



Sheirdrim Renewable Energy Development

Additional Information - Appendices

**Clarification Correspondence provided to
consultees**

November 2020

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Appendix A: Landscape

A.1 Correspondence with Argyll and Bute Council

- 01 September 2020

Response to Recommended Reasons for Objection to 19/02424/S36 – Sheirdrim RED

1. Landscape Impact

There are a number of factors which made up this reason for refusal, the first being that this landscape has *'very limited scope for additional turbines to be accommodated within this landscape principally due to potential cumulative effects that could occur on the coastal fringes of Kintyre and on views from Arran and Gigha.'* However, it has been demonstrated that the impacts on Arran (North Ayrshire Council and SNH responses) and Gigha (Gigha Community Council response) to be acceptable. The other reason stated in the LWECS for limited capacity is due the potential impact on the coastal fringes of the Kintyre peninsula. However, the EIAR and the Council's Landscape Consultant agree that there would be no significant impacts on either the East or West Kintyre Coast APQ.

The proposed Development is not located within the Knapdale APQ and is predominantly covered by commercial forestry, which detracts from its perception of naturalness and provides significant screening to much of the area. Only the visual components of landscape character would be affected by the proposed Development which would be seen, not in the main views to Jura, Islay or Gigha, but only in views back to the Kintyre peninsula which is generally not the focus of views from this APQ. It is also noted that since the EIAR was submitted, Airigh windfarm has recently been consented within the central part of this APQ within commercial forestry.

Although the proposed Development would inevitably result in some significant landscape impacts, these would be localised and not significant upon the most valued landscapes which have been identified in the LWECS as require protecting including Arran, Gigha or the East and West Kintyre Coast APQs. Therefore, it is assessed that the development meets the criteria set out within the LWECS and there is capacity for this development at this location. Given that the proposed Development adheres to the guidance set out within the LWECS, this proposal should be considered acceptable in landscape terms.

The cumulative elements will be dealt with under 3, below.

2. Visual Impact

Both the Council and the EIAR reported significant visual impacts on some of the nearest receptors, which is inevitable where renewable energy developments of this scale are proposed.

A83: There would be a notable change in the views inland from a section of the A83 between Whitehouse and Ronachan, but the most valued views from this route are those towards the coast would remain fully intact and unaltered.



South Knapdale/B8024: It should be noted that in July, Sustrans removed this route from the National Cycle Network, however the signage remains in place and will remain a route for tourists and recreational users exploring South Knapdale. The screening effect of tree cover on this route combined with intricate local landform would leave only occasional intermittent views towards the proposed Development from this route. With regard to the impacts around Ardpatrik Point, these would be extremely variable, for instance with only tips visible from the coastline at the last property on the road (Ferry House) with the potential for more open views from elevated positions such as Cnoc an Daimh. At Ardpatrik Point the key views out to Gigha and the more mountainous Jura and Islay would not be affected. From elevated positions, such as those illustrated in VP 9 we do not agree that the turbines would appear to spill down on the coastal hills. Instead the turbines are clearly perceived within the upland landscape (in a similar location to Freasdail), with lower parts of the turbines screened in most cases by the coastal hills and forestry, providing a clear separation.

Islay Ferry: There would be some significant visual impacts on a 5km section of the ferry route (between Gigha and Kennacraig) but only when looking back towards the Kintyre peninsula and not interrupting views to the islands.

Lochranza – Cloanaig ferry route: From the ferry the Sheirdrim turbines would be seen behind the consented Eascairt turbines. In some locations on Arran they would increase the density of turbines present but the difference in turbines sizes would not be apparent, such as at VP 11. However, at Lochranza the difference in turbine size would be noticeable but would be less noticeable than the difference between Cour and the recently consented High Constellation. Whilst this may be noticeable, this is not necessarily a reason for refusal and it is noted that Scottish Ministers did not require a reduction in height or removal of 4 turbines when consenting High Constellation on a similar basis.

Footpaths: It is acknowledged by both the EIAR and the Council's Landscape Architect that there would be some significant visual effects on users of local footpaths in the area including the Kintyre Way and Dunskeig. However, it is acknowledged that the impacts on the Kintyre Way are unavoidable and similar effects have been accepted elsewhere on the peninsula. Impacts at Dunskeig are not within the most valued and dramatic part of the views, which tend to be those towards Gigha, Jura and Islay or up West Loch Tarbert, but instead visible within the hinterland views back to the Kintyre peninsula and would not interrupt views to Arran.

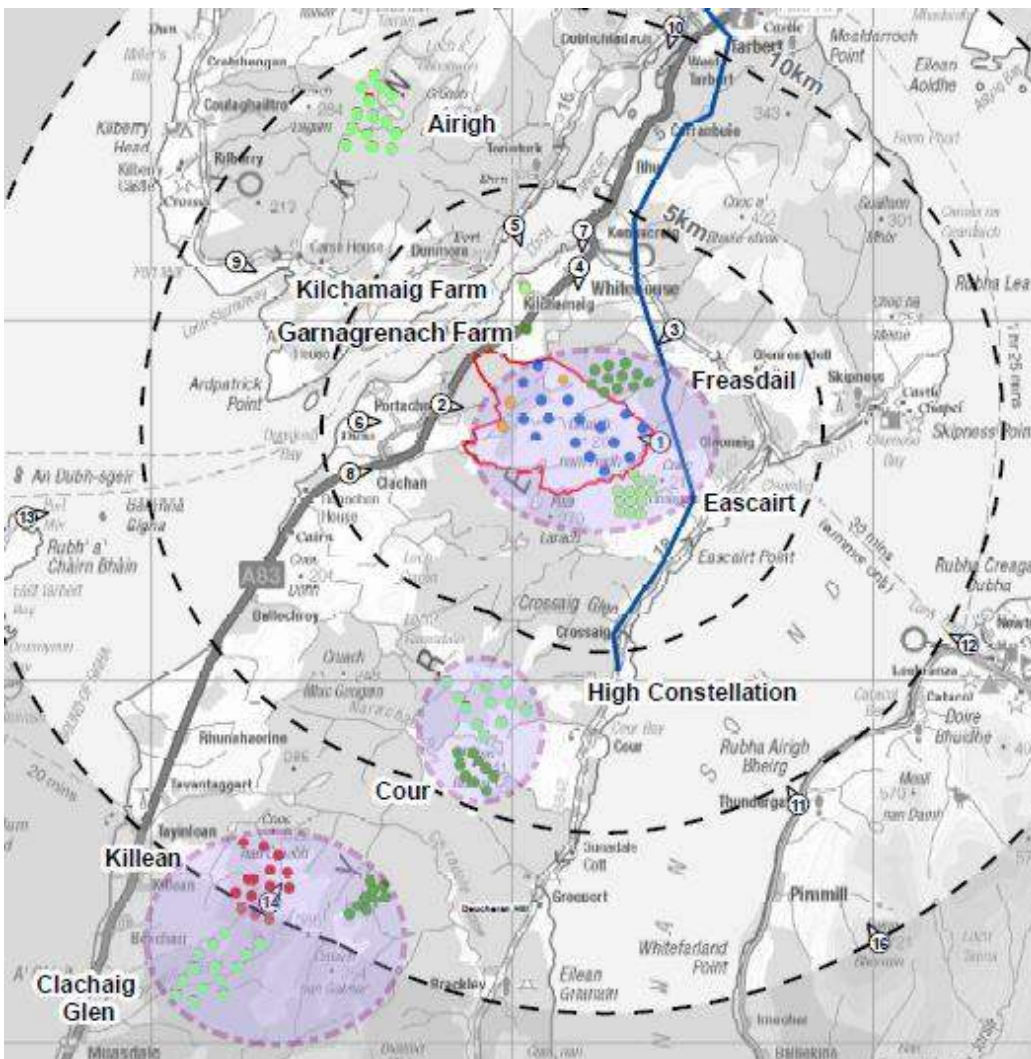
Whilst these significant effects have been identified by both the EIAR and the Council's Landscape Architect, in no case is their magnitude predicted to be so great as to warrant a reason for refusal on visual impact. It should be noted that the EIAR, as well as the Council's Landscape Architect, has taken a very precautionary approach and assumed that these visual changes would be adverse, but not everyone would perceive these changes to be so.



3. Cumulative Impact

There were a number of factors cited in this reason for refusal, some of which are stated in reasons 1 and 2 but a response to all cumulative elements will be consolidated under this response.

The first cumulative factor cited is that the proposed Development would infill the gap between the Freasdail and Eascairt windfarms. This is indeed the case, but rather than being an unhelpful association, it is very helpful in maintaining the strategic pattern of wind energy development on the Kintyre peninsula. As cited in Reason for Refusal 1, the LWECs identifies that a 'Landscape with wind farms' is a more appropriate strategy for Kintyre which would be achieved by 'clustered developments with clear and generous spaces between them would be a better approach aimed at reducing impacts from surrounding islands and seascapes.' This strategic pattern is illustrated on the plan below and in VP 11 and 12 from the east, this gap between the Freasdail/Sheirdrim/ Eascairt group is very clearly maintained from High Constellation/Cour group, 5km to the south.





Another cumulative factor mentioned is the wider spacing and larger size of the Sheirdrim turbines would create a 'cluttered appearance' with these two developments. The relationship would be similar to that between the operational Cour and recently consented High Constellation where Scottish Ministers concluded that *'Given the Scottish Government policy context, the economics benefits and contribution to renewable energy targets that the proposed Development would bring, on balance the Scottish Ministers consider that the proposed turbines in the landscape are acceptable, and there is no justifiable basis for seeking a reduction in turbine height or removal of turbines 4,5, 9 or 10.'*¹ Whilst we do not acknowledge this effect is noticeable, we do not believe it is sufficiently adverse in magnitude to warrant refusal.

As noted in the visual impact, there would be sequential effects as a result of Sheirdrim on users of the A83 and the Islay Ferry. However, there would be no notable combined views with Airigh and Clachaig Glen and therefore would not be of sufficient magnitude to warrant refusal.

The visual impacts noted from Dun Skeig would also include views to Airigh but in very different directions from each other and neither of these sites would affect the main views out towards Gigha, Jura and Islay or up West Loch Tarbert, or even Arran. From the northern shores of West Loch Tarbert; there would be limited views of Airigh in different direction to Sheirdrim amongst the forestry; no views to Eascairt and only limited views to Freasdail. From Ardpatrik Point area, as noted above, the visibility of Sheirdrim would be variable and from lower ground there would be no views of Eascairt or Airigh and limited views of Freasdail, with views to all of these sites only from the highest ground, where they would not be visible in the most dramatic parts of the view.

Cumulative impacts on the character of the Upland Forest Moor Mosaic would be minimised and not significant, as a result of adhering to the strategic pattern of wind energy development on the Kintyre peninsula, including the recently consented Clachaig Glen, which was included within the EIAR.

Now that more sites are consented within the Kintyre peninsula (High Constellation and Clachaig Glen), the cumulative impacts on the Kintyre Way would also increase. However, the addition of Sheirdrim would occur within a section which will already be affected by the consented Eascairt and operational Freasdail and therefore the impact should be deemed acceptable.

Conclusion:

Whilst there would be some significant landscape, visual and cumulative impacts, these should not be considered to be of such magnitude as to be unacceptable. Again, it should be noted that the EIAR, as well as the Council's Landscape Architect, has taken a very precautionary approach and assumed that all of these cumulative visual changes would be adverse, but not everyone would perceive these changes to be so.

¹ Page 16, High Constellation Decision Letter June 2020

A.2 Correspondence with North Ayrshire Council

- 14 April 2020

14 April 2020

Debbie Flaherty
Energy Consents Unit
Scottish Government

Our Ref: 4144.000481.00051

Your Ref:

Dear Debbie

RE: SHEIDRIM RENEWABLE ENERGY DEVELOPMENT - RESPONSE TO COMMENTS FROM NORTH AYRESHIRE COUNCIL ON LANDSCAPE

North Ayrshire Council (NAC) responded to the consent application on this proposed development on 17 January and 19 February 2020. SLR provided NAC with details of the consultation held prior to the application with SNH and Argyll and Bute following their first consultation response. This letter provides further comments relating to the 19 February response and also your email of 24 February 2020 on behalf of Scottish Power Renewables.

NAC highlighted that their main concern was the potential impact on the designated sites such as the North Arran National Scenic Area and the Wild Land Areas. The scope of the information included in the LVIA to assess the impact on these two areas was agreed with SNH in advance of the planning application submission and SNH did not state that they did not have enough information to make an informed judgement. Therefore, we consider that the response received from SNH confirms that sufficient information has been provided in the landscape assessment to enable a full assessment of these issues.

SNH submitted their consultation response to this proposal on 13 March 2020. SNH agreed with the EIA assessment that whilst there would be some adverse impacts on the North Arran NSA, there would not be a significant adverse impact in relation to any of the Special Qualities of the NSA nor on the qualities of the Wild Land Areas. NAC have said that they would look towards SNH to provide further input towards the potential landscape impacts.

Yours sincerely
SLR Consulting Limited

Redacted

Mark Brown
Technical Director - ESIA

Appendix B: Peat

B.1 Correspondence with Ironside Farrar, ECU Peat Advisor

- 10 March 2020
- 20 May 2020
- 28 October 2020

10 March 2020

Energy Consents Unit
Scottish Government
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Our Ref: 405.00481.00051
Ironsides Farrar Ref: 50517.020
Planning Application No.: Sheirdrim Renewable Energy Development

To Whom it May Concern,

SHEIDRIM RENEWABLE ENERGY DEVELOPMENT - PEAT LANDSLIDE HAZARD AND RISK ASSESSMENT RESPONSE TO STAGE 1 CHECKING REPORT, FEBRUARY 2020

This response has been prepared to address recommendations requiring a response, indicated by Ironsides Farrar in their Stage 1 Checking report dated February 2020.

In preparing this response SLR Consulting Ltd (SLR) has only addressed the Recommendations outlined in Section 4.3

In the context of the comments provided, SLR has reviewed the Peat Landslide and Hazard Risk Assessment (PLHRA)¹ submitted as part of the Environmental Statement originally submitted in October 2019.

Ironsides Farrar Ltd Response (February 2020)

Stage 1 Checking Report Comment

Recommendations requiring response from Developer are highlighted in bold with SLR Response in italics:

1. Ironsides Farrar

- **It is noted in the 'Acceptable Location' column of table 5-6 that turbine six is listed as having no significant peat. However, peat depth is 1.51m and is therefore deep peat as per table 4-3. Revaluation of whether it is an acceptable location (last column of table 5.6) requires to be looked at as slope is significant.**

SLR Response

¹ Peat Landslide and Hazard Risk Assessment, SLR 405.00481.00051 Final, October 2019

- *The peat would all be removed during construction and in terms of construction depth (in order of 3-4 metres) this is not significant and it will be engineered into the hillside, thereby mitigating risk. There is no significant peat immediately above the turbine location. The nearest peat is significantly further away below the turbine location and poses a negligible risk.*

2. Ironside Farrar

- **The substrate material criteria notes 'slip material' as scoring a maximum score of 5. Please define what is meant by 'slip material'.**

SLR Response

- *Slip material is any surface where the material is homogeneous and entirely cohesive in nature. Very rare in this type of scenario and usually only evident in areas where past slippage may have occurred. There is no significant cohesive material on this site.*

3. Ironside Farrar

- **Please clarify whether the lochs on the site or the dwelling to the south east of the site have been identified as receptors in the assessment. If not, then the consequence assessment may require to be updated.**

SLR Response

- *All the watercourses and water bodies were considered including the hill lochs, which were assessed but are not located in areas likely to be impacted by windfarm infrastructure. Loch Lurach is in a cross gradient position of part of borrow pit 5. Peat here is likely to be removed as part of the borrow pit excavation. The excavation of the borrow pit is unlikely to impact the Loch, therefore, based on extent, distance and slope.*
- *Loch Chorra-riabhaich is not within influencing distance of any infrastructure and is separated by a significant ridge to the north between the loch and the nearest Turbine (T11) over 800m away from the Loch.*
- *The residential property is also out with influencing distance at over 2.5km from the site and separated by a significant North East to South West ridge between Cnoc an t-Seallach Bhig and Cnoc Creagach, essentially confining the windfarm to the west of this.*

4. Ironside Farrar

- **Table 5-12 presents medium risk areas and proposed mitigation. Some medium and high risk areas falling on infrastructure locations appear to have been missed and require consideration.**

SLR Response

- *The areas identified as requiring further assessment are discussed in the following section:*
- *Area 8 is identified as high risk on figure 10.1.7, with a slide trajectory overlapping a track accessing solar array 2. This area was addressed, however, no new wind farm infrastructure is*

planned in this area as the track is already present and this area will not be disturbed during any site activities. The potential risk assuming it is undisturbed is limited.

