

Appendix D

Ecology



**TY MAWR WEST
NANTLLE
ECOLOGICAL SURVEY**

SEPTEMBER 2010

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1.0 SUMMARY

- Detailed studies of the vegetation in Ty Mawr Quarry revealed no notable or Schedule 8 protected species.
- No Schedule 1 bird species were found nesting in the Quarry. It is concluded that there will be minimal impact on birds generally.
- A single outlying inactive Badger (*Meles meles*) sett found during a survey in 2007 was relocated and still found to be inactive. No other signs of Badger activity were noted in the study area and it is concluded that this species will not be affected by the proposal.
- No Water Voles (*Arvicola terrestris*) were found in the Quarry. There is no suitable aquatic habitat present, so it is concluded that this species will not be affected by the proposal.
- No signs of Otters (*Lutra lutra*) were found within the Quarry. Otters will, therefore, not be affected by the proposal.
- Despite detailed survey for reptiles, only one Common Lizard (*Lacerta vivipara*) was seen in the Quarry. It is concluded that reptiles will not be affected by the proposal.
- The proposal will have minimal ecological impact since this post-industrial site contains no semi-natural habitats of note. Most of the habitats are secondary.
- There are some positive ecological benefits to be gained through mitigation which are discussed.

2.0 INTRODUCTION

Ty Mawr West Quarry in Nantlle, North Wales, is a slate quarry which is no longer actively worked for (new) slate products. However, the owners of the Quarry have been extracting material from the historic tips for use as ballast locally, principally for the road-building industry. Also, some of the slate waste is an attractive green and red, and there is some demand locally for the sieved material to be used for architectural (landscaping) purposes. The owners have almost completed the removal of usable material and would like to extend their extraction operations to include other tips in the Quarry as well as removing some of the ground in between the existing historic extraction holes. (Maps of the proposed areas for re-working and extraction will be found in other parts of this EIA). Most of this material is made up of shattered slate veins and is likely to be only usable for ballast rather than for roofing slates and slabs.

A screening opinion issued by Gwynedd County Council indicates that an EIA is required to accompany any Planning Application for additional working on the site. The following report covers all the ecological issues on the site except for Bats which will be dealt with separately elsewhere.

3.0 VEGETATION

3.1 Legislative Context

Under the Wildlife and Countryside Act 1981, it is an offence to intentionally pick, uproot or destroy any wild plant included in Schedule 8.

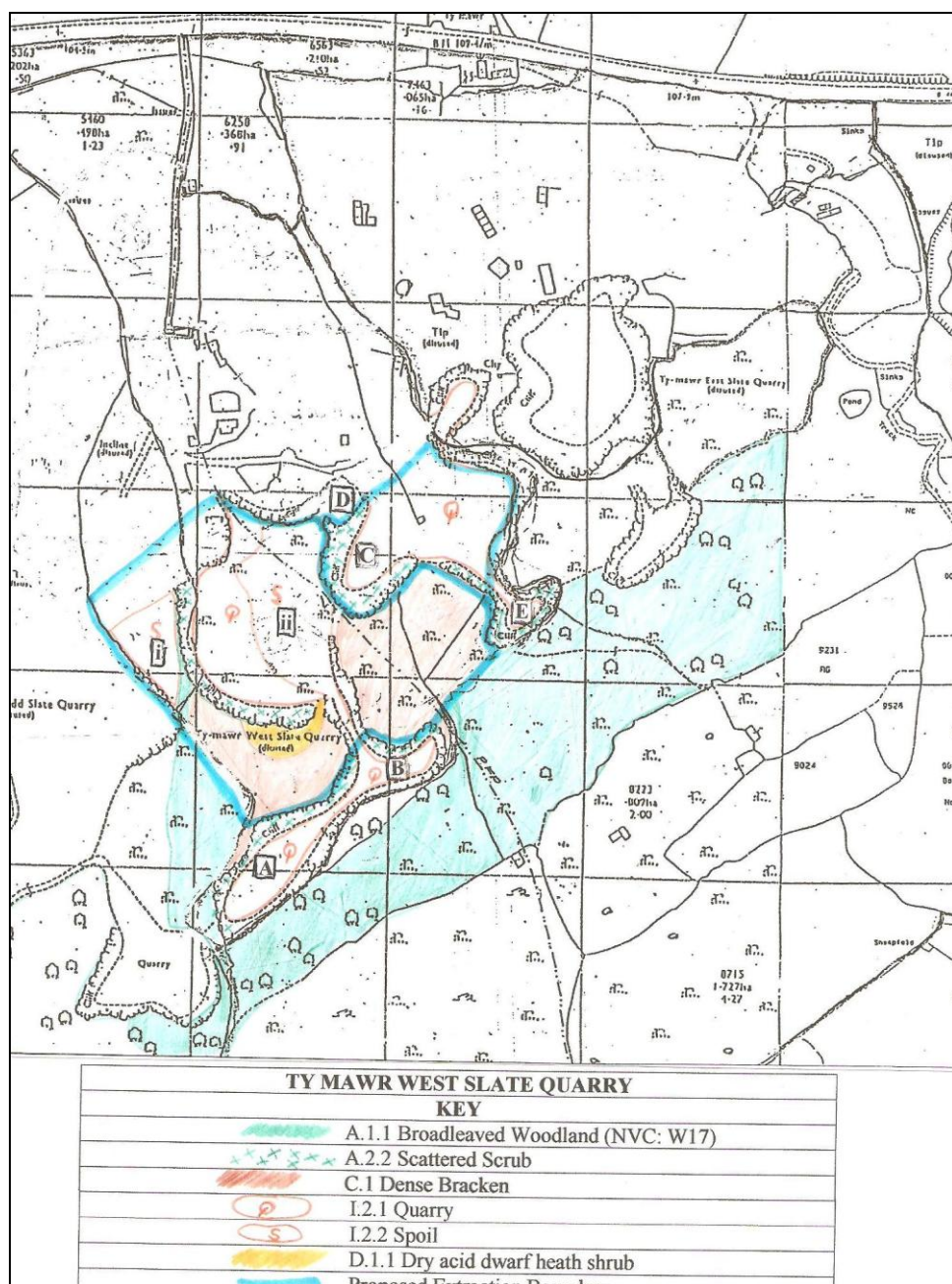
3.2 Results: General description of the site

Map 1 below shows an aerial photograph of the site.



Map 1. An aerial view of the Quarry complex.

It can be seen from the aerial photograph that the site is made up principally of quarry holes and extensive quarry waste tips. This map also shows how Ty Mawr West Quarry is bordered by the disused Ty'n y Weirglodd Slate Quarry to the west and Ty Mawr East Quarry to the east. The whole effectively constitutes one post-industrial landscape within separate ownerships. To the south and up hill, the Quarry is bordered by broadleaved woodland which lies outwith the ownership of Ty Mawr West. The Quarry is situated at about 100 metres asl and lies just outside of the Snowdonia National Park boundary to the east. The Quarry itself is actively worked during working hours with often large numbers of lorries removing waste slate material from the site. The Quarry is a busy working environment. However, there are a number of vegetation habitats on the site where plants have colonised old quarry workings and these will be described below separately. **Map 2** describes the vegetation types in the Quarry and all the following vegetation descriptions will refer to this map.



Map 2. Phase 1 map of the vegetation in the Quarry.

3.3 Results: The Quarry Holes

These are marked on **Map 2** as **Holes A-E**, working from west to east. They all have a more-or-less similar vegetation composition and so will be described together. It should be noted that the vegetation habitats of these holes represent by far the most interesting in Ty Mawr West Quarry since apart from **Hole C**, they are all virtually free from the influence of grazing stock which appear to run freely throughout the rest of the Quarry. As a result, the holes are choked with a dense secondary growth of trees and shrubs, notably *Acer pseudoplatanus*, *Fraxinus excelsior*, *Quercus petraea*, *Salix cinerea*, *Corylus avellana*, *Betula pubescens*, *Sorbus aucuparia* and *Crataegus monogyna*. A number of other shrub species are also found densely tangled beneath the developing tree canopy, notably *Rubus fruticosus*, *Rosa canina* and *Ulex europaeus*. Bracken (*Pteridium aquilinum*) stands have developed where the soils are deep enough and there is adequate light penetration. Since the quarry holes are so steep-sided, the humidity levels inside them are high which has allowed the development of a diverse fern and bryophyte flora. A full list of all the plant species found in these holes can be found in **Appendix 1**. **Photos 1,2** and **3** serve to illustrate the vegetation in these old workings.



Photo 1. Vegetation detail in **Hole A**. Note sapling and fern growth.



Photo 2. A diverse sapling and tree growth has become established in **Hole B**.

