5 Construction Method Statement

5.1 General Description

It is proposed to construct and operate a small-scale hydroelectric scheme on the Donich Water, at Inveronich, Lochgoilhead.

The proposed scheme will consist of an intake weir built across the river and a buried pipeline, which will be constructed from the intake weir to a single powerhouse that will be located on the right bank of the Donich Water.

The plant will be run-of-river status (i.e. will not involve storage) and the electricity generated will be exported to the nearby 11kV grid.

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

- Construction of site compounds and lay-down areas and other initial preparatory works;
- Delivery of equipment onto site;
- Initial construction works - Permanent Forest Roads and temporary access tracks, bridges etc.;
- Main construction works - Intake weir, pipeline, turbine house and tailrace; and
- Reinstatement.

The construction period is expected to last approximately 12-14 months, although much of the main construction works will be achieved in a shorter period of about 9-11 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 expert in Archaeology, Fisheries, Fresh Water Pearl Mussels, Habitat (Flora), Bryophytes, Protected Mammals and Birds; as well as expert assessments on Access & Traffic, Hydrology, Morphology, Landscape & Visual and Noise.

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 forest roads and temporary access tracks, the pipeline, the intake weir, the powerhouse and temporary construction areas. It considers how the construction of these may be made with as little disturbance to the environment as possible.

5.2 Construction Elements

Element	Description	Drawing No.
Access to site	Via the B839	P626 10100
Access tracks	The intake will be accessed via an existing forestry road that leads up from the B839 and two spurs of new forest road to provide access to the pipeline. Access to the powerhouse will be B839 and then via the existing road at Inveronich. A temporary construction track will be built adjacent to sections of pipeline that are inaccessible via either the existing or proposed new roads. This will be fully reinstated on completion of the scheme.	P626 10101
Pipeline	HPPE pipe will be used for the low-pressure section near the intake and GRP pipe will be used for the remainder of the pipeline. The tailrace will be buried apart from where it enters the river.	P626 10109
Construction compounds	One construction compound and one pipe lay down area will be located at the powerhouse. An additional construction compound and pipe lay down area will be located at the intake.	P626 10108
Quarries	A number of quarries will be used to provide material to construct the intake and the access tracks and as bedding material for the pipe.	P626 10106
Stream crossings	All crossings will be culverted.	
Bridges	As existing	
Intake	A “washover” intake of the Alpine type will be used at the intake.	P626 20101
Powerhouse	This will be a new structure on the right bank of the Donich Water.	P626 40101 & 40102
Grid connection	This will be via an existing 11kV supply	P626 50100

5.3 Guiding Principles for 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, which in turn will allow successful restoration.

The main environmental restriction on the development of this hydro scheme is the period between 1st June and 30th September allowed for in-river works. This determines that

access to the intake location must have been established prior to 1st June to allow the intake to be constructed in the specified time period.

5.3.1 Permanent forest roads and pipeline

Best practice guidelines will be followed for the restoration of the margins of the permanent forest roads and extending over the disturbed area of the pipeline. The general principles will include:

- The creation or upgrading of permanent tracks provides an opportunity to carry out restoration as the track is being excavated. Most importantly, 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.
- 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.
- Generally top peats and topsoil will be side stripped and stockpiled in linear strips at the edge of the corridor. Widening will take place with the bulk of material for infill won from the track excavation to avoid the need for additional quarries and haulage.
- Tracks will be finished using stone excavated from the site.
- 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 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.
- Where scree is exposed on the top side of the track, every effort will be made to retain soil and top peat on the slope, including benching the exposed sub grade, over excavating to allow slope gradients to be reduced.
- 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 / top peat 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.

5.3.2 Ground Water Dependent Terrestrial Ecosystems

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

- 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.
- To prevent the pipeline 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.
- Vegetation turves will be cut in an irregular pattern to prevent surface lines which may channel flow.

5.3.3 Quarry Restoration

Along the pipeline route, potential quarries have been identified; on completion, the final ground level will reflect the surrounding topography.

