Appendix 7.3

Peat Survey Report

SPEN

Glenmuckloch to Glenglass Reinforcement Project

Appendix 7.3: Peat Survey Report

Final report
Prepared by Kaya Consulting/LUC/SPEN
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SPEN

Glenmuckloch to Glenglass Reinforcement Project
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10191

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Introduction

1.1 Kaya Consulting Ltd was commissioned by Scottish Power Energy Networks (SPEN), through Land Use Consultants Limited (LUC), to undertake a peat depth survey for the Glenmuckloch to Glenglass Reinforcement Project (GGRP).

1.2 The proposed overhead line (OHL) route is located between Glenglass substation and the proposed Glenmuckloch substation in Dumfries and Galloway. The southern end of the route is approximately 6.5km the south-west of Sanquhar. The northern end of the route is approximately 3km to the north-west of Kirkconnel.

1.3 **Figure A** (see end of document) shows the extent of the route and survey. The survey covers the OHL route, Glenmuckloch Substation and access tracks. The route is comprised of a mix of upland heath, bog, improved grassland, and a commercial conifer plantation forestry.

1.4 This report covers the methodology and output of the peat survey undertaken along the route. The purpose of the survey was to establish an understanding of the peat depths at the site to optimise site design and layout to minimise both the extent of disruption to peatlands and the quantity of peat excavated.

Methodology

Desk-based Initial Assessment

1.5 The Carbon and Peatland Map 2016 (Scottish Natural Heritage (now NatureScot), 2016) was consulted prior to the peat survey. The map contains information on the likely peatland classes present within the survey area. The Carbon and Peatland map was developed to be used as "a high-level planning tool to promote consistency and clarity in the preparation of spatial frameworks by planning authorities".

1.6 Within the Carbon and Peatland map, Class 1 and Class 2 peatlands are identified as areas of "nationally important carbon-rich soils, deep peat and priority peatland habitat". Class 1 peatlands are also "likely to be of high conservation value" and Class 2 "of potentially high conservation value and restoration potential".

1.7 The Carbon and Peatland map for the route is shown in **Figure A**. The central and southern part of the route is predominantly comprised of Class 3 and Class 5 peatland with small areas of Class 4 peatland and mineral soil. There is a small area of Class 1 peatland just west of the route in the upper catchment of the Barr Burn, but this was avoided during early design iterations. The northern part of the route is marked as mineral soil.

1.8 The results of the desk-based assessment indicated that peat was likely to be present along the route.

Survey Methodology

1.9 The survey methodology follows current guidance in Scotland (Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland, on-line version only).

1.10 The field survey was undertaken by a team of two with the appropriate experience of assessing hydrology, hydrogeology, geology, soil, and peat for energy infrastructure routes in upland environments.

1.11 The peat survey was undertaken on the following dates:

- 19th to 20th November 2020 (inclusive)
- 24th to 27th November 2020 (inclusive)
- 20th to 22nd April 2021 (inclusive)
- 24th August 2021
- 4th October 2021
- 7th February 2022
- 15th June 2022
- 28th July 2022
- 18th August 2022

1.12 The following methods were employed for the peat survey:

- Areas of infrastructure (includes tower footprints, working areas, construction compounds, and borrow pits) were sampled at a systematic 10m grid. The proposed Glenmuckloch Substation was sampled at a 25m grid over a wider area to allow for micrositing. The grid was generated using QGIS software.
- The alignment of the proposed access track route centreline was probed at 50m intervals. This includes areas of existing track which were to be widened. Additionally, an offset (predominantly 10m but up to 30m) from the centreline was sampled either side of the track.
- A total of 2,908 sampling points were surveyed. The peat depth data was fed back iteratively to the design team to inform constraints mapping and the layout was revised to avoid deep peat areas where possible. Therefore, multiple iterations of the route alignment were surveyed with some areas sampled not carried forward in the final development plan. The extent of the peat survey is illustrated in **Figure A**.
- The peat survey was carried out using an extendable fibreglass utility probe capable of sampling to 5m. No records were in excess of the peat probe length. Depth recordings were taken by rounding up to the nearest 0.1m.
- Peat cores were taken using a gouge auger (20mm diameter) to confirm the existence and composition of peat. Cores were taken at representative locations across the site. The locations of the cores are shown in **Figure A**.

