

BAT TOWER REQUIREMENTS

Bat towers are built prototypes of bats habitation projects which explore strategies for increasing public awareness of bats as a critical component of our ecosystem. Bats are effective as natural pesticides, pollinators and mosquito abatement. Yet they are often considered as a kind of urban pest and are frequently exterminated by human-run services – pest control.

In an attempt to bring visibility to bats, Bat Towers Constructions challenges notions of the typical off-the-shelf bat house. Rather than fading into the background, the towers stand out very prominently visible outdoors. Bat Towers are usually situated and designed to attract and facilitate bat inhabitation. Located adjacent to a river or a lake, those sites boasting an abundance of mosquitoes and other insects. Chives, oregano and other bat-attracting plant are usually planted near the tower's structure. The tower needs to accommodate a warm environment for bat roosting and materials to absorb the sunlight, and to help facilitate entry near the top of the structure, possibly with landing pads.

All the UK bats have been known to use buildings but some have come to depend on buildings for their survival. Preferable buildings for bats are barns, farm buildings, churches and those with attics and lofts that can provide lots of cracks, gaps and openings.

Different bat species use buildings in different ways depending on particular needs of each species. Crevice dwellers – prefer tight spaces (about 20mm-30mm) and are often hidden from view. Typical spaces include gaps behind barge boards, fascia, roof tiles, wall coatings, hollow mortice joints, rain gutters, chimneys, window frames and cavity walls. Greater total areas of about 1sq meter is used for nursery roosts during summer. Male roosts contain smaller numbers of bats or even individual bats. Roof void-dwelling bats need timber joists or beams on which to roost – height of entry 2-7m.

Roof-void dwellers – like to cluster together in tight spaces but may also use roof timbers, the roof has specifically been designed to mimic a traditional pitched roof that is present on Rechabite Hall. The roof structure will be timber with traditional Hessian roofing felt. Provision for specialist bat entry roof tiles and ridge tile has been allowed for as well as tears in the felt to allow the bats to enter the tower without obstruction.

Bats that need flight space – need uncluttered space in the roost – at least 4m x 4m x 2.8m high, to fly around before emergence.

Bats that need flight space and fly-in access – these are the horseshoe bats, they can not crawl into roosts and need large access gaps, as well as uncluttered flight space – at least 4m x 4m x 2.8m high within roosts. The crevice-roosting provision within the roost to be located on the south or west side for solar heating. North facing structure will benefit from using insulating materials.

Swift – need at least 65mm x 33mm high excluding starlings. The bottom of the whole should be no more than 5cm above the floor of the nest. Floor area needs to be at least 350sq cm – 12cmx30cm, 15cmx25cm. Headroom possibly at 75mm low when space is constrained, recommended 150mm or even 200mm. The tower needs to have at 5m above ground and away from obstructions. It will have to avoid direct sun that would lead to overheating.

Refer to Architectural drawing:

- BAT-ESA-XX-XX-DR-A-061000_P02 - Planning Drawings
Proposed Masonry Tower Option - Sheet 1

This drawing is in Appendix B at the back of this report and details exactly what special ingress/egress points are in the design as well as the several other special features internally to the tower:

- Traditional hessian felt to aid crawling bats,
- Underground hibernacula to imitate a cave,
- Cool tower,
- Warm lofts,
- Bat tubes,
- Bat brick roosts hug vertically,
- Timber baffles,
- Bat boxes,
- Bat bricks,
- Blockwork walls with raked out joints and crevices,
- Smooth rendered walls,
- Horizontal timber batten perches,
- Bat ridge and roof tiles,
- Lead lined chutes,

All these feature specifically for bats have been discussed at great length during the Stage 3 design to ensure the tower meets the specific needs of the bats. This list has been put together through collaboration with Wildwood Ecology who have input their expertise to aid the Design team.

For further details on mitigation and enhancement measures being proposed, please refer to the Ecologist Report in Appendix A at the back of this report.



Ecologist Input

ECOLOGIST INPUT

Wildwood Ecology have been appointed as a bat specialist for this project with over-sight governing the legal constraints impacting demolition and construction. They are also advising with regard to the bat roost and hibernation functions, enabling for a focused architectural design that satisfies both functional ecological and aesthetic/planning criteria of the given project brief.

The legal UK framework for bat roosts prohibits the destruction of roosts until a new provision is built and in the case of roosts of high conservation status (such as maternity roosts) of rare species, there is evidence that the new roost is successfully inhabited.

