Heatons
Planning Environment Design

Technical Appendix D

Ecology & Biodiversity

Preliminary Ecological Appraisal & Breeding Bird Survey

Preliminary Ecological Appraisal

Back Lane Quarry, Nether Kellet

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Report 0922/5

Revision and update to report 0421/4

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EXECUTIVE SUMMARY

A habitat and notable species survey was carried out on and around Back Lane Quarry, Carnforth. It is proposed that the permitted extraction limits are deepened to allow more material to be removed from the existing quarry void.

The purpose of the survey was to identify protected and/or notable habitats and species which may be impacted by the proposals, to determine the likelihood of these impacts and suggest whether further surveys are required to quantify these impacts or to propose avoidance measures or mitigation to compensate for these impacts.

A desktop search for records and information, a field survey, and protected species data search were undertaken to establish species and habitats present on and in the near vicinity of the quarry. A provisional Zone of Influence was determined using interim findings from the hydrogeology team (Hafren Water) identifying areas in which the hydrological impacts from de-watering a deeper void may be evident. Thwaite House Moss SSSI is within this zone and could be impacted by changes in the local hydrology (the quarry is also within the SSSI buffer zone), meaning Natural England must be consulted regarding these proposals.

A total of 11 broad habitat types were recorded in the survey area. Of notable consideration were calcareous grassland, open mosaic habitat, limestone pavement and deciduous woodland (including ancient woodland). Four Biological Heritage Sites (BHS) are present within the land holding. One of these is no longer evident and three have been damaged to some extent by previous extraction consents (but remain in good or moderate condition). All these habitats and BHS are impacted to some extent by the daily noise and dust from quarrying activities. These impacts are unlikely to worsen if quarrying limits are deepened, but may continue for longer in time. No additional impacts are likely.

Numerous records of notable and protected species were collected from the vicinity of the quarry, though there are relatively few definite records of notable and / or protected species from within the quarry boundary. Within the active quarry the cliffs have been successfully used by nesting peregrine falcon, and the block factory roof used by nesting gulls this season (2022). Within the peripheral habitat there are records of; widespread nesting bird species in the woodland (including red-listed species), scrub and hedgerows, badger sett and foraging activity, stoat, roosting bats in woodland and lime kiln, dingy skipper butterfly (priority species) and widespread invertebrate species.

It is not considered that the deepening of Back Lane Quarry will have any specific impacts on the local ecology, as there will be no further lateral expansion of the quarry into adjacent habitats (the proposed extraction area will be within previously worked areas and under the concrete block factory - currently within the working area of the quarry). The habitats and species of interest in and around the quarry are currently impacted somewhat by the day-to-day quarrying activities (through noise disturbance and dust deposition), and as a result of the proposals these impacts are likely to continue for a longer period of time (but are not expected to worsen). The only exception to this is the loss of the block factory roof, currently used by gulls to nest.

Impacts on nearby protected sites (notably Thwaite House Moss SSSI) require further assessment depending on findings from the hydrogeologists.

A protected species method statement with avoidance measures should be written and adhered to for works around schedule 1 species (peregrine falcon) and for quarrying works (and blasting) in new areas that could potentially impact other nesting bird species and roosting bats. No further ecology surveys are required for these proposals, though the block factory should be re-assessed for bats and nesting birds prior to demolition.

A Biodiversity Net Gain assessment will be made as part of the Environmental Statement, which will include enhancement measures to improve the condition of nearby notable habitats.

Contents

1. INTRODUCTION

1.1 The aim of the survey

The aim of the survey was to identify any habitat or protected species issues or potential ecological constraints or concerns that would result from the deepening of quarrying activities within the current lateral extraction limits and the removal of limestone from under the existing concrete block factory at Back Lane Quarry, Carnforth.

The survey was carried out following technical guidelines provided by CIEEM (Chartered Institute of Ecology and Environmental Management) and mapped following UK Habitat Classification guidance (see Appendices for full references).

The survey was originally carried out in April 2021, this is a revised and updated report following a further survey visit in September 2022.

1.2 Proposed works

The proposed works involve deepening the quarrying within the agreed lateral extraction limits. The proposals also involve extraction under the existing concrete block factory on the quarry floor, which is currently outside the approved mineral extraction phasing area, but within the wider quarry.

1.3 The survey area/ zone of influence

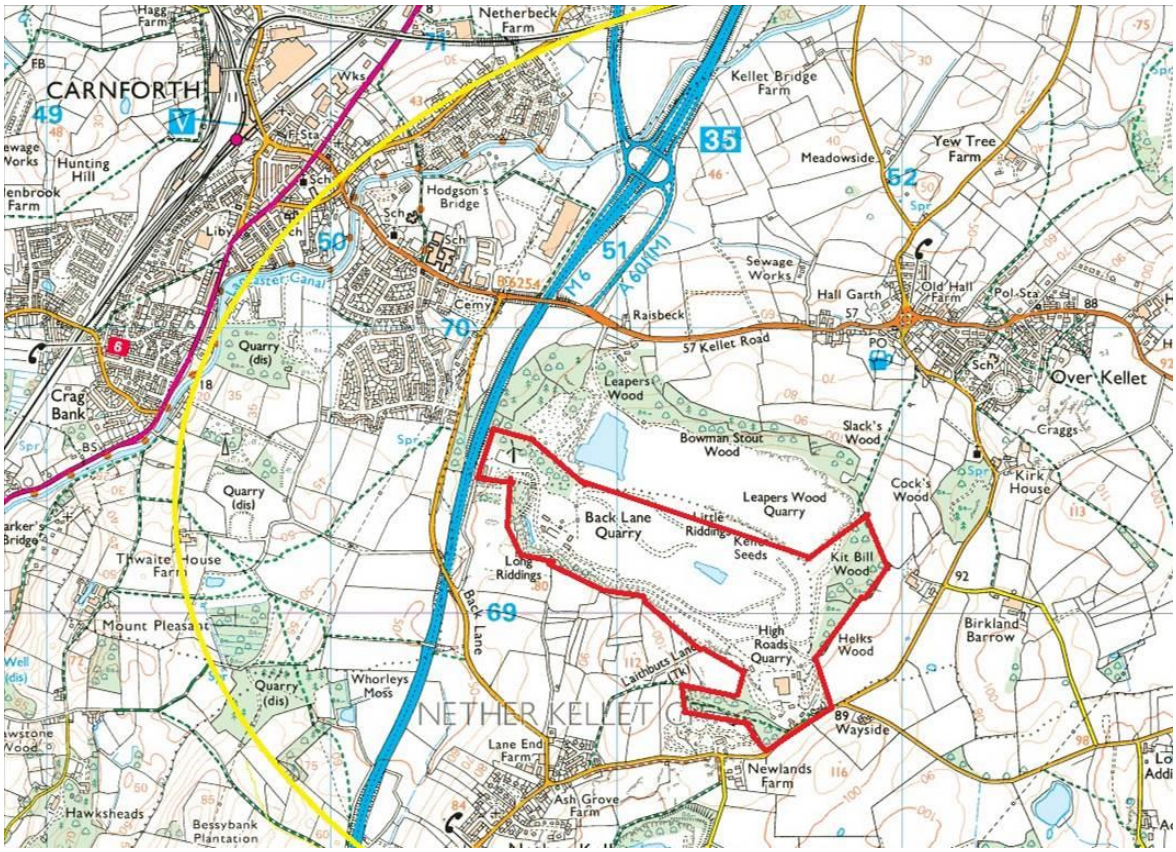
The habitat survey was carried out within the land management boundary of the quarry (red line on map below). Adjacent open land and field parcels were assessed using binoculars, where public rights of way were not present.

A zone extending to 500m from the development footprint was surveyed from public rights of way and access land to establish whether any ponds likely to support great crested newts were present.

The zone of influence of the proposed deepening of quarrying activities has not been determined as yet. Informal findings from the hydrogeology team (Rosie Morrant, Hafren Water, pers.comm) suggested that dewatering impacts could be felt up to 1.3km from the sump, but are unlikely to be manifest in a radial way around the quarry due to the complex geology. Impacts are not expected to be noted to the east of the M6 motorway, but there may be impacts on groundwater dependent sites where the water table is near to the soil surface west of the M6, and along the Netherbeck catchment (north and east of Carnforth). As such the area to the west of the M6 to a distance of 1.3km from the quarry were also included in the impact assessment.

The management boundary of the quarry, and the potential zone of influence of the proposals (both from Back Lane Quarry and the adjacent Leapers Wood Quarry) are shown on figure 1 below.

Figure 1: Back Lane Quarry management boundary (red line) and potential zone of influence west of M6 (yellow line)



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2. SURVEY METHOD

2.1 Desktop study

Previous survey reports, aerial photographs (Google Earth) and Ordnance Survey maps were used to assess the likely habitat types in and around the site, and to search for waterbodies that could host protected species such as great crested newts. Natural England and JNCC websites were used to obtain boundaries of any statutorily designated sites in the area.

Lancashire Environmental Records Network was consulted and a data search requested for protected species and Biological Heritage Sites within 2km radius of the boundary of the site.

2.2 Habitat survey

The fieldwork was carried out by Tamsin Douglas MCIEEM (South Lakes Ecology) on April 20th 2021, and the update survey and habitat condition assessment were carried out on September 12th 2022.

The area was walked over, and habitats within the study area were described and mapped using standard UK Habitats Classification methodology (UKHab 2020). The Professional edition of the UKHab guidance was followed, and habitats classed to level 5 of the hierarchy were applicable. The minimum mappable unit was 25m², with target notes used to describe smaller features.

Habitats present within the management boundary of the quarry were also assessed for their condition following guidance outlined in DEFRA's biodiversity metric 3.1, and woodland specific guidance from EWBG (England Woodland Biodiversity Group).

2.3 Protected species survey

Evidence of and potential for protected species was assessed on the site on 20th April 2021 and 12th September 2022. In particular, the potential for the following species/ animal groups was assessed:-

Birds

The site was assessed for its potential to support notable bird species, or important assemblages of wintering or passage birds. In particular the habitats on site were assessed for their potential and likelihood to support cliff breeding birds, and any evidence/ sightings noted. A dedicated breeding bird survey was carried out in and around the quarry by South Lakes Ecology in 2022.

