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Request for Quotation

## Peat Dam Adjustment and Peat Bunding on 22.4ha and upto approx. 6300 m in length covering NNR Management Sections 6 and 14 at Fenn’s, Whixall and Bettisfield Mosses National Nature Reserve, Shropshire

## Action C4

## Marches Mosses BogLIFE Project (LIFE15/NAT/UK/000786)

## Request for Quotation

**Peat Dam Adjustment and Peat Bunding on 22.4 ha (up to approx.6300 m) covering NNR Management Sections 6 and 14 at Fenn’s, Whixall and Bettisfield Mosses National Nature Reserve, Shropshire**

You are invited to submit a quotation for the requirement described in the specification below Appendix 1.

Please confirm, by email, receipt of these documents and whether you intend to submit a quote.

Your response should be returned to the following email address by:

Email:Robert.duff@naturalengland.org.uk

Date:09 August

Time: 15:00

Ensure you state the reference number and ‘**Final Submission’** in the subject field to make it clear that it is your response.

**Contact Details and Timeline**

Robert Duff will be your contact for any questions linked to the content of the quote pack or the process. Please submit any questions by email and note that, unless commercially sensitive, both the question and the response will be circulated to all tenderers.

|  |  |
| --- | --- |
| Action | Date |
| Date of issue of RFQ | 28-07-2022 at 09:00 BST / GMT |
| Deadline for clarifications questions | 08-08-2022 at 17:00 BST / GMT |
| Deadline for receipt of Quotation | 10-08-2022 at 15:00 BST / GMT |
| Intended date of Contract Award | 11-08-2022 |
| Intended Contract Start Date | 15-08-2022 |
| Intended Completion Date / Contract Duration  | 30-09-2022 |

### A site visit to view areas is possible by arrangement with Project Officer Robert Duff T 07970 286444 or Robert.duff@naturalengland.org.uk

### Glossary

Unless the context otherwise requires the following words and expressions used within this Request for Quotation shall have the following meanings (to be interpreted in the singular or plural as the context requires):

|  |  |
| --- | --- |
| “Authority” | Means the Department for Environment, Food and Rural Affairs acting as part of Natural England |
| “RFQ” | Means this Request for Quotation and all related documents published by the Authority and made available to suppliers |
| “Contract” | Means the contract to be entered into by the Authority and the successful supplier. |

### Conditions applying to the RFQ

You should examine your response to the RFQ and related documents ensuring it is complete prior to submitting your completed quotation.

Your quotation must contain sufficient information to enable the Authority to evaluate it fairly and effectively. You should ensure that you have prepared your quotation fully and accurately and that prices quoted are arithmetically correct for the units stated.

The supplier by submitting a quotation is deemed to accept the terms and conditions in the RFQ. Failure to comply with the instructions set out in the RTQ may result in the supplier’s exclusion from this procurement.

### Acceptance of Quotations

By issuing this RFQ the Authority does not bind itself to accept any quotation and reserves the right not to award a contract to any supplier who submits a quotation.

#### Costs

The Authority will not reimburse you for any costs and expenses which you incur preparing and submitting your quotation, even if the Authority amends or terminates the procurement process.

#### Mandatory Requirements

The RFQ includes mandatory requirements and, if you do not comply with them, your quotation will not be evaluated. All mandatory requirements are set out in Bravo.

#### Clarifications

The Authority reserves the right to discuss, confidentially, any aspect of your quotation with you prior to any award of Contract to clarify matters.

#### Amendments

The Authority may amend the RFQ at any time prior to the deadline for receipt. If it amends the RFQ the Authority will notify you in writing and may extend the deadline for receipt in order to give you a reasonable time in which to take the amendment into account.

#### Conditions of Contract

The terms and conditions Condensed Terms and Conditions can be found here <https://www.gov.uk/government/organisations/natural-england/about/procurement>

The Authority will not accept any material changes to these terms and conditions proposed by a supplier.

#### Specification

The Authority is Natural England. The Authority’s priorities are to secure a healthy natural environment; a sustainable, low-carbon economy; a thriving farming sector and a sustainable, healthy and secure food supply. Further information about the Authority can be found at: [Natural England](http://www.naturalengland.org.uk/)

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| **Appendix 1 below contains the Specification. Supporting plans are attached separately.**  |

It is anticipated that this contract will be awarded for a period of 6 weeks to end no later than

30/09/2022. Prices will remain fixed for the duration of the contract award period. We may at our sole discretion extend this contract to include related or further work. Any extension shall be agreed in advance of any work commencing and may be subject to further competition.

**Quotation Submission**

We will award this contract in line with the most economically advantageous tender (MEAT) as set out in the following award criteria:

Price – 40%

Quality – 60%

**Prices**

Prices must be submitted in £ sterling, inclusive of VAT.

**Pricing schedule**:

**Please complete and return the attached schedule entering your prices**: Natural England reserve the right to award all or some of the items on the pricing schedule.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| Work Item | **Number/ length (m)**  | **Price in £ (excluding VAT)** | **Price in £ PLUS VAT** |
| 1. Section 6: 3.1 ha
 |  |  |
| New U-pipes (install only)  | 6  |  |  |  |
| Extend U-pipes | 18 (option tbc) |  |  |  |
| Contour Bunding Approximate Length | 5no lengths, 1050 m  |  |  |  |
|  |  |  |  |  |
| 1. Section 14: 19.3 ha
 |  |  |
| New U-pipes - price to install only | 56 |  |  |  |
| Unit price\* - New U-pipes price to install x 1 |  |  |  |  |
| 1. Contour Bunding Approximate Length
 | Upto 2794\* m,  |  |  |  |
| B. Contour Bunding Approximate Length | 2500\* m |  |  |  |
| 3: Possible Contingency Work -additional bunding  |  |  |
| Additional contour bunding  | **Per 100m** |  |  |  |

**\* Natural England retains the option to include only part of Section 14 bunding in the contract award.**

The following quality criteria are weighted in accordance with the importance and relevance attached to each one.

|  |
| --- |
| **Technical - (weighting 60% of overall score)** |
| **Evaluation Criteria 1– 50%-** **Methodology** |
| * Timescale and Capacity:
	+ Proposed start date
	+ Number of excavators to be used and number of experienced drivers
* Equipment to be used including modifications for working on this site and site specific considerations including risk assessment; and what precautions will be taken to minimise damage to the bog.
* If you are sub-contracting please provide details of the company and their equipment.
* Any proposed amendments/ modifications to the specification.
 |
| **Evaluation Criteria 2– 40%-** **Work force** |
| * Please provide information on the workforce that is most likely to undertake the work. This can include brief CVs of individuals including training and experience.
* Please provide details of past experience of construction of linear contour bunds, high-core contour bunds, dams and balance pipes on other lowland raised bogs.

If you are sub-contracting please provide details of the company, the managers and on site operators (including brief CVs) |
| **Evaluation Criteria 3 – 10%- Health & safety** |
| Please provide a site specific emergency plan for this site.Please provide details of the pollution prevention measures you would put in place during operationsPlease describe how you will coordinate matters relating to project design health and safety particularly referencing co-ordination with the designated CDM co-ordinator. |

|  |  |
| --- | --- |
| **Score** | **Justification** |
| For a score of hundred (100):   | Excellent - Response is completely relevant and excellent overall.  The response is comprehensive, unambiguous and demonstrates a thorough understanding of the requirement and provides details of how the requirement will be met in full. |
| For a score of seventy (70):   | Good - Response is relevant and good.  The response demonstrates a good understanding and provides details on how the requirements will be fulfilled.  |
| For a score of fifty (50):   | Acceptable - Response is relevant and acceptable.  The response provides sufficient evidence to fulfil basic requirements. |
| For a score of twenty (20):   | Poor - Response is partially relevant and/or poor.  The response addresses some elements of the requirements but contains insufficient / limited detail or explanation to demonstrate how the requirement will be fulfilled. |
| For a score of zero (0):   | Unacceptable - Nil or inadequate response.  Fails to demonstrate an ability to meet the requirement. |

**Contract Management**

This contract shall be managed on behalf of the Authority by Robert Duff Robert.duff@naturalengland.org.uk Tel 07970 286444.

