The Council also appreciates that renewable energy developments can assist with the diversification of the rural economy, providing new sources of income and employment together with potential tourist attractions and one of the key goals of the Structure Plan is to encourage economic use of minerals, renewable energy and forestry in support of rural diversification.

Given its scale and the extent of the environmental considerations, the provision of the proposed hydro scheme is in accordance with the policies and requirements of the Perth and Kinross Structure Plan.

### 2.2.3 Local Policy

The Atholl Estate falls within the Highland Local Area, which covers half the land area of Perth and Kinross extending to approximately 1,000 sq. miles or 2,500 sq. km.

There has been a long history of the development of hydropower in the area and the dams, power stations and associated power lines reflect this.

Adopted in 2001, the Highland Local Plan seeks to meet the strategic aims and priorities of the Corporate Plan and the Structure Plan through a strategy, which seeks to enhance the quality and diversity of Highland Perthshire's environment and economy. The Plan also recognises that, in dealing with land use issues, it is necessary to take account of the inter-relationship between social, economic and environmental considerations in order to provide an achievable and sustainable Plan.

The Plan states that the Council will seek to ensure, where possible, that development within the Plan area is carried out in a manner in keeping with the goal of sustainable development. Moreover, the Council will encourage, in appropriate locations, renewable energy developments. Once accepted for renewable energy purposes, sites and installations will be safeguarded from development that would prevent or hinder renewable energy projects and could be accommodated elsewhere. Renewable energy developments, including ancillary transmission lines and access roads, will be assessed against the following criteria:

(a) The development will not have a significant detrimental effect on sites designated at national, regional or local level for nature conservation interest or archaeological interest
(b) The development will not result in an unacceptable intrusion into the landscape character of the area
(c) The development will not result in an unacceptable loss of amenity to neighbouring occupiers by reasons of noise emission, visual dominance, electromagnetic disturbance or reflected light.

The proposed scheme will have no major adverse effects on hydrology, ecology, fisheries, visual amenity or landscape resource. In view of this, the scheme and the associated mitigation measures are consistent with the policies contained in the Local Plan.

## 2.3 Methodology & Consultation

### 2.3.1 Need for an Environmental Statement

The requirements of the Electricity Works (Environmental Impact Assessment) regulations 2000 ('The Electricity EIA Regulations') state that a full Environmental Impact Assessment is required for schemes with a peak power output of 1MW or more. The proposed project has an output of more than 1MW, therefore SEPA, SNH and the Regional Council will require an environmental study and a thorough assessment of the scheme.

The scope of environmental studies has been determined by reviewing information from the following sources:

- Consultations with the Environmental Regulators
- Experience from other hydro schemes and studies
- The presence of Environmental Designations
- Information gathered from the site visits

### 2.3.2 Specialist Contractors

Drawing on the experience and reputation of sub contractors (mostly local) the following topics were studied:

| | |
|---|---|
| • Archaeology | J. Robertson |
| • Fish & Aquatic Assessment | R. Morgan, Morgan Fisheries Consultancy |
| • Habitat (Flora) | N. Dayton, Quadrat Scotland |
| • Bryophytes | G. Rothero |
| • Protected Mammals | P. Reynolds, Capreolus Wildlife Consultancy |
| • Birds | S. Lawrence, Lawrence Environmental Consultants |

In addition, Hydroplan undertook the following studies:

- Access & Traffic
- Hydrology
- Morphology
- Landscape & Visual Impact
- Noise

### 2.3.3 Consultations

Consultations were held with the following bodies/personnel:

- Perth & Kinross Council
- Tay District Salmon Fisheries Board
- Scottish Natural Heritage (SNH)
- Scottish Environment Protection Agency (SEPA)

# 3 Scheme Description

## 3.1 General

The principal dimensions and locations of the scheme will be as described in this document and associated drawings. In addition, the detailed design and construction contracts will ensure that the mitigation measures identified in this ES (or measures achieving equivalent performance) are incorporated into the scheme. However, the detailed design of the scheme (post consent) may necessitate minor changes to the layout.

