

Peat Bog Restoration Framework Agreement (NCS_22468) – Lot 2



Please note that the terms and conditions as detailed in Natural England's Peat Bog restoration Framework Agreement (NCS_22468) will apply to this call off Contract.

FROM

Authority	Natural England
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Bravo Reference Number	ECM 56125 <i>[To be quoted on all correspondence relating to this Order]</i>
Contract Start Date	21 st August 2019, though note section 8 'Dates' page 25

TO

Contractor	Dinsdale Moorland Specialist Limited
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1. SERVICES REQUIREMENTS

(1.1) Services [and deliverables] required:

Works to raise water levels by 27.29 ha of cell bunding, 683 m (16no.) contour bunding, 220 m (16no.) high-core contour bunding, new ditch cutting/cleaning, damming and balance-pipe installation of cleared deciduous woodland and sloping open mossland on peat at Fenn's, Whixall & Bettisfield Mosses raised bog National Nature Reserve, Shropshire/ Wrexham plus ancillary works.

SPECIFICATION

Specification for raising peat water levels by cell bunding, contour bunding, high-core contour bunding, ditch/grip blocking/cutting, balance pipe installation, drain cutting and cleaning and ancillary works for the restoration of cleared woodland, scrub and open areas on degraded raised bog at Fenn's, Whixall & Bettisfield Mosses National Nature Reserve, Shropshire & Wrexham.

Annexes (located at end of this document)

- Annex 1 Location map
- Annex 2 Contour and Cell Bunding Areas and Access Map
- Annex 3.1 – 3.7 Bunding Areas detail maps – Topography, Drains and important features
- Annex 4 Ground conditions, Areas, Peat Depths and Vegetation

LOCATION & the Marches Mosses BogLIFE Project

- Fenn's, Whixall, Bettisfield, Wem & Cadney Mosses are a complex of Lowland Raised Bogs totalling approximately 948ha. They are located about 4 miles south-west of Whitchurch in Shropshire and about 10 miles south of Wrexham. **Annex 1**
- The Marches Mosses BogLIFE project (LIFE15 NAT/UK/000786) is a five year project running from 1 October 2016 to 31 December 2021. The project aims to restore Britain's 3rd largest lowland raised bog within the Fenn's, Whixall & Bettisfield Mosses and Wem Moss NNRs near Whitchurch, Shropshire and Wrexham in Wales. The LIFE project is led by Natural England working in partnership with Natural Resources Wales and the Shropshire Wildlife Trust. The project is financially supported by LIFE, a financial instrument of the European Commission and the Heritage Lottery Fund.

1.1 The Work

- The aim of restoration is to have 95% of the site vegetated with appropriate lowland raised bog or fen/bog vegetation within 5 years of work being completed.
- The work is to use cell bunding, deep cell bunding, contour bunding, short stretches of high-core contour bunding, peat dams and balance pipes to raise peat water levels on the areas shown in Annex 2, by blocking ditches and creating bunds to bring water levels to within 10 cm of the peat surface for more than 70% of the year, permitting Sphagnum bogmoss to establish or spread and to outcompete higher plants on Fenn's & Whixall Mosses and Bettisfield Moss. **Annex 2.**
- The work involves mire recently cleared of deciduous woodland, areas with standing dead trees, thinned areas of deciduous woodland and areas with only the bund lines cleared, and also some open previously dammed mire.
- In contrast to previous use of bunding on other bogs to create impermeable lines on steeply sloping mire edges, or on surface milling fields with very little peat over clay, most of this work is generally on flat or gently sloping areas of peat apart from Bettisfield Moss SW which is a steep cutover peat face. The purpose of the bunding is not only to make any degraded surface layers impermeable, but to cut through and block old drains, peat hand cuttings and to bridge gaps between residual peat baulks/ high areas.
- The Framework work categories vary between the different NNR sections. **Annex 2:**
CELL BUNDING
Bog Surface (intact - tree scrub removal completed, 1-15 year old tree root plate 7.5m apart) – 1 site - Sect 38/23, Whixall Moss

Bog Surface (intact - tree scrub removal completed, 16-80 year old tree root plate 7.5m apart) – 3 sites - S10 Fenn's Moss, Whixall SW and Sect 18.2SE, 18.3 & 47 of Bettisfield Moss

Bog surface (cut over - tree/scrub removal complete 1- 15 year old tree root plate 7.5m apart)

- 2 sites - S.10 and Sect 1NW/29 of Fenn's Moss .

Bog surface (cut over - tree/scrub removal complete 16- 80 year old tree root plate 7.5m apart)

- 3 sites - Sect 38/23, Bettisfield S.19 and Bettisfield W.

CONTOUR BUNDING

Cut peat face (straight sections), peat face re-profiling (0-1m)

- 1 site – Sect 1NW/29

Contour bunds -Cut peat face (straight sections) Peat face re-profiling (2-3m) (proxy category – no re-profiling but tree roots present)

- 3 sites – S.10, S 38/23 and Bettisfield S.19

Cut peat face (undulating sections) Peat face re-profiling (2-3m) (proxy category for high-core bunds, no re-profiling but bridging deep wide gaps)

- 2 sites – Sect 18.2SE, 18.3 & 47and sect 1NW/29

DAMS

Drains (drain damming), 1.5x1.5m

- 130 no.

BALANCE PIPES

O/S - installation of balance pipes 300mm I.D.

- 67 no.

DEEP CELL BUNDING

O/S - Bunds as 2.4.6 but 2m depth, 20 x 10m cells

- 1.76ha

NEW/ CLEAN DRAIN

O/S – cutting new drain channel/ cleaning out existing drain channel

- 227 m

TRACKS

Track repair, reinstatement

- **Access track re-instatement – mineral tracks and mineral areas**

- As necessary to 100m.

O/S – Access track maintenance and make good – peat tracks

- As necessary to 400m.

O/S – Access track re-instatement – peat tracks

- As instructed to 400m.

O/S – installation of 3m wide crossing points over bunds

- 43 no.

REPORTING

Work also includes preparation of a report and plotting bund/ dam locations.

- Bunding. Construction of the banded cells is as described in the Framework documentation Lot 2, sections 1.3, 2 and 3.

Please note that unless otherwise specified, bund cores should only be about 150mm above ground level before turf is put back on, unless contours dip when higher stretches should be created or where high-core bunds are specified.

Drains, grips and cracks should be blocked and banded through as part of the cell construction. Tree roots to be removed on the line of the bunds and tipped into borrow pits or be circumvented.

It is proposed to treat specified areas as if they need banded cells all over, although in practice less work may be required. Any surplus time will be used elsewhere on the site.

Where access is to be maintained across bunds, ramping of the bunds with peat will be needed on specified trackways – **see track maintenance below**.

- Damming ditches. These vary from 0.5m x 0.5m to 1.5m x 1.5m. Ditches should be blocked using dams as described in the Framework Lot 2 section 4.
- Contour bunding. Construction of contour bunds is as described in the Framework documentation, Lot 2, sections 1.3 and 1.4. **Re-grading of mire edges is not involved**. Category 2.2.4 is used where larger tree roots are present. Category 2.2.8 is used where bunds are needed to cross wide gaps of 2- 3 m depth.
- Balance pipes. 6m-long 300mm internal diameter U-PVC twin-walled balance pipes to be installed through peat dams or bunds and under tracks in specified locations, fitted with seals and 90 degree bend at U/S end and 45 degree bend at D/S end. To conduct water under the above structures to outfall at an appropriate level, with sufficient cover of peat/ soil to support specified vehicular use– **outside scope**.
- Deep Bunding as category 2.4.6 Bog surface (cut over - tree/scrub removal complete 16- 80 year old tree root plate 7.5m apart) but where peat cuttings occur on steeply sloping mire edge where deep cracks are likely so bund to 2m depth.
– **outside scope**.
- New Drain 1m wide channel, vertical-sided as other drains/peat cuttings in the mire; depth the minimum required for peat baulk being cut through, generally 1-2m; invert depth and slope the minimum required for water flow over the required distance. Or existing channel cleaned out to above specification – **outside scope**.
- Track Maintenance and re-instatement. Methodology generally as described in the Framework Lot 2 section 6 for mineral tracks - Framework category **2.7.8**. For peat tracks as specified in section 3.7 below – **outside scope**. Methodology for bund crossing points as described in section 3.7 below, – **outside scope**.
- Report and electronic location records - **outside scope**
A brief report of works is required, see section 4 below. Electronic data collected during the operations should be provided to enable plotting of bund and dam locations.

2 SITE INFORMATION

2.1 Ground conditions, Substrate, Areas, Peat Depths and Topography – Annexes 3 & 4

- Fenn's Moss in Wales and eastern Whixall Moss in Shropshire lie on glacial sands, where peat has formed by paludification rather than from an open water body. Western Whixall Moss and Bettisfield Moss overlie lake clay on top of glacial till.
- The peat remaining after intensive commercial and hand peat cutting is predominantly much humified basal fen peat topped by humified "grey" Sphagnum peat. Prehistoric oaks are sometimes found at the base of the peat and there is a geographically restricted pine layer in the centre of the grey peat. In the upper layer of the peat there will be lots of roots of recent trees and scrub from these woodlands which have colonised abandoned fields or peat cuttings.
- Peat depths generally are between 1 and 3m on the areas to be bunded, but vary considerably from deep peats >7.5m in depth on more central areas, tapering out to virtually no peat and the sandy mineral ground of the Bronington moraine along the north-west of Fenn's Moss and north-east of NE Fenn's Moss and glacial till of the Bettisfield Moss/ Hornspike moraine around the west and south of Bettisfield Moss. **This will present challenges in bunding some parts of the cleared woodland areas. The contractor may suggest alternative solutions.**
- Most of the areas are almost flat with slopes of 1 to 2m across sections, with steepest slopes where the Railway Line falls to commercial peat cuttings and on the south-western edge of Bettisfield Moss. The topography for each section is shown overlain on aerial photographs in Annex 3, as is the peat-cutting pattern. **Annex 3.1-3.7**

2.2 Drainage, peat depths and topography

- The areas shown in **Annex 2** comprise:
 - Uncut areas converted to fields by marginal drainage, scrub 1-15 years - Whixall Moss section 38/23, and Bettisfield Moss section 18.3
 - Uncut areas affected by marginal drainage with some internal drains, cleared trees and scrub 16-80 years old.
 - Fenn's Moss section 10 south, marginal peat partly cleared of woodland in 2019
 - Whixall SW – disused afforested fields on moderate peat depths, partly cleared in 2019.
 - Uncut deep peat, affected by marginal drainage, scrub 16-80 years
 - Bettisfield Moss Section 18.2SE, cleared of forest in 2005.
 - Old non-patterned domestic Whixall bible hand peat-cuttings and old linear hand cuttings with trackside and some internal drains, with tracks and some high peat baulks, scrub 1-15 years,
 - Section 10 west
 - Recent linear commercial Dutch cuttings, level with tracks, with arterial, track-side and central drains, scrub 1-15 yrs. Dammed for 25 years
 - Fenn's Moss section 1NW/29.
 - Old hand-cut non-patterned peats with trackside drains, with 16-80 yr rootballs, cleared in 2001.
 - Bettisfield Sect. 19 and Bettisfield W.
- Many of the areas have not yet undergone hydrological restoration. However, drains and peat cuttings on sections 1 and S38 have been dammed up using peat, and plastic U-pipes inserted

to conduct storm water off-site. However for various reasons the peat water table has not been raised high enough on the latter areas. Consequently, mire species such as *Sphagnum* bogmoss are being out-competed by plants of drier habitats such as purple moor-grass (*Molinia caerulea*), wavy-hair grass (*Deschampsia flexuosa*), bracken, birch and excessive growth of cotton-sedges.

- **Description, drains, Topography and Peat depths.** The main drains around each block of land, peat depths and topography are shown in **Annex 3.1- 3.7. The boundary ditch/ ditches designated as the outlet to the bunded and dammed areas must not be blocked unless specified.**
 - **Section 10, Fenn's Moss. Annex 3.1** The area is marginal peat with sandy outcrops, partly colonised by self-sown woodland which will be felled or thinned and bund lines cleared in winter 2019. It comprises two parts - north and south.
Drains. The area drains southwards along the Eastern NNR boundary drain to the Whixall Manor Drain Diversion and also west along the English/Welsh Border drain.
Storm water drainage post bunding from the northern block will be to the eastern drain and from the southern block will be northward to section 8.10 of Fenn's Moss.
Topography. The area lies near to the eastern margin of Fenn's Moss with sand and gravel outcrops in the south of the woodland area.
The northern bunding area is bounded by higher ground at 91mAOD to the north, west and south and slopes down to 90.5mAOD in the east.
Peat. There is very shallow un-bundable peat in SE corner. Depths in the N area range from 0.5 to 1.25m, and in S area from 0.98 to 2.48m.
 - **Sect 38/23 Annex 3.2**
Section 23 comprises bog, converted into fields which had become covered by self-sown woodland. Bund routes will be cleared through the woodland and some cleared. Section 38 comprises an abandoned marginal area of the Moss, the central area being old Whixall bible cuttings, which will be re-cleared of scrub.
Drains. The Arterial Drains is the Whixall Main Drain to the west. Main Drains lie along both sides off the northern track, flowing west, and Section 38 has an eastern field drain which is already dammed as well as three old obscured internal drains.
Storm water drainage post bunding will be to the southernmost drains to both sections, and will be piped southwards and channelled into the fields to the south which are to be turf-stripped and regenerated to bog.
Topography. The area occurs near the edge of Whixall Moss near to glacial sand and gravel moraine outcrops such as at Cranberry Castle.
It forms a gently sloping area falling from 88mAOD in the west by the Main Drain and along the north and east of the area, to 87.5mAOD in the south-west.
Peat. The bulk of the peat lies between 3.0m and 1.9m, but with shallower peats between 0.3m and 1m along the Cranberry Castle ridge by the Whixall Moss Main Drain.
 - **Whixall SW Annex 3.3.**
This area was a network of old bullock fields on the bog with field-edge drains and access trackways. After abandonment, the ditch edge trees have rooted out into the fields and after fires some fields have developed completely into self-sown woodland. Woodland and scrub have been partly cleared in winter 2019.
Drains. The Arterial Drain AD1 lies in the south, running west from Morris's Bridge to the canal culvert at Roving Bridge on the south side of bridlepath track. Main drains comprise MD1 along the west track, flowing south-east from Sect 14.6SW, MD2 along the east track flowing south-east from sect 14.2SE, MD3 along north of the track north of scrapyard, which flows both east and west and MD 4 which flows west along the north of the scrapyard bridlepath, part culverted and with 2 pipes into AD1
Internal drains comprise field boundary and track-side drains flowing from north-west to

south-east and north-east to south-west into the Main drains.

Storm Water drainage post-bunding will be southward eventually into AD1.

Topography. It divides into eastern and western halves, the east half falling gently south-eastwards from 88mAOD in the north to 87.5mAOD towards AD1 at Morris's Bridge. The West half falls southwards very gently from 87.5m AOD in the north and east to 87mAOD at AD1 at Roving Bridge. The watershed divide is from the SE corner of sect 16.1 to the centre north of the scrapyard.

Peat. The area is entirely moderate to deep peat varying from 3.0m+ in the north to 1.5m in the south.

o Bettisfield Moss Section 19 (English) Annex 3.4

The area lies near the southern margin of the mire adjacent to the canalised lagg stream, the pumped World's End Drain. It has been colonised by deciduous woodland, to be thinned in winter 2019, while the rest of the Moss was colonised by self-sown pine forest, cleared in 2001 and banded in 2018.

Drains.

The Arterial drain AD1, the World's End Drain runs east to pumping station. Internal drains ID1-3 and ID6 are trackside ditches running north-east to south-west. ID4 and 5 run along eastward the north of the southern track.

Storm water drains post bunding will continue as now to be unknown as no flow into AD1 has been observed, but may be seepage or piping into AD1.

Topography.

This is marginal but deep peat which has formed north of the glacial till moraine of the Hornspike Ridge. Marginal peats have wasted after conversion to agriculture following canalisation of the lagg stream into the World's End Drain.

Section 19.2 slopes very gently from 88.5m AOD in the west to 88mAOD in the east.

Across section 19.3 there is a fall from north-west at 88m AOD to the south and south-east with a steep fall to the fields to the south at 87m AOD.

There is a steeper fall from north-west to south-east across section 19.6, from 87.5mAOD to 86.3mAOD, again most with a steep drop to the field in the south at 86.5m AOD.

Section 19.8 falls northwards from 87.6m AOD to below 87m AOD before rising up towards the southern track at 87.5mAOD again.

Peat. Only the southern part of Section 19.8 has un-bundable peat. Peat depths on section 19.2 and 19.3 probably vary from 1.0 to 2.0m, possibly shallower in 19.2SW. On section 19.6 from 1.2 to 2.5m and on section 19.8 from 1.5 to 0.3m.

o Bettisfield W and SW (Welsh) Annex 3.5

Bettisfield W is a flat area of very old Whixall Bible cuts, with intervening trackways leading from near the edge of the bog up onto the uncut dome. It was cleared of self-sown pine forest in 2001, track-side ditches have been dammed and the marginal deciduous trees and scrub have developed into woodland. Bunding routes will be cleared in winter 2019.

Bettisfield SW is an afforested set of steeply sloping abandoned domestic peat cuttings cut into the southern edge of the deep peat dome. Pines have already been cleared but the deciduous woodland will be partly cleared and bund lines thinned in winter 2019.

Drains.

The Arterial Drain – AD1 Bronington Manor Drain along the west of the areas, draining south to R Severn. The Main Drain – MD1 runs along northern field edge at the base of the Bettisfield SW slope. Internal drains lie along all tracksides.

Storm water drains taking water off the banded area will be the drain east of the Bettisfield W access track leading into AD1, and MD1.

Topography.

The area lies on cut-over marginal peats north of the Hornspike – Moss Lane - Cadney Lane clay moraine.

The bog plateau at 89m AOD falls westward through peat cuttings to the Bronington Manor Drain. Bettisfield W – north and central areas are almost flat, sloping from 86.2mAOD to 86m AOD in the west, while the south slopes towards the south-west from 86mAOD to 85.7m.

In Bettisfield SW, the cut-over western half slopes steeply down from the dome at 89mAOD over 30-45m to 87mAOD then in the west over a further 20m to 86.5m AOD. The eastern half slopes less steeply from 89mAOD to 88mAOD over 50m.

Peat. Bettisfield W has between 2.85m of peat in the east grading to 0.5 m in the west. Bettisfield SW has between 7.9m on the plateau to 0.5m nearer to the southern edge. Bogmats will be needed on the latter.

o Sect 18.2SE, 18.3 and 47, Bettisfield Moss. Annex 3.6.

The Mossland of Section 18.2SE, peaty field 18.3 and woodland 47 are part of a narrow neck of peat which runs southwards from the Bettisfield Moss dome ultimately to Wem and Cadney Mosses. Section 18.2SE was cleared of pine forest in 2002. Most of the northern two thirds of Section 47 was cleared of woodland in the mid1980s and cut linearly for domestic peat, but has since scrubbed over, and deciduous woodland and scrub on it and section 18.2SE will be cleared in winter 2019, or bund lines cut through the scrub.

There was a turf-bote house on the ridge in the centre east of S18.3.

Drains. The 2 Arterial Drains are AD1, the Bronington Manor drain, in the west and AD2, the dry English/Welsh Border Drain, in the east. The Main Drain MD1 runs down the east of the settlement then west to AD1.

There are five Internal Drains: ID1 – behind the pines then along the south of 18.2SE and 18.3, ID2 the field edge drain already dammed between 18.2 and 18.3, ID3 which flows east along the south of the 18/47 track, ID4 a largely defunct drain flowing south along the west edge of S.47 and ID5 which flows west along south of S 47. There are also internal drains between peat cuttings.

Storm water drainage post bunding will be from sections 18.2Se and 18.3 to section 47 and to the south-east of section 47.

Topography. Sections 18.2SE and 18.3 lie between the Hornspike clay moraine (91.5mAOD) in the east and the Cadney Lane moraine in the west (88mAOD), forming a neck of peat running south through S47 to Wem Moss.

The Moss falls from north to south through Sect.18.2SE, from 89mAOD to 87mAOD at the 18/47 track.

Field 18.3 is 0.25m lower than the Moss in the north at 88.25mAOD, falling to 86mAOD in the south-east corner, with a steep 1m drop off the Moss in the SW.

Section 47 falls from northwest to south-east, from 86.5mAOD in the north to 84.8 in the south-east and south-west corners.

There is a channel from the centre east below 85m AOD leading north. The western drain has created a depression along the western side of the land.

Peat. S.18.2SE has between 1.0 and 1.4m peat in the south increasing to 5.3m in the NW and to more than 6m in 18.2C.

