"AFON LAS MICRO HYDRO SCHEME"

Detailed Method Statement

Environmental Management Plan

&

Restoration Plan

Prepared by:

North Wales Hydro Power Ltd

And

Gritten Ecology

December 2014 and 7th June 2016
## CONTENTS

### PLEASE NOTE

Revisions to the original CMS are in **RED** and are clearly marked throughout this document. Superseded information are double crossed.

(Paragraph numbers have been changed to accommodate revisions)

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1. INTRODUCTION

A number of issues have arisen with the installation of a run-of- river HEP scheme on the Afon Las, Nant Peris. As a result, some revisions of the original CMS submitted by North Wales Hydro Power Ltd (Revision B) December 2014 are attached in RED.

2. SUMMARY

In accordance with conditions 4 and 11 of the planning decision notice ref: NP3/15/215B, this statement describes the proposed activities required for the installation of a 100kW micro hydro scheme on land adjoining the Afon Las watercourse near Nant Peris and includes the procedures required to safeguard the environment during the construction and restoration phase.

3. GENERAL DESCRIPTION OF WORKS

The scheme makes use of the water available in a river known as Afon Las within the Snowdonia National Park. The layout is shown in drawing Layout Drawing, and the works consist of the following:

- Installation of a Coanda Screen and integrated intake chamber unit onto stream bed
- Construction of stone faced retaining walls
- Welded polyethylene pipeline (~ 280mm outside diameter, approx. 615m long)
- Powerhouse with concrete floor slab and external pipe anchor block, clad in stone and a slate roof
- Turbine/generator set (~ 100kVA)
- Twin wall plastic discharge pipe (tailrace) to feed water back to the watercourse (~ 350mm outside diameter, approx. 6m – 10m long)
- Cabling to intake pressure sensor for automatic control (along penstock route)
- Buried power cabling to pole-mounted transformer
- Network Operator fuses and metering inside powerhouse building

As the intake will be built in the stream bed, close attention will be paid to mitigating the specific risks to the environment, as outlined below.
3.1 ENVIRONMENTAL CLERK OF WORKS – SUPERVISION AND MAINTENANCE OF SUITABLE METHODOLOGIES AS OUTLINED BELOW

A suitably qualified Environmental Clerk of Works (ECW) will be appointed to oversee the works. The ECW must be approved in advance of any works by the Local Planning Authority (LPA) and they must agree a reporting procedure with the LPA in advance of any works requiring their supervision. The key role of the ECW will include monitoring all necessary works and implementation of pollution prevention measures on an on-going basis and ensuring that such measures are adequate and properly maintained.

The ECW will keep an accurate log of environmental protection measures for example measures outlined in this statement e.g. tool box talks, operator familiarisation with constraints and methodologies.

This document details the steps that will be taken to avoid any pollution incident however if a pollution incident occurs, we will contact Natural Resources Wales immediately on 0800 807060. Immediate remedial action will include stopping construction work and reinforcing all measures in place to prevent pollution as outlined below.

4. LOCATION & ACCESS

As shown on the CMS Plan, the scheme will be accessed as follows:

i) Intake – Located at OS Grid Reference SH 61906 57994 will be accessed via an existing track and along the proposed pipe route together with the use of helicopters to deliver materials and equipment. A temporary track will be created along the pipe route within the SSSI and the SAC as set out on the SSSI & SAC Construction Layout Plan Drawing.

ii) Turbine House and Outfall – Located at SH 61370 57761 and SH 61369 57766 these will be accessed via the existing access track direct from the existing road as set out on the CMS Plan.

iii) Penstock and remainder of scheme - Access will be via along the penstock route, existing tracks and proposed temporary construction tracks as shown on the CMS Plan.
All materials and equipment with the exception of the intake materials will be stored at the temporary compound area located adjacent to the turbine house and access track shown on the CMS Plan. Majority of the intake material will be dropped off by helicopter and stored at the Helicopter Drop off Location shown on the CMS Plan.

5. DOCUMENTATION

In addition to this document, the outline design is to be built in accordance with the following drawings and documents:

<table>
<thead>
<tr>
<th></th>
<th>General Layout &amp; Site Plan</th>
<th>NWHP_S160_Layer_Layut Plan Rev H</th>
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<tr>
<td>2</td>
<td>Intake Plans</td>
<td>NWHP_S160_Intake_Planning_revG</td>
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<td>Turbine House</td>
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<td>Tree Report</td>
<td>MWA BS5837 Report</td>
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<td>7</td>
<td>Overview Plan</td>
<td>CMS Plan (Hydropol)</td>
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<td>SSSI &amp; SAC Working Area</td>
<td>SSSI &amp; SAC Construction Layout Plan Rev B</td>
</tr>
<tr>
<td>9</td>
<td>Tributary River Crossing</td>
<td>Tributary Crossing</td>
</tr>
<tr>
<td>10</td>
<td>Penstock River Crossing</td>
<td>River Crossing</td>
</tr>
<tr>
<td>11</td>
<td>SSSI &amp; SAC Working Area</td>
<td>SSSI &amp; SAC temporary access road crossing</td>
</tr>
</tbody>
</table>