- *Area 23 which is a medium risk on a proposed track, this was one point which is very limited in extent with no peat in the upgradient location. It was not deemed a significant risk and appropriate mitigation will be included in the design.*
- *Areas 4 shows medium risk on the track location, in this locations the risk area is limited to one point and will be excavated as part of the construction process. No significant peat was located surrounding these points.*
- *Area 6 is included in Table 5-12.*
- *Area 16 is on a medium risk area with medium risks both up slope and down slope. There is no risk upslope as it is on shallow superficial deposits. This location is a very localised area on a steep slope with no significant peat around it. The risk is not deemed significant.*

5. Ironside Farrar

- **Mitigation for some infrastructure locations showing medium and high risk has not been discussed, including micro-siting to lower risk areas. These areas require to be assessed and appropriate mitigation provided.**

SLR Response

- *Further analysis and possible micrositing will be undertaken if required, this would be supported by site investigation following consent in the pre-construction phase.*

6. Ironside Farrar

- **There is no mitigation provided for borrow pit areas and borrow Pit BP02 is noted to be located in a medium risk area.**

SLR Response

- *BP02 is not on a medium risk area but a negligible risk area. The borrow pits have been selected based on negligible peat. However, localised medium risk can occur with limited peat on steeper slopes, these tend to be very localised areas, which ultimately will be excavated as part of the borrow pit excavations, hence removing the potential risk. Please note BP01, BP2, BP03 and BP04 have all been partly excavated as part of the forestry works. They are all 'pre-existing' borrow pit sites with evidence of previous excavation. Each one has limited soils/peat cover.*

7. Ironside Farrar

- **Mitigation measures for the permanent and temporary storage of peat on the site should be provided in the document.**

SLR Response

- *We have not addressed peat storage at this stage, the location of peat stores will be determined by the Preferred Contractor in accordance with site specialists, e.g. Geotechnical Engineer, ECoW, ACoW. Suitable areas and sizes would need to be determined at that stage*

with suitable mitigation in place included as part of the CEMP. Any temporary storage areas would be located on negligible or low risk areas where the addition or storage of peat would not impact on peat slide risk. Further clarifications would be covered in the Stage 2 Peat Management Plan and CEMP.

Closure

We trust that this addresses the concerns that are raised in the checking report. If any further clarification is required, please do not hesitate to contact ourselves.

Yours sincerely

SLR Consulting Limited

Redacted

Colin Duncan
Technical Director

20 May 2020

Energy Consents Unit
Scottish Government
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Our Ref: 405.00481.00051
Ironsides Farrar Ref: 50517.020
Planning Application No.: Sheirdrim Renewable Energy Development

To Whom it May Concern,

SHEIDRIM RENEWABLE ENERGY DEVELOPMENT - PEAT LANDSLIDE HAZARD AND RISK ASSESSMENT RESPONSE TO STAGE 2 CHECKING REPORT, APRIL 2020

This response has been prepared to address recommendations requiring a response, indicated by Ironsides Farrar in their Stage 2 Checking report dated April 2020.

In preparing this response SLR Consulting Ltd (SLR) has only addressed the Recommendations outlined in Section 3.2.

In the context of the comments provided, SLR has reviewed the Peat Landslide and Hazard Risk Assessment (PLHRA)¹ submitted as part of the Environmental Statement originally submitted in October 2019.

Ironsides Farrar Ltd Response (April 2020)

Stage 2 Checking Report Comment

Recommendations requiring response from Developer are highlighted in bold with SLR Response in italics:

Points Addressed previously:

i), ii), iii) & vi) Ironsides Farrar – No Further Action

Points Requiring response:

iv) Ironsides Farrar

¹ Peat Landslide and Hazard Risk Assessment, SLR 405.00481.00051 Final, October 2019

Responses regarding the areas highlighted in the response are considered acceptable. However, it is still noticed that other high likelihood areas identified on Figure 10.1.7 have not been carried forward into the hazard ranking assessment table

(Table 5-12) or discussed in the response. For example, Area 4 highlighted in magenta on Figure 10.1.17 shows high concern (high risk) on/ adjacent to a track location. This is not discussed in Table 5-12.

Please provide information regarding the assessment of risk within the high likelihood areas identified in Figure 10.1.7. Robust mitigation should be provided at this stage of the application process.

In addition, the area highlighted over T6 appears to be high risk according to the risk map. Tables 5-6 & 5-12 record Area 6 as medium risk. This requires clarification.

Additional information / assessment of risk and mitigation is required for all areas of medium or high likelihood identified in Figure 10.1.7.

SLR Response

As indicated in previous response the majority of the high risk sites are either within a larger medium risk area (already addressed) with an isolated probe (either thicker peat or steep slope) influencing the assessment and increasing very locally the risk to high i.e. locations 1, 3, 4, 5, 6, 9 and 11, or the high risk areas are outwith influencing distance of the infrastructure i.e. 7, 8, 10 and 11.

Only location 2 (high risk), is close to Turbine 6 (medium risk) at the turbine site (indicated in Table 5-6), with some localised high risk areas to the north east, associated with steep gradients. As indicated in Table 5-6 the location around T6 would require excavation around turbine to mitigate risk., this would include excavating the localised steep slope around T6.

Area 4 (High Risk) was included in the assessment within Area 6, one high risk point within a medium risk site (Area 6). It is not uncommon to have localised high risk probe locations within overall medium areas. However, the single point is not indicative of a significant high risk of peat slide and there was no evidence on site of extensive areas of peat at risk of movement.

v) Ironside Farrar

This comment ties into the previous comment. According to the SLR PLHRA, high risk areas should be avoided by development all together which is line with the ECUBPG.

Fig 10.1.7 indicates some high risk areas on infrastructure (e.g. area 4 on proposed track), so if is the case, then micrositing off high risk needs to be considered as part of the mitigation. At this stage there needs to be comfort that there is enough information to demonstrate this mitigation would be credible. T6 needs clarification in this regard also.

Please provide comment on the applicability of micrositing to infrastructure locations on the site.

SLR Response

The high risk sites are either away from the infrastructure or included as part of a medium risk area, where usually one point has increased the assessment to high. In the instance of Area 4 the area is very localised thin peat on moderate to steep slope, the area does not display an extensive area of concern in a down gradient position and the plan would be to excavate this section of track thereby mitigating the risk. The track is located along a ridge line so moving the track is not a practical option.

Closure

We trust that this addresses the concerns that are raised in the checking report. If any further clarification is required, please do not hesitate to contact ourselves.

Yours sincerely

SLR Consulting Limited

Redacted

Colin Duncan
Technical Director

28 October 2020

Energy Consents Unit
Scottish Government
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Our Ref: 405.00481.00051
Ironsides Farrar Ref: 50517.020
Planning Application No.: Sheirdrim Renewable Energy Development

To Whom it May Concern,

SHEIDRIM RENEWABLE ENERGY DEVELOPMENT - PEAT LANDSLIDE HAZARD AND RISK ASSESSMENT RESPONSE TO STAGE 3 CHECKING REPORT (SEPTEMBER 2020).

This response has been prepared to address one final recommendations requiring a response, indicated by Ironsides Farrar in their Stage 3 Checking Report.

Ironsides Farrar Ltd Response (September 2020)

One point remains that requires discussion. It is noted that it is proposed to excavate the slope surrounding Turbine 6 in order to mitigate a high risk zone. IFL are unclear on how large an excavation is required, i.e. is it a small slope within the area of turbine base or a large area of slope above the turbine. Would it be possible to provide an area specific plan showing the extent of the excavation as requested of the Stage 3 checking report?

SLR Response

The area falls to the north west quite steeply so the plan was to cut a small bench for the crane pad and turbine. There are a couple of very localised peat depths which skew the analysis. It may be possible to microsite the turbine towards the crane hardstanding but as you see one value of 2.4m at the turbine is the issue, combined with the steeper slope, it is very localised. In fact this would actually be excavated out as part of the excavation and all around it are shallow peat values. The excavation would be very limited and probably not much larger than the crane pad area. A diagram showing the area of concern is attached, I am confident this will meet your requirements.

Closure

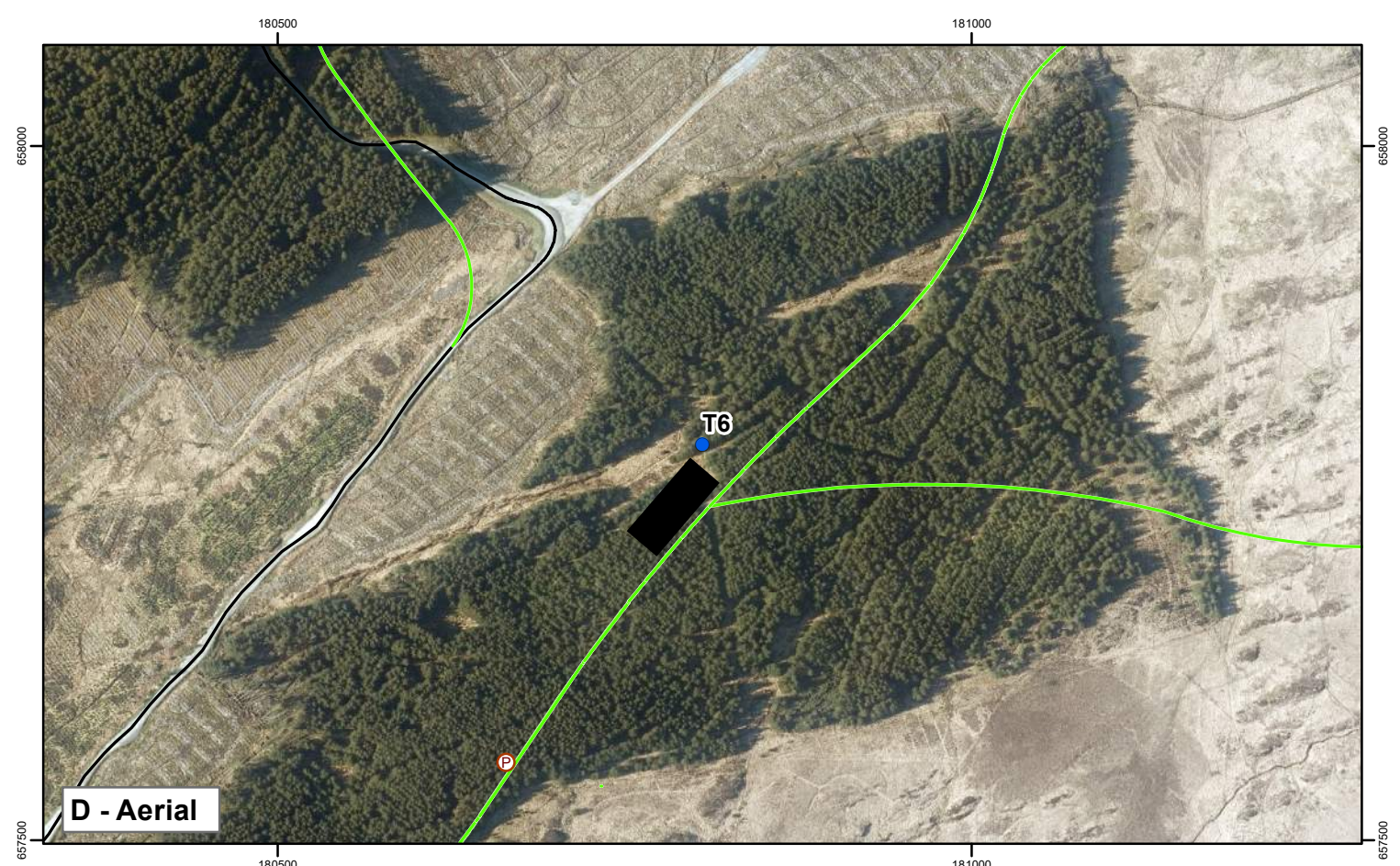
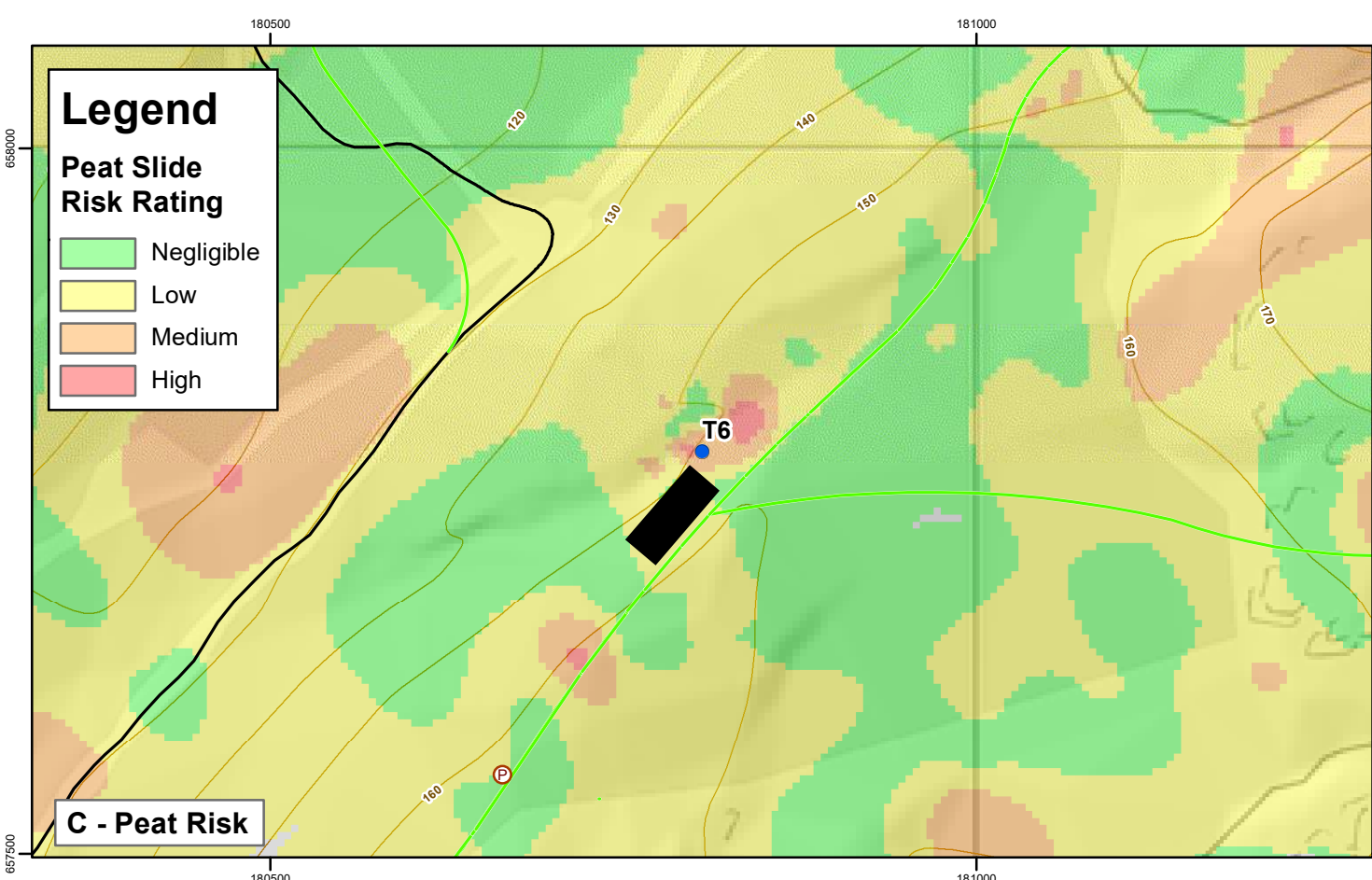
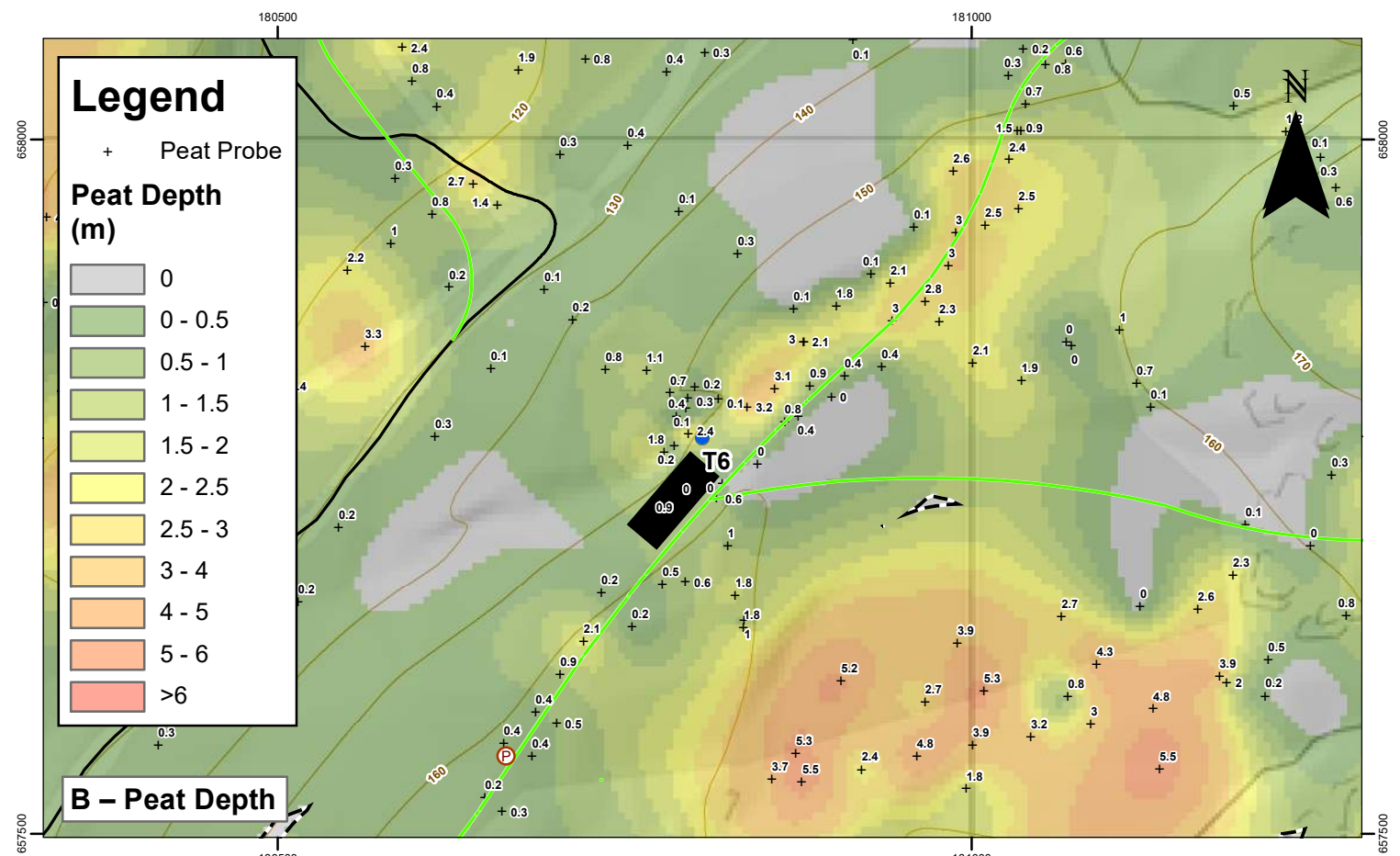
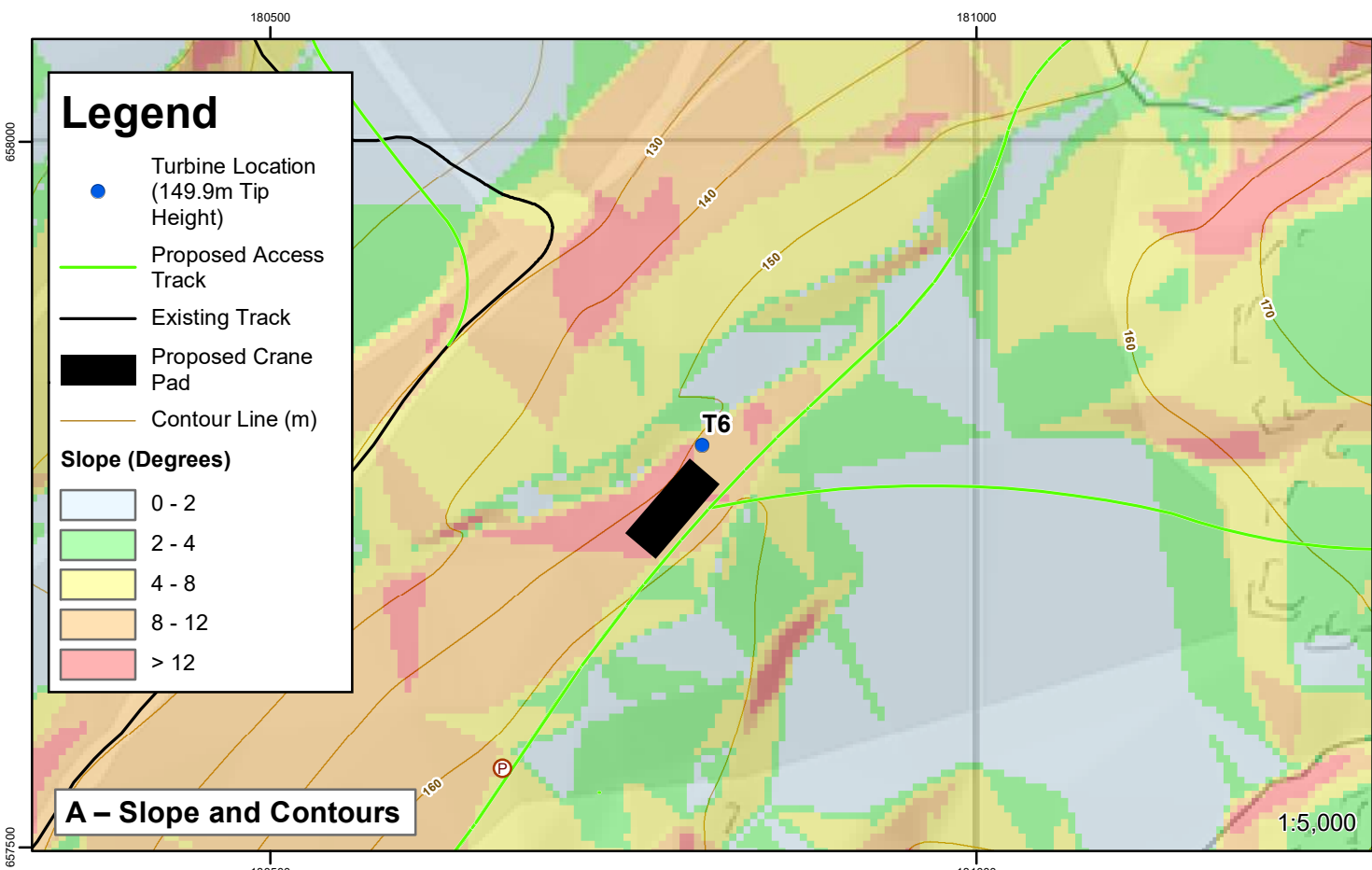
We trust that this addresses the concerns that are raised in the checking report. If any further clarification is required, please do not hesitate to contact ourselves.