The contract will be managed and directed in the field by Nathan Brake and Ellie Williams. Other contract matters should be sent to Robert Duff. A start up meeting will be held with Ellie and/or Nathan and the contractor. Thereafter day to day and weekly liaison will be undertaken as necessary.

The contractor will be expected to provide estimated bunding length details on a regular basis as agreed with the project officer to monitor progress.

We will raise purchase orders to cover the cost of the services and will issue to the awarded supplier following contract award.

Unless otherwise agreed, upon completion of the work an invoice may be submitted for payment.

### Disclosure

All Central Government Departments, their Executive Agencies and Non Departmental Public Bodies are subject to control and reporting within Government. In particular, they report to the Cabinet Office and HM Treasury for all expenditure. Further the Cabinet Office has a cross-Government role delivering overall Government policy on public procurement, including ensuring value for money and related aspects of good procurement practice.

For these purposes, the Authority may disclose within Government any details contained in your quotation. The information will not be disclosed outside Government during the procurement.

In addition, the Authority is subject to the Freedom of Information Act 2000 and the Environmental Information Regulations 2004, which provide a public right of access to information held by public bodies. In accordance with these two statutes, the Authority may be required to disclose information contained in your quotation to any person who submits a request for information pursuant to those statutes.

By submitting a quotation, you consent to these terms as part of the procurement.

### Disclaimers

Whilst the information in this RFQ and any supporting information referred to herein or provided to you by the Authority have been prepared in good faith the Authority does not warrant that this information is comprehensive or that it has been independently verified.

The Authority does not:

* make any representation or warranty (express or implied) as to the accuracy, reasonableness or completeness of the RFQ;
* accept any liability for the information contained in the RFQ or for the fairness, accuracy or completeness of that information; or
* accept any liability for any loss or damage (other than in respect of fraudulent misrepresentation or any other liability which cannot lawfully be excluded) arising as a result of reliance on such information or any subsequent communication.

Any supplier considering entering into contractual relationships with the Authority following receipt of the RFQ should make its own investigations and independent assessment of the Authority and its requirements for the goods and/or services and should seek its own professional financial and legal advice.

**Protection of Personal Data**

In order to comply with the General Data Protection Regulations 2018 the contractor must agree to the following:

* You must only process any personal data in strict accordance with instructions from the Authority
* You must ensure that all the personal data that we disclose to you or you collect on our behalf under this agreement are kept confidential.
* You must take reasonable steps to ensure the reliability of employees who have access to personal data.
* Only employees who may be required to assist in meeting the obligations under this agreement may have access to the personal data.
* Any disclosure of personal data must be made in confidence and extend only so far as that which is specifically necessary for the purposes of this agreement.
* You must ensure that there are appropriate security measures in place to safeguard against any unauthorised access or unlawful processing or accidental loss, destruction or damage or disclosure of the personal data.
* On termination of this agreement, for whatever reason, the personal data must be returned to us promptly and safely, together with all copies in your possession or control.

**General Data Protection Regulations 2018**

For the purposes of the Regulations the Authority is the data processor.

The personal information that we have asked you provide on individuals (data subjects) that will be working for you on this contract will be used in compiling the tender list and in assessing your offer. If you are unsuccessful the information will be **held and destroyed within two years** of the award of contracts. If you are awarded a contract it will be retained for the duration of the contract and destroyed within **seven years** of the contract’s expiry.

We may monitor the performance of the individuals during the execution of the contract, and the results of our monitoring, together with the information that you have provided, will be used in determining what work is allocated under the contract, and in any renewal of the contract or in the award of future contracts of a similar nature. The information will not be disclosed to anyone outside the Authority without the consent of the data subject, unless the Authority is required by law to make such disclosures.

**Appendix 1**

**Specification of Work**

**Fenn’s, Whixall and Bettisfield Mosses National Nature Reserve**

**Peat Dam Adjustment and Peat Bunding on 22.4 ha**

**(upto approx. 6344 m)**
including the detailed specifications

**Action C4**

**NNR Management Sections 6 and 14.
Marches Mosses BogLIFE Project (LIFE15/NAT/UK/000786)**

**Contents:**

* Background
* Site Location/ Access
* Task
* Work Area Details

**Attachments:**

* 1.1: Location Map
* 1.2: NNR Management Sections
* 2.0: Work Areas and Access
* 2.1 Dam Adjustment Area Generalised Contours
* 3.1.0: Whixall Moss “Second-fix” contract area
* 3.2.2: Section 14 detailed Works map
* 3.2.8: Section 6 detailed Works map
* 4.0: Example Risk Assessments including Site Hazard Assessment
* **General**

The Authority is looking for suppliers to carry out up to 6300 m appox of contour peat bunds split into over 61 lengths. This will be done with a combination of:

* U-pipe installation in minor arterial drains and through bunds – up to 61 new pipes
* Extending existing pipes – 18 possibly -to be confirmed
* access ramp provision over bunds - 1

The aim of the “Second-fix” works is to raise water levels in previously dammed areas, to amalgamate the hydrology of the complex and sensitive network of hand cuts and peat cutting flats on **22.4 ha** of Fenn’s and Whixall Moss, while retaining some access routes.

All work must be completed and invoiced for by 1 October 2022 to align with the closure of the BogLIFE Project. Intended start date is after 15 August 2022.

1. **Background**

This work is being carried out as part of the Marches Mosses BogLIFE Project (LIFE15 NAT/UK/000786). The BogLIFE project is a six-year project started in October 2016 and due for completion by 31 December 2022. The project aims to restore Britain’s 3rd largest lowland raised peat-bog, comprised of the complex of Fenn’s, Whixall & Bettisfield Mosses NNR’s and Wem Moss LNR all located near Whitchurch, Shropshire and Wrexham in Wales, in total approaching 1000ha (see Annex 1.1). The NNR sections and subsections are shown on Annex 1.2.

1. **Site Location/ Access**

The sites of the Works all lie in Fenn's, Whixall & Bettisfield Mosses National Nature Reserve, designated a Special Area of Conservation, a Site of Special Scientific Interest and listed in the Ramsar Convention, located four miles south-west of Whitchurch (Shropshire). Access to the work is shown on **Annex 2.** Different sections of the works should be accessed by different routes as described below.

Access for plant to **Sections 6 and 14** (**Annex 1.2**) on Whixall Moss will be from the Moss Cottages as shown on **Annex 2**.

The weight limit on the Canal bridge at Morris’s Bridge (**Annex 1.2**) and at Platt Lane (Annex 2) mean all plant transport must arrive from the A495 Ellesmere to Whitchurch Road, leaving it at SJ5026 4006, signed Fenn’s NNR and Whixall. Plant can be unloaded at the Manor House NNR Base (SJ505 366) or at the road junction west of the Moss Cottages.
Vehicles can be parked at Manor House or just west of the NNR gate to the west of Farm Five (on the dashed track north of The Fields Farm shown on Annex 2. Alternatively, it can be parked at Morris’s Bridge NNR Car Park.
ATV’s can use the tracks from parking areas shown on Annex 2.

Access for plant onto section 14 will be from the south. Along those ATV tracks along the small tracks shown on Annex 2.

Access to **section 6** -The Main access track lies along the west between section 3 and 4 and 6 and 7. There is a track along the north between section 6 and 3 which gives access, and another along the South between sections 6 and 14. On section 6 the contractor MUST NOT ACCESS along the N-S tracks between each subsection as these have already been Visqueen bunded, and also must not track on the already-bunded uncut section 6.7. The track along the south of section 6 is very narrow and unstable and should not be tracked on east of section 6.5.

The Mosses Trails and History Trail concessionary paths are shown in yellow on **Annex 2**. Contractors should be careful not to block or damage these as they are used by the public including dog-walkers, NNR staff/volunteers and other contractors, including machinery at times. Plant should leave them to get onto the Work Area as soon as possible and minimise tracking on them.

Most access points are through locked gates, keys to which will be provided to the successful contractor but these must be returned on completion of the contract. Special attention is drawn to the need for social distancing to be maintained with regard to any passers-by in line with the latest COVID-19 Government guidelines.