6. DURATION OF WORKS

It is estimated that the works will take up to five months to complete. However, the weather could have a significant impact on the length of time required on site. North Wales Hydro Power's preferred approach for small schemes of this scale is to hold back on construction during wet periods in order to limit damage to the working area. We are able to be flexible as we
will be building this scheme as the Project Manager, appointing a series of sub-contractors as and when required.

7. METHOD STATEMENT

<table>
<thead>
<tr>
<th>1</th>
<th>Site Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Set up compound areas and welding areas as shown on the CMS Plan including storage and welfare in the designated area which is to be located adjacent to the turbine house track. Welding area will be situated next to the temporary access road towards the intake to facilitate manipulation and storage during and after the welding.</td>
</tr>
<tr>
<td>1.2</td>
<td>Install signage and fencing as required</td>
</tr>
<tr>
<td>1.3</td>
<td>Topsoil to be stripped and stored adjacent to route on upper side of the route to contain run-off. Any excavated sub-soils / stone to be kept separate from topsoil. There is not always space to store stripped topsoil on the &quot;...upper side of the route to contain run-off&quot;. Where possible, this will be the case. Where possible topsoil (and its sward) will be stored separately from any sub-soils. Where considered appropriate by the ECW, a continuous line of silt-trap fencing will be placed between the penstock and the river to prevent sediment wash into the river. All soil heaps close to the river will be covered by fleece material to prevent rain-wash into water courses.</td>
</tr>
<tr>
<td>1.4</td>
<td>Any potential drainage points from workings to watercourses to be blocked with straw bales and / or Terram as necessary to filter sediment Sediment filter barriers will be made up of straw bales and 'Terrastop Premium'. This is a proprietary material made for this purpose and much more efficient than Terram.</td>
</tr>
</tbody>
</table>
1.5 If the workings expose any underground water drainage routes, these may require temporary fluming and / or containment using clay barriers to prevent access / penstock route becoming drainage route

Exposed "underground water drainage routes" will in general be ducted away from the penstock corridor which will be armoured with inert sub-base to a) act as a sediment filter and b) a surface upon which plant can move without creating further sediment run-off. Appropriate sediment sumps will be placed below these areas, outflows from them protected with sediment filters and straw bales, and pumps, generators, fuel etc left close by on stand-by in case of need in the event of heavy rainfall/spate events. A 'Silt Buster' also to be left close by to filter any arisings from these pumpings. Outflow water to be discharged onto land away from possible drainage back into the Afon Las at SH61540 57813 as agreed on site with NRW.

1.6 All works shall be carried out in accordance with the approved tree report

Tree Method Statement

- Minor crown raising to 3m-4m where appropriate along access routes.
- Trees T2, T3, T8, T9 & T10 will be carefully removed to facilitate access and the construction of the intake. As a precaution it is recommended that T2 and T3 are carefully felled by 'soft felling' techniques with a licensed and experienced bat worker in attendance.
- As indicated on the SSSI & SAC Construction Layout Plan the pipe will be laid at ground level or in a shallow trench between the intake and T17 and the roots of the surrounding trees will be protected Root with Geogrid (Cellweb or similar) in order to allow creation of temporary 3m wide access track (filled track above existing ground levels)
- Between F and H the pipe route passes through a group of hawthorn. In order to minimise excavation in this area it is proposed that the pipe will be laid at existing ground level following the existing contours and then overburdened with a thin layer of soil, hessian and seed or turf.
- Tree protection fencing used around trees in close proximity to the pipe route as indicated on the CMS Plan and Tree Report.
- Within the first planting season following completion of the works the applicant will plant Sessile Oaks sapling/"whip" trees along the existing fenced off area of the riparian zone of the depleted reach as approximately shown on the CMS Plan. (See below)
- Site operations should take sufficient account of wide loads, tall loads and plant with booms, jibs and counterweights (including drilling rigs), in order that they can operate without coming into contact with retained trees.
- Any materials whose accidental spillage would cause damage to a tree will be stored and handled well away from the outer edge of its RPA. It is essential that allowance should be made for the slope of the ground so that damaging materials such as concrete washings, mortar or diesel oil cannot run towards trees.
- If any tree pruning or felling or and hedge removal begins between April and mid August a suitably qualified and experienced surveyor will complete
surveys for breeding birds along the construction corridor no more than 24 hrs before work begins and appropriate mitigation steps will be taken if necessary.

