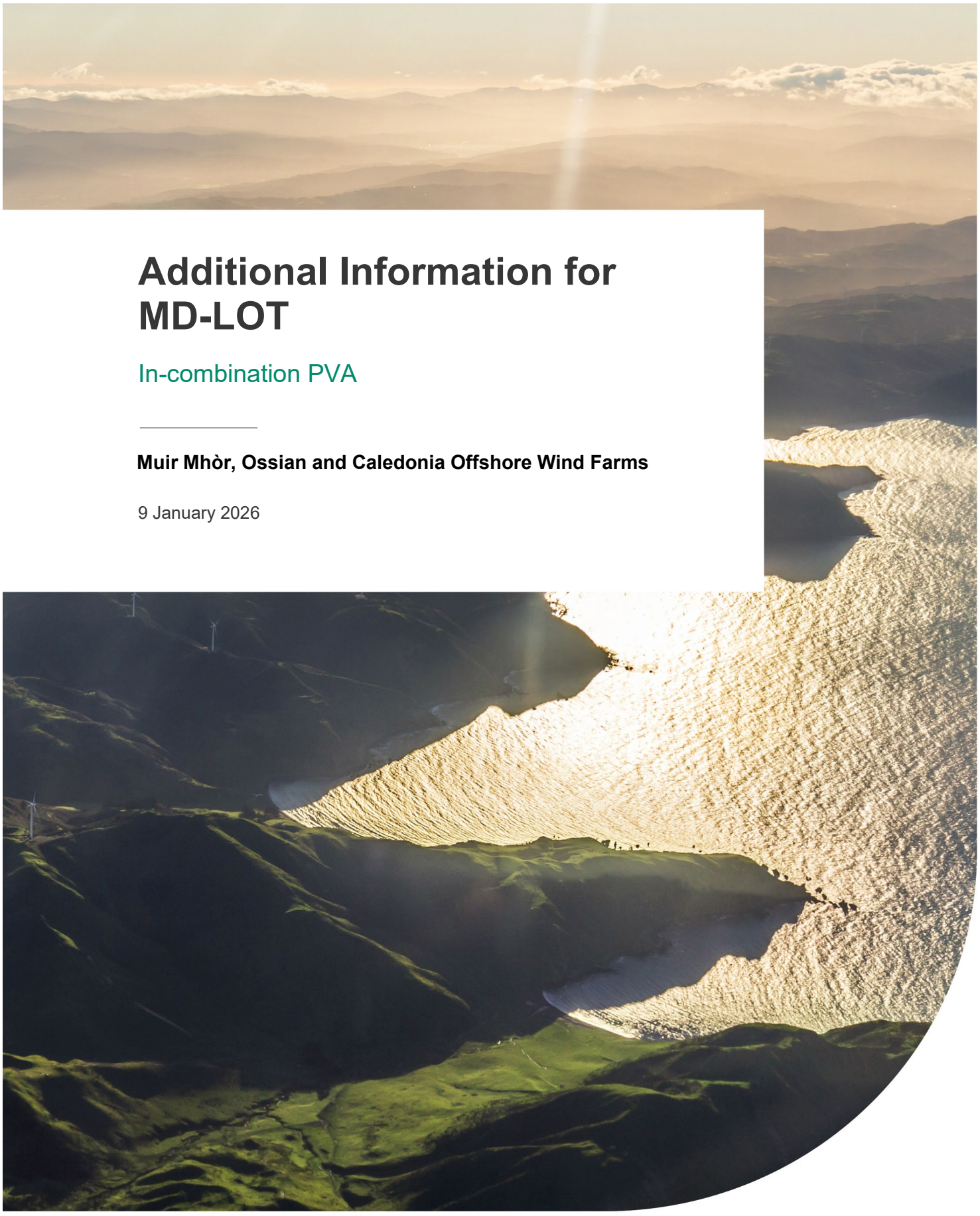

Additional Information for MD-LOT

In-combination PVA

Muir Mhòr, Ossian and Caledonia Offshore Wind Farms

9 January 2026

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Document history

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Note: This report has been produced on behalf of the Muir Mhòr, Ossian and Caledonia projects.