Reptiles

The site was assessed for its potential to support reptiles such as common lizard, slow-worm and adder, following guidance issued in the 'Herpetofauna Workers Manual'.

Amphibians

A search of the site was made to identify and assess any possible breeding ponds for amphibians, notably great crested newt *Triturus cristatus*. Ponds within 500m of the proposed development were assessed for suitability to host great crested newt using methods detailed by Oldham *et al* (2000). An assessment was also made of the quality of the habitat for foraging and potential for hibernation sites. Survey was carried out following guidance published in the 'Herpetofauna Workers Manual'.

Bats

The site was assessed for its suitability for roosting, foraging and commuting bats. Trees, buildings and other structures were appraised for likelihood of hosting roosting and/or hibernating bats, and topographical features of interest to commuting bats were noted. Survey followed methods described in the Bat Workers Manual.

Terrestrial mammals

The potential of the site to support other protected terrestrial mammals, notably badger *Meles meles*. Evidence of activity such as badger setts, paths, latrines, droppings/ spraints and feeding signs were noted and appropriate guidance followed.

Other species

Presence of and potential for other protected and/ or notable species was recorded.
Potential of the site to support important invertebrate assemblages was inferred from habitat quality, and any sightings recorded.

2.4 Invasive species survey

The presence of any invasive species within the survey area was recorded and mapped.

2.5 Survey constraints

The weather for the initial survey (April 2021) was sunny and warm, with a light breeze- and was suitable for signs or sightings of most diurnal wildlife, including reptiles.

The time of year was not ideal for assessing botanical quality of grasslands, as many plants had just started to come into leaf and species of interest are therefore harder to define. Woodland ground flora, however, was in full flower.

The bird nesting season has just started, but due to the cool spring many migrant birds had not yet arrived on breeding territory. The likelihood of notable breeding birds being present on the site was inferred from the habitat.

The second survey (September 2021) was carried out in warm, calm and wet conditions – and was less suitable for wildlife sightings. The bird nesting season had finished, but botanical quality of grasslands was more evident than in the April survey.

The likely presence of species mentioned in section 2.3 above was also inferred from the potential of the habitat to support them, desktop search information, and the professional judgement and knowledge of the surveyor.

Pedestrian access was only permitted outside the main working area of the quarry. In Kit Bill and Helks Woods access was limited to the public footpath and immediately adjacent habitat as deer fencing has been erected alongside the path to the west. Binoculars were used to assess the habitat beyond the deer fence.

Where habitats could not be directly accessed, other sources of information (previous surveys, reports etc) were used to guide the mapping. It is possible that small areas (less than minimal mapping unit) may have been missed, but overall these constraints are not considered to have impacted the conclusions of this report.

3. BASELINE ECOLOGICAL CONDITIONS

3.1 Desktop survey results

3.1.1 Protected and statutory sites search

There are numerous statutory protected sites within 2km of the quarry, and also further afield (between 2 and 5km away). These are described briefly below.

The quarry is within the protection buffer zone for several SSSIs (notably Thwaite House Moss). The nature of the proposed development, and its' proximity to protected wildlife sites, means that Natural England must be consulted to assess potential impacts of the proposals on these sites.

Table 1: Protected sites within 5km of Back Lane Quarry

Protected area/ site	Description of interest	Distance from quarry
Thwaite House Moss SSSI	Botanical (fen & wet woodland)	900m
Crag Bank SSSI	Botanical (neutral grassland)	1.5km
Forest of Bowland AONB	Landscape	1.7km
Arnside & Silverdale AONB	Landscape	1.8km
Morecambe Bay SSSI SAC SPA Ramsar	Marine/ intertidal habitats and species. Breeding & wintering waders and wildfowl.	2.3km
Warton Crag SSSI LNR	Botanical & butterflies	3km
Warton Crag Quarry LNR	Botanical & butterflies	3km
Burton Wood SSSI	Botanical (woodland)	3.2km
Morecambe Bay Pavements SAC	Limestone Pavement	5km
Leighton Moss SSSI SPA	Botanical (reedbed) & avifauna	5km
Cringlebarrow & Deepdale SSSI	Botanical (woodland) & limestone pavement	5km

There are four Natura 2000 sites (Morecambe Bay SAC and SPA, Morecambe Bay Pavements SAC and Leighton Moss SPA) within 5km of the proposals. The nature of the proposals, habitats present on site, and distance from the designated sites means that further assessment with relation to impacts on these sites (Habitat Regulations Assessment) is not necessary.

There are also Limestone Pavement Orders in place in various locations around the quarry, the closest being the Over Kellet Limestone Order which includes areas within the site adjacent to the current operational area, and by the adjacent Leaper's Wood quarry.

3.1.2 Non-statutory sites and notable habitats search

A total of 26 Biological Heritage Sites (sites of county importance) were found within 2km of the quarry boundary, of which 21 were within 1km. Habitats were predominantly woodland or grassland on calcareous soils or rock, as well as some habitat mosaics. A brief description of sites within 1km is included in the table below.

Table 2: Biological Heritage Sites within 1km of Back Lane Quarry

Biological Heritage Site	Description of interest	Distance from quarry
Helks Wood	Ancient Woodland & Limestone pavement	Within site
Kit Bill Wood	Ancient woodland	Within site
Long Riddings Wood	Ancient woodland	Within site
Hawthorns Rocks	Pasture on limestone outcrops	Within site
Helks Wood Farm Pasture	Species rich grassland	Adjacent to site
Leapers Wood, Bowman Stout Wood & Slack's Wood	Ancient woodland & limestone pavement	200m north
Lundsfield Quarry Central	Habitat mosaic	250m west
Long Dales Lane Fields	Grassland on limestone outcrops	300m south
Limestone Pavement and Crags, South of Cock's Wood	Exposed rock, species rich grassland	400m east
Kellet Road Verges	Species rich grassland	500m north
Whorley's Moss	Species rich woodland/ scrub	500m south
Cock's Wood	Semi natural woodland, rock outcrops	500m north
Over Kellet Crags	Species rich grassland	700m east
Lancaster Canal	Aquatic vegetation, birds, odonata	700m west
Dunald Mill Crags	Limestone grassland	750m south
Intack Wood	Wet woodland	750m south
Lundsfield quarry north	Habitat mosaic	750m west
Over Kellet Pond	Botany & amphibian assemblage	800m east
Dunald Mill Hole	Limestone cave system	800m south
Swantley	Limestone cliff & grassland	800m south
Lundsfield quarry south	Habitat mosaic	800m west

A search looking for priority habitats listed under section 41 of the NERC Act 2006 (previously known as BAP habitats) found several results within 1km of the quarry boundary. Within the site boundary are deciduous woodland and ancient woodland. Other nearby habitats include limestone pavement, ancient replanted woodland, traditional orchard, lowland fen, calcareous grassland and lowland meadows.

3.1.3 Protected and notable species search

The data search from Lancashire Environmental Records Network provided detailed records of protected, rare, scarce and alien species within 2km radius of the quarry. A total of almost 3000 records were returned of various species, almost half of which were botanical. Biological records provide a useful baseline of information, but some species groups are under-recorded – so a lack of records does not necessarily equate to that species not being present in the local area.

A table of key species which are of notable consideration within the context of the quarry and its routine operations is shown in Table 3 below. Notable bird species have not been included in the table below, unless they are of specific interest to the site, or have further

legislative protection, as all species of bird are protected whilst nesting. Tetrad results for breeding birds mean that the species has been recorded within the 2km square in which the quarry is found (many records are no more detailed than this).

A search was also carried out for invasive species recorded within 2km of the quarry. Most of these records were botanical and were distant from the quarry. However, one record of Cotoneaster within Helks Wood was found from 2015.

Table 3: Species of conservation concern which have been recorded within 2km of the quarry*

Species	Priority species listed under s41 of NERC Act 2006?*?	Wildlife and Countryside Act 1981 (as amended) Sch 1,5 or 8.	Proximity to site	Number of records (most recent)
Palmate newt		Yes	700m	4 (2017)
Smooth newt		Yes	700m	14 (2017)
Great Crested Newt	Yes	Yes	700m	20 (2014)
Common toad	Yes	Yes	700m	7 (2017)
Common frog		Yes	600m	13 (2017)
Common lizard	Yes	Yes	1.6km	4 (1983)
Slow worm	Yes	Yes	1.3km	2 (1983)
Otter	Yes	Yes	600m	11 (2019)
Badger**			Site	5 (2016)
Bats (8 named species)	Yes	Yes	Site	Natterer's roost in lime kiln (2011)
Hedgehog	Yes		100m	17 (2019)
Polecat	Yes		700m	2 (2013)
Dingy skipper	Yes		700m	52 (2019)
Ringlet	Yes		700m	5 (2016)
Small heath butterfly	Yes		700m	35 (2013)
Northern brown argus	Yes	Yes	2km	1 (2004)
Wall butterfly	Yes		700m	15 (2009)
Wall mason bee	Yes		1.5km	16 (2001)
Raven			Tetrad***	
Peregrine falcon		Yes	Site	Fledged chicks 1990
Kestrel			Tetrad	
Oystercatcher			Tetrad	

**Previously BAP (Biodiversity Action Plan) priority species*

***Protected under Protection of Badgers Act 1992*

****Tetrad record- see above for explanation*

3.2 Habitat survey results

The habitats were mapped, following UKHab methodology (see methods section and appendices), as shown in Figure 2 in the appendices. Descriptions of the major habitats are given in section 3.2.2 below, and detailed target notes on habitats or species of interest included as appendices to this report.

To enable calculations to be made for Biodiversity Net Gain, each of the habitats on site had its condition assessed, following guidance provided by DEFRA. Details of this are included in each habitat description.

Photographs of the habitats and area of the proposed works are provided at the end of the report.

Land adjacent to the quarry was assessed using binoculars, and is described in 3.2.4 below.