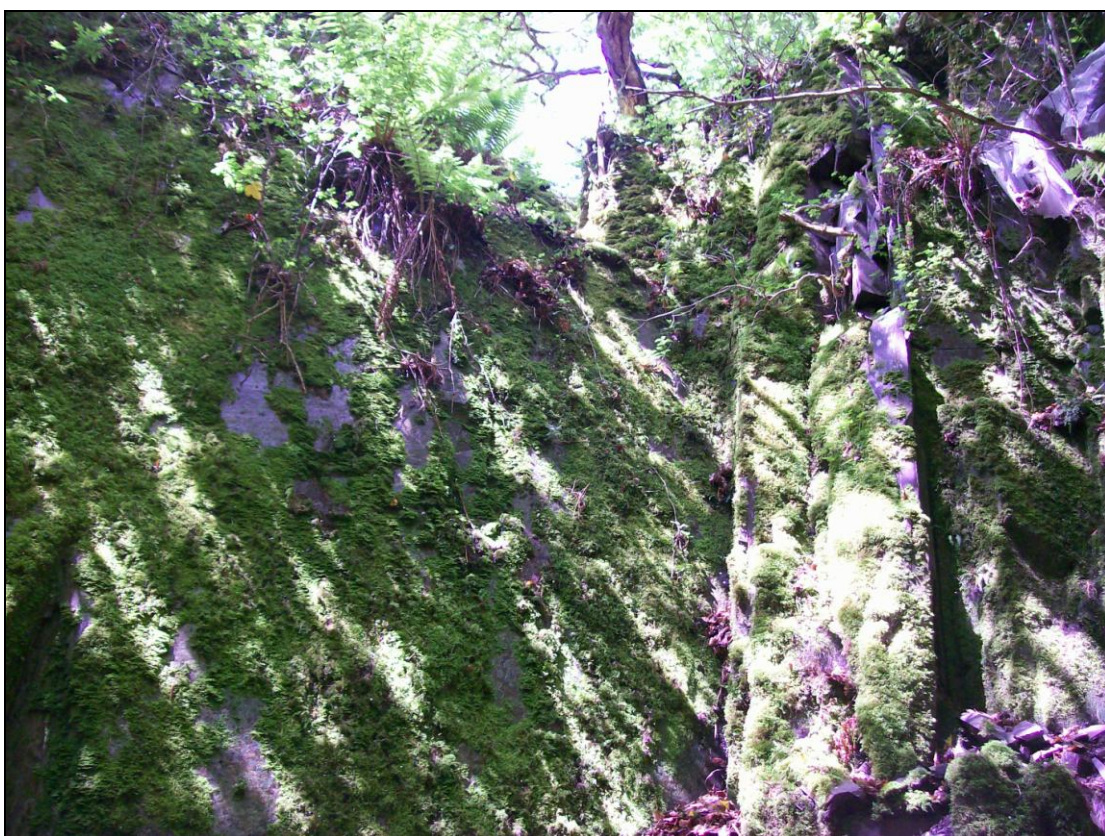


Photo 3. Bryophyte growth on a worked face in **Hole B**.

Of the five holes, **Holes A, B, and E** are the most ecologically interesting and have all the appearance of Conan Doyle's "Lost World". They have clearly been isolated from disturbance and grazing for several decades and allowed to develop an interesting secondary vegetation. Whilst this vegetation is by no means species-rich or intrinsically unusual, it does represent an almost unique habitat in the region – an ungrazed developing (scrub) woodland. **Hole D** lies outwith the scope of the present proposal since it lies within an area of old workings that are to be preserved for industrial archaeological reasons. **Hole C** is more open in character but has nevertheless developed a scrub woodland flora albeit slightly less diverse than **Holes A, B and E**.

Since the vegetation within these holes is almost entirely secondary, it is perhaps of little value to ascribe it to any one **NVC** category. However, it does seem to represent a transition between **NVC:W23 *Ulex europaeus-Rubus fruticosus*** scrub and a woodland community. Some measure of base enrichment is evident within these holes as typified by woody species such as Ash and Hazel and forbs such as *Geranium robertianum*.

3.4 Results: Dense Bracken areas

Situated to the north of **Holes A and B** and to the west of **Hole E** (see **Map 2**), is an area of slightly higher ground that has evidently remained untouched by previous quarry workings. This area clearly has deeper soils since it is colonised by dense Bracken (see **Photo 4**).



Photo 4. Dense Bracken covering the slopes to the north of **Holes A and B**. The broadleaved woodland fringing the site to the south can be seen in the background. **Hole A and B** is almost invisible between this woodland and the Bracken-covered slope in the foreground. Note *Ulex europaeus* and *Betula pubescens* colonising this slope.

Despite the grazing pressure on the site, abundant tree saplings and shrubs can be found emerging through the Bracken fronds, notably *Betula pubescens*, *Sorbus aucuparia*, *Ulex europaeus* and *Quercus petraea*. Bramble is also colonising this area. This vegetation conforms by and large to the **NVC: U20c *Pteridium aquilinum*-*Galium saxatile*** community, the species-poor sub-community. However, left to its own devices, this community is trending towards the **NVC: W25 *Pteridium aquilinum*-*Rubus fruticosus*** underscrub community since it is quite rapidly becoming colonised by tree species and Bramble. Other species noted growing weakly under the dense Bracken fronds are *Anthoxanthum odoratum*, *Potentilla erecta*, *Galium saxatile*, *Sedum anglicum*, *Rumex acetosella*, *Agrostis capillaris*, *Festuca ovina*, *Luzula campestris*, *Pleurozium schreberi*, *Calluna vulgaris*, *Rhytidadelphus squarrosus*, *Teucrium scorodonia* and *Ceratocarpus clavicula*.

As a habitat in its own right, dense Bracken of this sort is of little intrinsic interest especially since much of the ground layer is dominated by a thick layer of acidic Bracken litter. However, it is its eventual development into woodland that makes this area of some ecological value.

3.5 Results: Heath area

Where the soil thins out below the dense Bracken stands, a small piece of dry acidic dwarf shrub heath has developed between the Bracken covered slope to the north of **Hole A** and the large open area of quarry between **Tips i** and **ii** (see **Map 2**). This lies on a steep north-facing slope which can be seen in **Photo 5**.



Photo 5. The small area of heath below the dense Bracken stand down slope of **Hole A** and **B**. Note colonising scrub, particularly *Betula pubescens*.

It is quite probable that this area is also composed of secondary vegetation as are the tips (see 3.5 below) and the quarry holes already described in 3.2. At some time in

the past, the soil will have more than likely been scraped off during quarry workings and this small area has now become colonised with heathy vegetation. Species found here include *Vaccinium myrtillus*, *Calluna vulgaris*, *Erica cinerea*, *Potentilla erecta*, *Deschampsia flexuosa*, *Hypericum pulchrum*, *Carex pilulifera*, *Dicranum majus*, *Pleurozium schreberi*, *Rhytidiadelphus loreus*, *Hylocomium splendens*, *Bazzania trilobata*, *Cladonia impexa* and the ferns *Dryopteris affinis* and *D. dilatata*. The wet nature of the site is evidenced by sporadic incursion into the heathy sward of *Molinia caerulea*. Despite the evidence of some light sheep grazing, trees and shrubs are colonising this area too, namely *Betula pubescens*, *Sorbus aucuparia*, *Quercus petraea* and *Ulex europaeus*. This area conforms most closely to **NVC: H8 *Calluna vulgaris*-*Ulex gallii*** heath where the *Ulex gallii* is replaced by colonising *Ulex europaeus*.

3.6 Results: Tips and quarry floors

These are marked on **Map 2** as quarry and spoil and will be treated together since the vegetation of both is similar. The Quarry floors are often made up of disturbed ground and are frequently quite devoid of vegetation. The spoil tips themselves are less disturbed and an interesting vegetation can be observed to be developing here depending on the availability of fines between the larger rocks and boulders of quarrying waste. **Tip i** (see **Map 2**), for example, at its northern extremity (see **Photo 6**) has an impoverished colonising flora of graminoids and diminutive forbs which are prone to desiccation during spells of dry weather.



Photo 6. Typical colonising vegetation on **Tip I**, clearly prone to desiccation.

Species found here include the graminoids *Agrostis capillaris*, *A. stolonifera*, *Anthoxanthum odoratum*, *Festuca ovina* and *Aira praecox*. In such disturbed ground

Digitalis purpurea and *Epilobium montanum* flourish when the moisture regime is adequate. Bryophyte diversity, in the absence of taller competing vegetation, is quite high and includes *Racomitrium lanuginosum*, *R. heterostichum*, *R. canescens*, *Dicranum scoparium*, *Polytrichastrum formosum*, *Hypnum andoi*, *H. jutlandicum*, *Polytrichum juniperinum*, *P. piliferum*, *Campylopus flexuosus*, *Pseudoscleropodium purum*, *Pleurozium schreberi* and *Rhytidiadelphus squarrosus*. Where the soil becomes deeper, forbs such as *Sedum anglicum*, *Filago vulgaris*, *Teucrium scorodonia*, *Galium saxatile*, *Rumex acetosella*, *Lotus corniculatus* and *Plantago lanceolata* can be found. And where deeper soils still have developed, plants such as *Calluna vulgaris*, *Dryopteris affinis* and *Erica tetralix* become established. More shrubby species can be observed too, such as *Rubus fruticosus*, *Rosa canina* and the ubiquitous *Ulex europaeus*. This latter species is very much a feature of this Quarry and quite large areas of extremely dense stands have developed here.

One species of some interest is found on **Tip i**, namely *Euphrasia nemorosa*. This species is quite often a frequent component of disturbed quarry wastes and screes and being an annual, thrives here.

A few mature Oak trees can also be found at the edge of this tip which have become established here where grazing sheep cannot reach them

Tip ii (see **Map 2** and **Photo 7**) has essentially a similar flora to **Tip i** but there are a few floristic differences. This tip has a developed a slightly deeper soil than **Tip i**



Photo 7. **Tip ii** (see **Map 2**) showing dense Gorse cover on the right.

which has allowed species like *Thymus polytrichus*, *Trifolium repens*, *Achillea millefolium*, *Hypochoeris radicata*, *Veronica officinalis*, *Hieracium pilosella* and *Cryptogramma crista* to flourish (see **Photo 8**). The other notable difference is the large stand of *Ulex europaeus* that grows here.



Photo 8. Thyme and Bird's-foot-trefoil have developed on the deeper soils on **Tip ii**.

Although man-made, these tips are also of interest since they reflect a post-glacial landscape and flora. It is always valuable to observe how nature colonises a bare habitat whether man-made or naturally created such as that left by a retreating glacier. By and large, these tips, therefore, conform most closely to **NVC: U21 *Cryptogramma crista-Deschampsia flexuosa*** community, though they are in general quite species poor.