The following general principles will include:

- Where it is possible the front wall should be preserved and access made from the side or the back.
- Vegetative peat and topsoil will be side stripped from all drainage channels and silt trap pond areas and stockpiled at the edge of the pits in separate heaps so that the vegetation may continue to live.
- If the pit is within glacial till the back wall will, where feasible, be graded back and benched to a slope capable of retaining top peat / top soil. The upper edge will be rounded off and integrated into the surrounding topography. Vegetative peat will be spread over the exposed till to achieve a minimum of 300mm cover.
- If the pit exposes bed rock, every effort is to be made to break up the profile and naturalise the exposed rock face; to round off the top edge; to create ledges and gullies where soil / top peat can be placed.
- On completion the floor of the pit will be broken up and re-graded to an undulating, rough profile, ramping fill material up against the base of the face of the excavation. Surplus rock material in the vicinity of the pit will be removed into the pit. The base of the pit, and back face where feasible, will be fully covered with reclaimed top peat spread to a minimum of 300mm or to match the top peat depths in the adjacent area.
- Drainage channels will be fully backfilled with top peat spread over the surface. All till and rock will be buried. Silt trap ponds will be drained and backfilled with excavated material, placed to an undulating rough profile to integrate into the surrounding landform. Top peat will be spread over the surface to a minimum depth of 300mm and all exposed rock will be buried. Access tracks to the silt ponds will be removed and the moorland restored by removal of rock material and regrading to leave peat to surface and a rough and undulating surface.

5.3.4 Powerhouse area

After the powerhouse position has 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 powerhouse will provide a large amount of rock and some turf. The broken rock will be used within the construction of new forest roads and the turf may be used in the restoration of the quarries alongside the pipeline.

5.4 Construction of Forest Roads

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

Access incorporated within the existing forest roads to the Powerhouse and Intake are required for the following reasons:

- Transport of plant, machinery and materials during construction
- Construction of the Pipeline
- Permanent access to the Powerhouse and Intake for maintenance and existing forestry use

Access to the intake will be via the existing forestry road. Two spurs of new forest road will extend from the existing forest road, to enable construction of the pipeline. These roads will be permanent and will be retained for forestry purposes on completion of the scheme. The powerhouse will be accessed via the existing road at Inveronich. A temporary construction track will be built adjacent to sections of pipeline that are inaccessible via either the existing or proposed new roads. This will be fully reinstated on completion of the scheme.

All new road infrastructure will take into account local watercourses that are feeding upstream of the source and any crossing of these should be kept to a minimum. Pollution prevention measures should be put in place at each crossing point and silt traps, or equivalent, will be constructed at regular intervals to minimise the risk from pollution. Once constructed, site roads will be regularly maintained to ensure minimal erosion and hence pollution from the road surface.

The drawings have been set out in accordance with the surveyed route; trial pits will be dug at regular intervals along the route in order to avoid peat deposits greater than 1500mm; trial pits will also be dug into the deposit of hard core material to ascertain their suitability for road making and back-fill for the pipeline trench. In light of this acquired knowledge, it may be necessary to make small changes to the route.

Method of construction

Forest Road

The existing Forest Roads tracks are in good condition. The new spurs of Forest Road will be created using spoil that was previously left over from the previous construction of the tracks and material sourced from the quarries identified in drawing no. P626 10106. Passing places will be provided every 500m or as the topography dictates.

Drainage

Cut off drains will be re-established on the topside of the tracks; this will not serve to transfer water horizontally for long distances or to concentrate run off where it did not exist before. Culverts under the tracks will be placed to preserve the continuity of the existing drainage; these will be placed in deep enough and at an angle so as to avoid scouring at the outfall.

Reinstatement

These tracks will be permanent and 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.

5.5 Construction areas

Two construction areas are shown on Drawing No. P626 10108:

CA 1 – At the powerhouse
CA 2 – At the intake

There will also be one pipe storage area (PL1) near to the powerhouse and one pipe storage area (PL2) at the intake.