3.2.1 Habitats recorded within survey area

- w1f Lowland mixed deciduous woodland
- w1g6 Line of trees
- w1h5 Mixed plantation woodland
- h3h Dense scrub, no dominant species
- g1c Dense bracken
- g2a5 Calcareous grassland
- g3c Neutral grassland
- u1a Open mosaic habitat (disturbed ground)
- s1d Inland rock and scree
- s1b5 Limestone pavement
- r1 Standing open water

3.2.2 Habitat descriptions

w1f - Lowland mixed deciduous woodland

This habitat dominates the periphery of the quarry. Canopy species are predominantly ash and sycamore with wych elm, beech, oak, small-leaved lime and birch. Shrub species include hawthorn, blackthorn, elder, crab apple and hazel in varying proportions. There are three areas of ancient woodland (Helks Wood, Kit Bill Wood and Long Riddings Wood- all of which are listed as sites of local interest- BHS). There is also a remnant section of semi-natural woodland to the south of the concrete block plant, and several areas of self-sown and remnant semi-natural woodland to the north and west of the High Roads Quarry offices (linking into Helks and Kit Bill Woods). Limestone outcrops are frequent in the undisturbed sections of woodland. Ground flora is typical of established woodland with bluebell, primrose, dog's mercury, wood anemone, ramsons and wild arum. There is evidence of rabbit grazing and some badger digging in the woods.

These areas have a mixture of ages of trees, with some regeneration – though mostly of sycamore and ash. There are no truly veteran trees, with one found to have veteran features – providing features suitable for hole nesting birds and roosting bats. There is fallen and standing deadwood present, and sites appear to be lightly managed.

Long-Riddings Wood is assessed as being in good condition, losing points on the lack of veteran trees, prominence of beech in the canopy, and presence of ash dieback. Both Helks Wood and Kit Bill Wood are in moderate condition for the reasons above and also for the lack of good age diversity and vertical structure in the woodland.

w1g6 - Line of trees

This habitat links some of the woodland tracts in the south-east of the site, and forms a short part of the boundary on the south-west corner of the quarry. Species are mixed, and similar to those present in the established woodland. Alongside the quarry road at the southern edge of the working area trees have established on both sides of the track, especially at the foot of the quarry walls. These lines of young trees are predominantly willows, birch, ash, hawthorn, sycamore and buddleia.

They are assessed as being in poor condition due to the presence of ash dieback, absence of veteran trees, and lack of buffer habitat either side of the feature.

w1h5 - Mixed plantation woodland

There are several areas of planted woodland, many of which compliment and/ or link in with established/ancient woodland areas. Most trees are quite even aged, with some older trees and some scrub regeneration in canopy gaps. Species include ash, sycamore, wild cherry, birch, hawthorn and hazel with some larch and pine in places. Ground flora is variable, with primrose, lesser celandine, dog's mercury, ramsons and grasses such as false wood brome.

These woodland areas have been assessed as moderate quality habitats, losing points for not having much deadwood (fallen and standing), no veteran trees, limited age variation and lack of a good shrub layer. Some areas of woodland also had a prevalence of non-native species (Italian alder and beech).

One of these areas (target note 21) appears to have planted over and around some of the Hawthorn Rocks BHS at the south of the quarry.

h3h - Dense scrub, no dominant species

This category includes all locally native low growing (usually under 5m) shrubs as well as bramble and gorse. Dense scrub can be very important for nesting and feeding birds and, depending on the species present, it can also be of value for invertebrates.

There are two main areas of this around the site. One is around the settling pond near to the quarry offices, which comprises willow, hawthorn and buddleia as well as some regenerating sycamore and ash trees. The other area has established on previously cleared ancient woodland and remains part of Long Riddings Wood BHS. It is dominated by willows (grey and goat willow) with include elder, sycamore, wych elm, birch, ash and hazel. The ground had been significantly disturbed before the shrubs established and no trees have attained canopy height. Regeneration is predominantly of sycamore, and the ground flora is limited- comprising mostly strawberry (wild and barren), primrose and bryophytes.

These scrub areas are of moderate habitat quality- failing on age structure, poor regeneration and density of the shrub canopy.

g1c - Dense bracken

These areas can provide good foraging for small birds and mammals, and nesting habitat for some bird species. One small area of dense bracken is present on site near to the block factory in the southern end of the quarry. This is spreading slowly into adjacent grassland and along the track margins with the scrub.

This habitat did not need a condition assessment.

g2a5 - Calcareous grassland

The underlying bedrock of the site is limestone, and much of the ground flora reflects this. There is a broad spectrum of grassland quality from species poor tussocky grassland through species rich grassland to thinly vegetated limestone rubble. The best remaining examples of limestone grassland at the site are near the quarry offices and wind turbine at the western end of the site. Part of this area has received limestone grassland translocated from the eastern end of the quarry priory to its loss to extraction. Species are reported to include positive indicator species such as wild thyme, great burnet, eyebright, lady's bedstraw, common cats-ear, fairy flax, mouse-ear hawkweed and yellow oat grass – but most of these were not evident at the time of visit as it was so early in the season. Scattered scrub has established in the grassland, especially around the periphery, which will shade out the finer species if not controlled.

Elsewhere on the site there is species poor grassland of calcareous origin near to the block factory. This has been left unmanaged and is slowly becoming tussocky and colonised by bramble and bracken, but a careful search can still find some indicator species in the sward (sedges, bird's foot trefoil, vetches, St. johns wort, meadow vetchling and orchids).

Calcareous grassland is developing on bare disturbed ground alongside the track along the southern boundary of the quarry where it is not shaded by woodland (see also u1a below). Buddleia establishment and spread on the thin soil may prevent a good quality sward from establishing.

An area of calcareous grassland was mapped on the previous survey (2009) between Hawthorns caravan site and the quarry (Hawthorn Rocks), but this was not evident at the time of visit as trees and dense bramble appear to have shaded-out the finer flora.

Depending upon the species composition and structure these limestone grasslands can provide good habitat for invertebrates, small mammals and birds.

Both the main areas of calcareous grassland (compartments 3 and 14) are of moderate quality primarily due to the incursion of scrub. In compartment 3 this is mostly sycamore as well as willow and buddleia. Bramble is encroaching in compartment 14, and the finer species are being lost to the more tussocky grasses.

g3c - Neutral grassland

There is one long area of rough neutral grassland alongside the public footpath running through the woodland to the south of the quarry. This area is unmanaged and ungrazed (except for light rabbit grazing). Species are ruderal and dominated by aggressive species such as nettle, coarse grasses, thistle and willowherb (unable to determine species at the early stage of the season).

These areas provide good habitat for small mammals and foraging areas for birds.

This habitat is in poor condition due to the lack of structural diversity, proportion of scrub species, and high proportion of undesirable species (nettle, docks, thistles and creeping buttercup).

u1a - Open mosaic habitat (disturbed ground)

This is vegetation establishing on recently disturbed ground, such as spoil, gravels and tipped material. A large area of this is present along the southern edge of the quarry (above the working area) between Long Riddings Wood and semi-natural woodlands to the east. There is a patchwork of species present – with pioneer species on some areas (such as coltsfoot and mouse ear hawkweed), sedges in areas where drainage is impeded and buddleia establishing around the periphery of the track and on the steeper quarry edges. In places the habitat is grading into limestone grassland or scrub – but cover of vegetation is still scant.

Areas such as this can be very important for invertebrates, such as mining bee and wasp species, and can provide good habitat for reptiles.

This habitat was assessed as being in moderate condition, failing on the lack of pools amongst the habitat mosaic, and prominence of buddleia throughout the area.

s1d – Inland rock and scree

Surrounding the working area of the quarry are limestone cliffs with varying degrees of vegetation. Most have scrub developing where they are undisturbed (especially willows and buddleia). The cliffs at the eastern end of the quarry are currently being worked and are bare.

Depending on the level of disturbance, this habitat can be of particular interest for cliff nesting bird species, roosting bats and for bare rock and scree vegetation (especially ferns and bryophytes). All of the eastern cliffs are unsuitable for any wildlife at present. The southern cliffs are developing some vegetation, but most areas are not high enough (or undisturbed enough) to appeal to nesting birds such as peregrine falcon.

This habitat was not assessed as there was no safe means to access it from the boundary track.

s1b5 – Limestone pavement

This is a small area of limestone pavement (target noted only – see number 29) which was translocated in 2015 as a planning condition for the extension of quarrying activities eastwards into Helks Wood and Kit Bill Woods. The total area is about 20m by 20m, and is surrounded by ash plantation woodland (which is in poor condition due to the effects of ash dieback). There are some species typical of wooded limestone areas (such as hart's tongue fern and herb robert), but there is significant encroachment by bramble and raspberry, and also false oat grass.

This area was assessed in a separate survey visit to the site on 30th June 2022, and the condition status is poor due to the high proportion of undesirable species (notably bramble and false oat grass).

r1 - Standing open water

These areas can be very valuable for a variety of species – notably amphibians and invertebrates. The open water on site is a settling pond, which has very high turbidity. The water is shallow, and concentrated at the north end of the depression, with deep silts and limestone mud where the water level has dropped. No aquatic life could be seen in the pond.

This habitat was of poor quality due to the turbidity of the water, level of disturbance through quarrying activities and poor quality surrounding habitat.

A summary table of the habitats described above and their importance in the context of British conservation and the legal framework is shown below (Table 4).

Table 4: Habitats of conservation concern

Habitat	Priority habitat listed under s41 of NERC Act 2006?*	Is habitat a notable consideration?
Lowland mixed deciduous woodland	Yes	Yes, especially ancient woodland sections
Line of trees		
Mixed plantation woodland		
Dense scrub		
Dense bracken		
Calcareous grassland	Yes	Yes
Neutral grassland	Yes	No, examples on site don't meet NERC critieria
Open mosaic habitat	Yes	Yes
Inland rock & scree		
Limestone pavement	Yes	Yes
Standing water	Yes (ponds)	No, examples on site don't meet NERC critieria

***** *Previously UK Biodiversity Action Plan (BAP) habitat*

3.2.3 Surrounding habitat (adjacent to red line boundary of quarry)

The quarry is bounded by the M6 to the west and Leaper's Wood Quarry (an active limestone quarry) to the north. Habitats surrounding the quarry to the south and east are agricultural pasture, most of which is not of particular ecological interest – though the hedgerows are of local value, providing habitat links between woodlands and other semi-natural habitats. To the east of Helks Wood is Helks Wood Pasture BHS- an area of species rich grassland (though its condition could not be confirmed). To the south of the quarry is Hawthorns Holiday Park, a small caravan and lodge site.