Results

Peat depths

1.13 **Table 1** and **Figure 1** shows the range of results obtained during the peat survey. A total of 2,908 probes were collected across the survey period.

1.14 The Scottish Government guidance document on peat landslide hazard and risk assessment (Scottish Government, 2017) defines peat as a soil greater than 0.5m in depth, with an organic matter content of more than 60%. Soils of less than 0.5m depth are classified as organo-mineral soils. This is further evidenced by JNCC (2011), SNH (Bruneau, et al, 2014) and the James Hutton Institute (2019). Depths of 1m or greater are considered to be "deep peat", according to this same guidance.

1.15 **Figures B** to **E** (see end of document) show the spatial distribution of the peat depths from the peat survey data. 80.4% of probes were recorded as having a peat depth of less than 50cm across the peat survey. These probes are classified as organo-mineral soils and not formally considered to be peat. 90.5% of probes were recorded as having a peat depth of less than 100cm across the peat survey. 9.5% of the probes were recorded as having a peat depth of over 100cm across the peat survey. These probes are classified as 'deep-peat'.

1.16 **Table 2** shows the information collected during coring undertaken around the site. A total of 37 cores were taken across the survey period; the distribution of the cores is evident in **Figure A**. 19 of the 37 cores (51%) were in areas which contained peat. It was not possible to delineate the acrotelm layer in all the cores. When possible, it was determined that the acrotelm layer was up to 30cm deep.

1.17 Generally, the substrate material was mixed with cores containing peat having either a clay, rock/gravel or bedrock base. An example of the peat core with a clay base is evident in **Photo 1**. A general close-up of a peat core is shown in **Photo 2**.

Table 1: Peat depth summary across the peat survey

Peat depth range (cm)	Number of probes	Percentage of total probes
< 50	2,337	80.4%
50 - 99	296	10.2%
100 - 199	224	7.7%
200 - 299	46	1.6%
300 - 399	5	0.2%
400 - 499	0	0.0%
> 500	0	0.0%
Total	**2,908**	**100%**