There have already been several ‘infringements’ away from the original CMS concerning trees. The following mitigation is proposed, in agreement with the SNPA Woodlands Officer:

- Felled trees along and besides the penstock corridor are to be chain-sawed into small brash piles and stacked at the side of the penstock corridor to act as future habitat piles. Future digging operations are to avoid these piles. This to be done before any further digging is carried out so that sawn trees aren’t buried by spoil arisings.
- One Hawthorn has been inappropriately ‘pruned’ with the digger bucket. All future prunings and fellings are to be undertaken by a trained arboricultural contractor to BS 3998:2010.
- RPA of all trees close to the penstock corridor to be marked so digger driver can avoid them.
- All stumps of Rowan (*Sorbus aucuparia*) and Hawthorn that have been felled along the penstock corridor are to be dug out with as much root-ball as possible and planted in pre-dug holes beside the corridor and fenced with stock-proof fencing (see diagram) (Rhydian will supply details of individual tree fences that are goat as well as sheep proof). Epicormic growth is already evident on these stumps.

It is inevitable that some further (limited) tree pruning and felling will be necessary within the SAC/SSSI section but this will be kept to an absolute minimum by a) careful routing and b) minimising the width of the penstock corridor up to the Intake Weir and c) by using as small plant as possible within the SAC/SSSI section of the penstock route. It is anticipated that all the bullet points itemised in the original CMS can be adhered to.

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**Intake Construction**

28 calendar days’ notice will be given to NRW before construction commences. Due to close cooperation with NRW just prior the start of works, 7 day notice before construction will be given.

The intake is to be a Coanda Screen integrated into a concrete formed weir and chamber structure, plunge pool.
2.1 Use Ø500mm twin-wall pipe (or similar) with sandbags, visqueen and plastic sheeting to create a temporary diversion to form a natural stream crest upstream of works. The flow will be returned to the beck in a rocky section where the risk of the flow stirring up the river bed is minimal.

2.2 Place straw bales downstream of works to catch any displaced sediment.

2.3 Any remaining water below the diversion point will be pumped out and returned to the stream via a silt trap and / or discharged over grass, whichever is necessary to ensure no silt from the working area enters the watercourse. The silt trap shall consist of a hole dug in a flat area of surrounding ground and lined with a terram / geotextile layer to trap any silt. The water will then drain through the ground back into the stream. The silt trap will not be dug in a flush area.

2.4 If required, remove bedrock using heavy duty battery SDS chisel or pecker attached to excavator to form stable bedrock base for weir to be formed on.

2.5 Wire-brush bedrock to remove slime and allow good bond with concrete.

2.6 Excavate to necessary depth for weir and intake chamber

2.7 Pour blinding layer of concrete for base.

2.8 Drill and chem-set rebar into bedrock.

2.9 Cut + install wire mesh / rebar.

2.10 Form shuttering around mesh on base to form structure around.

2.11 Pour concrete (to be mixed on site) into structure

**NOTE** – Check weather forecast and only proceed with pouring concrete if three clear days ahead – this is to prevent washout of works in spate flows.

2.12 Remove shuttering

2.13 This process will be repeated to form different sections

2.14 Bell mouth to be formed / fixed in the intake chamber exit point

2.15 Once main intake works are complete any exposed areas of concrete will be clad in stone as indicated on the planning drawings

2.16 Allow minimum three days for concrete to cure before removing bypass pipe

3 **Pipeline and Sensor Cable**

The pipeline is to be made from 12-14m lengths of Ø280mm HDPE pipe, welded on site.

To avoid future erosion along the penstock, trench breakers will be constructed.
where appropriate taking into account ground conditions. A gate valve will be installed at both ends of the pipeline to allow manual shut-off.

3.2 Deliver pipe to site and stored at the temporary pipe storage compounds shown on the CMS Plan.

3.3 Place sections of pipe along route using a tracked dumper (or similar).

3.4 Excavate pipe trench where applicable in short sections. The pipe route installation will be tailored to the ground conditions, habitats and topography as follows:

**Zone 1: Intake to A1.**

The penstock pipe will be laid at ground level or very shallow trench (100mm to 150mm deep) from the intake to point A1 following the existing contours and overburdened with a thin layer of soil, hessian and seed or turf.

Penstock will be buried deeper just next to the intake since it is attached to it next to the bottom of intake settling chamber. The shallow trench will be maintained as close as possible taking into account surrounding contours.