**C. Site Topography**

The installation of the Oaf’s Orchard Arterial Drain between Sections 12,13 & 14 on Whixall Moss and 5 & 6 on Fenn’s Moss and the Whixall Moss Main Drain between sections 13 & 22 and 12 & 23 in the early 1900’s caused the collapse of the Fenn’s & Whixall Moss dome, permitting peat exploitation. The former drain ran from south-west to north-east forming the English/ Welsh border and joined the latter Drain to run south-south-east to the Roundthorn culvert under the Canal.
It has been divided from the later-installed Fenn’s Moss Main Drain that runs north-west between section 5.6 and 5.7 by the installation of a watershed dam between sections 13.1 and 12.1 near to the English/ Welsh Border.

Drains from section 14 and 17 were installed running south-east to the culvert under the canal at Roving Bridge, 30 cm lower than the Roundthorn culvert.

**Map 2.1** shows generalised contours for the Second-fix Damming area based on LIDAR data, with additions from the NE’s 1993 photogrammetric survey map which mirrors the complex shapes of the peat cuttings better. The Whixall Main Drain has created a subsidence valley along its length below 88.5mAOD (yellow) between sections 13 and 12. The ability to drain down to the level of the Roving Bridge culvert enabled the exploitation of the outer areas of Whixall Moss as fields below 88m AOD (buff), particularly south of section 14 and 17.

The peat surface varies within each section (**Annex 2.1**).

**Section 14** falls in general from the high ground of Oaf’s Orchard (section 6) south-east to section 16, but with lower ground at its southern corner on section 14.6 by the drain to Roving Bridge, and near the drains to Morris’s Bridge ( sections 14.1 and 14.2). It has a steep gradient into Section 16 to the south.

**Section 6**.
There is high ground >90mAOD to the west of section 6 (the section 6/7 Batters track, and in the south-east (section 6.7 the uncut lump). Water drains off to the north and south.
Section 6.6 slopes from west to east. A plateau on the northern half of section 6.5 slopes northwards near the northern S.6/3 track towards section 3 and also southwards towards a channel on section 6.4 which drains south near the sect 6.6/6.5 track to the southern English/Welsh border drain.
Section 6.2, 6.3 and the northern half of section 6.4 slope north towards the northern S6/3 track.
The southern half of section 6.4 slopes south-westwards to the 6.4/6.5 track.
**D. Site Peat Cutting and Restoration History**
Like Fenn’s Moss, Whixall Moss was divided in the early 1900s into oblong 80m wide peat cutting “flats” separated by 10m wide roadways/tracks using 1m wide drains up to 3.5m deep (**Annex 3.1**). A drain was cut either side of each track and a central drain parallel to the track. This was superimposed on the small oblong Whixall Bible cuttings which drained progressively downhill from cut to cut. However, because it was rented out acre by acre in the 1900’s to cut by hand by many different individuals, each acre was cut in a different way, and a myriad of drainage channels created to best optimise that acre’s drainage, often by putting sleeper bridges across cuttings made through the tracks or milk-churn culverts. Each acre was exploited to its maximum, sometimes cutting parts of the tracks away. It has left a network of tracks which generally lie at a higher level than the cut-out peat.

Peat cutting has left each “flat” at a different level to the adjacent “flats”. Restoration by damming at high spots would have created large areas of open water on low spots attracting birds and allowing wave action, so preventing Bogmoss establishment.

In storm conditions, pollution from the Moss Cottages near Manor House was flowing right across Fenn’s Moss in the Main Drain. In 2010 this was diverted, then in 2010 a watershed dam was installed at the English/ Welsh border (Section 5/13.1/12.1) but unlike the Fenn’s Moss Main drain, the Whixall Manor Drain and Whixall Main Drain were not blocked to allow rainfall to wash out polluted water and peat along the channels.

Peat cutting has left each “flat” at a different level to the adjacent “flats”. In the 1990’s as a “First-fix”, the trackside drains and central drains of each “flat” were, where possible, dammed with peat; these dams now have shrunk to just below peat surface. Restoration by damming at high spots would have created large areas of open water on low spots attracting birds and allowing wave action, so preventing Bogmoss establishment. This has happened at some locations on Whixall Moss.

The Drainage network. Access pipes have been put in by the peat cutters to drain from one subsection to another towards the 4 main outflow points:
 – the Whixall Main Drain, flowing south at the east of section13,
 – the drains leading south between section 14.1 and 14.2 and down the east of the track past section 22 towards Morris’s Bridge and
 – the Drains leading down the east and west of the track from the east of section 17 and west of section 14 south past section 16 to Roving Bridge
 – In times of flooding, water could also flow north from sections 13 and 14 to the English/ Welsh Border Oaf’s Orchard drain then north in the Fenn’s Moss Main drain, where the water level is set by a weir at 87.8mAOD .
The contour maps (**Annex 2.1**) show that the peat on sections 13 and 14, 17 and 22 has collapsed towards each of these drainage routes, leaving high central lumps in each section.

The damage to the surface peats including in the tracks is allowing water leakage despite the first –fix damming and dry-land species are taking over in some places.

**E. Requirement**

The aim of the “Second-fix” works is to raise water levels in previously dammed areas, to amalgamate the hydrology of the hand cuts and peat cutting flats on 22.4ha of Fenns and Whixall Moss, while retaining some access routes. This will be done with a combination of:

* contour bunding primarily along the edge of tracks
* U-pipe installation in minor arterial drains and through bunds
* raising existing u-pipes
* access ramp provision over bunds
* track improvement works.

**The Works are located across an area enclosed in a purple line on Annex 3.1 covering an area of 22.4 ha approximately**.

For a general description of the methods refer to section **M. Outline Generic Method Statement for Peatland Restoration.**

A summary of the works required are detailed in the **Table** below:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| Work Item | **Value for different sections** | **Total for all Sections** |
|  | **Section 14:** **19.3 ha** | **Section 6 Fenn’s Moss (subsections 6.2 to 6.4):** **3.1 ha** | **Two management sections across an area of 22.4 ha** |
| New U-pipes | 56 | 5 | 61 |
| Extend U-pipes |  | 18? | 18? |
| Contour Bunding Approximate Length | 56 no, 5294 m  | 5no,1050m | 61no, 6300 m, approx.  |
| Ramps over bunds | 1 |  | 1 |

**The Detailed specifications are given below for Whixall Moss Section 14 (Annex 3.2.2) and Whixall Moss Section 6 (Annex 3.2.8).**

The precise location and layout of the contour bunds and u-pipes and their quantity may vary by a certain degree as result of the Project Officer marking out each section in the field. Changes will be communicated to the appointed contractor. The meterage and quantity of pipes installed in each section could vary as a result.

**F. Protected Species**

Adders:

Any known adder hibernaculum locations will be marked on site with hazard tape, machinery is not to be tracked within 30m of these points. Locations with a high hibernaculum potential will also be marked, these must not be tracked over and works should be kept as far away as practical to do so. If an adder is seen on site then the NNR must be contacted with its approximate location.

**G. Whixall Moss Restoration principles**

General: Very little of the restored good bog vegetation is holding its own. On a lot of what were nicely regenerating bog areas, Molinia is now overwhelming the bog plants. The predominant pattern of vegetation in lower boggy areas is once-nicely-regenerating low areas ringed by encroaching 5-10m wide Molina bands against surrounding higher peat baulks or tracks and scattered Molinia patches invading even the best Sphagnum lawns.

