CHAPTER 5: Construction Method Statement

General Description
It is proposed to construct and operate a small-scale hydroelectric scheme on the Kip Water, below the Loch Thom Compensation Reservoir, south of Greenock.

The proposed scheme will utilise excess water that is spilled from the Loch Thom Reservoir into the Compensation Reservoir during wet weather, and will transfer this by a new buried pipeline into the Daff reservoir which has a large storage capacity. The water flows into the Daff reservoir will be supplemented by the natural catchment of the reservoir, as well as regulated flows from the Kelly Reservoir, along a short southern section of the Kelly Cut.

At times of electricity generation, water will be transferred from the Daff Reservoir to a new powerhouse near the main road between Inverkip and Greenock through a new high pressure buried pipeline.

This pipeline will be routed beneath the existing railway line, through an existing farm vehicle access underpass, pending the successful conclusion of discussions with Network Rail.

The electricity generated will be exported to the nearby grid via 1.5km of new overhead power line, to a new switchroom, to be located at the minor road crossing of the Kip Water at Millhouse as detailed on the drawing “P783 10101 r2 Scheme Layout”. The switch will then connect by buried cable, laid alongside the pipeline, to the new powerhouse.

The construction of a storage hydroelectric generating scheme comprises the following, but not necessarily sequential, stages:

- Construction of site compounds, lay-down areas and other initial preparatory works;
- Delivery of equipment on to site;
- Initial construction works - Permanent and temporary access tracks, bridges etc.;
- Main construction works - Intake structure, pipeline, switchroom, powerhouse and tailrace; and
- Refurbishment of existing structures – the concrete lined existing southern section of the Kelly Cut, and pipework at the Kelly dam.
- Reinstatement.

The construction period is expected to last approximately 20 months, although much of the main construction works will be achieved in a shorter period of about 12-14 months.

This is possible by progressing key stages concurrently, which not only achieves cost-effective construction but also minimises disturbance-type environmental impacts and interruptions to activities on the site. However, it is likely that periods of poor weather, such as heavy snowfall or periods of high rainfall, will lead to temporary cessation of some aspects of construction, such as pipe laying and pouring concrete. Heavy rain would also interrupt intake weir construction.

The Construction Method Statement (CMS) with the description of works for the main elements is presented below and follows up the recommendations of separate reports carried out by independent professional consultants, with an expertise in Archaeology, Fisheries, Habitat, Bryophytes, Protected Mammals and Birds. Additional assessments of Access & Traffic, Hydrology, Landscape & Visual and Noise were carried out by Hydroplan.
There may be some changes to the method described as the project proceeds and as more knowledge of ground conditions is gained. However, the final detailed design is not expected to differ significantly from that described and any differences are not expected to have a material impact on the findings of this Supporting Environmental Information (SEI). In addition, the detailed design and the construction contract will ensure that the mitigation measures identified in this SEI, or measures achieving equivalent performance, are incorporated into the detailed design, construction and operation of the scheme.

This CMS looks at the construction of the access tracks, pipeline, intakes, powerhouse, switchroom and temporary construction areas. It considers how the construction of these may be made with as little disturbance to the environment as possible.
## Contents

- 5.1 Construction Elements ................................................................. 4
- 5.2 Common Working Methods ......................................................... 5
- 5.3 Pipeline – Daff Reservoir to Powerhouse ........................................... 6
- 5.4 Pipeline – Compensation Reservoir to Daff Reservoir ....................... 8
- 5.5 Pipeline – Common Working Methods ............................................... 9
- 5.6 Kelly Cut ....................................................................................... 10
- 5.7 Vehicle Access Tracks ..................................................................... 10
- 5.8 Peat Management & Moorland Restoration ....................................... 11
- 5.9 Groundwater Dependent Terrestrial Ecosystems (GWDTE) .............. 13
- 5.10 Intakes ......................................................................................... 14
- 5.11 Powerhouse .................................................................................. 16
- 5.12 Grid Connection ............................................................................ 18
- 5.13 Switchroom .................................................................................. 18
- 5.14 Construction Areas ........................................................................ 19
- 5.15 Water Crossings and Drainage ....................................................... 20
- 5.16 Environmental Protection .............................................................. 22
- 5.17 Timetable for Construction Works ............................................... 24
- 5.18 Guidelines and Communications .................................................... 24
5.1 Construction Elements

Table 5.1 Summary description of construction elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Drawing No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td>The main access routes for construction will be from the minor road that turns east off the A78 road between Bankfoot and Spangle, and climbs towards Loch Thom. From this road traffic will generally go to one of the two main construction compounds – either next to the Switchroom, or next to the Daff Reservoir. These are the locations where the majority of pipeline materials will be stored and construction will be serviced from. There will also be access taken from Bankfoot to the Powerhouse and from the public road at the Compensation Reservoir. However traffic to these locations will serve only local activities, and not the wider pipeline construction works.</td>
<td>P783 10104</td>
</tr>
<tr>
<td>Existing Access Tracks</td>
<td>Existing vehicle access tracks will be used and upgraded, if necessary, as detailed on the drawing. The notable existing vehicle tracks that will be used are the one that leads from the standeads at Bankfoot to the powerhouse location, another that crosses the railway line southwest of the Kip Water, and one that goes from the minor road above Bridgend to the Daff reservoir.</td>
<td>P783 10104</td>
</tr>
<tr>
<td>New Access Tracks</td>
<td>A new temporary access track will be formed alongside the pipeline route and will be removed after the works. The track will be formed from screened crushed rock that will be obtained from the deep excavation for the pipeline leading from the Daff reservoir. A new permanent track will be built at the eastern edge of Leapmoor Forest, where an existing track ends, to the intake at Daff Reservoir.</td>
<td>P783 10104</td>
</tr>
<tr>
<td>Pipeline – Compensation Reservoir to Daff Reservoir</td>
<td>This buried pipeline will be designed as an aqueduct, so that it will operate effectively even when only partially full. This will be a shallow gradient pipeline, and as the water will be unpressurised, HPPE plastic pipeline will be used.</td>
<td>P783 10101</td>
</tr>
<tr>
<td>Pipeline – Daff Reservoir to Powerhouse</td>
<td>For this buried pipeline of around 3km total length, the lower section of around half the total length will be formed from segmented push fit sections of GRP or ductile iron pipe that are designed for such high pressure water. The upper section of the pipeline, featuring lower pressure water, will utilise continuously welded HPPE (plastic) pipe.</td>
<td>P783 10101</td>
</tr>
<tr>
<td>Construction Areas</td>
<td>The main temporary construction compounds will be formed at the switchroom and the Daff Reservoir. These will service the main pipeline construction works. Smaller construction compounds will be formed at the powerhouse area and the location of intake at the Compensation Reservoir, which will serve these local construction works.</td>
<td>P783 10104</td>
</tr>
<tr>
<td>Pipe Lay Down Areas</td>
<td>Temporary pipe laydown areas will be located at the construction compounds by the switchroom and Daff Intake.</td>
<td>P783 10104</td>
</tr>
<tr>
<td>Borrow Pits</td>
<td>Aggregate required for construction works, primarily for the formation of vehicle access tracks, will be obtained from the rock excavated from the deep dig for the pipeline leading from the Daff reservoir.</td>
<td>P783 31001</td>
</tr>
<tr>
<td>Bridges &amp; Stream Crossings</td>
<td>One pipe bridge will be required across a minor stream/the aqueduct pipeline from the Compensation Reservoir. A number of new minor stream crossings will be required. These will be formed using new culverts, and engineering licences for these works will be obtained through the SEPA CAR licencing regime.</td>
<td>P783 30002</td>
</tr>
<tr>
<td>Compensation Reservoir Intake</td>
<td>This will be a new structure on the south bank of the Compensation Reservoir.</td>
<td>P783 20101, P783 20104</td>
</tr>
</tbody>
</table>
5.2 Common Working Methods

