

Planning and Design Statement Cambrian Quarry (050695)

Current Planning Permission

ASH Resource Management Limited was granted planning permission reference 050695, on 28/04/2014 from Flintshire County Council for the restoration of Cambrian Quarry by the importation and recycling of inert materials.

The site is a disused quarry/mine that has been abandoned and left unrestored in a dangerous condition. It is in need of restoration to make the existing vertical sides safe. Once the quarry has been filled and the sides have been stabilised the site will be restored to woodland, open grassland and wet land.

Issue

Within the void space that is being restored and made safe, there is a cave which is occupied by bats in the north-east corner of the void area. The position of this cave is shown in Figure 1.



Figure 1: Approximate position of bat cave within infill area

Under the current final approved restoration scheme if it was to be implemented surface water would flow from the infilled completed landform area towards the bat cave entrance. The main landform is to be restored to a level of 295 meters AOD in the vicinity of the cave entrance which then slopes very steeply down towards the bat cave, which is located at the current level of approximately 280 meters AOD. Over time due to the water runoff it is envisaged there is potential danger that the mine could be flooded by the ingress of water from the runoff from the finished landform design. This will then render the cave system unsuitable for the large established population of lesser horseshoe and other protected bats that currently inhabit the cave network.

The issue is illustrated in Figure 2. The current entrance to the bat cave is shown in Figure 3.



Figure 2: Photo of current bat cave area

One of the main reasons that planning permission for the restoration of the quarry was granted was to make the quarry sides safe. The agreed current permission does not fully address this issue in the area around the cave and from the picture above it is clear to see that a large amount of vertical unsafe rock face will still be exposed if the current approved scheme is carried out.



Figure 3: Existing entrance to bat cave

Proposal

ASH proposes, in accordance with a license that would be issued by Natural Resources Wales under Regulation 55 of the Habitats Regulations, to construct a chamber in front of the existing bat cave entrance. The main chamber would have three pipes running out of it; one into the cave, a vertical shaft 1050 mm mounted on the top and a 1200mm shaft laid at a maximum incline angle of 30 degrees.(see attached plan .Drawing no MIT-01)

The proposed scheme would protect the entrance to the cave where the bats currently inhabit. By constructing the chamber as detailed on drawing reference; Extended Access to Cambrian Quarry Top Mine Entrance, drawing no MIT-01 the design takes into account the temperatures within the mine as the construction detail takes into account the air flows around the entrance which is needed in order to regulate and maintain the ambient temperatures within the mine. The modifications to the cave entrance will have no adverse effect on the existing bat population and will allow them free uninterrupted access to the cave. The structure will also allow safe access along the inclined shaft for the Clwydd Bat Society who visit the caves on a regular basis and monitor the existing bat population.

The proposed structure is made out of heavy duty thermoplastic and will be purpose made for the site. It will be a strong, lightweight structure which can be fabricated off site and then lowered into position on a prepared reinforced concrete foundation. The offsite fabrication process will also reduce the need to have men working for any prolonged lengths of time beneath the crumbling rock face above the cave entrance.

The structure will be sealed to stop any water ingress and the upper structure will be added to and raised up as the fill is deposited within the vicinity

ASH will build and fill around the structure with inert material in phases whilst ensuring both the vent pipe and pedestrian access pipe are secured at the entrance to each of the pipes at all times with a locked chamber to stop any unauthorised entry and to ensure optimum safety.



Justification

Without this proposed amendment proceeding, it is highly likely that:

- a) The bat cave will become unsuitable for lesser horseshoe bats and other bat species due to potential flooding which could effectively destroy their habitat, a potential offence under the Habitats Regulations
- b) The quarry sides above and to the side of the bat cave will become weathered over time and become even more dangerous
- c) The unstable rock face could collapse and actually block the current cave entrance
- d) The final design of the restoration scheme has not fully addressed the unsafe rock face as it leaves a substantial part of the dangerous quarry face exposed.