Drawings of the scheme layout and components, including the powerhouse layout and elevations, intake general arrangements and pipeline route are available in Appendix L – Drawings. The main components of the scheme are:

1. A dam and intake on the Bruar Water
2. A diversion of the Allt Beinn Losgarnaic, into the inundated area upstream of the intake dam.
3. A powerhouse located on the right bank of the Bruar Water
4. Approximately 4.5km of buried pipeline
5. A tailrace, to take water from the powerhouse back into the Bruar Water
6. Permanent access tracks and bridges that extend from the existing track up to the powerhouse and the intakes.
7. Temporary construction tracks along sections of the pipe route that cannot be accessed by the existing track, which will be reduced to ATV tracks on completion of the scheme.

Water will be transferred from the main intake on the Bruar Water to the powerhouse to drive two turbines, which in turn, will drive generators that generate the electricity. The plant will be of storage type and the electricity generated will be exported by private wire to an existing grid line, near Calvine.

The operation of the scheme will be dependent on the water levels and flows within the watercourses and their tributaries. The turbine will only operate when there is sufficient water for both abstraction and compensation flow. The compensation flow, released downstream of the intakes, is required to maintain the integrity of the aquatic environment and the species that it supports.

The total catchment of the intakes is approximately 40.7km$^2$. The capacity of the scheme will be 1.5MW and will generate approximately 5064MWh per annum.

## 3.2 Emissions Savings

Based on the DTI figures for the average UK generation mix, the emissions savings have been calculated as follows:

**Table 1. Emissions savings**

| Pollutant | mg/kWh | Total (t) | |
|---|---|---|---|
| | | 1 Year | 25 Years |
| $CO_2$ | 430,000 | 2177.5 | 54,438.0 |
| $SO_2$ | 5,891 | 29.8 | 745.8 |
| $NO_X$ | 3,164 | 16.0 | 400.6 |
| CO | 1,091 | 5.5 | 138.1 |
| $N_2O$ | 164 | 0.83 | 20.8 |
| HC | 11 | 0.06 | 1.4 |
| Particulate | 469 | 2.4 | 59.4 |

## 3.3 Intakes

The new dam (intake 1) will encompass and extend the existing dam at NN 8285 7676, with the intake located on the right bank of the Bruar Water (facing downstream). To accommodate a loch level rise of 0.8m, flood walls have been included into the dam structure which extend for 16m on the right bank and 40m on the left bank of the Bruar Water. The crest of the spillway is at 468.8m, inclusive of a 0.8m loch level rise. The general arrangement view of the proposed intake design is shown in Appendix L – Drawings. The loch will initially be drawn-down to enable construction works to take place.

Integrated into the intake structure will be a screen, collection chamber and stilling chamber. A trash rack cleaner will also be incorporated into the design, to remove any debris from the screen. The trash rack cleaner will be powered using an underground cable that will run from the powerhouse to the dam, following the pipeline. A valve will be within or close to the intake chamber in order to isolate the pipeline as required. Drain valves will also be fitted within the intake chamber for maintenance purposes.

During use, abstraction would begin with water flowing through the screen to the intake collection and stilling chamber, from where it will enter the pipeline and be transferred down to the powerhouse. A compensation flow will be passed through the weir and allowed to continue its natural path downstream.

Intake 2 refers to a river diversion at NN 8302 7597 on the Allt Beinn Losgarmaic burn to supply intake 1 with additional water. The water diverted at intake 2 will flow down an open channel, lined with a membrane to prevent any leakage and the former channel of this burn will be filled-in.

## 3.4 Fish Protection

The screen bar spacing on the intakes will be sized (10mm spacing) to prevent fish from dropping into the collection chamber and hence into the pipeline.

## 3.5 Pipeline

The scheme will require approximately 4.5km of pipeline. The proposed route of the pipeline is shown on the Scheme Layout drawing in Appendix L.

The pressure rating of the pipeline will increase as the pipe descends from the intake to the powerhouse. The pipeline will consist of a combination of High Performance Polyethylene (HPPE), at the low-pressure section near the intake weirs, and high-pressure Glass-Reinforced Plastic (GRP) pipe for the remainder.

The selection of the pipeline route takes into account the following technical and environmental considerations:

- The location of the intakes and the powerhouse
- The route of the existing access tracks
- The aim to minimise the length of pipeline and use of land that is required for construction
- The aim to route the pipeline away from sensitive ecological and cultural heritage areas, including woodland wherever possible
- The topography of the site
- The requirement to minimise the visual impact.