Field 18.3 grades from 4.25m along its Centre west boundary and 1.4m in the south against the 18/47 track, to no peat along the eastern boundary ridge.

S47 wood has between 2 and 3m of peat, only grading to less than 0.4m in the extreme south.

o Sect 1NW/29 (parts). Annex 3.7.

The area comprises land dropping steeply from the dis-used railway Line which was floated across Fenn's Moss in 1863, down into the commercial peat cuttings. Section 18.3 was hardly cut into, so remains as a high promontory.

Drains

The 2 Arterial drains comprise the Fenn's Moss Main drain, AD1, which flows south-west along the south of the area and AD2, the southern Railway Drain along the north. Water levels in AD1 are set by weirs near the canal in the west.

2 Main Drains flow into AD1 from Sect 1.6 SW

Internal drains occur along both sides of the tracks between the peat cuttings AND ALSO (not marked on maps) along the centre of each flat.

Storm water drainage post bunding will be south into the Fenn's Moss Main drain.

Topography. Most of the area falls steeply south-eastward from the Railway Line at 90 to 90.5mAOD to a plateau by the Fenn's Moss Main Drain at 88.5mAOD. The high plateau of section 1.18 also falls gently from 91.5mAOD in the east to 90.5 in the west, and has steep falls on east, south and west edges.

East of section 1.5, the ground rises gently towards the north to NE Fenn's Moss.

Peat. The whole area is covered by peat generally ranging from 3.5m (to 4.5m) near the Railway to 2.0m on the peat cuttings.

2.3 Rainfall

- Rainfall at Fenn's NNR is around 761mm per year (based on a 23yr average). Anecdotal observations reveals that rainfall patterns in recent years have changed from persistent light rain with occasional heavy showers to a pattern dominated by heavy downpours in short bouts. Monthly rainfall is fairly evenly spread, with some degree of autumn increase. The monthly rainfall averages based on the last 23 years for Whixall is¹:

Local rainfall data from Natural England

Month	J	F	M	A	M	J	J	A	S	O	N	D
mm	68	53	48	55	62	63	60	65	61	80	71	74

2.4 Vegetation, Adders and Retained timber

Vegetation for all areas is listed in detail in **Annex 4**. Trees and scrub will be removed to the extent required in winter 2019.

- Section 10. The northern area is deciduous woodland and the southern area marginal trees and scrub and open heather and Molinia mire with scrub, Trees are being kept on peat shallower than 30cm and along the NNR boundary.

- Section 38/23. Section 23 is deciduous woodland and section 38 has marginal deciduous trees and scrub with a central area of heather and Molinia with scrub. In Section 23 bund lines will be cut through the woodland and will be routed around trees of note whereas section 38 will be cleared to a greater extent.

- Whixall SW. The north-western part is deciduous woodland, where only wet woodland will be retained and bund lines cut through. The south-west area is reseeded fields which are scrubbing over, where ditch lines will be cleared. The eastern half is secondary pasture where ditch side willows have grown out sometimes to almost cover each field or dry woody species have invaded. Some areas are now covered by bracken which is good adder habitat. Some bunds will have to be made through cleared lines in trees.

- Bettisfield Sect 19 – the bunding area is currently deciduous woodland over bog with Molinia, bracken and bogmoss. Much of the bunding will be along undulating lines cleared through the woodland.

- Bettisfield W and SW. Bettisfield W is mainly dense young deciduous woodland with Molinia and only 6- 8m bunding channels will be cut through or around the woodland. Bettisfield SW is older deciduous woodland with heathy species below. A 25m deep woodland fringe will be left against the houses, where possible, and the pine-extraction track at the base of slope will be used for the lowest bund. Some standing dead trees will be left on the slope.

- Bettisfield 18.2SE, 18.3 and 47. S18.2SE is currently open heather dominated mire in the north with marginal trees and scrub in the south. A10m-wide band of trees will be retained in the west and a 10m band of tall scrub will temporarily be retained in the east, with bund lines cut-through. S18.3 is currently a grassy field with bramble and rushes and trees along some ditch lines. Some ditch lines trees will be retained.

Section 47 is deciduous woodland with some very tall pines. Deciduous woodland will be retained outside the bunding area in the west and east and along the southern boundary. Bunding lines will be cut through the southern retained woodland.

- Sect 1/29. There is deciduous woodland and scrub along the dis-used railway line, but much of the area is covered by bracken, heather, Molinia and scrub on peat baulks with mire in the base of dammed peat cuttings. Lines for bunding will be cut through the trees, if present.

Adders. Many of these secondary woodlands are good adder habitat, particularly bracken glades within them. Others are valuable wildlife corridors. The woodland clearance in winter 2019 will reflect this, and bunding and damming routes will be cleared in what is retained as necessary. Adder hibernacula will be marked with flashing tape and must not be tracked over.

3 Access – Annex 2

Annex 2 shows vehicular and ATV access points for each area. Many of the tracks are NNR Trails/ tracks and some are public rights-of- way which must not be blocked or damaged. Public, NNR staff/volunteer and contractor access should be expected on all tracks. Several access routes pass through locked gates which must be re-locked after use/ left as found.

Low ground pressure tracked machinery must be used and machinery movement limited to a maximum of two passes in any location where possible. **Machinery should enter onto each section by leaving the internal NNR tracks as soon as possible** to minimise damage to tracks, as NNR staff and visitors rely on using these tracks for access.

Section 10. Vehicular access is to the west end of the Shed Yard car park at 350322 336829. Machinery access and ATV access are along the peat track along the west of the N Area and north of S Area.

The History trail runs along the track leading north-west from the Shed Yard.

The track along west of the N Area and north of the S Area must not be included in bunds.

Section 38/23. Vehicular access is from Roundthorn Bridge at 350070 335705 along the gated track to the section 23/38 track at 349783 336091 in dry conditions or just to the car park at 349955 335845 if wet.

ATV access is from the parking area along peat tracks as possible without creating damage.

There is a gate into the south of Section 38.1 at 349707 335941.

PROWs and paths - The track leading north-west from Roundthorn Bridge is part of the Mosses Trail regularly used by staff and visitors. The section 23/38 track must not be included in bunding.

Whixall SW. Park at Morris's Bridge car park, the scrapyard or bungalow hardstanding. ATV and machinery access is north from Morris's Bridge along Mosses Trail to NE of area or from the Bungalow hardstanding, the dis-used scrapyard or track to the scrapyard. All temporary ditch crossings must be removed.

PROWs and paths - The track to the scrapyard is a bridlepath. Access to the Bungalow at Morris's Bridge and the dis-used scrapyard must not be blocked. Public will be using the Mosses Trail along the west of the area.

No use of the north-east to south-west tracks within the bunding areas, apart from at protected crossing points.

Bettisfield Section 19. Vehicular access is along track from Moss Lane Farm, Whixall to Bettisfield Moss car park at SJ48037 34830, SY13 2QE. ATV and machinery access is north through section 19.8 to the internal car park at SJ48083 34938 then along the tracks bordering sections 19.3 and 19.6.

PROWs and paths - The track leading to the car park is a RUPP giving residential access and must never be blocked. There is no access through the gate to Coppice House.

Within the Moss, all of the tracks are part of the Bettisfield Moss Trails so are used by the public, and are also part of the Shropshire Way.

There is a wet hole on the track 20m north of the SE corner of section 19.6, so minimise tracking on the east track.

Bettisfield W & SW. Vehicle access is from Cadney Lane, turning north through locked NNR gate at 347133 335311. Park at hammerhead at 347155 335491. ATV access is along the E-W tracks through peat cuttings.

PROWs and paths - The track leading north from the NNR gate must not be blocked as it gives access to a field at its northern end. There is concessionary access from the west of the Bronington Manor Drain across sleeper bridges.

NE tracks not to be bunded are those leading east on either side of the Hagenella area.

Bettisfield S 18.2SE, 18.3 and 47. Vehicular access is either from the World's End car park at 348044 334829 (SY13 2QE), parking at 348040 334952, or along Cadney Lane from Bettisfield Village then the track past the chalets to the small timber hammerhead at 347476 335012.

The small house on the north of the track opposite the chalets has no foundations so care must be taken tracking heavy machinery past it, and speed must be kept down when passing the properties. The track is part of the concessionary Shropshire Way and Bettisfield Moss Trails, which then run along the east side of field 18.3. The track is also used very occasionally for local horse riding.

Sect1/29. Vehicular access is either along the dis-used Railway line from the A495 down Conery Lane, or from Bettisfield Village. ATV access is possible in dry conditions on tracks between 1.5/1.6, 1.7/1.8 and 1.11/1.12.

The Railway Line is a concessionary public path and an important access for site staff so must not be blocked.

OUTPUTS - AREA WORK DETAILS

- 3.1 **Section 10 (Annex 3.1) Fenn's Moss Sect 10 Bunding Cleared & Thinned Woodland. Cell Bunding 2.4 ha, Contour Bunding 40m, New Drains 20m, 6 dams and 1 balance pipe Framework categories: 2.2.4, 2.3.7, 2.3.8, 2.3.9, 2.4.2, 2.4.3, 2.6.2, O/S (outside scope) x 2**

Contour bunding 2.2.4, Contour bunds through cleared woodland. Cut peat face (straight sections) Peat face re-profiling (2-3m) (proxy category – no re-profiling but tree roots present) – 40m 1no.

Cell Bunding

Bog Surface (intact tree scrub removal 16-80 year old tree root plate 7.5m apart) Cracked drained surface - 1.762 ha

2.3.7 20 x 10m 10% = 0.181 ha

2.3.8 20 x 20m 10% = 0.181 ha

2.3.9 30x30m 80% = 1.4 ha

Bog Surface (cutover - Tree/scrub removal completed 1-15 year old tree root plates) 0.714 ha

2.4.2 20 x 20m 50% = 0.357 ha

2.4.3 30x 30 m 50% = 0.357 ha

Dams

2.6.2 1.5 x 1.5m ditch dams in forestry grips – 6 no.

O/S – balance pipes 1no.

O/S – new drains 2no.20m

The objective is to stop water loss through cracks into NNR boundary ditches and on the northern area to encourage a graduation from dry woodland on the boundary to open mire where woodland is being cleared, and bog also on the southern area. Also to improve drainage of the north-eastern main access track and maintain a narrow access route around the NNR periphery for management purposes.

Cell Bunding.

N Area 1.484 ha - create along cleared routes 3no ca 30m x 30m cells along the south-east in retained woodland then one row of 30m x 25m cells where trees have been ring-barked, then 30 x 30m cell bund open area (cleared open area 0.521 ha, thinned area 0.963 ha)

S area 0.992 ha– 30x 30 to 20 x20m cell bund all open area (cleared open part 0.278 ha & open mire part 0.714 ha)

Boundaries.

N Area:

N- 35m south of Shed Yard track

NE & E – 10m off fields boundary ditch/ fences

SW – limit of bundable peat

W – 2m off track

(In the thinned woodland, 8m wide routes will be cleared through the woodland along bund routes)

S Area:

N – 2m off track

E – limit of bundable peat

S – 10-15m off boundary fence/drain

W – start of linear peat cuttings from 349821 336667 to 349823 336629

Contour bunds 2.2.4

Create CB1 From Shed Yard track at SJ 50303 36827 in cleared 8m strip, keying into the high peat lump in SW to stop flow into the field boundary drain from the wood retained as screening against the History Trail.

New Drains O/S

Create 2 no x 10m drains from the trackside ditch between the Field at ca SJ 50303 36827 and the track at SJ 50262 36841 to shed the Shed Yard track drain-water into the wood.

Dams. 2.6.2 Create 6 dams, D1 to stop water flowing south, D2-D5 (using mineral if necessary) and D6 to stop water flowing east.

D1 - 349879 336635

D2 - 350146 336679

D3 - 350189 336677

D4 - 350236 336673

D5 - 350283 336666

D6 - 350276 336778

Balance pipe. O/S UD1 at SJ49899 36667, collar on south to let water leave the bunded area by flowing north under the track then west.

Hazards. Frequent use of the History Trail by public.

3.2 **Sect 38/23 Whixall Moss (Annex 3.2) Whixall Moss Sect 23 and 38 Cleared & Thinned Woodland and Scrub and Bog. Cell Bunding 0.57 ha, Contour Bunding 148m, New Drains 107 m, 1 dam and 11 balance pipes**
Framework categories **2.2.4, 2.3.3, 2.4.6, 2.6.2, O/Sx2**

Contour bunds through cleared woodland

2.2.4 Cut peat face (straight sections) Peat face re-profiling (2-3m) (proxy category – no re-profiling but tree roots present) - 148m

Cell Bunding

Bog Surface (cut-over tree scrub removal 16-80 year old tree root plate 7.5m apart) Cracked drained surface - marginal 0.32 ha

2.4.6 20x20 m 100% = 0.32ha

Bog Surface (intact - Tree/scrub removal completed 1-15 year old tree root plates) – central 0.25 ha

2.3.3 20 x 20m 100% = 0.25 ha

Dams

2.6.2 1.5 x 1.5m ditch dams in forestry grips – 1 no.

O/S – balance pipes 11no.

O/S – new drains 4no.107m

The aim is not only to wet up the areas, in part by restoring the flow of water from north to south, but also to put in a feeder drain for rewetting the adjacent fields after their re-vegetation with mire species.

Boundaries.

NW – 2m off MD2

NE – 2m off ID1

SE – 2m off MD3

SW – cut routes through woodland, from 2m east of ID2 in the north crossing to 2m west of ID2 at UD3, to ca 5m north of ID3 then ca 12m east of AD1 in the south

Cell Bunding. Use 20 x 20m cells to rewet section 38.

Create 2 bunds, linking at boundaries to existing cell bunds: CB1 – 50 m from bund at 349,702 336,109 to southern bund at 349,732 336,068 and CB2 – 98 m from bund at 349,668 336,067 to bund at 349,749 336,121.

Dam. D1 at 349694 336014 to block north-south drain (if not already present).

Balance Pipes. 11 no. to redistribute water from section 23 and the Whixall Manor Drain into section 38.

No.	Grid ref	Location
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UD1	349624 335988,	under track, collar on north at 88mAOD.
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UD 2	at 349625 335985,	in ditch to west of ditch junction collar on west to stop water running back to Main Drain
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UD 3	349637 335971	with collar on north, through bund
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UD 4	349649 335999	from N ditch through bund
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UD 5	349670 336009	through bund in ditch line, collar on north
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UD 6	349670 336009	through bund in ditch line, collar on north
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UD7	349684 336026	under track into Northern ditch, collar on N
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UD 8	349,673 335,923	in old drain under bund into S drain
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UD 9	349,695 335,937	under bund into S drain
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UD10	349,714 335,950	from old drain under bund into S drain
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UD11	349,730 335,960	under bund into S drain
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Caveats. Cranberry Castle, the site of an old turf-bote in between the north of MD2 and AD1 at 349621 335975 must not be disturbed.

3.3 Whixall SW (Annex 3.3) South-west Whixall Moss - Bunding of Cleared & Thinned Woodland/Scrub and fields. Cell Bunding 5.78 ha, with 43 dams and 31 balance pipes Framework categories: 2.3.7, 2.3.8, 2.3.9, 2.3.10, 2.6.2, O/S, O/S

Contour bunding.

Bog Surface (intact tree scrub removal 16-80 year old tree root plate 7.5m apart) Cracked drained surface - 5.78 ha

2.3.7 20 x 10m 15% = 0.86 ha

2.3.8 20 x 20m 15% = 0.86 ha

2.3.9 30x30m 50% = 2.9 ha

2.3.10 40x40m 20% = 1.16 ha

Dams

2.6.2 1.5 x 1.5m ditch dams in forestry grips – 43 no.

O/S – balance pipes 31no.

The aim is to restore fen and bog by blocking up the field drains which dissect the area and bund to repair the damaged surface peats whilst retaining some of the carr and scrub which are of invertebrate value and some drier areas of value to herptiles. Balance pipes are to be used to restore the north-west to south-east flow of water off the bog dome through the area. Caveats. Bracken areas are good adder habitat so only track on them along peripheral and cross-bunding and damming lines. No tracking over areas marked as No-go points, marked in the field with flashing tape.

Cell bunds.

N block: Western half (fields 24-26, 32, 34 and 35) – cell bund using 40 x 40, 30 x 30 and 20 x 20m cells including the internal ditches within cells and damming where crossing them.

East half (fields 14 to 20, 22, 23 and 36) – Cell bund using 30 x 30, 20 x 20 and 20 x 10m cells to within 2m of each field boundary drain and create dams or U-pipes in field boundary ditches as specified.

S block: (fields 31, 33, 37 and 38). Do not block ditch against scrapyard.

- Donkey field 38 – bund with 30 x 30 and 20 x 20 cells to fit and dam W, N and (S) ditches as shown.

- Bracken field 33 – make 3 no. 30 x 30m cells, damming W ditch adjacent to bund lines and N ditch as shown. Limit tracking to bund lines because of herptiles.

Wood 37. Dam west ditch from field 31.

Boundaries:

N Block:

N – ditch to NNR sect 16 and field 21 (create cells open to ditch in north)

E – Fields 19 and 20 - 10m off Mosses Trail track. Then 2m off ditch to field 13.

S – 2 m north of north ditch of track no 12 (this will be through a tree belt)

W – ditch from bungalow to NNR section 16 & 17

SW block:

N – 2m south of trackway

E - 5m west of scrapyard

S – 2m north of northern bridlepath drain

W – 2m east of field 38 west drain and west ditch of wet wood 37

Dams – **2.6.2** - Drains dam (drain damming), 1.5x1.5m - 43 no. (purple dots on map with D label)

S Block

D1 - 349033 335325

D2 - 349003 335311

D3 - 348980 335301

D4 - 348952 335316

D5 - 348925 335342

D6 - 348962 335354

D7 - 348994 335366

D8 - 348909 335353

D9 - 348891 335370

D10 – 348946 335376

D11 - 348930 335399

D12 - 348945 335440

D13 - 348944 335347

N Block – west half 15 no. dams where ditches crossed in cells plus

D14 - 348873 335463 in west drain

D15 - 348886 335444 in west drain

D16 - 348904 335429 in west drain

D17 - 348930 335524 in west drain

D18 - 348948 335500 in west drain

D19 - 348961 335479 in west drain

N Block – east half 6no. dams for unknown ditches plus

D20 - 349106 335706 in path-drain 10m from track

D21- 348967 335642 in field 18/22 drain

D22 - 348985 335616 in field 18/22 drain

Balance pipes - **O/S** 31 no., purple dots on map with UD label

UD1 at 348915 335424, collar on north – from ditch (or within cell) at south of field 34 to bunded area on field 33 to convey water back down the slope of the bog.

UD2 at 348739 335480 with collar on north in south drain of NNR sect 16 to feed water into NW bund cell of field 26.

UD3 at 348789 335514 with collar on north, to bring water from NNR section 16 south ditch into field 25/26 drain.

UD4 at 348848 335555 with collar on north, to bring water from NNR section 16 south ditch into field 25/24 drain.

UD5 at 348883 335587with collar on north, to bring water from NNR section 16 south ditch into field 23/24 drain

UD6 at 348744 335464 with collar on north in track-side drain of field 26 to raise water sufficiently to feed water through UD 2 to UD5.

UD7 at 348827 335376 in trackside ditch to force water along ditches between 25, 26 and 32.

UD8 at 348792 335421 with collar on west to feed water from trackside ditch into NW cell of field 32.

UD9 at 348859 335480 with collar on north to feed water from cells in field 25 into cell 34.

UD10 at 348859 335480 in trackside ditch by trackway 12 with collar on north to control water levels in north ditch of track 12 and bungalow track.

UD11 at 349004 335828, 10m+ long, collar on N, under track to take water from S14.2 to SWTNE N drain – clean out/ create new drain to divert water from existing U-pipe at 14.2SE at 349010 335848

UD12 at 348934 335773, 10m+ long, collar on N, to take water from S 14.3SE to field 21

UD13 at 348856 335715, 10m+ long, collar on N, to take water from S 14.4SE to field 21

UD14 at 348914 335611, collar on N, to take water from field 23 N drain into cell, not blocking the drain.

UD15 at 348933 335626, collar on N, 10m +, to take water from field 21 to field 23/22 drain and to create watershed divide in NNR sect 16/ field 21 south drain.

UD16 at 348951 335640 collar on north to take water from field 22 N drain into cell, not blocking the drain.

UD17 at 348995 335678, collar on north, 10m +, to take water from field 21 to field 18/19 drain.

UD 18 at 349035 335709, collar on N to take water from SWTNE south drain into field 19 cell- not blocking the drain

UD19 at 349080 335733, collar on north in SWTSE south drain to conduct water from the SWTSE east drain into field 19 cell, without blocking drain.

UD20 at 349090 335736, collar on north, in field 19 east track-side drain, to divert water along

field 19 north drain.