Yours sincerely

SLR Consulting Limited

Redacted

Colin Duncan
Technical Director



Appendix C: Aviation

C.1 Correspondence with NATS

- 07 April 2020 Report
- 08 April 2020 Email

From: Mackenzie, Anne Redacted
To: Sacha.Rossi Debbie.Flaherty AULD, Alasdair E
Cc: NATSSafeguarding Templeton, Stuart
Subject: RE: Sheirdrim Renewable Energy Development EIA Application Consultation [SG27870]
Date: 08 April 2020 11:25:36
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[image004.png](#)
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[image006.png](#)
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[image008.png](#)
[image009.png](#)
[image010.png](#)
[image011.png](#)
[CL-5385-RPT-003 V1.0 Sheirdrim Renewable Energy Development Aviation Response.pdf](#)

Dear Sasha and Ali

Further to your email below to ECU (Debbie Flaherty is now Sheirdrim's case officer) and our meeting at Prestwick Centre in January, we commissioned Cyrrus to prepare a response to your objection, which we attach. This aviation response also addresses GPA's objection to Sheirdrim.

In short, SPR does not contest your findings in terms of radar modelling as set out in the TOPA – that four Sheirdrim turbines are likely to be detected by the Lowther Hill PSR. However, we do contest your objection in terms of airspace usage and NERL's current accommodation of the also visible and operational Freasdale turbines.

We note that CAP 764 states that 'Where an ANSP (Air Navigation Service Provider) determines that it is likely that a planned wind turbine development would result in any of the above effects on their CNS (Communication, Navigation and Surveillance) infrastructure, this may not, in itself, be sufficient reason to justify grounds for rejection of the planning application. The ANSP must determine whether the effect on the CNS infrastructure has a negative impact on the provision of the ATS.'

As highlighted by the NERL section in the attached aviation response, it is not considered that the clutter associated with this windfarm will have a negative impact on the provision of the ATS provided by NERL's Prestwick Air Traffic Control and therefore NERL's objection and requirement for mitigation cannot be substantiated and the objection should be withdrawn.

Kind regards

Anne Mackenzie
Aviation Manager

ScottishPower Renewables

Redacted

Aviation Response

Sheirdrim Renewable Energy Development

07 April 2020

CL-5385-RPT-003 V1.0

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Executive Summary

Cyrrus Limited has been engaged to address aviation issues associated with the proposed Sheirdrim Renewable Energy Development. The proposed Development comprises 19 turbines, 16 of which have a maximum tip height of 149.9m, the remaining three have a maximum tip height of 135m. The Proposal also comprises two solar arrays (up to 20 megawatt (MW)) and approximately 38 MW of battery storage. Objections to the Development have been received from NATS (En Route) plc (NERL) on the grounds of turbine visibility to Lowther Hill Radar, and from Glasgow Prestwick Airport (GPA) on the grounds of turbine visibility to its primary radars. Neither objection sets out the impact that turbine radar clutter has on the Air Traffic Service (ATS) provided by NERL or GPA respectively.

This report supplements the analysis set out in Section 15.9 of the Sheirdrim Renewable Energy Development Environmental Impact Assessment (EIA) Report. It has been prepared to address the objections submitted by GPA and NERL.

Glasgow Prestwick Airport

This report sets out detailed radar modelling of the proposed turbine layout against the two Primary Surveillance Radar (PSR) facilities (S511 and Terma radars) at GPA which shows the following:

- Radar Line of Sight (RLoS) does not exist between either of the PSRs and the proposed turbines;
- Probability of Detection (PD) analysis confirms that the turbines are unlikely to be detected by the S511 PSR or the Terma PSR.

GPA shared with Cyrrus its radar modelling used to establish its objection; upon review, it is apparent that GPA's radar modelling did not take into account the earth's curvature. This is a significant omission as it accounts for over 200m of effective height drop at the turbines' range from the radars.

NATS (En Route)

Cyrrus has undertaken detailed radar modelling in respect of the Lowther Hill PSR and does not contest NERL's findings as to the detectability of four Sheirdrim turbines (T1, T7, T15, T16) by the Lowther PSR as set out in NERL's Technical and Operational Assessment (TOPA) SG27870 dated December 2019.

In the Appendix, Cyrrus has undertaken detailed radar modelling in respect of Freasdail Windfarm which directly abuts Sheirdrim to the north-east. This shows that all the Freasdail turbines are likely to be detected by the Lowther PSR. NERL's TOPA indicates that NERL accepts the impact of the Freasdail turbines on its ATS.

This report then examines the airspace classification and usage in the vicinity of Sheirdrim. It concludes that the proposed Development is situated within uncontrolled airspace which extends to approximately 19,500ft Above Mean Sea Level (AMSL). NERL does not provide surveillance-based services in uncontrolled airspace and above Flight Level (FL) 195 utilises only Secondary Surveillance Radar (SSR). Any PSR returns, including clutter associated with turbines, would not be displayed to controllers and hence would not impact upon the provision of an ATS. Therefore, it has not been established that the four Sheirdrim turbines in addition to the Freasdail turbines would have any detrimental impact on NERL's ATS.

Abbreviations

AGL	Above Ground Level
ATS	Air Traffic Service
CNS	Communication, Navigation and Surveillance
DRA	Direct Route Airspace
DTM	Digital Terrain Model
EIA	Environmental Impact Assessment
FL	Flight Level
GPA	Glasgow Prestwick Airport
MW	Megawatt
NERL	NATS (En Route) plc
PD	Probability of Detection
PSR	Primary Surveillance Radar
RCS	Radar Cross Section
RLoS	Radar Line of Sight
SSR	Secondary Surveillance Radar
TOPA	Technical and Operational Assessment
VPD	Vertical Polar Diagram

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1. Introduction

1.1. Background

- 1.1.1. ScottishPower Renewables is proposing to construct a new onshore Renewable Energy Development located at the northern end of the Kintyre peninsula, approximately 10km south-west of Tarbert. Sheirdrim Renewable Energy Development, the proposed Development, comprises 19 three-bladed turbines; 16 with a tip height up to 149.9m and 3 with a tip height up to 135m, and blade lengths of up to 65m. The proposal also comprises two solar arrays (up to 20 megawatt (MW)) and approximately 38 MW of battery storage.
- 1.1.2. The proposed Development is adjacent to the existing Freasdail Windfarm.
- 1.1.3. Cyrrus Limited has been engaged to address the aviation issues arising from the planned development.

1.1. Effects of Wind Turbines on Aviation

- 1.1.1. Wind turbines are a problem for aviation Primary Surveillance Radars (PSRs) as the characteristics of a moving wind turbine blade are similar to that of an aircraft. The PSR is unable to differentiate between wanted aircraft targets and unwanted clutter targets introduced by the presence of turbines.
- 1.1.2. The significance of any radar impact depends on airspace usage in the vicinity of the windfarm site and the nature of the Air Traffic Service (ATS) provided in that airspace.

1.2. EIA Responses

- 1.2.1. Following submission of the Environmental Impact Assessment (EIA) report to the Energy Consents Unit, responses objecting to the development were received from NATS (En Route) plc (NERL) and Glasgow Prestwick Airport Limited (GPA).
- 1.2.2. The NERL objection concerns turbine visibility to Lowther Hill Radar, while the GPA objection concerns turbine visibility to their primary radars.
- 1.2.3. This report addresses the objections lodged by NERL and GPA to Sheirdrim.

1.3. Aviation Assessment Tasks

- 1.3.1. The assessment tasks identified are:
- Determine the radar visibility of the proposed wind farm to GPA's primary radars;
 - Determine the radar visibility of the proposed wind farm to Lowther Hill Radar;
 - Review the nature of the airspace in the vicinity of Sheirdrim Renewable Energy Development to determine any potential impact on aviation.

2. Data

2.1. Sheirdrim Renewable Energy Development

2.1.1. The final design freeze layout for the proposed development, dated 20th August 2019, has been supplied as a geo-referenced Shapefile:

- 190731_00481_00051_Turbines_Design_Freeze.shp.

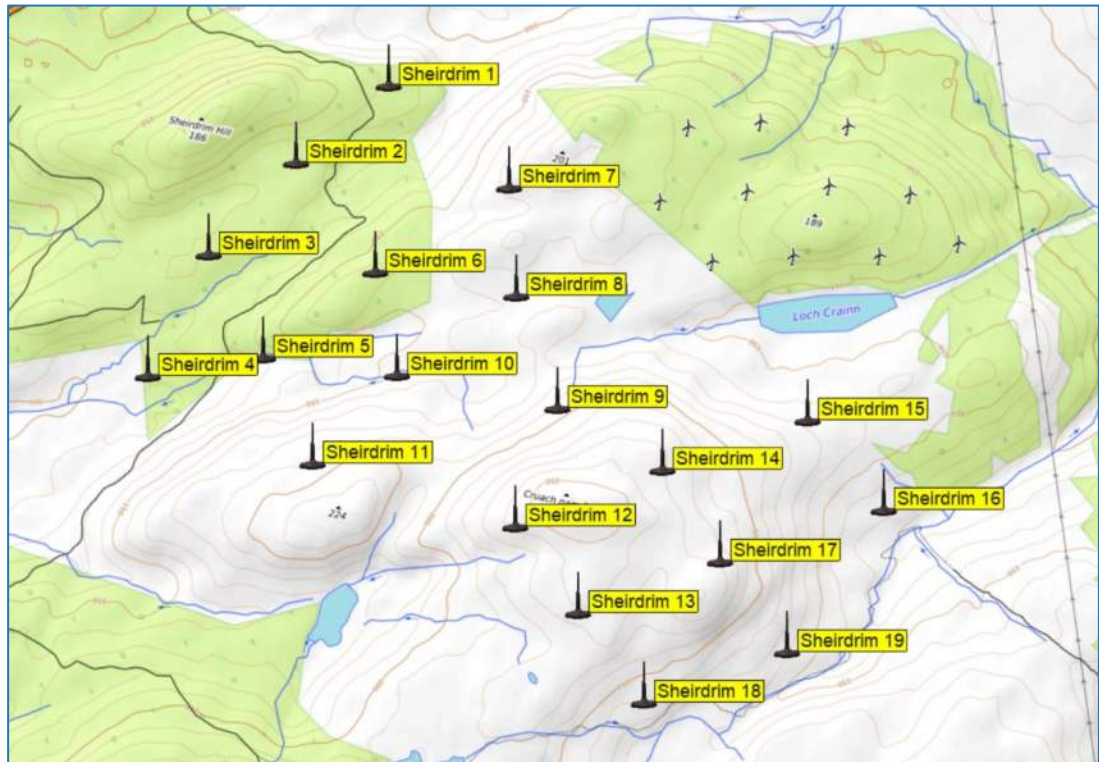
2.1.2. The Ordnance Survey National Grid coordinates for this proposed turbine layout, as used in the assessment, are listed in Table 1.