Discussions have been held with ecologists from Natural Resources Wales and Flintshire County Council and they are both in agreement that this scheme is required and is suitable to address the issues and ensure that the cave is preserved and a suitable habitat for lesser horseshoe bats is secured for the future.

The Solution

The system we propose to install has been designed by Ecological Design Consultants (EDC) in conjunction with TRP Consulting Engineers and Polypipe UK Ltd.

The structure is made from thermoplastic and is the latest Ridgistorm XL product which has been constructed using the latest technology from Polypipe. The Ridgistorm XL system is a sustainable solution for urban drainage systems and is used for works associated with commercial infrastructure especially within the water industry. The units are used extensively on water attenuation schemes which proves the system is durable and fit for purpose.

It combines the latest innovative solutions to SUDS and storm water management requirements. Combined with the experience of Tim Hodnett of EDC, Terry Parry of TRP Consulting Engineers and with the support of Polypipe Water Management Solutions Ridgistorm XL will be designed and constructed as a bespoke application for this project and will use the most advanced large diameter plastic pipe technology currently available in the UK today.

The system has a wide range of applications and has a range of pipes varying in size from 750mm to 210mm diameter. The structure is designed as a flexible structure to minimize the effects of ground movement and deformation and thus prevent leakage and ingress of water into the structure. Exceptional pipeline integrity is achieved using Ridgistorm XL due to the reduced number of joints therefore minimizing the number of potential leakage points and as a result removing the risk of ground water ingress.

The construction material used to make the plastic pipe is sustainable and is 100% recyclable. It is strong and yet retains great flexibility. The completed structure will be able to withstand ground movement without leakage.

The Environmental Benefits of using plastic pipes in construction are numerous and because they are lighter than concrete and typically weigh 94% less than their concrete equivalent it reduces energy during their construction therefore reducing greenhouse emissions.



ASH Group Ltd
Unit 16 Wilkinson Court
Clywedog Road South
Wrexham Industrial Estate,
Wrexham, LL13 9AE





Using plastic also reduces the need for quarrying virgin aggregates and due to the lightweight nature of the materials plastic pipes can be transported in greater volumes reducing the deliveries to our site to one as opposed to four if we used traditional concrete products. Not only will the reduced number of vehicle movements reduce co2 emissions the reduction of onsite traffic movements also reduces potential Health and Safety risks.

By using plastic pipe there are obvious cost savings involved as the product can be made cheaper. The cost savings are also increased due to the need for smaller craneage to lift the structure and by the having the units prefabricated off site it means less time for men to be working carrying out the installation which in this case is beneath a dangerous crumbling rock face.

The benefits of using Plastic Pipes as a solution include

- Lower density and weight than rigid materials so lower transport and installation costs
- Strong yet flexible with reduced risk of breakage
- Strong and lightweight providing excellent Health and safety benefits
- Plastic pipe installation have reduced leakage compared to rigid materials because of longer pipe lengths and high –integrity joint systems
- Can be manufactured from recycled materials
- Proven second life 100% recyclable
- Ability to use as dug materials in certain applications as a backfill material
- Ability to use off site construction techniques to minimize cost and time on site
- Non corrosive
- Chemically resistant
- Flexible pipe providing increased ability to withstand ground movement
- High resistance to site damage under normal usage conditions
- Structured wall engineered design with maximum system strength but minimum product weight and cost.
- Installation of Ridgistorm XL is quick therefore reducing open excavation times and high numbers of manpower and machinery are reduced
- Lightweight in comparison to concrete materials and therefore easier and safer to handle
- Beneficial with regards CDM compliance as the installation reduces many risks associated with the installation of large concrete pipes.

Outline Construction Sequence

The area adjacent to the cave currently has a temporary haul road running from the higher existing level down to where the cave entrance is located.