UD21 at 349105 335719, collar on north in field 20 east track-side drain, to divert water along field 20 north drain.

UD22 at 349091 335714 collar on north in field 20 north drain to conduct water from the field 20 east drain into field 20 cell, without blocking drain.

UD23 at 349056 335687 collar on north in field 20 north drain to into field 20 cell, without blocking drain.

UD24 at 349021 335661, blocking field 20 north drain, collar on east.

UD25 at 349047 335626, collar on north to take storm water from field 20SW cell into field 13/14 track east drain.

UD26 at 349039 335620 in field 13/14 track east drain, collar on north - just south of Field 13 north drain.

UD27 at 349056 335575 , collar on north, to set water level in fields 15, 16/17 north drain in combination with UDX

UD28 at 349085 335545, collar on north, 10m+ to conduct water under track into field 11.

UD29 at 349022 335511 in field 16 west drain, collar on north to set level in fields 15,16, 17 and 14.

UD30 in field 35/36 track south drain, collar on east, to hold water at the 87.5m contour in the field 35/36 east drain and field 38 south drain.

UD31 at 349050 335528 in north-south drain, collar on north

Put higher collars on pipes in existing bypass drain MD1 or dam it along its length.

3.4 **Bettisfield Sect 19 (English) (Annex 3.4) – Bettisfield Moss Section 19 - Bunding of Thinned Woodland. Cell Bunding 2.07 ha and 435m of contour bunding with 20 dams and 1 balance pipes**

Framework categories **2.2.4, 2.4.6, 2.4.7, 2.4.8, 2.4.9, 2.6.2, O/S**

Contour Bunding

Cut peat face (straight sections), peat face re-profiling (2-3m)- category used because of bigger root-plates and high core bunds needed respectively

2.2.4 contour bunds – 435m

Cell Bunding

Bog Surface (cut-over tree scrub removal 16-80 year old tree root plate 7.5m apart) Cracked drained surface

2.4.6 20x10 m 10% = 0.21ha

2.4.7 20x20 m 30% = 0.62ha

2.4.8 30x30 m 30% = 0.62ha

2.4.9 40x40 m 30% = 0.62ha

2.6.2 1.5 x 1.5m ditch dams in forestry grips – 20 no.

O/S – balance pipes 1no.

The aim is to rewet the woodland by bunding along cleared routes. Woodland thinning also aims to allow mire species to pass from the Moss through to the fields to the south-east which are to be restored to fen, while retaining some tree cover. .

Hazards. In the northern half there is a WW2 incendiary target bombing range on section 28.5 at SJ50006 37558. No live Ordnance has been dug up by peat cutters/ damming since WW2. All bund lines within a 150m radius will be checked for Ordnance.

In the southern half there are rotting or partly missing sleeper crossings on tracks and already dammed cuttings will have soft bases.

Cell Bunding

Sect 19.8 – cell bund within the 90 x 40m area using ca 20 - 30m x 15m cells to limits of bundable peat, omitting central track.

Section 19.2 – create 40 x 40m cells along marked bund routes

Section 19.3 – create 30 x 30m cells linked to existing cells to north. Dam the northern trackside drain at bund locations.

Sect 19.6 – create 20x 20 to 30 x 30 cells keyed into existing bunds to north.

Boundaries.

Sect 19.8

- S limit of bundable peat – ca 40cm
- E & W 5 m off boundary drains
- N 2m south of World's End drain

Sect 19.2

- S 2m north of southern track depending on trees
- E & W 2m off track-side drain dependant on tree retention and in south-west the limit of bundable peat.
- N – key into existing cells

Sect 19.3

- S 2m north of south track north drain depending on trees retention
- E 2m off track-side drain
- W 2m off track-side drain dependant on tree retention
- N – key into existing cells

Sect 19.6 cell bunding

- S at foot of slope north of track on cleared bund line
- W 2m off track or along cleared bund line
- E last cleared bund line before dense eastern woodland
- N key into 201718 cell bunds

Sect 19.6 contour bunds

- S at foot of slope north of track on cleared bund line
- E 2m off ditch or along cleared bund line
- N - at base of E-W track
- W key into 201718 cells

Contour bunds 2.2.4 6no. 415m.

Create a contour bund along the south and east of section 19.6 with E-W cross bunds to create 30 x 30 to 40 x 40 m cells linked into 201718 bund cells. Dam ditches adjacent to bunds and provide storm water exit pipe.

CB1 – 202m from 348249 334892 eastwards to 348293 334878 and north to track at 348368 335018

CB2 – 50m, from just north of willows ca 45m north of track corner, at 348312 334915 west to key into existing cell bund

CB3 – 50m from 348327 334944 west to key into existing cell bund

CB4 – 45m from 348342 334971 west to key into existing cell bund

CB5 – 40m from 348354 334993 west to key into existing cell bund

CB6 – 28m from 348367 335018 west to key into existing cell bund

Dams 2.6.2 - 20no.

Roughly every 30m in the drain just north of the main E-W track and up the E track of section 19.6, corresponding to bund locations. (not marked on map).

Balance pipes O/S - 1 no. – 300mm diam. U-pipes with collar

UD1 at 348,294.493 334,882, collar on north-west – from inside Sect 19.6SE cell into east drain north of existing balance pipe

3.5 Bettisfield W & SW – (Annex 3.5) Bettisfield Moss Section 18 W and 18SW - Bunding of Thinned & Cleared Woodland. Cell Bunding 2.75 ha with 100m new drains, 8 dams and 8 balance pipes

Framework categories: **2.4.6, 2.4.7, 2.4.8, 2.4.9, 2.6.2, O/S, O/S, O/S**

Cell Bunding

Bog Surface (cut-over tree scrub removal 16-80 year old tree root plate 7.5m apart) Cracked drained surface

Bett.W.

2.4.6 20x10 m 10% = 0.08ha

2.4.7 20x20 m 10% = 0.09ha

2.4.8 30x30 m 50% = 0.39ha

2.4.9 40x40 m 30% = 0.24ha

Bett.SW

O/S 20x10 m 90% = 1.76ha at 2m depth on slope

2.4.7 20x20 m 10% = 0.2ha

Dams

2.6.2 1.5 x 1.5m ditch dams in forestry grips – 8 no.

O/S – balance pipes 8no.

O/S – clean out drains –2no. 100m total

The objective for Bettisfield W is to bund around (and through in the S area) the retained woodland blocks causing the minimum of disruption to create wet rather than dry woodland.

The objective for Bettisfield SW is to stem the collapse of the bog dome caused by the drainage associated with the old peat cuttings in the woodland.

Hazard. Bogmats will be needed on Bettisfield SW as the peat of the plateau is very deep and sloppy. Care must be taken not to create a **bog-burst**.

Cell Bunds.

Bettisfield W- bund around areas then across tracks near east ends of cells.

W- N 0.219 ha, W –C 0.196 ha, W – S 0.373ha

When bunding across tracks, only make bund to surface level and cover with track crossing.

Do not bund across track leading east from the hammerhead

N- bund N, S, W borders and link to existing bunds in east.

Bettisfield SW

Dig bunds on slopes to 2m depth to break deep peat pipes and cracks. Use 20 x 10m cells parallel to the slope, with 20 x 20 on higher flatter ground in the north. Adjust to suit peat cutting pattern. Do not block track leading east from Bettisfield W-S.

Boundaries

Bettisfield W.

E – join to existing bunds (W-C limit of trees)

W – cleared bund line through woods at base of track.

W-N – N-2m south of 2nd track north of hammerhead then create up-to surface-only bunds across the track with crossing places to link to existing bunds north of track

S - 2m north of first track north of hammerhead

W-C N- 2m south of first track north of hammerhead

S – 2m north of track from hammerhead

W- S N – 2m south of track from hammerhead

S – Base of bank with boundary fence.

Bettisfield SW

- NE Existing bunds

- SW southern track or 25m from field edge and 30m in south
- SE Where double row of cells becomes single and veers north of the recently felled line of tree
- W 5m off perimeter fence
- N – south of track from Bettisfield W-S – leaving 10m from edge of existing contour bund pits.

Dams 8no.

Bettisfield W - use to bridge from bunds to tracks where shown.

D1 at 347170 335534 to block track-side ditch

D2 at 347223 335534

D3 at 347166 335484

D4 at 347192 335485

Bettisfield SW – 4 no. as necessary if ditches are seen leading south of cells to field edge drain and drain at 347462 335186

Balance pipes. 8no.

Bettisfield W from bunded cells into the trackside drain, collars on east.

UD1 at 347182 335575, from cell to east drain.

UD2 at 347160 335521 from cell to east drain.

UD3 at 347156 335465, from cell to east drain.

UD4 at 347156 335417, from cell to east drain.

Bett-SW. 3 no. from inside lowest cells near to drain locations onto moss surface to south so water will make its way to the drains. Collars on north.

UD5 at 347335 335376 on a line with ENE-WSW field drain

UD 6 at 347381 335301 on a line with ENE-WSW field drain

UD7 at 347422 335243 on a line with NNE-SSW field drain

UD8 at 347470 335195 in SE cell corner

Clean drains O/S 2no. 100m total.

Clean drains along the south and north side of Bettisfield W-C so water can flow from Hagenella area to the west.

3.6 Sect 18.2SE, 18.3 and 47 (Annex 3.6) – Bettisfield Moss Section 18.2 SE, 18.3 & 47 - Bunding Thinned & Cleared Wood & Fields. Cell Bunding 6.11 ha with 100m high-core bunds, 35 dams and 8 balance pipes Framework categories 2.2.8, 2.3.7, 2.3.8, 2.3.9, 2.3.10, 2.6.2, O/S

Contour Bunding

Cut peat face (undulating sections), peat face re-profiling (2-3m) – category used as high core bunds needed

2.2.8 High core bunds bridging contours or cuttings – 10no. 100m total

Cell Bunding

Bog Surface (intact tree scrub removal 16-80 year old tree root plate 7.5m apart) Cracked drained surface

2.3.7 20 x 10m 20% = 1.22 ha

2.3.8 20 x 20m 30% = 1.83 ha

2.3.9 30x30m 30% = 1.83 ha

2.3.10 40 x 40m 20%= 1.22 ha

Dams

2.6.2 1.5 x 1.5m ditch dams– 35 no.

O/S balance pipes – 8no. 300 mm.

The objective is to stop leakage of water from the Bettisfield Moss uncut dome into surrounding drains and to recreate a hydrological link from north to south towards Wem Moss. Also to recreate lagg vegetation on the overgrown field 18.3 and to dam up the peat cuttings on

section 47 and rewet the felled woodland areas. Storm water drainage to continue to pass to south.

Hazards.

18.2SE-in the north–west, bog-mats will be needed as the peat is deep and unstable.

Also an excavator bucket has been stolen off an excavator parked for 3 weeks in field 18.3 so security precautions will be needed.

S.47. Protected species activity in bracken lump at 347,383 334,986 opposite SE corner of fairground enclosure. NW has peat cuttings very near the track at SJ47434 35028.

Cell Bunds. 2.3.7 - 2.3.10 6.11 ha

18.2C – this area is leaking to the pine forest NE corner. Cell bund between the existing cells and the northern contour bund, restoring crossing points.

18.2SE - Cell bund including along cleared lines through retained scrub. Use 10 x 20m small cells along steep drop from Moss in SW into 18.3.

18.3 Cell bund each field section individually then create link bunds with dams through the E-W drains. Bund through 18.2/18.3 drain. In the north, using large cells, bund through north drain into 18.2SE to link to existing cells to north.

S.47

- In 47C (centre 1.27ha) Cell bund to limits of bundable peat, bunding along cleared lines in retained timber areas 47S and 47W (0.33ha) (thinned timber on map). On steeper slopes to western and southern “lagg” use 10m x 20m cells.

- In 47NW (1.01ha) cell bund using high-core bunds/ dams through the 1.1ha of peat cuttings to raise water to top surface level.

Boundaries.

18.2C – linked into existing cells and contour bund.

18.2SE

- NW cell bund to 2m off boundary drain against the forest, bunding through the brashmat. Do not bund the drain against the forest (cf UD9). Use bog-mats.

- W against field leave 10m strip.

- S Leave 3m north of track-side drain, which is piped under hammerhead.

- E continue through drain into 18.3

-N key through brashtrack into existing cells

18.3

- N bund through drain into S18.2SE woodland.

- W bund through drain into 18.2SE

- E limit of bundable peat except for extreme corner where a 10m+ wide strip must be left from the Border Drain along the boundary to the higher ground to permit access from the gates along the Trails.

-S 3m (dependent on tree roots) north of southern trackside drain which must not be blocked.

Sect 47.

- N 2m south of trackside drain

- E brash track

- W base of slope west of brashtrack.

- S 10m from southern drain

High-core contour bunds 2.2.8

S47

Ca 10 no. high-core bunds across wide peat cuttings (locations approximate on map but will be marked after tree clearance).

Dams. 2.6.2 34 no. (most not shown on Map)

S 18.2SE

D1 at 347500 335084 at the corner of the forest NE drain to stop water flowing southwards in field edge drain and push it into the 18.2SE cells.

S18.3

D2- D11 as necessary crossing field 18.3 drains and 18.2/18.3 drain (not marked)

S47

D12 -35 in S47NW as necessary (locations on map only approximate)

Balance pipes O/S 8 no. (Blue dots on map)

18.2SE

UD9 at 347509 335096 in NW capture water from boundary drain corner south-eastwards into cells with dam to stop water flowing south-west in the drain. (to 10m+ long)

UD10 at 347472 335025 to take water from SW cell under track into S47 cell. (to 10m+ long)

UD11 at 347526 334980 to take water from SW cell under track into S47 cell. (to 10m+ long)

18.3

UD 12 at 347546 334955 to take water from SW cell under track into S47 cell. (to 10m+ long).
47.

UD13 at 347522 334919 to take water from cell to Border Drain

UD14 at 347474 334841 to take water from cell to Border Drain

UD15 at 347474 334841 to take water from cell to Border Drain

UD16 at 347361 334814 to take water from cell to southern drain

3.7 **Sect 1/29 Fenn's Moss (Annex 3.7) Fenn's Moss S.1.W,1.13,1.14,1.18 & 1/29 - Bunding Thinned Wood, Scrub & Open Moss. Cell Bunding 18.85 ha with 140m high-core bunds, 17 dams, 7 balance pipes and 36 track crossings**

Framework categories **2.2.2, 2.2.8, 2.4.3, 2.4.4, 2.6.2, O/S, O/S**

Contour Bunding

Cut peat face (undulating sections), peat face re-profiling (2-3m) – category used as high core bunds needed in 16-80 yr rootball area

2.2.2 Contour bunding Cut peat face (straight sections) Peat face re-profiling (0-1m) 60 m 7no.

2.2.8 High core bunds bridging contours or cuttings – 6no. 120m total

Cell Bunding

Bog surface (cut over - tree/scrub removal complete 1- 15 year old tree root plate).

2.4.3 30 x 30m cells 60%= 11.31ha

2.4.4 40 x 40m cells 40%= 7.54ha

Dams

2.6.2 1.5 x 1.5m ditch dams in halfway drains – 17no.

O/S balance pipes – 6no. 300 mm

O/S track crossings – 36no.

The objective is to retain high water levels on the slope from the dis-used railway line to the lower commercial peat cuttings, by using the peat baulks and tracks left from the peat cutting to cell bund at the top of peat baulk level.

Caveats. Lines for bunding will be cut through the trees, if present. The trees along the railway line have adder hibernacula within them – these will be marked and must not be tracked over.

Hazards. The Fenn's Moss Main drain is extremely deep, has unstable sides and may still be polluted. Apart from section 1.18, all ditches have already been dammed so banks will be soft.

Cell Bunds. 12.94 ha

1.14 one cell round the area not including the track-side drains

1.13 2 NNW-SSE orientated rows of 20m x 30m cells cutting across the peat cuttings including damming the trackside ditches.

1/29 and 1W Cells on steep contours 10m x 80m cells (50%), (2.4.3 30x30m category) NE-SW walls along the top level of the peat baulk, damming the centre-flat and trackside ditches, NW-SE walls in the tracks, distance from drain as specified in boundaries below.

On less steep contours 20 x 80m cells. (50%) (2.4.4 40 x 40m cells)

Boundaries. (Annex 2 shows section numbers)

Sect 1/29, 1.13, 1.14, 1W-(NE)

- N. 2m south of Railway drain
- E Wherever and area finishes against a track, create the eastern cell bund 2m into the west side of the track
- S as marked generally following limit of steeply sloping ground.
- W Wherever and area finishes against a track, create the western cell bund 2m into the east side of the track APART from on section 1.19 where the cells should be keyed into the Sect. 1/2 track.

Sect 1.18

- N 2m south of Railway drain
- E Key into sect 1.11/1.18 track
- W Key into sect 1.13/1.18 track
- S Key into track or continue with area sect 1/29

High-core contour bunds 2.2.8 14no. 200m total

20m long running from Sect1/29cell bunds across the Railway Drain (with balance pipe in drain, see above) to key into the railway trackbed.

HB1 at 348525 337219

HB2 at 348525 337219

HB3 at 348305 337046

HB4 at 348217 336978

HB5 at 348069 336866

HB6 at 348807 337435

HB7 at 347888 336727

Also 8-10m long bunds across 1.13/1.14 track at bund locations (Not marked) 7no 60m total.

Dams. 2.6.2 - 17 no.

On section 1.18 east cuttings.

Balance pipes O/S - 7 no.

UD1 at 348593 337272 in high-core bund HB1 where it crosses the railway drain, collar on east.

UD2 at 348525 337219 in high-core bund HB2 where it crosses the railway drain, collar on east.

UD3 at 348305 337046 in high-core bund HB3 where it crosses the railway drain, collar on west. 348217 336978

UD4 at 348217 336978 in high-core bund HB4 where it crosses the railway drain, collar on west.

UD5 at 348069 336866 in high-core bund HB5 where it crosses the railway drain, collar on west.

UD6 at 348807 337435 in high-core bund HB6 where it crosses the railway drain, collar on west.

UD7 at 347888 336727 in high-core bund HB7 where it crosses the railway drain, collar on west.

Track crossings **O/S** - 43no.

As marked on map where bunds cross all the tracks from 1.5 to 1.17 except the 1.6/1.7 and 1.14/1.15 tracks.

4 Access track re-instatement

Apart from the dis-used railway line, tracks are on peat. Car parks and the dis-used railway line are topped with granite. Use of low ground pressure equipment is required at all times to minimise damage and these must leave NNR tracks to enter the bunding areas as soon as possible. Maintenance will be required during operations to ensure the tracks can continue to be used with minimal inconvenience (as the track are used by NNR staff and the public and

some are rights-of-way and trails) and re- instatement will be required after works.

- Photos of track condition are to be taken prior to work starting
- Mineral areas – 100 m.
Framework categories **2.7.8**
2.7.8 Access track repair –re-instatement of mineral tracks and mineral areas
Re-instate damage to the dis-used railway line and any car parks/ mineral access tracks by regrading and filling ruts and potholes with 40mm to dust granite. Quantity to be agreed with NE's Project Officer.
- Peat tracks –maintenance and repair - **outside scope** – 400 m.
Maintain and repair peat tracks in the work areas and access routes to them by flattening ruts and if necessary filling with dry rank vegetation obtained from adjacent areas (Molinia/ bracken and surface peat) and levelling off within a day of creating the damage so NNR staff and visitors can continue to pass. Quantity and source of material **MUST** be agreed with NE's Project Officer to avoid damage to sensitive areas.
- Peat tracks –re-instatement - **outside scope** – 400 m.
Re-instate damage to specified peat tracks by flattening ruts and if necessary filling with dry rank vegetation obtained from adjacent areas (Molinia/ bracken and surface peat) and levelling off so NNR staff and visitors can continue to pass. Quantity and source of material **MUST** be agreed with NE's Project Officer to avoid damage to sensitive areas.
- Any damage to culverts, fences, gates to be made good.
- Work must be to Natural England's Project Officers satisfaction and will be based on the pre-works photos
- Crossing Points – **outside scope** – 110 no.
Where bunds cross tracks which are needed for future access or to allow future access into certain cells, the covering over the core of the bunds will need extending by 3m each side for a 5m width, graded from bund height down to track height, so light machinery (mowers, ATVs) can be run over the bund.

5 Report and Photographic record

- **Framework category – O/S** - outside scope
- Contractors shall make no financial investment in the project and, therefore, shall not benefit from any intellectual property rights arising from the project.
- A brief report is required, detailing the implementation of the work. This will help Natural England to understand the positive and negative problems related to this type of restoration work and highlight any pitfalls that need to be communicated in future tenders. To include, for each different area:
 - Methodology of grip and ditch blocking/bunding/ damming with quantities, machinery, staffing times etc
 - A portfolio of photos and or videos taken during the works in electronic format. These will potentially be used for talks, seminars etc. but only with the contractors permission.
Photos/Videos to have appropriate file name explaining location and detail of the content.
- The cover of all reports and/or maps produced as part of the contract must include a statement

© Natural England and the date of creation.