3.2.4 Ponds within 500m of the proposed development

Previous reports, online aerial images and OS maps were used to identify any potential great crested newt breeding ponds within the quarry, or within 500m of the proposals. One settling pond was found within the quarry (all other water bodies in the quarry that are marked on the map had dried up/ were no longer present). This pond is described above, and the HSI score for the pond was 0.52 – below average suitability for great crested newt.

The quarry is bounded to the west by the M6, which is a barrier to any newt dispersal, so no ponds were surveyed beyond this. To the north is Leapers Wood quarry, which has no open water bodies. To the east of the site there are two small ponds 400-450m away from the quarry workings. One of these was not present during the survey, the other was on the opposite side of the main road in private land and could not be closely assessed.

3.2.5 Habitats and sites present in the (potential) Zone of Influence

The habitats in the area west of the M6 (up to 1.3km from the quarry) were assessed on a desktop search (in conjunction with advice from the hydrogeologists), looking for any areas that could be potentially impacted ecologically by a change in levels of groundwater.

Most of the land in this potential Zone of Influence is modified grassland (agricultural pasture or silage fields) or urban/ residential. Two key areas highlighted for further study were Netherbeck Stream, and the area around Thwaite House Moss SSSI and Whorley Moss.

Netherbeck Stream is a small watercourse with no designations. Careful checks of the biological records search found no evidence of any notable or protected species present in or around this watercourse that could be impacted by changes in the hydrology. River Keer (which the Netherbeck stream flows into) is not considered by the hydrogeologists to be vulnerable to changes in Netherbeck stream due its larger catchment.

Thwaite House Moss SSSI and the adjacent Whorley Moss were walked over (access limited to public footpaths) on September 13th 2022 to ground truth the assumption that they could be potentially impacted by the proposals. Both of these areas appeared to be quite dry underfoot despite the previous 24hours of rain, but the vegetation evident in the southern (ungrazed) part of Thwaite House Moss and in lower areas of Whorleys Moss were still characteristic of fen, moss and wet woodland habitats such as those present where the water table is at or near the ground surface. Grazed habitats within the SSSI, but outside the fenced southern fen/ moss/ woodland, had lost much of their floristic interest. Impacts on the SSSI will need further assessment by Natural England once a more robust model of likely impacts on the groundwater is available.

3.3 Protected and notable species survey results

3.3.1 Birds

Nesting birds are likely to be present within scrub, woodland and individual trees on the site. No notable species were observed during the fieldwork – though many spring migrants are yet to arrive on breeding territory. Singing willow warbler, chiffchaff and song thrush, and calling jays and buzzard were heard in Long Riddings Wood, and widespread species such as dunnock, wren, blackbird, great tit, blue tit and chaffinch were observed during the survey.

Peregrine falcon, kestrel and raven are often associated with quarries as they are cliff nesting species. None of these species were seen or heard during the fieldwork, though the field survey was carried out in the middle of the day, and the noise of the quarry activity would have drowned out any calling birds. Most of the higher quarry cliffs are along the eastern edge of the quarry – which look suitable for nesting but are currently heavily disturbed and subject to dust deposition from extraction and passing vehicles. There are good cliffs on the northern edge of the adjacent Leapers Woods Quarry, which may be more suitable as they are currently less disturbed- and there is some anecdotal evidence that they have recently bred there.

The breeding bird survey carried out in and around the active quarry in spring 2022 by South Lakes Ecology recorded successful breeding by peregrine falcon (1 well grown chick seen on 7th June), nesting on the southern cliffs (near to the block factory). Several other species were recorded in the woodland, including the red listed spotted flycatcher (proven breeding in Long Riddings Wood), dunnock, blackcap, chiffchaff, treecreeper and nuthatch. Most of the woodland birds were observed in Long Riddings Wood and the southern woodland bordering Hawthrons caravan park, with few records from the woodland to the east (Kit Bill and Helks Woods). The other red-listed breeding record was of herring gull, nesting on the roof of the block factory alongside lesser and greater black back gulls (7 nests observed).

Oystercatcher breed on open stony ground and are often encountered in quarries. This species was seen in the previous (2009) fieldwork, and on one occasion in the breeding bird survey (with no proof of breeding seen). There was a lot of quarry traffic throughout the quarry void, which may have deterred the species from breeding- though they may have been missed due to the noise and dust of the quarry. The habitat on site is still broadly suitable for this species.

3.3.2 Reptiles

The habitat is broadly suitable for common lizard and slow worm, especially around the more open areas near to the quarry offices in the north and above the block factory to the south of the quarry. Adjacent habitats are less suitable however, with close grazed pasture and woodland. There are no local records of reptiles – the only ones from the data search are from 1983 at a site over 1km away, and no mention of them in the previous (2009) survey. Slow worms are very cryptic and hard to see without a targeted survey, but common lizards are quite easily spotted in good weather conditions. No reptiles were seen during the fieldwork (which was carried out in very good reptile spotting conditions).

3.3.3 Amphibians

Amphibians, including great crested newt, are often encountered in quarries- including in settling ponds. There is only one settling pond present on site, and no nearby network of suitable ponds- reducing the chance of amphibians using the site. The water was very turbid, and the pond was clearly much reduced due to the prolonged dry conditions this April. No sign of amphibians or other aquatic life could be seen in the pond. There are no records of amphibian within the quarry, or mention of them in the previous survey. The closest records for all the widespread species, and for great crested newt are from ponds 600m away from the quarry boundary.

A Habitat Suitability Index (HSI) calculation was done on the settling pond, to establish likelihood of use by great crested newts, which generated a score of 0.52 (below average). See appendices for calculation table.

3.3.4 Bats

None of the buildings on site have particular suitability for roosting bats. Bats could use cracks and fissures in the quarry walls to roost during the active season, and possibly to hibernate – though the noise and disturbance in the quarry is likely to deter them from doing so in the actively worked areas of the site. A disused lime kiln in the car park at High Roads quarry offices has very good suitability for roosting and hibernating bats, and there is a record of a natterer's bat using this structure in March 2011 – which may be a hibernation record.

Bats also use trees to roost, and there are a small number of trees with good potential roost features, particularly in the southern corner of the site and in Long Riddings Wood, though many older trees elsewhere in the woodlands have not developed suitable features. There are some bat boxes installed in various places in the woodland, and these have been regularly used by pipistrelle species (Gail Armstrong, pers comm).

The site provides good foraging potential for bats around woodland edges, and there are some sheltered flight lines (such as hedgerows and woodland edges) around most of the site which can be used by bats to safely move between roosting and foraging locations. A total of eight species of bat have been recorded roosting and foraging in the general area around Back Lane Quarry.

3.3.5 Terrestrial mammals

One quite recently dug badger sett was found during the survey. This comprised three holes at the edge of Long Riddings Wood just above the quarry offices. The holes looked quite fresh, with no clear paths leading from them or any discarded bedding material or latrines nearby – which suggests that it is a new outlier or annexe sett rather than an active main sett.

Some signs of badger and rabbit activity were seen in the woodland and grassland above the main quarry. Quarry staff describe a crossing point where mammals such as badger and deer are often seen moving between the southern areas of woodland and those around Leaper's Wood Quarry (there is a lot of evidence of badger activity, including a main sett, in the woods above this quarry). A stoat was seen running along the defunct wall boundary in Long Riddings Wood during the fieldwork. Hedgehog have been recorded in the local area, though the quarry does not provide particularly good habitat for this species. There are also historic records of red squirrel in the general area (1993), but no recent sightings.

3.3.6 Other species

The bare ground, limestone grassland and deciduous woodland can all provide good quality habitat for invertebrates, including notable species. Only widespread species were observed during the survey (white tailed bumble bee, orange tip butterfly, speckled wood butterfly, small tortoiseshell, dark edged beefly). A dingy skipper was seen just south of Long Riddings Wood during the breeding bird survey.

The data search provided records of notable species near to the site, but none from the site. Some targeted planting for pollinators (notably butterflies) has been done on the grassland near to the quarry offices, but no species records have been found.

3.3.7 Protected and notable species summary

Within 50m of the proposed works :

The following signs or sightings of protected or notable species were seen during the survey within 50m of the works footprint.

- Nesting birds on block factory roof, in woodland and scrub (including red-listed species)
- Nesting peregrine falcon
- Badger sett and signs of foraging badgers
- Stoat in woodland (breeding habitat)
- Dingy skipper butterfly

The potential for protected and notable species identified during the survey within 50m of the proposed works was:-

- potential for breeding amphibians in the settling pool (common toad and newts- including great crested newt): low.
- Potential for ground nesting birds within quarry (i.e. oystercatcher): low- moderate
- Potential for roosting bats within rock faces and fissures: low
- Potential for invertebrates of interest around open mosaic habitat and limestone grassland

Within the broader survey area:

Extensive badger activity was noted in the woodland around Leaper's Wood quarry, with foraging routes through the boundary woodland of both quarries and an identified crossing route of the quarry road to the east of the Back Lane Quarry offices.

Bats are active in the local area (there has been a record of a bat roosting within the disused limekiln) and bats are known to regularly roost in bat boxes erected in woodland to the south of the quarry. They are likely to roost within the adjacent woodland and forage in and around the quarry. None of the buildings on site were particularly suitable for roosting bats.

3.4 Invasive species survey results

No notable invasive species were seen or recorded during the survey.

The data search provided records invasive and non-native species within 2km of the quarry. Most of these were botanical, and all were outside of the quarry aside from one record of cotoneaster within Kit Bill Woods in 2015.

4. SURVEY ANALYSIS

The table below provides a summary of all the features discussed above, and an indication of whether they may be impacted by the proposals, or if further investigations are required.