Figure 1: A histogram showing the peat depth measurements for the site

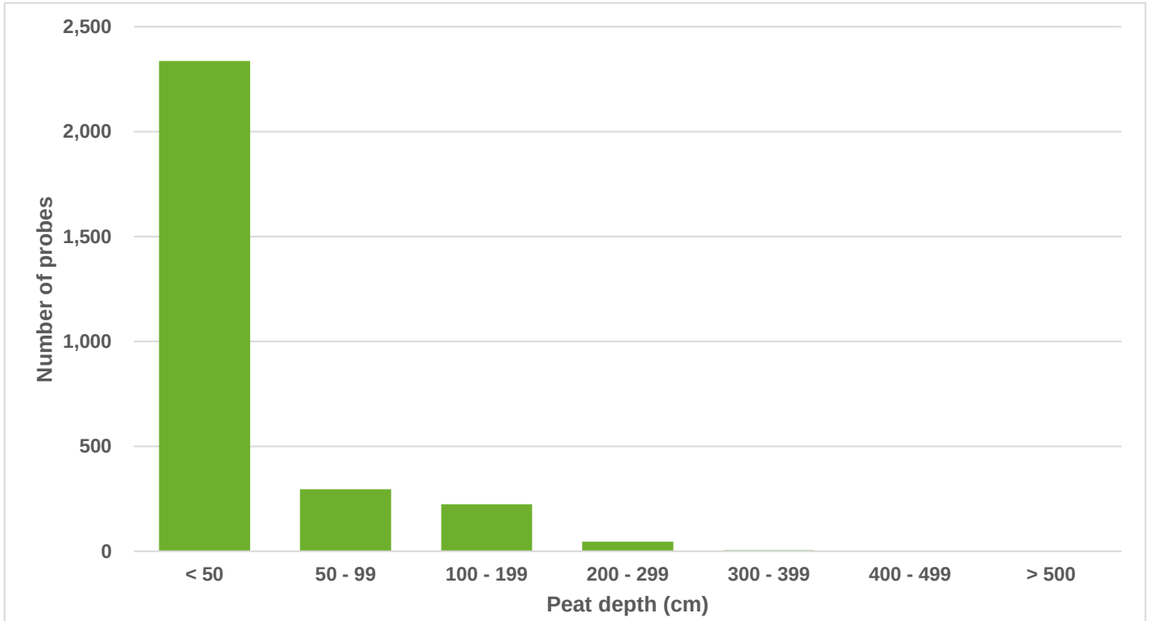

Photo 1: An example of a clay bottom to a peat core

Photo 2: A close-up of peat from a core

Table 2: Information on the cores taking along the route

Core ID	Peat	Core Depth (m)	Acrotelm Depth (m)	Catotelm Depth (m)	Substrate	Comments
1	No	0.2	-	-	Rock	-
2	No	0.3	-	-	Clay	-
3	No	0.8	-	-	Clay	-
4	No	0.1	-	-	Rock	-
5	No	0.2	-	-	Rock	-
6	No	0.2	-	-	Rock	-
7	Yes	0.9	-	0.9	Bedrock	No distinct acrotelm/catotelm boundary
8	No	0	-	-	Clay	-
9	Yes	1.9	-	1.9	Rock	Peaty hollow. No distinct acrotelm/catotelm boundary.
10	Yes	3.2	-	3.2	Rock	Peaty hollow. No distinct acrotelm/catotelm boundary.
11	Yes	3.1	-	3.1	Rock	Peaty hollow. No distinct acrotelm/catotelm boundary.
12	No	0.9	-	-	Rock	-
13	No	0.7	-	-	Clay	Carbon-rich topsoil layer, clay-rich soil deeper.
14	No	0.5	-	-	Clay	10-15 cm loamy topsoil, clay-rich, thick clay base.
15	No	0.5	-	-	Clay	Clay rich loamy topsoil, thick clay base.
16	No	0.4	-	-	Clay	30 cm top soil, thick grey clay below.
17	Yes	0.8	-	0.8	Clay	Uniform Peat, no clear horizons, no acrotelm visible.
18	Yes	1.4	-	1.2	Clay	Uniform peat, no acrotelm visible, no vegetation, clay at 120cm depth.
19	No	0.4	-	-	Clay	20cm topsoil, clay-rich.
20	No	0.4	-	-	Clay	20 cm topsoil, clay-rich, then grey clay beneath.
21	Yes	0.85	0.25	0.5	Clay	75 cm peat / 10 cm clay base
22	Yes	2	-	2	Rock	No distinct acrotelm/catotelm boundary.
23	Yes	1	-	0.9	Clay	No distinct acrotelm/catotelm boundary. 10cm clay base
24	Yes	1.7	-	1.7	Rock	Several core attempts. Bottom 30 cm amorphous. No distinct acrotelm/catotelm boundary.
25	Yes	1	-	1	Rock	Several core attempts, bottom 40cm fell away continuously (amorphous).
26	Yes	1	-	1	Rock	Vegetation throughout, very saturated at base.
27	Yes	0.8	-	0.7	Clay	10 cm clay base, vegetation throughout core, not very wet.
28	Yes	1	-	1	Rock	Vegetation throughout, bottom 20 cm fell away (amorphous).
29	Yes	1	-	1	Rock	No distinct acrotelm boundary, acrotelmic peat throughout.
30	Yes	0.7	-	1	Rock	Vegetation throughout, bottom 30 cm fell away (amorphous).
31	No	0.4	-	-	Rock	All soil, 20 cm loamy topsoil.
32	Yes	1	0.2	0.8	Rock	All peat, top 20 cm dry and sediment rich, roots throughout.
33	No	0.5	-	-	Clay	20 cm topsoil, 30cm underlying grey clay.
34	No	0.1	-	-	Rock	
35	Yes	0.8	-	0.8	Rock	No distinct acrotelm boundary.
36	Yes	0.3	0.3	-	Rock	No distinct acrotelm boundary.
37	No	0.2	-	-	Rock	

Peatland Condition

1.18 The entire site appeared to have been influenced by recent or historic human activity. Along the route there were areas of peat with a depth greater than 100cm; these were predominantly concentrated in the southern part of the route on Barr Moor (see **Photo 3**). A small area in the northern part of the route, near Rigg Farm, was also found to have deep peat; this area was well constrained with the peat located in a topographic hollow (see **Photo 4**) and was avoided during route design iterations.