- The front cover must:
 - include the following wording 'The Marches Mosses BogLIFE Project (LIFE15/NAT/UK/000786)' is financially supported by LIFE, a financial instrument of the European Commission'.
 - display the Natural England, Natura 2000, LIFE and HLF logos. The LIFE and N2K logos are available from the European Commission's LIFE toolkit – guidance on how to use these logos can be obtained from the website or they can be supplied by the Project Officer.
- The following standardised wording must be included in the report:
 - The Marches Mosses BogLIFE project (LIFE15 NAT/UK/000786) is a five year project running from 1 October 2016 to 31 December 2021. The project aims to restore Britain's 3rd largest lowland raised bog within the Fenn's, Whixall & Bettisfield Mosses and Wem Moss NNRs near Whitchurch, Shropshire and Wrexham in Wales. The LIFE project is led by Natural England working in partnership with Natural Resources Wales and the Shropshire Wildlife Trust. The project is financially supported by LIFE, a financial instrument of the European Commission and the Heritage Lottery Fund.
 - A link to the Marches Mosses Bog LIFE Project webpage.
 -

6 Bund/ Dam Location Plotting – O/S - out of scope

Record whilst carrying out the bunding and damming works, an electronic record of the locations of dams and bunds and supply in a format suitable for use in ArcGIS v 10.2.2. Also incorporate findings into the report above.**HEALTH AND SAFETY AT WORK****First Aid**

- The Contractor will be responsible for the health, safety and welfare of the contract work force, and a practicing first-aider with current certification will be present at all times. The Contractor will provide all appropriate first-aid equipment.

7.2 Lone Working

- Because of the remote location of the site there will be no lone working at any time.

7.3 Certification and codes of practice

- All work is to be conducted in accordance to codes of practice and operators must hold appropriate and current training certification for any machinery or equipment they use. Copies of all current personnel and machinery certification must be presented to the Natural England Project Officer, for retention, one week prior to work commencing.

7.4 Warning signs

- The site has visitors, staff and volunteers who will be using the tracks and Trails adjacent to the work areas. Contractor will be responsible for alerting visitors, staff and volunteers by erecting warning signs.

7.5 Risk Assessment and CDM

- **A copy of the Fenn's & Whixall Moss NNR risk assessment will be supplied to the successful contractor. The successful Contractor shall carry out a comprehensive Risk**

Assessment for all aspects of the project and present a copy to the Natural England Project Officer one week prior to work commencing. This should be signed as having been read and understood by all those who will be working on the site.

- A CDM co-ordinator Aegis Services Ltd. has been appointed: contact. All works will be carried out in accordance with CDM Regulations 2015 and the Contractor will liaise with the CDM coordinator accordingly to prepare the Construction Phase Plan. Contact [REDACTED], [REDACTED] [REDACTED] Aegis Services Limited, 15 Navigation Business Village, Navigation Way, Preston, PR2 2YP, Tel: [REDACTED]

7.6 Accident Reporting

- The Contractor will be responsible for immediately reporting any accidents involving either their personnel or the public to the Natural England Project Officer. All incidents involving the public, however minor, are reportable under RIDDOR.

7.7 Smoking

- **SMOKING IS STRICTLY PROHIBITED ON SITE FOR ALL PERSONNEL.** There is an extreme fire hazard on the raised mire at all times.

8 DATES

8.1 Work start date and order of works.

- This contract has to follow after woodland clearance which will be carried out in autumn and winter 2019/20. Once the contract has been let, work can commence after 1 January 2020 if the woods have been cleared. If some elements are not completed before, work must stop during the bird breeding season from the end March 2020 to end of July 2020.

8.2 Work completion.

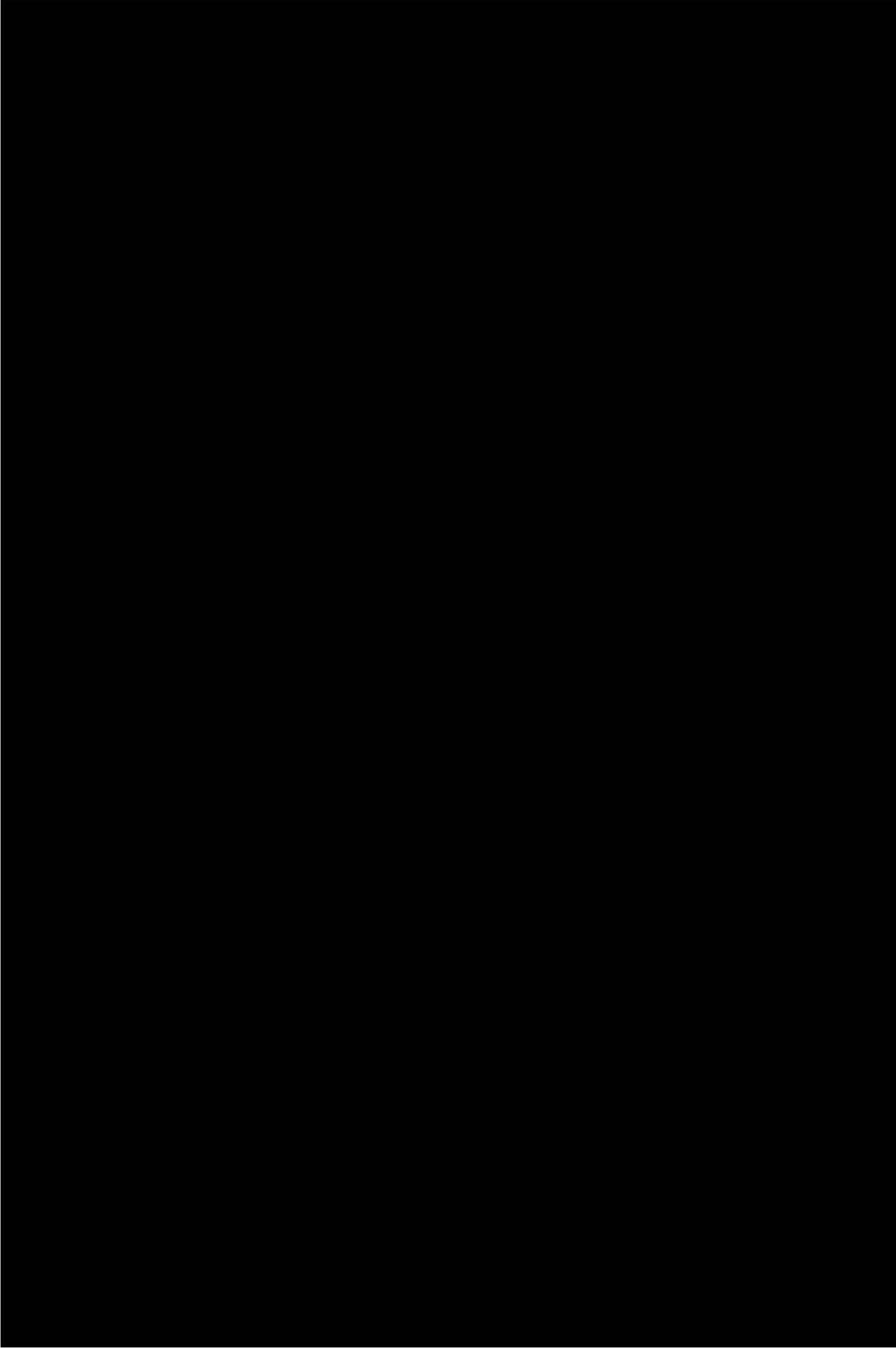
- Works must be commenced by 1 August 2020 at the latest and be completed the end of December 2020. Costs of moving of machinery between the two Mosses must be factored into the tender and also removal and return if a break for the bird breeding season is required. The contractor must specify their capacity in the tender submission.
- **All work and reporting must be completed by end of February 2021 and must be invoiced on or before by 10th March 2021, with an interim invoice to be submitted by end of April 2020 for works completed up to the end of March 2020. However works should all preferably be completed and invoiced by end of December 2020.**

(1.2) Commencement Date: 2nd January 2020

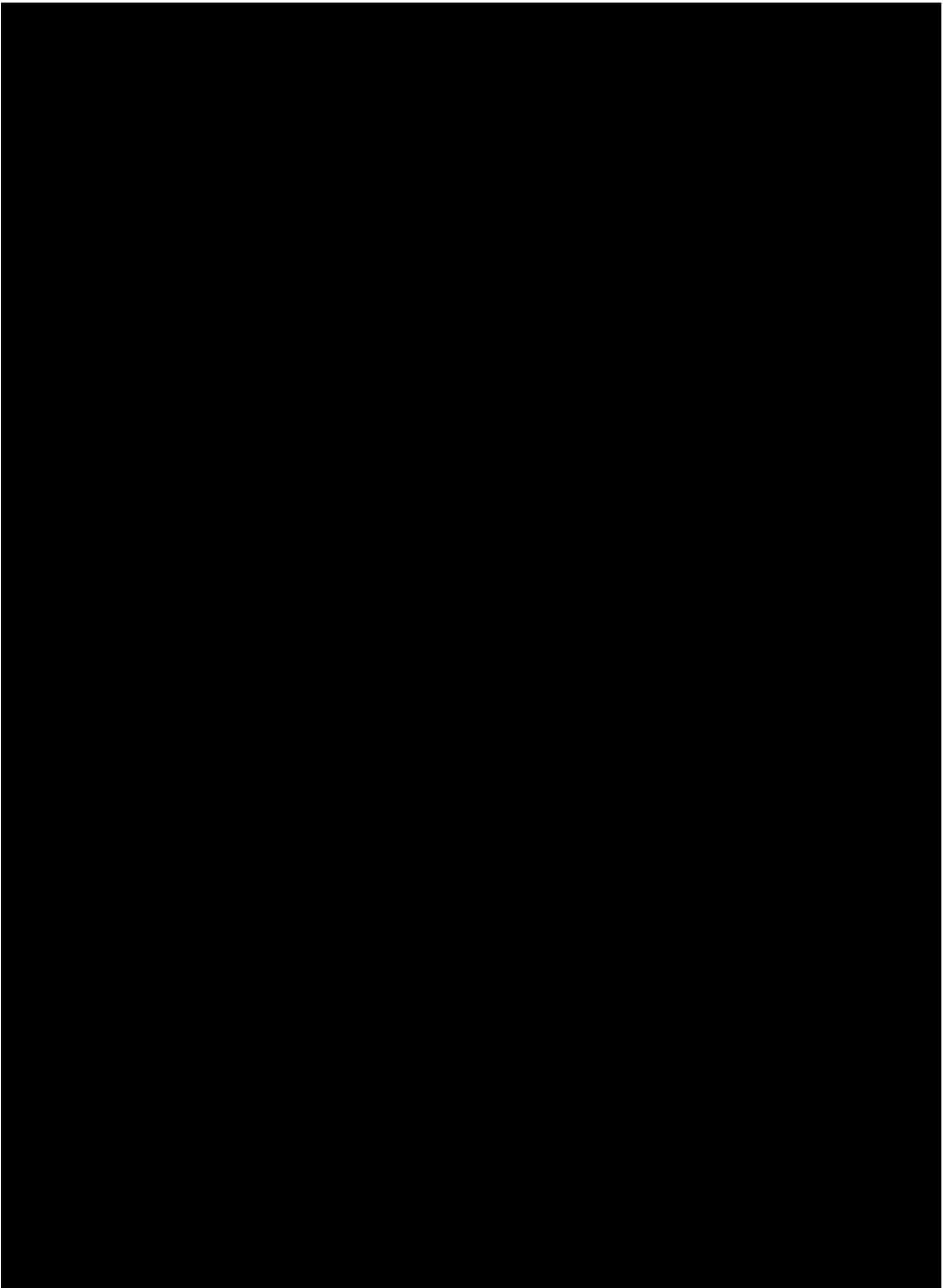
(1.3) Completion Date: 28th February 2021 at latest preferably by 31st December 2020

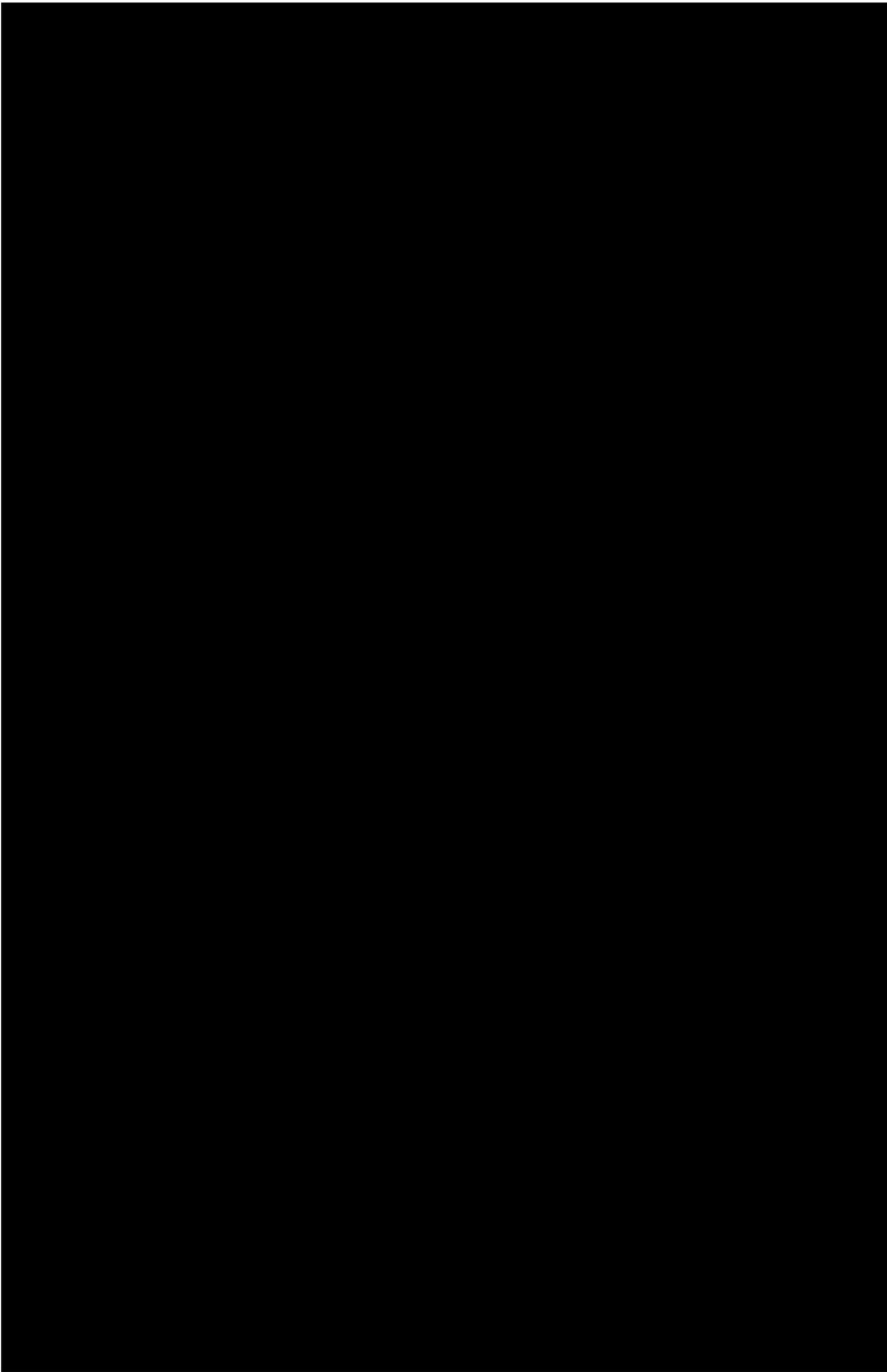
2. PERFORMANCE OF THE SERVICES AND DELIVERABLES

Methodology Provided by: Dinsdale Moorland Specialist Limited



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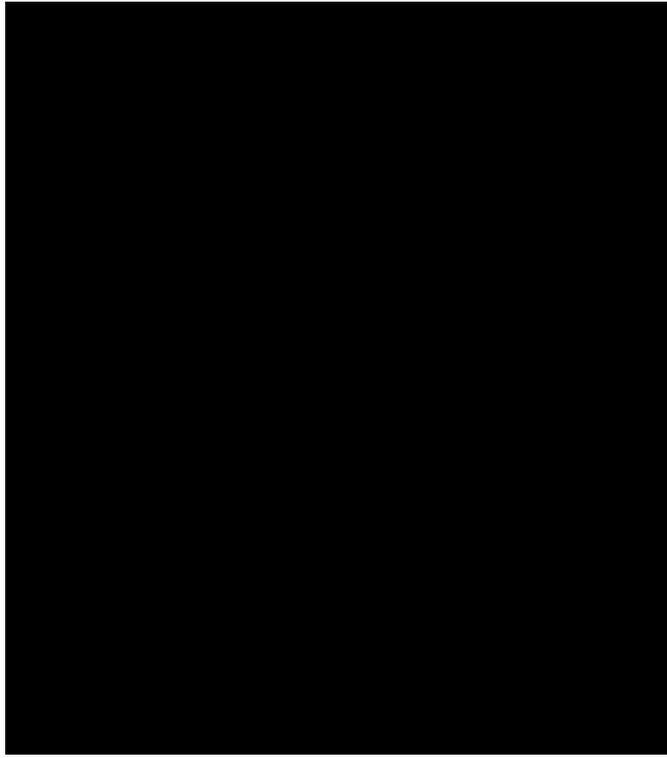


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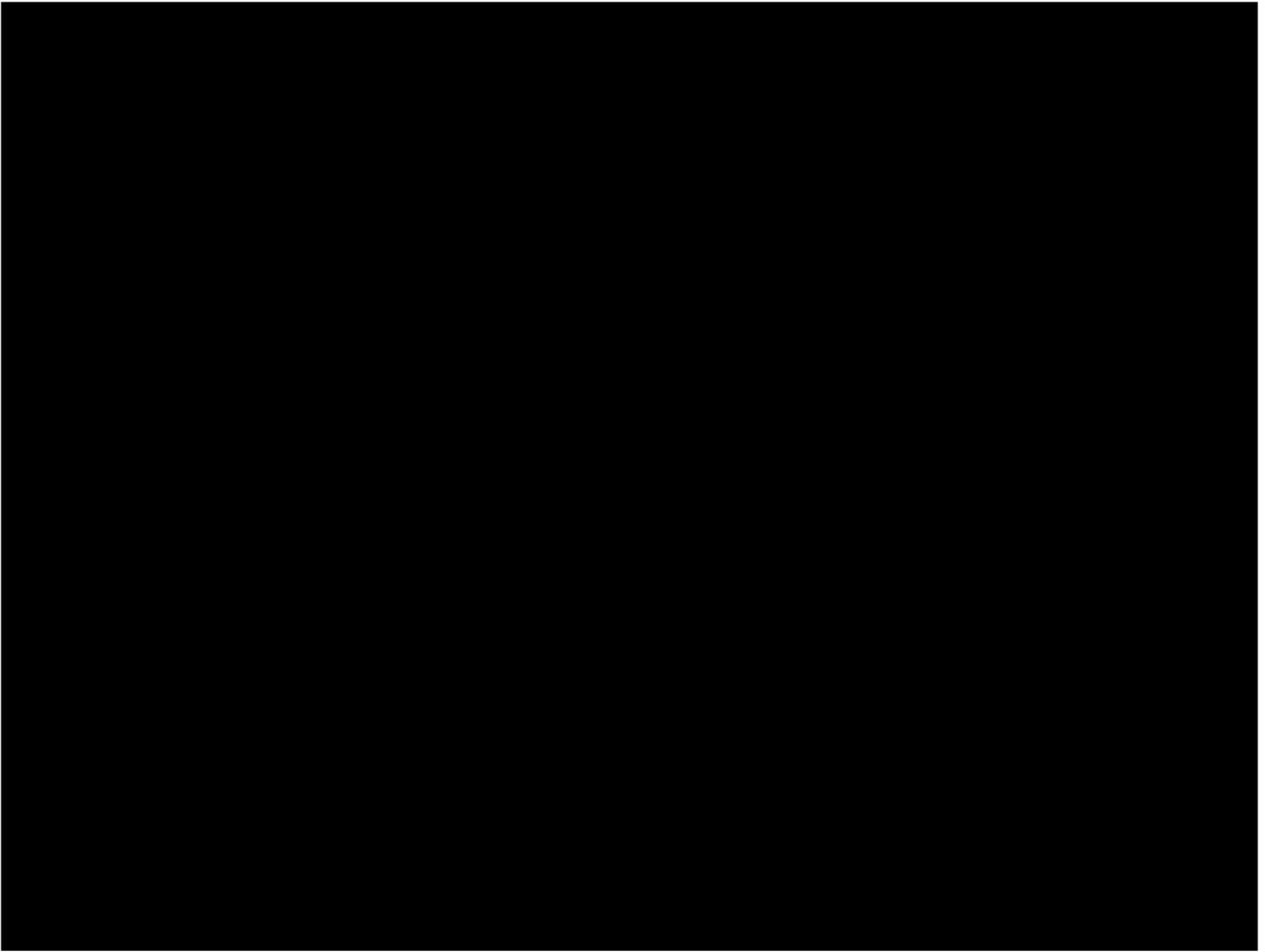
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Dinsdale Moorland Specialists Limited
Moorland Regeneration – Lowland Mire – Infrastructure – Mapping
Mountain Bike Trail Build & Design