Feature	(Potentially) affected by development		Rationale
	Yes	No	
Designated sites			
Thwaite House Moss SSSI			Needs further survey/ analysis following results of hydrogeology impact assessment. SSSI citation suggests it is an independent hydrological unit as it sits in a depression, but clarification needed.
Crag Bank SSSI, and a further 5 SSSI sites within 5km			All suitably distant from any potential impacts from deepening quarry workings.
Arnside & Silverdale AONB and Bowland AONB			Quarry is more than 1.5km from the boundaries of these sites, and so unlikely to cause any detriment to landscape character within them.
European Designated Sites - Morecambe Bay SAC SPA, Morecambe Bay Pavements SAC and Leighton Moss SPA			Quarry is more than 2km from any of the site boundaries, and the sites are unlikely to be affected by deepening of the quarry.
NERC S41 priority habitats and local Biological Heritage Sites			
Helks Wood, Kit Bill Woods & Long Ridding Woods BHS			Adjacent to red line boundary, and likely to be somewhat impacted by current (and future) quarrying activity through noise and dust, but no additional impacts foreseen due to deepening extraction. Current impacts considered in the Quarry's Biodiversity Management Plan.
Hawthorn Rocks BHS			Within management boundary of the quarry, but no longer has any of the cited features visible and could be de-listed.
A further 17 listed BHS within 1km of the quarry boundary including 2 wetland sites- Over Kellet Ponds BHS and Intack Woods BHS			Scoped out of assessment due to distance from quarry, or in case of the wetland sites, a lack of vulnerability to changes in the groundwater (east of M6 boundary and/or not groundwater dependent habitats).
Woodland and ancient woodland priority habitat			As for the woodland BHS above – adjacent to red line boundary and unlikely to be further impacted by deepening of quarry activity.
Calcareous grassland priority habitat			Within management boundary of quarry. Somewhat impacted by quarry activity at present (esp. dust), but no additional impacts foreseen due to deepening extraction.
Open mosaic priority habitat			
Limestone pavement priority habitat			

Protected and priority species highlighted by county data search and site survey			
Amphibians (including great crested newt)			Only 1 pond on site with low suitability for great crested newt, and no records of amphibians. Closest records of newts and other amphibians are from Over Kellet (700m to north-east). Amphibians are unlikely to be present on site, and hence very unlikely to be impacted by the proposals.
Common lizard and slow worm			Site survey revealed suitable habitat around periphery of site, but it is surrounded by low-suitability habitat. No sightings during fieldwork, no records from within 1km, and no records from local area for almost 40 years. Reptiles are unlikely to be present on site, and hence very unlikely to be impacted by the proposals.
Badgers			Badger setts and badger activity recorded in boundary woodland (outside the red line boundary). These animals are currently disturbed on occasion by blasting activity, but no additional impacts from deepening are expected.
Bats			Several species recorded in local area, and record of one bat roosting in lime kiln on site. Suitable roosting habitat in some rock faces -though subject to significant noise and dust disturbance on a daily basis, making occupation less likely. Blasting in new/undisturbed areas should follow a method statement. Block factory buildings have low suitability for bats, but need further assessment before demolition.
Hedgehog			No evidence of presence within the quarry, but records within 100m. Limited feeding, transit or resting habitat on site. Impacts from proposals are unlikely.
Other mammals (otter, polecat, stoat)			No records from the site, but stoat present in surrounding woodland. Deepening of quarrying unlikely to have impact on these species.
Peregrine falcon (listed on Schedule 1 of Wildlife & Countryside Act)			Regularly breeds in the quarry void (either Back Lane or Leapers Wood sections). Avoidance measures already in place to prevent disturbance of nesting pair resulting from quarrying. Deepening the void is unlikely to have any additional impacts.
Cliff and quarry nesting birds (not listed on schedule 1)			Gulls, jackdaw and oystercatcher known to/ likely to breed within working area of quarry. Deepening the quarry unlikely to have any impact on cliff nest sites, but factory roof used by gulls will be lost.
S41 butterfly and moth species and other notable invertebrates			Dingy skipper recorded on site, other priority species all located at least 700m from site. Limited habitat available in active quarry to support these species.

5. SURVEY CONCLUSIONS

It is not considered that the deepening of Back Lane Quarry will have any significant direct physical impacts on the local ecology, as there will be no further lateral expansion of the quarry into surrounding habitats (the expansion under the existing concrete block factory is in areas that have already been worked and is within the working area of the quarry void).

The habitats and species of interest in and around the quarry are currently impacted somewhat by the day-to-day quarrying activities (through noise disturbance and dust deposition), and as a result of the proposals to increase the amount of extractable material these impacts are likely to continue for a longer period of time (but are not expected to worsen).

Features which need further investigation, or need avoidance and/ or mitigation measures in place include:

- **Protected sites**
  Natural England needs to be consulted regarding potential impacts on nearby SSSI sites – notably Thwaite House Moss SSSI, as this is potentially within the Zone of Influence of any de-watering impacts.

- **Peregrine falcon**
  Peregrine falcon regularly breeds on cliffs within the Back Lane/ Leapers Wood quarry void. Listed under Schedule 1 of the Wildlife and Countryside Act it has greater legal protection than other nesting bird species. Avoidance measures are in place to minimise risk of disturbance to nesting pairs (including regular surveys to assess where the birds are nesting each year). These measures need to be adhered to, to ensure minimal impacts on this species.

- **Bats and nesting birds (within active quarry)**
  Bats are known to use the peripheral habitat (woodland and lime kiln) for roosting, and are very likely to forage around the quarry edge and inside the quarry if there is insect prey there. They are active at night, when there is no human/ vehicle activity in the quarry. The quarry cliffs could be used by roosting bats on occasion, but are very unlikely to be used as a regular roost site or by a significant number of bats due to the ongoing noise and disturbance by the ongoing quarrying activity.

  Birds such as kestrel and corvids may nest in crevices and ledges around the quarry and oystercatcher may nest on open ground on the quarry floor. Gulls (including herring gull) have nested in the block factory roof in small numbers. Once in the process of nesting, birds cannot legally be displaced until chicks have fledge and/ or the nest is abandoned through predation.

  The deepening of the quarry is unlikely to have any additional impacts on bats or nesting birds, but blasting and quarrying of new (or recently undisturbed areas) should follow a protected species method statement to ensure suitable guidance has been followed.

  The block factory in the southern corner of the active quarry will be demolished to permit extraction to continue in that area. The building roof is used by nesting gulls, and the building has low scope for bats in its current condition. The situation should be re-assessed following standard guidance before it is demolished, with any timing constraints due to the nesting birds adhered to.

6. RECOMMENDATIONS

6.1 Recommendations for further survey

Prior to the demolition of the concrete block plant, the building should be re-assessed for its potential to host bats and nesting birds following current survey guidance.

No further surveys are required to determine the impacts of the proposals on local wildlife.

5.2 Recommended mitigation for ecological impacts not requiring further survey

Peregrine falcon

Adopt and follow a formal protocol for the avoidance of disturbance to breeding raptors on quarry faces. The location of any peregrine falcon nests within the entire quarry void (both Leaper's Wood and Back Lane Quarries) should be identified in spring each season (by a dedicated experienced member of staff or an ecologist). The protocol should describe accepted methods of work around the nesting site, avoidance of blasting close to an occupied nest, avoidance of machinery use and ground disturbing operations within 50m of nesting site within the breeding season (March-July). It would be useful to collaborate with Leapers Wood Quarry to make an overarching protocol for the whole quarry void as the birds are likely to move nesting site as the quarries develop and different areas become suitable for breeding.

Nesting birds

If works are to commence between March and August (inclusive) in new blasting areas, or areas to be quarried that have been previously undisturbed, the areas should be first assessed for presence of nesting birds (especially corvids, kestrel and oystercatcher). Likewise, any clearance of vegetation within the bird nesting season (March to August) should only be carried out after a nesting bird check has been carried out by a suitably qualified person.

Roosting bats

Adopt and follow a protocol for the avoidance of disturbance and injury to roosting (including hibernating) bats that could be present in crevices in rock faces around the quarry. It is considered unlikely that bats would roost in worked areas of the quarry due to the levels of noise and dust disturbance, but as bats and their roosting sites are protected under UK law a strategy should be in place to ensure these impacts have been considered and avoidance measures put in place.

5.3 Recommended enhancements to encourage biodiversity gains

Following local planning guidance, measures to encourage a net gain of biodiversity should be included for all new developments. Biodiversity Net Gain assessment and recommendations are included in the Environmental Statement chapter of the EIA. Enhancements to peripheral habitats (including limestone grassland and deciduous woodland) are recommended as many of these habitats are not in good condition and require interventions to prevent further declines.