1.19 The forested areas of Libry Moor were comprised of commercial plantation (see **Photo 5**) and the ground had been heavily disturbed in the process of creating the forest. This was also the case in the southern part of the site near Glenglass substation which has previously been commercial forestry (see **Photo 6**). Areas of peat within existing or previously forested areas have been heavily impacted by the implemented drainage network; with a series of deep drainage ditches ranging from 0.5 to 1.0m wide and 1.0 to 1.5m deep.

1.20 Areas of improved grassland in the northern part of the route (see **Photo 7**) were predominantly mineral soil with only isolated pockets of peat.

Photo 3: Typical upland vegetation on Barr Moor in the southern part of the route

Photo 4: An area of deep peat in the northern part of the route

Photo 5: Commercial forestry in the central part of the route

Photo 6: Felled commercial forestry near Glenglass substation

Photo 7: Improved grassland in the northern part of the route

Summary

1.21 This report covers the methodology and output of the peat survey undertaken along the route. The purpose of the survey was to establish an understanding of the peat depths at the site to optimise site design and layout to minimise both the extent of disruption to peatlands and the quantity of peat excavated.

1.22 A total of 2,908 probes were collected across the peat survey for the OHL route. 80.4% of probes were recorded as having a peat depth of less than 50cm across the peat survey. These probes are classified as organo-mineral soils and not formally considered to be peat. 9.5% of the probes were recorded as having a peat depth of over 100cm across the peat survey. These probes are classified as 'deep-peat'. A total of 37 cores were taken across the survey period. 51% of the cores were in areas which contained peat.

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Figures

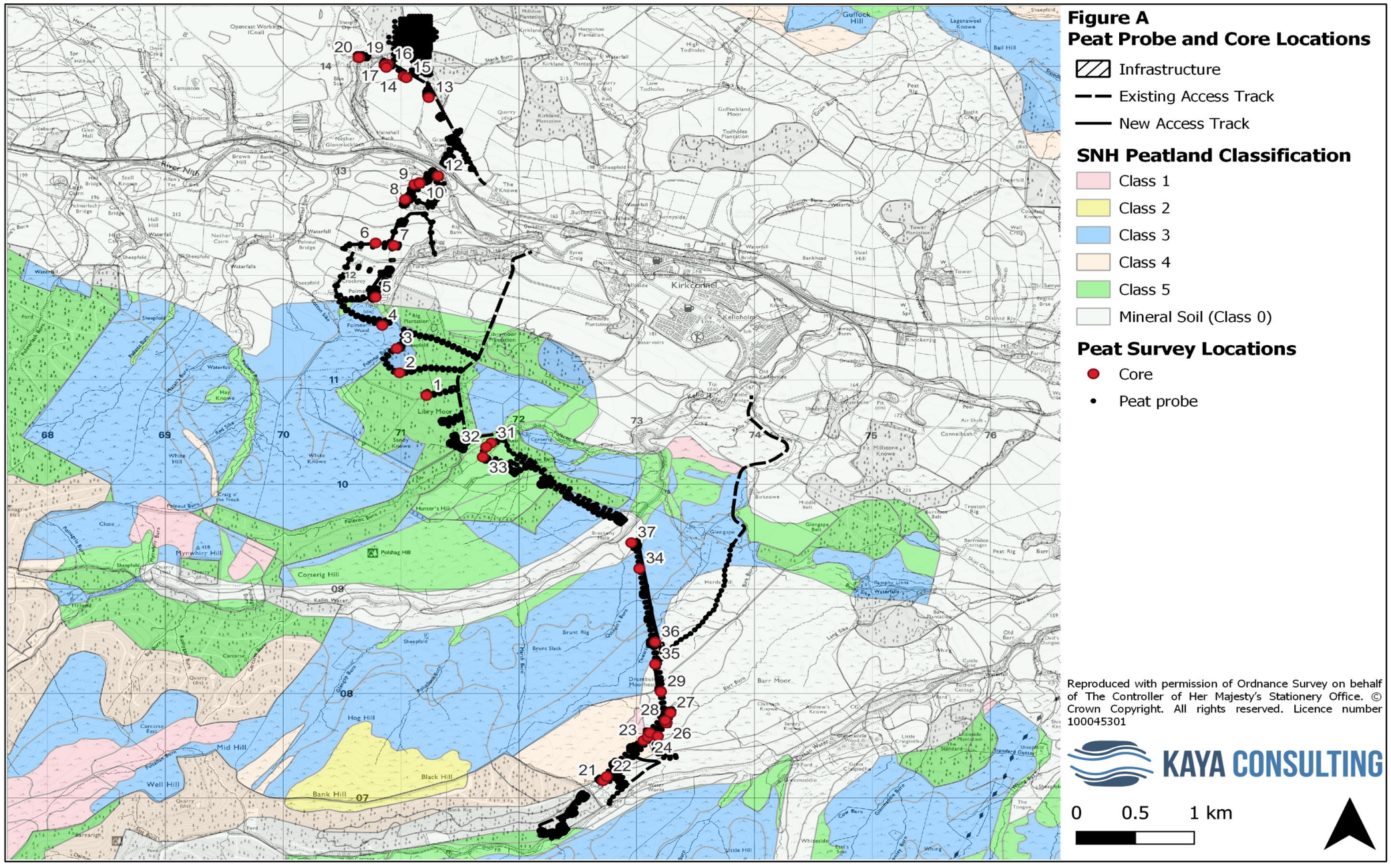
Figure A
Peat Probe and Core Locations
Infrastructure
Existing Access Track
New Access Track
SNH Peatland Classification
Class 1
Class 2
Class 3
Class 4
Class 5
Mineral Soil (Class 0)
Peat Survey Locations
Core
Peat probe
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0 0.5 1 km