3.7 Results: The quarry hole and tip faces

Though the flora of the quarry hole and tip faces is essentially similar to the tip tops and quarry floors, there is one essential and important difference – they are often virtually inaccessible to sheep grazing. As a result, colonising tree and shrub species have been allowed to mature here in a way rarely seen in the rest of the Quarry. Species noted here (see **Map 2**) include *Quercus petraea*, *Betula pubescens*, *Sorbus aucuparia*, *Corylus avellana*, *Salix cinerea* and *Rosa canina*, and of course the ubiquitous *Ulex europaeus* (see **Photo 9**). The fern flora is often abundant such as *Dryopteris affinis* and *D. oreades*. The invasive *Cotoneaster horizontalis* is often found growing on the ledges of the steep quarry faces.

3.8 Results: Waxcaps and other fungi

It is worth mentioning that no Waxcap species were found in the quarry. Indeed, almost no fungi were seen during any of the surveys, except for Honey Fungus (*Armillaria mellea*) which was found growing on the stumps of two rotting *Sorbus aucuparia*. The absence of Waxcaps indicates the lack of ancient grassland on the site.



Photo 9. Oak, Birch and European Gorse can be seen established on quarry hole and tip faces free of sheep grazing influence.

3.9 Conclusion

No Schedule 8 nor notable plant species were found on the site.

4.0 BIRDS

4.1 Legislative context

Under the UK Wildlife and Countryside Act (1981), it is an offence to take, damage or destroy the nest of any wild bird while that nest is in use or being built, or to take or destroy an egg of any wild bird. Under the same legislation, it is an offence to intentionally or recklessly disturb any bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young, or disturb dependent young of such a bird. Should there be a possibility that any bird nests be damaged during the proposed extraction, works would have to stop until the young had flown and there was no possibility of a second or subsequent brood being raised in the same nest.

4.2 Methodology

A careful search was made throughout all the quarry holes, floors and tips, the Bracken areas and the heath for nests. Binoculars were used to facilitate identification. Ideally, breeding bird surveys involve searching for signs of birds which may then lead surveyors to the site of nests. Finding nests themselves, especially in dense ground vegetation is, in practice, quite rare unless an observer can spot them by inadvertently ‘flushing’ the birds. Dedicated bird surveys were carried out on 10th and 22nd June 2010 during which weather conditions and visibility were ideal for such surveys. However, during other subsequent (reptile and other taxa) surveys, note was made of any additional bird species seen.

4.3 Results

25 bird species were noted during the surveys and these are tabulated below.

Blue Tit	<i>Parus caeruleus</i>
Great Tit	<i>P. major</i>
Coal Tit	<i>P. ater</i>
Long-tailed Tit	<i>Aegithalos caudatus</i>
Wren	<i>Troglodytes troglodytes</i>
Chaffinch	<i>Frangilla coelebs</i>
Goldfinch	<i>Carduelis carduelis</i>
Dunnock	<i>Prunella modularis</i>
Garden Warbler	<i>Sylvia borin</i>
Robin	<i>Erithacus rubecula</i>
Redstart	<i>Phoenicurus phoenicurus</i>
Blackbird	<i>Turdus merula</i>
Song Thrush	<i>Turdus philomelos</i>
Pied Wagtail	<i>Motacilla alba</i>
Pied Flycatcher	<i>Ficedula hypoleuca</i>
Treecreeper	<i>Certhia familiaris</i>
Great Spotted Woodpecker	<i>Dendrocopos major</i>
Jay	<i>Garrulus glandarius</i>
Magpie	<i>Pica pica</i>
Raven	<i>Corvus corax</i>
Carrion Crow	<i>Corvus corone corone</i>
Swallow	<i>Hirundo rustica</i>
Kestrel	<i>Falco tinnunculus</i>
Buzzard	<i>Buteo buteo</i>
Woodpigeon	<i>Columba palumbus</i>

It must be emphasised that most of these species were seen or heard within the broadleaved woodland to the south of the Quarry which is outwith the present proposal. Despite extremely careful search, only one nest was found, belonging to a Garden warbler (*Sylvia borin*) which was found in a Willow (*Salix cinerea*) tree in **Hole A** (see **Map 2**). Several species were noted in these holes collecting food for their young but no other nests were noted. The most common bird consistently seen during the surveys were Woodpigeons (*Columba palumbus*) but these were usually seen flying overhead towards the broadleaved woodland on the slopes above the Quarry. Both the Buzzard (*Buteo buteo*) and the Kestrel (*Falco tinnunculus*) were also seen flying overhead, neither actively seen feeding within the Quarry itself.

It is quite likely that Tawny Owl (*Strix aluco*) feed over the Quarry at night and indeed, they were once heard during the dusk bat surveys but no nests or roost sites were seen actually within the Quarry.

4.4 Conclusion

No Schedule 1 species were seen or heard in the Quarry and it must be concluded that the proposed development will have little direct impact on nesting bird species. This is hardly surprising since, as has already been mentioned, this is a working quarry and the levels of disturbance from noise, dust etc are high. Many of the shyer bird species would be quite affected by this disturbance and negatively influenced, particularly since the levels of disturbance will occur sequentially across the proposed working area. It is assumed that bird species will, as a result, tend to migrate away (southwards) from this disturbance towards the quieter more densely vegetated areas in the oak woodland above the site.

The most direct impact on bird species will be the destruction of feeding habitat. However, it will be possible to some extent to mitigate for this, at least in the long term. This will be discussed in **9.0** below.

5.0 BADGERS (*Meles meles*)

5.1 Legislative Context

Badgers enjoy statutory protection under the Protection of Badgers Act 1992. Under this legislation, it is an offence to:

- wilfully kill, injure, take, possess or cruelly ill-treat a Badger, or to attempt to do so,
- or to intentionally or recklessly interfere with a sett.

Sett interference includes disturbing Badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it. Under this legislation, a sett is defined as “any structure or place which displays signs indicating *current use* by a Badger”. It is thus important to be able to distinguish between an old unoccupied sett and one in current usage.

In Wales, the Welsh Assembly Government (WAG) provide licences for developments and construction activities which might disturb Badgers but for developments listed under S.55(1) of the Town and Country Planning Act 1990 it is the Countryside Council for Wales (CCW) who have the appropriate powers. Developments and construction activities include:

- the use of heavy machinery (generally defined as tracked vehicles) within 30 metres of any entrance to an active sett,
- the use of lighter machinery (generally defined as wheeled vehicles), particularly for any digging operations, within 20 metres,
- light work such as hand digging or scrub clearance within 10 metres.

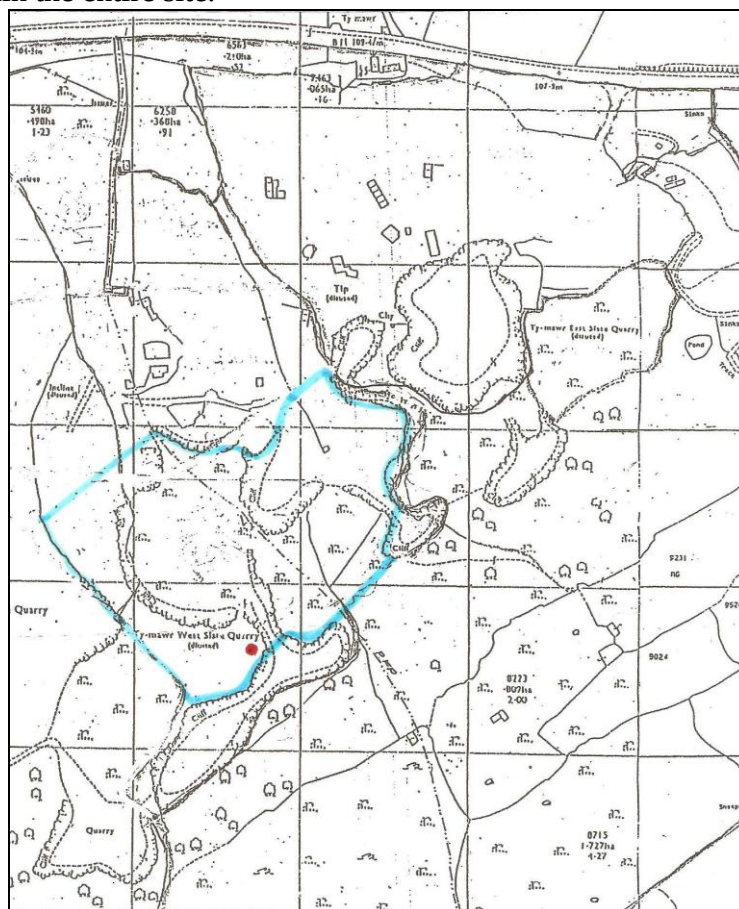
In practice, construction activities that require blasting with explosives will need to be licensed if more than 30 metres from an active sett. Thus, the need for a licence (and mitigation) will depend on the precise location and extent of the proposed development in relation to an active sett. In any event, it is probably best to consult both the Countryside Council for Wales (CCW) and WAG if there is any reasonable doubt about the possibility of disturbance to a sett.

5.2 Survey Methodology

Badgers are nocturnal animals and are rarely seen during the day, generally emerging from their setts at dusk. Thus, survey techniques rely on being able to detect field signs of these surprisingly common animals. Setts are the most obvious feature and a surveyor will be able to determine whether setts are active or not and gain some understanding of the population size and its fecundity by the number of entrances being used and the nature of the spoil outside these sett entrances. Other field signs include latrines, runs and footprints, feeding scrapes and the presence of their characteristic hairs caught on barbed-wire fences and other obstructions. If runs were located, these were followed for some distance in an attempt to find the location of active setts. The site was surveyed on 10th and 22nd June, 12th August and 1st September 2010 during periods of fine dry weather. Where practicable, the entire site was surveyed for signs of Badgers.