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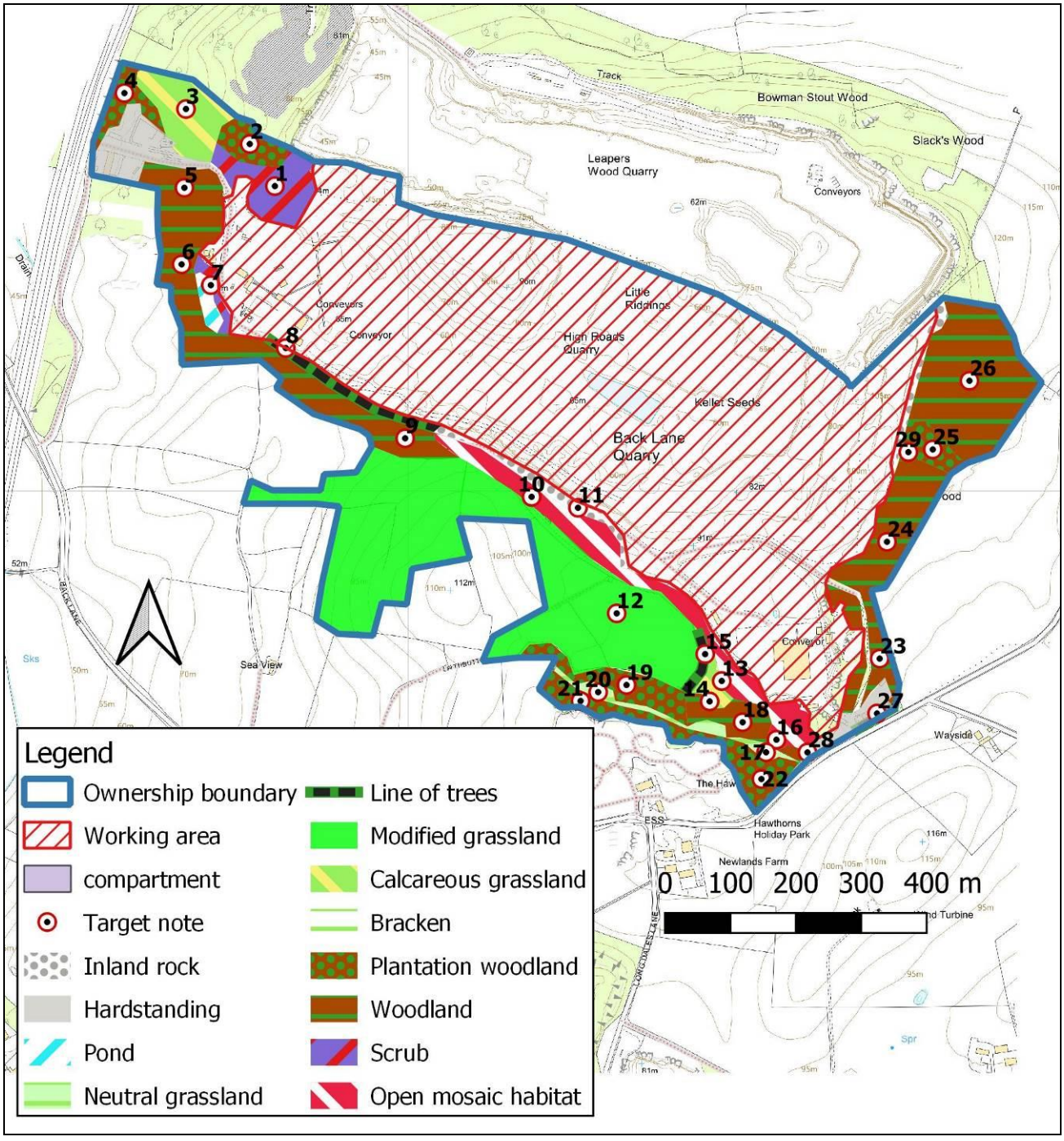
APPENDICES

Figure 2: Habitat map



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Survey target notes

Refer to figure 2 for locations of target notes.

No.	Description
1	UKHab: h3h Part of Long Riddings Wood BHS – 'an island of ancient semi-natural woodland' – though much of this section appears to have been damaged by extraction, with no mature or canopy trees noted. Relatively young trees creating a dense shrub thicket on limestone rubble and thin soils. Dominated by willows (notably Grey willow *Salix cinerea* & goat willow *S. caprea)*, with sycamore *Acer pseudoplatanus*, wych elm *Ulmus glabra*, hawthorn *Crataegus monogyna,* and birch *Betula sp*. Sparse ground layer with few grasses, very mossy in places (especially yellow feather moss *Homalothecium lutescens*). Also common dog violet *Viola riviniana*, Primrose *Primula vulgaris*, wild strawberry *Fragaria vesca*, barren strawberry *Potentila sterilis* and bramble *Rubus fruticosus* agg. Grazed by rabbits. Path to lookout 'Eagle's nest' with views across the quarry to the east. See image 1.
2	UKHab: w1h5 Area of planted woodland on limestone, grazed by rabbits. Species include birch, hawthorn, rowan *Sorbus aucuparia*, cherry *Prunus sp*, larch *Larix sp* and pine *Pinus sp.* Ground layer mossy with some bramble, ash *Fraxinus excelsior* and buddleia *Buddleia sp* regeneration, also lesser celandine *Ficaria verna*, ground ivy *Glechoma hederacea*, wild strawberry and primrose.
3	UKHab: g2a5 Area of calcareous grassland, grazed by rabbits with scattered scrub, especially around the margins. Appears unmanaged. Herb species evident in April include wild strawberry, birds foot trefoil *Lotus corniculatus*, sedges, wood sage *Teucrium scorodonia*, St Johns wort *Hypericum sp* and primrose. Bryophytes are abundant, in places dominant over grasses. Seedlings of sycamore and birch are plentiful, many ash seedlings are dying due to Ash Dieback. See image 2.
4	UKHab w1h5 Plantation and remnant semi-natural woodland along the western boundary of the quarry with the M6. Some mature trees. Ash and sycamore abundant with alder (Italian?), aspen, hawthorn and birch.
5	Badger sett. 3 holes in dumping area above the quarry offices. Some recent use, but don't look long established. No clear paths, latrines or bedding seen.
6	UKHab: w1f Large remaining part of Long Riddings Wood BHS, ancient woodland. Canopy dominated by ash and sycamore with birch and wych elm *Ulmus glabra.* Hazel *Corylus avellana*, hawthorn, elder *Sambucus nigra* also present and some mature beech *Fagus sylvatica*. Some regeneration of young trees, and both fallen and standing deadwood present. Ground flora dominated by dog's mercury *Mercurialis perennis*, wood anemone *Anemone nemerosa* and ramsons *Allium ursinum*. Also present bluebell *Hyacinthoides non-scripta*, wild arum *Arum maculatum*, primrose, wild strawberry and barren strawberry. Some bird boxes present, but in poor repair. Some limestone outcrops present.

	See image 3.
7	UKHab: r1 and h3h Standing open water- settling pool. Very turbid, and shallow at time of visit. Water concentrated at north end, bare fine silts to south. No sign of aquatic life seen. Dense scrub surrounding the pond, both on steep cliffs and edge of working area. Willows, sycamore, ash and hawthorn surrounding. See image 11.
8	UKHab: w1g6 Line of trees, unmanaged, self sown. Follows much of the route of the main access road along the southern edge of the working quarry, sometimes on both sides. Willows, sycamore, hawthorn, birch and buddleia all prevalent. See image 4.
9	Non-native trees in the woodland. Well established conifers (cypress). No sign of regeneration.
10	UKHab: u1a Mixed open mosaic of habitats establishing in previously disturbed area. Some bare rubble present, and some areas likely to get waterlogged in wet periods. Coltsfoot *Tussilago farfara* abundant in places, with mouse ear hawkweed *Pilosella officinarum* , wild strawberry and sedge species. Buudleia scrub frequent along cliff edges and along the periphery of the disturbed ground. Grading into patchy limestone grassland to the west and denser scrub with bramble, ash, sycamore and willow regeneration to the east. See image 5.
11	UKHab s1d Inland rock – low cliffs and scree above working area. Not tall enough to appeal to cliff nesting birds. Lots of buddleia saplings present.
12	UKHab g4 Modified grassland – sheep grazed pasture of low diversity. Some with hedgerow boundaries. Within AI ownership, but not under management control of quarry.
13	UKHab: g1c Dense bracken coverage, with some bramble.
14	UKHab: g2a5 Species poor grassland of calcareous origin, dominated by tussocky grasses. Wild strawberry and ribwort plantain *Plantago lanceolata* present. Some finer & calcareous species seen in September visit including sedges *Carex sp*, orchid (too late in season to tell species), bird's foot trefoil, St. John's wort, meadow vetchling *Lathyrus pratensis*, vetches *Vicia sp*, knapweed *Centaurea nigra* and yarrow *Achillea millefoilium*. Encroached by bramble and bracken *Pteridium aquilinum*. See image 6.
15	UKHab: w1g6 Line of trees along field boundary. Sycamore, willows, ash and hawthorn with bramble.
16	UKHab u1a Bare ground/ hard standing after removal of derelict buildings. Some ruderal species establishing and scattered sycamore and ash saplings, but still very sparse. See image 9.
17	UKHab: g3c Unmanaged neutral grassland alongside path between planted woodland and semi-natural woodland. Robust grasses (i.e. *Holcus lanatus, Dactylis*

	glomerata), nettle *Urtica dioica*, bramble, thistles *Cirsium* sp and willowherb.
18	UKHab: w1f Semi natural broadleaf woodland with some mature trees (especially ash). Also present sycamore, hazel, hawthorn, holly *Ilex aquilfolium* and elder. Bramble and raspberry *Rubus idaeus* in places where canopy thinner. Ground flora lesser celandine, bluebell, primrose and arum. See image 8.
19	UKHab: w1h5 Planted woodland. Mostly deciduous with wild cherry *Prunus avium*, rowan, larch, ash, sycamore, lime *Tilia s*p and hawthorn. Understorey variable with some woodland flora, but dominated by lesser celandine to south of footpath.
20	UKHab: g3c Unmanaged neutral grassland alongside path between planted woodland and semi-natural woodland following public footpath. Species as note 17.
21	Site of Hawthorn Rocks BHS. No sign of the interest feature. Well established tree planting on all the level ground, and dense bramble over the rock outcrops. See image 13.
22	UKHab: w1h5 Young plantation of deciduous trees – especially ash. Very even aged with some self-seeded hawthorn, cherry, rowan as understorey.
23	UKHab w1f Mixture of self sown, remnant and planted woodland. Mostly deciduous with ash and sycamore, but also some conifers (cypress). Provides good habitat links between Helks Wood and woodland to south by Hawthorns Caravan park.
24	UKHab: w1f 33 Remaining part of Helks Wood BHS. Ancient semi-natural woodland on limestone, also with some limestone pavement. Canopy dominated by ash and sycamore, with lime, wych elm and hawthorn. Ground flora with dog's mercury, ramsons, wood anemone, primrose and lesser celandine. Deer fence erected to the west of the public footpath.
25	UKHab: w1h5 Plantation woodland between Helks Wood and Kit Bill Wood. Ash, sycamore, beech and hawthorn dominate. Ground flora with wood false brome Brachypodium sylvaticum, ramsons, wild arum, primrose and lesser celandine. Deer fence erected to the west of the public footpath.
26	UKHab: w1f Remaining part of Kit Bill Woods BHS. Ancient semi-natural woodland on limestone. Canopy with ash, sycamore and beech as canopy trees. Wych elm, hawthorn, holly and hazel also frequent. Ground flora varied with wood anemone, primrose, lesser celandine, ramsons and dog's mercury. Deer fence erected to the west of the public footpath. New deer fenced path constructed from boundary with Slack's Wood (Tarmac/ Leaper's Wood Quarry) to the north to high point at the edge of the quarry void where a new viewing platform is to be constructed. High cliffs at quarry edge currently being worked. See images 7 & 12.
27	UKHab: w1g6 Line of trees along the roadside including hawthorn, beech, ash and sycamore.
28	Disused lime kiln at the rear of High Roads Quarry/ offices car park. Possibility of use by bats (previous record).