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.
- 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.

- 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.
- 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.

5.6 Quarries

There is a requirement for some material both for back filling the pipeline trench and possibly supplementing the upgrading of the existing access track. Potential sites for quarries have been identified as shown on Drawing No. P626 10106, which will contain material, that is capable of being screened for infill for the GRP pipeline and roadway construction. Q1 is located outside of the DWPA, however Q2 and 3 are located at the edge and within the catchment area for the Scottish Water intake. Mitigations measures are provided in 5.6.2. to ensure that drinking water is not contaminated.

5.6.1 Sequence of operations

1. Mark out extent of proposed quarry.
2. Ensure buffer strip of not less than 10m between the extent of this and any watercourse.
3. Strip off all vegetative and organic material and stack in heaps.
4. Clear area sufficient to install silt trap screens and allow for area for graded material.
5. When all material is used up cover over using previous heaps of vegetative and organic material.
6. Reinstatement should seek to blend in with the surrounding environment, the surface being compacted to make it stable but sufficiently rough to promote re-establishment of flora. The end result should be that the reinstated area does not look out of context when compared with the surrounding landscape.
7. Rocks may be left protruding.

5.6.2 Pollution Control

- Artificial drainage may be necessary and geotextile and/or straw bales should be installed in such channels before excavation begins.
- Regular monitoring of water quality downstream of these channels should be carried out before they join a watercourse.
- The geotextile and straw bales should be replaced before they become ineffective and a supply of these should always be kept on site.
- Any static water should be pumped onto the surface not less than 10m away from a watercourse.
- Settlement ponds can be installed as a control measure at the outfall of a borrow pit to ensure that suspended solids settle before the water reaches a watercourse.

5.7 Powerhouse

5.7.1 Description of Works

The construction of the powerhouse as shown on Drawing Nos. P626 40101 & 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 the turbine, a synchronous generator and control equipment; it will be constructed as a portal frame structure on a reinforced concrete floor with timber clad walls and a green tin roof.

5.7.2 Tailrace

The flow from the turbine will discharge into a tailrace pit, which will return the water to the river. Attention will be given to the design so that water velocities do not lead to any scouring of the opposite bank. Provision has been made for the exclusion of mammals and any migrating fish. Particular attention will be given to the visual appearance

Apart from breaking out the bank for construction, there will be no in-river works.

5.7.3 Transformer compound

The transformer and associated switchgear will be accommodated adjacently as shown in Drawing No. P626 40101. The compound will have a concrete base with bund walls and will be fenced off.

5.7.4 Grid Connection

The scheme will connect to the nearby 11kV supply via approximately 500m of buried cable.

5.7.5 Pollution Control

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:

- 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 onto the surface not less than 10m away from the watercourse
- SEPA Guidelines on pollution control should be followed.

5.7.6 Sequence of Operations

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. Remove over burden to base rock using an excavator.
6. Move excavated material to contractor’s compound.
7. Excavate rock to formation level.
8. Drill rock head and fix steel dowels.
9. Blind formation with concrete.
10. Install steel reinforcement.
11. Install Earth network
12. Construct formwork.
13. Place concrete.
14. Compact concrete using a vibrating poker.
15. Strike formwork once the concrete has been cured.
16. Where a second lift of concrete is required, place second lift of concrete and compact.
17. Take structure up to foundation level ready for the Steel Erector sub-contractor.
18. Build superstructure
19. Carry out ground works including landscaping around powerhouse.
20. Remove anti-pollution method.

21. Tidy site on conclusion.

5.8 Pipeline

5.8.1 Description of Works

Approximately 2km of pipeline will be installed between the intake and the powerhouse. The pipeline will be a combination of approximately 725m of Glass-Reinforced Plastic (GRP) and 1275m of High Performance Polyethylene (HPPE). This reflects the fact that pressure increases as the pipe drops down the hill making it necessary to use GRP for the high pressure section.