5.2.1 Prior to Construction Works

- Site management to contain working areas and access routes.
- Land made available demarked by temporary fence at commencement and fence retained until completion or such time as stock may be allowed access whereupon the fence will be removed.
- Prior to the commencement of any works, carry out long section survey of all the watercourses and natural drainage, leaving marking on the temporary fencing where such drainage enters and leaves the construction corridor so that during restoration such natural drainage may be re-instated.

5.2.2 Sediment Control measures

- Carry out works to natural drainage across the site, diverting or directing the watercourses so as to avoid erosion and outwash of disturbed soils.
- Silt traps will be placed at all possible outfalls to prevent silt from flushing across any peat surface
- Control and prevention of silt run-off and construction pollution into adjacent water courses by means of cut-off drains, silt traps and attenuation ponds, all to be removed and restored at completion.

5.2.3 Stripping and storing materials

- Careful side stripping of top peat from all areas to be disturbed. Depth of strip to be at least 250mm but to be determined on site depending on ground conditions. Peat and turf to be lifted and stored in one operation where possible and retained as intact turfs where feasible.
- Do not mix sub-soil with top-soil or peat.
- Use defined peat storage areas to avoid mixing of materials and double handling where possible, with peat stored ‘vegetation or turf side up’ to avoid desiccation.
- Substrate and turves will be stored separately for each habitat, particularly for flush, peat and woodland habitat.
- All material dug from the pipeline trench will be returned in the order of excavation so that all mineral soil dug out from the pipeline trench will be returned to the bottom of the trench.
- When returning excavated materials to the trench, provide an adequate layer of top-soil or peat for replaced turf species to root.
5.2.4 Turf Management

- Stripped turves should be stored at the edges of the construction corridor ‘vegetation or turf side up’ with adequate growing conditions e.g. water, light & temperature.
- Generally, turves will be placed ‘turf side up’ wherever possible. However, where space is restricted within the construction corridor, it may be necessary to stack the turves, up to a maximum of thickness of two turves.
- Avoid storing turves on good quality heath/blanket bog.
- Turves should be re-used in areas with similar vegetation and hydrology.
- Restoration of stripped turves should be replaced consecutive to track formation or backfilling of the pipeline to avoid prolonged storage of stripped materials and allow assimilation of the track to commence as soon as possible.
- The heath/bog turves should be replaced no later than 2-3 weeks after the initial cut. However, if this is not possible and heath/bog vegetated turves are to be stored for longer than 2-3 weeks, they should not be stacked. Providing there are adequate growing conditions, turves can be stored for up to 2 months during March/September (growing season).
- Grassland turves can be stored for a maximum period of 2 months.
- The scheme avoids flushes and Groundwater Dependent Terrestrial Ecosystems (GWDTE) where possible. However where turves will be stripped from GWDTEs, they should be replaced as soon as possible, ideally on the same day (please refer to Section 5.7).
- The geomorphology of some features, particularly flush and soak-away habitats, must be correctly re-established to ensure that the original hydrology is maintained.
- Turf transfer should not be undertaken in periods of hot and dry conditions or sub-zero conditions to avoid desiccation or frost damage.
- Monitor turves and water during dry spells to ensure that they remain viable and do not desiccate.

5.3 Pipeline – Daff Reservoir to Powerhouse

5.3.1 Description of Works

Approximately 1.5km of buried pipeline will be installed between the Compensation Reservoir Intake and Daff Reservoir, and approximately 2.5km of further pipeline between the Daff Reservoir and the powerhouse. A new temporary vehicle access track will be formed alongside this pipe route for the duration of the works, to enable transport of plant, materials and personnel. This track will be formed using crushed rock obtained from the deep dig and will be fully reinstated on completion of the works.

The pipe, which will be around 1m in diameter, will be buried in a pipe trench next to the temporary access track, and will be buried to a depth of around 1m cover, however this may be slightly deeper in places to maintain the design gradient on the pipeline. This trench will be excavated over short sections at a time, which will be reinstated as soon as the pipe has been buried. During excavation, stripping and storing of materials will conform to the method outlined in Section 5.2.

The majority of the pipes will be delivered to the larger construction compounds A and B; however a smaller number may be delivered to the compound D at the powerhouse area. The pipe-laying contractor will be responsible for moving the pipes from the compounds to
the pipeline route. It is expected that the pipe will be moved to the appropriate points along the pipe route with a tractor and trailer or similar.

5.3.2 HPPE Low Pressure Pipeline

The upper section of pipeline, which comprises around half of the overall length and contains lower pressure water, will be formed from continuously welded HPPE (plastic pipeline). This pipe material is delivered to site stacked on articulated lorries in 13.5m sections, which are then welded into strings of around 100m in length, which are of short enough length that they can be dragged by excavator to the appropriate section of the pipe route, for burial in a pipe trench. The trenches formed for these pipe strings are likely to be between 100 and 200m in length at any one time.

The first 200m of the pipeline below the new intake on the Daff Reservoir will require a relatively deep excavation, to keep the pipeline at a suitable depth of around 1m below the proposed lower operational water level for the Reservoir. This excavation will be up to 10 to 15m in depth (as detailed on drawing number P783 31001), and will be fully reinstated to the original profile on completion of this section of pipe laying.

5.3.3 High Pressure Pipeline

The lower section of pipeline, which is designed for higher pressure water, will consist of 6m long rigid pipe sections which are joined with a push fit socketed connection. These will either be of Glass Reinforced Plastic (GRP) or Ductile Iron (DI) material.

These pipes form slightly straighter curves than the HPPE pipe, and so cannot follow the terrain profile quite as well as HPPE pipe. This means that although this pipe material will again be laid to a depth of around 1m, it may at points be laid to a depth of up to 2m.

Another feature of laying these socketted pipes is that as each pipe segment is so short, the section of trench kept open at any time will only be up to around 20m in length, and will be closed over soon after the pipe has been laid.

The temporary access track along the pipeline will enable the delivery of each 6m pipe and the necessary back filling material. Installation of GRP requires that the pipe is laid on a prepared bed of graded material (40mm) and that it is supported and protected around its circumference by graded material not greater than 20mm.

The following preparations will be made prior to construction of the high pressure pipeline section, to minimise the extent of construction works.

- Trial pits must be dug along the pipeline route to confirm depth of peat, soil and rock.
- Suitable material to grade must be available either from the excavation of the pipeline itself or from an on-site borrow pit, or imported from a local quarry.
- The access track must be close to the pipe route so that pipes can be handled and graded material delivered to the pipe trench.
- Deep peat should be avoided.
- The route selected should minimise the need for rock excavation.