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Contents

1. Context

Three offshore wind projects (Muir Mhòr, Ossian and Caledonia) submitted Additional Information (AI) to MD-LOT in autumn 2025. The three projects provided updated Population Viability Analyses of predicted impacts on SPA qualifying features in their respective submitted AIs based on the most recently publicly available information. This, however, did not include updated predicted impacts from all three projects in-combination with other reasonably foreseeable plans and projects. The reason for this is that these predicted impacts were not available to each project at the time of their respective Additional Information submissions.

MD-LOT advised that, in order to complete an in-combination Appropriate Assessment, PVAs for the predicted impacts from the three projects combined with other reasonably foreseeable plans and projects would be required. In consultation with NatureScot and MD-LOT, the SPA qualifying features requiring a PVA to inform the Appropriate Assessments were identified following a PVA screening exercise agreed with NatureScot (Section 2.1). The results detailed in this submission are provided to ensure that MD-LOT have the information required to draw conclusions within each projects Appropriate Assessment.

2. In-combination PVA

2.1. Approach to screening SPA qualifying features

A screening approach was discussed and agreed with NatureScot to determine which SPA qualifying features needed a PVA to inform the Appropriate Assessment to be completed by the competent authority (MD-LOT). A four step approach using a PVA screening tool was agreed with NatureScot:

1. Collate all SPA features with connectivity and predicted impacts from at least one of the Muir Mhòr, Ossian and Caledonia projects;
2. Include only SPA qualifying features with connectivity with two or more of the Muir Mhòr, Ossian and Caledonia projects;
3. Include only SPA qualifying features where the predicted in-combination impacts exceeded a change in adult survival of 0.02% points (as recommended in NatureScot Guidance Note 11); and
4. Include only SPA qualifying features where an Adverse Effect on Site Integrity has been concluded, and compensation is proposed, by at least one of the Muir Mhòr, Ossian and Caledonia projects.

Step 1 in this approach identified 67 SPA features (Table 5.5) which were reduced to 32 SPA features by Step 2, as the other 35 SPA features were only predicted to be impacted by one of the Muir Mhòr, Ossian or Caledonia projects, meaning that any PVAs included in the respective projects' autumn 2025 AI submissions remain valid.

Applying Step 3 removed a further SPA qualifying feature, as the total in-combination predicted impact did not result in a predicted change in adult survival or 0.02 percentage points or more.

Finally, it is not possible to conclude no Adverse Effect on Site Integrity in-combination if one (or more) of the Muir Mhòr, Ossian or Caledonia projects alone have already concluded an Adverse Effect on Site Integrity (and are proposing compensation for that SPA qualifying feature) within their respective project RIAAs. Consequently, fifteen SPA qualifying features were removed due to an existing Adverse Effect on Site Integrity (and proposed compensation) from one, or more, of Muir Mhòr, Ossian or Caledonia.

The PVA Screening tool is provided as Annex A for reference.

2.2. Consultation with NatureScot

NatureScot provided feedback on a draft PVA screening tool [email 16 December 2025] which noted four key elements:

1. Four SPA features with connectivity to more than one of the three projects had been excluded erroneously;
2. The razorbill feature at the West Westray SPA was included in Step 2 erroneously;
3. SPA population sizes for some features appeared to be inconsistent with the proposed approach; and
4. Several SPA features where one of the projects had already determined that no Adverse Effect on Site Integrity could not be excluded should have been included in PVAs for the other project but with compensated numbers removed.

Each of these four points are considered in more detail below.

2.2.1. SPA feature connectivity

Kittiwakes at West Westray SPA have been added to the PVA selection tool. This species is included in Step 1 and Step 2 but excluded at Step 3 as Muir Mhor have predicted an in-combination adverse effect and are proposing compensation.

Kittiwake at Cape Wrath SPA has been added to the remaining steps of the PVA selection tool and a PVA for this feature will be run and results provided.

