



Framework Contract for Wetland Restoration Works

Contract Ref: 304/HLS/14/1114

WORKS SPECIFICATION and MITIGATION MEASURES

1. MATERIALS

1.1 STANDARDS AND SUBMISSION OF MATERIALS

1.1.1 The supply of materials for this contract is heavily regulated due to the nature of the works and the site designations.

1.1.2 Natural England has approved the materials used for this type of restoration work in the New Forest Site of Special Scientific Interest.

The following will be required:

- ✓ As dug hoggin
- ✓ As dug oversize gravels or rejects
- ✓ 20/40mm washed gravels
- ✓ Over 40mm washed gravels
- ✓ Clay
- ✓ Heather bales – Supplied by the Forestry Commission
- ✓ Hardwood stakes for securing heather bales (FSC certificated timber). In areas of instability or steep gradient, chestnut stakes should be used.
- ✓ Oak posts and boards (FSC certificated timber).

As dug hoggin, oversize gravels or rejects and washed gravels must be sourced from Avon Valley quarries in the vicinity of the New Forest.

Given the likely difficulties of sourcing clays from the New Forest and surrounding area, it may be necessary to consider other formations that occur within the West Sussex, Hampshire and Dorset area. The specification for clay is that:

The clay should be unweathered when extracted (so that it can be engineered to the required properties).

Ideally the pyrite content of the clay should be as low as possible (in order to avoid potential issues with pH and water chemistry as the pyrite breaks down).

The carbonate content of the clay should be as low as possible (in order to avoid potential issues with pH), although given the impervious nature of the clay, the effect of the presence of low concentrations of calcium carbonate may not be significant.

The sand and silt content of the clay should not be so high that it compromises its impermeability.

Geological formations that may be suitable as a clay source are:

- ✓ Clays of the Headon Formation (Local)
- ✓ Clays of the Poole Formation (Local)
- ✓ London Clay Formation (Local and Hampshire)
- ✓ Gault Formation (Sussex and Surrey)
- ✓ Weald Clay Formation (Sussex and Surrey)
- ✓ Kimmeridge Clay Formation (Dorset and Wiltshire)

1.1.3 All infill material sources submitted will be checked on a case by case basis on the criteria set out above. No alternative materials can be used without the prior consent of the Contract Manager.

1.1.4 Unless otherwise agreed by the FC Contract Manager, all the materials, with exception of the heather bales, will be procured and supplied by the Contractor. The deliveries of all aggregates are to be ordered and managed by the Contractor.

1.1.5 As soon as possible after the Contract has been awarded, the Contractor shall submit to the

Employer for his approval a list of his proposed suppliers (with detailed quotes) and sources of materials required for the execution of the Works. The Contractor shall demonstrate that they can undertake an open and transparent process to procure the materials on an annual basis, considering all the local approved suppliers that can provide materials that comply with the specification stated under this contract. The Forestry Commission will need to see proof of the procurement process used.

- 1.1.6 If a mini-competition is held for specific works (Work Packages), the price submitted by the contractor will incorporate the materials following the specification given as part of the documentation for that job.
- 1.1.7 The materials subsequently supplied shall conform to the quality of samples which have been approved by the Contract Manager.
- 1.1.8 Names of additional suppliers and sources may be submitted by the Contractor during the execution of the Contract, but no source of supply shall be changed without the Employer's approval.
- 1.1.9 The contractor shall provide a relevant COSHH assessment for all materials supplied to the works and demonstrate that the information contained therein.
- 1.1.10 The contractor will be responsible for requesting the materials necessary for the works and for ensuring that only those materials necessary for the works are requested and delivered to the agreed storage areas on site. The subsequent removal or re-conveying of surplus materials will be the sole responsibility of the Contractor who will not be eligible to charge the Forestry Commission for any unnecessary materials ordered and not used.
- 1.1.11 Wherever, in respect of any British Standard (BS), a BSI Kitemark Certification Scheme is available, all materials required to comply with that Standard, or the containers of such materials, shall be marked with the BSI Certification Trade Mark (the Kitemark). The mark of conformity of any other third party certification body accredited by the National Accreditation Council for Certification Bodies or an equivalent mark shall be an acceptable alternative to this requirement.

1.2 STORAGE OF MATERIALS

- 1.2.1 Materials and components shall be stored in such a manner as to preserve their quality and condition to the standards required by the Contract.
- 1.2.2 Granular materials shall be handled in such a manner that no segregation, contamination or other deterioration of the material can occur.
- 1.2.3 Materials and components shall be handled in such a manner as to avoid any damage or contamination, and in accordance with all applicable recommendations of the manufacturers.