* 1. Topography: The centre of section 14 is higher than the marginal subsections against surrounding major drains because of marginal subsidence and greater cutting. Bunding patterns and storm-water pipe installation will re-instate movement of water along the hydrological gradient from high ground to lower ground rather than along the peat cutters drainage system.
	2. Refuges and special cases.
	Because of the sensitivity of the residual wildlife on Whixall Moss, the best wetter areas will be left untreated. These are shown on Annex 3.2.1 to 3.2.4.
	High lumps with known adder refugia again will be marked and left undisturbed.
	3. Desired water level rises
	Major bunding pounds should all have U-pipes to control storm water to achieve the water level rises below.
		1. Good areas holding their own – none or only bunding around the subsection margin with exit pipe.
		2. Good areas with some invasion by Molinia – 10-15 cm WL rises
		3. Good areas being overwhelmed 20 – 30cm WL rises as long as not Hagenella areas
		4. Overwhelmed low areas 30- 50cm rises
		5. High but narrow peat baulks – no bunding.
		6. Large higher derelict areas – check hibernacula importance – bund accordingly.
	4. Bunding.
	5. No uniform cell bunding will be involved unless areas are totally derelict. Because of previous re-wetting often it is not possible to cell bund, so contour bunds from track to track along specified high peat baulks will be needed. Bunding “cells” should be as large as possible so they avoid dividing “good areas” and should key into, but not be on higher baulks, suitable for adders, lizards etc.
	6. Where possible bunding should be within the subsection on the lower ground although where it is classic peat cuttings this may not be possible and bunds would need to be on adjacent track edges, if they are low enough. Where tracks are too high and conventional 1m deep bunding would not penetrate deep enough to be below the base of the old track-side ditching, additional under-ground peat compaction at a lower level will be required.
	7. New U-pipes. **Pipes and 90 degree bends will be supplied by Natural England and the contractor will need to collect these from the NNR yard at Manor House.**Existing pipes are shown on Annex 3.2.1. Two kinds of U-pipes will be used: 6 - 12 m long pipes with right-angle collars and extensions on their upstream ends under access tracks between subsections and 3m-long U-pipes with collars through bunds within the subsections.
	**Instructions on the height to set the pipe collars at will be provided the supervising Natural England Project Officer with reference “site notes”.**
	8. Extend U-pipes. Extension pipes, collars and seals are to be supplied by the contractor (except in instances NE has readily available spare seals and collars it at Manor House it can donate). The contractor will be responsible for collecting these pipes from the Manor House NNR Base.
	9. Access ramp provision over bunds. Any bunds across tracks on Whixall Moss should be flush with the track surface and have no cross track borrow pits. To allow continued access in tracked ATVs or NE’s excavator, peat ramps will be needed to enable a few of the new bunds to be crossed.
	10. Exact locations of Works. The structures required will be marked in the field at specific locations. These locations will be specified to the successful contractor but may vary from the locations shown in **Annex 3.2.2 and 3.2.8** which show approximate locations only.
1. **Whixall Moss Section 14: 19.3 ha**

**Relevant Annexes: 3.2.2**

|  |  |
| --- | --- |
| Specified Work Category in Section  | Total Amount for Specified Works  |
| Total Number of: |  |
| New U-pipes | 56 |
| Bund crossing ramps | 1 |
| Contour Bunding Approximate Length | 5294 m (56no.) |
| Track improvements |  |

New U-pipes: U16-UT72
Bund ramps- 1
Contour bunds: CB27-CB83 - flat 14.1 13no. 1237m; Flat 14.2 - 17no 1324m; Flat 14.3 – 10no 968m**;**  Flat 14.4 - 4no 695m; Flat 14.5 - 5no – 610m;Flat 14.6 – 7no – 460m**.

Summary**
The southern halves of the flats tend to have old Whixall bible cuts and the centres and north liner Dutch cuttings
Section 14.1 south east has a carr with Willow/Molinia/Sphagnum with mineral-rich upwelling. This is surrounded by large expanses of Molinia interspersed with small areas of Erica/ Sphagnum bog. The southern Molinia needs a 30cm rise but overall a 15cm rise is needed as Molinia is invading. It drains to s22

Section 14.2 is generally too dry and needs at least a 20cm water level rise. It drains to S. 14.1 then S22.

Section 14.3 has good Whixall bible cuttings in the south third which require a gradual small water level rise as they have very deep cuttings with bog vegetation in their bases but and large amounts of birch invasion and progressive Molinia invasion. The northern two thirds of the flat lies at a higher level and has very deep linear Dutch cuttings with large amounts of Molinia invasion and water levels ca 60cm down so needs a greater water level rise of 30cm. It drains to S 14.4

Section 14.4is lower than adjacent flats and is too wet. It has higher ground in the north and centre west and is flooded out in the east and south. The south is lower than S14.5 so water is to be shed to section 16 in the south-west corner, or a new ditch be dug on section 16 parallel to the track leading to lower ground to the west. Any Whixall bible cuttings in the south have been completely inundated. It is too wet and the pipe to 16 and 14.5 must be lowered otherwise erosion will erode the boundary tracks and the hydraulic gradient to S16 could over time blow the track out. Water which the peat cutters used to channel north can no longer exit via the Oaf’s Orchard drain, so the natural gradient of water must be set from north to south again.

Section 14.5 is generally just slightly too dry so Molinia is starting to invade even the best Sphagnum lawns. The central area is higher than to the north and south and baulks are being completely taken over by Molinia. The northeast will have to drain into 14.4 to repair the central high area.
The southern Eriophorum/ Sphagnum area is partly drained through the 14.5/ 14.6 track half way up it into section 14.6 but in future will drain into S14.4 which is also lower then into S16.

Section 14.6 is higher and too dry in the north-west and is also too dry in the centre. The north and centre are being taken over by Molinia on dry peat baulks, of no use to Hagenella. However Molinia is invading the lower area in the southern half between the pool and the higher drier ground to the north, particularly in the west and may become good Molinia habitat. The southern pool is to be retained for interpretive use by the seat. **Works Description**:

1. **Works**

	1. New Dams:
	The approximate points of the dam is shown on **Annex 3.2.2.** The drain to be dammed will be approximately 1m wide and up to 3m deep. Vegetation should be scraped off the drain edges to undamaged peat, a borrow pit created off-drain line if necessary on an adjacent flat and dense wet peat used to fill the channel to above peat surface for a 2-3m length which should be compressed using a bucket. The dam should protrude for at least 0.5m height to allow for shrinkage and should extend as far as necessary to the sides of the drain to meet general peat surface level, as the immediate peat around the drain has often shrunk down.

	Block the channel and the internal drain at:
	D5 SJ48814 35694 in the southern drain of flat 14.4, to the west of the nice patch of bog near the track.
	2. U-pipe dams
	The approximate points of the U-pipe dams are shown on **Annex 3.2.2**.

	On flat 14.1 all pipes U16 – U27 should be aiming to create a 15cm WL rise. - 11 no

	3m pipes through bunds:
	U16 through at SJ48872 36124, collar on the north – 15cm rise above the Sphagnum carpets
	3m pipes through dams in drains:
	UD17 at SJ48868 36063, collar on the north, 15cm above the Sphagnum carpets
	UD18 at SJ48923 36033, collar on north through CB30.
	UD19 at SJ48926 36054 , collar on north through CB31
	UD20 at SJ48966 36062, collar on north through CB32
	UD 21 at SJ48968 35954, collar on north through CB33
	UD22 at SJ48967 35993, collar on north through CB35
	UD23 at SJ48999 36017, collar on north through CB35
	UD24 at SJ48989 35946, collar on north through CB36
	U25 at SJ49013 35915, collar on north through CB37
	U26 at SJ49028 35872, collar on north through CB39
	U27 at SJ49026 35853, collar on north through CB39

	On flat 14.2 15 no
	UD28 at SJ 348,769.884 336,046, collar on north through CB40
	UD29 at SJ 348,783.740 336,016, collar on north through CB42
	UD30 at SJ 348,797.318 335,998, collar on north through CB44
	UD31 at SJ 348,818.656 335,965, collar on north through CB46
	UD32 at SJ 348,853.572 335,993, collar on east through CB47
	UD33 at SJ 348,935.597 335,957, collar on north through CB48
	UD34 at SJ 348,905.392 335,914, collar on west through CB50
	UD35 at SJ 348,913.982 335,894, collar on east through CB50
	UD36 at SJ 348,976.055 335,901, collar on north through CB50
	U37 at SJ 348,914.260 335,850, collar on north through CB53
	U38 at SJ 348,938.091 335,790, collar on north through CB54
	U39 at SJ 348,971.067 335,816, collar on west through CB55
	U40 at SJ 348,979.104 335,819, collar on north through CB54
	U41 at SJ 349,002.104 335,840, collar on north through CB54
	UT42 through the 14.1/14.2 track, collar on the west at SJ48950 35938

On Flat 14.3 -10no
U43 through CB57 collar on north, at SJ48912 35768
U44 through CB57 collar on north, at SJ48859 35728
U45 through CB60 at SJ48845 35826, collar on north
U46 through CB59 at SJ48807 35841, collar on south
UD47 through CB61 at SJ48784 35835, collar on north
UT48 through the 14,3/14.4 track at SJ48747 35871, collar on east
UD49 through CB63 at SJ48786 35896, collar on east
UD50 through CB64 at SJ48790 35931, collar on north
UD51 through CB65 at the west of the Molinia square at SJ48781 35966
U52 through the join of CB66 and CB41 at SJ48776 36022, collar on the north, shedding water into the bunded cell to the south-east.