The construction corridor for the pipeline will be kept to the minimum possible and is not expected to exceed a width of 30m. All the pipes will be delivered to the pipe storage area as marked on Drawing No. P626 10108. The pipe-laying contractor will be responsible for moving the pipes from this area to the pipeline route and for laying out the pipe ready for jointing / fusion welding. It is expected that the pipe can be moved from the delivery point to appropriate points along the pipe route with a tractor and trailer or similar.

5.8.2 HPPE Pipeline

The terrain between the Intake and the change to GRP pipe is not particularly difficult; it will not be necessary to create any benches to allow the laying out of the pipes, although tree roots will need to be removed. Because of the diameter of the pipe, the lengths of HPPE (13m) pipe will be welded together on site directly beside the pipeline route.

The excavation of the trench, the pipeline installation, backfilling of the pipeline and reinstatement will be a continuous process. The various steps in this process are outlined in Drawing No. P101 60001.

5.8.3 GRP Pipeline

The proposed new spurs of forest road will provide easy access to the pipeline. It is important to lay out the access track so that it is beside the GRP pipeline; this is required for the easy delivery of each 6m pipe and the 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.

This makes certain requirements on the project design:

1. Trial pits must be dug along the pipeline route to confirm depth of peat, soil and rock.
2. Suitable material to grade must be available either from the excavation of the pipeline itself or from the quarry close by the pipeline as shown in Drawing No. P608 10106
3. The access track must be close to the pipe route so that pipes can be handled and graded material delivered to the pipe trench
4. Deep peat should be avoided
5. The route selected should minimise the need for rock excavation
6. The pipe must be covered by not less than one pipe diameter

The various steps in this process including reinstatement are outlined in Drawing No. P101 60002. 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.

The use of tarpaulins to set dug material on has been considered but, in view of the process shown, is not practical in this circumstance.

5.8.4 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. While small in size (400mm high), these may be disguised by the judicious use of rocks or tree roots during the reinstatement of the pipeline route.

There will be at least two pressure tests of the entire pipe to confirm the required pressure of 1.5 times the static head for 1 hour without leakage.

5.9 Intake

5.9.1 Description of Works

The weir will consist of a low concrete structure built across the river as shown in Drawing No. P626 20101. From the right bank, the intake will form part of the weir and will be fitted with an Alpine wash-over type screen. Water will pass through the screen and will be collected in a stilling chamber prior to entering the pipeline. The remainder of the weir will be a concrete wall running into the left bank.

Method of Construction

The base rock will be exposed and prepared for the foundation slab on which the weir structure is to be built. This preparation will include the removal of any loose material and some rock excavation may be required. This will be achieved by use of an excavator and rock hammer and smaller hand held tools. The base rock will be drilled to allow the slab to be keyed into the rock surface using rock anchors.

Construction of the intake weir should be carried out during a period of low to moderate flow between 1st June and 30th September and will require the temporary diversion of water. This will involve the construction of a temporary cofferdam across one half of the riverbed using sand bags or material available on site. Part of the weir is built downstream of the cofferdam. The temporary cofferdam is then moved over to the other half of the river. The river then passes through the scour valve that is capable of passing a flow equivalent to Q_{20} and cast into the first half of the weir while the remaining part of the weir is built. This work may last for about three to four weeks.

The weir at the Intake will be approximately 14m long. Concrete will be placed by direct placement, the first pour being for the base slab. The weir wall and the intake part of the structure will then be placed in two lifts to simplify the shuttering requirements.

5.9.2 Fishery Protection

Fishery protection measures for downstream migration will be achieved by:

- Design of the screen
- Avoidance of sharp edges in the concrete and
- Establishment of a plunge pool below the intake weir.

5.9.3 Pollution Control

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

- Geotextile and/or straw bales should be installed in the watercourse before excavation begins.
- Regular monitoring of water quality downstream of these should be carried out.
- The geotextile and straw bales should be replaced before they become ineffective and a supply of these should always be kept on site.
- 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.
- Any static water should be pumped onto the surface not less than 50m away from the watercourse.
- SEPA Guidelines on pollution control should be followed.