5.3 Results

During a previous survey of the site conducted in October 2007, an inactive sett was found at SH 49675226 in the dense Bracken area just to the north east of **Tip A** (see **Map 3**). This was clearly an outlying sett though the main sett could not be located. It is most certainly outwith the Quarry boundaries. During the present surveys, this sett was again located but it was clearly still inactive. No bedding material was found outside the sett, there were no signs of trampling, regular pathways or latrines nearby. Indeed, there was no evidence of Badger activity anywhere within the study area. Apart from the Bracken area, it is unlikely there are any other suitable places with a sufficient depth of soil for sett construction within the entire site.



Map 3. The site of the inactive outlying Badger sett located within the dense Bracken area.

6.0 WATER VOLES (*Arvicola terrestris*).

6.1 Legislative Context

Water Voles (*Arvicola terrestris*) are protected by law and are a conservation priority within the UK's Biodiversity Action Plan (BAP). Under the Wildlife and Countryside Act 1981 (as amended by Variation of Schedule 5) (England) Order 2008 it is an offence to intentionally or recklessly:

- damage, destroy or obstruct access to any structure or place that Water Voles use for protection or shelter,
- disturb a Water Vole whilst it occupies such a place.

This increased protection adds prohibitions against intentional killing, taking or injury, possession and sale. It should also be noted that Section 10 of the Act requires that "reasonable" steps are taken to avoid unnecessary damage to such structures or places.

Should it be considered that Water Voles might be disturbed by a development or construction activity, a licence will need to be obtained from CCW.

6.2 Survey Methodology

This usually involves a careful and detailed examination of the riparian and wetland habitats where they live and looking for the following signs: burrows, latrines, runs and larders.

6.3 Results

No signs of Water Voles were noted during any of the surveys. This is hardly surprising given there is no aquatic or mire habitat within the proposed quarry working area. There are no records of Water Voles close to the site.

6.4 Conclusion

Water Voles will not be affected by the proposal.

7.0 OTTERS (*Lutra lutra*).

7.1 Legislative Context

The European Otter is fully protected in England and Wales under Sections 9.1 and 9.5 of Schedule 5 of the Wildlife and Countryside Act 1981 under which it is an offence to kill, injure or take an Otter without a licence; to intentionally damage, destroy or obstruct a holt; or to disturb an Otter in its resting place.

In addition, it is protected under the European Habitats & etc Directive (92/43/EEC) since it falls under Annex 2a and 4a of the Bern Convention (Appendix III). Otters are, therefore, 'European Protected Species'. They also receive worldwide protection under CITES (Convention on International Trade of Endangered Species). Licences are required for checking known holts or for carrying out work that may disturb Otters such as the management of trees that are known to be used as resting (lie-up) sites. In Wales, the licensing authority is CCW.

7.2 Survey Methodology

Otters are very largely nocturnal animals and in practice are rarely seen during surveys. Instead, surveyors have to rely on characteristic field signs. The most common of these are their droppings, known as spraints. These have a very distinctive smell and

appearance and are used to mark Otter territories. They are, therefore, often deposited on prominent riparian features such as rocks, beneath bridges or on large tufts of tussocky vegetation. Careful examination of these spraints can often reveal the recent diet of these illusive animals since fish bones, scales etc pass through the Otter's gut relatively unaffected by digestive enzymes. The texture and appearance of spraints can also be used to determine how recently they were deposited. The frequency of their distribution can also inform surveyors of the relative Otter activity within a catchment. The characteristic smell of fresh spraints can often be detected some time before the spraints themselves are seen.

Other field signs are also important indicators of Otter activity. These include prey remains, footprints and slides, holts and lie-up sites. Holts (breeding sites) and lie-up sites are usually marked by sprainting activity near their entrances.

7.3 Results

No signs of Otters were noted anywhere within the study area. Although there are no riparian or marshy habitats on the site, Otters will nevertheless travel across country to reach such habitats and may well pass through the Quarry. However, careful search revealed no indication that Otters are using the Quarry.

7.4 Conclusion

Otters will not be affected by the proposal.

8.0 REPTILES

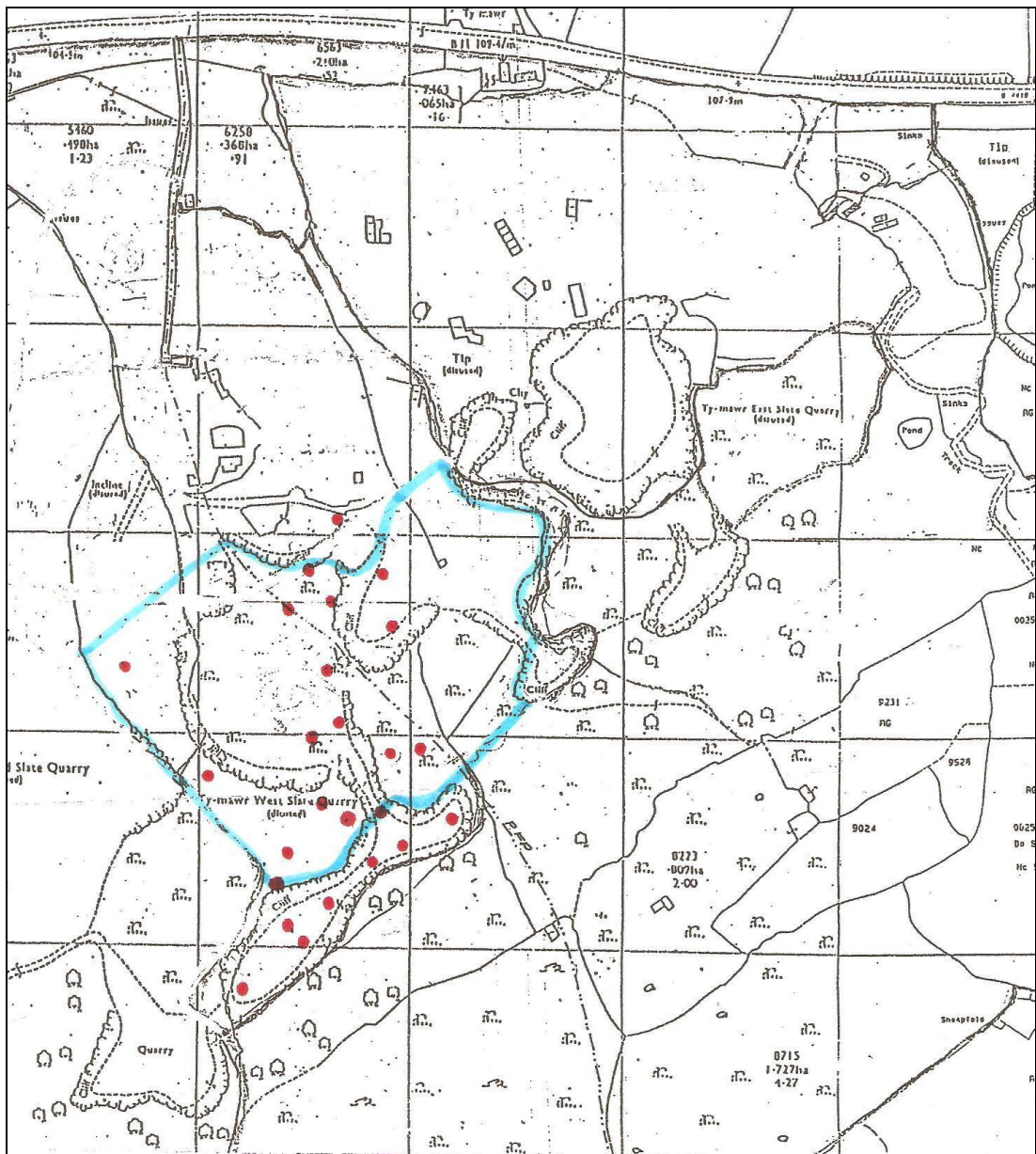
8.1 Legislative Context

Under the Wildlife and Countryside Act 1981, it is an offence to intentionally kill, injure or take any reptile included in Schedule 5. In the present context, this would include Adder (*Vipera berus*), Common Lizard (*Lacerta vivipara*), Slow-worm (*Anguis fragilis*) and Grass Snake (*Natrix helvetica*). It is now accepted practice, where there is a known and significant population of any of the above reptile species or the development is of such a scale, to exclude them from the site by appropriate fencing, capture and translocation.

8.2 Methodology

Two survey methods were used. Firstly, on each of the site survey visits, careful watch was made in likely (basking) sites for reptiles during quiet dedicated walks around the site. They were also searched for under any likely artificial refugia such as quarry litter etc that was already present within the survey area. Secondly, 25 half-metre square artificial refugia were made from bitumastic roofing felt and placed around the site in strategic locations. Protocols used were as specified in Froglife Advice Sheet 10*. **Map 4** shows the location of these artificial refugia. 11 refugia were placed in sunny positions within the quarry holes, seven were placed in clearings within the dense Bracken areas and seven were placed on tips. In this way, all accessible habitats in the quarry area were surveyed. All refugia were placed in position on 10th June 2010. Visits to check on these refugia were made on 22nd June, 12th August and 1st September during warm sunny weather. All refugia were removed from site on 1st September.

*(Froglife (1999). Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife, Halesworth)



Map 4. Location of artificial reptile refugia.

8.3 Results

No reptiles were found underneath the specially placed artificial refugia nor under similar suitable objects that might have acted as refugia during any of the study visits. However, one Common Lizard (*Lacerta vivipara*) was seen basking on an exposed rock on **Tip ii** (see **Map 2**) on the 1st September visit close to the entrance to **Hole B**. No other species or individuals were noted.

8.4 Discussion

Failing to find reptiles underneath refugia must not be considered as an indication that reptiles are absent from the site. In addressing this common (negative) survey circumstance, Froglife Advice Sheet 10 suggests that an absence of reptiles found underneath refugia during dedicated surveys should be recorded as “likely absence”. However, one must also consider the likelihood of reptiles being present on the site based on the nature of the site and the use to which it is put.

