Quarry Battery

Fact Sheet:
The History of Glyn Rhonwy

Glyn Rhonwy Development Timeline

PAST

Slate Quarrying

Pre 1840 - Agriculture

1840 - Open pit mining begins.

1914 - OS map shows that land has again been added to Llyn Padarn. The OS map for 1920 shows no signs of development which could indicate work at the site was beginning to slow down.

1889 - Railway link developed to connect the quarries to the Llanberis - Caernarfon line. Large differences in historical maps show the rapid expansion of slate quarrying. Slate tips extend and one ex-quarry to the NW is filled with slate waste. Land added to Llyn Padarn.

1928 - Chwarel Fawr and Chwarel Cefn Du close down and cease operations.

1930 - Glyn Rhonwy ceases slate quarrying activities.

Bomb storage & disposal

1942 - Winter brought heavy snowfall and led to the collapse of one of the large storage chambers burying 14,000 tons of explosives.

After **1942** the site changed purposes to open storage, disposal and demolition of explosives. Many of the explosives were dumped to the rear of the depot.

1941 - [World War II] The MoD take possession of part of the site to store weapons and munitions. The bomb store was constructed leading to many areas being flattened. Slate waste was piled over the top of the store for camouflage.

1953 to 1963 - A large lake appears in the Glyn Rhonwy quarry.

Restoration

1992 - Municipal waste landfill sites are cleared.

1969 to 1976 - A team of explosives experts were given the task of removing all explosives and triggers from the site. This involved moving large volumes of slate and draining the lake that had formed in the Glyn Rhonwy Quarry.

Redevelopment

1999 - A second phase is commenced creating 3 additional platforms for business premises.

2006 - QBC first get involved at Glyn Rhonwy, in opposition to a snowdome development.

2012 - QBC seek permission to convert Chwarel Fawr and Glyn Rhonwy into a pumped storage facility.

1998 - Gwynedd Council begin developing the area to make it commercially viable for business premises. Slate tip slopes behind Gallt Y Glyn were made safe and slope inclinations lowered to provide greater stability for the slope. Two platforms created from slate waste for business premises.

2009 - Gwynedd Council clear site, repair fences and surface access roads.

PRESENT

Fact Sheet:
Design, Construction and Operation

QBC and the engineers at AECOM have developed a preferred design in conjunction with Gwynedd LPA, EAW and Cadw. During the design process we looked at several options and their impacts on the environment.

Pumped Storage is a way to store electricity. At Glyn Rhonwy, the system uses electrical energy to pump water up to the higher quarry. Energy is stored simply by letting the water sit up there. When the operator lets the water drop down again through a turbine, the energy from the falling water is turned back into electricity and can be used when we need it most.

Design and Construction

With the engineers at AECOM, we have looked at various options for developing the quarries. The preferred design avoids using the quarries that are home to rare birds and rules out using Llyn Padarn as a lower reservoir. The pipe route – or penstock – has been designed to minimise disturbance to the landscape. Of the 3 options for disguising the pipes including cutting and filling, shallow tunnels and deep tunnels, the preferred design shows the cut and fill option because there are still many uncertainties over the geology beneath the site. Cut and fill involves excavating a trench, laying the pipes side by side and then filling the trench and covering the pipes up.

At the construction stage, further mitigation measures may include avoiding certain construction activities during bird nesting and breeding seasons and, where possible, crushing slate waste on site for reuse in the concrete mixture to minimise waste and blend structures into the landscape.

With all these factors taken into account, the development will require work to stabilise and line the quarries and improve access to and around the upper quarry. It is estimated that a 20m dam on the upper quarry and a 15m dam on the lower quarry will be needed as well as tunnels to move the water up and down; and a turbine house and grid connection. Environmental impacts have been considered at the design, construction, operation and decommissioning phases. The grid connection will be subject to a separate application.

The Lifetime of Pumped Storage

Pumped Storage is one of the most efficient ways to store electricity and one of the few that works at the scale of the grid. With efficiencies of more than 75%, it allows all electricity consumers to use a greater proportion of electricity from renewable sources at times of peak demand instead of the fossil fuels we have to burn at the moment.

We expect that construction will take 3 to 5 years. If the planning application is successful, it may be possible for construction by a contractor to begin as early as 2013.