Bats cannot be disturbed within certain periods of the year, especially maternity roosts (yet to be determined by survey) – between 1st of May and 31st August being the most sensitive period. The demolition of the existing structure should be between March-April and September-October (i.e., active bat season but avoiding maternity season and hibernation season).

The appointed ecologist has recommended distance constraints between the existing building/last known roost and the proposed tower. This is the primary reason for location 1 being selected to site the new tower. The proposed location meets all the requirements set out by the ecologist:

The new structure is best placed adjacent to the river and close to the tree line. New planting will be required to attract new insects for bats to feed and to provide connectivity to off-site habitats. The structure itself must be fully locked so people or children won't disturb the area for legal and safety reasons. If the structure is within POS, inappropriate access should be prevented by thorny planting or fencing to minimise the likelihood of vandalism/disturbance. Potential fence lines to be discussed and agreed with the Client at Stage 4 detailed design.

Materials recommended to use in the construction: wood, stone or brick (at the location of the roosts, to ensure the roost material thermal properties are suitable for roosting bats). It is important the structure is not climbable to prevent any disturbance of the bats and their habitat. To combat this issue the design team have elected to use flush faced stone with near vertical sides sloping at just 2.5°.

There is a requirement for internal access to the roosts for regular maintenance/surveillance that will be undertaken by NRW licensed ecologists/personnel. An allowance has been made for a steel security rated doorset along with internal caged ladder to provide access from the cool tower to the warm loft. The hibernacula will be protected by a steel grate with spacing big enough for a flying bat to pass through.



EXAMPLES OF NEW-BUILD ROOSTS



Wildwood Ecology example above of a new-build roost (mid-construction) with a loft for free-hanging lesser horseshoe bats and internal crevices for crevice-dwelling bats. This loft will be accessed by a hopper entrance in the middle of the roof pitch (seen partially constructed).

On the north elevation the bat loft structure will be built into a slope, to provide a hibernation wall (seen in the photo). This comprises hessian roofing felt wall (covered by weather boarding once finished) and slot access ports under the weather boarding leading into passively controlled interior roosting area. Note the two examples of hibernation crevices – additional crevices were created after this photo was taken, branching off horizontally at various heights. The crevices will not be visible once the weather boarding is installed.

The hibernacula built here is a great precedent however the timber clad building is not a suitable construction for our scheme due to it not being completely secure, fire proof, or not at an adequate height.

South facing roof areas help heat the interior with a dark, draught free but vented interior which has a recommended ambient temperature range. Additional interior features such as triangular baffles are installed to partition the loft area and to create varied thermal regimes. Internal crevices are provided in the loft, made from short sections of battens, and roosting surfaces are provided for free-hanging bats in the form of wooden ridge boards. Wooden sarking or hessian roofing felt are installed under the tiles. Access points for crevice-dwelling bats are provided under tiles and ridge tiles by installing modified tiles.



Linear bat roosts that would be built horizontally and have an underground structure. This proposal must provide a 3 to 5m high access point. The space inside for free-hanging bats is usually 4m x 4m, with c.2.8m apex height to provide sufficient volume for bats to fly in. Internal features and access features as described in the option bat roost above.

Landing /access points cannot be built of steel or plastic as bats cannot cling to the smooth surface; they need rough natural surfaces to cling to for landing and entry such as wood, stone, and brick. Any steel used as walls would need to be carefully designed to afford good landing areas for the bats, perhaps incorporating render, stone, brick, so that bats can climb up these surfaces to the roosts.

A buried linear hibernaculum, (photo above, mid-construction) to provide winter hibernation opportunities. The opening with a lockable gridded gate (13cm - 15cm air space between bars) should face north or north-east and feature insect attracting planting to the surround to provide linear connectivity from existing habitats to the new bat roost. This 'linear- cellar' roost features a dark roosting internal space that has ambient temperatures stabilized (aiming for 8 – 13C and very high humidity). The hibernaculum is dug c. 1.5m-2 deep and covered with soil (grassed over once completed). It is built from breeze blocks, with internal features such as alcoves and fake chimney breasts to provide very dark locations, hessian roofing felt sections and battens to provide gripping surfaces/ crevices, and bat tubes built into the walls.