	See image 10.
29	UKHab s1b5 Small area of translocated limestone pavement (translocated in 2015 as part of mitigation measures for eastwards quarry expansion). Under sparse canopy of young ash. Some woodland plants present, but significant encroachment by raspberry and bramble around and over the pavement. See image 14.

Description of Wildlife Law and Legislation referred to in this document

National Planning Policy Framework (2018)
Current guidance recommends that planners ensure that all new developments:

- minimise impacts on biodiversity and protected sites
- result in a local net gain in biodiversity
- safeguard wildlife-rich habitat and wider ecological networks
- promote conservation/ restoration and enhancement of priority habitats and ecological networks
- promote protection/ recovery of priority species

Nesting birds
Under Section 1 of the Wildlife and Countryside Act 1981 (as amended), wild birds are protected from being killed, injured or captured. Under this legislation their nests and eggs are also protected from being damaged, destroyed or taken (this includes nests in the process of being built as well as those with eggs and/or chicks in).

Birds (such as peregrine falcon) which are listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) are further protected as it is also an offence to intentionally or recklessly disturb the birds at or close to an active nest, whilst with dependent young, or the young themselves. Further enforcement has been provided by The Countryside and Rights of Way Act 2000.

Bats
Bats have declined in numbers dramatically across the UK and Western Europe in recent decades. Key factors linked to their decline are loss of roosting places due to building works and woodland destruction. Other factors implicated in their decline are changes in the countryside resulting in habitat loss and greater fragmentation of foraging habitats, and severing of commuting flightlines due to transport developments and hedgerow destruction.

As a consequence of these significant declines, bats and their roosts are protected under British and European law.

All bats are listed under Annexe IV of the EU Habitats Directive, and some under Annexe II. This law is transposed into English law into the Conservation of Habitats and Species Regulations (2010). Bats are also protected in the UK under the Wildlife and Countryside Act 1981 (as amended).

As a result of the above legislation it is an offence to;

- Deliberately capture, injure or kill a bat,
- Disturb a bat such that their survival, reproductive capacity, or the well being of the local population is affected
- Intentionally or recklessly disturb a roosting bat, or block access to its roost.

Reptiles
The four widespread species of reptile (common lizard, slow-worm, grass snake and adder) receive partial protection under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) in respect of Section 9(5). It is an offence to intentionally kill, injure, sell, or to advertise for sale, any of these species without an appropriate licence. Further enforcement has been provided by The Countryside and Rights of Way Act 2000.

Amphibians
The four widespread species of amphibian (common frog, common toad, smooth newt and palmate newt) receive partial protection under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) in respect of Section 9(5). It is an offence to sell or possess (dead or alive) these species. Further enforcement has been provided by The Countryside and Rights of Way Act 2000.

Great crested newts are a European Protected Species, and their breeding sites or resting places are protected under Regulation 41 of the Conservation of Habitats and Species Regulations 2010 and Section 9 of the Wildlife and Countryside Act 1981.

It is an offence for anyone intentionally to kill, injure or disturb a great crested newt, to possess one (whether live or dead), or sell or offer for sale without a licence. It is also an offence to damage, destroy or obstruct access to any place used by great crested newt for shelter.

Badger
Badger is a protected species under the Protection of Badgers Act 1992 which makes it an offence to wilfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so; or to recklessly interfere with a sett. Further enforcement has been provided by The Countryside and Rights of Way Act 2000.

Guidance as to best working practices around badger setts have been developed, to minimise disturbance to these animals.

Biodiversity Action Plans – Species and Habitats
The UK Biodiversity Action Plan (UK BAP) was published 1994, in response to the Convention on Biological Diversity (CBD), which the UK signed up to in 1992 in Rio de Janeiro. National and Local action plans were developed for the most threatened species and habitats.

The plans, and species and habitats to which they related are reviewed and updated regularly. The current lists can be found on the JNCC website. These have now been succeeded by NERC Act 2006 (see below) but are still commonly used for guidance.

Natural Environment and Rural Communities (NERC) Act 2006
Section 41 of the NERC Act 2006 requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with Natural England, as required by the Act. This purpose of this list is to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the Natural Environment

and Rural Communities Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

56 habitats of principal importance are included on the S41 list. These are all the habitats in England that were identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. There are 943 species of principal importance included on the S41 list. As above, these are the species found in England which were identified as requiring action under the UK BAP and which continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework.

Photographs

(images taken on April 20th 2021 unless stated otherwise)

Photo 1.
Dense scrub on rocky outcrop at Eagle's nest, listed as part of Long Riddings Woods BHS, but no longer classed as woodland.

Target note 1.

Photo 2a.
Limestone grassland near to the quarry offices and wind turbine.

Target note 3.

Photo 2b.
Limestone grassland Looking upslope from the car park to the area shown above in image 2a when scrub in full leaf (image taken Sept 12th 2022).

Photo 3.
Long Riddings Wood BHS Ancient Woodland.

Target note 6.

Photo 4.
Looking west along southern edge of quarry to offices. Showing edge of Long Riddings Woods and line of scrub/ young trees along quarry road below. These cliffs are not suitable for peregrine nesting.

Target note 8.

Photo 5.
Open mosaic habitat on bare / disturbed ground.

Target note 10.

Photo 6.
Rough unmanaged grassland of calcareous origin.

Target note 14.

Photo 7.
Deer fenced path to proposed new look out at eastern end of quarry.

Target note 24.

Photo 8.
Mature trees in undesignated woods to south of quarry.

Target note 18.

Photo 9.
Bare ground after removal of derelict buildings.

Target note 16.

Photo 10.
Lime kiln near High Roads offices.

Target note 28.

Photo 11.
Settling pond surrounded by scrub at western end of quarry.

Target note 7.

Photo 12.
Cliffs at the rear of the quarry (east) which are actively worked, and not suitable for peregrine in their current condition.

Target note 26.

Photo 13.
Area previously described as Hawthorn Rocks BHS. Now under scrub and young trees due to lack of grazing or other management.

Target note 21.

Photo 14.
Area of translocated limestone pavement showing bramble and raspberry growth.

Photo taken 30th June 2022.

Target note 29.

HSI calculation for settling pond at Back Lane Quarry

Pond ref	Back Lane Quarry	2	3	4	5
SI1 - Location	1				
SI2 - Pond area	0.2				
SI3 - Pond drying	1				
SI4 - Water quality	0.33				
SI4 - Shade	1				
SI6 - Fowl	1				
SI7 - Fish	1				
SI8 - Ponds	0.1				
SI9 - Terr'l habitat	0.67				
SI10 - Macrophytes	0.3				
HSI	0.52				

Pond ref					
SI1 - Location					
SI2 - Pond area					
SI3 - Pond drying					
SI4 - Water quality					
SI4 - Shade					
SI6 - Fowl					
SI7 - Fish					
SI8 - Ponds					
SI9 - Terr'l habitat					
SI10 - Macrophytes					
HSI					

Comments and constraints on Habitat Suitability Index data for this project (if appropriate). If

Categorisation of HSI scores: HSI <0.5 = poor; HSI 0.5-0.59 = below average; HSI 0.6-0.69 = average; HSI 0.7-0.79 = good; HSI >0.8 = excellent.

Breeding bird survey, Back Lane Quarry, 2022

Report Number 0922/07

27th September 2022

Report commissioned by;

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CONTENTS:

1.0 INTRODUCTION

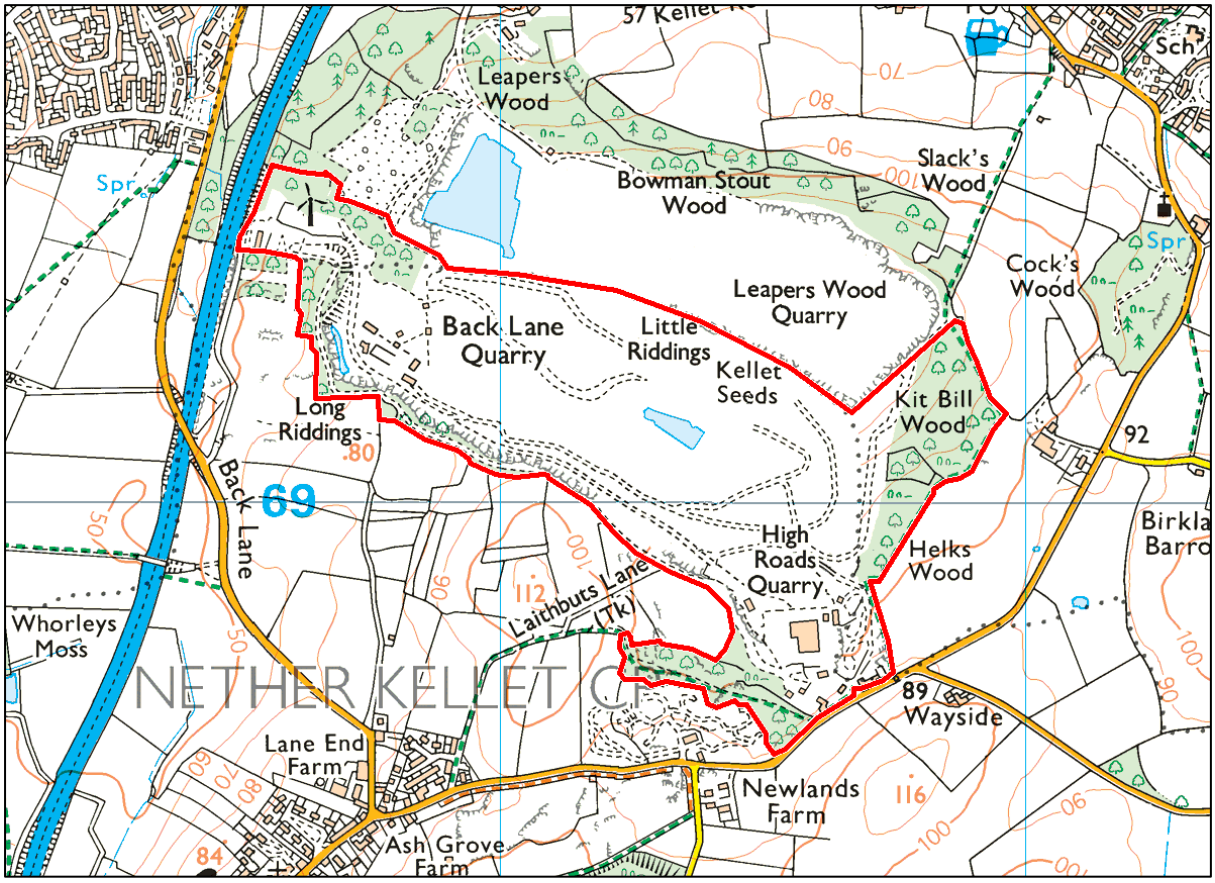
1.1 Aim of the survey

The aim of the survey was to determine which species breed at Back Lane Quarry, while also estimating their abundance and mapping out breeding locations where possible.