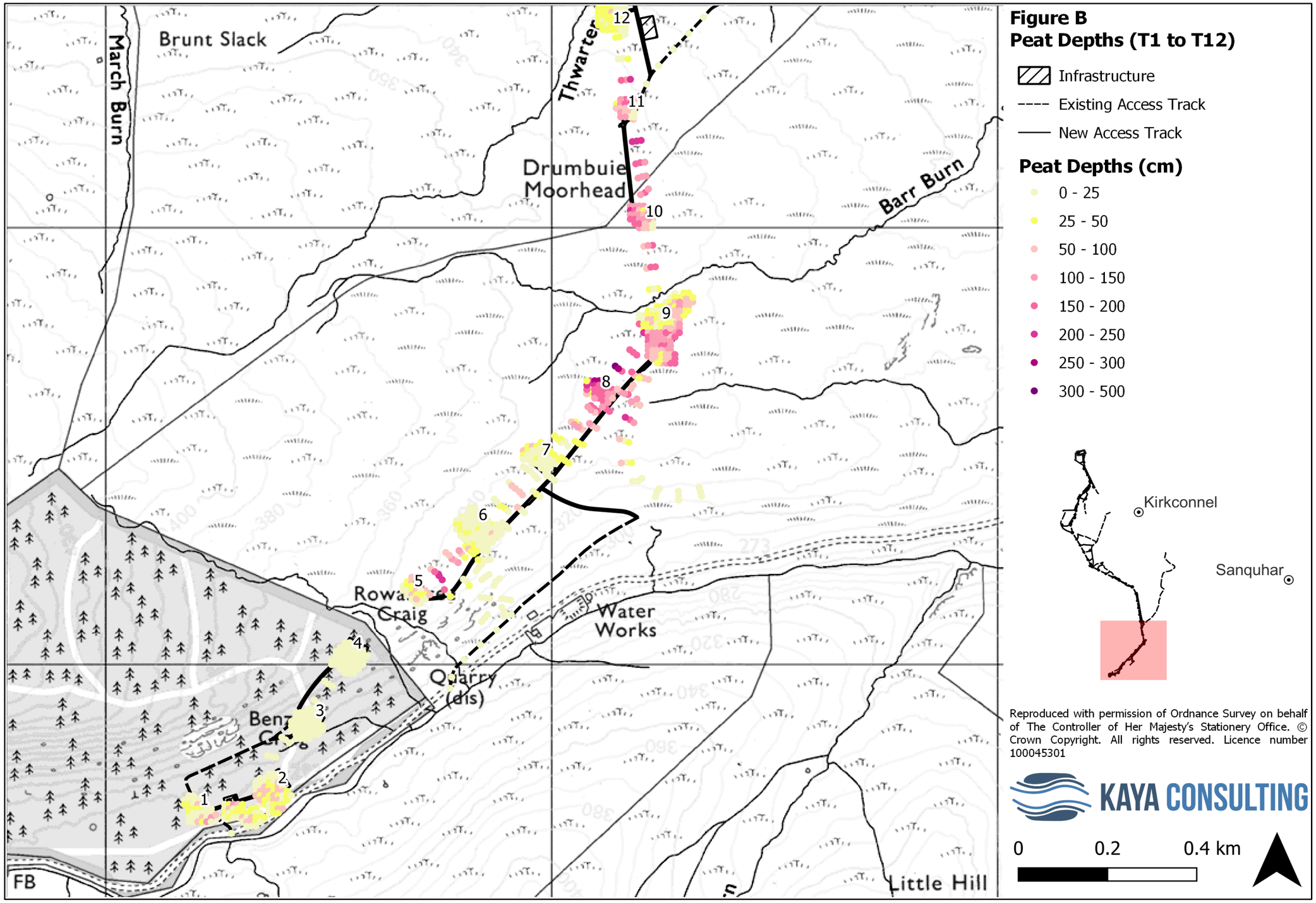

Figure B
Peat Depths (T1 to T12)

Infrastructure
Existing Access Track
New Access Track

Peat Depths (cm)