Ty Mawr West Quarry, as has previously been mentioned, is a busy, noisy working environment. It is considered unlikely that Slow-worms and snakes would find such conditions favourable, especially as they are relatively slow to move. Common Lizards on the other hand are much more likely to be found in this environment and seeing one individual corroborates this supposition. More lizards are likely to be present. One must also consider the habitats found in the quarry. Much of these are artificial with an undeveloped vegetation cover. This would suggest that the (mammalian) prey of snakes, at least are likely to be in short supply since, in turn, their food supply is limited. Lizards feed mainly on insects and these are likely to be sufficiently abundant to support what is per force likely to be a limited population.

8.5 Conclusion

The results of the refugia surveys strongly suggests that it is most unlikely that this quarry environment supports a significant reptile population, apart from the odd Common Lizard. Nevertheless, one must consider the impact that the proposal might have on reptiles.

It is understood in discussion with the quarry owner, that new workings will progress in a more-or-less linear manner working from the existing crusher site and haul roads southwards. This will allow any reptiles to move away from disturbance rather than to be isolated, trapped and killed.

9.0 DISCUSSION AND MITIGATION

While there are some quite ecologically diverse habitats in the worked out Quarry at Ty Mawr West, the majority of the ground is severely degraded by past slate extraction and tipping. Very little of the area can be even reasonably considered as semi-natural habitat. **Photo 9** is an excellent illustration of this, the core area for proposed extraction. However, the main interest in the quarry must be the secondary vegetation, of some intrinsic value in its own right but mainly as an exemplar of the recolonisation process. A process, incidentally, that is occurring over large numbers of similar worked-out quarries in North Wales. One must therefore put the proposal to extract further material from this quarry into some perspective. The fact of the matter is that reworking such degraded and recolonising habitats will have little ecological impact. No protected or notable species will be affected. The extraction of mainly secondary aggregates from such a post-industrial site will have considerably less ecological impact than if the area was pristine.

Although secondary, the most interesting habitats in Ty Mawr West Quarry are the ‘islands’ of habitat isolated from grazing pressure in **Holes A, B, and E**. It is likely that in time these will become even more diverse. Accordingly, the Quarry owner has agreed to fence these off from possible future grazing pressure and to leave them undisturbed by future quarrying activities. Since these three areas of habitat abut directly onto the broadleaved woodland to the south and outwith the Quarry boundary, future (good quality) habitat enlargement is assured. This will also increase ecological connectivity within Dyffryn Nantlle.

In addition, once future extraction has been completed (or in appropriate stages of the process), the exposed ground will be covered in a layer of suitable topsoil (derived from the Quarry and stockpiled), made stock-proof and allowed to naturally regenerate a secondary vegetation much as has already occurred on the tips and quarry holes. In the opinion of the author, this is preferable to tree-planting since species that are more likely to survive the desiccating environment that prevails within the quarry are already in plentiful supply locally and are demonstrably flourishing and producing adequate viable seed. Of particular note must be *Ulex europaeus* and *Betula pubescens* both species that will produce a supply of soil-building leaf litter which will, in turn, encourage the colonisation of other desirable species. Eventually, a climax vegetation of *Quercus petraea*-dominated woodland will develop much as is already happening within the Bracken areas. The owner has also agreed to control any invasive plant species that might colonise these areas of habitat restoration.

Appendix 1

Plant species established in the five quarry holes

<i>Acer pseudoplatanus</i>	<i>P. sterilis</i>
<i>Agrostis capillaris</i>	<i>Pteridium aquilinum</i>
<i>A. stolonifera</i>	<i>Quercus petraea</i>
<i>Aira praecox</i>	<i>Rosa canina</i> agg.
<i>Anthoxanthum odoratum</i>	<i>Rubus fruticosus</i> agg.
<i>Arrhenatherum elatius</i>	<i>R. idaeus</i>
<i>Asplenium adiantum-nigrum</i>	<i>Rumex acetosa</i>
<i>A. ruta-muraria</i>	<i>R. acetosella</i>
<i>A. trichomanes</i>	<i>Sagina procumbens</i>
<i>Athyrium filix-femina</i>	<i>S. cinerea</i>
<i>Betula pubescens</i>	<i>Sedum anglicum</i>
<i>Blechnum spicant</i>	<i>Senecio jacobaea</i>
<i>Calluna vulgaris</i>	<i>Sorbus aucuparia</i>
<i>Cardamine flexuosa</i>	<i>Taraxacum officinale</i> agg.
<i>Cerastium fontanum</i>	<i>Teucrium scorodonia</i>
<i>Corylus avellana</i>	<i>Thymus polytrichus</i>
<i>Crataegus monogyna</i>	<i>Trifolium dubium</i>
<i>Cryptogramma crispa</i>	<i>Ulex europaeus</i>
<i>Dactylis glomerata</i>	<i>U. gallii</i>
<i>Deschampsia flexuosa</i>	<i>Umbilicus rupestris</i>
<i>Digitalis purpurea</i>	<i>Urtica dioica</i>
<i>Dryopteris affinis</i>	<i>Vaccinium myrtillus</i>
<i>D. dilatata</i>	<i>Veronica arvensis</i>
<i>Epilobium brunnescens</i>	<i>V. officinalis</i>
<i>E. montanum</i>	<i>V. serpyllifolia</i>
<i>Erica cinerea</i>	<i>Viola riviniana</i>
<i>Festuca ovina</i>	<i>Vulpia bromoides</i>
<i>Fragaria vesca</i>	<i>Amphidium mougeotii</i>
<i>Fraxinus excelsior</i>	<i>Andreaea rothii</i> subsp. <i>rothii</i>
<i>Galium saxatile</i>	<i>Atrichum undulatum</i>
<i>Geranium robertianum</i>	<i>Bazzania trilobata</i>
<i>Hedera helix</i>	<i>Breutelia chrysocoma</i>
<i>Hieracium</i> sp.	<i>Bryum capillare</i>
<i>Holcus lanatus</i>	<i>Campylopus atrovirens</i>
<i>Hypericum pulchrum</i>	<i>C. flexuosus</i>
<i>Jasione montana</i>	<i>Dicranella heteromalla</i>
<i>Juncus effusus</i>	<i>Dicranum majus</i>
<i>Lonicera periclymenum</i>	<i>D. scoparium</i>
<i>Lotus corniculatus</i>	<i>Diplophyllum albicans</i>
<i>Luzula campestris</i>	<i>Fissidens dubius</i>
<i>Lysimachia nemorum</i>	<i>Homalothecium sericeum</i>
<i>Oxalis acetosella</i>	<i>Hylcomium splendens</i>
<i>Pilosella officinarum</i>	<i>Hypnum andoi</i>
<i>Plantago lanceolata</i>	<i>H. jutlandicum</i>
<i>Polypodium vulgare</i>	<i>Isothecium myosuroides</i>
<i>Potentilla erecta</i>	<i>Kindbergia praelonga</i>

Lophocolea bidentata
Metzgeria furcata
Mnium hornum
Mylia taylori
Pellia epiphylla
Plagiochila porelloides
Plagiothecium undulatum
Plagiomnium undulatum
Pleurozium schreberi
Pogonatum aloides
P.urnigerum
Polytrichastrum formosum
Pseudotaxiphyllum elegans
Racomitrium aquaticum
R. fasciculare
R. lanuginosum
Rhytidiadelphus loreus
R. squarrosus
R. triquetrus
Scapania gracilis
Sphagnum fallax
S. girgensohnii
S. palustre
S. subnitens
Thuidium tamariscinum
Tortella tortuosa



Eryri Ecology

Ty Mawr West, Nantlle

Proposed Quarry Extraction - Bat Survey Report

29th October 2010

Report by: Kate Williamson: Eryri Ecology, 15 Ty Canol, Harlech, Gwynedd,
LL46 2NZ. 07760909574 eryriecology@aol.co.uk

Client: Ellis Wyn Jones

**Planning
Authority:** Gwynedd County Council

**Grid
Reference:** SH 4952

SUMMARY

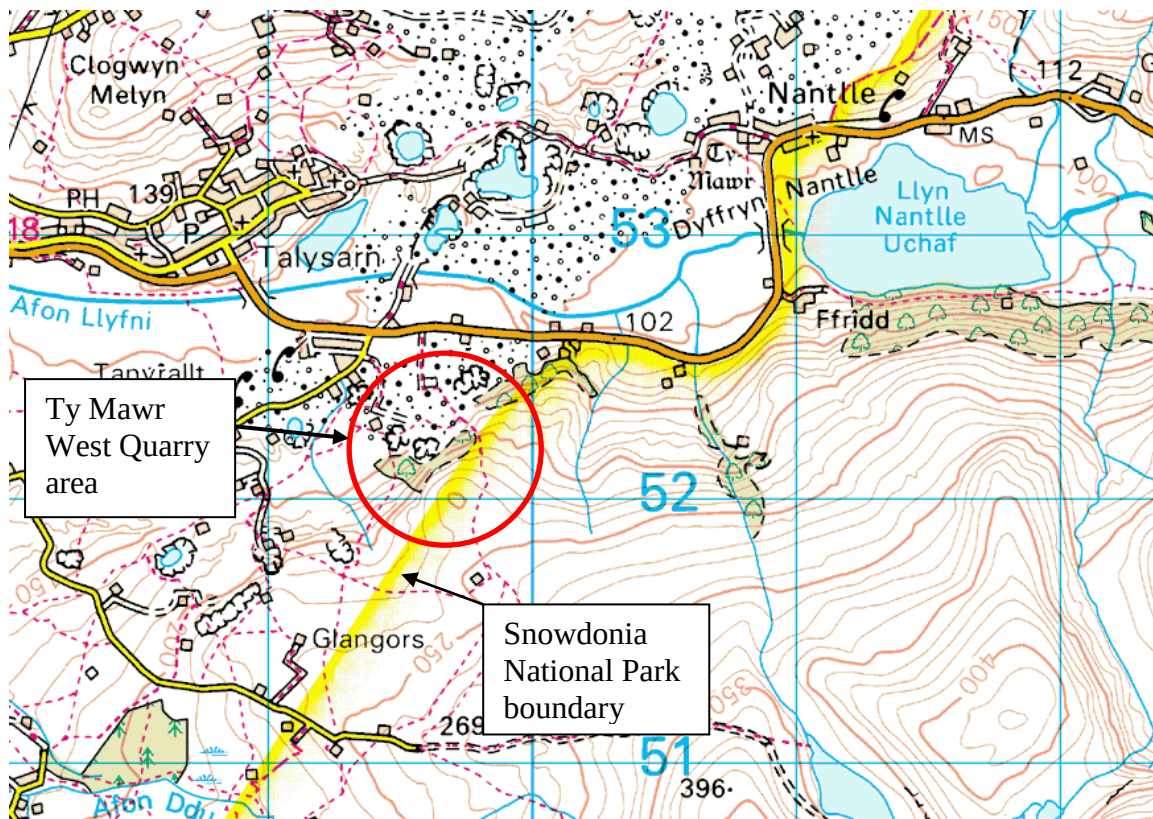
- A total of 7 individual bat species were recorded on the site
- Only one individual common pipistrelle bat was found roosting in a location that will be unaffected by the proposed new extraction
- A total of 8 Lesser Horseshoe Bat passes were recorded during 33 individual surveys over a 5 month period.