**Zone 2: A1 to E1**

The pipe will be buried in a shallow trench up to a maximum of 1m depth. For details of tributary crossing see Tributary Crossing Plan. All trench work will be kept to a minimum possible width (c.300mm) and depth in order to minimise the footprint and overall excavation required. A spoil retention fence will be erected along this section to prevent sediment run-off into the river.

**Tributary Crossing Method**

Excavate the foundations for supporting blocks past the tributary bank so the construction will not interfere in tributary. If required, remove rock using chisel or pecker attached to excavator. Put reinforcement and shuttering into place and pour the concrete. After sufficient concrete blocks hardening, remove shuttering, install the supporting beam, place and fix penstock pipes and finally construct wooden construction for stone cladding and paving. Reinstate the terrain after construction is done.

Special attention will be paid to concrete management to prevent concrete entering the tributary. Concrete casting will only be carried out in dry conditions – a full local forecast will be obtained daily and concrete only poured if dry weather is forecast for at least three days. Concrete casting will be carried out from bank belonging to particular block – manipulation with concrete above tributary will not occur. This will minimise the risk of washout before concrete is cured.

Only essential materials to be stored within SSSI & SAC area for limited periods in order to minimise working area within this protected site. No material will be stored
within any flush areas.

Zone 3: E1 to F
The pipe route passes across part of the RPA of an ash tree sited next the watercourse. In order to avoid damaging the roots it is proposed to hand dig/Airspade dig around the roots of this tree in order to bury the pipe.

"... hand dig/Airspade dig around the roots of... " an ash tree next to the watercourse is impractical and unachievable. It is inevitable that some trees will be damaged during the construction process. Damage to trees will be kept to a minimum as detailed above but future tree planting will more than mitigate for any tree damage.

Zone 4: F to H
Through this group of hawthorn woodland the pipe route will pass close to and across the periphery of several RPAs. In order to minimise excavation in this area it is proposed that the pipe will be laid at existing ground level following the existing contours and then overburdened with a thin layer of soil, hessian and seed or turf.

Zone 5: H to K
Between H and I the pipe route crosses through a small flush area and then I to J crosses the watercourse and J to K crosses the periphery of the SAC boundary and grassland habitat. It is proposed to hand dig and bury the pipe in a shallow trench in this zone to minimise impact on the habitats.

For Zone 3, Zone 4 and Zone 5, hand digging is unfortunately impractical and the corridor has already been excavated. Any further works close to flushes will avoid those flushes as far as is possible, water will be ducted away from the penstock corridor and appropriately filtered with sediment trap fencing/straw bales. Within the SAC/SSSI flushes will be cordoned off with marker tape and avoided. Where sensitive plant communities are encountered along the remaining corridor to be dug, turfs will be carefully removed and stored at the side of the penstock corridor and replaced after works have been completed. Close inspection with the Contractor of these areas has confirmed that this can be undertaken.

(ALHL have stressed that any hand-digging (as mentioned in the original CMS) will be quite impractical on this project. However, it should be stressed again that extreme care will be taken in all excavation works with particular care being taken within the SAC/SSSI.)
Rules for pipe installation will be applied as described for Zone 6.

**River Diversion Method for Penstock Crossing**

A fish rescue will be carried out by NRW prior to any in-river works.

Put the river diversion into place using 3x DN600 twin-wall pipes and construct the coffer dam above and below the works to ensure that the working area of the river crossing is kept dry. For coffer dam use builders bags filled with suitable material and overlapped by heavy duty polyethylene or heavy tarpaulin to form an impermeable layer. The flow will be returned back in a rocky section where the risk of the flow stirring up the river bed is minimal.

The river diversion has been sized to accommodate flow equivalent to Q1.

Establish pumps and other sediment management to keep working area dry and avoid contamination of river. Every effort will be made to keep the area dry.

Any remaining water below the diversion point will be pumped out into a silt buster and then discharged over grass, whichever is necessary to ensure no silt from the working area enters the watercourse. Outflow water to be discharged onto land away from possible drainage back into the Afon Las at SH61540 57813 as agreed on site with NRW.

The coffer dam shall be inspected daily to confirm that its integrity is satisfactory. A record of inspection of coffer dam to be available in the site office.

**Penstock Pipes Laying**

Excavate the trench for penstock in the extent shown in cross-section. If required, remove bedrock using chisel or pecker attached to excavator.

Pour the bedding into trench, lay the penstock pipes and protect the pipes with boulders cast in concrete. Finally reinstate the river bottom to original state using the river stones.

Remove coffer dam and river diversion.

**Zone 6: K to Outfall**

The pipe will be installed in a standard shallow trench throughout this zone.

