Biodiversity Duty:
Phase 1 Habitat Survey of
National Slate Museum, Llanberis

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Introduction

Biodiversity is a core component of sustainable development, underpinning economic development and prosperity, and has an important role to play in developing locally distinctive and sustainable communities. From 1 October 2006, all public authorities in England and Wales have a Duty to have regard to the conservation of biodiversity in exercising their functions. The Duty aims to raise the profile and visibility of biodiversity, clarify existing commitments with regard to biodiversity, and to make it a natural and integral part of policy and decision making. The Duty is set out in Section 40 of the Natural Environment and Rural Communities Act (NERC) 2006 which states: *"Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity"*.

As part of the museum's response to the legislation, biodiversity audits are being carried out at its sites. In this report, a Phase 1 habitat survey of the National Slate Museum, Llanberis is presented. The Phase 1 habitat survey technique is the standard system for classifying and mapping wildlife habitats (including urban areas) in Britain (Nature Conservancy Council 1989; Wyatt 1991). The aim of the survey is to provide information about the nature, location and extent of semi-natural habitats to direct decision making and conservation effort effectively. Sites are mapped reasonably rapidly by visiting each parcel of land and mapping the vegetation, usually at the scale of 1:10,000, according to about ninety specific habitat types using standard colour codes. More detailed notes ("target notes") are made on areas of interest. The surveys can then be used to determine areas for more detailed survey, to indicate areas of value for nature conservation, and to provide a simple baseline for monitoring change in the future.

The National Slate Museum, Llanberis is composed of two parts, the museum building and the Vivian Incline. The Museum buildings are set in Padarn Country Park and consist of a rectangular building with a central courtyard and an enclosed area to the east with a café, children's play area, quarry man's cottages and the water wheel tower. The Vivian Incline is set close by in Coed Dinorwig Site of Special Scientific Interest (SSSI), a semi-natural oak woodland (Appendix 1). The incline is leased from Gwynedd County Council and under the Museum's management.

Methods

The museum grounds were mapped on 7 October 2009 in good weather following the survey manual (Nature Conservancy Council 1989). The areas surveyed are shown in Figure 1.

Results

The following Phase 1 habitat types were present (Figures 2 and 3):

A.2.2 Scattered Scrub

There are two small patches of cut bramble scrub at the base of the incline, one with abundant false brome (Figures 3 and 5).

A.3.1 Broad-leaved parkland/scattered trees

Two pedunculate oak trees and one sapling occur immediately to the west of the water wheel tower (Figure 2).

D.1.1 Dry Dwarf Shrub Heath

At the base of the incline is a small triangular area of heathland c. 10m x 8m dominated by heather and bell heather, with bramble (Figures 3 and 6).

J.1.3 Ephemeral/short perennial vegetation

Scattered around the museum quadrangles are small areas of ephemeral vegetation. These vary from place to place and may be composed of annual meadow-grass, cornsalad, New Zealand willowherb, early hair-grass, pearlwort, etc. (Figures 2 and 4).

J.1.4 Introduced Shrub

A small area of butterfly bush scrub occurs at the base of the incline (Figures 3 and 5).

J.2.5 Wall

Other than the walls of the buildings, there are a few walls along the museum buildings site boundary and at the incline. Most walls have maidenhair spleenwort, and the wall by the river has ivy (Figure 2). The wall in front of the cottages supports a rare lichen.