Restoring Nature's Balance

Deepdale Head
Wigglesworth
Skipton
North Yorkshire BD23 4RH

Tel: 01729 840088
Fax: 01729 840259

www.dinsdale.co.uk
E-mail: moorland@dinsdale.co.uk

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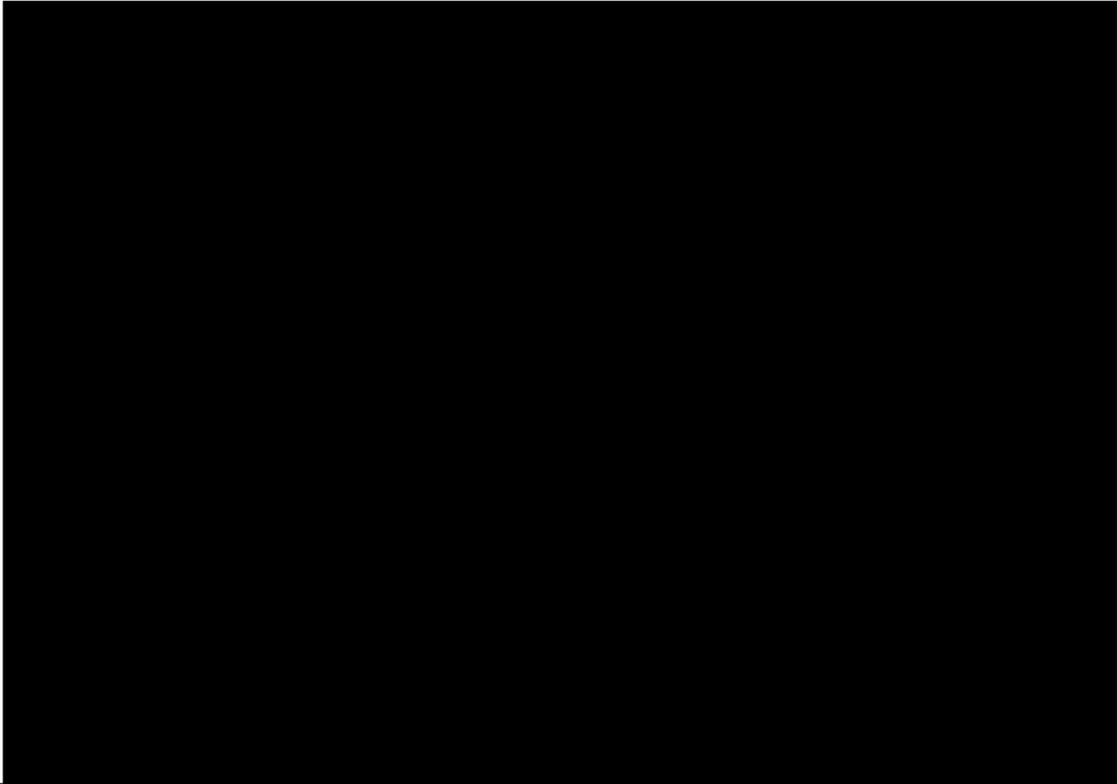
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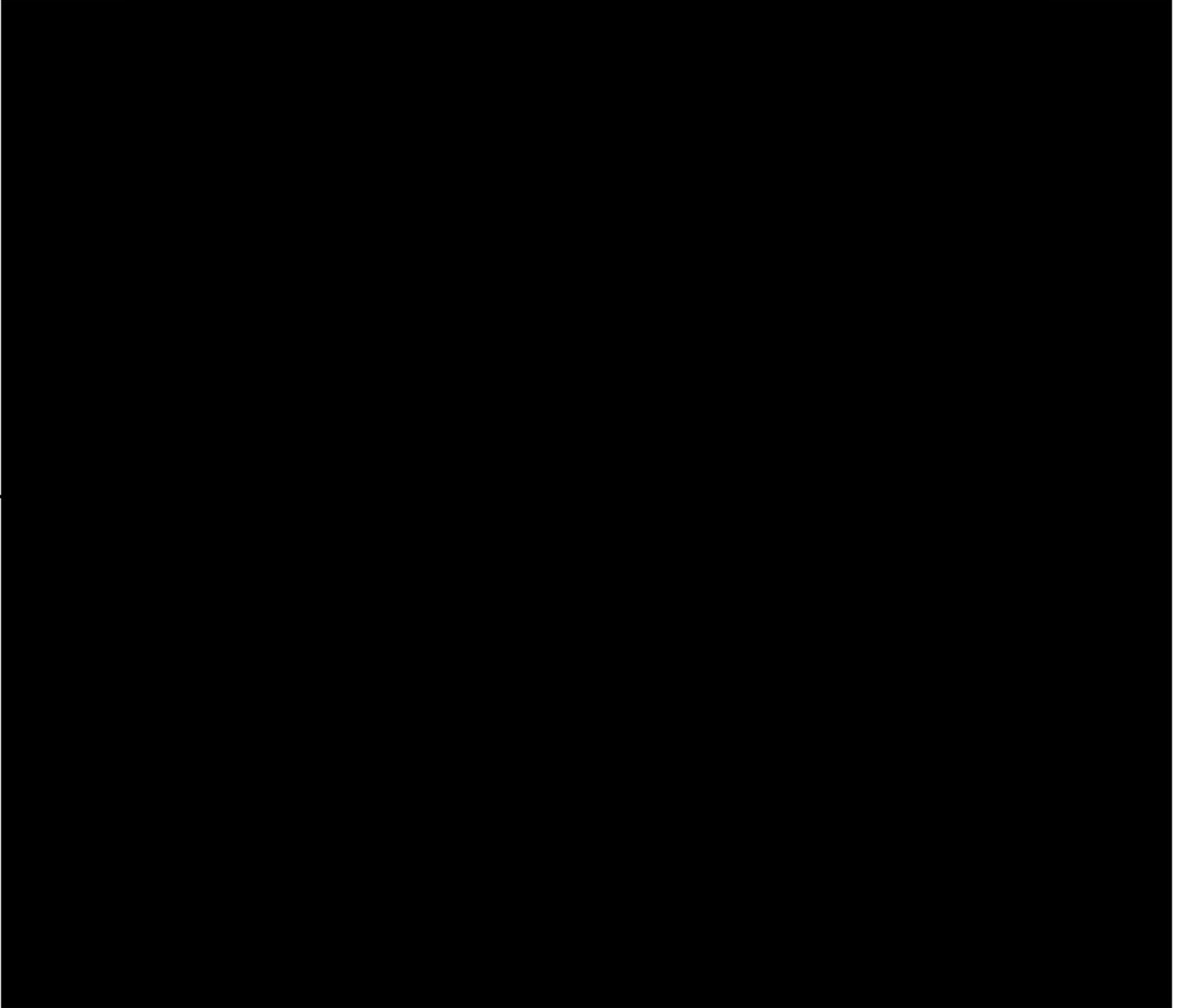
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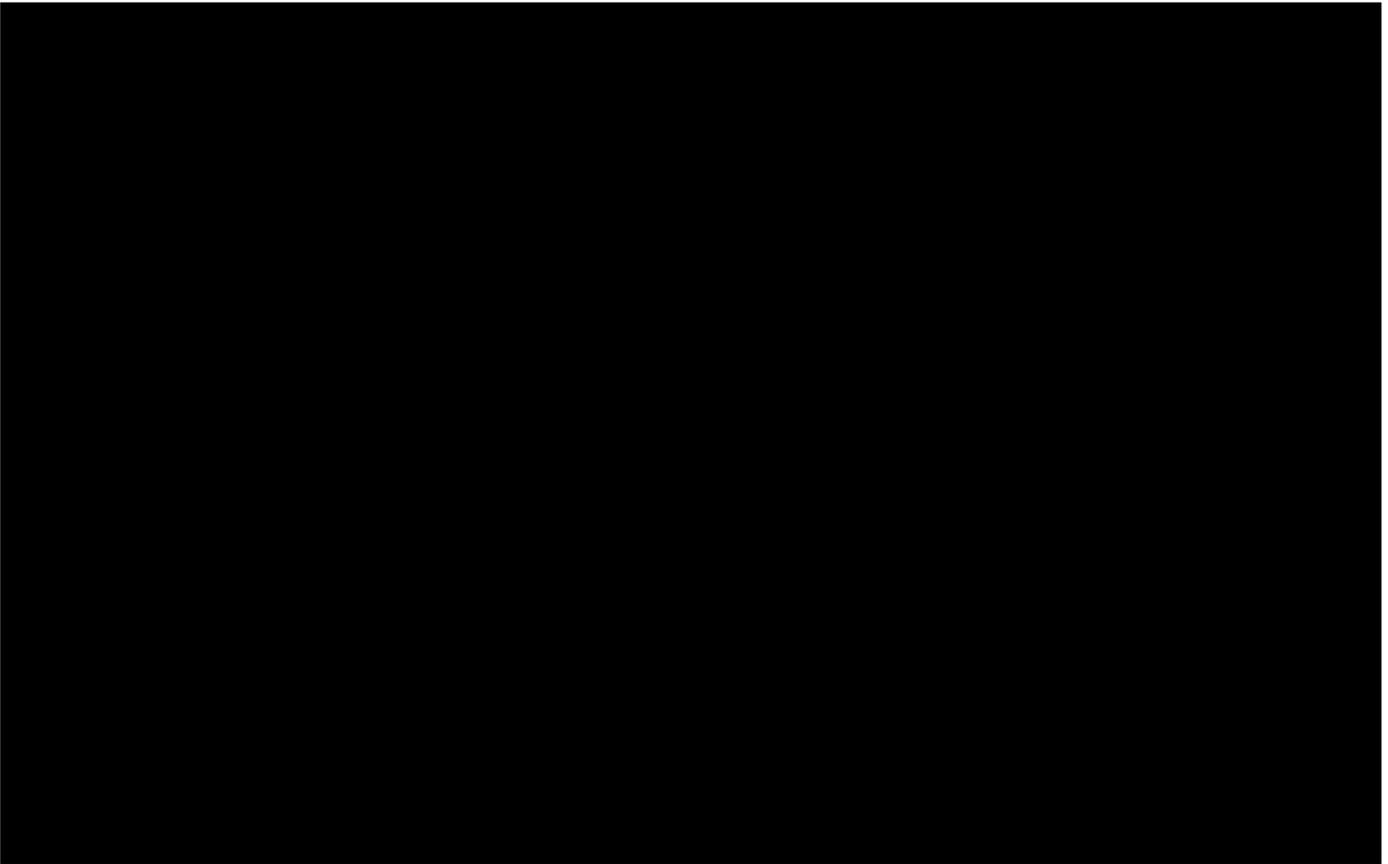
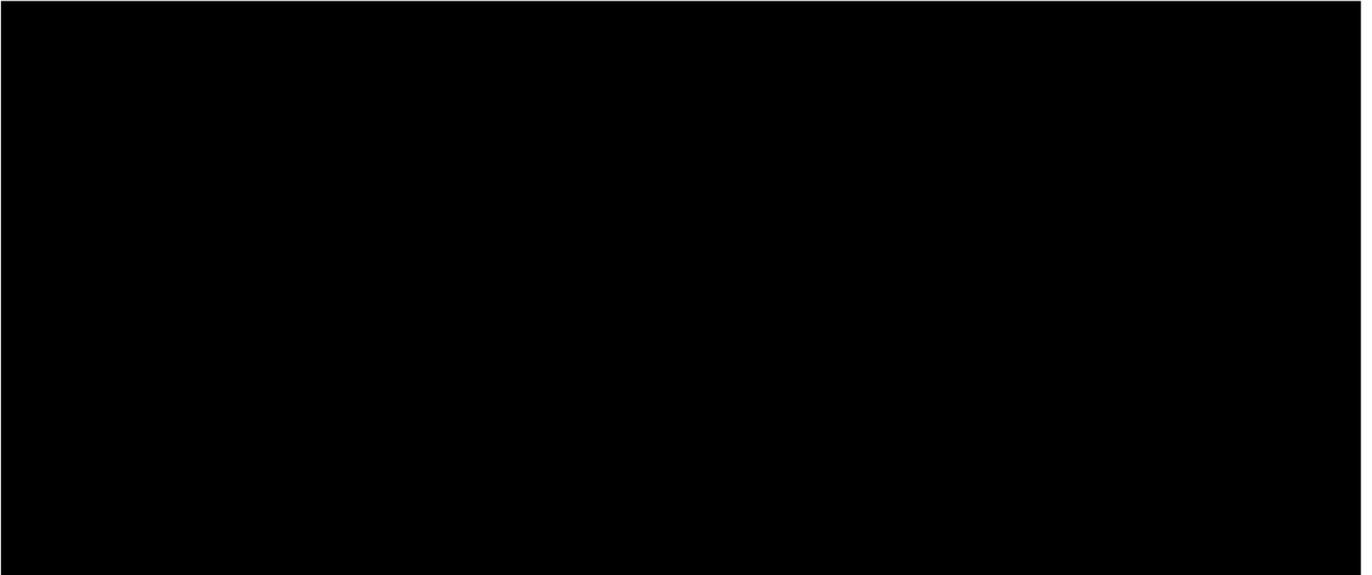
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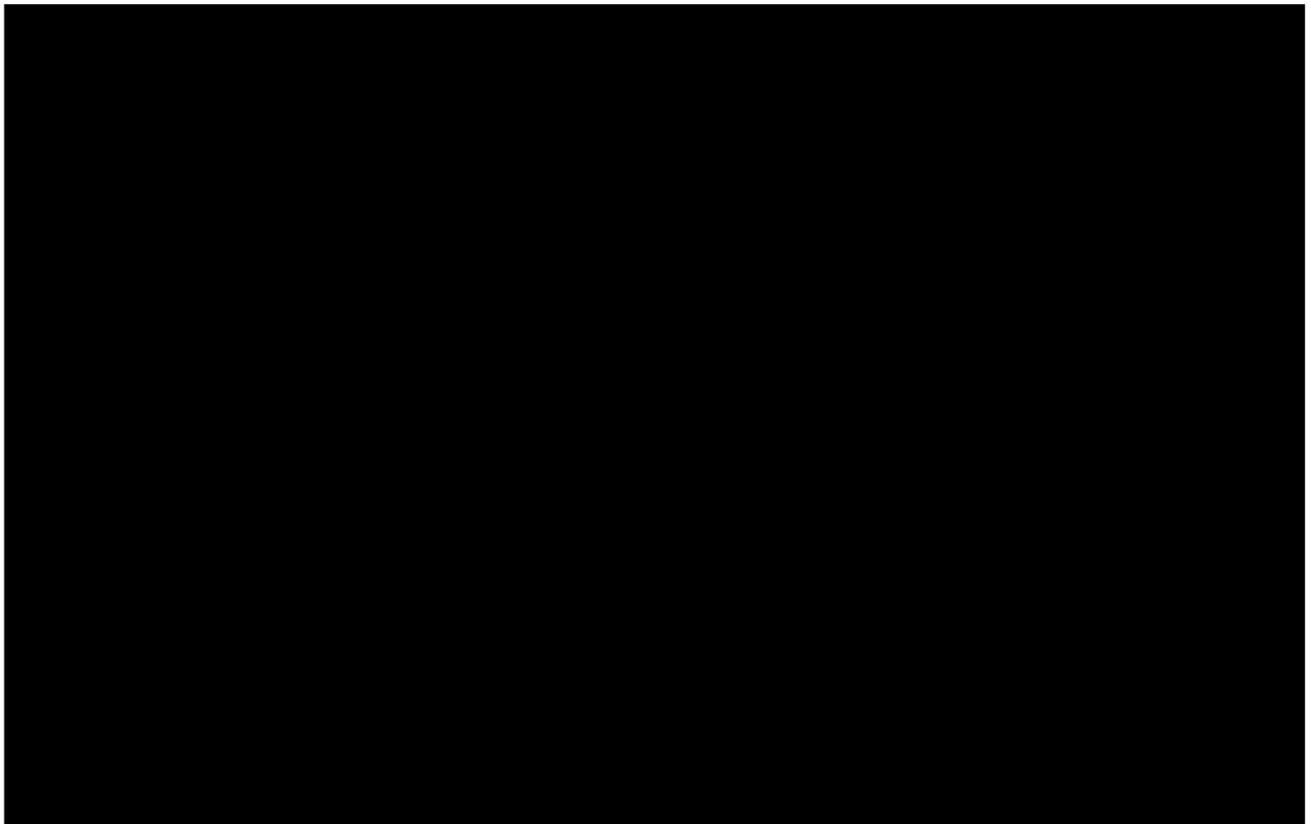
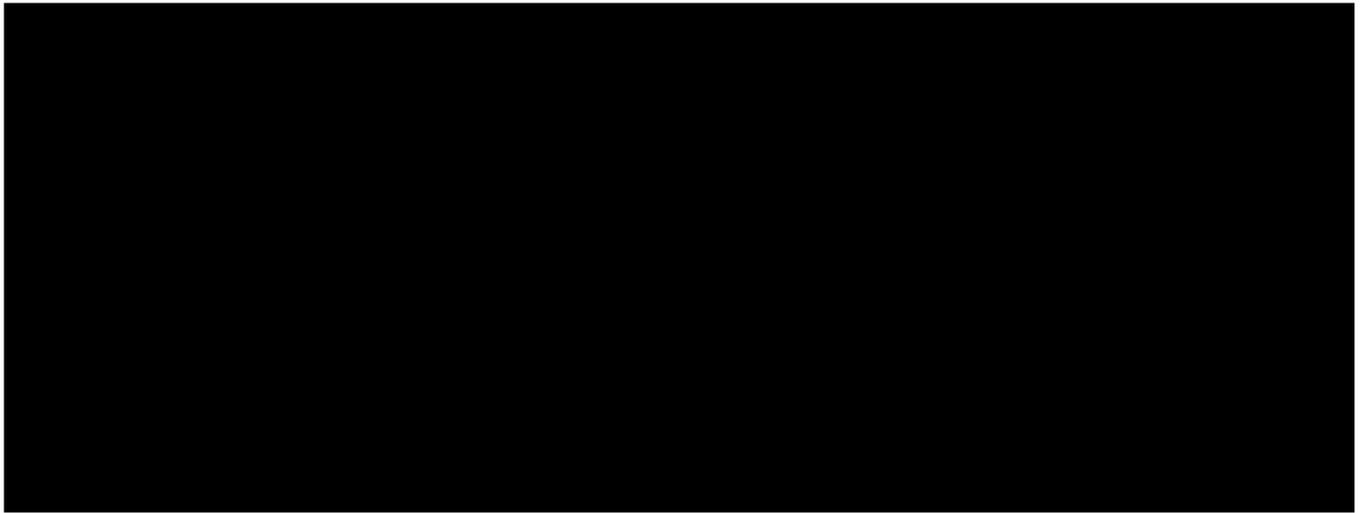