Puffin at Coquet Island and Farne Islands SPAs were added to the PVA selection tool. Both features will have a PVA completed and the results provided.

2.2.2. Razorbill feature of the West Westray SPA

This feature should have been screened out of the PVA selection tool at Step 2, as only the Caledonia project was predicting impacts to this feature.

2.2.3. SPA feature population sizes

NatureScot noted that the source for the kittiwake feature at the Copinsay SPA was incorrect and the correct source was the SMP database, however there was no issue with the population size used. This correction is noted.

NatureScot noted that the population size used for the kittiwake feature of the Marwick Head SPA was larger than the value from the Ossian RIAA. The smaller population size from the Ossian Additional Information addendum (1,812 individuals) will be used in an updated PVA.

NatureScot noted that the population size for the puffin feature of the Forth Islands SPA was larger than the value from the Ossian RIAA. As Ossian did not update their assessment of this feature in their Additional Information addendum, the smaller of the two values, agreed with NatureScot, between the two addenda values used by Muir Mhòr and Caledonia was used (90,291 individuals).

2.2.4. Excluded compensated values from in-combination PVAs

NatureScot noted that some of the SPA features where compensation was being progressed by Muir Mhòr, Ossian or Caledonia were being assessed in PVAs that included the compensated predicted impacts. It was discussed and agreed with NatureScot [meeting with Muir Mhòr only on 17 December 2025] that this would progress as is, albeit at risk. However, the approach taken in these assessments was confirmed as the correct approach to use to inform the Appropriate Assessments by MD-LOT [email 19 December 2025].

2.3. Screening results

The screening process described above resulted in 16 SPA qualifying features requiring a PVA to inform MD-LOT's Appropriate Assessment. These are shown in Table 2.1. The predicted impacts from each of the three projects requiring an Appropriate Assessment and the predicted impacts from other, consented, projects and the predicted change in adult survival rate is shown in Table 5.6.

Table 2.1: List of SPA qualifying features requiring PVA.

Species	SPA
Gannet	Fair Isle
Gannet	Hermaness, Saxa Vord and Valla Field
Gannet	North Rona and Sula Sgeir
Gannet	Noss
Gannet	Sule Skerry and Sule Stack
Kittiwake	Cape Wrath
Kittiwake	Copinsay
Kittiwake	Fair Isle
Kittiwake	Marwick Head
Kittiwake	Rousay
Puffin	Coquet Island
Puffin	Fair Isle
Puffin	Forth Islands
Puffin	Hoy
Puffin	North Caithness Cliffs
Puffin	Farne Islands

2.4. PVA models

PVA input parameters (Table 5.7) were based on NatureScot guidance and starting population sizes were based on published information agreed with NatureScot.

Models were run using the Natural England and JNCC seabird PVA tool (Searle *et al.* 2019).

Combined impacts from Muir Mhòr, Ossian and Caledonia were collated and summed from published AI reports and where relevant, original RIAA documents for the relevant projects. Predicted in-combination impacts were estimated using the in-combination values collated by Royal Haskoning DHV [version dated 3rd April 2025] on behalf of the North East and East Ornithology Group (a collective of 12 ScotWind offshore wind farm developers) with predicted impacts removed from SPA qualifying features that were already proposed to be compensated by the consented projects.

Outputs were provided as Microsoft Excel compatible files describing the inputs and outputs for each model run for each SPA qualifying feature. Files were provided to allow MD-LOT to reach conclusions in their Appropriate Assessment so no presentation or interpretation is presented here. The PVA output files are available to download from link presented in Annex B.

3. References

Searle, K., Mobbs, D., Daunt, F. & Butler, A. 2019. A Population Viability Analysis modelling tool for seabird species. Centre for Ecology & Hydrology report for Natural England. Natural England Commissioned Report NECR274.

4. Annex A: SPA screening tables

Table 4.2: List of 67 SPA qualifying features screened at the start of the assessment & total annual predicted impacts (using high displacement mortality rates from NatureScot Guidance Note 8) from each project (from Additional Information submissions).

