atmos CONSULTING

90151

Technical Report

Lochluichart East BESS

Peat Survey Results

Boralex

February 2025

Contents

Document Prepared For

Katrina Walker
Boralex Ltd

Document Prepared By

Wayne Gourlay
Ecological Consultant
wayne.gourlay@atmosconsulting.com

Document Approved By

Adam Rochester
Senior Ecologist
adam.rochester@atmosconsulting.com

Version	Date	Reason
1.1	04/02/2025	Draft for internal review
1.2	13/02/2025	Client issue
1.3	19/02/2025	Update to report and reissue to client

1 Introduction

1.1 Terms of Reference

In January 2025, Atmos Consulting Ltd. (Atmos) was commissioned to undertake a peat survey and reporting on behalf of Boralex Ltd. for the Lochluichart East Battery Storage project.

1.2 Site Location and Description

The proposed development site at LochLuichart (hereafter referred to as the 'Site') is located just north of the A832, west of Garve in Highland region. The Site is located within a section of coniferous forestry plantation which is in the process of being felled. At the time of the survey, the proposed battery storage areas have largely been felled, with coniferous plantation and woodland mainly to the edges of the site and at proposed access tracks. The area designated for the development is centred on grid reference: NH 34399 63640. The access track to the Site from the A832 begins at GR: NH 33602 63480. LochLuichart lies to the south of the site along with the Dingwall – Kyle of Lochalsh railway line. The surrounding landscape consists of both planted forestry and natural woodland in addition to the remote upland landscape typical to the Highlands.

Close to the Site access track are a few warehouse buildings used by the nearby shooting estate, and some of the land close by is used for game shooting, target practice and the rearing of pheasants.

1.3 Proposed Development

It is proposed to build a 36 MW Battery Energy Storage System (BESS) with associated infrastructure on Site.

1.4 Objectives

To Undertake a peat probing survey adopting two approaches; higher resolution (survey points taken at 10m2) survey areas concerned with the proposed construction of the two BESS and lower resolution (survey points taken at 50m2) in areas where proposed supporting infrastructure is to be location.

1.5 Peat Condition

For the purpose of the report, the Macaulay Institute (1984) peat definition is used whereby peat is described as "an organic soil which contains more than 60 per cent of organic matter and exceeds 50cm in thickness." Deep peat is defined by Bruneau and Johnson, (2014) to be "a peat soil with a surface organic layer greater than 1.00m thickness." This follows Scottish Government et al. (2017) where "Peat soil is an organic soil which contains more than 60 per cent of organic matter and exceeds 50 centimetres in thickness." The Scottish Government guidance however further states that "a peat depth survey should assess the presence of any peat layer even when less than 50cm thickness."

The structure of an active peatland typically comprises a thin surface layer of living vegetation (the acrotelm) overlying a usually thicker layer of well decayed and

humified peat, comprising the consolidated remains of former surface vegetation (the catotelm). Where there is no discernible plant remains, the peat is known as amorphous. Below the peat is the basal substrate, mineral soil, mineral superficial deposit or bedrock.

The acrotelm is the upper aerobic layer of peat and consists of living and partially decayed plant material. It typically has a higher hydraulic conductivity than underlying peat and is defined with relation to distance to the water table. Acrotelm thickness varies with topography – such as hummocks, peat hags, hollows – and with time, especially in drought periods of when it is drained. The acrotelm is not always present.

The catotelm layer sits beneath the acrotelm and consists of well decayed and humified material, and is denser with a very low hydraulic conductivity. Conditions are permanently anaerobic and anoxic because the catotelm is permanently below the water table. The catotelm is less cohesive than the acrotelm layer.

Amorphous peat is highly decomposed organic material where all recognisable plant remains are absent. These deposits are dark brown to black in colour, plastic, are low tensile strength and are unable to stand unsupported > 1m when stockpiled.

2 Method

A peat survey was undertaken in January 2025 in accordance with current guidance (Scottish Government *et al*., 2017). This consisted of a desk study element followed by field survey work and GIS analysis.