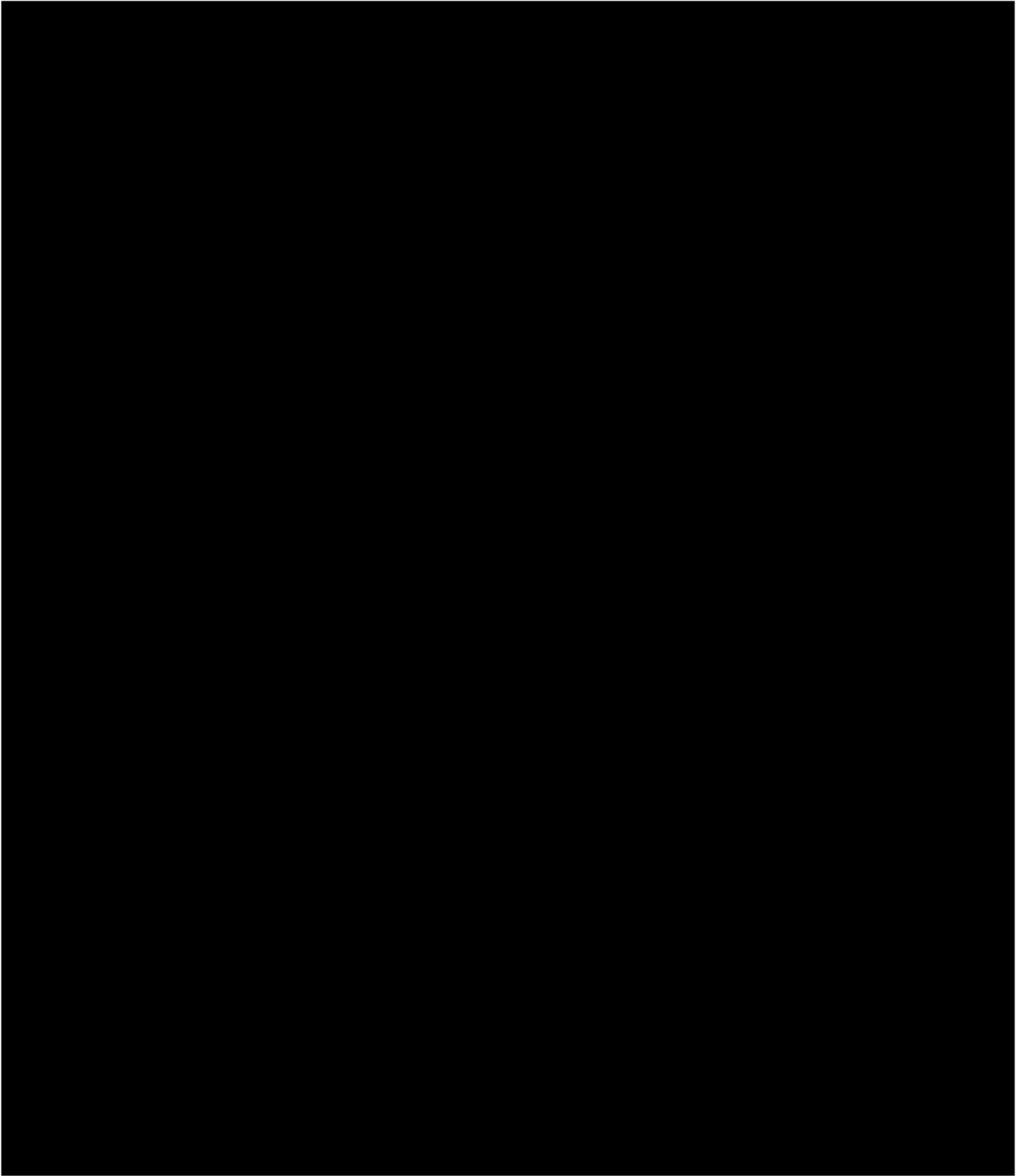


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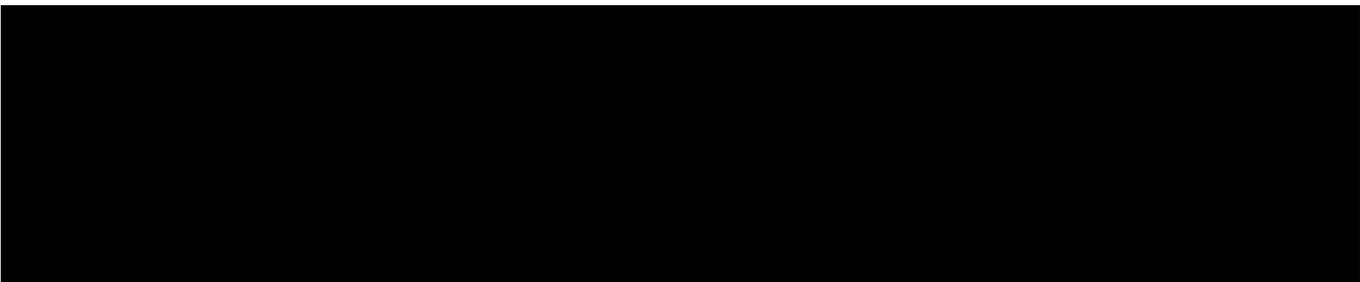
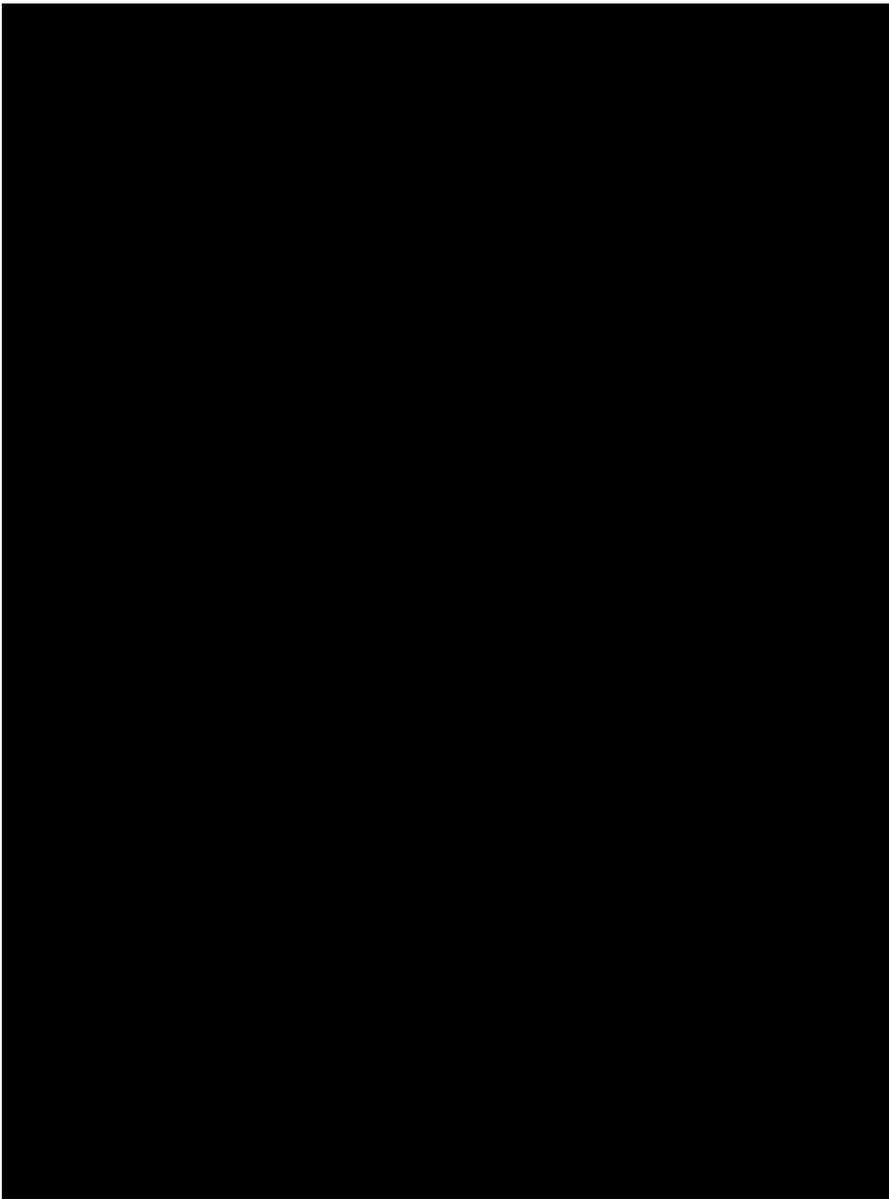


Diagram 1 - Tree Cleared Site with Stumps Left in Situ

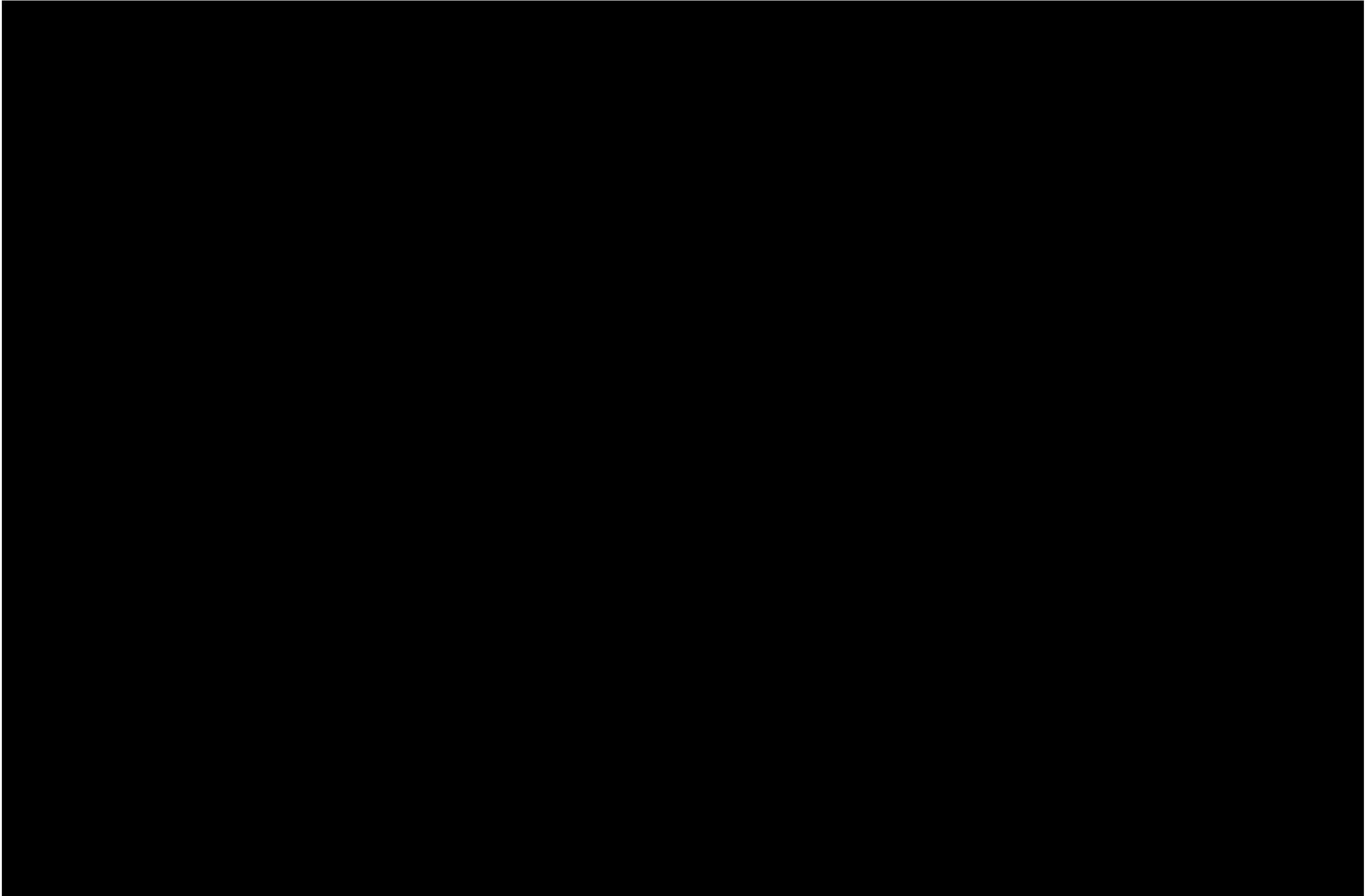


Diagram 2 – Proposed Line of Bunds

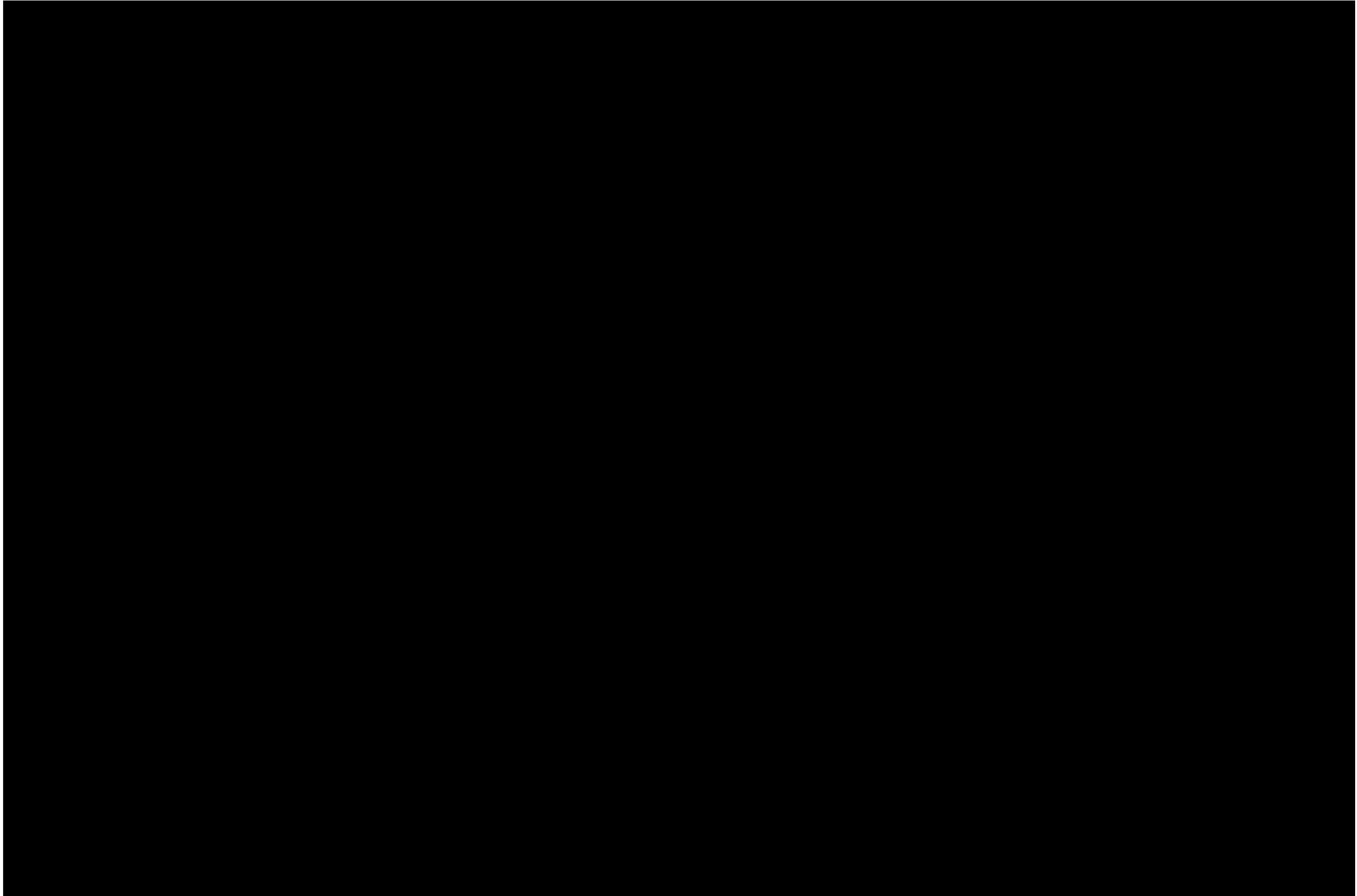


Diagram 3 – Stumps to be removed



Diagram 4 – Area after Stump Removal

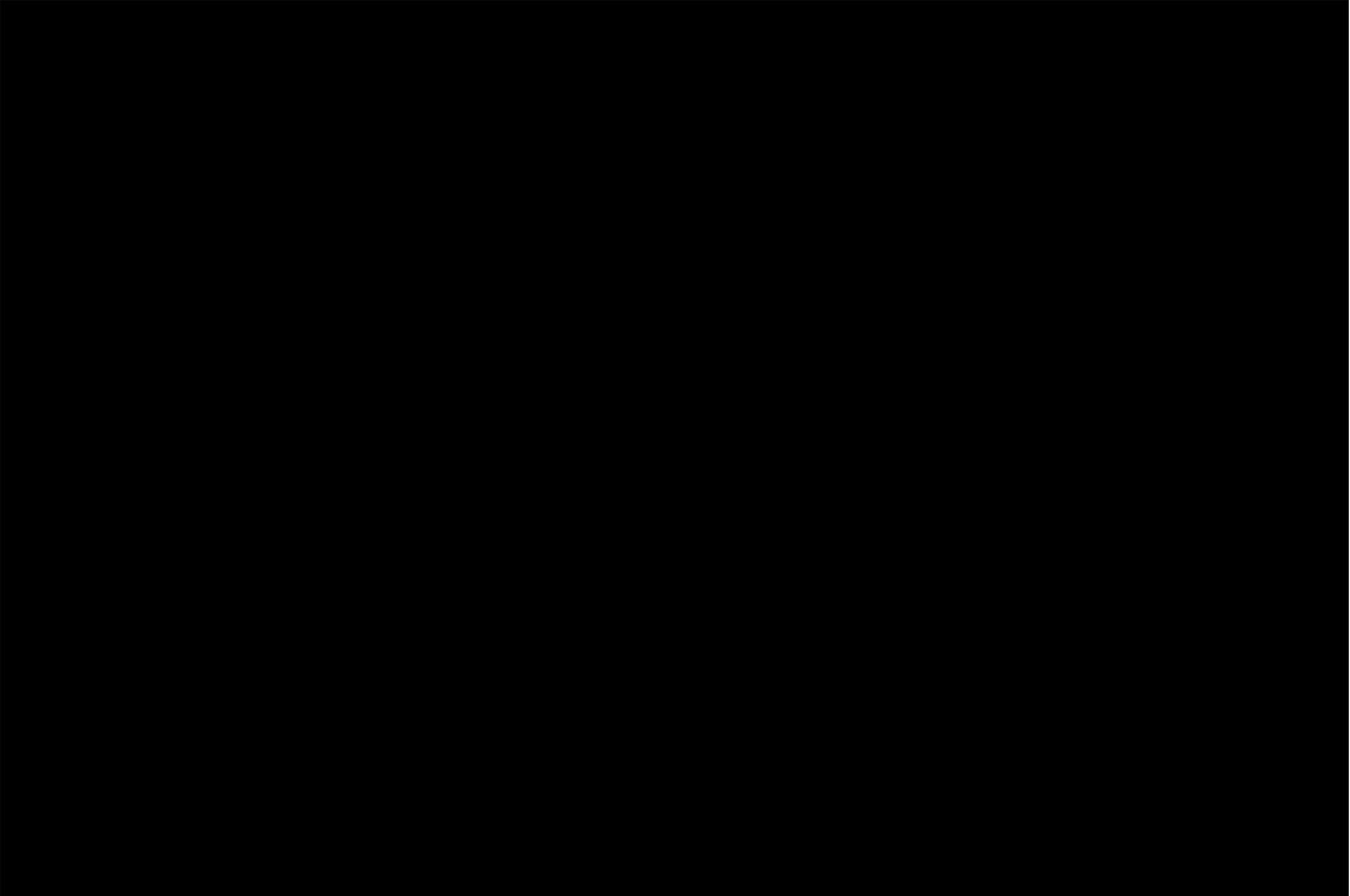
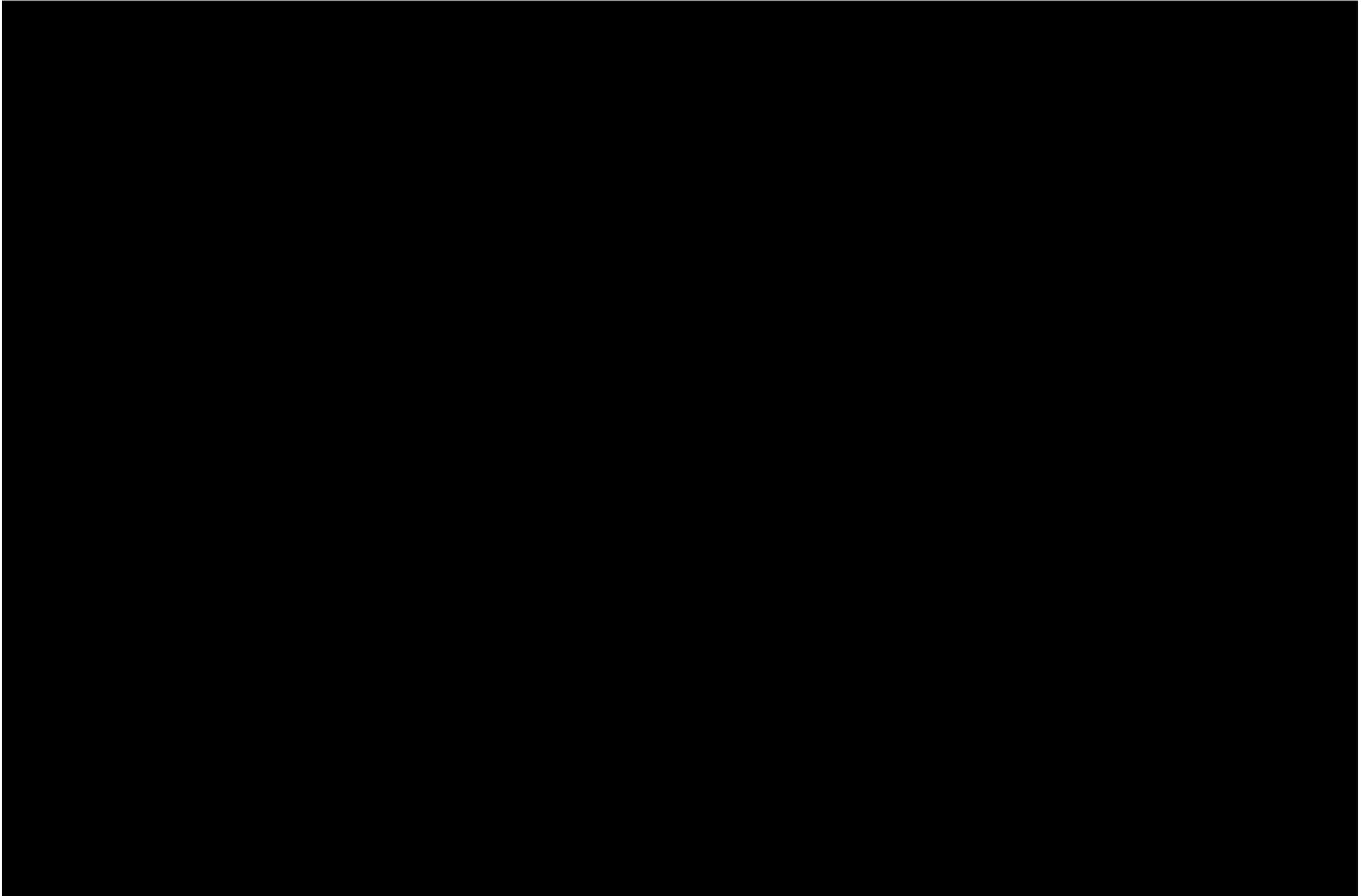