In summary, turf should be stripped off and kept separately so that it is not covered over and can continue to grow. Peat should be kept separately from mineral subsoil. The pipe will be bedded and surrounded by graded material and the trench will be filled in and compacted with mineral subsoil. The stripped area will be re-covered with peat and turf; boulders will be left strewn on the surface. The end result should fit into the landscape and should not be harrowed or reseeded but left rough to allow the original vegetation to re-establish itself.
5.3.4 High Pressure Pipeline - Steep section above the Powerhouse

This section is relatively steep, with a gradient of around 25%. This slope is of conventional steepness for hydro scheme pipeline works, and we are comfortable that our construction plant will be able to operate on this safely, and with no additional risk to personnel safety, or to the local environment. We are comfortable that this slope can be fully reinstated to its former habitat on completion of the works, through the common working methods described in section 5.2.

5.3.5 High Pressure Pipeline - section through railway underpass

We are currently in discussion with Network Rail to gain approval for our proposed methodology for these works. However our outline proposal (as detailed on drawing number P783 60003) has the following key features:

- The pipeline will pass through the viaduct above ground, on a straight or very long radius curve, which will ensure no thrust forces are transferred into the railway bridge structure
- The pipeline will rest either on a steel pipe bridge, or concrete pads at ground level, to ensure no excavations are required in the region of the railway bridge structure.
- The existing walkers path will be closed during a period of the works, however this access will be reopened on completion of the works.

5.4 Pipeline – Compensation Reservoir to Daff Reservoir

5.4.1 Description of Works

This will be an aqueduct style pipeline which will operate at low water pressure, and will be constructed from continuously welded HPPE plastic. This has the benefit of being able to form tight curves, in order to better follow the difficult terrain on the steep sided gorge of the Kip Water below the Compensation reservoir.

This will help to reduce the extent of depth and volume of excavations required. However these will still be substantial, at up to 8m in depth, in order to keep the pipe at an adequate depth below the Compensation Reservoir water level, which is necessary to drive the water through the pipeline.

A drawing “P783 30002 Pipeline Construction Sequence” has been produced detailing the extent and procedure for these excavations on this stretch of pipeline. These excavations will involve staged stripping of rock and soil down to the design depth of the pipeline, and the transporting of the material for local storage as detailed on the drawing.

As with the previously described section of HPPE pipeline, the excavations will be undertaken over stretches of around 150m to 200m at a time. Once the HPPE pipeline string of around 100m in length is placed in the design position, then the ground will be reinstated to the original profile. The excavations will be manged using the procedures and controls described in section 5.2, to minimise environmental harm during the works, and additional measures will be implemented to stabilise the steeper slopes, and promote the regeneration of vegetation on these slopes, as detailed on the drawing “P783 30002 Pipeline Construction Sequence”.
5.5 Pipeline – Common Working Methods

5.5.1 Pollution Control for Pipeline Works

The following mitigation is employed as best practice construction measures:

- SEPA Guidelines on pollution control should be followed.
- Work in dry areas by diverting/pumping the water body around the working area or alternatively by forming temporary culverts through the working area, after obtaining agreement from SEPA.
- Intercept surface run-off from undisturbed areas surrounding a site (e.g. by using cut-off trenches) and divert this around the works.
- The period of time that the stockpiles and ground are exposed will be kept to a minimum where possible and ideally the pipeline will be reinstated as soon as possible.
- Install silt traps at the toe of a slope where pipeline excavation or road construction crosses existing drainage. This will reduce silt transportation and to filter out suspended solids in the water caused by excavation works.
- Excavated materials will be kept well away from watercourses.
- Excavated rock, mineral soil and peat should be kept separate.
- Where pipe trenches are excavated in close proximity to the burn, storage of the materials can be on the topside on the trench, to prevent and excavated material falling into the watercourse.
- No plant or wheel washing will be carried out within 10m of the burn but at designated areas of hard standing.
- Fuel will be stored in steel bunded tanks away from any watercourse at designated construction compounds
- Pollution spill kits will be on site and any soils contaminated with fuel or oil will be removed to a suitable landfill site. All site staff will be trained in the use of spill kits.
- Chemicals and oils to be kept in a locked steel container away from any watercourse at designated construction compounds.
- Settlement ponds can be created as a control measure at the outfall of track culverts to allow suspended sediments to settle before entering a watercourse.
- Temporary, erosion proof, outfalls should be utilised where necessary.
- Ensure that developers, Contractors and others involved in earthworks which could pollute the water environment are aware of their statutory responsibly not to cause water pollution or damage habitats. All such persons should be aware, and should make their employees aware, of the likely causes and consequences of environmental pollution and should be familiar with any control measures and emergency procedures to be deployed.

5.5.2 Pipeline Corridors

The construction corridor for the pipeline will be kept to the minimum possible and is not expected to exceed a width of 30m as detailed on the drawings “P101 60001 Construction Corridor – HPPE” and “P101 60002 r0 Construction Corridor – GRP”.

5.5.3 Air Release Valves

Chambers are required to house the air release valves. These will consist of a flanged tee section of pipe to allow the connection of the air valve, and a simple chamber, constructed
using pre-cast concrete rings with a pre-cast concrete lid providing manhole access and ventilation. Being small in size (400mm high), these may be disguised by the judicious use of rocks during the reinstatement of the pipeline route.

5.6 Kelly Cut

Water from the Kelly Reservoir is going to be transferred to the Daff Reservoir for use by the hydro scheme. However enabling this will require minimal additional works. Scottish Water, who owned and operated but no longer use these two reservoirs, had formed the structure to transfer water from the Kelly Reservoir to the Daff Reservoir. This comprises a modern pre-cast concrete channel lining in the line of the Kelly Cut. This channel has since silted up and become overgrown with vegetation. The extent of works required to re-establish this water transfer regime should comprise cleaning the concrete channel in the Kelly Cut, and repairing and making good the existing pipe work at the Kelly Reservoir that feed the Daff Reservoir.

5.7 Vehicle Access Tracks

5.7.1 Overview

Vehicle access tracks to the Powerhouse and Intakes are required for the following reasons:

- Transport of plant, machinery and materials during construction
- Permanent access for operations and maintenance personnel.
- Permanent access for large plant required in operational maintenance at the intake and powerhouse, and for occasional servicing or removal and replacement of electro-mechanical plant at the powerhouse.

A temporary vehicle access track on the pipeline route is required during construction for the following reasons:

- Transportation of personnel, construction plant, pipe material, and pipeline backfill material.
- Movement of material during bulk excavation works, for temporary local storage.

5.7.2 Vehicle access across the railway

We are also currently in discussion with Network Rail to gain approval for taking construction vehicle access via the existing bridge over the railway, as detailed on drawing no. P783 10104. This is an operational vehicle bridge, and will have a maximum design loading, which will be able to ensure our construction vehicles do not exceed.

5.7.3 Construction methodology

Reference is made to the booklet “Constructed tracks in the Scottish Uplands,” published by SNH on which this method statement is based.