There is an existing abstraction on the Donich Water for a public water supply. Therefore more detailed preventative measures are given in Section 5.11.

5.9.4 Sequence of Operations

1. Arrive on site and receive site induction.
2. Create appropriate signage.
3. Take receipt of relevant drawings.
4. Carry out a site survey.
5. Mark out “no go” zones.
6. Make temporary water diversion to allow work to continue at the site of the intake structure.
7. Remove overburden to base rock using an excavator.
8. Keep excavated material away from edge of watercourse in separate heaps.
9. Excavate rock to formation level using an excavator and hydraulic rock hammer.
10. Drill base rock and fix steel dowels.
11. Blind formation with concrete.
12. Install steel reinforcement.
13. Install valves and fittings.
14. Construct formwork.
15. Compact concrete using a vibrating poker.
16. Strike formwork once the concrete has been cured.
17. Dress surface of first layer of concrete using a scabbler.
18. Place second lift of concrete and compact.
19. Fix fixtures and fittings.
20. Install Fish Screen.
21. Remove pollution control methods.
22. Tidy site on conclusion.

5.10 Environmental Protection

5.10.1 Description of Works

The proposed development has taken into account the principles of sustainability. Specific aspects of the project which accord with these principles are:

- Selection of a site which avoids designated or protected status of the environment, the landscape, or the built and cultural heritage;
- Design of the site layout to reduce environmental effects;
- Scheduling of works to reduce effects on the natural heritage;
- Using existing Forest Roads;
- Consideration of other users

The overall effects on the environment as a result of the proposed development are considered to be not significant.

5.10.2 Potential environmental hazards and mitigation measures

	Hazard	Mitigation
1	Silt making the water turbid and causing damage to aquatic plants and fish populations	• Install geotextile material below areas of excavation to filter out suspended solids in the water • Install silt traps and service on a regular basis where siltation is likely to be a problem
2	Cement entering the watercourse	• Pour cement used in the construction of project structures in accordance with SEPA pollution prevention guidelines 5 & 6
3	Spilled / leaked vehicle fuel and hydraulic oil entering watercourses, affecting water quality and fish populations	• Store diesel in double skinned or bunded tanks with 110% required capacity away from watercourses • Check construction vehicles leaks and supply spillage contingency kits • Adequately maintain vehicles
4	Oil and fuel contaminating soil	• Keep pollution spill kits on site • Move soils contaminated with fuel or oil to a waste site with appropriate licence to accept such special waste by a Registered Waste Carrier • • SEPA and Scottish Water will be notified of an incident.
5	Chemicals entering the watercourse	• Keep chemicals and oils in a locked steel container • Avoid using polluting substances • Advise workers of importance of avoiding spillage • SEPA and Scottish Water will be notified of an incident.
6	Protected mammals such as badgers and otters becoming trapped within open pipe runs.	• Adopt a cut and fill strategy such that the length of open pipe run is minimised • Install ramps at frequent intervals within open pipe runs at the end of each working day • Cap the open ends of stored and installed pipes to prevent access to badgers
7	Trampling and vehicle damage during the construction phase.	• Confine the pipeline corridor to a width of 30m • Ensure that vegetation cover is restored to as it was before construction • Use vehicles designed to spread load and excavators with wide tracks • Wherever possible route vehicles to avoid flushes, streams and soaks • Ensure that culverts used are made out of a neutral pH material and are large enough to carry heavy flow • Culvert all burns alongside tracks to avoid erosion of track sides • Take care to avoid disturbing the soil around the streams enabling the groundwater to seep naturally through the peat • Minimise the number of journeys made across unprotected ground • Mark out areas which should not be touched • Advise all staff as to where important habitats are and provide alternative routes to avoid crossing them
8	Drainage	• Avoid drains as far as possible but, where necessary dig around the contour rather than downslope • Do not use drains to transfer large volumes of water laterally • Make culverts from a material with a neutral pH • Ensure that culverts reserve natural drainage continuity • Ensure that culverts do not lead to erosion, scouring or spread of sediment
9	Reinstatement	• Cut turves leaving the vegetation intact and replace as soon as possible • Avoid all linear features, for example, pile excavated peat in heaps rather than as a continuous strip-pile • After back filling, spread excess peat thinly over the peat surface • Pile excavated mineral subsoil onto a tarpaulin and return mineral soil • Keep all excavated peat soil separate from mineral soil • Place all excavated mineral soil at bottom of trench • Ensure that turves are irregular in shape and replaced as soon as possible • Return the peat within the trench to as near natural structure as possible • Consolidate mineral soil and peat round pipe to exclude air and avoid water following the pipeline • Restore vegetation cover to as it was before construction