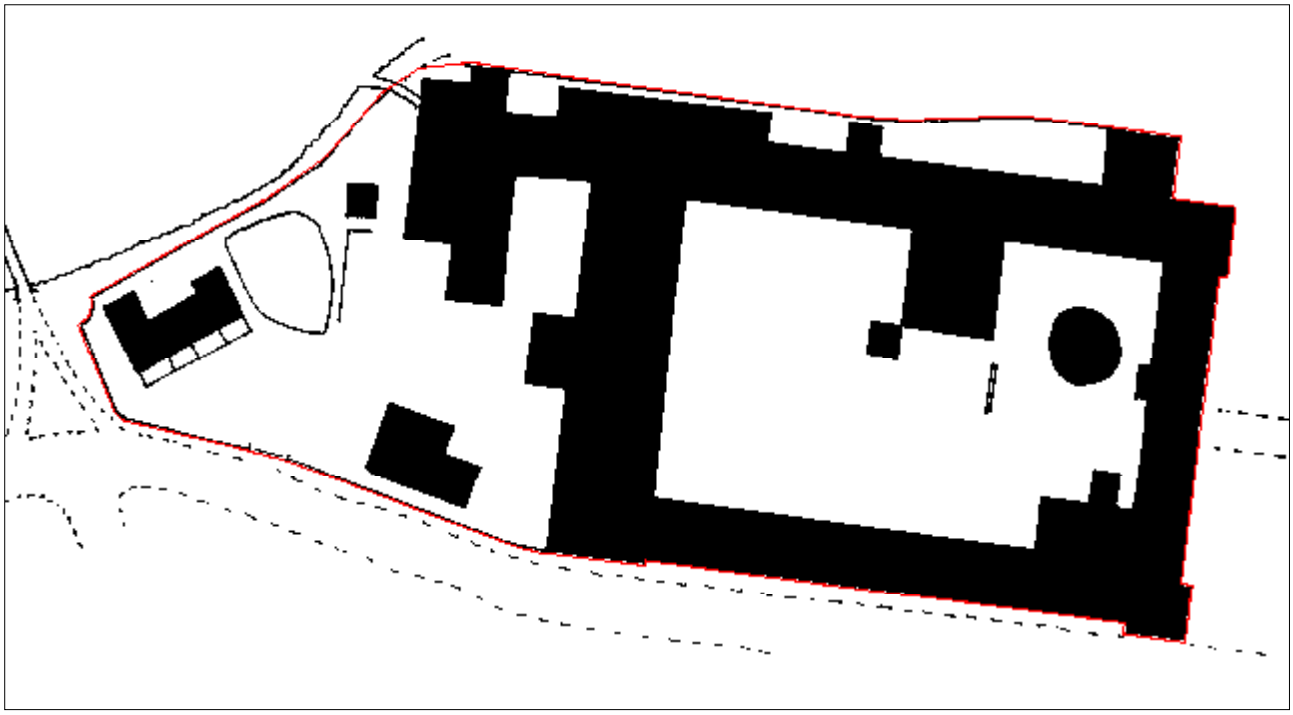
J.3.6 Buildings

The Museum buildings are well maintained and are known to have a bat roost. The walls of the waterwheel tower had some tree saplings and other plants at the time of survey, though these were cleared in October 2009 (Figure 2).

J.4 Bare ground

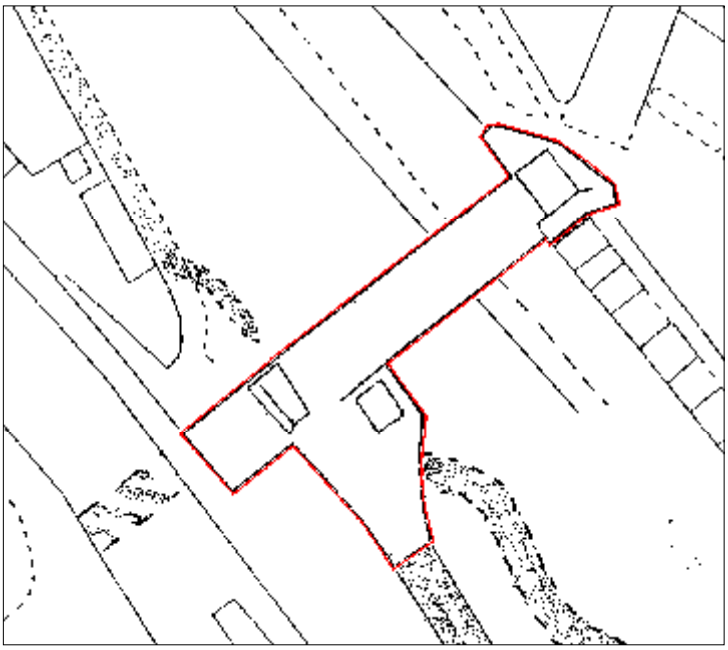
Most of the ground within the museum buildings site is covered with small slate chippings.

Figure 1. Areas surveyed. A, museum buildings. B. Vivian Incline. The site boundary is shown in solid red. Not to scale.