Diagram 5 – Area after Bunding



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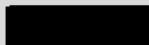
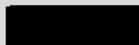
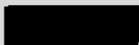
www.dinsdale.co.uk
E-mail: moorland@dinsdale.co.uk

[Redacted]

3. PRICE AND PAYMENTS

(3.1) Contract Total Fixed Price (GBP) payable by the Authority excluding VAT, payment profile and method of payment (e.g. BACS) - £112,155. As detailed below:

Costs:-				
Works	Unit/Area size	Cost /ha (this must not be more than the agreed maximum rate which were assessed as part of the framework tender)	Total (exc VAT)	Total (inc VAT)
Cell bunding and contour bunding with damming ditches and installation of balance pipes and through pipes and cutting of new drains– (sections 3.1 – 3.7 above)				
Section 38/23 Bog Surface (intact - Tree/scrub removal completed, 1-15 year old tree root plates) 2.3.3 20 x 20m cells	0.25 ha total 0.25ha			
Section 10, Whixall SW, and Sect 18.2SE, 18.3 & 47 Bog Surface (intact tree scrub removal completed, 16-80 year old tree root plates 7.5m apart) 2.3.7 20 x 10m cells 2.3.8 20 x 20m cells 2.3.9 30x30m cells 2.3.10 40x40m cells	13.64 ha total 2.26 ha 2.87 ha 6.13 ha 2.38 ha			
Section 10 and Section 1/29 Bog surface (cut over - tree/scrub removal complete 1- 15 year old tree root plate) 2.4.2 20 x 20m cells 2.4.3 30 x 30m cells 2.4.4 40 x 40m cells	8.254 ha total 0.357 ha 0.357 ha 7.54 ha			
Sect 38/23, Bettisfield S 19 and Bettisfield W Bog surface (cut over - tree/scrub removal complete 16- 80 year old tree root plate 7.5m apart) 2.4.6 20x10m cells 2.4.7 20 x 20m cells 2.4.8 30 x 30m cells 2.4.9 40x40m cells	3.39 ha total 0.61 ha 0.91 ha 1.01ha 0.86 ha			
Sect 1/29 Contour bunding Cut peat face	60 m total 60 m			

(straight sections), peat face re-profiling (0-1m) – 7no. 2.2.2 contour bunds				
Sect 10, 38/23 and Bettisfield Sect 19 Contour bunding Cut peat face (straight sections), peat face re-profiling (2-3m) – 9no. 2.2.4 contour bunds	623 m total 623 m			
Sect 18.2SE, 18.3 & 47 and sect 1/29 Cut peat face (undulating sections), peat face re-profiling (2-3m) – category used as high core bunds needed 2.2.8 High-core bunds bridging contours or cuttings – 16no.	220 m total 220 m			
Sect 10, 38/23, Whixall SW, Bettisfield S19, Bettisfield W & SW, Sect 18.2SE, 18.3 & 47 and Sect 1/29 Drains (drain damming), 1.5x1.5m 2.6.2 dams	130 no. total 130 dams			
Sect 10, 38/23, Whixall SW, Bettisfield S19, Bettisfield W & SW, Sect 18.2SE, 18.3 & 47 and Sect 1/29 Balance pipes 300mm I.D.in dams/bunds Out of scope	67 no. total 67 U-pipes			
Bettisfield SW Bog surface (cut over - tree/scrub removal complete 16- 80 year old tree root plate 7.5m apart). Bunds as 2.4.6 but to 2m depth, 20 x 10m cells Out of scope	1.76 ha total 1.76ha			
Sect 10, 38/23 and Bettisfield W & SW New / Cleaned out Drain 1mx 1-2m Out of scope	227m total 227m			
Ancillary work	Section 4 above) Cost/ m			
Access track re-instatement – mineral tracks and mineral areas 2.7.8	100m			
Access track maintenance and make good – peat tracks Out of scope	400m.			

Access track re-instatement – peat tracks Out of scope	400m			
Sect 1/29 Track crossings over bunds Out of scope	47 no. totals 47 crossings			
Report and Photographic record (section 5 above) Out of scope	Cost/unit			
Bund/ dam location plotting (section 5 above) Out of scope	Cost/unit			
Total			£112,155.00	£134,586.00

(3.2) Invoicing and Payment

The Contractor shall issue invoices in arrears.

All work and reporting must be completed by end of February 2021 and must be invoiced on or before by 10th March 2021, with an interim invoice to be submitted by end of April 2020 for works completed up to the end of March 2020. However works should all preferably be completed and invoiced by end of December 2020.

The Supplier shall submit the invoice to the Authority at the following addresses:

Accounts-Payable.neg@sscl.gse.gov.uk or

Shared Services Connected Limited, Natural England, PO Box 793, Newport, Gwent, NP10 8FZ.

The invoice should clearly state the purchase order number and the reference “C7 (LIFE15/NAT/UK/000786 – Marches Mosses BogLIFE Project).

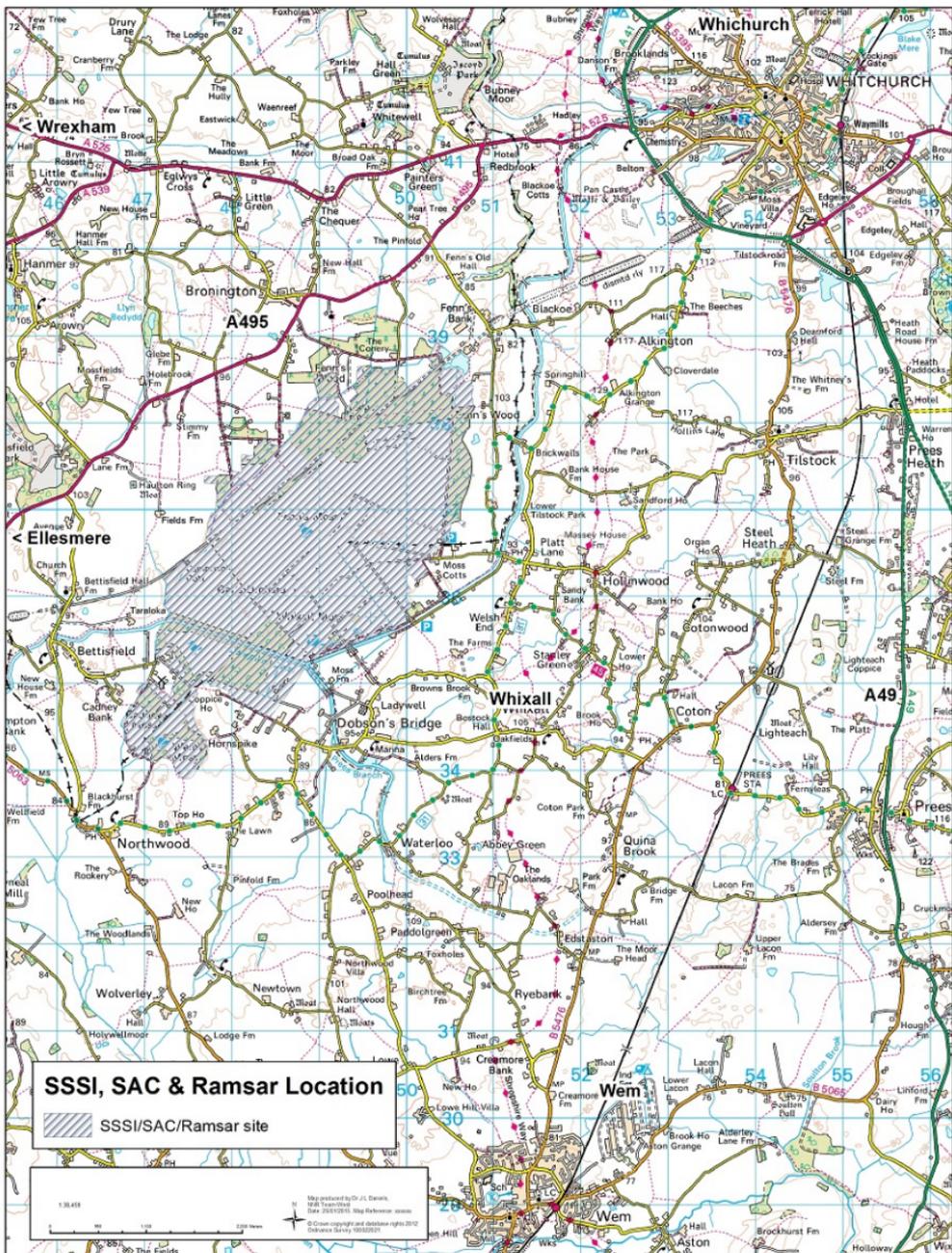
AGREEMENT BY ELECTRONIC SIGNATURE

Acceptance of the award of this contract will be made by electronic signature carried out in accordance with the 1999 EU Directive 99/93 (Community framework for electronic signatures) and the UK Electronic Communications Act 2000. Acceptance of the offer comprised in this Agreement must be made within [7] days from the date of this Award Letter and the Agreement is formed on the date on which the Contractor communicates acceptance on the Customer’s electronic contract management system (“Bravo”). No other form of acknowledgement will be accepted. Please remember to quote the reference number above in any future communications relating to this contract.

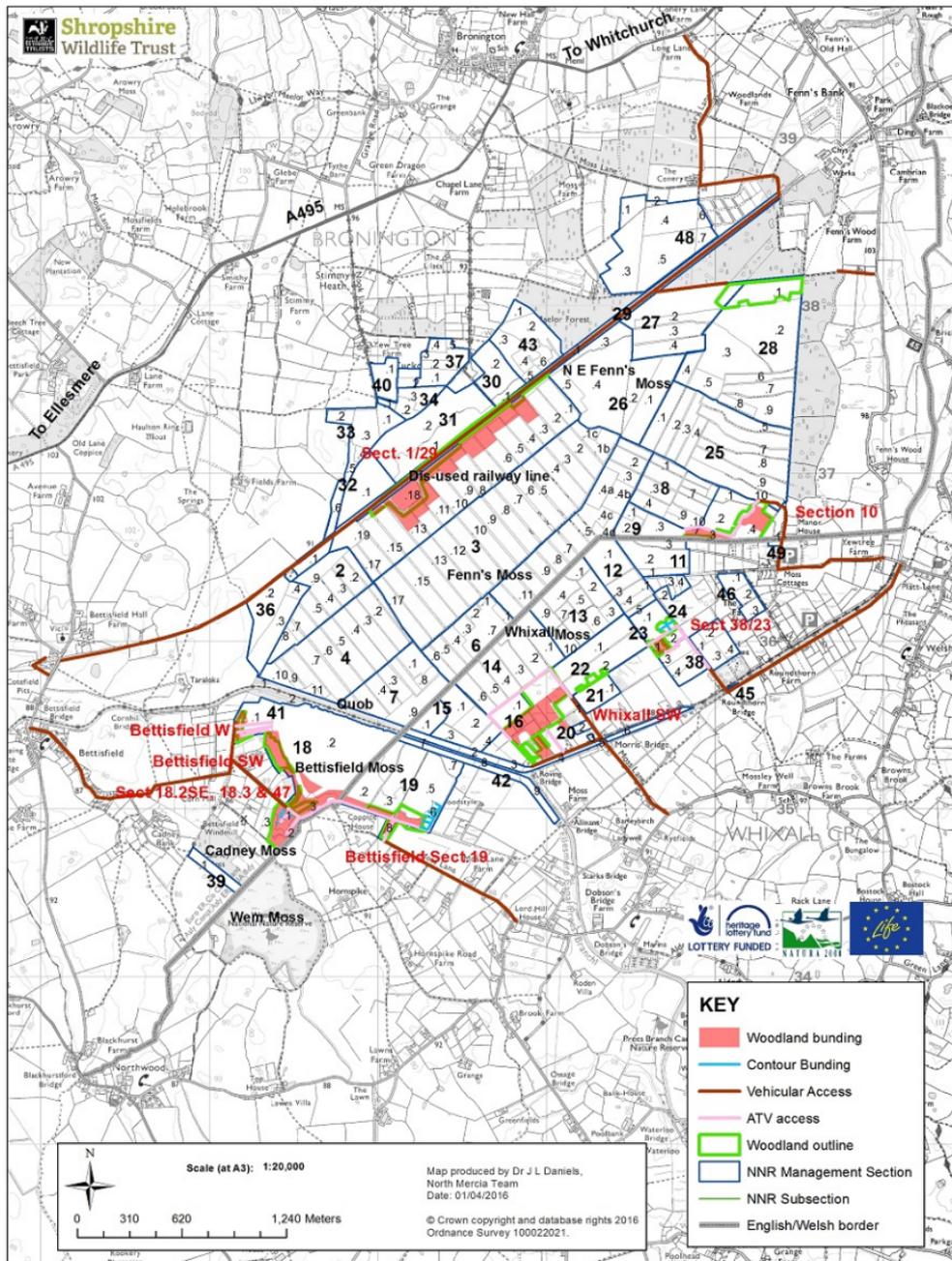
Map 1 Fenn's, Whixall, Bettisfield, Wem & Cadney Mosses Site of Special Scientific Interest Special Area of Conservation & Ramsar Sire



NATURAL ENGLAND



Map 2. ACTION C3 05 Cleared & Thinned Woodland Bunding Locations & Access



Map 3.1 C3 05 Fenn's Moss Sect 10 Bunding Cleared & Thinned Woodland
 Cell Bunding 2.4 ha, Contour Bunding 40m, New Drains 20m, 6 dams 1 balance pipe

Key

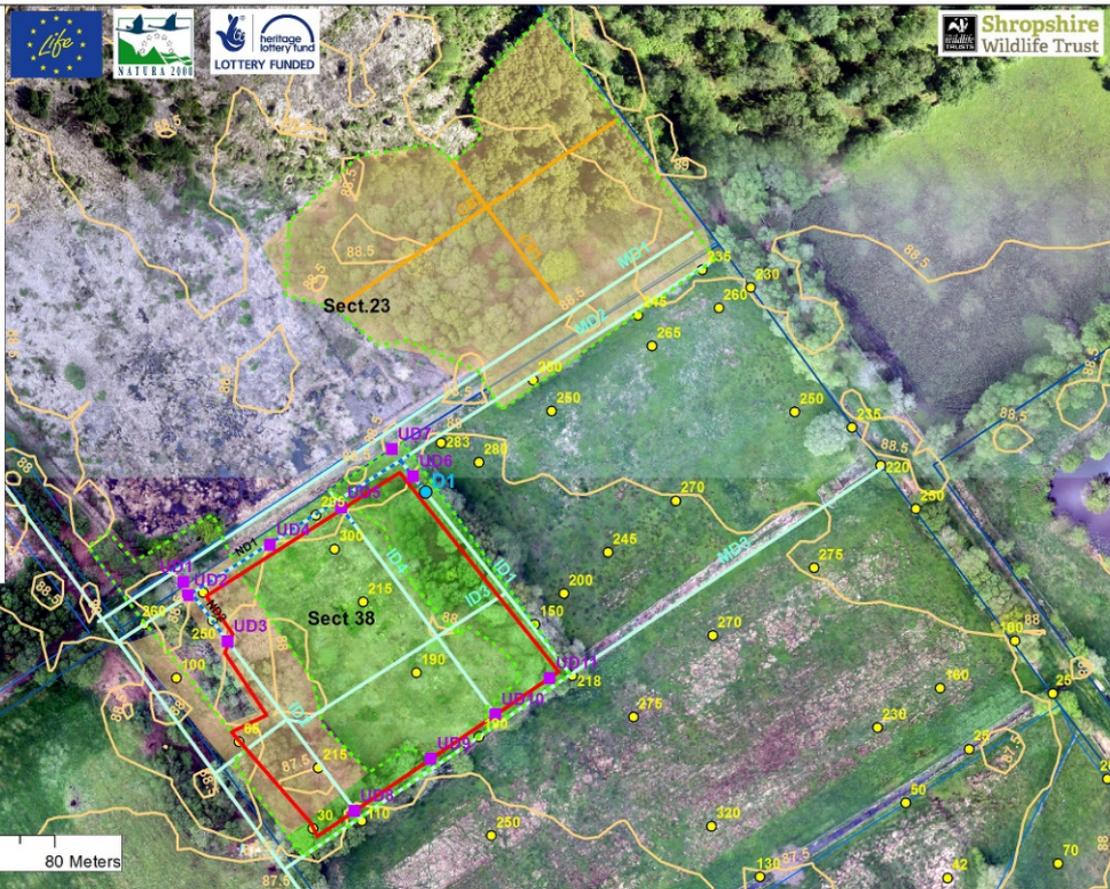
- Bunding areas
- Contour bunding
- New balance pipes
- New dams
- New drains
- Existing drains
- Peat depths
- 500mm Contours
- Woodland outline
- Clear-felled woodland
- Thinned woodland



Map 3.2 C3 05 Whixall Moss Sect 23 and 38 Cleared & Thinned Woodland and Scrub and Bog
Cell Bunding 0.57 ha, Contour Bunding 148m, New Drains 107 m, 1 dam and 11 balance pipes