On Flat 14.4 – 4 no
U53 through CB68 at SJ48654 35902, collar on north
U54 through CB69 at SJ48732 35849, collar on north
U55 through CB70 at SJ48740 35753, collar on north
If the U pipe to sect 16 NE cannot reduce the pool water down to 88.3mAOD, if necessary create U56 at SJ48820 35662 through the south-western bund of the northern cell receiving water from the pipe.

On Flat 14.5 – 6no
UT57 in the ditch through the 14.4/14.5 track at SJ48609 35879, collar on west
UT58 in the ditch through the 14.4/14.5 track at SJ48639 35843, collar on west
UD59 in the trackside ditch through CB76 at SJ48557 35790, collar on north
U60 through CB75 at SJ48622 35801, collar on west where the cutting has been bunded through
U61 through CB73 at SJ48649 35735, collar on north
UT62 through CB72 and the 14.5/14.6 track at SJ48706 35620, collar on east, replacing the track sleeper crossing.

On Flat 14.6 – 10 no
UT63 in the ditch through the 14.5/14.6 track at SJ48529 35818 , collar on west
UD64 in the trackside ditch through CB77 at SJ 48544 35792, collar on north
UD65 through CB78 at SJ48544 35792, collar on west.
UD66 through CB80 at SJ48526 35768, collar on west.
UD67in the trackside ditch through CB79 at SJ48566 35764, collar on north
UD68 through CB82 at SJ48544 35743, collar on the west
UD69 in the trackside ditch through CB81 at SJ48587 35742, collar on north
UD70 through CB83 at SJ48593 35707, collar on the north
UD71 through CB81 at SJ48557 35689, collar on the west
UT72 through the 14.5/14.6 track at SJ48642 3,689, collar on the east (set at 10cm rise for sect 14.5 carpet)

* 1. Extending existing U-pipes
	The aim is to raise the top height of the U-pipe to just below track level. Depending on the requirement, either top up the dam as 1.3 above and either remove the extension, insert a new seal and a longer extension, or use a straight collar with seals, and if necessary, an extension, to extend the pipe to the required height.
	Extend one U-pipe:
	E2 the 14.1/14.2 S under track pipe at SJ49019 35854
	2. Contour Bunding – 5294 m (56no.)
	Create impermeable bunds as specified in pages 8 and 9 of “NRW Peatland Framework Lot 1 Hydrological Restoration Specification - Specification for low elevation contour bund construction”, damming any drains crossed by the bunds:
	Flat 14.1. – 13no 1117
		1. Create CB27 ( 65m) keyed into the 14.1/14.2 track at SJ48839 36092 to the Molinia baulk at SJ48863 36114 then North to key into the 14/5 track at SJ48840 36138
		2. Create CB28 (85m) keyed into the 13.9/14.1 track at SJ48924 36152, round the edge of the Molinia lump damming the mid-way drain and along the Molinia baulk along the south of the N-S cuttings to key into CB27 at SJ48863 36114
		3. Create CB29 (57m) from the 14.1/14.2 track at SJ48866 36062, with a U-pipe through the trackside ditch along the Molinia baulk to SJ48895 36084 then diagonally across Molinia areas to block the western ditch of the eastern cuttings at SJ48892 36094.
		4. Create CB30 (100m) from keyed into the 14.1/14.2 track at SJ48896 36019, if possible to the Molinia baulk at SJ48932 36039, with a U-pipe UD18 through the ditch, then north along the Molinia baulk to join CB29 at SJ48895 36084. If too wet just bund from the track and block the N-S ditch at SJ48923 36034 with a dam.
		5. Create CB31(68m) keyed into the 13/14 track at 348,972.234 336,095, west along a baulk to CB30 at SJ48923 36052 with UX in the western drain of the cuttings
		6. Create CB32 (72m) keyed into the 13/14 track at across, chicaning round low areas to CB30 at SJ48932 36039.
		7. Create CB33 ( 175m) keyed into the 14.1/14.2 track at , with UD21 in the N-S drain of the western cuttings, chicaning to SJ48983 35972 then North along the Molinia track to join CB30 at SJ48931 36039.
		8. Create CB34 (55m) keyed into the 14.1/14.2 track at SJ48965 35928, round the edge of the Molinia area to key into CB33 at SJ48978 35967.
		9. Create CB35 (65m) keyed into the 13/ 14 track at SJ49019 36032, west to join CB33 at SJ48968 35993.
		10. Create CB36 (100m) from CB34 at SJ48986 35944 along the edge of the lower area to the north to SJ49010 35979, then turning west to key into the 13/14 track at SJ SJ49046 36002.
		11. Create CB37 (125m) keyed into the 13/14 track at SJ49067 35964 , 3m from the north edge of the wood to SJ49011 35914 then north along the low area, to key into CB36 at SJ48989 35919.
		12. Create CB38 ( 90m) from CB34 at SJ48973 35934 along the edge of the lower area to CB39 at SJ49026 35871
		13. Create CB39 (240m) around the Molinia south of the willow carr keyed into the 13/14 track just north of the heather and south of the trees, to the heather in the west.

		Flat 14.2 - 17no 1324m
		14. Create CB40 (115m) keyed into the 14/6 track at SJ48811 36112, south to SJ48824 36098 then west along the Molinia baulk south of the N-S cuttings to SJ48768 36044 and north to key into the 14/6 track at SJ48757 36057,.
		15. Create CB41 (40m) from CB40 at SJ48768 36044 west of the cutting N-S end drain to CB42 at SJ48782 36014.
		16. Create CB42 (85m) from CB41 at to key into the 14.1/14.2 track at SJ48845 36068.
		17. Create CB43 (45m) from CB42 at SJ48782 36014 south along the edge of the Molinia high lump to SJ48802 35988 the west to the 14.2/14.3 track
		18. Create CB44 (85m) keyed into the high lump/ CB 43 at SJ48795 35996 then east along the Molinia baulk to key into the 14.1/14.2 track at SJ48862 36046.
		19. Create CB45 (82m) from the 14.2/14.3 track at SJ48797 35975 then east and along the eastern edge of the Molinia lump to SJ48841 35931 then west again to the track.
		20. Create CB46 (87m) from CB45 at SJ48817 35964 east to key into the 14.1/14.2 track at SJ48889 36015.
		21. Create CB47 (70m) keyed into the 14.1/14.2 track at SJ48869 36041 around the high Molinia lump to CB46 at SJ48855 35991.
		22. Create CB48 (106m) from the 14.2/14.3 track at SJ48851 35900 chicaning east to key into the 14.1/14.2 track at SJ48936 35958.
		23. Create CB49 (105m) along the west of the flat from CB48 at SJ48851 35900 south to CB 54 at SJ48937 35788
		24. Create CB50 (105m) from CB48 at SJ48894 35928, south down a Molinia baulk, chicaning as necessary, to SJ48932 35870 then east to key into the 14.1/14.2 track at SJ48977 35902.
		25. Create CB51 (45m) from CB49 at the 14.2/14.3 track at SJ48865 35883 to CB50 at SJ48903 35909.
		26. Create CB52 (58m) from CB50 at SJ48907 35912 round the east of the hand cuttings and back to CB50 at SJ48926 35878.
		27. Create CB53 (45m) from CB49 at SJ48899 35839 to CBxx at SJ48936 35864.
		28. Create CB54 (103m) from CB49 at SJ48937 35788 eastward, north of the trackside drain to key into the 14.1/14.2 track at ca SJ49012 35854, curving around the north of the corner scrub.
		29. Create CB55 (65m) from CB50 at SJ48932 35870 to CB54 at SJ48972 35814.
		30. Create CB56 (83m) from CB50 at SJ48955 35886 to CB54 at SJ49000 35837, chicaning to follow the edge of the high Molinia area.