1.3 SPECIFICATION FOR TIMBER:

- 1.3.1 All timber must be sourced from a sustainably managed UK forest registered under the Forestry Stewardship Council (FSC) or with equivalent credentials. This will have to be proved by the supplier either with signed documentation or proof of membership.

2. WETLAND RESTORATION WORKS – GENERAL WORKS STATEMENTS

2.1 GENERAL

- 2.1.1 The contractor shall carry out his operation in such a manner as to avoid damage to, or deterioration of, the final surfaces of excavations.
- 2.1.2 Forest Enterprise will fell and remove all trees on land to be occupied by the Permanent Works. The Contractor might be responsible for felling some trees/scrub or relocating some felled trees to the appropriate location on site as directed by the Employer/Client.
- 2.1.3 Trees, shrubs, undergrowth, hedges and structures outside the working area for the permanent works shall not be interfered with in any way. Adequate precautions shall be taken to prevent damage to trees, shrubs, undergrowth or hedges where they are to be maintained.

- 2.1.4 All excavations shall be to the widths, depths, lengths and slopes as shown on the drawings or described in the specification or to such alternative depths and dimensions as may be directed by the Employer/Client.

2.2 EXCAVATION AND STORAGE OF TOPSOIL

- 2.2.1 Topsoil' shall mean the top layer of soil that can support vegetation.
- 2.2.2 Topsoil/existing turves and vegetation shall be required for re-use and it shall be stockpiled separately.
- 2.2.3 Topsoil/existing turves and vegetation may be required to be stripped from areas of the works (and in some instances following the direction of the FC Ecologist from areas over which machinery will be moving), but only immediately prior to commencement of works in each area.
- 2.2.4 Temporary stockpiles for topsoil shall not exceed 2.5 metres in height and shall be so formed that water will not lie on the surface. Any temporary stockpiles will be situated in locations to be agreed with the FC Ecologist.
- 2.2.5 Topsoil stockpiles shall not be contaminated by contact with subsoil, lime, petrol, oil or any other harmful materials. Topsoil shall not be buried by subsequent operations or compacted in any way as this would irreversibly damage its structure.

2.3 WORKS STATEMENTS

2.3.1 WORKS STATEMENT 1: MEANDER EXCAVATION

Excavation or clearing out of the original remnant stream meanders, and where required, excavation of new sections of meander to connect to the existing watercourse or link disconnected stretches of remnant meander.

- Meet with the **Forestry Commission CDM Project Designer** to identify the area of works. The access routes to be used during the works must be checked well in advance for any trees or branches requiring felling or cutting back to ensure safe passage for machinery. Additional felling to be marked up and undertaken by the method approved by the Forestry Commission, and by FC staff or its appropriately appointed contractors.
- Meet with the **Forestry Commission CDM Project Designer** to identify, mark up and mitigate where necessary/required all site specific sensitivities. A separate document lists a number of the likely sensitivities, the standard mitigation approach to be used and an indication of their impact on the delivery of the works.
- Meet with the **Forestry Commission CDM Project Designer** to mark out and agree the watercourse route, its dimensions, in-channel variation and special features (pools, bankside profiles, backwater areas, etc). Progress on this will be regularly reviewed during the meander excavation stage.
 - The desired channel width will vary both between sites and also along the length of the watercourse at each site. The typical range of restored channel width is from 100-500cm. Similarly, desired channel depth will also vary on site, and will vary between the sites. The typical range of restored channel bed depth is from 10-70cm, and is largely guided by the depth of the accumulated sediment/leaf litter, and the location of the original gravel stream bed, if present.
 - Deeper pools (up to 150cm deep, depending on channel dimensions) will be incorporated within the channel to slow flows, provide habitat diversity and refuges in periods of drought. Bankside angles and gradients will vary depending on the size of the watercourse, its sinuosity and the adjacent floodplain features.
- Before any meander preparation work starts, pump down the water level (if required) to ensure dry working conditions.