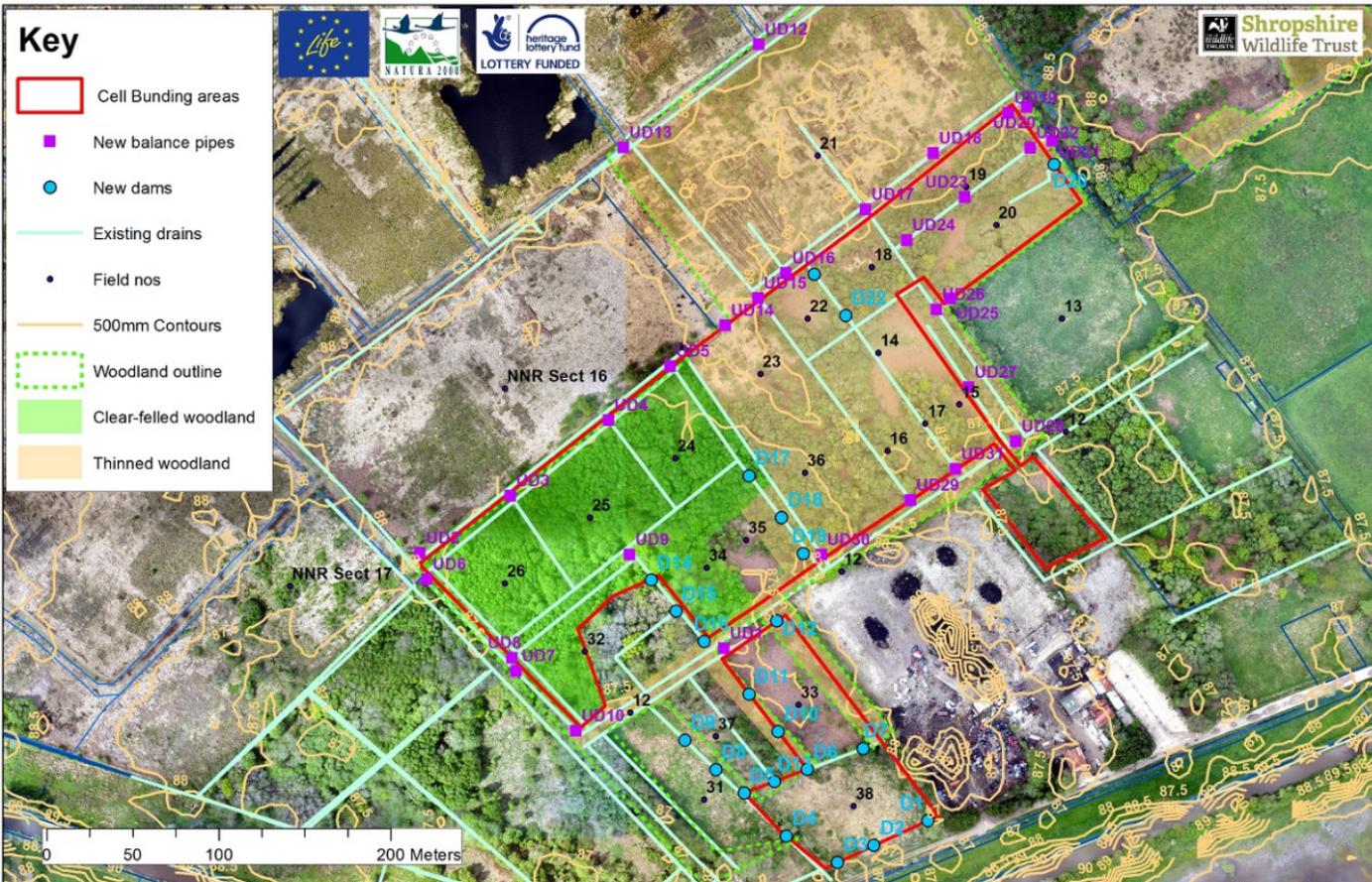
Key

- Bunding areas
- Contour bunding
- New balance pipes
- New dams
- New drains
- Existing drains
- Peat depths
- 500mm Contours
- Woodland outline
- Clear-felled woodland
- Thinned woodland

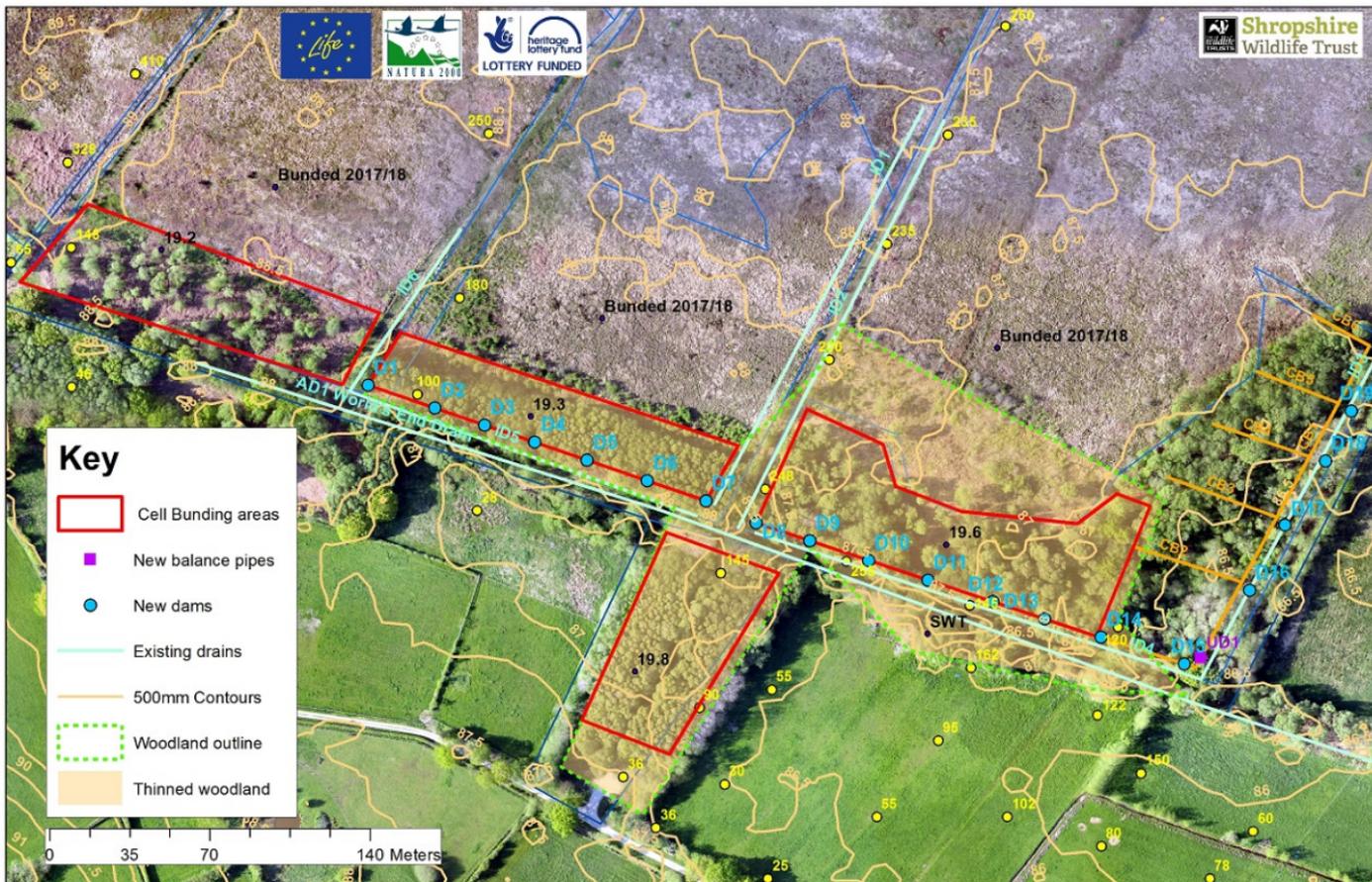


Map 3.3 C3 05 South-west Whixall Moss - Bunding of Cleared & Thinned Woodland/Scrub and fields

Cell Bunding 5.78 ha, with 43 dams and 31 balance pipes



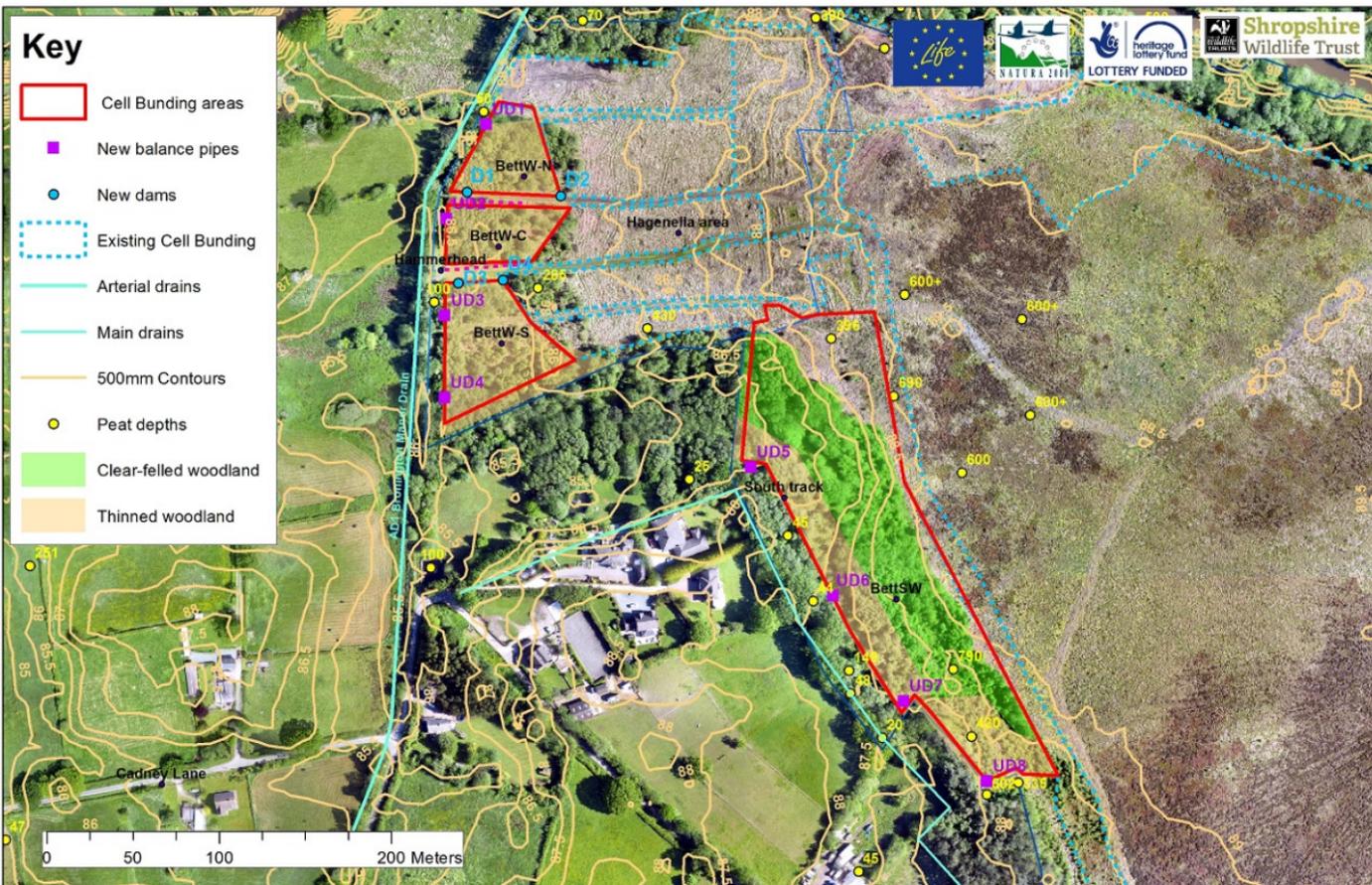
Map 3.4 C3 05 Bettisfield Moss Section 19 - Bunding of Thinned Woodland Cell Bunding 2.07 ha and 435m of contour bunding with 20 dams and 1 balance pipes



Map 3.5 C3 05 Bettisfield Moss Section 18 W and 18SW - Bunding of Thinned & Cleared Woodland Cell Bunding 2.75 ha with 100m new drains, 8 dams and 8 balance pipes

Key

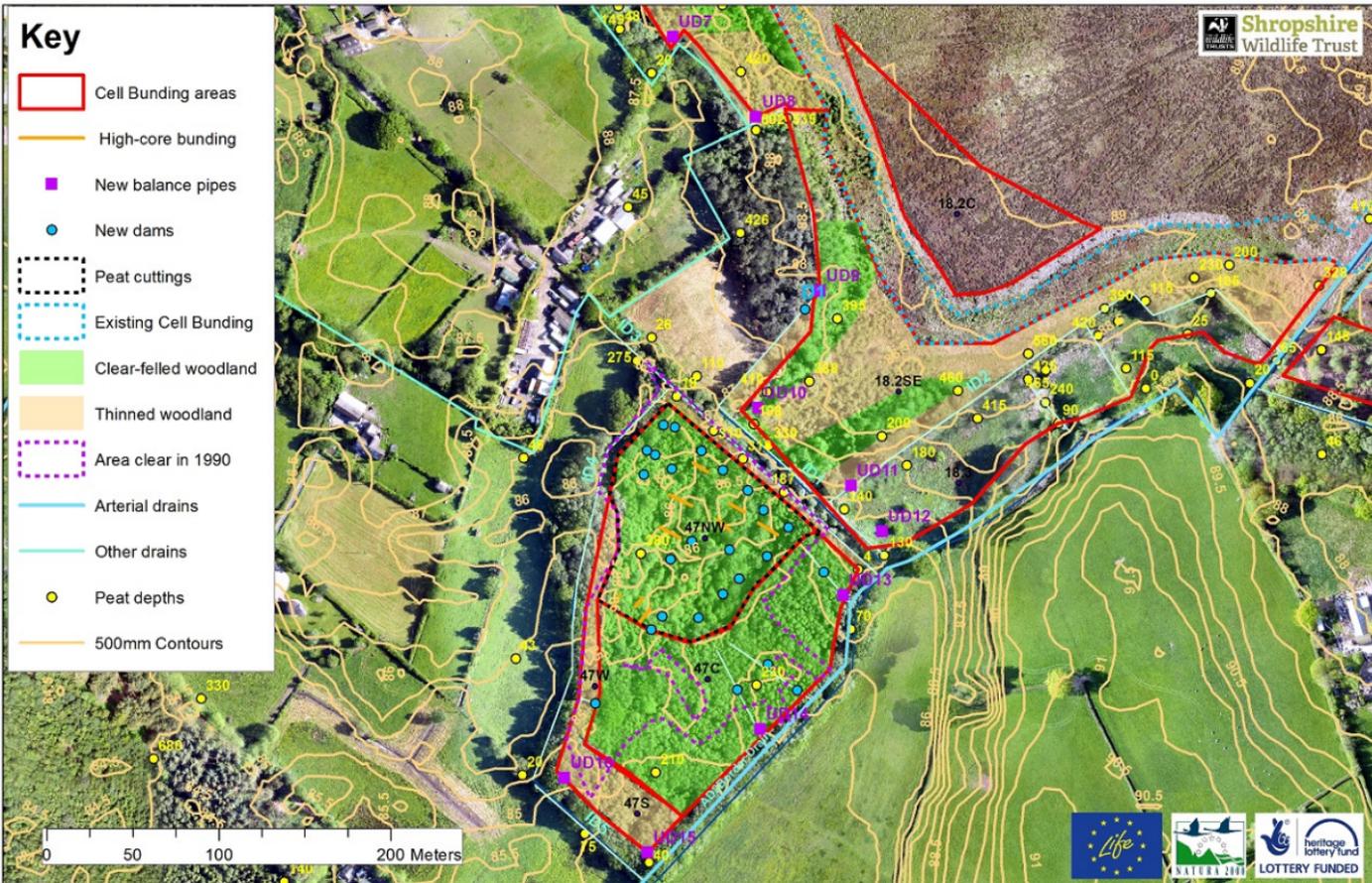
- Cell Bunding areas
- New balance pipes
- New dams
- Existing Cell Bunding
- Arterial drains
- Main drains
- 500mm Contours
- Peat depths
- Clear-felled woodland
- Thinned woodland



Map 3.6 C3 05 Bettisfield Moss Section 18.2 SE, 18.3 & 47 - Bunding Thinned & Cleared Wood & Fields
 Cell Bunding 6.11 ha with 100mhigh-core bunds, 35 dams and 8 balance pipes

Key

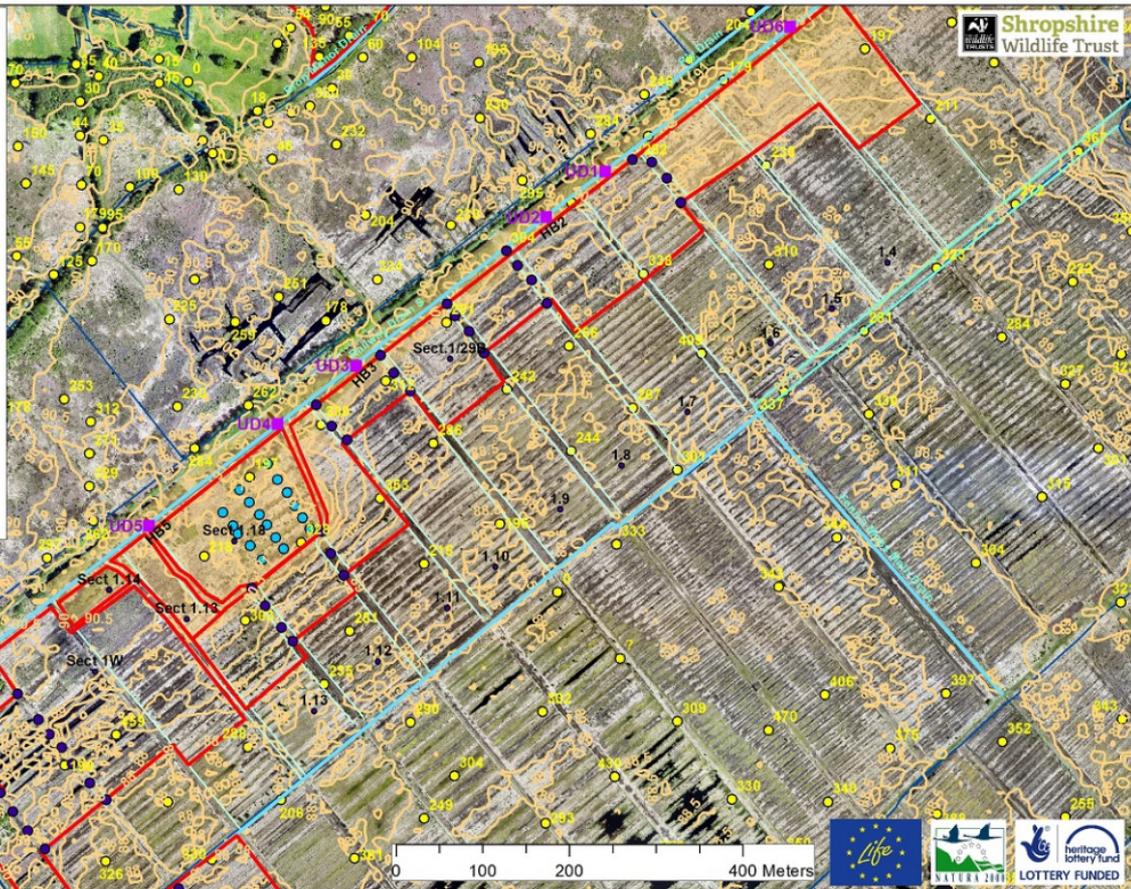
- Cell Bunding areas
- High-core bunding
- New balance pipes
- New dams
- Peat cuttings
- Existing Cell Bunding
- Clear-felled woodland
- Thinned woodland
- Area clear in 1990
- Arterial drains
- Other drains
- Peat depths
- 500mm Contours



Map 3.7 C3 05 Fenn's Moss S.1.W,1.13,1.14,1.18 & 1/29 - Bunding Thinned Wood, Scrub & Open Moss Cell Bunding 18.85 ha with 140m high-core bunds, 17 dams, 7 balance pipes and 36 track crossings

Key

-  Cell Bunding areas
-  High-core bunding
-  New balance pipes
-  New dams
-  Track crossings
-  Arterial drains
-  Other drains
-  Peat depths
-  500mm Contours
-  Thinned woodland



**Annex 4 – C3 Cell and Contour Bunding Woodlands and Open Moss – 202021.
Ground conditions, Areas, Peat Depths and Topography**

Site	Area ha/dist.	Type	Current vegetation	Ground conditions	Peat depths m
Section 10	2.48	N- intact S - Cutover	N – bare or Birch trees S- Dry mire – bracken, Molinia	N- Dry S – dry baulks, damp cuttings	SE corner<0.3m. N Area - 0.5m – 1.25m. S Area - 0.98m – 2.48m
Section 23/38 NW	0.57	S23 – cutover S38 – intact and cutover	S23 birch & willow carr S38 birch & oak wood and Molinia mire	S23 – wet S38 – dry with damp cuttings	1.9m- 3.0m apart from 0.3-1.0m near Main drain
SW Whixall	5.78	Intact drained	Overgrown fields, drain-side trees and birch and willow woodland	NW – wet most dry	3.0m+ -1.5m from N to S
Bettisfield Sect. 19 (English)	1.53	Cutover	Partly cleared birch woodland on Molinia mire	Dry	1.2 -2.48 m
Bettisfield W and SW	2.75	Cutover	Partly-cleared Birch woodland and scrub with heather/ Molinia	Dry on slopes Bett W-S can be flooded	Bett W - east 2.85 m to 0.5 m in the west. Bett SW - plateau 7.9m to 0.5m nr. S edge.
Bettisfield 18.2SE, 18.3 and 47	6.11	Intact. S47 centre cutover	Birch woodland and fields	S18.2 damp S18.3 & 47 dry	S 18.2 (1m) 2.0m to 4.0m S.18.3 1.0m - 1.3m to 0m S.47 3.8 – 2.0m to 0.5m round edge
Section 1/29 (part)	18.85	Cutover commercial cuttings	Open dammed mossland with Molinia/ bracken on baulks and mire in cuttings	Dry on slopes , wet in cuttings	Generally all 2.0 to 3.5m, rarely to 4.5m depth, deeper in the north and shallower in the east