Conversely, a vertical tower roosting configuration will need to feature similar environmental and functional requirements with sufficient internal volume to accommodate a sufficiently sized roosting area. Summer roosts and winter roosts should be provided, with thermal regimes/ materials. These constraints have informed the Stage 3 design of the tower which incorporates all dimensional requirements and all special features suggested

SPECIALIST ECOLOGIST FINDINGS

For full findings, impacts, assessment and mitigation/enhancement measures, please refer to Appendix A at the back of this report:

ECOLOGICAL IMPACT ASSESSMENT REPORT
RECHABITE HALL, TAFF AND CRESCENT STREETS,
MERTHYR VALE - Document Ref: WWE19105 REV A

Works Undertaken:

2019

A Preliminary Ecological Appraisal (PEA) was undertaken, consisting of a desk study and an extended Phase I Habitat Survey, carried out in July 2019, following the Chartered Institute of Ecology and Environmental Management (CIEEM) Preliminary Ecological Appraisal (2017) guidelines. A Preliminary Roost Assessment (PRA) was undertaken at Rechabite Hall during July 2019, consisting of a desk study and field survey following best practice in line with the Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edn (Collins, 2016).

Three dusk emergence/dawn re-entry surveys were undertaken from July to September 2019 following survey guidelines (Collins, 2015). Following the 2019 survey effort, it was agreed with Natural Resources Wales (NRW) as part of bat licence (Ref. licence number: S087946/I) that Rechabite Hall would become a dedicated bat house to compensate for the loss of roosts during the demolition of Taff and Crescent Street.

2022

A single monitoring survey was undertaken in June 2022 as per the above NRW development licence.

2024

From May to June 2024, three bat emergence surveys were undertaken following survey guidelines (Collins, 2023), in order to inform the demolition of Rechabite Hall.

Potential Impacts:

Due the proposed works, it is likely that in the absence of mitigation there will be adverse effects on the following ecological features:

- Afon Taf Site of Importance for Nature Conservation (SINC);
- bats (roosting);
- bats (foraging and commuting);
- birds (nesting);
- fish; and
- otter

Recommendations Compensation and Enhancements:

- a Construction Environmental Management Plan (CEMP) will be required in order to avoid impacts on the Afon Taf SINC and its designated features (including bats, fish, and otter) during demolition and construction. Mitigation measures during the construction phase of the proposed development are required as follows:

Bats

- In order to avoid triggering legislation that protects bats and bat roosts, a bat licence will be required prior to works. The licence can be applied for from NRW after full planning is achieved. The licence must be in place prior to the commencement of the work.
- The compensation bat tower will be completed prior to the start of the Rechabite Hall demolition. The bat tower will be built as per the design specified in the licence and will include roosting features suitable for all bat species and roosts confirmed by the on-site surveys in 2029, 2022, and 2024. The broad design principles are stated in Section 5 of this report (see Appendix III for details).
- Prior to commencement of works, a toolbox talk will be

on-site, advising them that the building is a confirmed bat roost, advise about the licence work methods, and what to do if a bat is found during works.

- Additionally, a pre-works check will be required prior to demolition works along with exclusion measures to prevent bats from entering the building during the works.
- Roof stripping works will be conducted under supervision of the named ecologist or an accredited agent.

Birds (nesting)

- If buildings or habitats suitable for nesting birds are to be removed, then works will take place outside of the bird nesting season. If clearance work has to be undertaken during the nesting season (generally from 1st March until 31st August, although birds are known to nest outside of these dates in suitable conditions), a nesting bird check will be required; carried out by a suitably qualified person.
- To ensure legislation that protects active nests is not triggered, active nests will be protected by a suitable buffer, as directed by the ecologist, until the young have fledged, as confirmed by the ecologist.
- Bird boxes will be included in the tower design to compensate the loss of nesting sites.

Fish and otter

- A Precautionary Working Method Statement will be required in order to avoid impacts on fish and otter during the works. Mitigation measures during the operational phase of the proposed development are required as follows:
- The loss of the bat roosts within Rechabite Hall will be compensated via the construction of the on-site bat tower. The roosts will be monitored by ecologists as per the licence conditions, likely to be Year 2 and year 4 after the tower is completed. This will be an internal inspection of the tower followed by a dusk emergence survey between May – August (inclusive). A daytime internal inspection of the hibernacula will be required in Year 2 and Year 4, between November and March (inclusive)



Historical Context

LANDSCAPE HISTORY

The Valleys reflect the history of coal mining, iron extraction and smelting. The iron industry provided the spur for the rapid industrialisation of the whole area from c. 1800.

The particular geology and land-form provided all the materials needed for iron making in a relatively accessible form. The linked exploitation of these materials and the transport systems leading to and from major works structures shaped the industrial landscape.