2.1 Desk Study

A desk study exercise was undertaken to determine the likely presence of peat within the Site with reference to the Scottish Natural Heritage (SNH) Carbon and Peatland Map, 2016. This map is a high-level predictive planning tool which provides an indication of the likely presence of peat, at a course scale. The map shows the areas of peat referred to in the Scottish Planning Policy (SPP) (Scottish Government, 2014) – carbon-rich soil, deep peat and priority peatland habitat. On the map, the top two classes (1 and 2) taken together identify the nationally important resource:

Class 1

- Nationally important carbon-rich soils, deep peat and priority peatland habitat.
- Areas likely to be of high conservation value.

Class 2

- Nationally important carbon-rich soils, deep peat and priority peatland habitat.
- Areas of potentially high conservation value and restoration potential.

2.2 Field Survey

Once the presence of peat was determined to be likely, a peat depth survey exercise was undertaken within the Site boundary. Probe locations were generated on a 10m grid and on a 50m grid in addition to specific probe locations on potential access tracks, covering the Site using GIS software, resulting in a total of 362 survey points.

Field surveyors were provided with GPS units containing waypoint files to allow accurate location of probe locations. At each survey location, using industry standard equipment (fibreglass rods with a steel tip) a peat probe was used to measure the depth of peat present which was then recorded against the predetermined probe location identifier.

Following completion of field survey work, results were compiled for GIS analysis.

2.3 GIS Analysis

GIS analysis will utilise online datasets and interrogate the results from this survey. In order to map interpolated depths and slope gradients the GIS analysis will utilise ArcMaps's Topo to Raster and nearest neighbour tools map interpolated depths across the Site. The terrain slope will slope angle using the Terrain5 dataset, with 5m resolution, and the Slope tool in ArcGIS 10.3.1.

2.4 Limitations

The positioning of the probing in relation to the predefined GIS grid was guided using a GPS enabled tablet. The GPS has WAAS and GLONASS functionality to aid accurate positioning. The tablet and its GPS functionality follow industry standard capabilities, but it should be noted that all portable equipment will have an inherent level of error, and this is amplified in localities with foliage particularly in dense woodland.

A single sampling point 306 was not accessible due to a pheasant pen in situ.

3 Results

3.1 Desk Study

The SNH Carbon and Peatlands Map shows that the Site comprises of Class 5 (see Appendix A Figure 1), indicating peat soils, which are carbon-rich and deep, with no peatland vegetation present.

3.2 Field Survey

The results of the peat depth survey are mapped in Appendix A Figure 2 with the raw data list in Appendix B Table. A summary of peat depths is presented in Table 1 below.

Table 1: Distribution of Peat Depths

Depth Range (m)	No of measured points
0 -0.5	231
0.5 -1	79
1 -1.5	25
1.5 - 2	11
2 - 2.5	10
2.5 - 3	4
3 - 3.5	2
3.5 - 4	0

3.3 GIS analysis

GIS analysis resulted in the production of four figures (see Appendix A)

- Figure 1 – display of SNH Carbon and Peatlands 2016 map data within the Site;
- Figure 2 – display of measured peat depth at each survey point, in half metre brackets;
- Figure 3 – display of interpolated peat depth, created using the Topo to Raster and nearest neighbour tools in ArcGIS software 10.3.1, based on 100m spaced survey data; and
- Figure 4 – display of slope angle using the Terrain5 dataset, with 5m resolution, and the Slope tool in ArcGIS 10.3.1.

4 Discussion

The desk study revealed that the site falls under Class 5 soils as defined by SNH Carbon and Peatlands Map. This classification projects peat soils, which are carbon-rich and deep, with no peatland vegetation present.

The Peat probe results are skewed towards probe depths with minimal peat (not meeting Macaulay Institute (1984) peat definition), with just under two thirds (231 probes - 63.8%), of the total survey probes (362) returned very shallow depths of peat (<0.5m). The second most frequent probe depth was 0.5m-1m Peat depth range, recorded in 79 probes (21.8%) (meeting and exceeding the Macaulay Institute (1984) peat definition). Finally, the least frequent depths were those measuring in excess of 1 meter, in just 52 (14.4%) probe locations which can be described as deep peat (as defined by Bruneau and Johnson, (2014)). Figure 3 shows the interpolated distribution of peat soils on site, with the majority of the deep peat broadly localised to four localities.

Figure 4 (Appendix A) shows the analysis of slope using Terrain5 data analysis – much of the Site is relatively steep in the north, south and southeast with centre of the Site generally flatter.