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- 250 - 300
- 300 - 500

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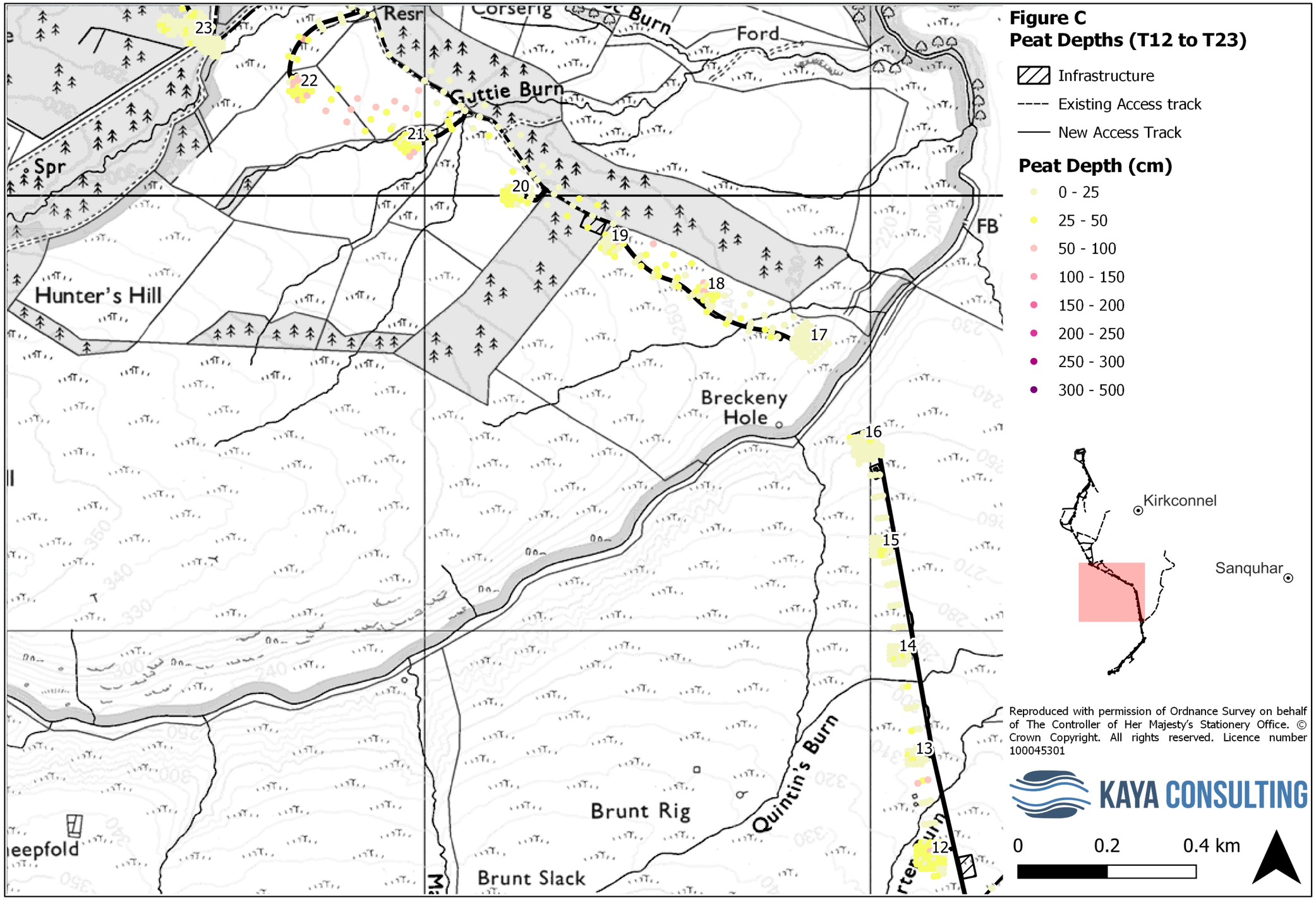
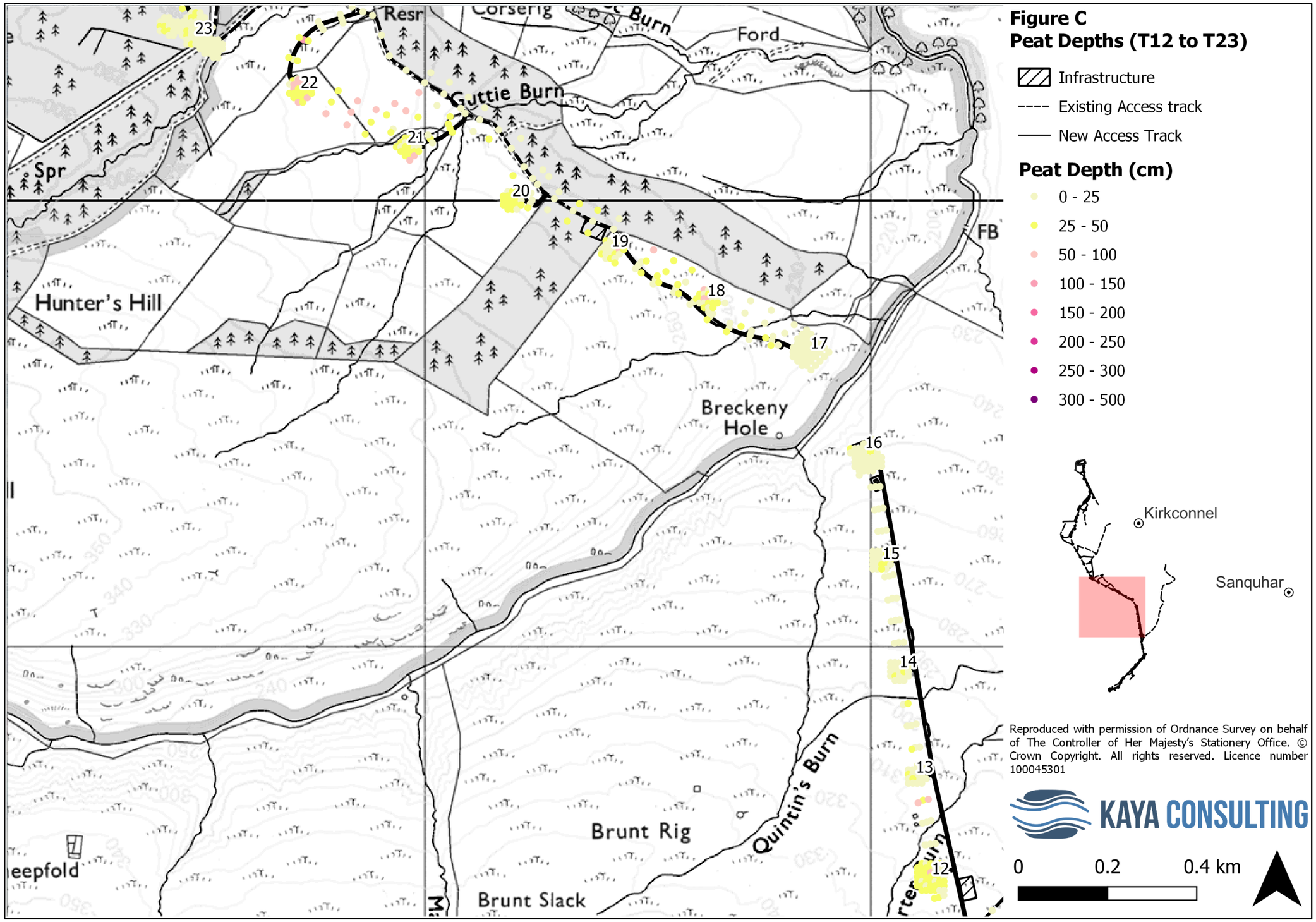
0 0.2 0.4 km