5.7.4 Method of Track Construction

Normal Track Excavation

Track construction will involve the normal procedure of stripping top peats and topsoil until solid substrate in unearthed and stockpiling in linear strips at the edge of the corridor (please refer to Section 5.2).

The tracks will be formed by laying a bed of crushed rock fill, which is then rolled and compacted to provide a surface capable of supporting heavy construction plant, and spreading its load across softer ground beneath. Where the road is required to cross
particularly soft ground, then the depth of the bed will be extended with coarser rock fill, which furthers the ability to spread the weight of traffic. The crushed rock used for the formation of the access tracks will either be obtained from the deep dig or from an existing local quarry.

Best practice guidelines will be followed for the restoration of the margins of the access tracks and extending over the disturbed area of the pipeline. The general principles will apply:

- In most cases and where cross slope is not steep, the corridor width will be kept to the minimum. Where tracks are to be cut into steep cross slopes or widening at corners is required, consideration will be given to widening the construction corridor to avoid side slopes that are too steep to allow soiling and re-establishment of vegetation and to allow integration of slopes into the adjoining landform.
- Where tracks will be permanent, restoration of the edges will be carried out progressively as part of the construction; this will consist of ensuring that excavated mineral soil is buried on top of mineral soil and covered over with vegetative/organic soil and covered with turf. The bulk of the restoration of verges and cuts should be undertaken consecutive to the initial track formation to avoid prolonged storage of stripped materials and allow assimilation of the track to commence as soon as possible.
- Where permanent tracks are to be narrowed post construction, the downhill side of the road surface will be broken up to relieve compaction and top soil / top peat material stockpiled adjacent to the tracks will be used to narrow the track to the agreed width. Soil will be placed to a rough uneven profile. For less steep sections the intake tracks, a thin covering of soil will be placed on the centre of the track to encourage the quick establishment of a central vegetated strip.
- Temporary tracks will be removed by breaking up the hard core of the track to relieve compaction and replacing the excavated topsoil and turves stockpiled adjacent to the track and pipeline. Temporary culverts will be removed and intercepting ditches will be filled in to restore the natural ground profile and maintain the original ground hydrology.
- Where rock is exposed, every effort is to be made to break up the profile; to round off the top edge; to create ledges and gullies where soil can be placed.
- Monitoring and management over a three-year post construction period to ensure establishment takes place with remedial work carried out if required.

5.8 Peat Management & Moorland Restoration

The key to successful restoration lies in managing the disturbance, so that it lasts for as short a period as possible, and planning the timing of the disturbance to offer the best conditions to do the work.

5.8.1 Guiding principles for restoration

Best practice guidelines will be followed in the restoration of the temporary construction impacts. The general principles include:

- Rapid, progressive restoration as the project proceeds, wherever possible, to reduce the duration of visual impact and to reduce the risk of loss, damage and desiccation to stockpiled top peat and turfs.
• Careful reinstatement of undulating / rough landform over construction corridor using re-spread till, rock and deep peat prior to final shaping with top peat and including forming watercourses to natural irregular alignment to match existing character and integration of the construction site into the adjoining rough and uneven moorland.

• Use of low ground pressure machinery and avoidance of over compaction and blade grading in placement of peat. Top peat will, in preference, be placed by digger bucket, loosely graded with bucket teeth and left rough and undulating. Where intact turfs are being placed these will be lifted in as large a unit as feasible and placed right side up, lightly compacted and all roots buried.

• Where surrounding landscape has numerous boulders on the surface, consideration will be given to retaining irregular groups of rock in random distribution.

• Removal of temporary culverts over water courses at completion and reinstatement of hydrology at completion.

• Utilising the existing top peat and turf as the principle material for reinstatement by careful placement of turfs with roots well buried and creating a matrix of cover over the site if there is a shortage of suitable turf material.

• Give consideration to the continuation of stock exclusion / additional stock management to reduce deer and sheep grazing within the establishment period.

• Monitoring and management over a three-year post construction period to ensure establishment takes place with remedial work carried out if required.

5.8.2 Peat Management

It is likely that there will be some deep peat on the site, in particular on flatter terrain at the higher ground, and in particular around the Daff reservoir. In order to avoid unnecessary excavation of the peat, floating tracks may be required, along with careful mitigation to minimise impact on peat wherever possible.

It is important to note that reinstatement of peat needs to consider the localised hydrology to ensure that the peat will regenerate. With reference to Scottish Renewable’s ‘Guidance on the assessment of peat volumes, reuse of peat and minimisation of waste’, the following guidelines for the management of peat will be followed:

• Peat re-use will be limited to the areas already disturbed during construction and that peat should not be spread on intact vegetated areas as this will smother vegetation.

• Surplus acrotelmic peat will be reused for track verge reinstatement where possible. The height of the deposited peat should not exceed 1m and the slope angle should not exceed 15° to ensure slope stability. Turves will be placed on top of the peat wherever possible to prevent desiccation. For tracks near to watercourses, the peat will only be reused on the topside of tracks.

• Should any surplus unconsolidated, saturated peat (catotelmic) arise during excavation, it can be used for the restoration of borrow pits. Surplus peat may be deposited at a maximum depth of 1m. Peat will only be used for borrow pit restoration if it can be placed on mineral substrate of a low drainage capacity to prevent degradation and maintain hydrology. Turves will be replaced on top, wherever possible to prevent peat desiccation. Alternatively, reseeding could be done, if appropriate and in consultation with an Ecologist, to help maintain structure.

• Surplus and excavated catotelmic peat will be kept well away from any watercourses.
- Peat may be utilised as backfill material for cable installations, although electrical and thermal design criteria will need to be considered. It is important that only peat uncontaminated with debris is used for this application (i.e. no large stones or tree stumps, etc.).
- Peat should be temporarily stored at areas where the mineral substrate is of a low drainage capacity.

5.9 **Groundwater Dependent Terrestrial Ecosystems (GWDTE)**

In order to minimise the increased drainage across any wetland habitats created by linear features (pipeline, drains), the following steps will be implemented:

- Where any GWDTE may be intersected by the pipeline or tracks, the habitat should be marked to prevent unplanned disturbance and the exact route through the habitat should be clearly defined.
- Approach flushes from either side using boards to protect the vegetation.
- Drains will be avoided as far as possible but, where necessary, will be dug around the contour rather than downslope.
- When laying pipeline, turves will be cut leaving the vegetation intact and replaced as soon as possible, ideally on the same day.
- Vegetation turves will be cut in an irregular pattern to prevent surface lines which may channel flow.
- If construction takes place during dry weather (or in the event of any delays to construction) water the turfes to keep them wet.
- Excavate the pipe trench, taking care to store topsoil and sub-soil separately.
- Install the pipeline and, if necessary, place clay bunds at more regular intervals to prevent the pipeline trench becoming a preferential conduit of water and to maintain groundwater flow through the wetland. Where more discrete groundwater flows are intercepted (flush/spring) a clay plug will be placed immediately either side of the feature to maintain the original hydrological conditions within the wetland either side of the pipeline.
- To prevent the pipeline trench from channelling the water along it, the peat within the trench will be returned to as near natural structure as possible. As much material will be returned to the trench as possible and tamped down very firmly to evict air and close any gaps caused by cutting, without causing compaction.
- Excavated material will be replaced in the order that it was removed.
- Take care to replicate the original soil profile and, in the case of flushes, recreate any slight depression that channelled the flush across the peat.
- Replace the turves, with any flush turves replaced along the original line of the flush.
5.10 Intakes

5.10.1 Description of Works

The intakes required for the scheme are one on the Compensation Reservoir, and one on the Daff Reservoir.