5 References

Bruneau, P.M.C & Johnson, S.M. 2014. Peatland - definitions & information resources. Scottish Natural Heritage Commissioned Report No 701.

Macaulay Institute for Soil Research (1984). Organization and Methods of the 1:250 000 Soil Survey of Scotland. University Press, Aberdeen.

Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland, on-line version only.

Scottish Government (2014). Scottish Planning Policy. On-line version only.

Appendices

Appendix A. Figures

Figure 1 – SNH Carbon and Peatlands map

Figure 2 – Peat depth survey results map

Figure 3 – Interpolated peat depth maps

3a Nearest Neighbour analysis

3b Topo to raster analysis

Figure 4 – Slope map

Lochluichart Extension II Wind Farm

BORALEX

Figure 1
Carbon and Peatlands Map

Key

Site boundary

NatureScot Carbon & Peatlands Map (2016)

- Non-soil
- Mineral soil
- Class 1
- Class 2
- Class 3
- Class 4
- Class 5

atmos CONSULTING

0 0.25 0.5 1
Kilometers

N

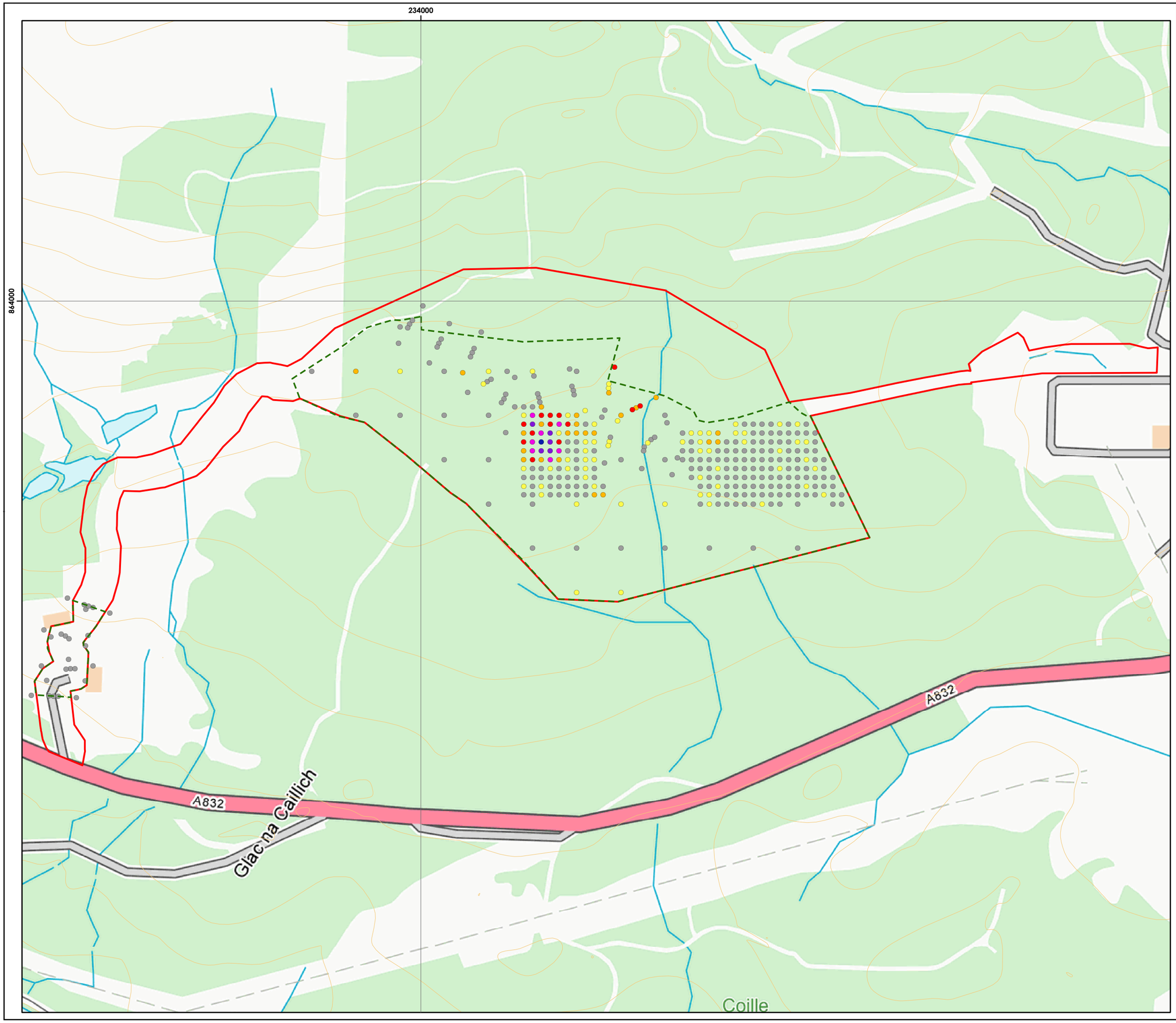
Scale @ A3:
1:15,000

13/02/2025 90151/GY/001a
Drawn by: LB Checked by: KM Approved by: AR

Lochluichart Extension II Wind Farm

BORALEX

Figure 2
Phase 1 & 2 Peat Survey Results



Key

- Site boundary
- Survey Area

Measured peat depth

- < 0.5m
- 0.5 - 1m
- 1 - 1.5m
- 1.5 - 2m
- 2 - 2.5m
- 2.5 - 3m
- > 3m

atmos CONSULTING

0 50 100 200
Meters

N

Scale @ A3:
1:4,000

13/02/2025 90151/GY/003a
Drawn by: LB Checked by: KM Approved by: AR

Lochluichart Extension II Wind Farm

BORALEX

Figure 3a
Interpolated Peat Depth
Natural Neighbour Interpolation

Key

- Site boundary
- Peat survey area
- + Surveyed peat points

Interpolated peat depth

- < 0.5m
- 0.5 - 1m
- 1 - 1.5m
- 1.5 - 2m
- 2 - 2.5m
- 2.5 - 3m
- > 3m

233500
234000
234500
864000
863500
A832
Glac na Caillich
Coille Ceann Loch Luichairt