With proper maintenance and timely replacement of the main moving parts, a Quarry Battery can last for decades.

Amount of Energy Stored: 500 megawatt hours (MWh)

The size of the development at Glyn Rhonwy is measured in terms of the energy stored. This is directly linked to the volume of water that can be held in the quarries. The volume of the quarries and the size of the dams are designed to make the most of this energy storage capacity.

At Glyn Rhonwy, the operator will pump 1.1bn litres of water up to the top quarry. This amount of water represents the storage of about 500 megawatt hours of energy (MWh).

This is equivalent to:

- burning enough petrol to drive your car 750,000 miles
- the energy you would need for 60 people to leave their kettles boiling for a whole year
- the physical effort you would need to put in to burn off the calories from eating 1.5 million chocolate bars

This is still only 5% of the energy stored at Electric Mountain.

Power Generation: 49.9 megawatts (MW)

Electricity from normal power stations is usually described in terms of megawatts (MW) of power generated instead of energy. This is like talking about the size of your car engine instead of how much time you spend driving.

Pumped Storage at Glyn Rhonwy uses dams to increase the capacity to store energy but the volume of the quarries and the size of the dams are not directly related to the power output.

QBC's studies show that the economic case for Pumped Storage makes sense with an output of 49.9 MW because this is useful for the National Grid.

The turbine house will have a footprint of 75m x 45m – this is about ¾ the size of a football pitch.

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Fact Sheet:
Landscape & Visual Impact Amenity

The visual impact of the project will be assessed from twelve locations, at a variety of distances and directions from the Glyn Rhonwy development. The viewpoints were chosen to represent a range of views from a range of sources including local residents, tourists and users of local roads and public footpaths, and were agreed in consultation with Gwynedd Council and Snowdonia National Park. The reasoning behind each viewpoint is explained below.

Viewpoint Descriptions

Viewpoint 1 – Snowdon
The viewpoint is located close to the summit of Snowdon, within Snowdonia National Park. This viewpoint was chosen as it is a popular tourist destination and can attract a large amount of visitors all year.

Viewpoint 2 – Moel Eilio
The viewpoint is located close to the summit of Moel Eilio, within Snowdonia National Park. This viewpoint was chosen as Moel Eilio is a prominent hill to the south of the site with extensive views in the direction of the Glyn Rhonwy development.

Viewpoint 3 – Glyder Fawr
The viewpoint is located close to the summit of Glyder Fawr, within Snowdonia National Park. This viewpoint was chosen as it is a very popular destination for walkers and offers clear views towards the site from within the Glyder range.

Viewpoint 4 - Llanberis Lake Railway, Llyn Padarn
The viewpoint is located at Cei Llydan Station on the Llanberis Lake Railway. This viewpoint was chosen as the Llanberis Lake Railway is popular tourist attraction and represents views from Padarn Country Park. From this location there are clear views of the lower parts of the site across Llyn Padarn.

Viewpoint 5 - Llanberis / A4086
The viewpoint is located on the footpath along the A4086, close to the Dinorwig Electric Mountain visitor centre in Llanberis. This viewpoint was chosen as it captures the view of the site from the centre of Llanberis – a view which residents and visitors will experience.

Viewpoint 6 – Pen-y-Llyn
The viewpoint is located within the small settlement of Pen-y-Llyn on the minor road between the A4244 and Dinorwig. This viewpoint was chosen to represent the views of residents at the northern end of the valley, looking across Llyn Padarn.

Viewpoint 7 – Cefn Du
The viewpoint is located adjacent to a cairn in the vicinity of the summit of Cefn-du. This was chosen as it is close and has views over the upper parts of the site.

Viewpoint 8 – Dinorwig
The viewpoint is located within the village of Dinorwig on a public footpath off the minor road which serves the village. This viewpoint was chosen to represent the views of residents across the valley from where much of the site is visible.

Viewpoint 9 – Dolbadarn Castle
The viewpoint is located in the grounds of Dolbadarn Castle and has panoramic views across Llyn Padarn to the north-west and Llyn Peris to the south-east. This viewpoint was chosen to represent the views of tourists visiting the castle and to generally capture the view from this end of the valley.

Viewpoint 10 – Public Footpath, Llanberis
The viewpoint is located on a public footpath to the west of Llanberis. This viewpoint was chosen as it captures the view of walkers and road users entering or leaving the town from the west.