**General Precautions:**

Particular care will be taken that contractors follow the approved method statement and CMS. In particular the following precautions will also be taken:
- All contractors to be informed of the location of the SAC boundary
- Where excavators need to access across wet ground conditions or any flush area, either extra wide low ground pressure tracked excavators and/or bog mats will be used to avoid damage to the habitats
- Turves will be stripped and replaced within 24 hours along pipe route following pipe installation. Pipe trench/turves keep to minimum i.e. 300mm wide. Where it become impractical to strip turves then appropriate seed mix will be used and/or brash/hay cutting taken from pipe toure corridor and applied to soil following pipe installation.

"Turves (sic) will be stripped and replaced within 24 hours...". This is simply not possible. The penstock corridor will be stripped of turfs/topsoil and then benched/cut-and-fill to create a track to the Intake. This track will have to remain as a working track during the construction of the Intake Weir and the positioning of the penstock itself. Vegetation re-instatement will have to be carried out at the end of the process. See General Comments below

- No materials will be stored within any flush areas
- Only essential materials to be stored within the SSSI & SAC area for limited periods in order to minimise working area within this protected site.
- Only those materials necessary for the installation of the intake and part of the pipe route will be taken into/ stored in this part of the site.
- Where necessary silt traps will be used to prevent sediment transfer into any flush areas
- Double silt fences with double plank backing will be placed along the penstock in the SSSI & SAC site as an anti pollution precaution
- Materials kept in the SSSI & SAC site will be done so on two raised podiums one located near the intake weir and one slightly further down the penstock.

| 3.5 | Sections of pipe to be welded together using butt welding or electro fusion joints, at the welding stations shown on the CMS Plan then dragged along the pipe route and laid into trench and reinstated over as appropriate (Note – unless construction uncovers any sharp or big grain rock, no pipe bedding materials is required. Sorting may be required). Pipe section between the Turbine House and Peg K will be dragged into position by excavator or tracked dumper truck etc. as will the pipe section from Peg E1 to the Intake. The pipe for section Peg K to E1 will be dragged to Peg K from the lower welding station and then dragged into position using a winch and pulley system set up close to Peg E1. |
| 3.6 | Single cable to be laid along pipe route. Cable to be covered in silt trench or similar. |
| 3.7 | Where necessary any reinstated areas will be fenced off using temporary stock proof fencing if livestock are to be present to allow any turfed or reseed to fully establish for a minimum of one full growing season post construction. |
| 4 | Powerhouse The powerhouse is designed around a concrete floor slab which restrains both the |
pipe and the turbine. The building will be of concrete shuttered construction with stone facing, and a slate roof. The turbine will discharge into a concrete sump, with a tailrace made from 350mm twin-wall pipe. Care will be taken to prevent runoff flushing excavated material into the watercourse nearby.

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<tr>
<td>4.1</td>
<td>Mark out powerhouse and tailrace.</td>
</tr>
<tr>
<td>4.2</td>
<td>Excavate foundation trenches, sump and trench for tailrace.</td>
</tr>
<tr>
<td>4.3</td>
<td>Cast wall footings and floor sump.</td>
</tr>
<tr>
<td>4.4</td>
<td>Install tailrace pipe.</td>
</tr>
<tr>
<td>4.5</td>
<td>Construct formwork for sump around first section tailrace pipe, and formwork for turbine bed frame. Include anchor block, floor drain and cable ducts (as will be shown in engineering drawings).</td>
</tr>
<tr>
<td>4.6</td>
<td>Cast sump walls and main floor slab, with starter bars for anchor block. Slab to have slight fall to allow drainage into floor drain, and apron to fall away from building.</td>
</tr>
<tr>
<td>4.7</td>
<td>Build up block walls, leaving cut-out for anchor block, and including ventilation notches top and bottom of southern gable end.</td>
</tr>
<tr>
<td>4.8</td>
<td>A trial stone work panel, including pointing not less than 2.00 m sq will be constructed for prior approval by Local Planning Authority. As soon as approval gained remaining stone facing can be completed.</td>
</tr>
<tr>
<td>4.9</td>
<td>Fit wall plates, rafters, heavy duty impermeable waterproof membrane and cover with earth and seeds.</td>
</tr>
<tr>
<td>4.10</td>
<td>Fit insulation to internal roof space to control noise, plus baffle boxes over ventilation notches for same purpose.</td>
</tr>
<tr>
<td>4.11</td>
<td>Fit doors and rainwater goods as appropriate.</td>
</tr>
</tbody>
</table>

5

**Tailrace & Outfall**

5.1 Form barrier around outfall to isolate works from watercourse using steel piles or sandbags / visqueen. The outfall should be built as parallel to the bank as possible.