atmos CONSULTING

0 75 150 300
Metres

N

Scale @ A3:
1:4,500

13/02/2025 90151/GY/004a
Drawn by: LB Checked by: KM Approved by: AR

Lochluichart Extension II Wind Farm

BORALEX

Figure 3b
Interpolated Peat Depth
Topo to Raster Interpolation

Key

- Site boundary
- Peat survey area
- + Surveyed peat points

Interpolated peat depth

- < 0.5m
- 0.5 - 1m
- 1 - 1.5m
- 1.5 - 2m
- 2 - 2.5m
- 2.5 - 3m
- > 3m

atmos CONSULTING

0 75 150 300

Metres

N

Scale @ A3:
1:4,500

13/02/2025 90151/GY/004a

Drawn by: LB Checked by: KM Approved by: AR

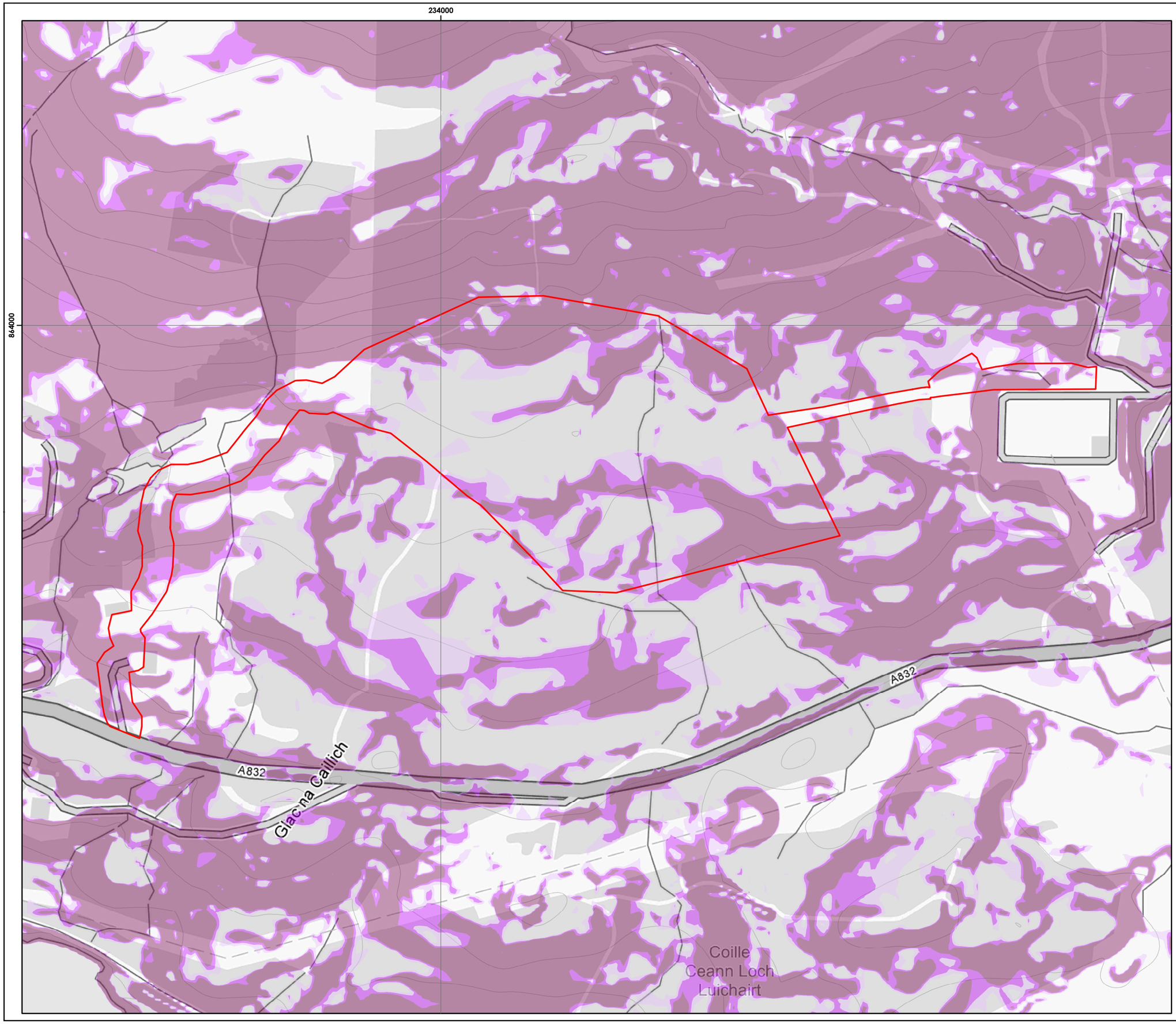
233500 234000 234500

864000 863500

A832

Glac na Caillich

Coille Ceann Loch Luichairt



Lochluichart Extension II Wind Farm

BORALEX

Figure 4
Slope Map

Key

Site boundary

Slope Gradient

10 - 12%

12 - 14%

> 14%

atmos CONSULTING