The construction corridor for the pipeline will be restricted to a width of approximately 30m. A new track will be constructed almost parallel and close to the pipeline where possible and within the marked corridor. Along the route, the pipeline will be buried or mounded over.

Air release valves will be installed on the pipeline at approximate spacing of 400-500m and at high points along the pipe. These will consist of a flanged tee section of pipe to allow the connection of the air valve to the main pipeline. A simple chamber will be constructed, probably using pre-cast concrete rings with a pre-cast concrete lid, to provide manhole access and ventilation.

## 3.6 Powerhouse

The powerhouse and the associated equipment will be built at grid reference NN 8232 7261, at an elevation of 380m AOD. The location has been selected to minimise the potential landscape and visual effects and yet serve the requirements of the pipeline and grid connection.

It has been designed to accommodate one turbine and associated generation and control equipment. The incoming pipeline will be buried and the tailrace will return the water to the Bruar Water.

The building itself will measure approximately 18m by 11m and will extend to a maximum height of 9.05m. The building will take the form of a portal frame structure bolted to a concrete floor slab. The walls will consist of stone cladding and the roof will be profiled to resemble a traditional tin roof. Top and subsoil removed from the building and hard standing areas will be used for restoration where appropriate. The transformer is likely to be of an oil-filled design and will be located outside the building. The transformer compound will be stone clad.

The tailrace, in the form of either a pipeline or an open channel, will be located on the southwestern side of the building. This will transfer water from the powerhouse to the Bruar Water. Where the tailrace emerges from the powerhouse building; a screen with 20mm openings will be fitted to prevent entry of otters and fish. At the point where the tailrace discharges into the river, the channel will widen to reduce the velocity. This arrangement will avoid erosion of the main riverbed and banks.

Powerhouse plan, section and elevation views are available in Appendix L – Drawings.

## 3.7 Access and Traffic

### 3.7.1 Vehicle Access

All traffic will access the site using the A9, which is regularly used by HGVs. Approximately 12km of existing track will be used to access the site and to partially access the intakes. Approximately 5km of new permanent track will be required to access the intakes and powerhouse and 1.3km of temporary construction track for pipeline installation, which will be reduced to ATV tracks on completion of the scheme. Access will be to the necessary standard to ensure there will be no damage to the roads, verges and roadside drainage from construction traffic.

In designing the access layout within the confines of the site area, the following considerations have been made with respect to the access track requirements:

- Minimise requirement for additional lengths of track
- Enable operational access for maintenance to weir and powerhouse, and
- Accommodate sensitive ecological features, cultural heritage interest and minimise visual impacts.

### 3.7.2 Construction traffic

Construction of the scheme is expected to take 18-24 months. During this time, increases in traffic levels on the main access routes will occur due to the delivery of construction materials, plant and machinery and small vehicles transporting staff and visitors to and from the site. During the operational phase and under normal circumstances, traffic movements will be reduced to routine maintenance visits to the powerhouse and intake.

Information regarding the impact of traffic as a result of the proposed scheme is presented in Appendix A.

## 3.8 Grid Connection

The Bruar Hydro Scheme will connect to the National Grid system via a new 33kV buried private line that connects to the SSE 33kV sub station at Struan, near Calvine.

## 3.9 Operation and Maintenance

### 3.9.1 General Description and Operational Activities

It is intended that this generating station is fully automated and only manned on a part-time basis. Once commissioned, the basic control philosophy will be as follows:

1. Plant is switched to 'auto' on panel.
2. The control will sense if all systems are satisfactory (e.g. grid healthy etc.).
3. The control will sense when the level in the collection chamber is high enough to allow start up and running of the plant.
4. The inlet valve will partially open which will cause the turbine to accelerate to synchronous speed.
5. At synchronous speed, the circuit breaker will close, connecting the generator to the grid.
6. The turbine then opens up to the appropriate flow setting, being controlled by a level sensor at the intake.
7. The level sensor will constantly monitor the flow through the turbine. The minimum residual river flow between the intake and the tailrace discharge, at the turbine house is maintained at all times. The control system shall start and stop the turbine/generator automatically such as to optimise the use of the stored water.
8. In a fault condition, the control will disconnect the generator from the grid and shut the turbine down.