5.2 Dig trench for tailrace pipe to watercourse

5.3 Install tailrace pipe
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<th>Section</th>
<th>Description</th>
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<tr>
<td>5.4</td>
<td>Use local boulders to create scour protection and scree at outfall and landscape pipe exit</td>
</tr>
<tr>
<td>5.5</td>
<td>Fit outfall screen (stainless steel with 6mm spacing)</td>
</tr>
<tr>
<td>5.6</td>
<td>Backfill pipe (selected backfill to avoid damage)</td>
</tr>
<tr>
<td>6</td>
<td><strong>Electro-Mechanical Installation</strong></td>
</tr>
<tr>
<td>6.1</td>
<td>Deliver turbine / generator and control panel and ancillaries to site, unload to concrete apron and use rollers to move into powerhouse lifting area.</td>
</tr>
<tr>
<td>6.2</td>
<td>Fit turbine and generator in place, align, bolt down and grout in.</td>
</tr>
<tr>
<td>6.3</td>
<td>Fix main inlet valve support to concrete, and check alignment / positioning of unit.</td>
</tr>
<tr>
<td>7</td>
<td><strong>Connect &amp; Restraine Pipe</strong></td>
</tr>
<tr>
<td>7.1</td>
<td>Pipe to be flushed with intake screen in place to remove debris from pipe (small stones etc.)</td>
</tr>
<tr>
<td>7.2</td>
<td>Cut pipe to length, and fit reducer with stub pipe to suit turbine inlet. Reducer to be located within anchor block, at upstream end.</td>
</tr>
<tr>
<td>7.3</td>
<td>Connect pipe to turbine inlet using VJ coupling or similar, ensuring 5-10mm gap between flange and end of pipe</td>
</tr>
<tr>
<td>7.4</td>
<td>Construct formwork for anchor block, fixing pipe securely to prevent floating in concrete</td>
</tr>
<tr>
<td>7.5</td>
<td>Pour anchor block</td>
</tr>
<tr>
<td>7.6</td>
<td>Backfill around block</td>
</tr>
<tr>
<td>7.7</td>
<td>Ground to be reinstated as far as reasonably practical to same standard and condition as prior to construction (see section 8 below for further information)</td>
</tr>
<tr>
<td>8</td>
<td><strong>Electrical Installation &amp; Power Cabling</strong></td>
</tr>
<tr>
<td>8.1</td>
<td>Install control cabinet</td>
</tr>
<tr>
<td>8.2</td>
<td>Connect generator, actuator and sensor cables. Install local power and lights.</td>
</tr>
<tr>
<td>8.3</td>
<td>Connect signal cable from intake</td>
</tr>
</tbody>
</table>
8.4 New transformer and fuse / metering to be installed on new pole by DNO

8.5 Install LV power cable from pole to powerhouse. Cable to be installed in duct. Warning tape to be laced in trench, depth and other details to be specified by DNO

8.6 Fuses to be fitted by DNO following electrical installation

8.7 Install intake level sensor(s) under intake screen

9 Final civil’s, making good

9.1 Stone face powerhouse

9.2 Remove straw bales, waste and excess materials, making good.

9.3 Remove sediment from any traps, fill and reinstate turf

9.4 Dirty water to be pumped out of working areas and bunds before these are removed.

10 Commissioning

10.1 System commissioning as per turbine supplier instructions

8. Environmental Management Plan

The areas of environmental impact that are relevant to the proposed works include contamination of the river with concrete and / or silt, fuel or oil spillages and disposal of waste (both solid and liquid). Specific risks associated with these areas, together with mitigation procedures to minimise or eliminate these risks are outlined in the following sub-sections.

Relevant EA pollution prevention guidelines will be followed, including:

- PPG 01 “General guide to the prevention of pollution”
- PPG 05 “Works in, near or liable to affect watercourses”
- PPG 06 “Working at construction and demolition sites”

8.1 Specific Flora / Fauna

8.1.1 Otter / Badger
No Hazards will be left overnight and all holes will be covered or fitted with escape routes.

8.1.2 Bats

No lighting will be used on the site at night after 8pm as this could disturb foraging bats.

If works are to be undertaken outside of daylight hours, where possible, lighting should be directional and focussed on the development area and away from the wider countryside and any areas of shrub/scrub.

8.1.3 Breeding Birds

As set out above if any tree pruning or felling or and hedge removal begins between April and mid August a suitably qualified and experienced surveyor will complete surveys for breeding birds along the construction corridor no more than 24 hrs before work begins and appropriate mitigation steps will be taken if necessary.

8.2 Concrete

Any fresh concrete or cement entering the watercourse has the potential to kill fish, and poses the greatest environmental risk for this project. Great care will be taken at all stages of the work to prevent concrete or cement entering the watercourse.