A Museum buildings.

B Vivian Incline



Target notes (Figures 2 and 3)

Museum buildings

1. Short ephemeral vegetation, mostly short-lived annuals (e.g. field speedwell, early hair-grass) or perennials which get sprayed before maturity (Figure 4). Only one unexpected plant was found which is sea stork's-bill, normally a plant of sea cliffs and the coast.

2. Two pedunculate oak trees and one sapling.

3. A small strip of riverside woodland (outside museum's ownership) with downy birch, alder, rhododendron and oak over bramble and ivy. River is a site for spawning of rare Arctic Char.

4. Waterwheel Tower has range of plants including saplings of grey willow, and lots of wood meadow-grass.

Vivian Incline

5. Base of incline. A trampled area by the picnic table with patches of butterfly bush and bramble scrub. maintained by Padarn Country Park staff (Figure 5).

6. Small area of heather and bell heather with bramble at base of incline (Figure 6).

7. Incline. A steep slate slope with sporadic plants of willowherb, figwort and English stonecrop. Maintained by herbicide spraying.

8. Top of incline. Trampled area by path. Ivy, gorse and some bramble on wall on west side.

Figure 2. Phase 1 habitat map of museum buildings.

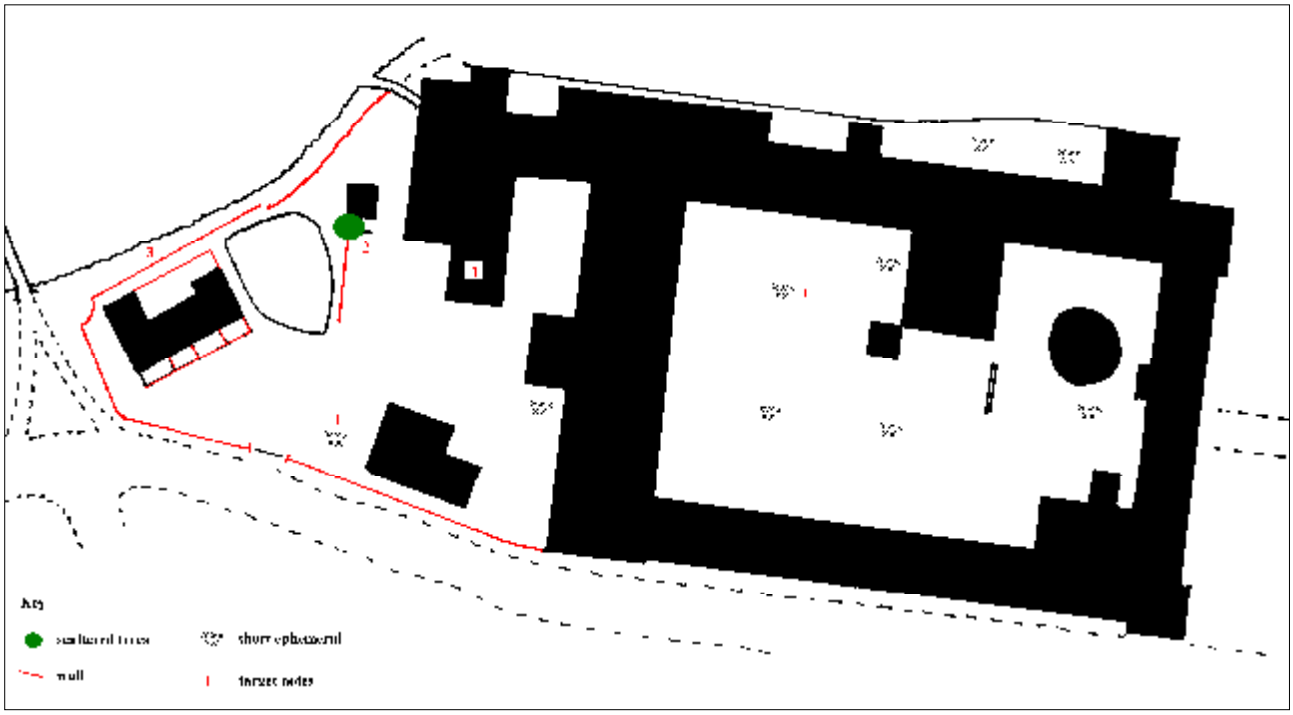


Figure 3. Phase 1 habitat map of Vivian Incline.