Viewpoint 11 – Elidir Fach
The viewpoint is located close to the summit of Elidir Fach within the Snowdonia National Park. This viewpoint was suggested by the Snowdonia National Park Authority. It was chosen as it represents a clear and elevated view from the opposite side of the valley to the development.

Viewpoint 12 – Hebron Station
The viewpoint is located on a public footpath adjacent to Hebron Station, within Snowdonia National Park. The footpath connects with the Llanberis Path to the north, which leads to the summit of Snowdon. This viewpoint was suggested by the Snowdonia National Park Authority. It represents the view of visitors climbing Snowdon and users of the Snowdon Mountain Railway.

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Fact Sheet: Ecology

During the EIA, Cambrian Ecology have been working to establish the ecological baseline for Glyn Rhonwy. Extensive surveys have been conducted focusing on protected species; the results are summarized here.

Phase I and II Habitat Surveys

The unique environment which results from the quarry voids at Glyn Rhonwy creates a broad array of habitats. Habitats range from both dry and wet heath/acid grassland to semi – improved pastures to habitats formed on the slate waste piles.

Amphibians

The site is sub-optimal for amphibians due to the sterile nature of the water and dry rocky habitat of the terrestrial zone. Frogs and palmate newts were discovered in a quarry void to the south of the main site. It is anticipated that amphibians will not be an issue on this site.

Badgers

The majority of the site is unsuitable habitat for badgers. One badger sett was found outside of the site boundary. No evidence was found of badgers using the site for foraging. It is anticipated the development will have no significant impact on badgers.

Bats

Seven species of bat were recorded:

- Common and soprano pipistrelle;
- Daubentons bat;
- Brown long-eared bat;
- Whiskered/Brandts;
- Lesser Horseshoe; and
- Noctule.

The survey found that a relatively low number of bats loyally use the site features for roosting and foraging but no significant maternity roost or swarming site is located within the site boundary. Low numbers of lesser horseshoe and natterers bats were found hibernating on the site. All British bats are fully protected under UK and European law and destruction of their habitat will be prevented or mitigated.

Breeding and Wintering birds

Cambrian Ecology identified seventeen notable bird species in the breeding bird survey and fifteen in the wintering birds survey. Eight species on the RSPB red list were found on the site:

- Chough
- Cuckoo
- Grasshopper warbler
- Kestrel
- Peregrine falcon
- Ring Ouzel
- Skylark
- Song thrush

The Peregrine falcon and Chough are both ‘Schedule 1’ species protected by the Wildlife and Countryside Act 1981. Any disturbance to these birds while nesting or while they have dependent young could constitute a criminal offence. The project design will safeguard the breeding grounds of these protected species.

Invasive species

A single specimen of Rhododendron is the only invasive plant species from the Welsh list on the site. It will likely be removed from the site if on the working width of the development. There are large amounts of buddleia in some areas, which can be considered invasive.

Fish have been found in the lower Glyn Rhonwy quarry. The fish will be identified before appropriate action is taken.

Otters

The presence of otters on the site is unlikely due to a lack of prey availability and poor habitat connectivity. For example; the water bodies have no out-flow streams and are isolated in the quarry voids. It is anticipated the development will have no significant impact on otters.

Reptiles

One slow worm and two common lizards were recorded during 591 checks on 100 reptile refugia. A small number of common lizards were also reported as adhoc sightings as they occupy habitats across the whole site. The populations of both slow worms and common lizards is not nationally significant at Glyn Rhonwy.

Lichens (lower plants)

Overall the site has a number of notable species of lichen. A single Section 42 species, Usnea florida, was recorded. Some species such as Protoparmelia atriseda, are found on slabs of rock which may be possible to move. The remaining significant lichen areas are all adjacent to quarry voids.

Fungi

A total of 39 grassland fungi species were found on the site. Species include the distinctive Crimson Waxcap, other waxcaps, Fairy clubs, Pinkgills, Earthtongues and Crazed caps.

Llyn Padarn

Llyn Padarn is a Site of Special Scientific Interest (SSSI), protected for its natural population of Arctic Char. Otters, salmon and sea trout can also be found. The impact of the Glyn Rhonwy development on Llyn Padarn will be given careful consideration.