8.2.1 Transportation and Storage of Concrete

The volume of concrete required will be of the order of 5-6m³ at the intake and 8-9m³ at the powerhouse. Concrete will likely be delivered to site pre-mixed for the powerhouse and mixed on site for the intake. It will then either be tipped into the formwork or shovelled by hand. It must be ensured that any spillages that occur during transportation cannot enter the river.

Cement will be stored off the ground (e.g. on pallets or boards) and covered from wind and rain. Concrete will be mixed in a sheltered area to avoid dry cement being blown around, and this will be done well away from the river, in an area with no risk of runoff entering the watercourse.

8.2.2 Concrete Pouring

Placing concrete at the intake poses the greatest risk of spillage / leakage into the watercourse. As the majority of the intake work will be in or adjacent to the stream bed, the river will be diverted well away from the formwork, and the surrounding areas de-watered and protected.
from runoff in the event of rain. Plywood sheet will be placed around the areas being poured in order to collect any spillage.

Concrete casting will only be carried out in dry conditions – a full local forecast will be obtained daily, and concrete only poured if dry weather is forecast for at least three days. This will minimise the risk of washout before concrete is cured.

8.2.3 Washing of equipment

A small pit will be dug well away from the river, to contain wash water and allow cement / concrete to be settled out. All equipment will be washed in / to this pit. Once the cement has cured the pit can be filled in.

8.3 Silt

Silt, although not as harmful as concrete, can have an adverse effect on the river environment and all efforts will be made to prevent silt entering the watercourse.

8.3.1 General silt protection

Straw bales will be placed downstream of the intake works to act as stilling ponds to collect disturbed silt. All working areas will be kept as dry as possible, and runoff from the surrounding banks should be diverted away from the works.

8.3.2 Excavated material

Where it is deemed to be appropriate, i.e. within close proximity of a watercourse then excavated material will be placed away from the river on plastic sheeting and will be covered in the event of rain.

8.4 Fuel & Oil

Fuel or oil entering the watercourse can kill fish, invertebrates and plants and contaminate any downstream abstractions. It will not be allowed to enter the river.
Fuel storage, and spill kits (including drip trays) will be located within the compound at the powerhouse location which will be locked when absent from the site. In the event of a fuel spillage, a clean-up operation will commence immediately using materials on site. Fuel storage will comply with the Control of Pollution (Oil Storage) Regulations 2001.

### 8.4.1 Storage

All oil and fuel containers will be placed in suitable containment bunds well away from the river. The bund volume will be at least 110% of the storage container. Large-scale storage of fuel will not be required or permitted on site.

### 8.4.2 Refuelling vehicles or equipment

Any refuelling or oiling is to be carried out well away from the river. Suitable containers and funnels will be used to avoid spillage, and drip trays or absorbent material will be placed beneath equipment while filling.

### 8.4.3 Leakage

Machinery (plant, generators, pumps, etc.) and any fuel storage facilities must be checked daily to ensure there are no oil leaks.

A clean up kit will be available on site to absorb and contain any spillages.

### 8.5 Noise

Noise from machinery and equipment will be minimised to reduce the effect on wildlife and the amenity of neighbours.

#### 8.5.1 Plant machinery noise

There will be 4-6 weeks of excavator work across the site. There will also be noise from general access and transportation of materials.

#### 8.5.2 Other machinery noise

Generators, pumps and other machinery will be switched off when not in use. Such machinery will not be required to run continuously, and will not operate outside the hours of 8am to 8pm.
except during the period immediately after the intake weir cast in which case pumps will keep the working areas dry through the night.

8.5.3 Waste Disposal

While we do not envisage us moving or making contact with any type of controlled waste in this project, we note that this should be removed from the site by a registered waste carrier to an appropriately licensed site or company.

Copies of all waste disposal licences and waste transfer documents will be filed on site and available for inspection.

8.6 Waste Water Disposal

The site welfare facilities will generate waste water from toilets and washbasins, and these are to be fitted with a waste water collection tank that can be pumped clean by a registered operator for removal and treatment at a local water treatment works.

9 Restoration Plan

The banks, pipeline route and surrounding areas will be reinstated as appropriate, with excavations being reseeded if turf stripping and replacement becomes impractical. Where necessary the reinstated ground will be fenced out to allow the sward to re-establish itself with greater ease. Generally ground to be reinstated as far as reasonably practical to same standard and condition as prior to construction.