- If clearing out only is required, remove soft sediment/leaf litter and any obvious obstructions to flow (fallen trees, accumulations of woody debris), leaving this material heaped to one side for later drain infill and/or top-dressing. Ensure it is deposited in accessible locations for later remobilisation.
- If excavation is required, create a clear channel in the old meander course, following the route, dimensions and profile as marked out and agreed in advance with the **Forestry Commission CDM Project Designer**. Carefully remove the existing overburden/organic material on the line of the natural channel, taking particular care to lift sections of turf intact on lawn habitats. Temporarily store this material adjacent to the drain to be infilled, maintaining the surface layer for final habitat reinstatement.
 - Excavate/scrape down to the old riverbed using a 360° hydraulic excavator. The level of excavation is often indicated by an existing gravel layer. The depth of excavation will vary due to the old meander bed level rising and falling.
 - In locations where there is not a gravel bed beneath the accumulated sediment/leaf litter, once through the sediment **do not continue to excavate if the sub-soil is reached**. In this instance, contact the **Forestry Commission CDM Project Designer** for advice on how to proceed. Materials excavated shall be left to one side for later drain infill and/or top-dressing.
- Bankside edges must be reprofiled incorporating natural vegetation and turves to promote rapid consolidation of the restored course.
- Along gravel-bedded stretches where not much gravel bed has been found, supplement the restored meander with washed gravels (comparable in size to the naturally occurring gravels) to provide the basis of a bed. This should result in a minimum depth of gravels of 20cm (on stretches where gravels would naturally occur). Take into account the final desired channel width and depth when supplementing gravel beds.
- Along meanders where no gravels are evident, vegetation and turves should be removed, carefully set aside, the appropriate amount of material excavated and then the vegetation and turves replaced and dynamically compacted using an excavator bucket.
- Once the meander course is fully prepared, the section of bank at the upstream end of the meander will be removed to divert the existing watercourse's flow into the new meandering course. A clay plug will be installed to permanently divert the course of the stream.
- Immediately after the course has been diverted, excavate surface gravels/sediments from the bed of the now redundant drain channel and scatter these along the restored meander, to encourage colonisation of flora and fauna in the restored channel.

2.3.2 WORKS STATEMENT 2: BED LEVEL RAISING/PARTIAL DRAIN INFILL AND NARROWING USING HOGGIN/REJECTS

Bed level raising and/or narrowing (partial infill) of drainage channel using hoggin/rejects.

- Meet with the **Forestry Commission CDM Project Designer** to identify the area of works. The access routes to be used during the works must be checked well in advance for any trees or branches requiring felling or cutting back to ensure safe passage for machinery. Additional felling to be marked up and undertaken by the method approved by the Forestry Commission, and by FC staff or its appropriately appointed contractors.
- Meet with the **Forestry Commission CDM Project Designer** to identify, mark up and mitigate where necessary/required all site specific sensitivities. A separate document lists a number of the likely sensitivities, the standard mitigation approach to be used and an indication of their impact on the delivery of the works.
- Meet with the **Forestry Commission CDM Project Designer** to mark out and agree the restored watercourse dimensions, course within the footprint of the existing channel, in-channel variation and special features (pools, bankside profiles, backwater areas, etc). Progress on this will be regularly reviewed.

- The desired channel width will vary both between sites and also along the length of the watercourse at each site. In the case of bed level raising and channel narrowing, these dimensions are extrapolated from remnant meanders, or intact upstream or downstream reference points. The typical range of restored channel width is from 100-500cm. Similarly, desired channel depth will also vary on site, and will vary between the sites. The typical range of restored channel bed depth is from 10-70cm.
 - Deeper pools (up to 150cm deep, depending on channel dimensions) will be incorporated within the channel to slow flows, provide habitat diversity and refuges in periods of drought. Bankside angles and gradients will vary depending on the size of the watercourse, its sinuosity and the adjacent floodplain features.
- Pump water over between sections of restored meander to enable partial infill to be completed in a dry working environment. This will also ensure sediment release is minimised.
 - Excavate and set aside some of the gravel bed/sediment from the existing drain, to mitigate for the potential loss of fauna present in the stream bed.
 - Excavate any loose material and square off the section of drain channel to be partially infilled, taking care to retain any turf or bankside vegetation to use in bankside reprofiling and habitat reinstatement. Temporarily store this material adjacent to the channel for use in top dressing the completed section.
 - Bed level raising and/or narrowing may be done using just hoggin, or hoggin with rejects and bankside spoil as the infill material. These will be transported using tracked or wheeled dumpers (as agreed with the **Forestry Commission CDM Project Designer**), from the stockpile area to the area of drain that is to be partially infilled.
 - The hoggin/rejects must be built up to the new bed level height (to grade in to match the levels on the restored meanders, where present) in manageable layers, and dynamically compacted using an excavator bucket.
 - Most stretches partial drain infill will also include channel narrowing, where the channel width will typically be reduced by 50-300cm. If the existing channel is to be narrowed, the line of the restored channel will be meandered within the footprint of the existing wide channel, and the banksides built in using compacted hoggin dressed with any spoil and retained organic material.
 - Partial drain infill will involve the installation of clay plugs to the height of the infill to ensure that the imported stream bed is held in position. These will be put in every 15-20 metres. These plugs must be keyed in to the stream bed (by 50cm) and banks (50cm) to prevent water eroding around them.
 - Finally, the surface of the hoggin/rejects/clay plugs is dressed with the previously rescued gravel bed/sediment material to encourage colonisation of flora and fauna in the restored channel. This may be supplemented with appropriately sized washed gravels, where appropriate, to achieve a gravel bed depth of at least 20cm.
 - Banksides that have been narrowed will be top dressed with any retained natural vegetation and turves to promote rapid consolidation of the restored course