10	Post-construction monitoring and compliance	• Retain the services of an ecologist to monitor any changes in water table and ensure that appropriate mitigation has been carried out
11	Timing specified for protection of fish	• Construct intake (in-river works) 1st June - 30th September

5.11 Protection of Water Supplies

There is an existing Scottish Water weir at NN 2080 0191 on the Donich Water that abstracts for a public water supply. Much of the site is positioned within a Drinking Water Protected Area (DWPA). Therefore the following preventative measures will need to be taken during the construction period to safeguard the supply from the risk of a pollution or contamination event.

5.11.1 Prevention of water contamination from construction compound

The construction involves the limited use of hazardous substances; however, activities associated with the transfer or storage of fuel and lubricants have the potential to cause pollution. The following mitigation measures will be put in place to ensure that this cannot happen:

- The compounds will be sited on a level area.
- Refueling will only take place at Construction Area 1 (CA1), at the powerhouse. This is downstream of the point of the Scottish Water abstraction and adheres to the Best Practice guidance of a minimum 10m buffer from the nearest watercourse. CA 1 will also be the location for storage of oils and other hazardous substances.
- Fuel will be stored in steel bunded tanks away from any watercourse
- Any hazardous substances will be kept in a locked container.
- There will be no artificial drainage associated with the compound that could lead to accidental spillage (if any) reaching the watercourse.
- All used oil and filters will be removed from the site immediately.
- In the event of contamination of any part of the compound, the area will be immediately excavated, stored on a chemical resistant material and disposed of by an approved contractor.
- All staff will be made aware of their responsibility to protect the environment.
- A copy of SEPA's Pollution Prevention Guidelines – PPG 2, 5, 21 and 26 will be kept on site.

5.11.2 Construction of the intake

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:

- Geotextile and/or straw bales should be installed in the watercourse before excavation begins.
- Regular monitoring of water downstream of the works will be carried out.
- Excavated material will be kept well away from the watercourse.
- Excavated rock, mineral soil and peat will be kept separate.
- Pouring of concrete will not take place when heavy rain is imminent
- Any static water will be pumped onto the surface not less than 10m away from the watercourse.
- SEPA Guidelines on pollution control will be followed.

5.11.3 In-River Works

During in river works the contractor will be bound to follow the following mitigation measures:

- Where possible, a diversion will be created upstream of the works to channel the water around the working area to prevent it becoming contaminated.

- Where it is not possible to divert the watercourse. The water will be channelled into large diameter pipes and taken directly through the works.
- Cementous material will not be placed into water.
- Geotextile and/or straw bales should be installed in the watercourse before excavation begins.
- At times where water has to be pumped from an area, the outfall will be placed away from any existing watercourse. This will stop any suspended solids from entering the watercourse.
- Fuel will be stored in steel bunded tanks away from any watercourse
- Chemicals and oils to be kept in a locked steel container.
- 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.