In summary the following measures will be taken to ensure that the site is reinstated as far as reasonably practical to the same standard and condition as prior to construction:

- Use of Low Ground Pressure extra wide tracked excavators and bog matt in sensitive areas to avoid damage and reduce need for reinstatement
- Working corridor kept to minimum
- Excavation/trenches kept to a minimum depth and width
- Pipe welded in long sections and dragged into place before trench excavated
• Excavations backfilled and reinstated as soon as reasonably practical
• Works carried out in dry weather conditions where possible
• Utilising existing tracks for access and pipe route as shown on the layout plan to avoid unnecessary encroachment into other areas
• Where possible and practical, depending on geological structure, turf to be stripped and re-laid in original position
• Where relaying of turf not practical the excavated soil will be backfilled and compacted to a suitable compaction and then reseeded using a suitable local/native seed mix
• If livestock are to be present, any reinstated areas to be fenced off with temporary stock proof fencing to allow ground to fully re-establish for at least one full growing season post construction.
• Any sections of overburdened pipe will be done so with soil from the shallow scrape/trench under the pipe or from other soil excavated along the pipe route, or a combination of brash, seed and hessian screening.

• As ‘Planning Gain’, a number of trees (Sorbus aucuparia, Betula pubescens, Crataegus monogyna, Quercus petraea) to be randomly planted within the corridor. It is estimated some 25 trees have already been felled from the penstock corridor. At least 100 trees will be planted as replacements. (Note that both the Lichen and Bryophyte reports submitted as part of the Planning Application mention the desirability of increasing the tree cover in the Afon Las valley). Note presence of wild goats in this valley. Each tree planted, including the re-planted stumps of Crataegus and Sorbus, will be fenced out from grazing individually with fencing tall enough to exclude goats. (Specifications in Forest Research Best Practice Guidance for Land Regeneration Note 12, 2014)
• Once all construction works have been completed and the entire system pressure-tested, ground restoration can be finished. This will involve the careful replacement of all soils with the top soil and turfs uppermost. A ground operative will accompany the digger to ensure that all turfs are replaced the right way up.
  The digger driver will use the back of the bucket to firm down the turfs to ensure there are no desiccating voids beneath them.
  Boulders will be replaced as far as possible in a random fashion to avoid a linear intrusion in the landscape. Boulders will be replaced lichen-side uppermost. All areas of the penstock will be reseeded with the ‘Snowdon Mix’(Hunter Seeds Limited), which has been approved for use within the Eryri SAC by NRW for a number of years. An organic calcified seaweed fertiliser will be spread by hand over the entire penstock to speed establishment of the re-seeded sward.
  A suitably qualified Ecologist will visit the site annually for ten years (or less if deemed no longer necessary) to determine how efficient the sward establishment is proceeding and advise on any further works required to ensure complete vegetation cover recovery.
  The Ecologist will also survey the viability of all trees planted and check on the condition of the individual tree fencing and advise on additional tree works required.

10. ADDITIONAL COMMENTS
1. Heli-lifts have been suggested within the original CMS. It would be preferable to heli-lift all the construction materials needed up to the site of the Intake Weir. Clearly, as much of the equipment and materials required will be transported close to the site by heli-lift but much of these materials will need to be transported to the sites marked on the attached CMS plan (Hydropol) and carried up to the Intake Weir site etc. by low ground-pressure tracked dumper. Depending on costs and helicopter availability, two heli-lifts might be used if storage space is a limiting factor. A temporary wooden platform will be built close to the Intake Weir site in order to store materials on it out of reach of possible flooding.

2. ALHL recognizes the need to minimise impact of penstock track construction within the SAC/SSSI. ALHL are committed to keeping the width of the penstock through this sensitive area as narrow as possible (3 metres) and to achieve this (and construction of the Intake Weir) using as small plant as possible (13 tonne).

3. The crossing of the tributary will remain in the location already suggested within the original CMS. However, two revisions are proposed. Firstly, that the working corridor/stream crossing will be carried out with the use of a temporary bridge much like that already within use at the main river crossing. This will be removed at the end of each working day. No in-stream works will be needed.

4. It is clear that the most vulnerable area in the event of heavy rainfall is where the penstock corridor crosses the river. It has been decided to construct an I-Section-steel and-timber bridge that plant can use to cross the river. This temporary bridge will be erected above water level so river water flows will not be interrupted. The bridge will be removed at the end of each working day in case of sudden spate conditions occurring when contractors are not on site and stored safely away from the river. NRW have advised that no consents are required for this design of river crossing. The use of this temporary bridge will allow any regular tracking of plant across the river to occur during the remains of the construction period and will mean no sediment will enter the water course.

5. Mainly because of heli transports a larger area around the site compound area is desired for the temporary storage of the penstock pipes.

6. As far as can be foreseen at this stage in the construction process, all the details in the original CMS can and will be adhered to. However, if any on-site ground conditions are encountered which might suggest otherwise, any future deviations from the original CMS (and this revision) will be discussed with SNPA and their agreement secured before works proceed any further.

7. It has been agreed that the ECW will visit a minimum of two to three times a week during works in sensitive localities (SSSI/SAC and river crossings).