2.3.3. WORKS STATEMENT 3: BED LEVEL RAISING/PARTIAL DRAIN INFILL AND NARROWING/DRAIN INFILL USING HEATHER BALES

Bed level raising and/or narrowing of an existing watercourse in conditions with steep gradients which are likely to erode if hoggin and/or rejects is used, or complete infill of drainage channels or erosion nick points in mire habitats.

- Meet with the **Forestry Commission CDM Project Designer** to identify the area of works. The access routes to be used during the works must be checked well in advance for any trees or branches requiring felling or cutting back to ensure safe passage for machinery. Additional felling to be marked up and undertaken by the method approved by the Forestry Commission, and by FC staff or its appropriately appointed contractors.
- Meet with the **Forestry Commission CDM Project Designer** to identify, mark up and mitigate where necessary/required all site specific sensitivities. A separate document lists a number of the

likely sensitivities, the standard mitigation approach to be used and an indication of their impact on the delivery of the works.

- The heather bales will be provided by the Forestry Commission, who will arrange for their transport to the site using a tractor and trailer to minimise the number of passes. Where possible, these will be stacked adjacent to the drain. If ground conditions, tree cover or vegetation prevent this, then they will be stockpiled at the nearest appropriate location, to be agreed with the **Forestry Commission CDM Project Designer** or Forestry Commission HLS Works Supervisor.
- Bed level raising and partial drain infill and narrowing over stretches with steep gradients will incorporate a single layer of heather bales. If the infill requirements of the drain to be bed level raised or partially infilled are greater than a single bale depth (25-30cm when compacted) a layer of compacted hoggin or hoggin/rejects mix can be used as an initial 'packing' layer of infill below and beside the outer edges of intact entire bales.
- Complete infill of drainage channels or erosion nick points in mires will only use heather bales as infill material. In this instance, if the depth of the drain or area to be infilled does not correspond to entire bales, older broken bales can be used as an initial packing layer of infill below intact entire bales.
- In the case of bed level raising where the channel also requires narrowing, meet with the **Forestry Commission CDM Project Designer** to mark out and agree the restored watercourse dimensions, course within the footprint of the existing channel, in-channel variation and special features (pools, bankside profiles, backwater areas, etc). Progress on this will be regularly reviewed. As bed level raising a channel using heather bales indicates that a steeper gradient is present, such as at the end transition to an unrestored stretch downstream, opportunities for in-channel variation and special features may be limited.
- Pump water out of the works area to enable partial infill to be completed in a dry working environment. This will also ensure sediment release is minimised.
- In the case of bed level raising, excavate and set aside some of the gravel bed/sediment from the existing drain, to mitigate for the potential loss of fauna present in the stream bed.
- For both bed level raising/narrowing and complete drain/nick point infill, excavate any loose material and square off the area to be worked, taking care to retain any turf, bankside or mire vegetation to use in bankside reprofiling and/or habitat reinstatement. Temporarily store this material adjacent to the area being worked for use in top dressing the completed section.
- Transport heather bales (and clay, if bed level raising along a channel) from the stockpile area to the drain to be infilled using rubber tracked dumpers.
- Bed level raising and partial drain infill and narrowing where the dimensions are greater than a single bale depth will require the hoggin or hoggin/rejects mix to be built up in layers and dynamically compacted using an excavator bucket.
- Bed level raising and partial drain infill and narrowing will require the installation of clay plugs every 15-20 metres. These will be put in to correspond to the height of the gravel infill to ensure that the imported stream bed is held in position. These plugs must be keyed in to the stream bed (by 50cm) and banks (50cm) to prevent water eroding around them. The single layer of heather bales will not be interrupted by clay plugs.
- Once the initial packing material (either hoggin, hoggin/rejects mix and clay plugs, or broken bales in the case of mire habitats) has been installed, lay the finishing layer of intact, entire heather bales into the squared off area to be infilled using an excavator bucket, and dynamically compact them to ensure that there are no holes or pockets that could create a hazard for people or livestock.
- Stake each heather bale in place using 4' long, 2"x2" wooden stakes, two per bale. Cut off the top of the stakes where necessary to ensure that they lie flush with the surface of the heather bale.
- Where partial drain infill also requires channel narrowing, the line of the restored channel will be meandered within the footprint of the existing wide channel. A single layer of bales will be used for the channel bed, with the banksides built in using compacted hoggin dressed with any spoil and retained organic material.
- If undertaking bed level raising/partial drain infill, the surface of the heather bales will be dressed with the previously rescued gravel bed/sediment material to encourage colonisation of flora and fauna in the restored channel. This may be supplemented with appropriately sized washed gravels,

where appropriate, to achieve a gravel bed depth of at least 20cm, as advised by the **Forestry Commission CDM Project Designer**.