0 75 150 300

Meters

N

Scale @ A3:
1:4,500

13/02/2025 90151/CP/002a

Drawn by: LB Checked by: KM Approved by: AR

Appendix B. Peat Survey data

Table 2: Peat Survey Depths

Point	Depth (m)
84	0.1
85	0.92
86	0.67
87	0.38
88	0.22
89	0.28
90	0.17
91	0.18
92	0.2
93	0.25
94	0.44
95	0.38
96	0.52
97	0.67
98	0.65
99	0.34
100	0.14
101	0.19
102	0.41
103	0.2
104	0.3
105	0.37
106	0.35
107	0.5
108	0.14
109	0.35
110	1.3
111	0.4
112	0
113	1.4
114	0.7
115	0.5
116	0.63
117	0.55

Point	Depth (m)
118	0.2
119	0.01
120	0
121	0.01
122	0.25
123	0
124	0
125	0.14
126	0.51
127	0.17
128	0.12
129	0.41
130	0.33
131	0.16
132	0.55
133	0.29
134	0.34
135	0.36
136	0.32
137	0.59
138	0.24
139	0.46
140	0.43
141	0.2
142	0.25
143	1.22
144	1.1
145	0.55
146	0.89
147	0.27
148	0.23
149	0.18
150	0.39
151	0.43
152	0.31
153	0.41
154	0.29
155	0.4