Turbine	Easting	Northing
1	180708	658743
2	180304	658273
3	179935	657728
4	179735	657058
5	180306	657251
6	180806	657785
7	181417	658330
8	181549	657783
9	181859	657244
10	181005	657274
11	180654	656755
12	181750	656605
13	182147	656219
14	182452	657021
15	183153	657399
16	183620	657004
17	182827	656603
18	182560	655820
19	183251	656198

Table 1: Sheirdrim Renewable Energy Development turbine coordinates

2.1.3. Turbines 3, 4 and 7 have a planned tip height of 135m, all others have a planned tip height of 149.9m. All turbines have a planned blade (rotor) diameter of 130m.

2.1.4. The proposed 19 turbine layout used for the modelling is shown in Figure 1.



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Figure 1: Proposed turbine layout

2.2. Radar Data

2.2.1. Radar parameters used in the assessment have been taken from data held on file by Cyrrus.

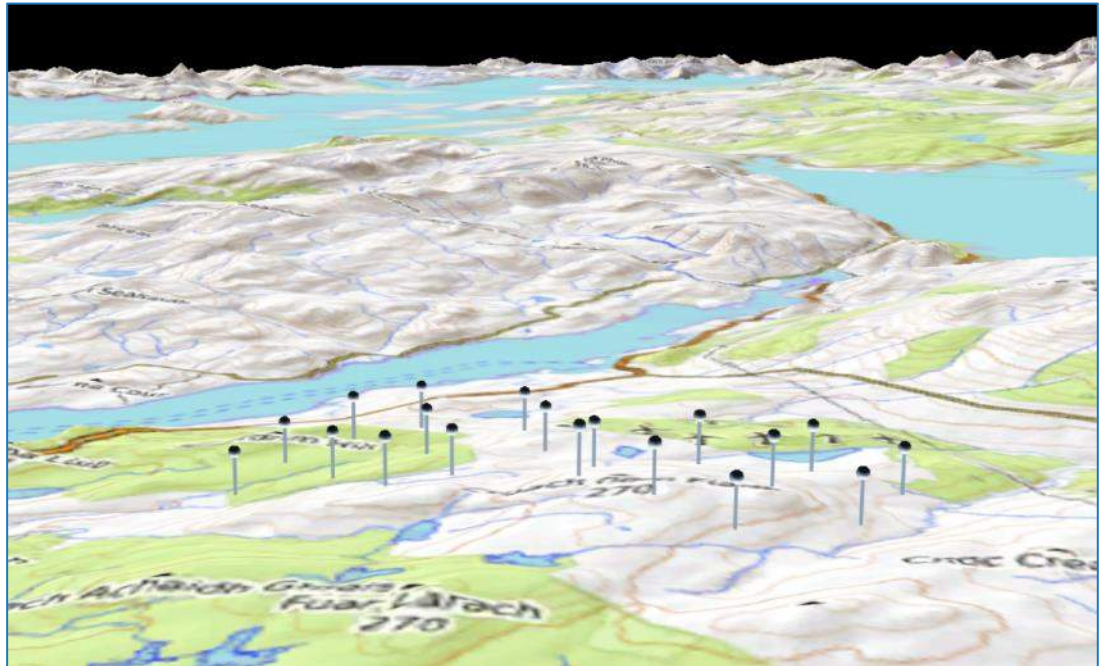
2.3. Analysis Tools

- ATDI ICS telecom EV v15.5.3 x64 radio network analysis tool;
- ZWCAD+ 2015 SP1 Pro v2014.11.27(26199).

2.4. Terrain Data

- ATDI UK 25m Digital Terrain Model (DTM), 2015, ETRS89 projection.

2.4.1. A 3D view of the turbines and the terrain model is shown in Figure 2.



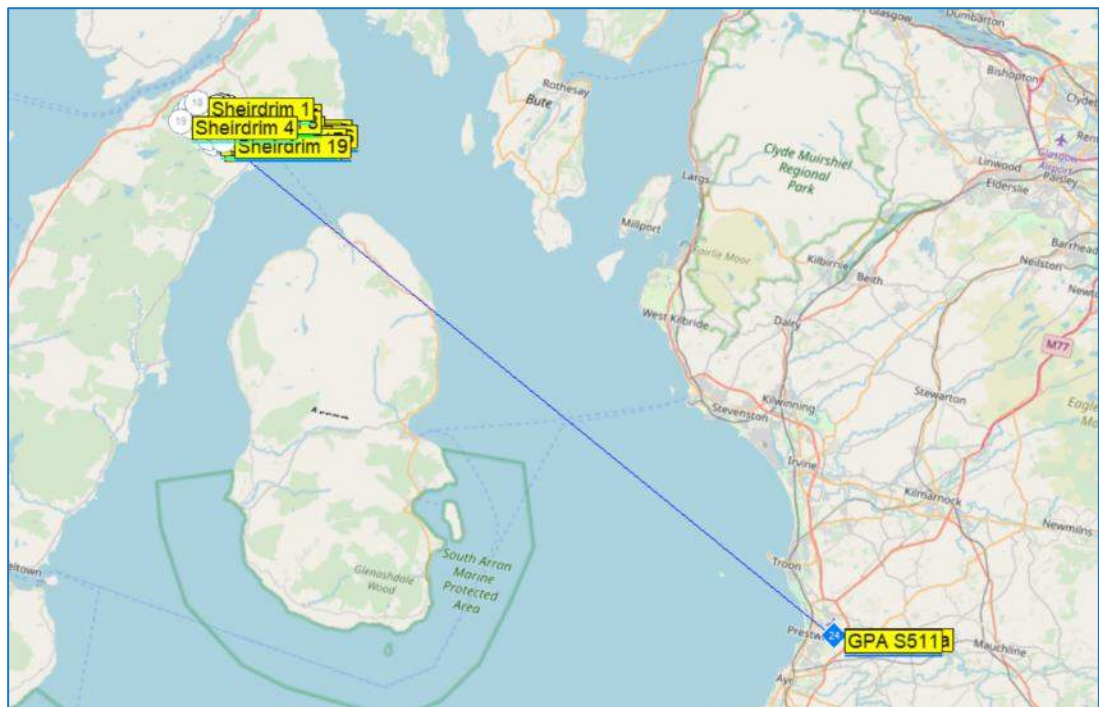
© OpenStreetMap contributors

Figure 2: 3D view of turbines and terrain from south

3. GPA Assessment

3.1. Radar Location

- 3.1.1. There are two PSR facilities at GPA: a Marconi S511 radar used for planning purposes while a Terma Scanter 4002 radar is used for approach control.
- 3.1.2. At its closest point the proposed development area is approximately 62km north-west of the GPA PSRs, as shown in Figure 3.



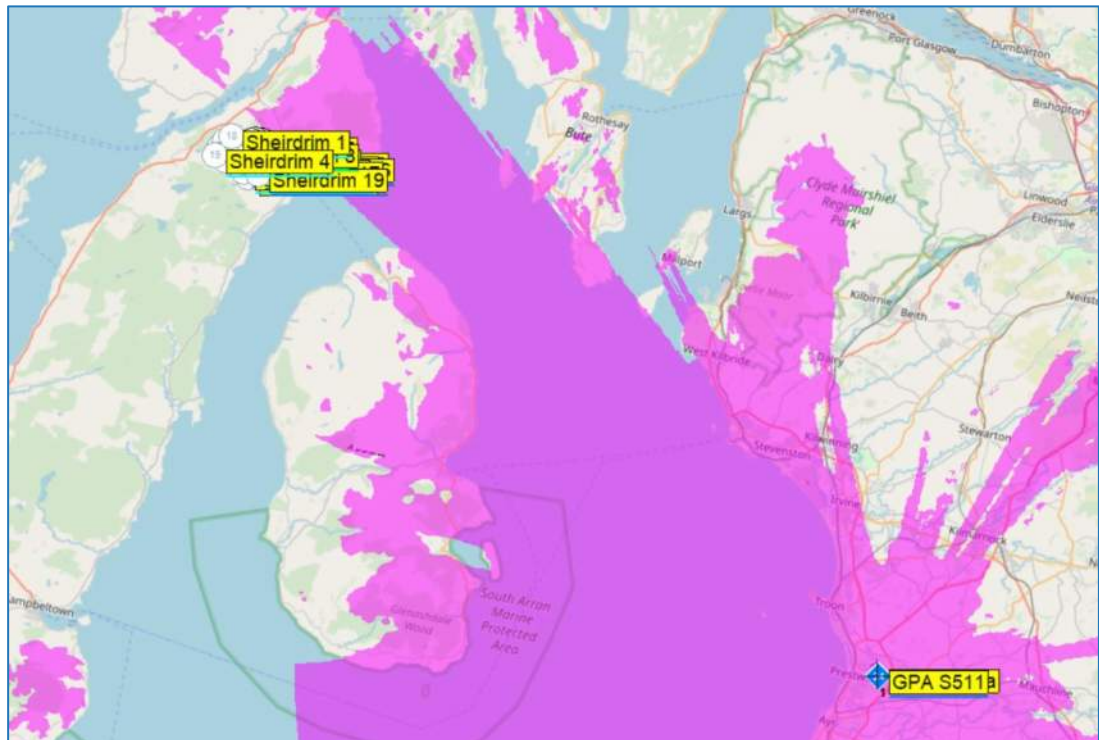
© OpenStreetMap contributors

Figure 3: : Locations of GPA PSRs and Sheirdrim Renewable Energy Development

3.2. Radar Line of Sight Modelling

- 3.2.1. Radar Line of Sight (RLoS) is determined from a radar propagation model (ATDI ICS telecom EV) using 3D DTM data with 25m horizontal resolution. Radar data is entered into the model and RLoS to the turbines from the radar is calculated.
- 3.2.2. Note that by using a DTM no account is taken of possible further shielding of the turbines due to the presence of structures or vegetation that may lie between the radars and the turbines. Thus, the RLoS assessments are worst-case results.
- 3.2.3. For PSR, the principal sources of adverse windfarm effects are the turbine blades, so RLoS is calculated for the maximum tip height of the turbines, i.e. 149.9m Above Ground Level (AGL).

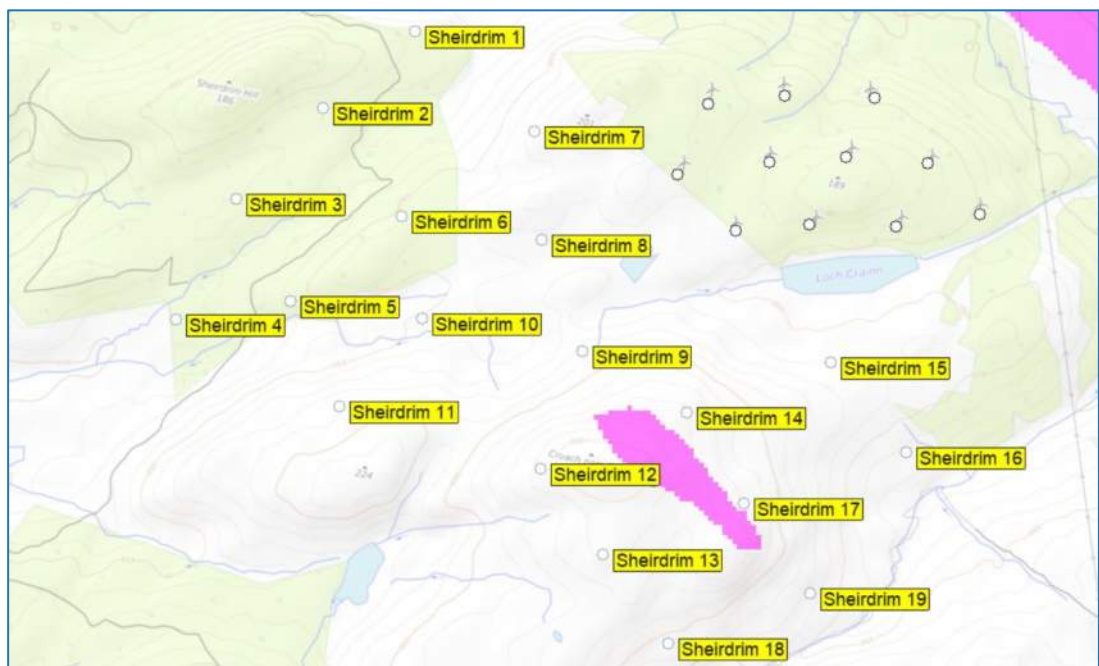
- 3.2.4. The magenta shading in Figure 4 illustrates the RLoS coverage from the GPA S511 PSR to turbines with a blade tip height of 149.9m AGL.



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Figure 4: GPA S511 PSR RLoS to 149.9m AGL

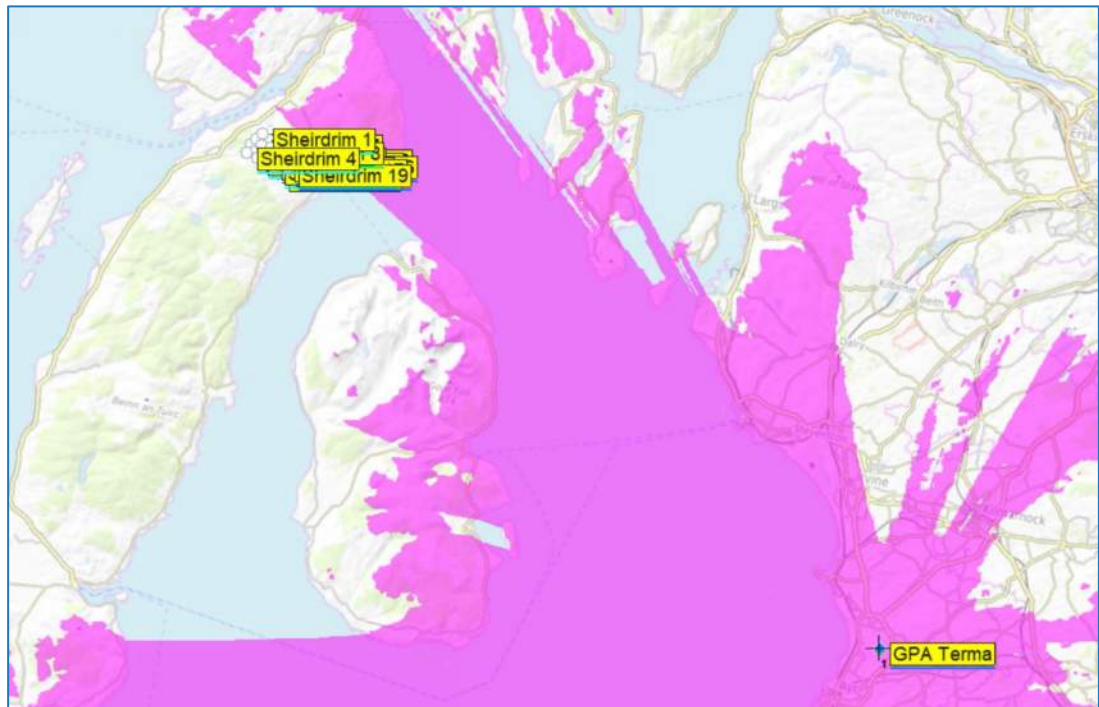
- 3.2.5. The zoomed view of the Development in Figure 5 shows that RLoS does not exist between the S511 PSR and any of the turbine blade tips. Turbine 17 lies close to the RLoS boundary.