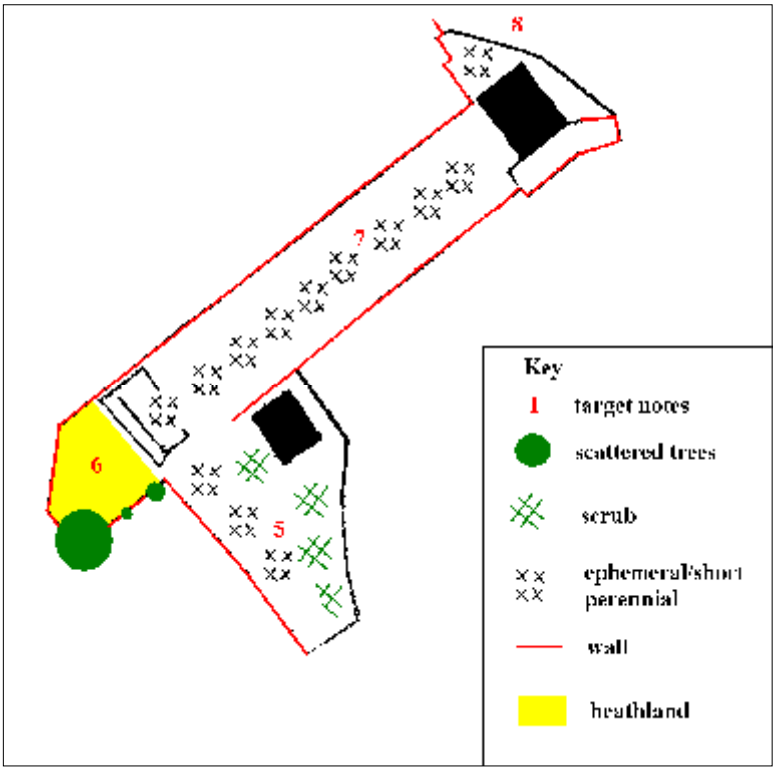


Figure 4. Ephemeral vegetation. Some occurs on the slate chippings, and others amongst museum artefacts.

Figure 5. Base of incline showing trampled area and butterfly bush and bramble scrub

Figure 6. Small area of heathland with brambles at base of incline.

Discussion

There are three habitats of significance for nature conservation within the National Slate Museum:

1. The museum buildings which support a bat roost. The bats are protected by law.
2. The wall in front of the quarrymen's cottages which supports a rare lichen, which may be new to science.
3. The Vivian Incline is included within the Coed Dinorwig SSSI and is thus potentially of national importance, though the habitats present are not those for which the site is designated (i.e. broad-leaved woodland; Appendix 1).

The main management operations are applications of herbicides at both the buildings, and on the incline to control weed growth. The spraying on the incline is carried out by approved contractor using approved sprays arranged in co-operation with Parc Padarn/Gwynedd County Council staff, who liaise with the Countryside Council for Wales. The area of butterfly bush and bramble scrub are cut regularly by Padarn Country Park/Gwynedd County Council staff. Feral goats graze Coed Dinorwig and thus the incline, and are currently being controlled.

Torgoch, a unique race of the Arctic Char *Salvelinus alpinus perisii*, a fish relict from the ice age, is present in the adjacent Llyn Padarn and spawns in the river by the Museum, but is not affected by museum activities. There is some current concern about how a cyanobacteria (*Anabaena spiroides*) problem in Llyn Padarn might affect the torgoch population, and it may prove necessary to relocate the fish to another lake.

Acknowledgements

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References

Nature Conservancy Council (1990). *Handbook for Phase 1 habitat survey - a technique for environmental audit.* England Field Unit, Nature Conservancy Council, Peterborough.

Wyatt, G. (1991). *A review of Phase 1 habitat survey in England.* England Field Unit, Nature Conservancy Council, Peterborough.