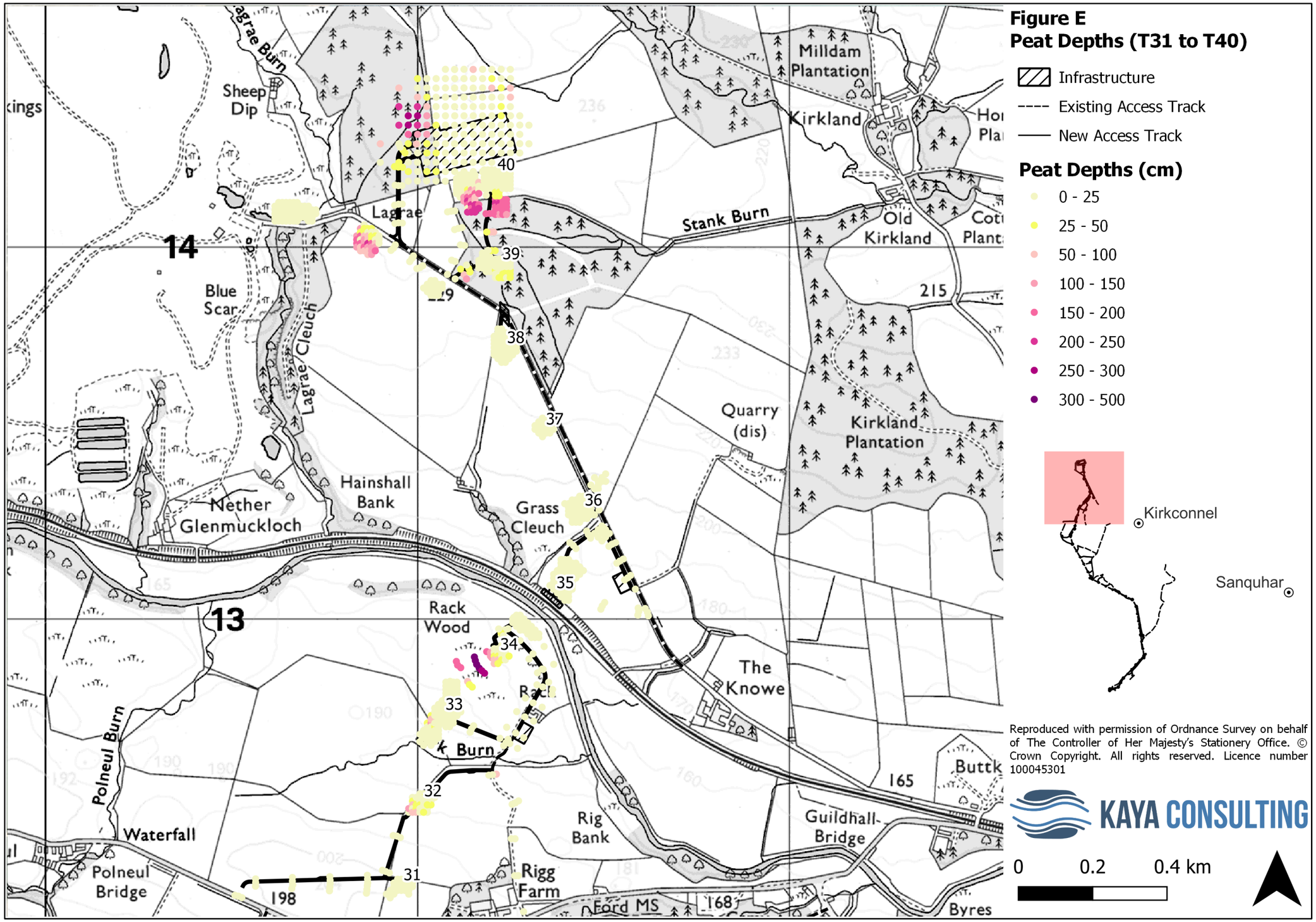


Figure E
Peat Depths (T31 to T40)

Infrastructure
Existing Access Track
New Access Track

Peat Depths (cm)

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- 250 - 300
- 300 - 500

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0 0.2 0.4 km