- If undertaking complete drain infill or infill of eroding nick points within mire habitat, spread any available spoil and retained vegetation over the surface of the bales, to accelerate colonisation and help with stabilisation. The finished infill level should be slightly proud of the surrounding ground level, to allow for settlement. If undertaking partial infill, this settlement must be taken into consideration when calculating final bed levels.

2.3.4 WORKS STATEMENT 4: DRAIN INFILL USING HOGGIN/REJECTS

Complete infill of redundant drainage channels (including vegetation reinstatement).

- Meet with the **Forestry Commission CDM Project Designer** to identify the area of works. The access routes to be used during the works must be checked well in advance for any trees or branches requiring felling or cutting back to ensure safe passage for machinery. Additional felling to be marked up and undertaken by the method approved by the Forestry Commission, and by FC staff or its appropriately appointed contractors.
- Meet with the **Forestry Commission CDM Project Designer** to identify, mark up and mitigate where necessary/required all site specific sensitivities. A separate document lists a number of the likely sensitivities, the standard mitigation approach to be used and an indication of their impact on the delivery of the works.
- Pump out any remaining pools in the redundant drain channel.
- Excavate surface gravels/sediment from the bed of the drain and immediately transfer to the newly restored meander route to introduce native material and wildlife, and encourage rapid colonisation of the new watercourse.
- Excavate any loose material and square off the section of the drainage channel to be infilled, to ensure that the introduced infill material will be suitably compacted. If there are spoil banks present on one or both sides of the drain line, these must also be levelled to ensure the floodplain functions correctly. Take care to retain any turf or bankside vegetation from the drain and adjacent spoil banks to use in reinstatement. Temporarily store this material adjacent to the channel for use in top dressing the completed section. Additional material recovered from levelling spoil banks should also be stored in the same way (but separately) for top dressing the infill material.
- Infill materials (hoggin, rejects and clay) will be transported using tracked or wheeled dumpers (as agreed with the **Forestry Commission CDM Project Designer**), from the stockpile area to the area of drain that is to be infilled.
- At the upstream end of the drain to be infilled, where the stream flow is to be diverted in to the newly restored meander, install a substantial clay plug. The plug will need to be 5-8m long (to be confirmed on site by the **Forestry Commission CDM Project Designer**) and will need to be firmly keyed in (1m either side and 50cm into clay bed). To achieve this, the clay will need to be compacted in shallow layers. The top of this important clay plug should be 10cm above the height of the surrounding floodplain. The face of the plug presented to the flow of the water (ie where the water hits it and is guided into the new meander) will need to be shaped in such a way as to convey the flow. By gently curving the face of the bund the water will enter the meander with reduced risk of future erosion (and repairs) during winter flows.
- Below the first clay plug, the hoggin and/or rejects must be built up in shallow layers ensuring thorough compaction of the material in order to avoid future settlement as far as is possible. Small amounts (no more than 15% of the infill) of any on-site cut timber may also be embedded in the hoggin as infill. The use of on-site timber as infill material must be discussed and agreed with the **Forestry Commission CDM Project Designer**. The finished level of the hoggin will need to allow sufficient space to top-dress the surface with the adjacent spoil and other excavated materials.
- Every 15-20 metres along the drain, install a clay plug. The method of installation is the same as the first one described above. However, these will be much smaller in size, 2m long and only keyed in to the banks and bed by 50cm. The height of these smaller clay plugs will again need to allow for top-dressing with local material. At the lower end of a drain infill section (ie where a meander crosses the line of the drain, or rejoins the drain line for a stretch of partially infilled channel) the final 2m will be infilled with a clay plug, regardless of distance from the previous one. This will ensure that

infill is not washed out when the stream is in spate. The result will be a drain completely infilled with hoggin or hoggin and rejects, with clay plugs at least every 20m.

- Top-dress the infill with all of the excavated material (from meanders), all of the adjacent spoil and any retained vegetation so that the **eventual** infill height is level with surrounding land. Immediately upon completion of works this top-dressing will therefore need to be slightly proud (5-10cm) of the surrounding floodplain to allow for minor settling.