There is normally a manual facility included in this type of controller. This is mainly for commissioning purposes and maintenance procedures.

### 3.9.2 Operational Maintenance

The proposed development would be unmanned, with operations being controlled via a remote modem link. The maintenance for this type of plant is minimal. A typical maintenance routine would be as follows:

| | |
|---|---|
| **Weekly** | • Test shut down facility on control<br>• Inspect powerhouse for maintenance purposes; |
| **Monthly (or after storm event)** | • Inspect intake screen and tailrace for blockage or damage<br>• Check and lubricate relevant parts of equipment<br>• Clean screens, during low flow conditions, to remove accumulated algal and other growth |
| **Annually** | • Drain system and intake. Exercise gates. Inspect conveyance, intake chamber and tailrace channel.<br>• Clean the inside surface of the pipeline with a foam swab to remove particulate built up. This would be undertaken during periods of flow suitable to disperse the discharged residue and is not expected to be more frequent than once every three years; and<br>• As-required maintenance of the access tracks as noted during routine visits to the site |

# Clarification Note - CNPA

## Introduction

Hydroplan submitted a planning application for a small-scale (1.5MW) hydroelectric scheme on the Bruar Water, Blair Atholl to Perth and Kinross Council on 4th January 2012. As the scheme lies within the Cairngorms National Park, the application was referred to the Cairngorms National Park Authority (CNPA) for comment. Following a site visit and initial meeting with Hydroplan on 3rd May 2012, CNPA requested further information and clarification on a number of aspects of the scheme, each of which is addressed below.

### Item 1 – Pipe and restoration

The ground immediately downstream of the proposed intake (and existing dam site) is several metres higher than the pipe invert level. It is therefore proposed to cut a bench into this terrace for the access track and pipeline. An access track is required in order to lay the pipe and also access the dam following completion. Sections through the bank are shown in Drawing No. P575 30111. Due to the nature of area, a retaining wall is proposed for the first 50 metres or so of the pipeline to stabilise the banks and protect the pipeline from the river. This will be a concrete wall with stone cladding to reduce the visual impact.

### Item 2 – Inundation

It is proposed to entomb the existing dam with a new dam and raise the level of the lochan by 0.5m, which will increase the inundation area behind the dam. The projected inundation as a result of the new crest height is shown in Drawing No. P575 10115.

### Item 3 – Intake 2

The Allt Beinn Losgarnaich burn currently joins the Bruar Water just below the existing dam. Part of the proposal is to divert this burn behind the dam via an open channel. In low flows water will flow through the open channel into the loch. In high flows any excess water will simply flow over the diversion and carry on downstream. The diversion will be constructed of sheet piles with a concrete cap and material will be placed on the upstream and downstream sides of the sheet piling in order to give the wall a natural look. Details of the diversion are given in Drawing No. P575 20201. The material on the downstream side will also serve as an access over the burn.

### Item 4 – Access from A9

The existing track from the A9 to Bruar Lodge is in good condition and on the whole suitable for construction vehicles. However, the initial section from the A9 is too steep for larger vehicles and so a new section of track has been proposed for this initial accent. This new track will be a full-sized track (3.5m wide) and will be retained following construction for access to the scheme for maintenance. Details of the track are given in Drawing No. P575 10112.

### Item 5 – Stone Cladding

The powerhouse will be stone clad on all elevations with a profiled tin roof. Some examples of stone clad powerhouses are shown below in fig. 5-1 and fig. 5-2.