- There will be no loss or damage to existing bat roosts in Ty Mawr West
- There will be no significant loss of bat foraging habitat
- There will be no impact on the integrity of bat commuting routes through the Nantlle valley, including those from the Glynllifon SAC
- There will be no detrimental effect on the favourable conservation status of any bat species

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1. Introduction
2. Methodology
3. Survey Limitations
4. Site Description and Evaluation
5. Results
6. Conclusion
7. Mitigation & Recommendations
8. Legal Implications

Figure 1: Location of Survey Site



PROPOSED QUARRY EXTRACTION AT TY MAWR WEST BAT SURVEY REPORT:-

Ty Mawr West
Nantlle
Gwynedd

29th October 2010

1 Introduction

Kate Williamson of Eryri Ecology was commissioned by the client, Mr Ellis Wyn Jones, to carry out a series of bat surveys at Ty Mawr West quarry, near Nantlle, to ascertain whether there would be any effect on the favourable conservation status of any bat species present in the event of the new extraction works proposed for the site. Lesser horseshoe bats in particular are of concern, due to the relative proximity of the important maternity roost at Glynllifon college (SH 45663 55380). Ty Mawr West quarry site is located around SH 4952.

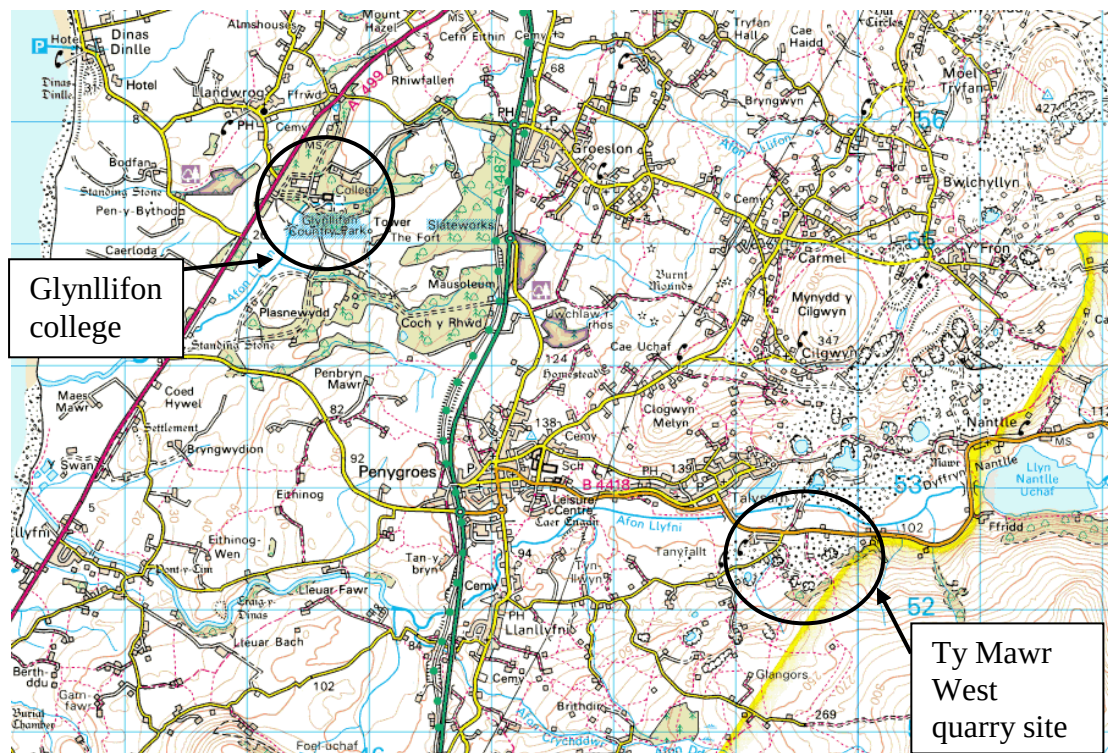


Figure 2: Proximity of Glynllifon college and Ty Mawr West quarry

2 Methodology

Both emergence surveys and overnight Anabat surveys were used on this project.

Emergence surveys: These were conducted using licensed bat workers at strategic points on the site. A total of 11 surveys were completed over a 5 month period (June,

July, August and September). Surveyors made a visual survey for any emerging bats, used Duet detectors to help with identification in the field and recorded any bat activity onto Anabat detectors, which were analysed after the survey.

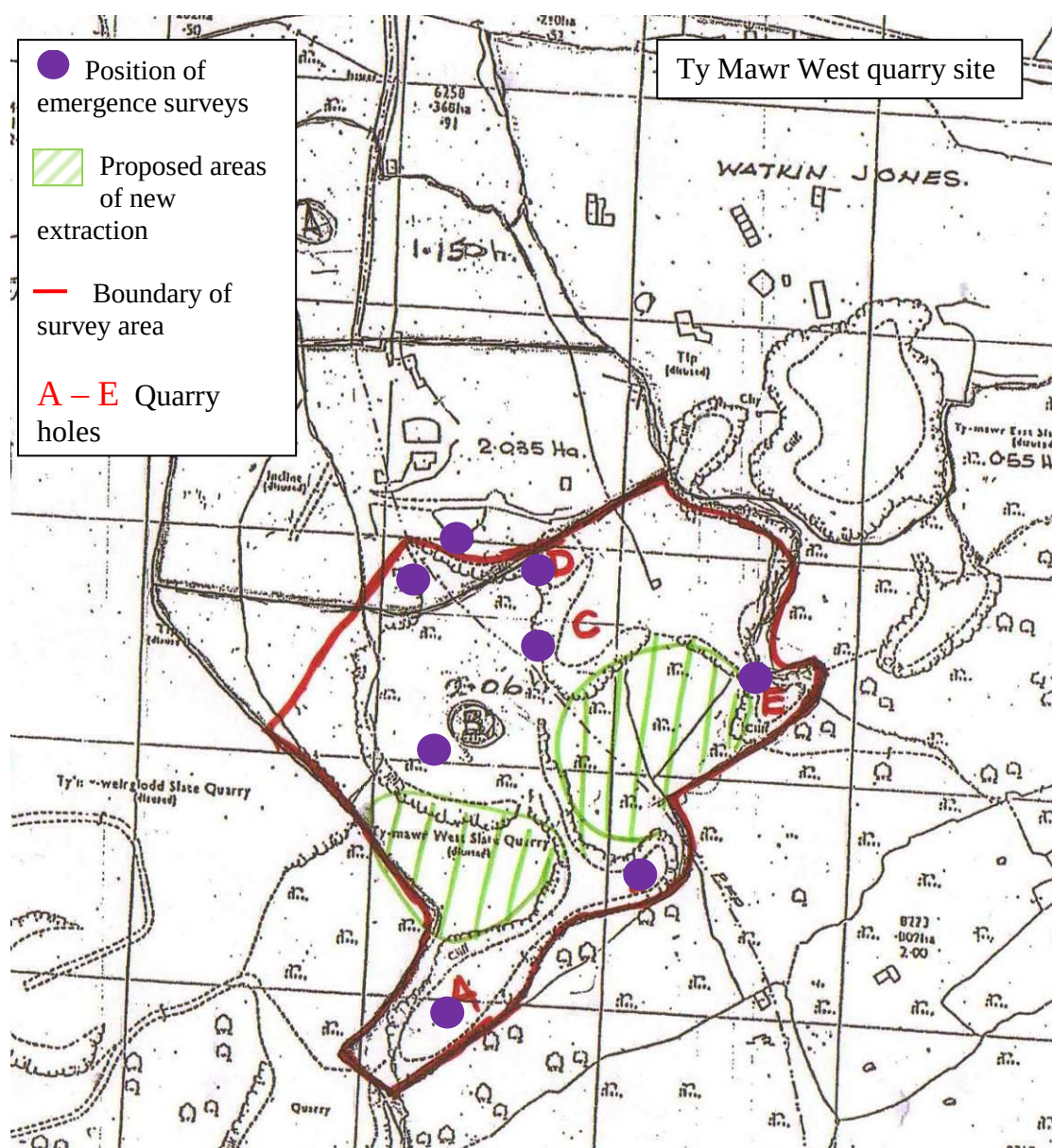


Figure 3: Position of emergence surveys within survey boundary

These emergence surveys commenced half an hour before sunset on each visit and continued until at least an hour after sunset, to allow for the variation in emergence times between different species.