The existing road formation will be compacted and a new haul road constructed with a minimum of 300mm of crushed aggregate. The material will be compacted and rolled and will eventually form the base along which the pedestrian access shaft will be laid.

The works will be undertaken using a 21 tonne excavator equipped with a digging bucket and full ROP's and FOP's protection cab to protect the operator whilst working close to the unstable rock face



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There will be a full time supervisor on site who will continually monitor the existing rock face. Any loose material that can be safely removed will be dislodged using the excavator. Should there be any risk of rock failure then work will stop immediately and will not recommence until a full structural investigation has been undertaken by a suitably qualified engineer.

Prior to works commencing a detailed survey of the existing rock face will be undertaken and a decision made as to whether a crash deck should be built above the cave entrance to protect construction personnel working below.

The existing spoil around the cave entrance will be excavated and removed to tip on site. All works will be carried out under strict supervision and in accordance with detailed method statements and risk assessments.

A suitable level to construct the concrete slab will be agreed. The slab will then form the base for the structure to be mounted on. This area will be excavated down to an agreed level and all unsuitable surplus material removed. The formation will be compacted and tested for load bearing properties. Once test results are received the engineer will design a suitable raft for the structure to be located on.

The base will be constructed with reinforced concrete and will be of a size and design suitable to site the structure on.

Consideration will be given as to the stability of the cave entrance and whether any permanent propping is deemed necessary.

Should it be necessary then it can be installed using steel I beams and acrow props.

The bespoke structure will be delivered as three units, the main chamber and two shafts which can be attached once the main vessel has been sited and secured.

The main vessel will be lifted into position using the excavator which will travel down the slope whilst carrying the lightweight structure.

The vessel will be positioned so the shaft which is at right angles to the main body of the vessel is positioned within the void of the cave.

The vessel will then be secured using block work and concrete. The resultant void around the pipe into the cave will be sealed up using a suitable waterproof material to stop any ingress of water. Materials and method to be agreed on site with engineers TRP and EDC.

Once work has been completed and the vessel sited and secured and the void around the outside of the pipework into the cave sealed we will then back fill around the concrete base with suitable material.

Once this work is complete we will place the first 6 meter length 1050 mm diameter vent shaft pipe on top of the main vessel in accordance with the manufacturer's instructions. The pipework will be secured with a water tight seal and secured temporarily with straps to hold it upright whilst suitable fill is engineered around it and the levels raised resulting in the pipe being buried.

The next step is to place the first 1200mm diameter access vent shaft pipe at approximately 30 degree angle whilst securing it and sealing it to the main body of the vessel in accordance with manufacturer's specification.

Once all the relevant pipes are in position we will carefully backfill around the existing structure using suitable cohesive materials which will be compacted using an hydraulic trench hoe compactor mounted on the excavator dipper.



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Unit 16 Wilkinson Court
Clywedog Road South
Wrexham Industrial Estate,
Wrexham, LL13 9AE





The material will be carefully compacted around the structure in 300mm layers taking time and care so as not to cause any damage to the newly constructed structure.

The material will be compacted and the levels slowly raised until the whole of the lower body of the vessel is covered. The existing vent pipe will then be filled around it using similar methods as described earlier.

The pedestrian pipe will also be backfilled using suitable cohesive fill.

The area of void around the cave entrance will then be carefully filled and levels raised using suitable cohesive materials.

The area will be backfilled to a level of 1 meter below the top of the existing 1050 mm vent pipe. A secure lockable entrance cover will be fixed to the top of the pipe to stop any unauthorised entry into the shaft.

Once the area has been filled to within 1 meter below the top of the extended pipe level another 6 meter pipe will be secured and fitted to the existing vent pipe to raise the level of the shaft system. The lockable entrance cover will be removed then attached to the top of the extended pipe. The area round the vent pipe will continue to be filled and compacted.

As works progresses and the ground is raised the pedestrian vent pipe will be extended and the existing ramp will be backfilled as the levels are raised.



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