Species	SPA	Muir Mhòr impact	Ossian impact	Caledonia impact
Gannet	Fair Isle	0.5	1.0	0.7
Gannet	Flamborough and Filey Coast	1.4	4.4	0.4
Gannet	Forth Islands	12.2	58.0	7.9
Gannet	Hermaness, Saxa Vord and Valla Field	2.2	3.8	1.2
Gannet	North Rona and Sula Sgeir	0.3	0.8	0.4
Gannet	Noss	1.1	2.1	0.9
Gannet	St Kilda	1.1	2.6	0.0
Gannet	Sule Skerry and Sule Stack	0.4	0.9	0.9
Guillemot	Buchan Ness to Collieston Coast	177.0	73.7	13.3
Guillemot	Calf of Eday			
Guillemot	Copinsay			
Guillemot	East Caithness Cliffs			
Guillemot	Fair Isle			
Guillemot	Farne Islands			
Guillemot	Forth Islands			
Guillemot	Fowlsheugh			
Guillemot	Hoy			
Guillemot	Marwick Head			
Guillemot	North Caithness Cliffs			
Guillemot	Rousay			
Guillemot	St Abb's Head to Fast Castle			
Guillemot	Sule Skerry and Sule Stack			
Guillemot	Troup, Pennan and Lion's Heads	107.2	54.1	34.1
Guillemot	West Westray			
Kittiwake	Buchan Ness to Collieston Coast	11.5	6.5	2.8
Kittiwake	Calf of Eday			
Kittiwake	Cape Wrath	0.2	0.0	0.2
Kittiwake	Copinsay	0.0	0.1	0.1
Kittiwake	East Caithness Cliffs	4.3	4.3	18.0
Kittiwake	Fair Isle	0.1	0.1	0.0
Kittiwake	Farne Islands	0.6	2.1	0.1

Species	SPA	Muir Mhòr impact	Ossian impact	Caledonia impact
Kittiwake	Flamborough and Filey Coast			
Kittiwake	Forth Islands	1.1	1.9	0.4
Kittiwake	Foula			
Kittiwake	Fowlsheugh	7.1	9.4	2.1
Kittiwake	Handa			
Kittiwake	Hermaness, Saxa Vord and Valla Field			
Kittiwake	Hoy			
Kittiwake	Marwick Head	0.1	0.1	0.2
Kittiwake	North Caithness Cliffs	0.9	0.8	2.5
Kittiwake	North Rona and Sula Sgeir			
Kittiwake	Noss			
Kittiwake	Rousay	0.1	0.1	0.1
Kittiwake	Shiant Isles			
Kittiwake	St Abb's Head to Fast Castle	0.8	2.7	0.3
Kittiwake	Sumburgh Head			
Kittiwake	Troup, Pennan and Lion's Heads	6.0	3.5	7.9
Kittiwake	West Westray	0.5	0.0	0.7
Puffin	Cape Wrath			
Puffin	Coquet Island	4.0	5.0	0.0
Puffin	Fair Isle	0.7	0.0	1.9
Puffin	Farne Islands	10.6	12.1	0.0
Puffin	Forth Islands	11.0	11.5	19.0
Puffin	Foula			
Puffin	Hoy	0.1	0.0	0.3
Puffin	North Caithness Cliffs	0.4	0.0	1.7
Puffin	North Rona and Sula Sgeir			
Puffin	Noss			
Puffin	Sule Skerry and Sule Stack			
Razorbill	East Caithness Cliffs			
Razorbill	Fair Isle			
Razorbill	Forth Islands			
Razorbill	Fowlsheugh	10.4	4.5	0.0
Razorbill	North Caithness Cliffs			
Razorbill	St Abb's Head to Fast Castle			
Razorbill	Troup, Pennan and Lion's Heads	4.4	0.9	3.0
Razorbill	West Westray			