Anabat surveys: In conjunction with the emergence surveys, a number of Anabat recording systems were left in situ overnight, on 6 separate occasions over a 5 month period (June, July, August, September and twice in October). These detectors record all bat activity between dusk and dawn. The machines are collected the following morning, all the data downloaded and analysed using Analook. Each bat recording is labelled with the time, so looking at activity on a number of different detectors from a

single night can sometimes give information about specific species movements. A total of 22 survey nights were conducted using Anabats.

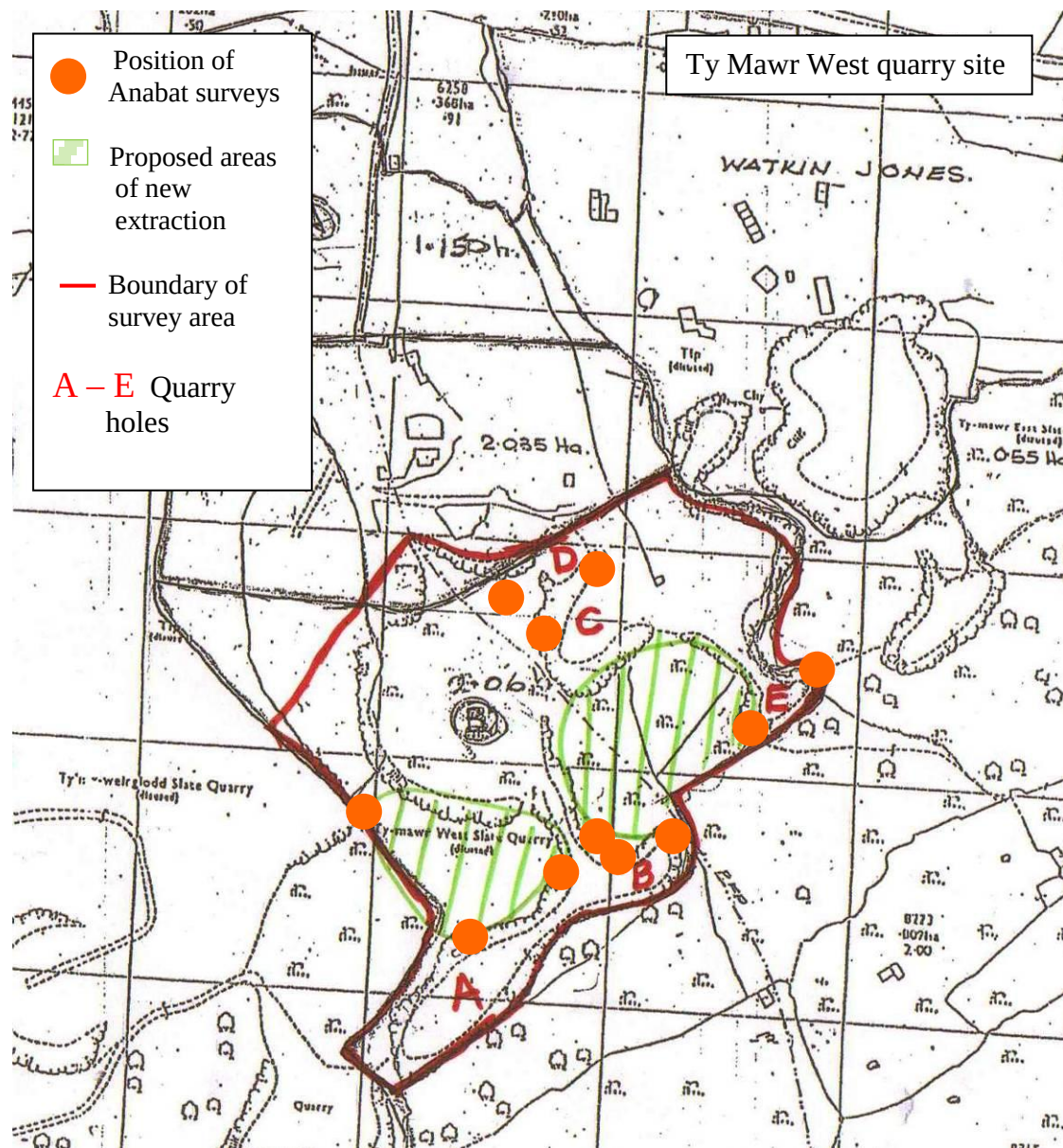


Figure 4: Position of Anabat surveys conducted within the survey area

The habitat was assessed for potential roost sites and emergence and Anabat survey positions included to cover these areas.

3 Survey Limitations.

Bats are highly mobile animals and some species move roosts on a regular basis. It is possible that bats could move into any roost area after the survey has taken place. An assessment of the suitability of the habitat to support roosting bats is therefore important to establish the likelihood of this occurring. It is also envisaged that by

conducting surveys on a number of different occasions over a relatively long period of time, that the chance of this happening is further reduced.

4. Site Description and Evaluation.

A full, detailed description of the habitat can be found in the Ecological Survey report written by Dr Rod Gritten, Gritten Ecology.

In terms of bat requirements, the site offers some good foraging opportunities in the relatively damp, lush quarry holes. These holes have been free from grazing for some considerable time, allowing an early succession woodland to develop, see picture 1.



Figure 5: Quarry hole A

As well as the foraging opportunities within the quarry holes, there is a continuous band of woodland along the southern, western and eastern edges of the site, which could also provide good foraging and act as flight paths for commuting bats in the area (see Figure 6).

There are a number of rock faces within the survey boundary, some of which have fissures that could provide potential roosting opportunities for bats. These were examined during emergence surveys.

A large percentage of the habitat identified as having potential benefits to bats will be unaffected by the proposed extraction works.

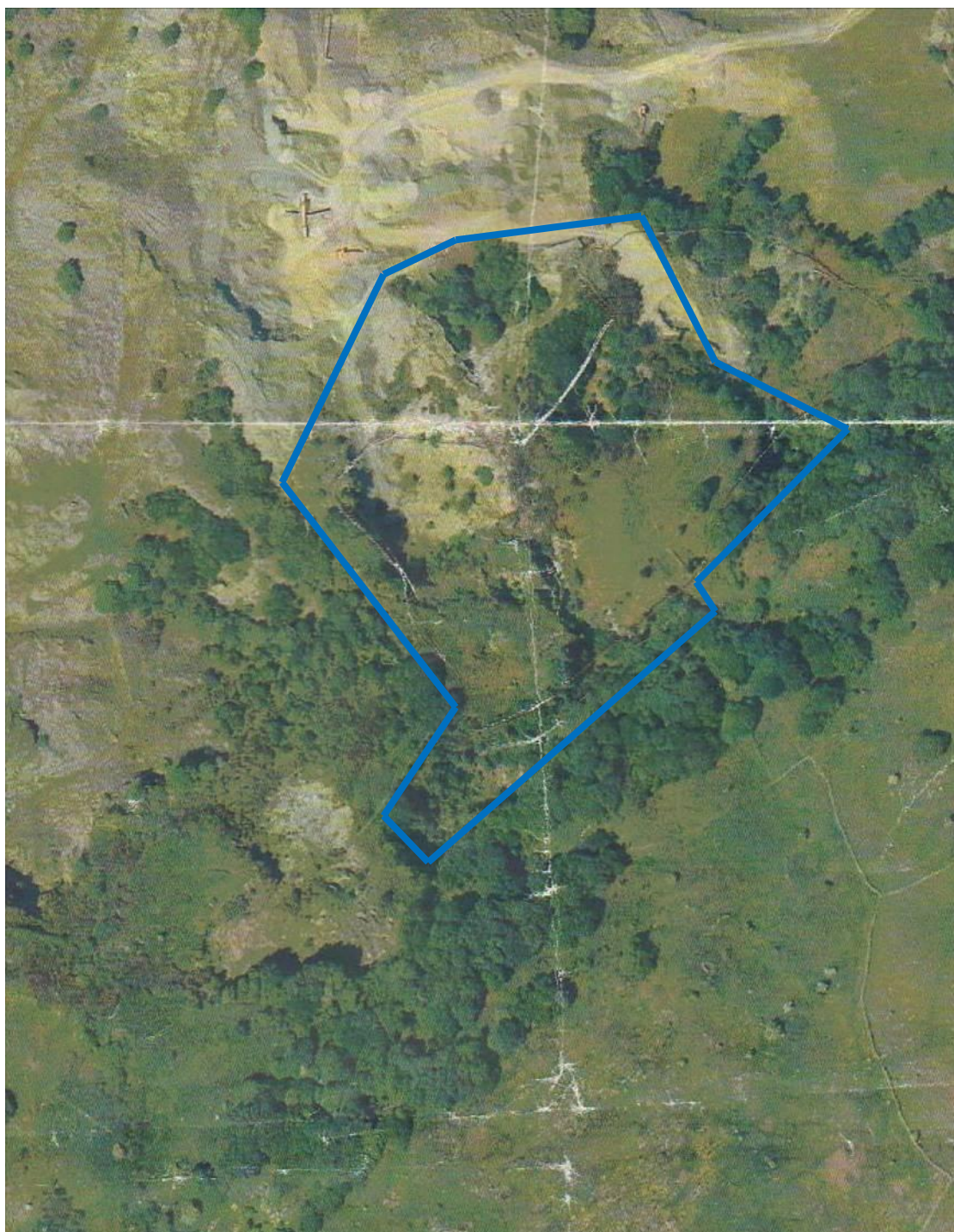


Figure 6: Aerial photo showing survey site boundary and areas of adjacent woodland

5 Results

A total of 7 individual species of bats were recorded on the site during the surveys, as well as activity that could only be identified down to *Myotis* species. *Myotis* recordings showing characteristics of Natterers bat, Whiskered bat and Brandts bat were identified, but for the majority it was not possible to get at specific species identification. It is often not possible to distinguish between the *Myotis* bat species from Anabat recordings, and for the intents and purposes of this report they can all be assessed together as a group.