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Figure 5: GPA S511 PSR RLoS to 149.9m AGL – zoomed

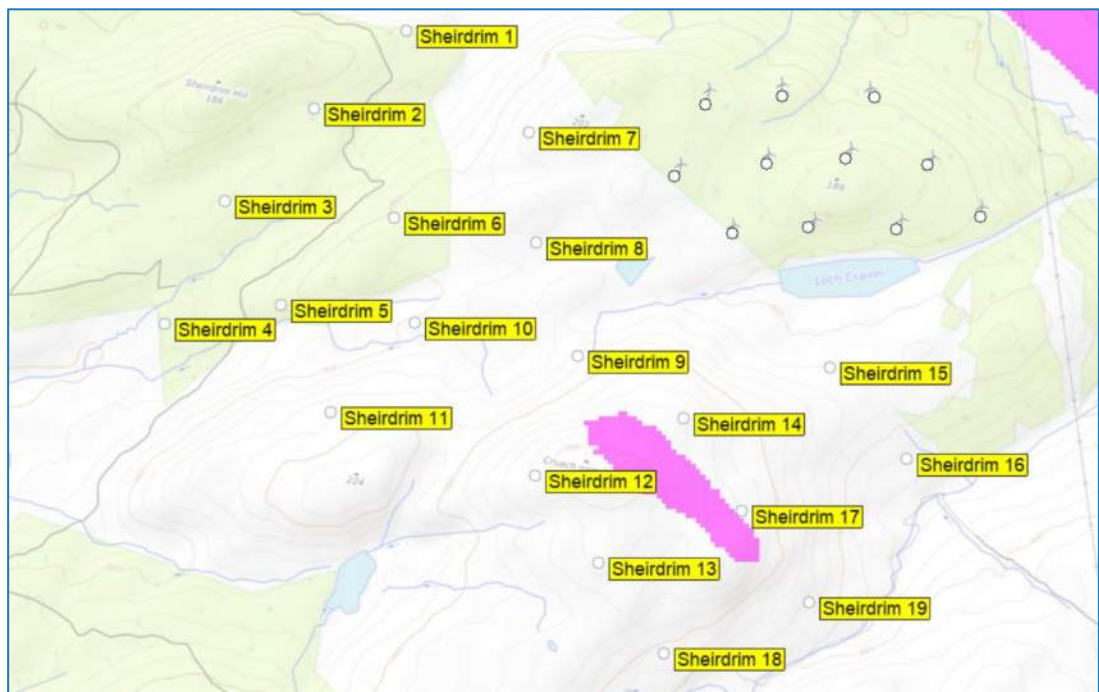
- 3.2.6. The magenta shading in Figure 6 illustrates the RLoS coverage from the GPA Terma PSR to turbines with a blade tip height of 149.9m AGL.



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Figure 6: GPA Terma PSR RLoS to 149.9m AGL

- 3.2.7. The zoomed view of the Development in Figure 7 shows that RLoS does not exist between the Terma PSR and any of the turbine blade tips. Turbine 17 lies close to the RLoS boundary.



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Figure 7: GPA Terma PSR RLoS to 149.9m AGL – zoomed

- 3.2.8. When no RLoS exists between a turbine and a radar it can generally be assumed that the radar will not detect the turbines. However, this can only be assured by analysis of path profiles between the radar and each turbine and conducting PD calculations.

3.3. Probability of Detection

- 3.3.1. Using a radar propagation model, the actual path loss between the GPA PSRs and various parts of each turbine can be determined.
- 3.3.2. Figure 8 illustrates the path loss profile between the GPA S511 PSR and turbine 17 and shows that terrain blocks RLoS to the turbine tip.

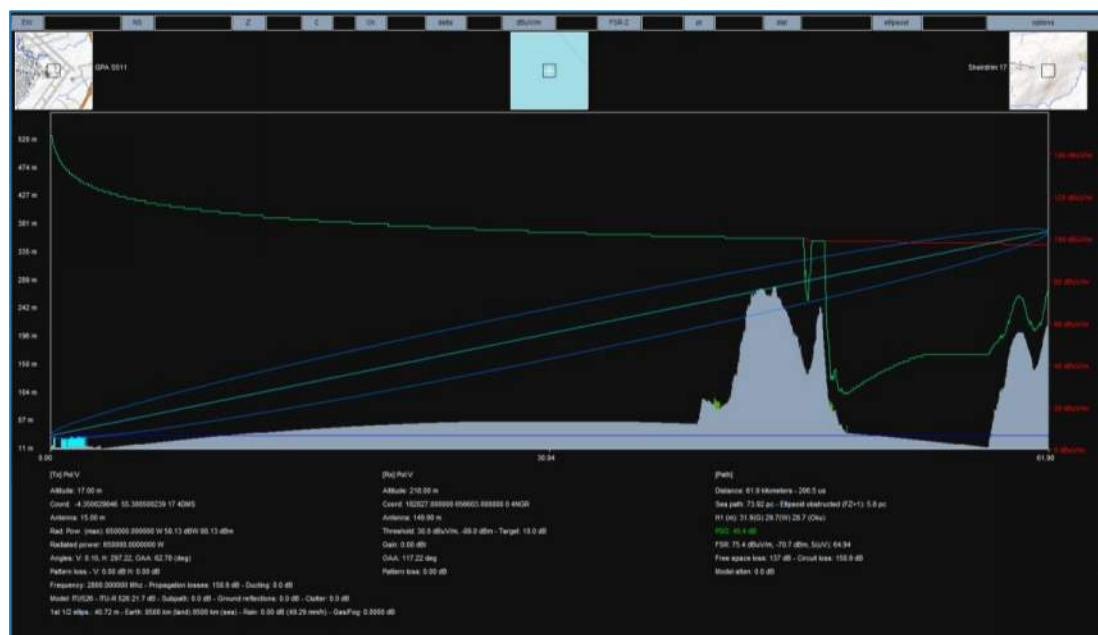


Figure 8: Path loss profile between GPA S511 PSR and tip of turbine 17

- 3.3.3. Similarly, Figure 9 illustrates the path loss profile between the GPA Terma PSR and turbine 17. Again, terrain blocks RLoS to the turbine tip.



Figure 9: Path loss profile between GPA Terma PSR and tip of turbine 17

- 3.3.4. Even when intervening terrain blocks RLoS between the radar and a turbine, the probability that the turbine will be detected by the radar is still dependant on several factors including the radar's power, the angle of antenna tilt and distance to the object.
- 3.3.5. The radar propagation model can determine the actual path loss between the PSR and various parts of the turbine. By knowing the PSR transmitter power, antenna gain, 2-way path loss, receiver sensitivity and the turbine Radar Cross Section (RCS) gain, the probability of the radar detecting the target (PD) can be calculated.
- 3.3.6. The static parts of the turbine (tower structure) are ignored in the calculation as these will be rejected by the radar Moving Target filter. In this refined model, 3 parts of the turbine blade are considered: the hub, the blade tip, and a point midway along the turbine blade. Each part of the turbine blade is assigned an RCS of 45m² based on a blade length of 65m (half of 130m rotor diameter). Path loss calculations are made to all turbines. The received signal at the radar from each component part of the turbine is then summed to determine the total signal level.
- 3.3.7. The path loss calculation carried out for each turbine component is as follows:

	Tx Power	dBm
+	Antenna Gain	dB
-	Path Loss	dB
+	RCS Gain	dB (45m ² ~ +47dB@2800MHz/+57dB@9000MHz)
-	Path Loss	dB
+	Antenna Gain	dB
=	Received Signal	dBm

- 3.3.8. The received signal is then compared with the radar receiver Minimum Detectable Signal level.
- 3.3.9. An example of the path loss calculation from the GPA S511 to turbine 17 is shown in Figure 10.

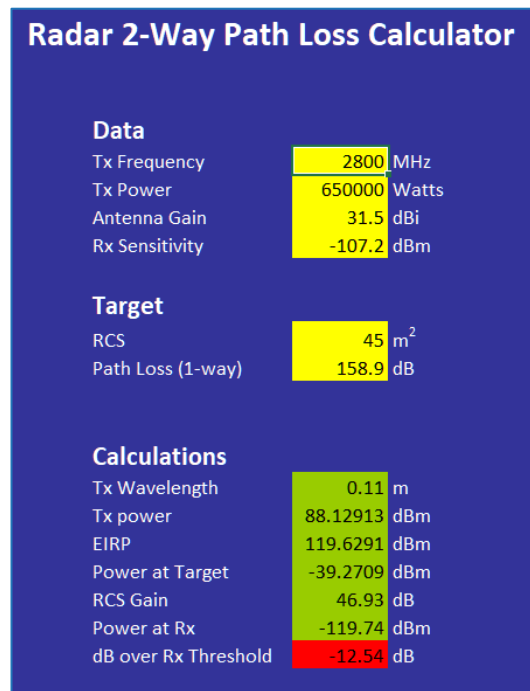


Figure 10: GPA S511 path loss calculation for turbine 17

- 3.3.10. Similarly, Figure 11 shows the path loss calculation from the GPA Terma PSR to turbine 17.

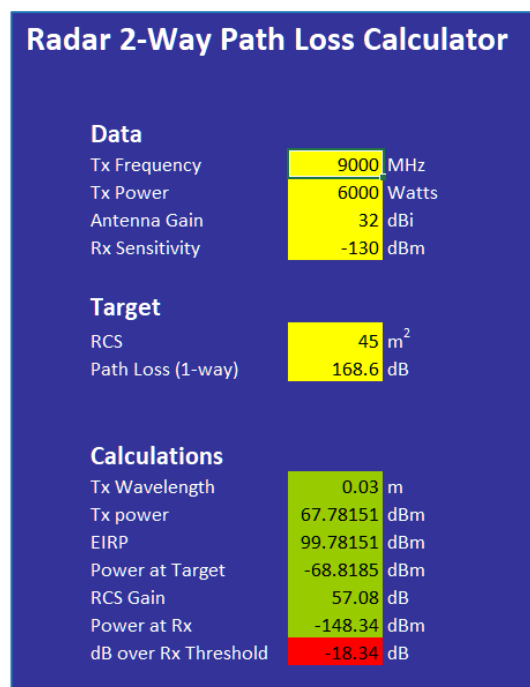


Figure 11: GPA Terma path loss calculation for turbine 17

- 3.3.11. The two-way path losses from the turbine components are tabulated and combined to give total radar received signals from each turbine. The results are colour-coded to indicate the likelihood of detection. Radar returns $>3\text{dB}$ above the detection threshold are coloured green as these values show a high probability of detection. Those between $+3\text{dB}$ and -3dB are coloured yellow and indicate a possibility of detection. Between -3dB and -6dB , results are coloured orange to show only a small possibility of detection. Signals $>6\text{dB}$ below the threshold of detection are shaded red as these values show that detection is unlikely.
- 3.3.12. Using this representation provides a ready visual comparison of different scenarios. The final result is shown in the final column (TOTAL) of each colour-coded chart.
- 3.3.13. The results of the GPA S511 PSR PD calculations for each turbine are shown in Table 2.

Turbine ID	Turbine Nacelle	Blade mid-point	Blade Tip	TOTAL
	Path Loss dB	Path Loss dB	Path Loss dB	dB over RX threshold
1	197.2	194.7	191.9	-77.19
2	187.6	180.1	177.9	-49.16
3	202.8	188.4	185.4	-64.56
4	198.0	188.9	187.7	-68.14
5	203.5	190.2	188.4	-69.96
6	187.3	179.9	177.2	-48.00
7	192.4	189.4	188.3	-68.90
8	183.0	180.6	177.9	-49.13
9	182.2	179.5	174.5	-43.21
10	199.8	176.9	175.1	-43.36
11	188.6	186.7	184.4	-61.80
12	181.7	178.6	174.3	-42.65
13	182.9	177.4	172.0	-38.36
14	176.2	169.5	160.1	-14.88
15	183.7	181.0	179.1	-51.07
16	189.1	185.8	182.3	-58.39
17	176.4	171.8	158.9	-12.52
18	186.7	184.3	181.5	-56.38
19	179.2	176.1	171.3	-36.78

Table 2: GPA S511 PSR PD results

- 3.3.14. From Table 2 it appears that all of the turbines are unlikely to be detected by the GPA S511 PSR.
- 3.3.15. The above calculations are based on the optimum performance of the radar, however the gain of a radar antenna in the vertical axis is not uniform with elevation angle. The beam is a complex shape to minimise ground returns by having low gain at elevations close to the horizontal but having high gain at elevations just a few degrees above the horizon.
- 3.3.16. At the low elevation angles of the turbine tips from the S511 PSR ($+0.1^\circ$ or less) the reduction in antenna gain further reduces any probability of turbine detection.

3.3.17. The results of the GPA Terma PSR PD calculations for each turbine are shown in Table 3.

Turbine ID	Turbine Nacelle	Blade mid-point	Blade Tip	TOTAL
	Path Loss dB	Path Loss dB	Path Loss dB	dB over RX threshold
1	207.0	203.2	200.9	-81.46
2	197.9	190.6	188.6	-56.85
3	223.2	206.4	193.6	-68.33
4	225.9	210.7	209.8	-98.54
5	218.1	200.4	198.9	-77.18
6	207.4	204.7	201.4	-82.86
7	202.3	200.1	198.9	-76.43
8	193.0	190.3	187.9	-55.40
9	200.9	194.5	186.9	-54.81
10	220.0	191.8	189.9	-59.43
11	204.1	201.4	198.3	-76.57
12	196.2	192.7	188.1	-56.76
13	201.5	198.2	189.5	-60.05
14	189.6	184.8	174.5	-30.10
15	203.0	201.1	199.0	-77.27
16	207.4	202.9	197.8	-76.30
17	190.4	184.5	168.6	-18.34
18	194.4	192.6	190.2	-59.85
19	194.8	191.7	186.8	-54.21

Table 3: GPA Terma PSR PD results

3.3.18. From Table 3 it appears that all of the turbines are unlikely to be detected by the GPA Terma PSR.

3.3.19. Again, the above calculations are based on the optimum performance of the radar. It is likely that the turbine tip elevations from the Terma PSR (+0.1° or less) are below the peak elevation where the antenna gain is maximum. Any reduction in gain further reduces the probability of turbine detection.

3.3.20. GPA provided Cyrrus with the radar modelling it used as the basis for its objection to the proposed Development. Upon review, it is apparent that GPA's RLoS modelling did not account for the earth's curvature. When modelling radar propagation, it is customary to use a 4/3 radius model of the earth to simulate the radar horizon. The impact of earth curvature on RLoS is relatively minor for ranges up to 3 or 4km, but at 62km it accounts for over 200m of effective height drop.

3.4. GPA Conclusion

3.4.1. There is no RLoS between the GPA radars and the proposed turbines and PD calculations show that the turbines are unlikely to be detected. An analysis of airspace usage by GPA is not required as there is no basis for GPA's objection.

4. NATS (En Route) Assessment

- 4.1. Detailed radar modelling in respect of the Lowther Hill PSR for both Sheirdrim and the neighbouring Freasdail Windfarm has been undertaken. The Freasdail modelling is set out in Appendix A. The Sheirdrim modelling confirms the finding of NERL's TOPA that several of the Sheirdrim turbines would be detected by Lowther PSR, and the Freasdail modelling shows that all of the Freasdail turbines are likely to be detectable.
- 4.2. Cyrrus therefore does not contest NERL's predicted impact on Lowther PSR. Note, however, that all the existing Freasdail turbines are visible to Lowther and NERL accommodates this impact. This necessitates a review of the airspace and its usage by NERL in the vicinity of Sheirdrim.
- 4.3. The proposed Development is situated within Class G (uncontrolled) airspace which extends from the ground to Flight Level (FL) 195 (approximately 19,500ft Above Mean Sea Level [AMSL]).