2.3.5. WORKS STATEMENT 5: DEBRIS DAM CREATION

Installation of large woody debris within the channel.

- Meet with the **Forestry Commission CDM Project Designer** to identify the area of works. The access routes to be used during the works must be checked well in advance for any trees or branches requiring felling or cutting back to ensure safe passage for machinery. Additional felling to be marked up and undertaken by the method approved by the Forestry Commission, and by FC staff or its appropriately appointed contractors.
- Meet with the **Forestry Commission CDM Project Designer** to identify, mark up and mitigate where necessary/required all site specific sensitivities. A separate document lists a number of the likely sensitivities, the standard mitigation approach to be used and an indication of their impact on the delivery of the works.
- In conjunction with the **Forestry Commission CDM Project Designer** or Works Supervisor, identify adjacent trees to be used to create debris dams within the watercourse channel. Some will be existing fallen trees, others will require uprooting or felling.
- If debris dams are to be installed during the bird breeding season, the Forestry Commission's Head Keeper, Beat Keeper or the **Forestry Commission CDM Project Designer** must check the selected trees before they are felled or repositioned.
- A debris dam may consist of one whole tree or several parts of tree.
- Using an excavator, uproot, push over or move existing fallen trees (whole and in parts) and place in channel, to impede sediment movement. A chainsaw may be required to fell selected trees that cannot easily be uprooted. Positioning of material relative to the line of the watercourse should be varied – the objective is to mimic natural processes, rather than provide a specific prescription.
- Debris dams are to be randomly spaced along the watercourse, but not less than 10m upstream or downstream of a forest road, ride, track or crossing.

3.2.6 WORKS STATEMENT 6: FORD CONSTRUCTION

Creation or replacement of either vehicle or pedestrian fords/stock crossings on the line of the restored channel.

3.2.6.1 Vehicle Fords:

- Firstly restore the stream channel on either side of the ford crossing, as the restored level will dictate the finished height of the ford. However, it is important to ensure that the stream gradient across the ford is such that it does not cause erosion on the downstream side. If this proves unavoidable, one or two lines of staked heather bales will need to be installed in the channel on the downstream side to prevent future erosion. **Forestry Commission CDM Project Designer** to advise on site.
- Pump around to ensure working in a dry environment.
- At the vehicle ford location dig 2 trenches that are 4 metres apart, each 30cm wide & 45cm deep.

- In each trench drive in pointed oak posts (a minimum of 6 posts to support 2m boards) and nail horizontal oak boards to the inside face of them.

Backfill with a 1:1 mix of rejects and hoggin (mixed at stockpile), using the excavator bucket to compact in shallow layers.

3.2.6.2 Pedestrian fords/stock crossings:

- Dig 2 trenches that are 2 metres apart, each 20cm wide & 20cm deep.
- In each trench drive in pointed oak posts (a minimum of 4 posts to support 2m boards) and nail horizontal oak boards to the outside face of them. Board depth needs to be 15cm.
- Backfill with a 1:1 mix of rejects and hoggin (mixed at stockpile), using the excavator bucket to compact in shallow layers.

3.2.6.3 Bridge structures, vented causeways, passageways:

These works will be managed as directed by Forestry Civil Engineers (FCE), and potentially contracted out to local specialist contractors. The **Principal Contractor** may be required to work in conjunction with FCE staff/contractors to remove and/or install culverts and bridge structures, but all new solid structures will be designed and constructed by either FCE or their appointed contractors to approved specifications.

2.4 SITE SPECIFIC SENSITIVITIES AND MITIGATION

2.4.1 This section lists a number of the likely sensitivities, the standard mitigation approach to be used and an indication of their impact on the delivery of the works.

2.4.1.1 Commoners Stock

- If the site is located on the Open Forest or in a thrown open Inclosure, it will be subject to grazing by Commoners' stock throughout the year. Areas open to grazing should not be fenced off, but the site should be left safe when unattended (ie large holes should have sloping sides or an exit route for livestock). No cut yew is permitted to be left on the ground at all at any time. Machine operators must be vigilant for ponies, cattle, pigs and donkeys moving across the site at any time during the day or night.