The intakes (detailed on drawing nos. P783 20101 and P783 20201) will be similar in style and will feature three main elements:

- Firstly each will be a buried concrete box structure, which provides a suitable depth of water above the mouth of the pipeline, which is necessary for effective hydraulic operation of the pipeline.
- Secondly each will incorporate a steel gate that can be lowered to restrict water movement into the pipeline, for maintenance or other operational purposes.
- Thirdly each intake structure will incorporate a metal screen to restrict debris from being drawn into the pipeline.

Each intake will be constructed within a small excavation on the edge of the loch. A small temporary concrete cofferdam, of around 1m in height, will be formed between the work area and the edge of the loch, prior to the commencement of the excavation. This will minimise water ingress into the excavation from the loch. Surface water drainage will also be provided, in the form of shallow ditching across the slope above the excavation, that will direct surface water run-off into the loch and so also minimise water entering the excavation. Where pumping is required, to remove any residual water that does enter the excavation, this will be pumped onto the rough moor land at least 10m from the loch shore, to ensure that this silt laden water soaks into the ground rather than contaminating the loch.

5.10.2 Sequence of Operations for Construction of intakes

1. Arrive on site and receive site induction.
2. Erect appropriate signage.
3. Take receipt of relevant drawings.
4. Carry out a site survey.
5. Mark out “no go” zones.
6. Dig shallow trench down to firm material or bedrock, on the edge of the loch but outwith the water.
7. Cast temporary concrete cofferdam wall on line of the trench
8. Excavate the intake area down to base of the structure using an excavator.
9. Keep excavated material away from edge of watercourse in separate heaps.
11. Install steel reinforcement.
12. Install valves and fittings.
13. Construct formwork.
15. Strike formwork once the concrete has been cured.
17. Place second lift of concrete and compact.
18. Fix fixtures and fittings.
19. Install inlet screens.
20. Replace excavated material around intake, bring ground back to original profile.
21. Remove the temporary cofferdam and reduce the ground level in front of the intake screens, to the bottom water level for the hydro scheme.
22. Excavate bed of loch around
23. Remove pollution control methods.
24. Tidy site on conclusion.

5.10.3 Pollution Control for Intake Works

During the intake works the following pollution risks have been identified:

- Loch level rising and overflowing so construction area is inundated.
- Excess silt being washed into the loch.
- Oil and fuel entering the loch.
- Chemicals entering the loch.

At all the stages of construction, the contractor will be contractually bound to follow the relevant pollution prevention guidelines which will include the following mitigation measures:

- SEPA Guidelines on pollution control should be followed.
- Prior to construction a shallow ditch will be formed across the hillside upstream of the works to divert surface water run-off around the working area to prevent it from draining into the excavation.
- The temporary cofferdam will be formed between the loch and the excavation area, to a length and depth that it will mitigate the majority of groundwater seepage into the excavation
- Excavated material should be kept well away from the loch shore.
- Excavated rock, mineral soil and peat should be kept in separate heaps.
- Pouring of concrete should not take place when heavy rain is imminent.
- Cementous material will not be placed into water.
- Fuel will be stored in steel bunded tanks away from the loch and surface water drainage that feeds into the loch.
- Chemicals and oils to be kept in a locked steel container.
- Any static water should be pumped onto the surface not less than 10m away from the watercourse. The pumping of water will prevent stop any suspended solids from entering the loch.
- Pollution spill kits will be on site and any soils contaminated with fuel or oil will be removed to a suitable landfill site.
- All operatives made aware of the need to prevent the loch from being contaminated.
5.11 Powerhouse

5.11.1 Description of Works

The powerhouse, as shown on Drawing No. P783 40102 will include the construction of a substantial concrete sub-structure capable of withstanding the thrust of the entire pipe line; the superstructure including a gantry crane, pigging chamber, tailrace and the connection of the pipeline to the main inlet valve and turbine will be an integral part of this.

The powerhouse will house one turbine, one synchronous generator and control equipment; it will be constructed as a portal frame structure on a reinforced concrete floor, and will be partially buried with the visible walls stone clad and a slate roof.

5.11.2 Sequence of Operations for Powerhouse Construction

1. Arrive on site and receive site induction.
2. Create appropriate signage.
3. Take receipt of relevant drawings.
4. Carry out a site survey and mark out "no go" zones
5. Removal and storage of vegetation and topsoil
6. Remove over burden to base rock using an excavator.
7. Move excavated material to contractor’s compound.
8. Excavate rock to formation level.
9. Drill rock head and fix steel dowels.
11. Install steel reinforcement.
12. Install Earth network
13. Construct formwork.
14. Place concrete.
15. Compact concrete using a vibrating poker.
16. Strike formwork once the concrete has been cured.
17. Where a second lift of concrete is required, place second lift of concrete and compact.
18. Take structure up to foundation level (ready for the Steel Erector sub-contractor, if appropriate).
20. Carry out ground works including reinstating and landscaping around powerhouse.
22. Tidy site on conclusion.

5.11.3 Tailrace

The flow from the turbine will discharge into a tailrace pit, which will return the water via a partially covered open channel directly to the Kip Water. Attention will be given to the design so that water velocities do not lead to any scouring of the river bank or act as an attractant flow for fish. This could include widening and deepening the outfall of the tailrace structure to decelerate flow velocities.

Provision has been made for the exclusion of mammals and any migrating fish. Particular attention will be given to the visual appearance, i.e. by minimising exposed concrete where possible.
5.11.4 Tailrace Construction Sequence

- Construction will adhere to the guidelines for in-river works (Section 5.11.5)
- Excavation of the tailrace area down to bed rock or solid ground – some bed rock may need to be removed to gain sufficient depth. Existing bed material to be placed to one side for reinstatement
- The floor slab will then be cast in concrete
- Once cured the main outfall structure will be shuttered and cast with reinforced concrete, around the pipe from the turbine
- Wing walls will be completed, tied into the banks
- River bed reinstated to original level
- Bank and bed scour protection (gabions and/or boulders in concrete) will be completed
- Outfall screens fitted

5.11.5 Pollution Control for In-River Works

During the intake works the following pollution risks have been identified while redirecting the watercourse:

- Water level rising and overflowing so construction area is inundated.
- Excess silt being washed into the watercourse.
- Oil and fuel entering the watercourse.
- Chemicals entering the watercourse.

At all the stages of construction, the contractor will be contractually bound to follow the relevant pollution prevention guidelines which will include the following mitigation measures:

- SEPA Guidelines on pollution control should be followed.
- Excavated material should be kept well away from the watercourse.
- Excavated rock, mineral soil and peat should be kept in separate heaps.
- Pouring of concrete should not take place when heavy rain is imminent.
- Cementous material will not be placed into water.
- Fuel will be stored in steel bunded tanks away from any watercourse.
- Chemicals and oils to be kept in a locked steel container.
- Any static water should be pumped onto the surface not less than 10m away from the watercourse. The pumping of water will prevent stop any suspended solids from entering the watercourse.
- Pollution spill kits will be on site and any soils contaminated with fuel or oil will be removed to a suitable landfill site.
- All operatives made aware of the need to prevent the watercourse from being contaminated.
- Regular monitoring of water quality downstream of these should be carried out.