		Flat 14.3 – 10no 968m
		31. Create CB57 (180m) in a U-shape around the outside of the southern half of the Whixall bible cuts from SJ48834 35758 on the 14.3/14.4 track to the south-west then south-east corner of the flat then north to SJ48907 35818, either on the track sides to encompass the flat-side N-S drains, but north of the southern drain, with a U pipes to the southern drain to flat 14.4 **initially only turned 10cm up** eventually to be raised to 15cm. **This is a safe-guard bund in case Molinia makes future gains into the Sphagnum carpets.**
		32. Create CB58 (95m) from CB57 at SJ48854 35732 2m from the edge of the higher ground round to the 14.3/14.4 track at SJ48820 357761.
		33. Create CB59 (145m) keyed into the 14.3/14.4 track at SJ48795 35812 then running east near the edge of the Molinia baulk round the E-W cuttings to SJ48843 35825 then north to SJ48825 35855 and west to key into the 14.3/14.4 track at SJ48785 35826.
		34. Create CB61 (133m) keyed into the 14.3/14.4 track at SJ48780 35832 round the E-W cuttings to SJ48819 35862 then north to SJ48800 35889 and west, keying into the south end of CB63 to key into the 14.3/14.4 track at SJ48757 35857.
		35. Create CB62 (60m) from CB61 at SJ48811 35873 east chicaning near the edge of the Molinia baulk to key into the 14.2/14.3 track at SJ48837 35912.
		36. Create CB63 (135m) from the higher ground on the 13.2/13.3 chicaned track at SJ48714 35997 south down the higher ground to the east of the western E-W cuttings to key into CB61 at SJ48794 35885
		37. Create CB64 (50m) from CB63 at SJ48771 35917 east to key into the 14.2/14.3 track at SJ48812 35947
		38. Create CB65 (50m) from CB63 at SJ48752 35943 east to key into the 14.2/14.3 track at SJ48796 35974
		39. Create CB66 (75m) from the 14.2/14.3 chicaned track at SJ48718 36001, south to SJ48733 35986 then parallel to the track to join CB41 at SJ48775 36021
		40. Create CB67 (45m) keyed into the 14.3/14.3 track at SJ48686 35955 east to the north end of CB63 at SJ48723 35986 then north along the 14.2/14.3 chicaned track to higher ground at SJ48714 35996

		Flat 14.4 - 4no 695m
		41. Create CB68 (200m) keyed into the 14.5/14.4 track at SJ 348,620.656 335,870, chicaning round the edge of the higher baulks to the 14.4/ 14.3 track
		42. Create CB69 (90m) keyed into the 14.5/14.4 track at SJ 348,679.394 335,795 to the 14.4/ 14.3 track at 348,746.598 335,859
		43. Create CB70 (125m) keyed into the 14.5/14.4 track at SJ 348,723.844 335,736 to CB69 at 348,719.082 335,833
		44. Create CB71 (80m) keyed into the 14.5/14.4 track at SJ 348,767.236 335,681 to CB70 at 348,736.544 335,747

		Flat 14.5 - 5no – 610m
		45. Create CB72 (185m) 2m west of the eastern edge of the 14.5/14.6 track from SJ 348,615.810 335,721 south to 348,708.944 335,616 just south of the section 14/16 northern trackside drain, then east 2m onto the southern track as far as possible or to SJ 348,746.515 335,644.
		46. Create CB73 (100m) from CB72 at SJ 348,615.810 335,721 east to SJ 348,636.448 335,737 then chicaning north to SJ 348,628.510 335,747 then east across to key into the 14.4/14.5 track at SJ 348,675.606 335,789
		47. Create CB74 (95m) keyed into the 14.4/14.5 track at SJ48704 35743, west chicaning round the edge of the higher Molinia infested ground to CB73 at SJ 348,632.744 335,734.
		48. Create CB75 (100m) keyed into the 14.5/14.6 track at SJ 348,574.535 335,766, east along the peat baulk then south to 348,625.864 335,799 and east along the peat baulk south of the flooding to key into the 14.4/14.5 track at SJ 348,650.735 335,821
		49. Create CB76 (130m) around the high ground in the NW of the flat, keyed into the 14.5/14.6 track at SJ48556 35789, east to just west of the centre N-S drain at SJ48599 35822 then north to SJ48587 35837 and east to the next N-S drain and north through the dams to key into the sect 6/14 track at SJ48547 35844.

		Flat 14.6 – 7no – 460m
		50. Create CB77 (95m) keyed into the 14/17 track at SJ48475 35729 then east with a small chicane to key into the 14.5/14.6 track at SJ48545 35792.
		51. Create CB78 (33m) along the easternmost N-S peat baulks from the chicane in CB77 at SJ48521 35771 north to key into the 14/6 track at SJ48496 35793
		52. Create CB79 (90m) keyed into the 14/17 track at SJ48495 35711 then east with a small chicane to key into the 14.5/14.6 track at SJ48566 35764.
		53. Create CB80 (32m) from the chicane in CB79 at SJ48545 35747 north along the end of the western E-W cuts to key into CB77 at SJ48524 35772
		54. Create CB81 (105m) keyed into the 14/17 track at SJ48540 35670 then east along the edge of the higher ground to SJ48560 35686 then chicaning north along Molina tussocks to SJ48553 35713 then east to key into the 14.5/14.6 track at SJ48587 35741.
		55. Create CB82 (30m) from CB81 at SJ48563 35721 north along the end of the eastern E-W cuts to key into CB79 at SJ48543 35746
		56. If possible, create CB83 (75m) from CB81 at SJ48560 35687 chicaning along the edge of the slightly higher vegetation to key into the 14.5/14.6 track at SJ48615 35715
1. Fenn’s Moss Section 6 (sub-sections 6.1 to 6.4): 3.1 ha

**Relevant Annexes: 3.2.8**

|  |  |
| --- | --- |
| Specified Work Category in Section  | Total Amount for Specified Works  |
| Total Number of: |  |
| New U-pipes (install only) |  6 |
| Extend U-pipes | Possibly 18 – depending on field assessment |
| Build up dams as necessary | 0 |
| Bund crossing ramps | 0 |
| Contour Bunding Approximate Length | 5, 1050m  |
|  |  |

New U-pipes: 19no. - 3m long – 5no. 6-12m long – 1no.
U-pipe extensions – 19no – if necessary through the Visqueen bunds
Build up dams - none
Bund ramps -0
Contour bunds: Sect 6 - 5, 1050m

**Works Description**:

* 1. Area description and problems
		1. The aim of the Works must be to restore a hydraulic gradient that relates to contours.

		On section 6, the drain along the western Batters track and the drain along the northern S.3/6 track were left undammed to maintain access, and later the northern one was part dammed with a U-pipe at sect 6.4NE. The N-S tracks between each subsection have been cutaway to below the level of the peat baulks on the flats, leaving a drain along the edge of each flat plus a wider drain in the centre of the track.

**IMPORTANT -** **BRIDGING BUNDS with Visqueen cores have been constructed from baulk to baulk to below drain base level as shown on Map 3.2.8 which must not be destroyed during this section of bunding**.

* + 1. This area divides into 3 parts.
			1. Section 6 – 3 parts, water now to be directed into the Visqueen bunded tracks.
				1. Section 6.6 with a 0.5m SW to NE slope across the flat.
				2. Plateau on section 6.3, 6.4 and 6.5 North and on the south of 6.4 draining north to the 6/3 track and south-west to the 6.5 gully.
				3. Section 6.2 with a steep 0.5m S to N slope across the flat.
		2. Water flows.
			1. Section 6.
			Being the centre of the Moss there are no major water flows through section 6, but the area drains to the north and south.
			In the west water from the track is collected to flow north by the Batters Track Drain then there is a further section-side drain on S6.6.
			In the north, water is collected by the section 6 north trackside drain and flows north-east then north through a U-pipe into the eastern ditch of section 3.13, see map 3.2.8. (The U-pipe between 3.4 and 3.3 flows west to east).
			Also water collected by the southern drain and cuttings flows south in a U-pipe from section 6.6 into section 14.6.
	1. **Works**
		1. New U-pipe dams 3m long – 7no., 6m – possibly 1
		The approximate points of the 19 U-pipe dams are shown on **Annex 3.2.8**.
		All will be 300mm twin-walled U-Pipe installed at base of drain/cell/ top of peat baulk level, fitted with a right angle bend at the upstream end. Unless otherwise specified, all will be 3m long.
		If crossing tracks pipes must be low enough to support ATV traffic.