2.4.1.2 Habitats

- All restoration sites will be within the New Forest Site of Special Scientific Interest (SSSI), and are also part of the New Forest Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar sites. Habitat types within and adjacent to the working area and access route will be identified and shown on a map.
- If pasture woodland is present, the Ancient Tree Hunt data shapefile, part of the FC Conservation Module in GIS Forester, will be checked to see if any significant veteran or character trees have been recorded in this area. The Survey of Open Forest Scots Pine Stands in the New Forest (2008) will be checked to confirm there are no landscape pines present within the site boundary. The deadwood resource within the Inclosure will be managed in accordance with UKWAS/FC national guidance 'Life in the Deadwood'. Deadwood in pre-Inclosures woodland (as identified in the Forest Design Plan) will also be managed in accordance with specifications in the New Forest SAC Management Plan 2001 and FC Local Management Guidelines for Fallen Wood (FC New Forest Management Plan Part B: The Crown Lands, Section B4 The Ancient & Ornamental Woodlands, Policy B4-7). The treatment of dangerous standing deadwood will be carried out in accordance with OGB1 Tree Safety and FC Woodland Management for Bats.
- The restoration methods, together with access routes and stockpile areas, have been designed to have minimal impact on the habitats present. Machinery will access the site via the agreed access routes, and the stockpiles for gravels and clay will be located at agreed locations

(where possible, on hardstanding within an Inclosure). No vehicles used during the proposed restoration may exceed the existing size or weight limits for the track, and tipper lorries delivering materials will remain on the track at all times. Restoration machinery will use existing vehicle tracks across the Open Forest wherever possible.

- The restoration working area will be minimised as far as practicable and machinery access routes will be selected carefully, taking account of ground conditions, archaeological and ecological constraints. Access routes and stockpile areas will be shown on maps.
- The work will be undertaken during the summer months, when water flows are low and ground damage from repeated vehicle passes can be minimised. The contractor will use low ground pressure tracked excavators, rubber tracked dumpers, bog mats and, if appropriate, propose other **innovative techniques** that limit ground disturbance (e.g. temporary light railways) specifically as agreed with and directed by the FC ecologist at the pre-start meeting, to reflect current ground conditions. If the ground is too wet or heavy rain is forecast, work will be postponed or suspended until ground conditions are suitable to ensure habitats are protected from unnecessary damage.
- The presence of any rare fungi, lower plants, vascular plants or plant communities will initially be assessed from prior review of environmental databases, site walkovers and information from FC Beat Keepers. If there is any indication that the works area is of high interest botanically, areas to be worked will be surveyed, and any rare fungi, lower plants, vascular plants or plant communities recorded. These will be avoided by machinery accessing the watercourse, or where necessary and appropriate, turves or vegetation will be translocated to areas within the footprint of the site that will not be directly impacted on by the works. Any turves or vegetation lifted to excavate remnant meanders will be relocated on the line of the infilled drain as part of the vegetation reinstatement process.

2.4.1.3 **Fish**

- The ecologist in charge of supervising the restoration work regularly liaises with the EA Fisheries Advisor to ensure suitable provision and/or safeguarding of important habitat features, to be incorporated as an integral part of the meander restoration work. These will be advised upon during the marking out stage of meander preparation.
- A number of New Forest watercourses run dry during the summer months, and therefore on these sites, there will be no impact on fish during the course of the on-site restoration work. If the watercourse to be worked on is still flowing (or has significant pools remaining at the time works are due to commence), a fish rescue will be undertaken by the Environment Agency. Electric fishing will remove as many fish as possible, and these will be released at a safe point further downstream.
- **Contractors will be required to erect a suitable temporary barrier (usually using heather bales) to upstream fish migration immediately after this operation.** The fish rescue should not delay contractors as this work will be done immediately in advance of works starting on the watercourse. If, however, there is heavy rainfall during the course of a site being worked, a further fish rescue may be required as fish will have potentially dropped down into/swum up into the worksite.

2.4.1.4 **Invertebrates – freshwater**

- Bankside and marginal vegetation and stream bed material will be recovered from the existing drainage channel and dispersed along the restored meander route, to help the recolonisation process for invertebrate fauna.

2.4.1.5 **Amphibians**

- The habitat potential of the works area for amphibians will have been considered and the access routes and working methods amended accordingly. Where great crested newts or natterjack toads are present, habitat management work must be carefully planned to comply with the legislation protecting these species. No works should be undertaken within 100m of a confirmed breeding pond. Access routes will have been selected to ensure that they do not

pass within 100m of a breeding pond or through habitat likely to provide optimal hibernation or resting sites.

- There is a possibility that great crested newts might occasionally be present at greater distances from a breeding pond, and operators will need to remain vigilant if working within 250m of a confirmed breeding pond, especially during the spring and autumn when newts are dispersing.

