIA
	Expected		Minimum		Maximum	
Change in emissions due to improvement of degraded bogs	**-1,042**	**-71**	0	0	-3,133	-212
Change in emissions due to improvement of felled forestry	**0**	**0**	0	0	0	0
Change in emissions due to restoration of peat from borrow pits	**0**	**0**	0	0	0	0

Emission Type	AI Report	2024 EIA	AI Report	2024 EIA	AI Report	2024 EIA
	Expected		Minimum		Maximum	
Change in emissions due to removal of drainage from foundations & hardstanding	**-333**	**-333**	0	0	-4,573	-4,573
Total change in emissions due to improvements (tCO_2 eq.)	**-1,376**	**-404**	0	0	-7,686	-4,785

Potential effects on peat are considered further in Section 5: Hydrology, Geology and Hydrogeology.

This is considered to be a positive effect of Moderate significance *i.e.*, a material, but non-fundamental change, alteration of the baseline condition.

6.3.4 Payback Period

The payback period is calculated by taking the total carbon release (carbon emissions) associated with the Proposed Development and dividing that figure by the annual carbon gains from displaced fossil fuel power generation and any site improvements.

The shorter the payback period, the greater benefit the Proposed Development will have in displacing greenhouse gas emissions associated with electricity generated by burning fossil fuels.

When taking into consideration the potential renewable energy generation, displacement and savings of carbon and carbon release, the Proposed Development is expected to payback the carbon release in 1.9 years compared to the grid mix electricity generation (Table 6). At which time it is estimated to be carbon neutral.

After 1.9 years, the Proposed Development will continue to offset carbon throughout the rest of its Operational lifetime, resulting in a net positive.

There are no current guidelines on what payback time would be considered a significant effect, but this represents only 4.75% of the total Operational life of the Proposed Development.

This is considered to be a positive effect of Moderate significance *i.e.*, a material, but non-fundamental, alteration of the baseline condition.

Table 6: Carbon Payback Time of the Proposed Development

Grid Mix	AI Report	2024 EIA	AI Report	2024 EIA	AI Report	2024 EIA
	Expected		Minimum		Maximum	
Coal-fired electricity generation (years)	**7.9**	**8.4**	5.6	5.8	17.6	21.3
Grid-mix of electricity generation (years)	**1.9**	**2.0**	1.3	1.4	4.2	5.0
Fossil fuel-mix of electricity generation (years)	**1.1**	**1.2**	0.8	0.8	2.6	3.1

6.3.5 Carbon Intensity

The Scottish Government's Climate Change Plan (2018) states that by 2030 Scotland will have a largely decarbonised electricity system with a grid carbon intensity of 0.05kg CO_2e/kWh.

An update to the Climate Change Plan was issued in 2020 through the Securing a Green Recovery on a Path to Net Zero: Climate Change Plan 2018–2032 – Update. The update confirmed that the carbon intensity of electricity generated in Scotland has fallen to less than 50g CO_2e/kWh in both 2018 and 2019.

The Proposed Development is expected to have a carbon intensity of 18g CO_2e/kWh (Table 7), a figure below the achieved carbon intensity target. Therefore, the Proposed Development is anticipated to further support Scotland's Climate Change Plan by maintaining and exceeding the target already achieved.

The Amended Design therefore represents a minor 2 CO_2e/kWh decrease in carbon intensity compared with the 2024 EIA layout.

This is considered to be a positive effect of Moderate significance i.e., a material, but non-fundamental, alteration of the baseline condition.

Table 7: Carbon Intensity of the Proposed Development (g CO2e/kWh)

	AI	2024 EIA	AI	2024 EIA	AI	2024 EIA
Carbon Intensity	**Expected**		**Minimum**		**Maximum**	
Carbon Intensity (gCO_2e/kWh)	**18**	**20**	13	13	41	50

6.4 Summary of Changes to the Significance of Effects

There is no change to the significance of effects from the 2024 EIA Report.