5.11.4 Construction of Forest Roads and Pipeline

- Surface run-off can be prevented from entering excavations for the pipeline by using cut off ditches
- Excavated material along the pipeline will be reinstated as quickly as possible so that the period of time that stockpiles are exposed is minimised.
- Install silt traps at the toe of a slope where pipeline excavation or road construction crosses existing drainage.
- Where the pipeline is excavated in close proximity to the burn, storage of materials will be on the topside of the trench to prevent excavated material falling into the watercourse.
- With the exception of where the pipeline immediately exits the intake, the pipeline will not be located within 10m of the watercourse.
- Track culverts will be made of inert materials and placed to maintain existing drainage.
- 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.
- If cement is required to construct a culvert track crossing, the watercourse will either be diverted around the construction area or taken through the construction area by means of a pipe culvert.
- Due notice will be provided to Scottish Water to inform of commencement of construction for areas of the hydro scheme where pipelines cross SW infrastructure or are located within 10m of infrastructure. Careful excavation of the pipeline is required (such as hand excavation) to ensure there is no disturbance to SW mains or assets.

5.11.5 Vehicle use of Forest Roads

- No plant or wheel washing will be carried out within 10m of the burn but at designated areas of hard standing (CA1).
- Maintain vehicles and check for leaks on a regular basis.
- Spill Kits will be kept in vehicles at all times.

5.11.6 Monitoring

- Monthly samples will be collected by a quality approved sampling officer at the Scottish Water abstraction point prior to site works commencing to establish a baseline water quality
- Weekly samples will be taken during the construction stage and post hand-over (for a period agreed by Scottish Water) and compared to the baseline dataset to identify any impacts of the development on water quality and to identify the requirement for remedial mitigation measures.

5.11.7 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 overleaf is to be followed.

1. Discoverer of incident to alert Site Foreman of nature and magnitude of the incident.
2. Site Foreman to report incident to SEPA and Scottish Water immediately in order to inform other water users of potential hazards and to take advice on how to proceed.
3. Site Foreman and Team to attempt to prevent situation from getting any worse (i.e. stop pollution source if possible).
4. If not possible to stop pollution source, Site Foreman and Team to try to contain situation and minimise damage.
5. Work not to be recommenced until pollution incident is resolved and all mitigation measures (EPMs, etc.) have been checked and reinstated.
6. 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.

5.12 Guidelines and Communications

5.12.1 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 and Scottish Water 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.

5.12.2 Communications

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

5.12.3 Guidelines for working near Scottish Water (SW) mains and assets

- Due notice will be provided to SW for construction activities that involve crossing SW water infrastructure with the pipeline or works within 10m of SW Infrastructure. Liaison will occur SW during the construction process and all construction workers will be notified of the infrastructure arrangement to prevent accidental damage to water mains or assets.
- No stationary plant, equipment, scaffolding construction or excavated material should be placed over or close to any SW assets
- Avoid covering or filling SW assets.
- Excavation or pumping should not be carried out in the proximity of a water or waste water main without due notice
- In the event of any SW assets being damaged, full details must be passed immediately to the local operations team.
- Provide adequate notice and full information regarding proposals for piling or any construction methods that may create vibrations in SW pipelines or ancillary apparatus.

- When crossing over SW existing apparatus, ensure the effect use of temporary protection to spread the weight on the water pipes and sewers
- Do not interrupt the flow of water or waste water mains
- Allow SW access to assets at all times

5.13 Health and Safety

5.13.1 Potential Hazards and Remedial Measures

	Risks	Mitigation
1	Plant and vehicle movements	Standard construction site practice plus signage and fencing on hazardous areas
2	Injuries from falls and manual handling of equipment and materials	Use of Personal Protective Equipment (PPE), staff awareness program and First Aid provision
3	Adverse weather conditions	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
4	Parasites – ticks and keds	All staff will be made aware of Lymes disease and primary treatment will be provided on site
5	River flooding	All staff will be made aware of the possibility of river flooding. Construction works in the river during flood season will be avoided.

5.13.2 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.

5.13.3 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.

5.13.4 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