		Install new U-pipes:
		**Section 6**  3m long – 5no., 6m – possibly 1
		3m long through bunds (those in arterial drains need to be deeper than base of the bund on the flat level, so will have extensions on)
		UD92 through CB137 at SJ48578 36223, collar on south
		UD93 through CB140 at SJ48384 36037, collar on east, in the drain line to shed water onot the section 4.4/4.5 track
		UD94 through CB141 at SJ48541 35890, collar on north
		UD95 through CB142 at SJ48311 35977, collar on east to shed water into the trackside drain
		UD96 through CB142 at SJ48471 35806, collar on east to shed water into the trackside drain
		6m pipes
		If there is not already a U-pipe there, UD97 through CB147 at SJ48257 35948 in the Batters Track Drain, collar on south to shed water north. The purpose of this is to retain access along the Batters, but not to deprive sect 6.6 of all of the water.
		2. Extend U-pipes – ?18no.
		On section 6, U-pipes were installed through the VISQUEEN BUNDS**. Assess in consultation with the Project Officer whether any of them need extending and mark them. If all or some of the pipes are not required, the allocated cost will reassigned to undertake additional bunding as agreed with the Project officer.**
		3. Contour Bunding – Sect 6 -5no , 1050m

		**Section 6**
		Create:
			1. CB137 (150m) Keyed into the bund on the high lump of section 6.7 at SJ48601 36204 on the S 6.1/6.2 track then north 2m from the west of the track to the baulk adjacent to the S3/6 track, west to the existing bund at SJ48521 36172 then south crossing the cuttings and baulks to the existing bund at SJ48549 36141.
			2. CB138 (200m) Keyed into the bund on the high lump of section 6.7 at SJ48577 36094 then north across the cuttings of S6.3 to the existing bund at SJ48535 36130, west to the existing bund at SJ48477 36079 then south crossing the cuttings and baulks to the existing bund at SJ48512 36042 then keyed into the high lump.
			3. CB139 (155m) Keyed into the existing bund at SJ48535 36130, north to the existing bund at SJ48507 36158 west to the existing bund at SJ48449 36106 then south crossing the cuttings and baulks to CB138 at SJ48477 36079.
			4. CB140 (385m) Keyed the high lump of section 6.7 at SJ48523 36004 near the 6.3/6.4 track then north across the cuttings of S6.4 to the existing bunds at SJ48499 36031, SJ48464 36066 and SJ48439 36093 avoiding the borrow pits, west to the existing bund at SJ48377 36045 then south crossing the cuttings and baulks to the existing bund at SJ48465 35951 then east to key into the high lump at SJ48496 35976.
			5. CB141 (160m) Keyed CB140 at SJ48466 35952 south keyed into 3 existing bunds to SJ48533 35881 avoiding the borrow pits, west to near the edge of the existing cuttings at SJ48562 35905 then north and east to key into the high lump at SJ48552 35921.
1. Whixall Moss Works Area- Digital Mapping: Section 6 and section 14 ha
	1. **Bund/ Dam Location Plotting**
	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. This data should be supplied to Natural England’s Project Officer by email by 1 October 2022.
2. **HEALTH AND SAFETY AT WORK**

For all work carried out on NE sites and on other sites on NE’s behalf, NE requires compliance with relevant regulations. These may include, but not limited to:

* Health and Safety at Work Act 1974
* Avoiding Danger from Underground Services - HSG47
* Control of Vibration at Work Regulations 2015
* Construction, Design and Management Regulations 2015)
* Personal Protective Equipment at Work Regulations 1992
* Lifting Operations and Lifting Equipment Regulations 1998
* Provision and Use of Work Equipment Regulations 1998 (PUWER)
* First aid at work: The Health and Safety (First-Aid) Regulations 1981

The contractor must adhere to Construction Design and Management Regulations (<http://www.hse.gov.uk/construction/cdm/2015/responsibilities.htm>)

Contractors on **all projects** must:

1. make sure the [client](http://www.hse.gov.uk/construction/cdm/2015/responsibilities.htm#client) is aware of the client duties under CDM 2015 before any work starts
2. plan, manage and monitor all work carried out by themselves and their workers, taking into account the risks to anyone who might be affected by it (including members of the public) and the measures needed to protect them
3. check that all workers they employ or appoint have the skills, knowledge, training and experience to carry out the work, or are in the process of obtaining them
4. make sure that all workers under their control have a suitable, site-specific induction, unless this has already been provided by the [principal contractor](http://www.hse.gov.uk/construction/cdm/2015/principal-contractors.htm)
5. provide appropriate supervision, information and instructions to workers under their control;
6. ensure they do not start work on site unless reasonable steps have been taken to prevent unauthorised access;
7. ensure suitable welfare facilities are provided from the start for workers under their control, and maintain them throughout the work;

The principal contractor must:

1. make and maintain arrangements which will enable the principal contractor and workers engaged in construction work to cooperate effectively in developing, promoting and checking the effectiveness of measures to ensure the health, safety and welfare of the workers;
2. consult those workers or their representatives in good time on matters connected with the project which may affect their health, safety or welfare, in so far as they or their representatives have not been similarly consulted by their employer;
3. ensure that those workers or their representatives can inspect and take copies of any information which the principal contractor has, or which these Regulations require to be provided to the principal contractor, which relate to the health, safety or welfare of workers at the site, except any information—
4. the disclosure of which would be against the interests of national security;
5. which the principal contractor could not disclose without contravening a prohibition imposed by or under an enactment;
6. relating specifically to an individual, unless that individual has consented to its being disclosed;

(iv) the disclosure of which would, for reasons other than its effect on health, safety or welfare at work, cause substantial injury to the principal contractor’s undertaking or, where the information was supplied to the principal contractor by another person, to the undertaking of that other person;

1. obtained by the principal contractor for the purpose of bringing, prosecuting or defending any legal proceedings.
* **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 2015and the Contractor will liaise with the CDM coordinator accordingly to prepare the Construction Phase Plan. **Contact: Alan Davies, CDM Principal Designer, Aegis Services Limited, 15 Navigation Business Village, Navigation Way, Preston, PR2 2YP, Tel: 01772 736522**. [www.aegis-services-ltd.co.uk](http://www.aegis-services-ltd.co.uk).
	1. **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
	2. **Lone Working**
* Because of the remote location of the site there will be no lone working at any time.
	1. **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.
	1. **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.
	1. **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.
	1. **Smoking**
* **SMOKING IS STRICTLY PROHIBITED ON SITE FOR ALL PERSONNEL**. There is an extreme fire hazard on the raised mire at all times.
1. **Environmental considerations**

**The Contractor is responsible for ensuring that they comply with the Environment Protection Act 1990 and any other relevant legislation currently in use or which may be introduced in the future.**

All contractors should be aware of site procedures and store materials and chemicals safely to prevent any spillage to land or to controlled waters.

All contractors must correctly dispose of any waste produced using the relevant waste documentation.

All spill/emergency incidents should be reported to NE staff immediately.

The contractor must ensure that recyclable items are used wherever possible.

If relevant to the contract and when available, contractors should include the following documentation:

* Their company Environmental Policy Statement if employing 5 or more people
* Details of any Environmental Training given to staff if employing 5 or more people
* Environmental considerations should be included in the risk assessments and method statements
* Copies of relevant documents e.g. Waste carrier registration, environmental permits, waste exemptions

The contractor shall allow for the removal of all rubbish and debris arising from the contract as it occurs and to comply with the transfer of waste, under the Waste Regulations 2011. On completion of the contract the site is to be left in clean and tidy order.