SPECIES	NUMBER OF RECORDINGS	PERCENTAGE OF ACTIVITY
Common pipistrelle	1090	57%
Soprano pipistrelle	640	33%
Myotis species	112	6%
Lesser Horseshoe bat	8	0.5%
Noctule bat	8	0.5%
Brown Long-eared bat	10	0.5%
Other*	49	2.5%
TOTAL	1917	100%

Figure 7: Summary table of Anabat results for emergence and Anabat surveys combined

***These are Anabat calls for which it was not possible to identify the call to species or species group**

As you can see from Figure 7 above, the vast majority of activity at Ty Mawr West is pipistrelle bats (90% of all activity). Most of this activity was a bat flying past, but there was also a certain amount of feeding activity recorded and a large number of social calls. These were particularly prevalent during August and September. The areas showing highest levels of pipistrelle activity were quarry holes A and B and along the western edge of the site.

A single common pipistrelle was recorded emerging from a dry stone structure in the middle of the site during August emergence surveys, (see Figure 9).

All the noctule bat records were of animals commuting over the site, either relatively soon after sunset (recorded during emergence surveys), or towards the end of the night. There was no foraging or social activity recorded for this species. There were no trees identified on the site that showed any potential for tree-roosting species. They were mainly young, scrub trees.

Nearly half of all the *Myotis* activity was recorded during the June surveys (47/112), with some foraging recorded. Activity was recorded throughout the surveys at a low level and no animals were observed emerging from roosts.

Lesser horseshoe bats were recorded on 3 occasions, during August, September and October. All recordings were brief passes. In August 2 passes were recorded at 22.10 and 04.44, during September another 2 passes were recorded at 20.12 and 03.46,

whilst during October a total of 4 passes were recorded at 19.37, 00.47, 05.17 and 06.27. See Figure 9 for the position of these bat passes.

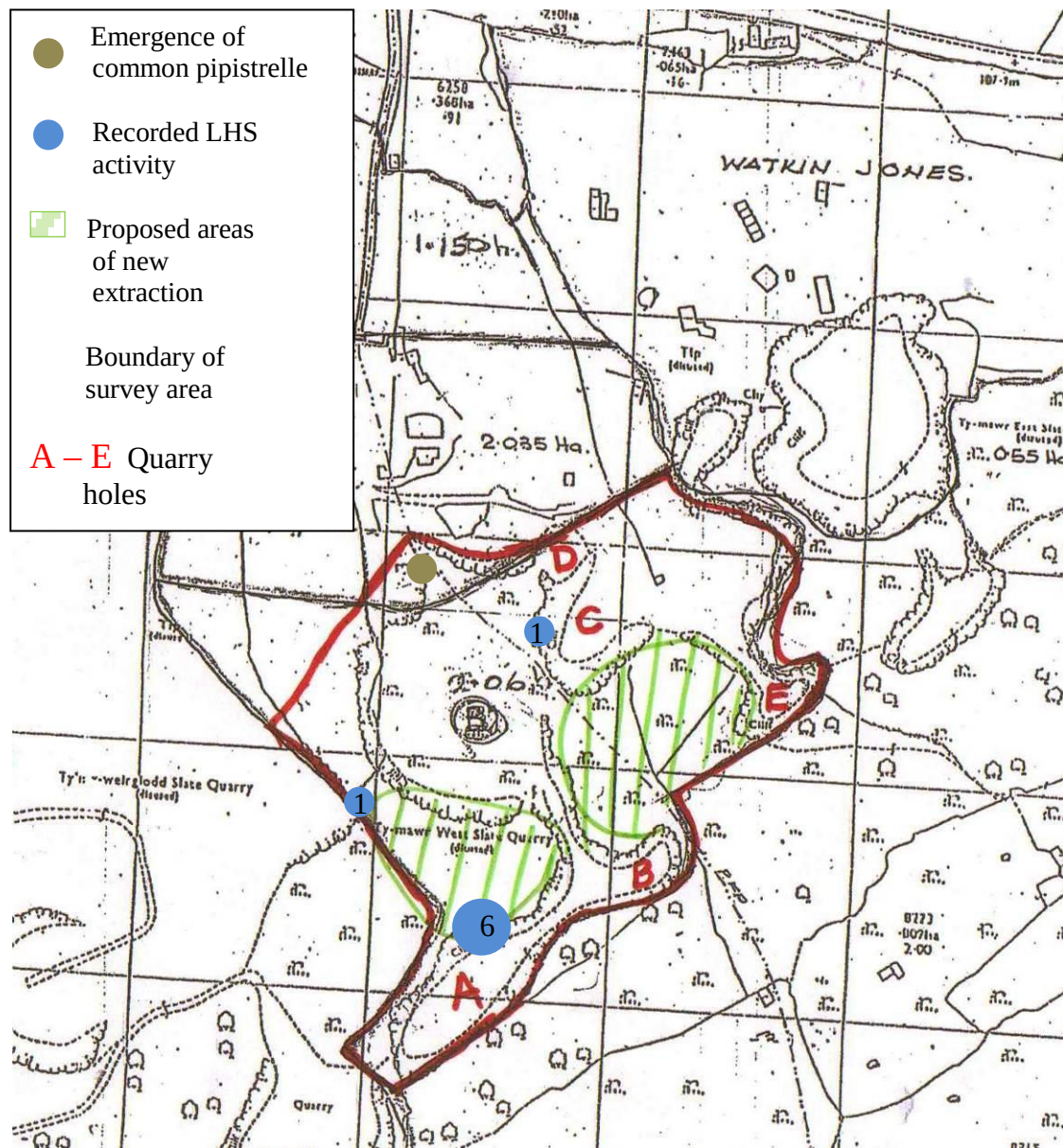


Figure 9: Map showing Lesser Horseshoe Bat (LHS) activity and number of passes in each area, plus site if common pipistrelle emergence

7 Conclusion

The Ty Mawr West quarry site is well used by pipistrelle bat species, both for foraging and socialising. Other species are recorded as present at various times through the season, but their combined contribution to bat activity on site is less than 10%. No other species were found to be socialising in any numbers, although *Myotis* species were recorded foraging, especially over some of the quarry holes.

Despite 11 emergence surveys in different areas of the site, only a single common pipistrelle was observed emerging. It is concluded that the site does not represent any significant roosting potential for bats of any species.

Although lesser horseshoe bats were recorded during the surveys, these were in very low numbers over the season. The timings of recordings are such that it is concluded to be occasional individual bats commuting through the site and not an area that is used as a flight path of any significance.

It can be seen from Figure 9, that the area of the site to be directly affected by the proposed new extraction work is only between a quarter to a third of the survey site. It does not include the common pipistrelle roost recorded during these surveys. That area is to be left intact as it has significant archaeological interest. In addition to this, the quarry owner has agreed fence off quarry holes A, B and E from future grazing, once the 'new' areas are extracted and the site is opened up, (see Gritten 2010). This will enable the existing vegetation to persist and the continued foraging for bats. As the majority of bat activity was recorded in these areas, it is unlikely that as a whole the proposed works will have any detrimental effect on foraging and socialising opportunities for bats using this site.

The woodland surrounding the site on its western, southern and eastern boundaries will likewise be unaffected by the proposed works. As the bat passes picked up along these boundary edges are likely to be bats commuting along this woodland edge, there will be no detrimental effect to this activity either.

The site is already in use, extraction comprising material from historic quarry tips, and so any disturbance from heavy machinery will remain at a constant level. As the quarry is only active during daylight hours, this will not affect bats in the area.

In conclusion, there is going to be very little loss of bat foraging and commuting habitat and no roosts lost if the proposed new extraction work goes ahead. The majority of 'good' bat features and habitat are remaining unaffected and in sufficient quantity and quality to remain a functioning ecosystem, meeting the needs of bat populations in the area. There will be no detrimental effect on the favourable conservation status of any of the bat species recorded on the site.

8 Mitigation & Recommendations

Due to the fact that there will be no loss or damage to existing roosts, no significant loss of foraging habitat and no impact on the integrity of commuting routes in the area, no mitigation measures are required.

There is, however, good quality foraging habitat on the site, but a lack of suitable roosts. This provides an opportunity to provide habitat enhancements. As there have been a variety of bat species recorded foraging in the Ty Mawr West quarry, the installation of a number of both Schwegler 1FF and Schwegler 2FN woodcrete bat boxes will cater for the species-specific roosting requirements. Five boxes of each design, erected on mature trees around the site, would be adequate.

The restoration of the site post-extraction, outlined in Gritten 2010, along with the exclusion of grazing from quarry holes A, B and E, will ensure that quality foraging habitat in this area persists in the long-term.

9 Legal Implications

Bats

General Implications

Bats are protected under UK law by the Wildlife and Countryside Act 1981 (as amended) and also under European law by the Habitat and Species Regulations 2010. Under these laws it is an offence to deliberately kill or injure a bat, to disturb a bat or to damage, destroy or block access to a roost. Bat roosts are protected under these laws whether the animals are present at the time of survey or not. Under both laws the Welsh Assembly Government are empowered to issue licences to carry out work to bat roosts for reasons of overriding public interest. There is however the scope within the legislation, where only individual bats are involved, and where there will be no impact on the favourable conservation status, (FCS) of the species, to carry out work using a 'Reasonable Avoidance Measures Strategy' (RAM Strategy), rather than carrying out work under licence. It is not illegal to tend a disabled bat pending recovery.

Specific Implications

Due to the fact that there will be no loss or damage to existing roosts, no significant loss of foraging habitat and no impact on the integrity of commuting routes in the area, there are no specific legal implications with regards to this proposal.

However, if bats are found during the course of the work carried out, work must stop until such time as CCW can be consulted with regards to how to proceed as there may then be a requirement for a licence from the Welsh Assembly Government.

References

1. Ty Mawr West Nantlle; Ecological Survey report – Dr Rod Gritten, Gritten Ecology, September 2010