Appendix 1. Coed Dinorwig SSSI

CYNGOR CEFN GWLAD CYMRU COUNTRYSIDE COUNCIL FOR WALES
SITE OF SPECIAL SCIENTIFIC INTEREST CITATION
GWYNEDD COED DINORWIG
Date of Notification: 1976, 1985
National Grid Reference: SH 584608
O.S. Maps: 1:50,000 Sheet number: 115 1:25,000 Sheet number: SH 56 **Site Area:** 41.3 ha

Description:
Coed Dinorwig is a large representative example of a wood sage - oak/birch *Teucrium scorodonia - Quercus/Betula* type woodland. It is situated on a dry, south-west facing hillslope on an ancient woodland site and has been little grazed by sheep in recent times. The canopy is dominated by sessile oak *Quercus petraea*, although birch *Betula* occurs locally. The understorey, which is sometimes patchy, is characterised by mountain ash *Sorbus aucuparia*, holly *Ilex aquifolium* and hazel *Corylus avellana*. The field communities of heath (notably bell-heather *Erica cinerea* and bilberry *Vaccinium myrtillus*), greater woodrush *Luzula sylvatica* and bramble are characteristic of ungrazed hill woods on generally acidic soils and are relatively scarce in Wales. Bracken and grasses, particularly wavy hair-grass *Deschampsia flexuosa*, brown bent-grass A*grostis canina* and creeping soft-grass *Holcus mollis* are also present. Bryophytes include *Dicranum scoparium, Dicranum majus, Hypnum cupressiforme, Plagiothecium undulatum, Polytrichum formosum* and *Rhytidiadelphus loreus*. A few Atlantic species have been recorded, including Wilson's filmy fern, *Hymenophyllum wilsonii*. Other herb species, particularly bluebell *Hyacinthoides non-scripta*, are locally abundant. The uncommon long-leaved helleborine *Cephalanthera longifolia* is present. The fauna includes wood ants, speckled wood butterfly and a range of characteristic oakwood bird species including pied flycatcher and redstart.

YOUR SPECIAL SITE AND ITS FUTURE

'Your Special Site and its Future' is part of our commitment to improve the way we work with Site of Special Scientific Interest (SSSI) owners and occupiers. In it, we explain what is special about the wildlife on your site, and what care is needed to look after its wildlife into the future. All SSSIs are considered to be of national importance and we recognise the crucial role that owners and occupiers play in their management and protection. We need you to share your views and knowledge of this site with us, to help safeguard it. We hope that you will find 'Your Special Site and its Future' interesting and helpful. Please contact us if there is anything about the site and its management that you would like to discuss.

What is 'special' about Coed Dinorwig SSSI?
Coed Dinorwig has one special feature:

- **Semi-natural broadleaved woodland**

This is an ancient woodland site, and forms a prominent feature on the steep slopes above the south-eastern end of Llyn Padarn. The site is a Local Nature Reserve and is important as a recreational and amenity woodland for local people and visitors to the area. As well as the features listed above, Coed Dinorwig has other species and habitats that contribute to the special interest. The narrow-leaved helleborine, a nationally scare species of orchid with delicate white flowers occurs here. The Victorian Vivian quarry and associated slate waste and quarry pool have been scheduled as a National Monument by CADW, and are of historic and social importance as testimony of the area's industrial past. Lesser horseshoe bats, an internationally endangered species are known to use the quarry for hibernation, and pipistrelle bats forage in the woodland. There may be other species of bat present as well, such as Daubenton's bat, which is known to forage above the adjacent Llyn Padarn SSSI.

What do we want Coed Dinorwig to look like?
This broadleaved native woodland comprises mainly sessile oak, with occasional birch and an understorey of hazel, holly and honeysuckle. There should be no decline in the current extent of the woodland, which consists of trees of varying ages. Oak should be the main canopy species with birch in places. Along paths and in gaps, saplings of oak and other native trees including mountain ash, holly, hazel and birch should be regenerating well and should not be damaged by browsing goats and sheep. The ground flora will typically consist of species such as bell-heather, bilberry, greater woodrush and some patches of bramble, which is typical of ungrazed hill woods on acidic soils. Mosses, liverworts, and ferns, should thrive in the understorey including some uncommon species such as Wilson's filmy fern, bracken and grasses, particularly wavy hair-grass, brown bent-grass and creeping soft-grass should also be present. In the spring carpets of bluebells should cover the ground and a colony of the uncommon long-leaved helleborine should thrive. Some mature non-native trees and shrubs will be tolerated but seedlings will be controlled to protect the woodland habitat. No rhododendron shrubs should be present within the site. Dead wood should be abundant providing an important habitat for fungi, mosses, and insects, which are a vital food source for birds and small mammals, but for

safety reasons it will often not be left standing. Butterflies such as the speckled wood butterfly and moths should be abundant. The large mounds formed by wood ants should be a distinctive feature of the woodland floor.
The birds seen in or around the woodland should include the pied fly-catcher, redstart, tawny owl and woodpeckers. Badgers should be present in the woodland, along with stoats and field mice.