**Fig. 5-1 Tearnait Powerhouse**

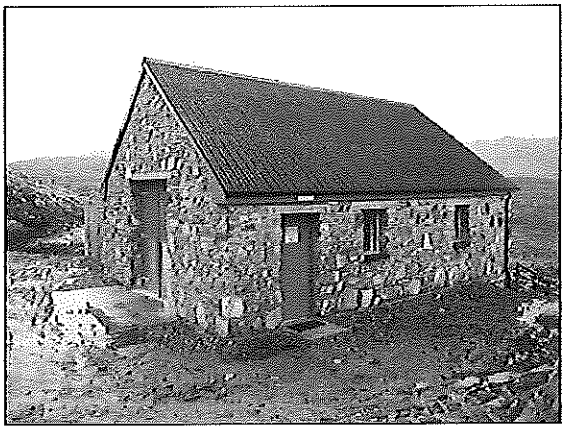
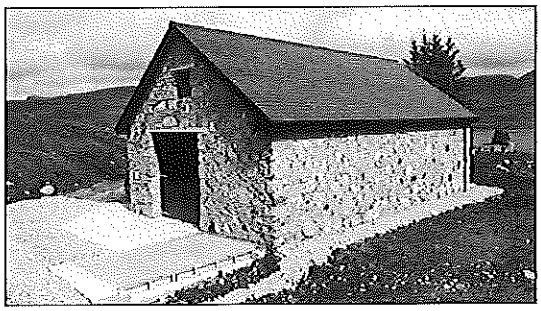


**Fig. 5-2 Garvault Powerhouse**



## Item 6 – Pipe Bridge

The majority of the pipeline will be buried but there will be an over ground crossing over the Allt a Chaise just before the powerhouse. A concrete thrust block will be required at either end of the pipe bridge to secure the pipe and straps will be used to hold the pipe onto the bridge. Examples of pipe bridges are shown below in fig. 6-1 and fig. 6-2.

**Fig. 6-1 HPPE Pipe Bridge**

**Fig. 6-2 GRP Pipe Bridge**

## Item 7 – Switchroom

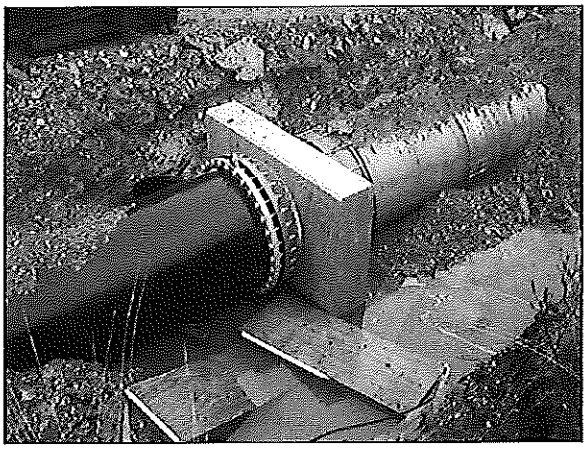
Part of the grid connection arrangement for the scheme includes a switchroom to house the point of connection and MPAN to connect from a private wire to the SSE national grid. The switchroom will be located close to the existing SSE substation at Calvine. The switchroom details are provided in Drawing No. P575 50102. The orientation of the switchroom is shown in Drawing No. P575 50111

## Item 8 – Thrust blocks and air valves

A detailed pipeline long section has not been prepared at this stage but from the topographical survey available it is predicted that two thrust blocks (fig. 8-1) will be required, one at approximately NN 8280 7345 and one at the change in direction above the powerhouse at approximately NN 8238 7283. There will also be a thrust block either side of the pipe bridge. In addition to the thrust blocks, there will also be a small concrete block at the transition between HPPE and GRP pipe (see fig. 8-2). All thrust blocks (apart from the pipe bridge) will be buried.

**Fig. 8-1 Thrust Block**

**Fig. 8-2 Pipe Transition**



Air valves will be required approximately every kilometre; hence there will be 4-6 in total. They will be adjacent to the track and will be painted green (see figs. 8-3, 8.4).

**Fig. 8-3 Air Valve**

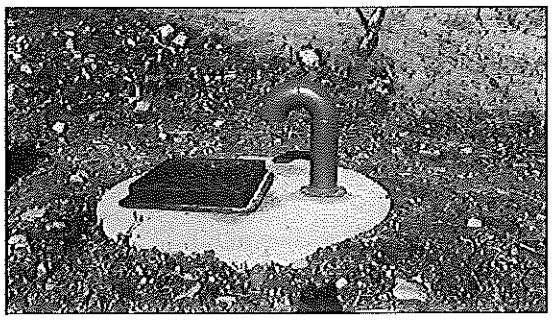


**Fig. 8-4 Air Valve**