5.11.6 Transformer compound

The transformer and associated switchgear will be located within a fenced compound, immediately next to the powerhouse building, as shown on the Drawing No. P783 40102.
5.11.7 Pollution Control

At all the stages of powerhouse construction, the contractor will be contractually bound to follow the relevant pollution prevention guidelines which will include the following mitigation measures:

- Regular monitoring of water downstream of the works should be carried out
- Excavated material should be kept well away from the watercourse
- Excavated rock, mineral soil and peat should be kept separate
- Pouring of concrete should not take place when heavy rain is imminent
- Any static water should be pumped on to the surface not less than 10m away from the watercourse
- SEPA Guidelines on pollution control should be followed.

5.11.8 Pipe Bridge

A pipe bridge will be required to carry the pipeline across the Kip Water from the foot of the steep slope. The bridge is detailed on Drawing No. P783 30002. It will require a concrete abutment on each bank, which will support a steel frame to carry the pipeline segments.

5.12 Grid Connection

The developer has a grid connection offer that would provide a connection to the national electricity grid via the installation of approximately 1500m of new 11kV overhead power line (supported on wooden poles). These works would be consented by the DNO under Section 37 of the Electricity Act.

The connection that this offer is based in is for a previous proposed powerhouse location, close to Majeston Farm, and near the construction compound A.

There will be a switchroom constructed at this location, which will house the switchgear necessary for enabling a connection onto the national electricity grid (as described below in Section 5.13). There will then be a buried cable laid from this switchroom to the powerhouse, alongside the route of the pipeline.

Please refer to Drawing No. P783 10103 for the grid connection arrangement.

5.13 Switchroom

The switchroom will house the 11kV switchgear and ancillary equipment. It will be constructed as a portal frame structure on a reinforced concrete floor with rendered concrete block walls and a profiled tin roof (please refer to Drawing No. P783 50112).

5.13.1 Description of Switchroom Works

After the switchroom building positions have been surveyed and laid out, careful consideration should be given to using the excavated spoil in the most effective manner. It is expected that the excavation of the switchroom will provide some turf which may be used in the restoration of the pipeline.

- Site preparation
  - Excavation of foundations for switchroom floor wall footings
  - If required, pumps will be used to keep the working area dry and this will be discharged to a settlement pond dug several meters away from the adjacent Kip Water.
- Construction
5.14 Construction Areas

5.14.1 Locations of Construction Areas

Construction Areas will generally be located on naturally flat terrain. Four construction areas are shown on Drawing No. P783 10104.

- Construction compound A will be positioned at the switchroom, and will be one of the two main pipe laydown areas for receiving the articulated lorry deliveries, and storing the pipe. This will be the main storage area for pipeline and materials required on the lower half of the pipe route.
- Construction compound B will be located by Daff Reservoir, and will be main storage location for HPPE pipeline used on upper section of the pipeline from Daff Reservoir, and for the pipeline from the Compensation Reservoir to the Daff Reservoir.
- There will be two smaller construction compounds, C and D, located at the Compensation Reservoir and the powerhouse, and these will be used for the construction of these structures, and other works in the immediate area.

5.14.2 Pollution Control

This type of construction involves limited use of hazardous substances; however, activities associated with the transfer or storage of fuel and lubricants have the potential to cause pollution by contamination of the sub soil and by transfer directly into the watercourse. The following mitigation measures should be put in place to ensure that this cannot happen:

- The compound should be sited on a level area.
- The compound should not be directly adjacent to the watercourse.
- Refuelling and the storage oils and other hazardous substances will take place at Construction Compound A or B. These sites adhere to the Best Practice guidance of a minimum 10m buffer from the nearest watercourse.
- There should be no artificial drainage associated with the compound that could lead to accidental spillage (if any) reaching the watercourse.
- All used oil and filters should be removed from the site immediately.
- Any hazardous substances should be kept in a locked container, away from any watercourse.
- Fuel will be stored in steel bunded tanks away from any watercourse.
- In the event of contamination of any part of the compound, the area should be immediately excavated, stored on a chemical resistant material and disposed of by an approved contractor. SEPA should be notified to this.
- All staff should be made aware of their responsibility to protect the environment.
- A copy of SEPA’s Pollution Prevention Guidelines – PPG 2, 5, 21 and 26 should be kept on site.
- On completion of construction, the hard standing area will be reduced in size by covering over, reusing firstly the subsoil and then the organic material.
5.15 Water Crossings and Drainage

This section sets out in detail the procedure for in-river works and draws upon both previous site experience and SEPA’s *Good Practice Guide for River Crossings*.

As the track and pipeline traverses the hillside, it is required to cross a number of small streams and ditches. Intercepting ditches and cut off drains will be re-established on the topside of the track; this will not serve to transfer water horizontally for long distances or to concentrate run off where it did not exist before. Where a topside drain or cut through a bank on the top side of the track is made, the peat and turf should be re-used within a few hours to cover over the change in land form.

The type of water crossing employed is dependent on the size of the watercourse, width of the channel and the depth of the river banks. The proposed number, type and locations of watercourse crossings will be dependent on further topographic survey that will be undertaken nearer to the time of construction.

5.15.1 Typical Track Culverts

Where the burns are less than 2m in width, twin-walled plastic culvert pipes are preferred. Culverts will be placed to preserve the continuity of the existing drainage; they should be placed at locations where streams or natural drainage channels cross the track route. They should also be located at regular intervals between these points (Table 5.2).

<table>
<thead>
<tr>
<th>Ditch Gradient %</th>
<th>Normal Conditions</th>
<th>Very Wet or Steep Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ground Cross Slope &lt;15%</td>
<td>Ground Cross Slope &gt;15%</td>
</tr>
<tr>
<td>&lt;4</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>160</td>
<td>80</td>
</tr>
<tr>
<td>6</td>
<td>130</td>
<td>65</td>
</tr>
<tr>
<td>7</td>
<td>115</td>
<td>55</td>
</tr>
<tr>
<td>8</td>
<td>100</td>
<td>45</td>
</tr>
<tr>
<td>9</td>
<td>90</td>
<td>40</td>
</tr>
<tr>
<td>10</td>
<td>80</td>
<td>35</td>
</tr>
<tr>
<td>11</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>12</td>
<td>65</td>
<td>25</td>
</tr>
</tbody>
</table>

The existing normal watercourse channel width will be maintained and if multiple barrels are required, channel width will be maintained across all barrels.

Culverts will be placed in deep enough and at an angle so as to avoid scouring at the outfall. The exit points of culverts should not be on to peaty soils in order to avoid scouring and peat erosion. Where possible, the culvert will be laid below bed level to attempt to retain material and replicate a natural bed. The calculated culvert capacity will take this into account, in addition to flow and flood levels (Please refer to Drawing No. P101 60010).

Where the pipeline is to be constructed adjacent to the track, the hydro pipe can also be positioned across the culvert pipes and mounded over, adjacent to the track.