What management is needed on Coed Dinorwig SSSI and why?

Although Coed Dinorwig is an excellent place for wildlife/geology it will only remain so if the necessary management continues. CCW's aim is to work with you to ensure that this management is carried out.

What does this mean in practice?

There are many factors that could damage the special features at Coed Dinorwig if they are not properly managed. These are the ones we regard as most important:

Grazing and natural regeneration: Boundaries should be maintained to exclude stock or control grazing levels within the woodland. A balance needs to be struck between encouraging natural regeneration whilst at the same time preventing vigorous vegetation such as dense brambles and tall grass tussocks competing with woodland plants including any moss, liverwort and lichen interest in the woodland. It is expected that tree saplings will grow into gaps naturally created by the occasional death of old trees ensuring a mixed age structure of trees. Sheep grazing can potentially prevent natural regeneration of the woodland by browsing the young tree seedlings and saplings. It may be beneficial to re-introduce short spells of carefully controlled grazing with appropriate livestock, but this would need to be carefully assessed There are various possibilities for achieving this: in some areas a continuous, low stocking density may be desirable. Alternatively periods of heavy grazing could be alternated with periods of no (or very low) grazing. Deer are known to be spreading further north in Wales and could pose future problems for the regeneration of the woodland.

Goat browsing. Feral goats in the area enter the site and cause a great deal of damage to saplings by browsing. This limits regeneration and threatens the long term future of the woodland. The problem needs to be addressed by appropriate authorities and conservation bodies.

Deer: Deer are known to be spreading further north in Wales and could pose future problems for the regeneration of the woodland if numbers are uncontrolled.

Dead and decaying wood: Dead and decaying wood is an important habitat for many wildlife species including insects, birds, fungi and mosses and should be retained wherever possible within the woodland. Deadwood should be left where it falls and standing dead trees should be allowed to fall naturally unless felling is required for safety or access reasons. Where dead or decaying trees or branches pose a risk to the public and require felling, the cut wood should also be retained.

Rhododendron: Rhododendron, if not controlled, grows to the exclusion of all else, forming a dense canopy and casting deep shade. Each mature bush can produce millions of tiny mobile seeds, which germinate readily in the moist soil conditions of northwest Wales. It is present on the slate tips and near the museum at the eastern end of the site and has the potential to spread into the woodland. It will be necessary to remove all rhododendron bushes and seedlings where they occur in order to prevent this.

Non-native tree species: Beech and sycamore occur at the site, particularly in the area around the quarry pool together with a number of mature conifers within parts of the woodland. Mature nonnative trees may not pose any particular problem for the conservation of the site but a close watch should be kept in case seedlings become invasive. If goats are successfully controlled, conditions will be more favourable for all woody species including invasive exotics, in which case it will be even more necessary to remove non-native seedlings. With abundant seed sources in the area it will not be possible to permanently eradicate these species and long-term management work to control them may be needed. The woodland is fairly steep which makes management, particularly extraction of larger undesirable trees, difficult.

Narrow-leaved helleborine: This rare plant, which is declining nationally, needs to be considered in managing the site and known colonies protected from encroaching vigorous bramble growth within the woodland.

Public Access: Paths and viewing points are maintained through the woodland for amenity and also to prevent walkers from damaging the site by seeking other routes. It is important to ensure that interpretation is adequate and up to date to encourage the use of these paths.

Finally

Our knowledge of wildlife is far from complete. It is possible that new features of value may appear and new management issues may arise in the future, whilst other issues may disappear. This statement is written with the best information we have now, but may have to change in the future as our understanding improves. Any information you can provide on the wildlife of your site, its management and its conservation would be much appreciated.