Point	Depth (m)
156	0.15
157	0.6
158	0.39
159	0.51
160	0.4
161	0.13
162	0.5
163	0.19
164	0.37
165	0.96
166	0.09
167	0.36
168	0.26
169	0.62
170	0.18
171	0.31
172	0.29
173	0.23
174	0.5
175	0.42
176	0.33
177	0.34
178	0.4
179	0.44
180	0.48
181	0.48
182	0.08
183	0.36
184	0.2
185	0.52
186	0.38
187	0.17
188	0.52
189	0.25
190	0.39
191	0.34
192	0.46
193	0.29

Point	Depth (m)
194	0.37
195	0.12
196	0.23
197	0.5
198	0.92
199	0.28
200	0.35
201	0.71
202	0.48
203	0.62
204	0.48
205	0.53
206	0.37
207	0.13
208	0.27
209	0.3
210	0.51
211	0.28
212	0.49
213	0.42
214	0.26
215	0.43
216	0.37
217	1.43
218	1.89
219	1.34
220	2.06
221	1.31
222	0.83
223	0.34
224	0.52
225	0.53
226	0.2
227	0.25
228	0.3
229	0.15
230	0.3
231	0.4

Point	Depth (m)
232	0.4
233	0.15
234	0.25
235	0.3
236	1.5
237	2.4
238	3
239	2.6
240	2.3
241	0.4
242	0.45
243	0.95
244	0.5
245	0.5
246	0.2
247	0.75
248	0.7
249	0.3
250	0.4
251	0.3
252	0.4
253	0.2
254	2
255	2.2
256	3.15
257	2.65
258	1.9
259	0.5
260	0.45
261	0.75
262	0.6
263	0.7
264	0.4
265	0.8
266	1.05
267	1.2
268	0.35
269	0.45

Point	Depth (m)
270	0.6
271	1.3
272	1.95
273	2.1
274	2.65
275	1
276	1.05
277	1.1
278	1.4
279	1.05
280	0.4
281	0.6
282	0.7
283	0.6
284	1.35
285	1.8
286	2.65
287	1.1
288	1.7
289	2.35
290	1.7
291	1.3
292	0.3
293	0.55
294	0.8
295	2.1
296	1.7
297	2
298	2
299	0.55
300	1.4
301	0.15
302	0.5
303	0.5
304	1.1
305	0.31
306	0.14
307	0.51

Point	Depth (m)
308	0.45
309	0.36
310	0.51
311	0.37
312	0.31
313	0.3
314	0.26
315	0.32
316	0.29
317	0.26
318	0.2
319	0.31
320	0.53
321	0.41
322	0.36
323	0.49
324	0.78
325	0.28
326	0.4
327	0.5
328	0.4
329	0.37
330	0.7
331	0.25
332	0.3
333	0.5
334	0.8
335	0.2
336	0.45
337	0.3
338	0.5
339	0.3
340	0.2
341	0.3
342	0.3
343	0.65
344	0.6
345	0.4

Point	Depth (m)
346	0.7
347	0.8
348	0.3
349	0.5
350	0.5
351	0.4
352	0.2
353	0.5
354	0.2
355	0.2
356	1
357	0.45
358	0.4
359	0.35
360	0.4
361	0.6
362	0.4
363	0.75
364	0.5
365	0.3
366	0.3
367	0.28
368	0.27
369	0.46
370	0.3
371	0.73
372	0.38
373	0.4
374	0.2
375	0.15
376	0.42
377	0.42
378	0.06
379	0.59
380	1.38
381	0.45
382	0.3
383	0.1

Point	Depth (m)
384	0.01
385	0.25
386	0.3
387	0.3
388	0.2
389	0.4
390	NA
391	0.2
392	0.35
393	1.08
394	0.53
395	0.2
396	0.42
397	0.31
398	0.35
399	0.27
400	0.27
401	0.42
402	0.18
403	0.24
404	0.39
405	0.37
406	0.72
407	0.6
408	0.22
409	0.35
410	0.22
411	0.11
412	0.25
413	0.61
414	0.94
415	0.28
416	0.31
417	0.5
418	1.55
419	1.35
420	0.45
421	0

Point	Depth (m)
422	0
423	0
424	0
425	0.23
426	0.14
427	0
428	0.16
429	0.15
430	0
431	0
432	0.1
433	0.1
434	0.1
435	0
436	0.2
437	0.14
438	0.05
439	0.12
440	0.45
441	0.1
442	0.23
443	0.98
444	1.18
445	1.72
446	1.65
447	0.38

NA = Not Accessible due to an obstruction