2.4.1.6 **Reptiles**

- The habitat potential of the works area for reptiles will have been considered and the access routes and working methods amended accordingly. Sub-optimal and low potential habitats will be used for access routes and works wherever possible. Where work is within good reptile habitat (e.g. mire, wet heath) on the edge of extensive suitable reptile habitat, this will provide ample opportunity for reptiles to disperse.
- The timing of the works means that reptile species are likely to be active (and therefore able to move) and less vulnerable to site work disturbance and direct impacts.
- On sites with good reptile habitat, to eliminate the risk to reptiles and ensure that an offence is not committed, a suitably qualified ecologist will:
 - ✓ Carry out a walkover survey of the works area and access tracks before machines are taken on site to reassess the required mitigation measures, in order to amend the advice to contractors, as appropriate;
 - ✓ Undertake a walkover clearance of the site immediately in advance of the first machine access. The first pass will flatten the vegetation along the main infill route, making it sub-optimal for reptiles;
 - ✓ Search dead wood and root bowls that have the potential to provide sheltering sites within the works. Dead wood will be transferred to the nearest suitable habitat out of the works area;
 - ✓ Give a tool box talk to all contractors working on site covering ecological issues, including protected species with a focus on reptiles and reptile habitat;
 - ✓ If common reptiles are found on site once work has commenced, a suitably qualified ecologist would relocate the reptile to the nearest suitable habitat. If a smooth snake is found on site during the works, works in that area would stop immediately and Natural England would be contacted. Only an ecologist with the appropriate smooth snake licence would relocate this species.
 - ✓ Works will follow best practice standards including the Herpetofauna Workers Manual (*JNCC, 2003*), the Reptile Habitat Management Handbook (Edgar, P. et. al, 2010) and Guidance on managing woodlands with sand lizard and smooth snake in England (*Forestry Commission and Natural England 2007*).

2.4.1.7 **Birds**

- Tree felling and vegetation clearance will be avoided during the bird breeding season. Should any further tree work or vegetation clearance be required during the bird breeding season, the area will be checked for active nests prior to works commencing; any active nests identified will be protected until the young have fledged. If the surrounding habitats are home to either Schedule 1, Schedule 5 or ground nesting bird species, these sites will only be worked after the end of the bird breeding season.

2.4.1.8 **Bats**

- Prior to any tree felling taking place, all trees will be assessed for potential bat roosts by a suitably experienced ecologist. No trees with potential roosts will be felled unless careful inspection has indicated that no bats (or evidence of bats) are present. The joint Forestry Commission/Natural England 'Guidance on managing woodlands with bats in England' will be followed.

2.4.1.9 **Badgers**

- The presence of setts will be identified from prior review of environmental databases, site walkovers and information from FC Beat Keepers. All off-track machinery access routes will be walked by a suitably qualified ecologist prior to their use by vehicles. In the unlikely event that a badger sett is recorded the access route will be altered to avoid any potential disturbance.

2.4.1.10 **Otters and water voles**

- The presence of undercut banks, and exposed bankside roots may provide opportunities for otter to 'lay-up' and/or have holts. Further targeted otter walkover surveys will be undertaken if required.
- The terrestrial habitat within the vicinity of the banks of the watercourses, in most locations, is either overshadowed or too closely grazed, and therefore does not offer suitable structural habitat to support water vole. Further targeted water vole walkover surveys will be undertaken if required.

2.4.1.11 **Archaeology**

- A desk-based assessment and walkover field survey is undertaken (either by the New Forest National Park Authority or an approved archaeological contractor) to provide a concise summary of the historic environment features identified in the area. Those features requiring consideration prior to restoration work are identified (within the working area, access routes and buffer zones), and prior to works commencing are marked up on a site walkover with the Archaeologist, the Forestry Commission CDM Project Designer and the Principal Contractor.
- A toolbox talk, specific mitigation measures (e.g. using bog mats to cross sensitive earthworks) and/or a watching brief during intrusive excavations in specific locations may be required. **This may slow the delivery of the works, and is therefore recognised as a chargeable item in the Bill of Quantities on a site specific basis.**

2.4.1.12 **Ordnance**

- Some parts of the New Forest have been used as military training areas and bombing ranges in the past. If evidence indicates that there is still ordnance present, suitably qualified ordnance contractors will be engaged to safely locate, clear and dispose of any remaining ordnance prior to the Principal Contractor commencing restoration works in the area. In some situations it will not be possible to check all areas (e.g. below stacked felled timber) before groundworks commence, and therefore ongoing liaison between the Principal Contractor and the approved ordnance contractor will be needed in order to utilise watching briefs, as required.
- All staff will be given a toolkit talk before being allowed to work on the site. **This may slow the delivery of the works, and is therefore recognised as a chargeable item in the Bill of Quantities on a site specific basis.**