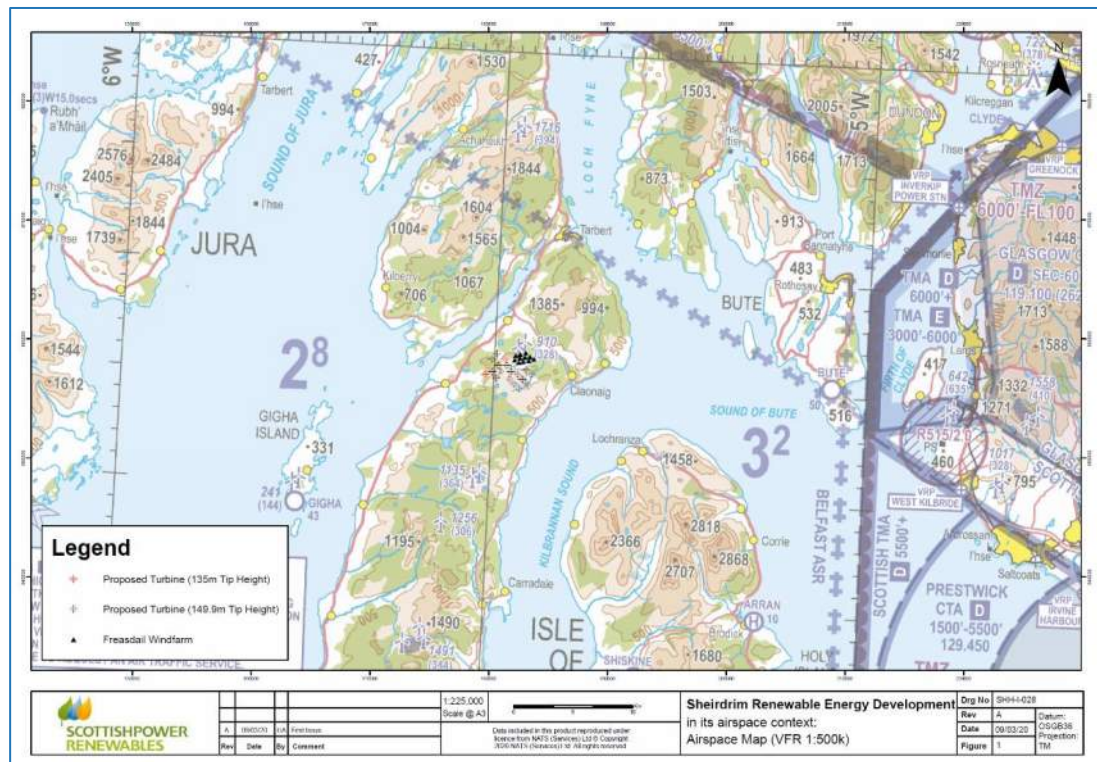


Figure 12: Sheirdrim airspace context

- 4.4. In uncontrolled airspace, such as this, the responsibility to see and avoid other traffic and obstacles rests with the pilots in command of civilian and military aircraft - any Air Traffic Services provided are essentially advisory. Above FL195 the airspace is Class C controlled airspace and it is located within a Temporary Restricted Area (namely TRA 08C). The elevation of the highest proposed turbine extends to less than 1,300ft AMSL, and as such does not penetrate any controlled airspace. The site is well clear of any of the airspace structures that are in the vicinity.

- 4.5. NERL does not provide surveillance-based services in uncontrolled airspace (only a Basic Service is offered). Under a Basic Service there is no requirement for the service provider to monitor the flight although controllers may utilise any ATS surveillance system derived information at their disposal in the provision of a Basic Service. However, given that the provider of a Basic Service is not required to monitor the flight, pilots should not expect any form of traffic information from a controller. It is accepted that where a controller has information that indicates that there is aerial activity in a particular location that may affect a flight, in so far as it is practical, they should provide traffic information in general terms to assist with the pilot's situational awareness, however, whether traffic information has been provided or not, the pilot remains responsible for collision avoidance without assistance from the controller (see CAP 774¹).
- 4.6. The Sheirdrim turbines are more than 20 Nautical Miles from any lower airspace routes, as shown in Figure 13.

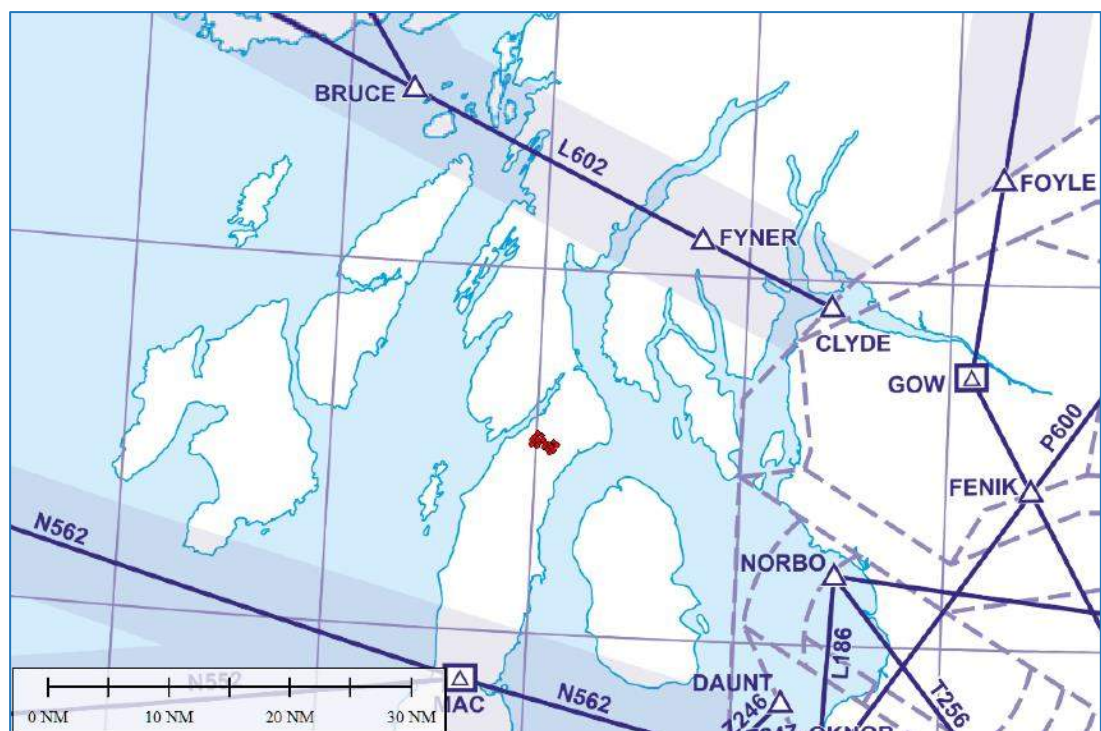


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Figure 13: Extract from Lower ATS Routes (North Sheet) ENR 6-69

- 4.7. The airspace above FL255 in the vicinity of the Sheirdrim turbines is classified as Scottish Direct Route Airspace (DRA), as depicted in Figure 14. Within DRA transatlantic traffic can plan more efficient direct routes to cut flying times and save fuel. For all aircraft in UK airspace above FL100 it is mandatory to carry Secondary Surveillance Radar (SSR) transponder equipment.

¹ CAP 774: UK Flight Information Services, Version 1, 25 May 2017

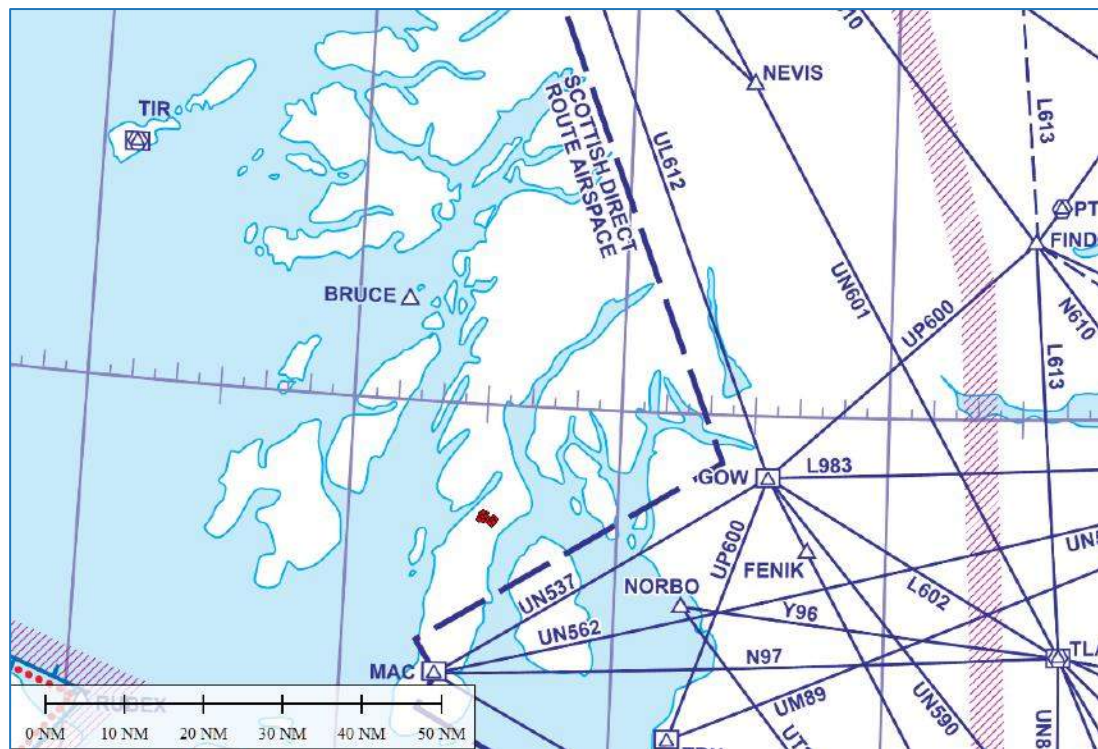


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Figure 14: Extract from Upper Airspace Control Area and Upper ATS Routes (North Sheet) ENR 6-71

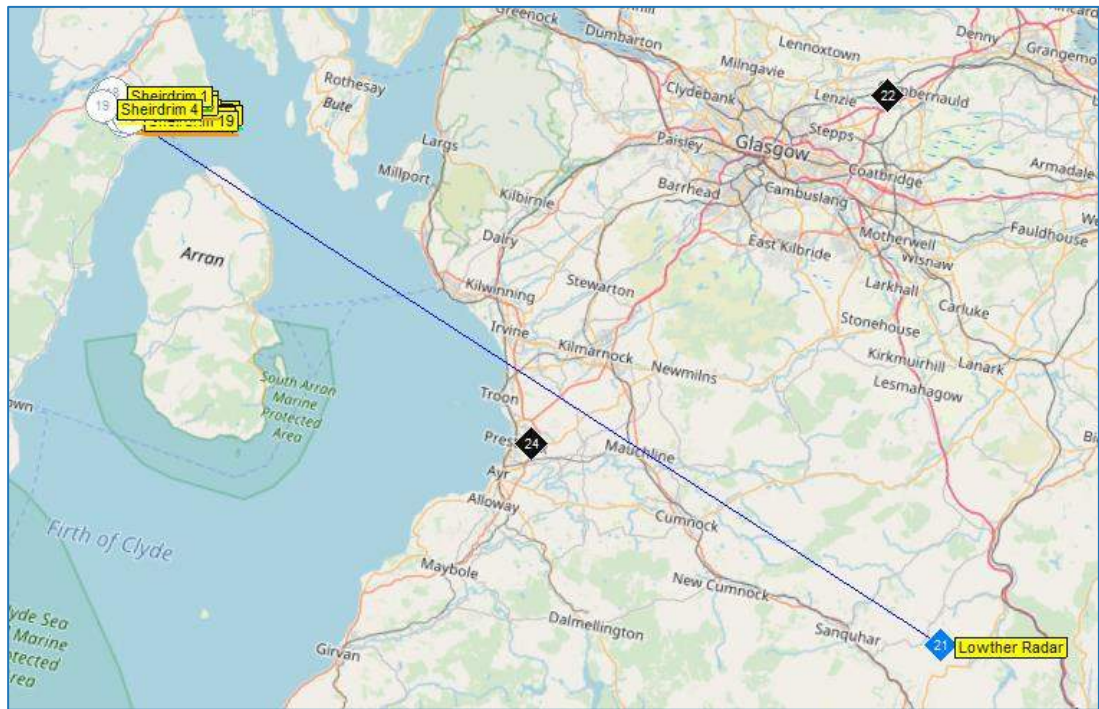
- 4.8. The ATS provided by NERL above FL195 utilise only SSR therefore any primary radar returns (clutter) associated with the turbines would not impact upon the provision of ATS as they would not be presented to the controller. Note that the rules for the provision of ATS within Class C airspace do not apply within an active TRA, and for large portions of the day this airspace is an active TRA from FL195 to FL245. ATS in an active TRA is provided in accordance with CAP 774.
- 4.9. CAP 764² states that 'Where an ANSP (Air Navigation Service Provider) determines that it is likely that a planned wind turbine development would result in any of the above effects on their CNS (Communication, Navigation and Surveillance) infrastructure, this may not, in itself, be sufficient reason to justify grounds for rejection of the planning application. The ANSP must determine whether the effect on the CNS infrastructure has a negative impact on the provision of the ATS.' As highlighted by the paragraphs above, it is not considered that the clutter associated with this windfarm will have a negative impact on the provision of the ATS provided by Prestwick Air Traffic Control (NERL).
- 4.10. Accommodation of Freasdail suggests that any primary radar clutter in this area is not of significant concern to NERL. If any mitigation has been applied to Freasdail by NERL of its own volition (e.g. application of Project RM) it is unclear why NERL cannot extend its existing mitigation to the four Sheirdrim turbines.

² CAP 764: Policy and Guidelines on Wind Turbines, Version 6, February 2016

A. Annex A – Lowther Hill Radar Assessment

A.1. Location

- A.1.1. At its closest point the proposed development area is approximately 115km north-west of Lowther Hill Radar.



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Figure 15: Location of Lowther Hill Radar and Sheirdrim Renewable Energy Development

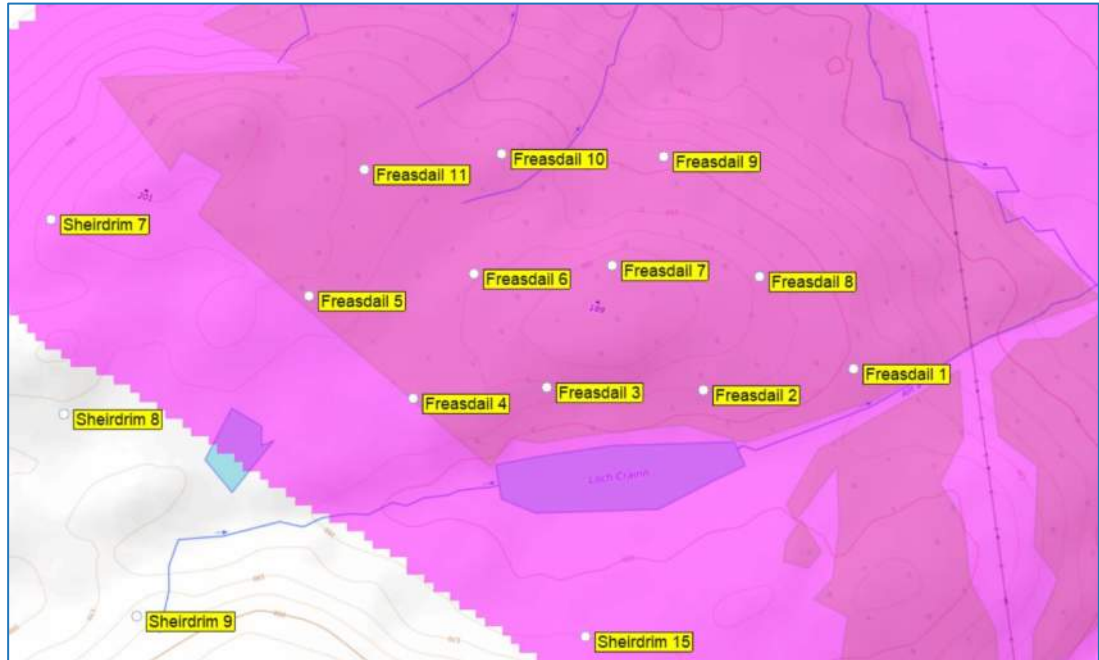
A.2. Radar Line of Sight Modelling

- A.2.1. RLoS is determined from a radar propagation model (ATDI ICS telecom EV) using 3D DTM data with 25m horizontal resolution. Radar data is entered into the model and RLoS to the turbines from the radar is calculated.
- A.2.2. Note that by using a DTM no account is taken of possible further shielding of the turbines due to the presence of structures or vegetation that may lie between the radar and the turbines. Thus, the RLoS assessments are worst-case results.

A.3. Freasdail Windfarm

- A.3.1. Freasdail Windfarm is an existing adjacent development to the north-east of the proposed Sheirdrim site. The 11 Freasdail turbines have a maximum tip height of 100m AGL and a rotor diameter of 80m. The magenta shading in Figure 16 illustrates the RLoS coverage from

Lowther Hill PSR to turbines with a blade tip height of 100m AGL and shows that RLoS exists between Lowther PSR and the tips of all 11 turbines.