Long rows of former 19th century miners' terraces of stone, brick and coloured render are particularly distinctive, extending in some areas up very steep slopes and seen against a backdrop of bracken or conifers higher up the valley sides.



1876



1900



1958-1961



1972-1973



1990-1991

INDUSTRIAL LANDSCAPE

The eighteenth and nineteenth centuries saw remarkable changes to the South Wales landscape, population and economy. This beautiful landscape of rugged valleys, fast flowing rivers and semi-uplands was one of the first places to be lit by the fires of the Industrial Revolution.

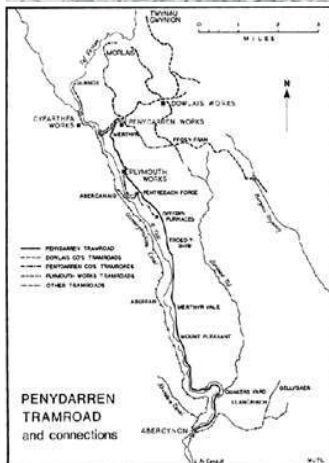
Ironworks, collieries, ironstone mines, coke works, tin plate works, quarries and cooper works were opening across south Wales with thriving associated industries. The population of these industrial areas in south Wales witnessed unprecedented population booms as unparalleled numbers of workers migrated into the industrial areas to fill the jobs readily available at the expanding works.

The four major ironworks in the area were the basis for the development and expansion of the industrial and urban landscape and town-scape. New modes of transport were introduced to meet the needs of the industry and society. A complicated network of roads, tram roads and railway tracks threaded the landscape and were an essential part of the industrial operations. In the 17th and over the course of 18th century iron production transformed Merthyr Tydfil from a small rural hamlet to the largest town in Wales and the centre of the world's iron making industry.

Merthyr Vale was a coal mining community which sprung up in the 1870s around the colliery sunk by John Nixon between 1869 and 1875, which was originally called the Taff Colliery. The sinking of the Colliery took over six years to complete and when the first coal was brought up there was a celebration in the Windsor Hotel. The name new name of Merthyr Vale for the area around Ynys Owen possibly developed after the Taff Vale Railway Station post 1841 which adopted this title. Although originally named the Taff Colliery, the coal mine here came to be called Merthyr Vale Colliery.

THE FOUR GREAT IRON WORKS

The ironworks of Merthyr Tydfil have often been described as the “Engine of Empire”, the technological leaders of their day, and more than any other area in Wales led the way in the production of iron and extraction of coal that the Industrial Revolution so heavily relied upon. By the middle of the nineteenth century there were five large ironworks in Merthyr Tydfil.



DOWLAIS IRONWORKS

The Dowlais Ironworks was the first major ironworks and steelworks located in Merthyr Tydfil. Founded in the 18th century, it operated until the end of the 20th century, at one point being the largest steel production in the UK. Dowlais was one of the first to introduce steam power and went on to pioneer the use of the Bessemer process for steel production in 1865.



CYFARTHFA IRONWORKS

Iron production started in 1765. The works obtained the right to quarry limestone from the Guanau Quarry for use in the works blast furnaces. The surrounding ironworks built a tram road for import and exports. In 1879 the Cyfarthfa Ironworks was converted to a steel production plant, closed in 1910 and reopened in 1915 was reopened to produce pig iron and shell steel during the Great War. Closed forever in 1919.



PENYDARREN IRON WORKS

The Penydarren ironworks was founded in 1784 and operated until 1859. Penydarren was the first rail ever in Wales rolled for the Liverpool and Manchester railway which opened in 1830. Here too, the cable for the bridge spanning was made. In 1804, Penydarren Ironworks conveyed a load of iron by steam power to the navigation, at Abercynon a distance. The locomotive travelled at 5 miles per hour with a load of ten tons of iron and 70 passengers reached its destination safely, attracting publicity world wide.



PLYMOUTH IRON WORKS

In 1763 Plymouth Works started on land leased from the Earl of Plymouth, it failed to be a success and it's been sold two years later. In 1786 the works prospered and the metal at Plymouth was considered to be the finest in South Wales. The ironworks had many owners, with a later owner following the Bessemer process until closer in 1882.

The Plymouth Ironworks was spread over three sites, Plymouth Works where Bakers (Now Evans Halshaw) Garage is, Pentrebach Forges where the Co-op Superstore is, and Duffryn Iron Works where Linde ex (Halla) were.





The site: Features and Context