The contractor is to prevent smoke, dust, unreasonable noise and other forms of pollution or nuisance, to comply with the Noise & Statutory Nuisance Act 1993.

No burning of materials will be allowed.

Specify use of recycled materials, plastics and aggregates.

1. **General description of Bunding method**

This statement is for the skilful manipulation of peat with tracked excavators to raise and stabilise water levels. The methods proposed to achieve higher water tables and improved bog surface profiles include (but are not limited to);

* low elevation contour bunding;
* re-profiling of high peat bunds;
* building and strengthening dams;
* re-profiling surfaces and inverting vegetation.

The project site is environmentally sensitive and are legally protected at a National and European level for their wildlife interest.

**Key considerations:**

* All machinery must be low ground-pressure tracked machines fitted with metal, plastic or rubber tracks designed to ensure disturbance to the surface vegetation is minimised. In order to be suitable for the task, machines should have a ground pressure lower than 3 psi on drier, more degraded areas of bog and 2 psi on wetter, more pristine bog areas. The contractor must be confident that the machine can be operated across the site without breaking the fragile surface.
* Bio-degradable hydraulic oils must be used, and the machines should be clean and free of oil/fuel leaks.
* Some locations may require the use of bog mats to work on very wet ground.
* Excavator size and digger buckets should be chosen appropriately to create the structure or achieve the profile required. Any features or modifications which help to minimise ground disturbance and the need for movement of the excavator such as tilt rotators or the use of excavators of different weights/arm length may be an advantage for certain jobs.
* Peat depth is between 0.5m and 10m
* Disturbance of peat is to be restricted to the minimum area necessary to achieve the desired restoration.
* Some access routes may have un-rated bridges. A bridge assessment will have been undertaken by contract start date and will be provided to contractors at call off stage. On some sites the width of access routes may limit the width of machinery which can access the site.
* All the sites support protected species and habitats.
* There may be archaeological interest and within the peat – if any is uncovered during works, work must stop immediately, and contract manager must be informed.

**9.1 Outline Generic method Statement for Peatland Restoration**

**9.2.1 Low elevation contour bund construction**

The installation of low elevation peat bunds is designed to slow the loss of rainfall across drainage affected slopes and re-wet upslope areas. All work will be in areas of deep (4-10 m) peat, which is generally waterlogged to within 20-50cm of the surface (i.e. there is only a shallow surface layer of relatively dry peat and vegetation to support the weight of machinery). It is therefore vital that suitable low ground pressure machinery and suitably experienced operators are used for the work.

Low elevation contour bunds are sub-surface trenches with a smaller surface peat banks of *c*.25 cm high by *c*. 80 cm wide, constructed on the contour of sloping or level bog surfaces to slow surface run-off and raise water tables to within 10 cm of the bog surface.

* Bunds will be constructed by removing turf & the upper, degraded peat from a narrow (*c.*80 cm wide) trench, excavated down (*c.*50 cm) to un-decomposed, permanently wet, clay-like catotelm peat [‘Good’ peat].
* Excavate a further c.1 m into the permanently wet ‘clay-like’ catotelm ‘good’ peat. Overturn this peat and squash it back into the trench- this cuts through deep roots and blocks any cracks or water escape routes.
	+ 1m is given here as an indication of most common excavation depth required. However, NE are aware of some locations with cracks extending up to 3m deep. In these cases, excavation and re-packing will be required to a depth below the crack depth to ensure minimal water loss.
* Pack the trench to *c*. 25 cm above adjacent ground surface level with good peat from an adjacent borrow pit on the uphill side of the bund.
* Cover the bund with a layer of turf and fill the borrow pit with the excavated degraded peat, leaving surfaces level and tidy.
* Bund lengths may also have *c*. 6 m length cross-bunds made every 20 m to create elongated U-shaped compartments, extending uphill from the bund. These are required to safe-guard against any bund collapse. If a bund fails, only one U-shaped compartment will fail. It will also act to slow water movement in pools behind the bund. Waves produced by wind in larger pools of water will stop mosses establishing.
* Level the bund crest carefully to ensure even overflow and even irrigation of downslope peat.A level crest is essential.
	+ Bunding will be carried out by experienced machine operators using low ground pressure tracked excavators.
	+ Some short sections of bund of approximately 3m longitudinal length will need to be constructed in order to facilitate future access by low ground pressure tracked vehicles across the bunds.
* The alignment of each bund section should be confirmed by walkover survey, supported by laser levelling if needed.
* Bunds achieve maximum benefit by positioning them close to the crest of shrinkage zones where gradients are relatively shallow.
* Multiple rings of bunding may be required on steeper gradients.
* Disturbance of active (carbon accumulating) primary (previously un-cut) bog surfaces should be minimised by locating bunds at the edge of the primary peat or on cut-over peat.
* Access routes to & from the bunding location will be agreed with the Contract Manager prior to or on commencement of work.
* Further details on this technique will be supplied to the successful contractors.

Diagram B.1: Angled pipe sluice (diagram taken from Brooks *et al*. 2014[[1]](#footnote-2))



Diagram B.2: Angled pipe sluice

**1.2.2 Raise & stabilise water levels by building or strengthening dams**

**9.2.2 Peat Dams in ditches (0.5 x 0.5 m to 1 x 1 m width & depth),** **drains (1.5 x 1.5 m to 3 x 3 m width & depth)** **& peat cuttings:**

* Install at set intervals using a low ground pressure excavator by first cutting a 90° trench or slot (approximately 1 m wide extending into the ditch bank by approximately 1 m) into the ditch or peat cutting bank to provide a ‘key’ for the dam.
* Remove all existing vegetation and set aside.
* Remove degraded peat to a depth where good peat is encountered beneath.
* Source more uniform “good” peat from the deeper layers of the bog from a borrow pit at the side of the ditch and/or on the upstream side of the dam.
* Pack good peat into the trench to form an impermeable dam.
* Use some of the vegetation from the borrow pit to cap the dam, with the rest being replaced in the pit.
* Leave the dam crest 0.5 m above the surrounding ground to allow for settlement. But keep crest height low to minimise/eliminate scrub colonisation.
* Also build large dams from low permeability (clay -like), deeper, ‘good’ peat. Larger dams cannot easily be capped due to their size but can be colonised naturally by bog vegetation
* Key in properly to the same good peat layer to ensure a good seal.
* Incorporate subdivisions to minimise wind fetch & promote *Sphagnum* colonisation.
* The final dam thickness for ditches (0.5 x 0.5 m to 1 x 1 m width & depth) should measure 1.5m at its base, narrowing to approximately 0.75 m at its crest before turf is added.
* The final dam thickness for drains (1.5 x 1.5 m to 3 x 3 m width & depth) should measure 2.5 m at its base, narrowing to approximately 1 m at its crest before turf is added.
* Wider dams (3.0 m crest width) may be required across peat cuttings, ditches & drains at some locations to allow machinery access.

**9.2.3: Ditch re-profiling and infill:**

* Re-profiling;
	+ Where ditchings/spoil banks exist, remove the turf and translocate the ditchings/spoil into the ditch and cover the bank with the turf previously removed.
	+ If no ditchings/spoil banks exist, remove an approximately 1 m wide strip of turf from either bank of the ditch; push the underlying peat into the ditch to create a shallow edge gently sloping into the centre. Lay the turf to cover any bare peat. The final profile should gently slope to a depth of approximately 15 cm deep to allow bog mosses to colonise.
	+ Ditch re-profiling may also be achieved by pressing down vegetated edges of ditches; this also reduces the risk of grazing animals becoming trapped in over-grown ditches.
* Ditch Infill;
	+ Ditch infill with peat will be used in cases where sufficient peat is locally available and where the aim of restoration is to create a continuous peat surface grading into the adjacent terrain*, and where peat stripped from re-profiled dry slopes needs to be re-located into nearby open water.*
1. Brooks, S., Stoneman, R., Hanlon, A., and Thom, T. (2014) *Conserving Bogs. The Management Handbook*. 2nd Edition, Yorkshire Wildlife Trust. [↑](#footnote-ref-2)