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Figure 16: Lowther Hill PSR RLoS to 100m AGL – zoomed

A.3.2. Similar PD calculations can be carried out, but this time with an RCS of 15m² for each part of the 40m blades.

A.3.3. The results of PD calculations for the Freasdail turbines are shown in Table 4.

Turbine ID	Turbine Nacelle	Blade mid-point	Blade Tip	TOTAL
	Path Loss dB	Path Loss dB	Path Loss dB	dB over RX threshold
1	135.9	135.9	135.9	36.46
2	136.0	136.0	136.0	36.26
3	136.0	136.0	136.0	36.26
4	136.0	136.0	136.0	36.26
5	136.1	136.1	136.1	36.06
6	136.0	136.0	136.0	36.26
7	136.0	136.0	136.0	36.26
8	136.0	136.0	136.0	36.26
9	136.0	136.0	136.0	36.26
10	136.0	136.0	136.0	36.26
11	136.1	136.1	136.1	36.05

Table 4: Lowther Hill PSR PD results – Freasdail Windfarm

A.3.4. The path loss results indicate that there is a high probability that Lowther Hill PSR detects all the Freasdail turbine blades.



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Appendix D: Forestry

D.1 Correspondence with Scottish Forestry

- 31 March 2020
- 15 May 2020
- EIAR Figure 3.2.8 Infrastructure Felling Plan

31 March 2020

Energy Consents Unit
Scottish Government
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Our Ref: 405.00481.00051
Planning Application No.: Sheirdrim Renewable Energy Development

To Whom it May Concern,

SHEIDRIM RENEWABLE ENERGY DEVELOPMENT - RESPONSE TO SCOTTISH FORESTRY LETTER DATED 15 JANUARY 2020

This response has been prepared to address comments made in the response by Scottish Forestry to the ECU dated 15 January 2020.

In preparing this response SLR Consulting Ltd (SLR) and DGA Forestry have compiled the following response.

In the context of the comments provided, SLR and DGA Forestry have reviewed the Forestry Technical Appendix 3.2 submitted as part of the Environmental Statement originally submitted in October 2019.

Scottish Forestry comments requiring response are highlighted in bold with the SLR/DGA Response in italics:

1. Calculation of UKFS percentages for windfarm proposal area.

- **Accurate figures are needed for the differing types of open ground to demonstrate UKFS compliance:**
 - **Other land should be removed from the total area for the calculation of percentages**
 - **Area awaiting stocking is essentially woodland and should therefore be included as a separate line**
 - **Development on open ground should reduce the overall total area for UKFS compliance figs**

Grouping the open ground types together will skew the percentages and not give an accurate reflection of what is proposed.

In addition, the phasing on the development felling proposal starts in 2016. Proposals should begin from 2020.

SLR/DGA Response

- The Forestry Study Area (FSA) extends to approximately 378.89 ha and comprises three forestry properties: Sheirdrim; Gartnagrenach; and Scotmills. They in turn form part of an extensive area of state- and privately-owned forestry. The forest contains a range of woodland types and age classes due to original planting and current felling programmes, together with areas of unplanted land. The crops are comprised largely of commercial conifers with areas of mixed broadleaves and open ground. The woodlands are in the production phase with rotational felling and restocking underway. Sheirdrim and Gartnagrenach were previously part of a more extensive long-term forest plan, however since the production of the plan parts of the forest have been sold off and subsequently excluded from the development area. Scotmills was a small part of a separate extensive long term forest plan and it is understood the majority of this is now under separate ownership.
- As a result, the current baseline restocking proposals do not meet the criteria for species composition set out in the UK Forestry Standard (UKFS), as shown in Table 1.
- Unplantable land, water bodies and open ground for development infrastructure (other land) are excluded from the area calculations for UKFS compliance, which are illustrated in Table 1.

Table 1 - UKFS Compliance Baseline Restocking

Category	Requirement (%)	Baseline (%)
<i>Primary Species</i>	<75	78.2
<i>Other Species</i>	10	3.2
<i>Native broadleaves</i>	5	1.7
<i>Open ground</i>	10	16.9

- Despite restructuring the baseline restocking proposals to integrate the development infrastructure, the development restocking proposals in the original October 2019 submission, also fell short of achieving compliance with UKFS (as shown in Table 2). This was as a result of combining separate elements from different plans, the baseline restocking proposals had not been designed as a cohesive Forest Plan.

Table 2 - UKFS Compliance Development Restocking (October 2019 submission)

Category	Requirement (%)	Baseline (%)
<i>Primary Species</i>	<75	74.6
<i>Other Species</i>	10	3.0
<i>Native broadleaves</i>	5	2.6
<i>Open ground</i>	10	19.8

- Therefore, changes are proposed to the development restocking proposals (Table 3) to achieve compliance with the requirements of UKFS, as shown in the revised EIAR Figure 3.2.7 (attached) and in Table 4. Other land is excluded from the calculations in Table 4.

Table 3 - Proposed Development Restock Species Composition (Proposed revision)		
Species	Area (ha)	Area (%)
<i>Open ground</i>	<i>64.0</i>	<i>16.9%</i>
<i>Sitka spruce</i>	<i>210.1</i>	<i>55.4%</i>
<i>Sitka spruce/Mixed conifer</i>	<i>4.1</i>	<i>1.1%</i>
<i>Mixed conifer</i>	<i>33.1</i>	<i>8.7%</i>
<i>Mixed broadleaves</i>	<i>16.8</i>	<i>4.4%</i>
<i>Mixed woodland</i>	<i>0.3</i>	<i>0.1%</i>
<i>Development open ground</i>	<i>49.4</i>	<i>13.0%</i>
<i>Other land</i>	<i>1.0</i>	<i>0.3%</i>
Totals	378.89	100.0%

Table 4 - UKFS Compliance Development Restocking (Proposed revision)		
Category	Requirement (%)	Baseline (%)
<i>Primary Species</i>	<i><75</i>	<i>65.2</i>
<i>Other Species</i>	<i>10</i>	<i>10.2</i>
<i>Native broadleaves</i>	<i>5</i>	<i>5.1</i>
<i>Open ground</i>	<i>10</i>	<i>19.5</i>

- With regards to the felling phases, the development restocking plan is compared to the existing forest plan and, therefore, uses the felling phases contained within that. At a future date, if a Long Term Forest Plan (LTFP) is to be prepared which would include the development this would be the time to alter felling phases to align with the current date.

2. Calculation of felling within the catchment of Clachan Burn – part of the Clachan Potentially Vulnerable Area (PVA)

- Clachan is proposed as a new PVA because a large proportion of the community is at risk of river flooding. In recent years there have been a number of floods in Clachan causing damage to homes and businesses and affecting the road network.

- **UKFS states: Page 177 (Good forestry practice requirement 12) 'In areas prone to flooding, woodland creation or the management and redesign of existing forests and woodlands in relevant upstream water catchments should be considered as a way of mitigating flood risk.'**
- **Activities in the existing woodland have the potential to impact on downstream flood risk, both directly via changes in forest cover and indirectly through sediment impacts. Felling operations are likely to have the greatest scope for increasing flood flows by temporarily removing the existing water use effect, which can amount to as much as 70 m³/ha during a storm event. Its significance greatly depends on the scale of operations and research suggests that it is only likely to be significant/measurable if more than 20% of the catchment area above the community at risk is felled within a 10-year period.**
- **A catchment scale calculation is needed to demonstrate that the increased felling proposed will not have a negative impact on the flooding issue. If an effect is found then, comment is also required on synchronisation issues with the Allt Mohr Burn. A new forest plan is being prepared for the neighbouring woodland at Achavhraid.**

SLR/DGA Response

- *As confirmed in Technical Appendix 3.2 (Forestry) of the Environmental Impact Assessment Report (EIAR) 26.03 hectares (or 0.2603 km²) of advance felling would result from the proposed Development. The felling is required to establish the proposed infrastructure and where possible, due to the age of the existing crop, the proposed Development will be "key holed" into the existing forest crop e.g. most of the crop would not be felled to establish the proposed Development.*
- *Existing flood risk and occurrence of flooding at Clachan was recognised in the Environmental Impact Assessment Report (EIAR) (see Chapter 10 thereof) which accompanied the consent application. Measures to ensure flood risk was not increased at Clachan as a result of the development were also presented in the assessment (See para 138 to 142 of Chapter 10 of the EIAR) which included a number of measures to reduce flood risk in the Clachan catchment.*
- *It is noted that Scottish Environment Protection Agency have not raised concerned or objected regarding flood risk here.*
- *The catchment of the Clachan Burn extends to 28.8 km². Assuming all of the felling required to establish the proposed Development lies within the Clachan Burn catchment then the proportion of felling proposed equates to only 0.9% of the Clachan Burn catchment and thus the proposed felling is very unlikely to result in any significant adverse effect on flooding occurrence at Clachan.*
- *It is also recognised that additional forest felling, in accordance with the wider forest felling, will occur within 10-years of construction of the proposed Development. The attached plan shows the Clachan Burn surface water catchment and the total potential felling extent (not just felling resulting from the proposed Development). As a worst case, as all the felling would not occur within 10-years, the total area of felling is 3.8 km², of which 1.8 km² is within the catchment of the Clachan Burn. Thus, the proportion of potential felling is only 6.3% of the Clachan Burn catchment and forest felling, which is significantly less than the >20% figure stated by Scottish Forestry. Therefore, the total felling in the Clachan catchment is unlikely to have any significant adverse effect on flooding occurrence at Clachan.*

3. Compensation Planting (CP)

- The area of CP proposed will need to be recalculated (as in 1 above).
- SF object unless a CP plan is conditioned as part of the consent. SF advise that the full CP plan should be considered under the Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017, when the details are available, but before commissioning of the wind farm. Wording of such a condition is currently under discussion between ECDU and SF National Office team.

SLR/DGA Response

- *See response to item 1*
- *The comments regarding the consent condition is noted. SPR is willing to accept this condition.*

4. Long Term Forest Plan (LTFP)

- It has been the practice, in Argyll and Bute, for planning consent to cover the tree felling required only for the infrastructure (e.g. pads and roads). Any further felling (such as that for wind efficiency) would be assessed in the ES, but then approved via the Forestry Act (amendment to existing forest plans, new Forest Plans or felling licences).
- We note that a proportion of the forest sits out with the red line and would recommend that this is included in the LTFP.
- SF object unless a LTFP is conditioned as part of the consent. The LTFP should be secured using a suitably worded condition e.g. 'There shall be no Commencement of Development until a Long Term Forest Plan in line with UKFS has been submitted to and approved in writing by the Planning Authority in consultation with Scottish Forestry.'
- The LTFP should be prepared according to current Applicants Guidance and best practice found here: [Forest Plan Resources](#).

SLR/DGA Response

- *SPR note the comments regarding the LTFP consent condition within the site boundary, however SPR are unable to influence the LTFP outside of the development plan area and in this case such a consent condition would be unworkable.*

Closure

We trust that this addresses the concerns that are raised in the checking report. If any further clarification is required, please do not hesitate to contact ourselves.

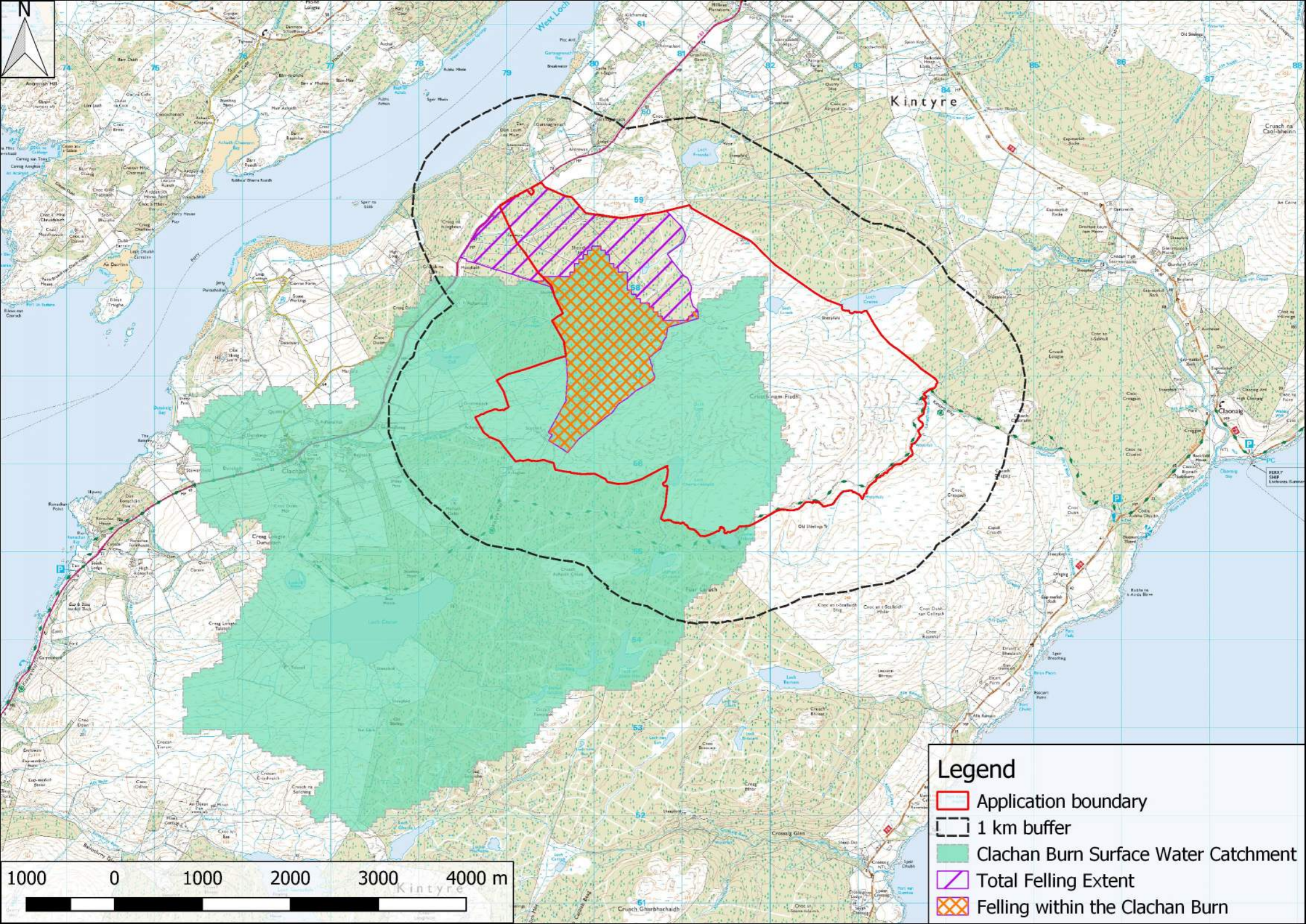
Yours sincerely

SLR Consulting Limited






Redacted

Mark Brown

Technical Director



Legend

-  Application boundary
-  1 km buffer
-  Clachan Burn Surface Water Catchment
-  Total Felling Extent
-  Felling within the Clachan Burn

15 May 2020

Energy Consents Unit
Scottish Government
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Our Ref: 405.00481.00051
Planning Application No.: Sheirdrim Renewable Energy Development

To Whom it May Concern,

SHEIDRIM RENEWABLE ENERGY DEVELOPMENT - RESPONSE TO SCOTTISH FORESTRY LETTER 3 APRIL 2020

1. This note is prepared in response to Scottish Forestry's (SF) initial response dated 15th January 2020; their subsequent response dated 3rd April 2020.
2. Point 2 of the 3 April letter relating to flooding has been addressed separately and an email from SF's Elaine Jamieson dated 6th May 2020 to the ECU confirms this point. We can confirm that the percentages of felling quoted in the analysis of catchment flows are below the 20% threshold of the Clachan Burn catchment based on the additional felling due to the wind farm (ie, Phase 2 = 78.21ha and Ph3 = 67.52ha) as quoted in the Forestry Technical Appendix of the EIA Report (Appendix 3.2).
3. This letter response, therefore, addresses point 1 (and point 3 which refers back to point 1) of the 3 April SF response.
4. The SF response dated 15th January 2020 stated:

It has been the practice, in Argyll and Bute, for planning consent to cover the tree felling required only for the infrastructure (e.g. pads and roads). Any further felling (such as that for wind efficiency) would be assessed in the ES, but then approved via the Forestry Act (amendment to existing forest plans, new Forest Plans or felling licences).