Table 5.3: **Final 16 SPA qualifying features requiring a PVA to inform the Appropriate Assessment. Breeding adults = population size (individuals) of each SPA feature. Impacts from Muir Mhòr, Ossian, Caledonia and all other projects are the predicted annual mortalities from each source. Change in adult survival is the predicted percentage point change in annual adult survival.**

Species	SPA	Breeding population (adults)	Muir Mhor impact	Ossian impact	Caledonia impact	All others impact	Total impact	% change in adult survival
Gannet	Fair Isle	9,654	0.5	1.0	0.7	11.3	13.6	0.141
Gannet	Hermaness, Saxa Vord and Valla Field	39,606	2.2	3.8	1.2	68.7	75.8	0.191
Gannet	North Rona and Sula Sgeir	18,990	0.3	0.8	0.4	5.2	6.7	0.035
Gannet	Noss	24,670	1.1	2.1	0.9	35.8	39.9	0.162
Gannet	Sule Skerry and Sule Stack	15,648	0.4	0.9	0.9	32.6	34.8	0.222
Kittiwake	Cape Wrath	6,656	0.2	0.0	0.2	4.4	4.8	0.072
Kittiwake	Copinsay	592	0.0	0.1	0.1	3.8	4.0	0.680
Kittiwake	Fair Isle	896	0.1	0.1	0.0	4.2	4.4	0.490
Kittiwake	Marwick Head	1,812	0.1	0.1	0.2	3.4	3.8	0.207
Kittiwake	Rousay	660	0.1	0.1	0.1	9.4	9.7	1.473
Puffin	Coquet Island	50,058	4.0	5.0	0.0	52.0	61.0	0.122
Puffin	Fair Isle	13,332	0.7	0.0	1.9	9.5	12.1	0.091
Puffin	Farne Islands	87,504	10.6	12.1	0.0	161.5	184.1	0.210
Puffin	Forth Islands	90,291	11.0	11.5	19.0	344.1	385.6	0.427
Puffin	Hoy	722	0.1	0.0	0.3	3.1	3.5	0.484
Puffin	North Caithness Cliffs	5,438	0.4	0.0	1.7	51.9	54.0	0.992

Table 5.4: Input parameters used in PVA runs. Sources follow NatureScot guidance.

Species	Guillemot	Razorbill	Kittiwake	Puffin	Gannet
Simulations	5000	5000	5000	5000	5000
Seed	52	52	52	52	52
Burn-in (years)	10	10	10	10	10
Age first breeding (years)	6	5	4	5	5
Maximum brood size	1	1	2	1	1
Productivity rate (chicks per pair)	0.629	0.57	0.69	0.617	0.698
Productivity SD	0.174	0.247	0.296	0.151	0.071
Annual adult survival (SD)	0.939 (0.015)	0.895 (0.067)	0.854 (0.051)	0.906 (0.083)	0.919 (0.042)
Survival years 0 - 1	0.560 (0.013)	0.630 (0.209)	0.790 (0.051)	0.709 (0.022)	0.424 (0.007)
Survival years 1 - 2	0.792 (0.034)	0.630 (0.209)	0.854 (0.051)	0.709 (0.022)	0.829 (0.004)
Survival years 2 - 3	0.917 (0.022)	0.895 (0.067)	0.854 (0.051)	0.709 (0.022)	0.891 (0.003)
Survival years 3 - 4	0.939 (0.015)	0.895 (0.067)	0.854 (0.051)	0.760 (0.019)	0.895 (0.003)
Survival years 4 - 5	0.939 (0.015)	0.895 (0.067)		0.805 (0.017)	0.919 (0.042)
Survival years 5 - 6	0.939 (0.015)				
Impact assumed start year	2032	2032	2032	2032	2032
Impact assumed end year	2081	2081	2081	2081	2081

The PVA screening tool is available for download at https://www.caledoniaoffshorewind.com/document-library/

5. Annex B: PVA Output Files for Screened in SPA Features

PVA output files are available for download at

https://www.caledoniaoffshorewind.com/document-library/

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