5.15.2 Track Culvert Construction Sequence

- Install silt traps downstream of construction area.
- Place [number] closed pipe culvert barrels of suitable dimensions in the burn.
• Install the hydro pipe across the culverts.
• Construct a stone riprap or a concrete headwall at the inlet and outlets for scour protection. Depending on whether concrete is required, it may not be necessary to divert the watercourse as the flow will be directed straight through the construction area via the culvert.
• The culvert (and hydro) pipes are mounded over with earth or a rock-free compacted fill.
• A surface fill can be laid on the top so that the crossing is suitable for construction vehicles.

5.15.3 Typical pipe crossing below original ground level

The hydro pipe can be buried underneath the burns and the river bed is backfilled and the original channel restored. Depending on the depth of the pipe, it may be necessary to reinforce the channel to prevent erosion (using a gabion or reno mattress for example).

5.15.4 Construction Sequence for Pipe Crossings below Original Ground Level

• Make a small diversion upstream of the construction area and install silt traps downstream of the construction area.
• Pump any excess water into settlement ponds so that the construction area is kept dry.
• Excavate riverbed for pipe trench.
• Bed the hydro pipe in rock-free material and then backfill with river bed material so that the natural channel width and depth are restored.
• It may be necessary to lay a geotextile liner above the pipe bedding material, with a reno/gabion mattress on top, to prevent and erosion of the river bed once reinstated.
• Remove diversion so that the river flow continues down the natural stream channel.

5.15.5 Pollution control

During the in-river works for water crossings, the following pollution risks have been identified while redirecting the watercourse:

• Water level rising and overflowing so construction area is inundated.
• Excess silt being washed into the watercourse.
• Oil and fuel entering the watercourse.
• Chemicals entering the watercourse.

At all the stages of culvert construction, the contractor will be contractually bound to follow the relevant pollution prevention guidelines which will include the following mitigation measures:

• SEPA Guidelines on pollution control should be followed.
• Track culverts will be made of inert materials.
• If concrete is required, please refer to Section 5.9 Pollution Control for In-River Works
• Sediment traps should be installed on watercourses downstream of the works and regular monitoring of the watercourses should be carried out.
• Excavated material should be kept well away from watercourses.
• Excavated rock, mineral soil and peat should be kept separate.
Any static water should be pumped on to the surface not less than 10m away from the watercourse.

5.16 Environmental Protection

Table 5.3 lists the potential environmental hazards and associated mitigation measures specific to the construction phase only. The environmental impacts of the scheme as a whole, including long-term impacts from operation, are considered in Chapter 4 of this ES, and the impacts and mitigation are listed in Table 4.2 at the end of that chapter.

Table 5.3 Summary of Construction Phase Environmental Protection Measures

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Silt entering nearby watercourses and making the water turbid and</td>
<td>• Install geotextile material below areas of excavation to filter out suspended solids in the water</td>
</tr>
<tr>
<td>causing damage to aquatic plants and fish populations</td>
<td>• Install silt traps on construction area drainage and service on a daily basis where siltation is likely to be a problem</td>
</tr>
<tr>
<td>2 Cement entering the watercourse</td>
<td>• Pour cement used in the construction of project structures in accordance with SEPA pollution prevention guidelines 5 &amp; 6</td>
</tr>
<tr>
<td>3 Spilled / leaked vehicle fuel and hydraulic oil entering watercourses,</td>
<td>• Store diesel in double skinned, bunded tanks with 110% required capacity away from watercourses</td>
</tr>
<tr>
<td>affecting water quality and fish populations</td>
<td>• Check construction vehicles leaks and supply spillage contingency kits</td>
</tr>
<tr>
<td></td>
<td>• Adequately maintain vehicles</td>
</tr>
<tr>
<td>4 Oil and fuel contaminated soil</td>
<td>• Keep pollution spill kits on site</td>
</tr>
<tr>
<td></td>
<td>• Move soils contaminated with fuel or oil to a waste site with appropriate licence to accept such special waste by a Registered Waste Carrier</td>
</tr>
<tr>
<td></td>
<td>• Correct paperwork will be in place</td>
</tr>
<tr>
<td></td>
<td>• SEPA will be notified of an incident</td>
</tr>
<tr>
<td>5 Chemicals entering the watercourse</td>
<td>• Keep chemicals and oils in a locked bunded steel container</td>
</tr>
<tr>
<td></td>
<td>• Avoid using polluting substances</td>
</tr>
<tr>
<td></td>
<td>• Advise workers of importance of avoiding spillage</td>
</tr>
<tr>
<td>6 Waste water drainage</td>
<td>• No waste water will be generated during operation of the scheme</td>
</tr>
<tr>
<td></td>
<td>• Any temporary waste generated during construction for welfare facilities (e.g. portalos) will be removed by a registered waste carrier to a licenced disposal site</td>
</tr>
<tr>
<td>7 Protected mammals such as badgers and otters becoming trapped within</td>
<td>• Adopt a cut and fill strategy such that the length of open pipe run is minimised</td>
</tr>
<tr>
<td>open pipe runs</td>
<td>• Install ramps at frequent intervals within open pipe runs at the end of each working day</td>
</tr>
<tr>
<td></td>
<td>• Cap the open ends of stored and installed pipes to prevent access to animals</td>
</tr>
<tr>
<td>9 Trampling and vehicle damage during the construction phase</td>
<td>• Confine the pipeline corridor to a width of 30m</td>
</tr>
<tr>
<td></td>
<td>• Use vehicles designed to spread load and excavators with wide tracks</td>
</tr>
<tr>
<td></td>
<td>• Wherever possible route vehicles to avoid flushes, streams and soaks</td>
</tr>
<tr>
<td></td>
<td>• Ensure that culverts used are made out of a neutral pH material and are large enough to carry heavy flow</td>
</tr>
<tr>
<td></td>
<td>• Culvert all burns alongside tracks to avoid erosion of track sides</td>
</tr>
<tr>
<td></td>
<td>• Take care to avoid disturbing the soil around the streams enabling the groundwater to seep naturally through the peat</td>
</tr>
<tr>
<td></td>
<td>• Minimise the number of journeys made across unprotected ground</td>
</tr>
</tbody>
</table>
### Best Construction Practice Environmental Protection Measures