SLR/DGA Comment:

5. It is our understanding that in the past the felling and restocking plans submitted with an EIAR have been approved in their entirety as part of the planning permission. While we understand there has been some discussion about amending this, it is, as far as we are aware, still the current position.
6. SF then went on to state:

SF object unless a LTFP is conditioned as part of the consent. The LTFP should be secured using a suitably worded condition e.g. 'There shall be no Commencement of Development until a Long Term Forest Plan in line with UKFS has been submitted to and approved in writing by the Planning Authority in consultation with Scottish Forestry.'

The LTFP should be prepared according to current Applicants Guidance and best practice found here: Forest Plan Resources.

7. Their response dated 3rd April contradicted this objection. It stated:

- *Our Scoping stated that- A long term forest plan should be provided as part of the EIA Report (as a technical appendix for context) to give a strategic vision to deliver environmental and social benefits through sustainable forest management and describes the major forest operations over a 20 years period.*
- *SLR's letter explains that the proposed felling and restocking plans provided are based on the existing forest plans with the development felling and restocking added. This does not meet the requirements in the paragraph above.*
- *This should not be left to post consent and as a minimum a draft needs to be should be prepared following the current Applicants Guidance and best practice found here: Forest Plan Resources.*

8. This point was reiterated in the email of 6th May 2020 from SF to the ECU.

SLR/DGA comment:

9. There are already two separate baseline Forest Plans, approved by SF covering the woodlands:

- Achaglass and Gartnagrenach, Ref 4460711, expires 10/01/2023; and
- North and East Ronachan and Scotmill, Ref 4659693, expires 03/05/2020.

10. It is understood there have been ownership changes to parts of the woodland contained within the above plans outside of the Proposed Development area. It is therefore not clear what benefit there would be from the production of a yet an additional plan at this stage. The production of such a plan would in the Applicant's opinion be of little value and inappropriate at this time. It would be potentially subject to change; the Applicant does not have control over parts of the forest outwith the red line boundary and it therefore would not encompass management of the entire forest management unit.

11. It would be a more rational approach to produce such a plan once the final development proposals have been confirmed; the Proposed Development has been consented; and the above Forest Plans have expired and will required to be renewed to allow the landowner to continue with their felling and replanting programmes. This would allow the Proposed Development forestry plans to be incorporated into the Forest Plan.

12. Additionally, the request for a draft LTFP to be prepared at time of application is inconsistent with other SF responses for similar developments in Kintyre, e.g. High Constellation, and elsewhere in

Scotland, e.g. Lethans Wind Farm in East Ayrshire, where the production of such a plan is conditioned as requested in the SF response dated 15th January 2020.

13. The Applicant is prepared to accept a condition of approval that a Long Term Forest Plan is prepared prior to the commencement of construction, with the wording to be agreed between the parties.
14. For example, the recommendations, which are set out here, made by SF for the High Constellation application, in their response to the Energy Consents Unit on 2 September 2019, would also appear to be relevant here and would be acceptable to ScottishPower Renewables:

A.2 Forest Planning

We appreciate that the age of the remaining woodland pushes any further felling outside of the period of the plan and we assume that to be 10 years from a forestry perspective. We recommend however, the production of constraints, opportunities and concept plans that will demonstrate how UKFS compliance can be achieved, and the most benefit made of the substantial tree species change. For example, wildlife corridors, links to adjacent ancient woodland and riparian zones. We recommend that these plans are secured through a condition.

A.3 We recommend that an operational plan for harvesting, restocking and establishment be secured through a condition.

Closure

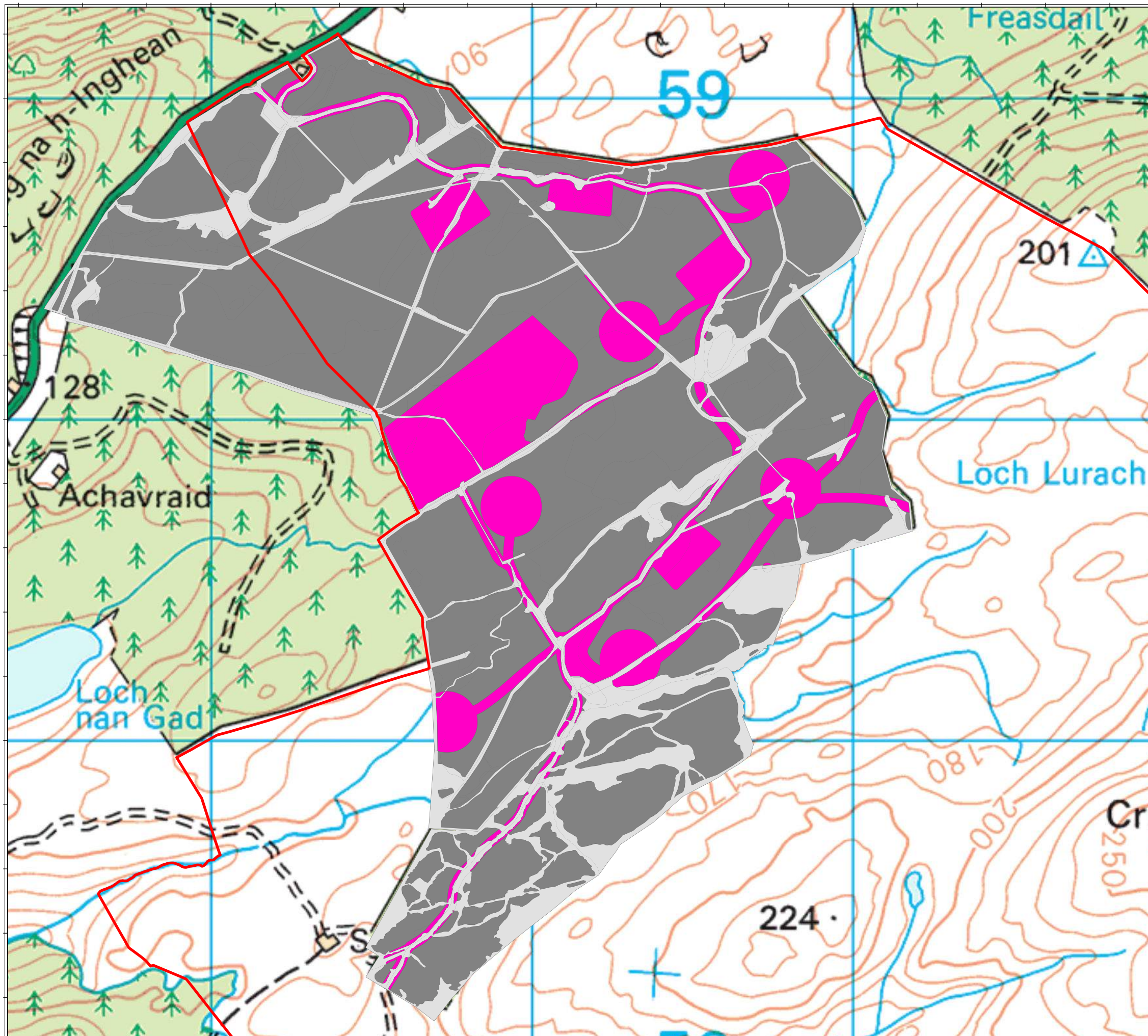
We trust that this addresses the concerns that are raised by SF. If any further clarification is required, please do not hesitate to contact ourselves.

Yours sincerely

SLR Consulting Limited

Redacted

Mark Brown
Technical Director



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Appendix E: Ornithology

E.1 Correspondence with Scottish Natural Heritage (SNH), (now NatureScot)

- 01 April 2020

This Technical Note provides clarifications to Scottish Natural Heritage's (SNH) comments regarding aspects of the ornithological assessment relating to the proposed Sheirdrim Renewable Energy Development. SNH's comments were conveyed in a letter (dated 13 March 2020) to the Scottish Government in response to the planning application.

Below we provide SNH's comments, in underlined italics, and our response to each.

"A Bird Protection Plan (BPP) will be implemented during the construction period to minimise risk of disturbance to protected birds but we note that there are no proposals included for minimising disturbance risks during the operational phase. Should this Proposal be consented, the BPP would need to include operational mitigation measures for a range of species including Hen Harriers, Black Grouse and Red-Throated Divers"

We are unsure as to why mitigation measures implemented through the Bird Protection Plan (BPP) should be extended into the operational phase of the windfarm.

The purpose of the BPP is to prevent disturbance to all breeding birds, in compliance to the Wildlife and Countryside Act 1981 (as amended), during construction of the proposed Development. Hen harrier, black grouse and red-throated diver, species of high or moderate Nature Conservation Importance, breed in the vicinity of the proposed Development. Therefore, it is appropriate and necessary to specify measures to protect these breeding birds from disturbance created by construction activities, including tree felling and borrow pit works. The BPP does this.

However, it is assumed that if the aforementioned species choose to return, after the completion of the construction phase, and breed adjacent to any constituent element of the proposed Development at a distance that would trigger the BPP then these birds will be tolerant of the presence of these elements and its operation. As such, there is no requirement for the BPP to extend into the operational period as there is no disturbance to mitigate.

It should be noted that the disturbance distances contained within Whitfield *et al.* (2008) are precautionary and allow construction to proceed in the knowledge that compliance with the Wildlife and Countryside Act is being adhered. For example, the distance cited for hen harrier range between 500 – 750 m; however there is evidence that hen harriers will tolerate operational activities and continue to successfully breed at distances of 200 m.

Furthermore, by SNH's own admission *"There are a number of records of hen harriers nesting successfully close to operational or under construction turbines in Scotland and the weight of*

evidence is that harriers are rarely displaced and or if they are, they are displaced by small distances". Therefore it is difficult to see why operation mitigation measures are required for hen harrier. Please refer to the EIA Report Chapter 9 paragraphs 113, 114 and 127 – 133 and the references therein.

Similarly for black grouse, SNH state "... one lek site is approximately 300 m away from nearest infrastructure which is closer than our recommended buffer of at least 500 m. However, given the small size of the black grouse population within the site, this is unlikely to have a significant impact on this species". Again, it is not clear why operational mitigation measures are required for black grouse if the location of infrastructure is unlikely to have a significant impact. Please refer to the EIA Report Chapter 9 paragraphs 113, 114 and 134 – 140 and the references therein.

Finally for red-throated diver, SNH state that "The nearest Freasdail turbines to the lochan are approximately 380 m to the north east and east...". However, Freasdail Wind Farm became operational in March 2017 and red-throated divers continued to actively breed on the lochan in 2018 and 2019 (no surveys were undertaken in 2017). Therefore it is unclear why operational mitigation measures are required when the nearest proposed turbine and associated track are at a distance greater than 400 m from the lochan and at a distance greater than those turbines at Freasdail Wind Farm. Please refer to the EIA Report Chapter 9 paragraphs 113 – 123 and the references therein.

Therefore, we would respectfully suggest that SNH's recommendation is reworded to exclude "...the BPP would need to include operational mitigation measures for a range of species including Hen Harriers, Black Grouse and Red-Throated Divers."

With regard to the comments made in Annex 1 of SNH's response;

In our view, there is insufficient information to determine whether the Proposal is likely to have a significant effect on Greenland white-fronted geese (GWF).

We disagree with this comment. Sufficient information has been presented within the EIAR Chapter and supporting documents to conclude that the likelihood of significant effects exists. Within the EIA Report Chapter 9, Paragraphs 167 – 169 detail the steps undertaken to reach this conclusion. The conclusion of Step 2 states "*Due to the proximity of the proposed Development to roosting sites and feeding fields used by the qualifying species and the likely potential for disturbance to the species during construction and operation, it is considered that there is a likelihood of significant effects*".

We consider that the EIA Report has not fully considered the potential for any impact from the Solar Array SA2 in the Habitat Regulations Appraisal...

We disagree with this comment and set out the reasons for this below. In our opinion sufficient information has been presented within the EIAR Chapter and supporting documents to inform a Habitats Regulations Appraisal (HRA).

The solar arrays are not located in areas used by feeding GWF geese; therefore no direct displacement from feeding habitat is predicted. Indirect displacement from feeding habitat

could occur through routine operation and maintenance activities or by the perceived threat of predator concealment created by the solar arrays.

Within the EIA Report Chapter 9, Paragraph 178 concludes that due to the distance between the proposed Development and roosting/feeding sites and the nature of routine operation and maintenance activities, operational disturbance would be at a level which would not cause significant disturbance.

During winter GWF geese are flocking, open-country foragers preferring a wide view in order to detect and escape from predators by flight. Field boundary features (i.e. forest edges, hedges, walls etc.) have a depressing effect on goose feeding distribution due to the threat of predator concealment. Solar arrays could therefore be perceived by geese as having the potential to conceal a predator and this effect would be similar in magnitude to other boundary features, i.e. the distance in which a goose believes it can detect and evade a predator. There are no studies we are aware of that specifically address GWF geese and displacement caused by solar arrays. However, there are numerous studies on which we can draw an inferential relationship, e.g. Madsen *et al.* (1985)¹.

As Loch nan Gad is c.600 m from the nearest solar array no effects are predicted. Count data held by SNH shows that the nearest regularly used feeding field is c.300 m away, and the nearest feeding field which receives 'feeding' payments under the Kintyre Local Goose Management Scheme² is c.980m away,; distances greater than that suggested by the literature, e.g. Madsen *et al.* (1985). Therefore, the conclusion reached in paragraph 178 remains valid.

We firmly believe that this conclusion could have been reached without the requirement of undertaking further desk-based assessment; a degree of reciprocated professional judgement based on knowledge of goose biology and the site-specific application of such knowledge could have reached the same conclusion.

... (consider) whether there are any light effects (e.g. glare or light on moonlit nights) which could cause disturbance / displacement or increase collision risk.

PV solar panels are designed to absorb as much light as possible (including moonlight), and are coated with an anti-reflective film for this reason. In addition, the grid-like panel design means reflection is fragmented, a principle applied to windows in order to reduce collision events (Sheppard & Phillips, 2015)³. Furthermore, the solar arrays would be spaced between 5 m and 7 m apart between rows further fragmenting the limited reflected light. Therefore no effects due to light (e.g. glare or light on moonlit nights) are predicted.

¹ Windbreaks, plantations and banks were analysed and a depressing effect was found from 0m – ca.150m.

² Payments under the KLGMS are made to farmers to provide GWF geese with undisturbed feeding refuges. Outside these feeding refuges normal farming practices can continue and non-lethal scaring of GWF geese can be undertaken.

³ Sheppard, C. & Phillips, G. 2015. Bird-friendly Building Design, 2nd Edition. American Bird Conservancy, The Plains, VA.

Once constructed, the solar array will have an overall height of around 2.5 m – 3 m above ground level. As GWF geese fly between roosting lochs and feeding fields no barrier effect or risk of collision are predicted.

“It is noted that paragraph 124 of Chapter 9 states that GWF are ‘not considered to be especially vulnerable to disturbance compared to some ‘grey goose’ species’ although there is no scientific evidence provided to support this statement.”

Please refer to the preceding paragraph 90 of Chapter 9 where it states; *“White-fronted geese are not considered to be especially sensitive to disturbance, although no published studies examining their response to construction-type activities are known. Research on the responses of other goose species to disturbance has been published; however, most studies focus on disturbance as a result of hunting activities or evaluate effects on feeding rather than roosting birds. Further, many of the populations studied have, unlike white-fronted geese, been subject to hunting pressure so were likely to have been more sensitive to disturbance (e.g. Madsen, 1985).”*

The EIAR Chapter could have cited many other studies that look at the disturbance distances (or reaction distances) of grey geese before, during and after the “open season”. However, as these are already cited in Madsen (1985) it seemed pointless in doing so. For example, Gerdes & Reepmayer (1983)⁴ showed that greater white-fronted goose disturbance distance reduced from 500 m to 200 m following the closure of the hunting season. Therefore, as there is scientific literature on the reduction in disturbance distances between the “open” and “closed “ season and that Greenland white-fronted geese are protected from hunting whilst other grey goose species are not, by inference Greenland white-fronted geese are not as sensitive to disturbance as other grey goose species whilst wintering in the UK.

Blair Urquhart
Senior Research Ecologist
Natural Research (Projects) Ltd.

⁴ Gerdes, K. & Reepmeyer, H. (1983). Zur raumlichen Verteilung uberwinternder Saat-und Blessgänse (Anser fabalis und A. albifrons) in Abhängigkeit von naturschutzschadlichen und fordernden Einflüsse. Vogelwelt 104: 54-67.

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