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Mark out areas which should not be touched</td>
</tr>
<tr>
<td></td>
<td>• Advise all staff as to where important habitats are and provide alternative routes to avoid crossing them</td>
</tr>
<tr>
<td>10 Changes to drainage regime during construction</td>
<td>• Avoid drains as far as possible but, where necessary dig around the contour rather than downslope</td>
</tr>
<tr>
<td></td>
<td>• Do not use drains to transfer large volumes of water laterally</td>
</tr>
<tr>
<td></td>
<td>• Make culverts from a material with a neutral pH</td>
</tr>
<tr>
<td></td>
<td>• Ensure that culverts reserve natural drainage continuity</td>
</tr>
<tr>
<td></td>
<td>• Ensure that culverts do not lead to erosion, scouring or spread of sediment</td>
</tr>
<tr>
<td>11 Damage to vegetation and habitat</td>
<td>• Cut turves leaving the vegetation intact and replace as soon as possible</td>
</tr>
<tr>
<td></td>
<td>• Avoid stacking turves wherever possible. If this is unavoidable, stack at a maximum of two turves thick</td>
</tr>
<tr>
<td></td>
<td>• Avoid all linear features, for example, pile excavated peat in heaps rather than as a continuous strip-pile</td>
</tr>
<tr>
<td></td>
<td>• After back filling, spread excess peat thinly over the peat surface</td>
</tr>
<tr>
<td></td>
<td>• Pile excavated mineral subsoil and return mineral soil</td>
</tr>
<tr>
<td></td>
<td>• Keep all excavated peat soil separate from mineral soil</td>
</tr>
<tr>
<td></td>
<td>• Place all excavated mineral soil at bottom of trench</td>
</tr>
<tr>
<td></td>
<td>• Ensure that turves are irregular in shape and replaced as soon as possible</td>
</tr>
<tr>
<td></td>
<td>• Return the peat within the trench to as near natural structure as possible</td>
</tr>
<tr>
<td></td>
<td>• Consolidate mineral soil and peat round pipe to exclude air and avoid water following the pipeline</td>
</tr>
<tr>
<td></td>
<td>• Restore vegetation cover to as it was before construction</td>
</tr>
<tr>
<td>12 Damage/disturbance to fish populations</td>
<td>• Construct tailrace (in-river works) 1st June - 30th September</td>
</tr>
</tbody>
</table>

### Site-Specific Environmental Protection Measures

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Destruction of Archaeology</td>
<td>• Site 4 – care to be taken to ensure preservation of this route by integrating the new track into the old track</td>
</tr>
<tr>
<td></td>
<td>• Site 6 – keep damage to a minimum and reinstate after construction</td>
</tr>
<tr>
<td></td>
<td>• Site 9 – must be avoided – ensure a 10m buffer around the site and mark with orange fencing</td>
</tr>
<tr>
<td></td>
<td>• Site 10 – Avoid and mark out on ground using orange fencing</td>
</tr>
<tr>
<td></td>
<td>• Site 11 – Avoid, if not possible microsite, keep damage to a minimum and re-instate after construction</td>
</tr>
<tr>
<td></td>
<td>• Site 12 – avoid and upgrade track on the NW side</td>
</tr>
<tr>
<td>14 Disturbance to Birds</td>
<td>• Subject to monitoring, a possible constraint to construction work at the intake may be required between April – August for Red Throated Diver</td>
</tr>
<tr>
<td></td>
<td>• Brief workforce on sensitive locations</td>
</tr>
<tr>
<td></td>
<td>• Mark out ‘no-go’ areas prior to construction works</td>
</tr>
<tr>
<td>15 Protection of Protected Mammals</td>
<td>• Pre-construction surveys to determine presence of protected mammal species</td>
</tr>
</tbody>
</table>
5.17 **Timetable for Construction Works**

Table 5.4 provides an approximate indication of the construction programme and the duration of each construction phase.

**Table 5.4  Indicative Programme for Construction Works**

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th></th>
<th>2020</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>J</td>
<td>F</td>
<td>M</td>
<td>A</td>
<td>M</td>
<td>J</td>
<td>J</td>
<td>A</td>
</tr>
<tr>
<td>Duration of Construction Period</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
</tr>
<tr>
<td>Access Tracks &amp; Bridges</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
</tr>
<tr>
<td>In-river works (intakes/tailrace)</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
</tr>
<tr>
<td>Ecological Timing Constraints</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
</tr>
<tr>
<td>Pipeline Construction</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
</tr>
<tr>
<td>Powerhouse Construction</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
<td>light pink</td>
</tr>
<tr>
<td>Restoration/Reinstatement</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
<td>light yellow</td>
</tr>
</tbody>
</table>

5.18 **Guidelines and Communications**

5.18.1 **Guidelines**

Throughout the construction phase, the SEPA guidelines “Prevention of Pollution from Civil Engineering Contracts: Special Requirements” and the “Pollution Prevention Guidelines (Relevant PPG’s include 2, 5, 11, 21 & 26)” must be followed.

These guidelines will be implemented and issued to the contractors prior to work commencing. In addition, SEPA will be advised of the start of the construction works before works commence and will be asked to advise on a pollution response scheme to be implemented in the event of any incidents.

Reference to and consideration of SNH’s “Constructed Tracks in the Scottish Uplands” has been made throughout the writing of this Construction Method Statement.

5.18.2 **Communications**

Close contact will be established and maintained with the contractor, the estate, local farmers and neighbours who will be advised of the time tabling of the different construction elements.

5.18.3 **Exceptional Incident Procedure**

In the unlikely event that the Environmental Protection Measures (EPMs) should fail and an unforeseen pollution incident should occur, the following procedure is to be followed:

- Discoverer of incident to alert Site Foreman of nature and magnitude of the incident.
- Site Foreman to report incident to SEPA and Water Supply Users immediately in order to inform of potential hazards and to take advice on how to proceed.
- Site Foreman and Team to attempt to prevent situation from getting any worse (i.e. stop pollution source if possible).
- If not possible to stop pollution source, Site Foreman and Team to try to contain situation and minimise damage.
- Work not to be recommenced until pollution incident is resolved and all mitigation measures (EPMs, etc.) have been checked and reinstated.
Following incident, Foreman to review site EPMs and working practices with SEPA officer to ensure good practice as per WAT-SG-29 Temporary Construction Methods.

5.18.4 Health and Safety

<table>
<thead>
<tr>
<th>Risk</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Plant and vehicle movements</td>
<td>Standard construction site practice plus signage and fencing on hazardous areas</td>
</tr>
<tr>
<td>2 Injuries from falls and manual handling of equipment and materials</td>
<td>Use of Personal Protective Equipment (PPE), staff awareness program and First Aid provision</td>
</tr>
<tr>
<td>3 Adverse weather conditions</td>
<td>All staff will be made aware of the possibility of rapid changes in local weather conditions and will have additional items of warm clothing and wet-weather gear</td>
</tr>
<tr>
<td>4 Parasites – ticks and keds</td>
<td>All staff will be made aware of Lyme’s disease and primary treatment will be provided on site</td>
</tr>
<tr>
<td>5 River flooding</td>
<td>All staff will be made aware of the possibility of river flooding. Construction works in the river during flood season will be avoided.</td>
</tr>
</tbody>
</table>

5.18.5 Operatives on Site and Relative Training

- Supervisors
- Plant Operators
- Steel fixers
- Joiners
- Labourers
- All preferred contractor employees to have completed a CITB safety awareness course. Any plant operators to hold the relevant CITB certificate for that item of plant.

5.18.6 Personal Protective Equipment (PPE)

Hard hats, eye protection, foot protection, protective trousers, gloves and reflective clothing will be worn as a minimum. Hearing protection, masks and wet weather clothing will be available to operatives as necessary.

5.18.7 Plant on Site

- Wide Tracked Excavator
- Rock breaking/trimming tools
- Drilling machine
- Pumps
- Vibrating pokers
- Compressor
- Generators
- Small hand tools
- Wide Tracked Dumper
- Welding machine
- Tipper lorries
- Concrete lorries
- Concrete pumps