1.2 Survey Area

The survey area encompassed the worked quarry and its margins, the breeze block factory to the southeast, and the woodland areas to the east (Kit Bill Wood), south (adjacent to The Hawthorns) and east (Long Riddings Wood and the area leading to Eagles Nest Viewpoint). Birds singing just outside the boundary (see Figure 1) were also included, as their territories are likely to overlap the quarry boundary.

Figure 1, Back Lane Quarry Survey area (boundary in red)



OS Map copied under licence (No. 100055725)

2.0 SURVEY METHOD

2.1 Field Survey Method

The survey aimed to assess the presence, abundance, breeding status and breeding locations of birds. As such a common birds census (CBC) style survey was used, whereby all accessible areas of the site were walked on four survey visits in between April and June inclusive. At Back Lane Quarry this meant a route which was largely confined to the margin of the survey area and the adjacent woodlands to the south, east and northwest.

Any birds seen or heard (including individuals immediately outside of the boundary) were mapped using BTO species codes (*https://www.bto.org*), with the addition of activity codes / symbols (Bibby et al 1992) to help assess territory occupancy and breeding status (see Appendix 2). Several vantage points were used along the survey route to check for cliff nesting birds such as peregrine, with compass bearings and triangulation used to pinpoint nests on survey maps. At the end of the survey period, data from all visits were looked at in combination to estimate the number of territories held by each species.

Survey visits took place from civil dawn and were completed by 10am. They were scheduled to ensure that subsequent surveys were at least 14 days from the last and were planned to encompass the whole of the breeding bird period of April to June inclusive. Surveys were not carried out where wind was more than Beaufort force 4 or in heavy or persistent rain.

2.2 Surveyor and equipment

Mike Douglas (BSc MCIEEM) has been carrying out similar surveys for more than 20 years and has lead courses in bird identification (both visual and audio identification).

8 x 42 binoculars and a 27-60 x 85 telescope were used to observe and scan for birds and nests. A phone mapping app was used to pin-point surveyor and breeding bird location, and this was backed up with a Garmin GPS to check and ensure accuracy.

2.3 Constraints

The weather was favourable for all surveys, which spanned the whole of the breeding season. Visibility was good and sight lines from several vantage points along the survey route provided good views of all areas.

The survey method concentrated on the dawn period and therefore may have missed more nocturnal species such as owls and woodcock.

3.0 RESULTS

3.1 Survey dates and periods

Table 1, survey visit dates and conditions

Date	Time	Weather conditions
29.04.22	06.00 – 08.45	No wind, 0/8 c.c., 1°C to 7°C, dry
24.05.22	05.40 – 09.10	W fc 2-3, 7/8 c.c., 7°C to 12°C, few light showers
07.06.22	05.45 – 09.15	No wind, 0/8 c.c., 8°C to 14°C, dry
22.06.22	05.35 – 09.00	N fc 1, 0/8 c.c., 13°C to 16°C, dry

3.2 Field survey results

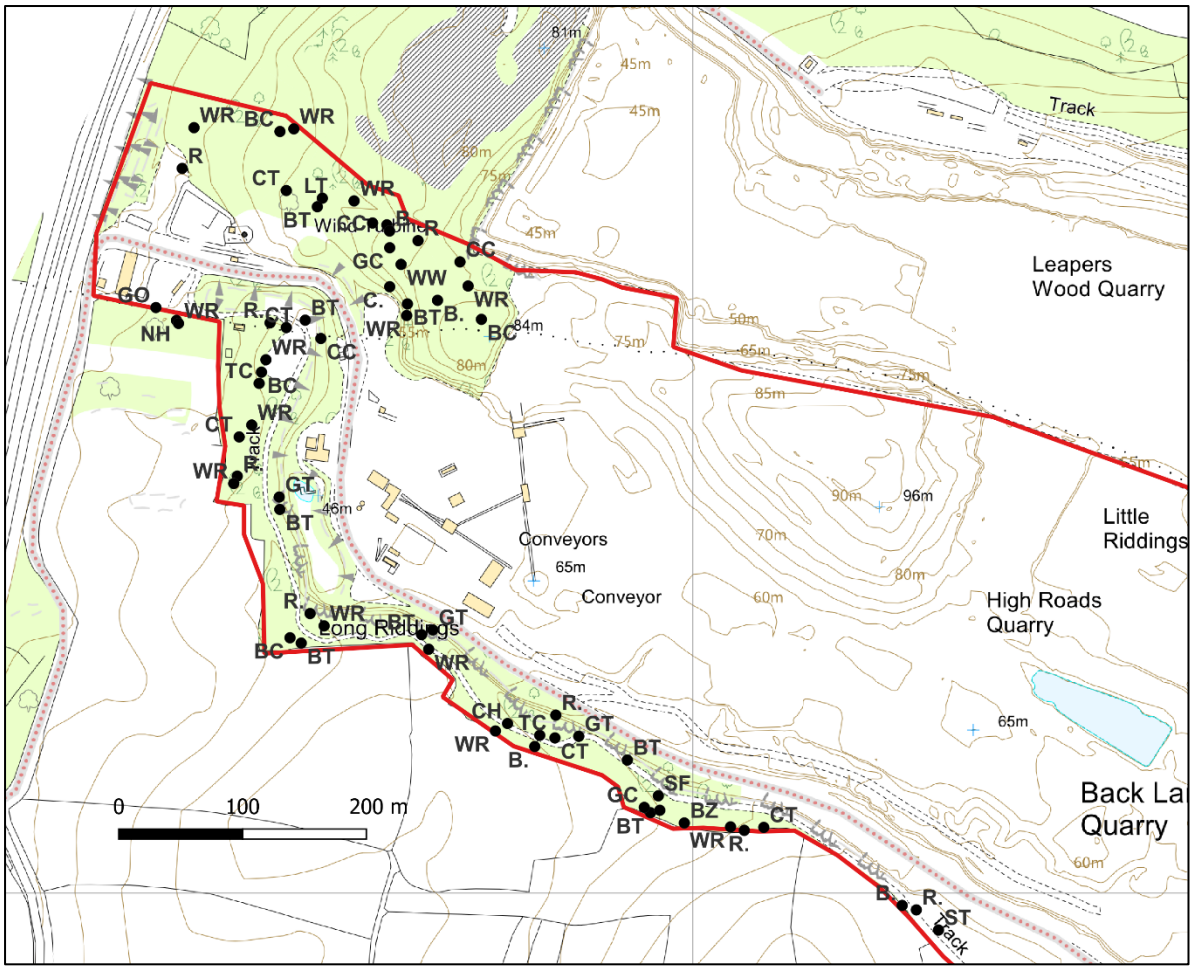
Results suggest that 29 species are breeding within the quarry boundary. Of these 29, 2 species are on the UK red list due to historical or recent declines: herring gull and spotted flycatcher. See Appendix 1 for all raw data.

Table 2, estimates of number of territories / pairs of each breeding species, and highest level of breeding evidence

Species	BTO code	No. of pairs / territories	Breeding status and additional information: confirmed (C) or probable (P)
Buzzard	BZ	1	P – pair alarming S boundary, 22nd June
Peregrine	PE	1	C – nested on S cliff, full grown juvenile on 7th June
Red-legged partridge	RL	1	P – on suitable habitat on repeated visits
Oystercatcher	OC	1	P – single bird displaying / alarming 29th April
Herring gull	HG	7	C – 7 occupied nests 24th May
Lesser black backed gull	LB	27	C – 27 nests on 24th May, 12 broods on 22nd June
Great black backed gull	GB	1	C – 1 brood present 7th June
Wood pigeon	WP	1	P – pair in southern woodland
Dunnock	D.	1	P – singing bird
Wren	WR	24	P – well distributed through woods and margins
Robin	R.	12	P – singing on repeated visits
Spotted flycatcher	SF	1	C – adult carrying food at S. boundary
Blackbird	B.	9	P – singing and alarming repeated visits
Song thrush	ST	6	P singing and alarming repeated visits
Nuthatch	NH	4	P – singing on repeated visits
Blackcap	BC	11	C – adult seen carrying food
Garden warbler	GW	1	P – observed singing once
Willow warbler	WW	3	P – singing on repeated visits
Goldcrest	GC	3	P - singing on repeated visits
Chiffchaff	CC	8	P - singing on repeated visits
Blue tit	BT	10	C – family parties seen at territories
Coal tit	CT	8	C – family parties seen at territories
Great tit	GT	9	P – singing on repeated visits
Long tailed tit	LT	1	C – family parties seen at territories
Treecreeper	TC	2	P – singing birds
Jackdaw	JD	?	Numerous on undisturbed cliff faces
Carrion Crow	C.	1	C - Adults at nest, NW woods, 29th April
Goldfinch	GO	2	P – singing birds
Chaffinch	CH	6	C – 1 pair carrying food

Particularly notable in Table 2 are a raft of species which prefer mature trees or woodland, including blackcap, chiffchaff, treecreeper, nuthatch and spotted flycatcher. The majority of these records came from the southern most block of woodland, the southern boundary of the worked quarry and the northwest patch of scrub and woodland. Very few records came from the woodland which borders the eastern end of the quarry (see Figures 2 and 3).

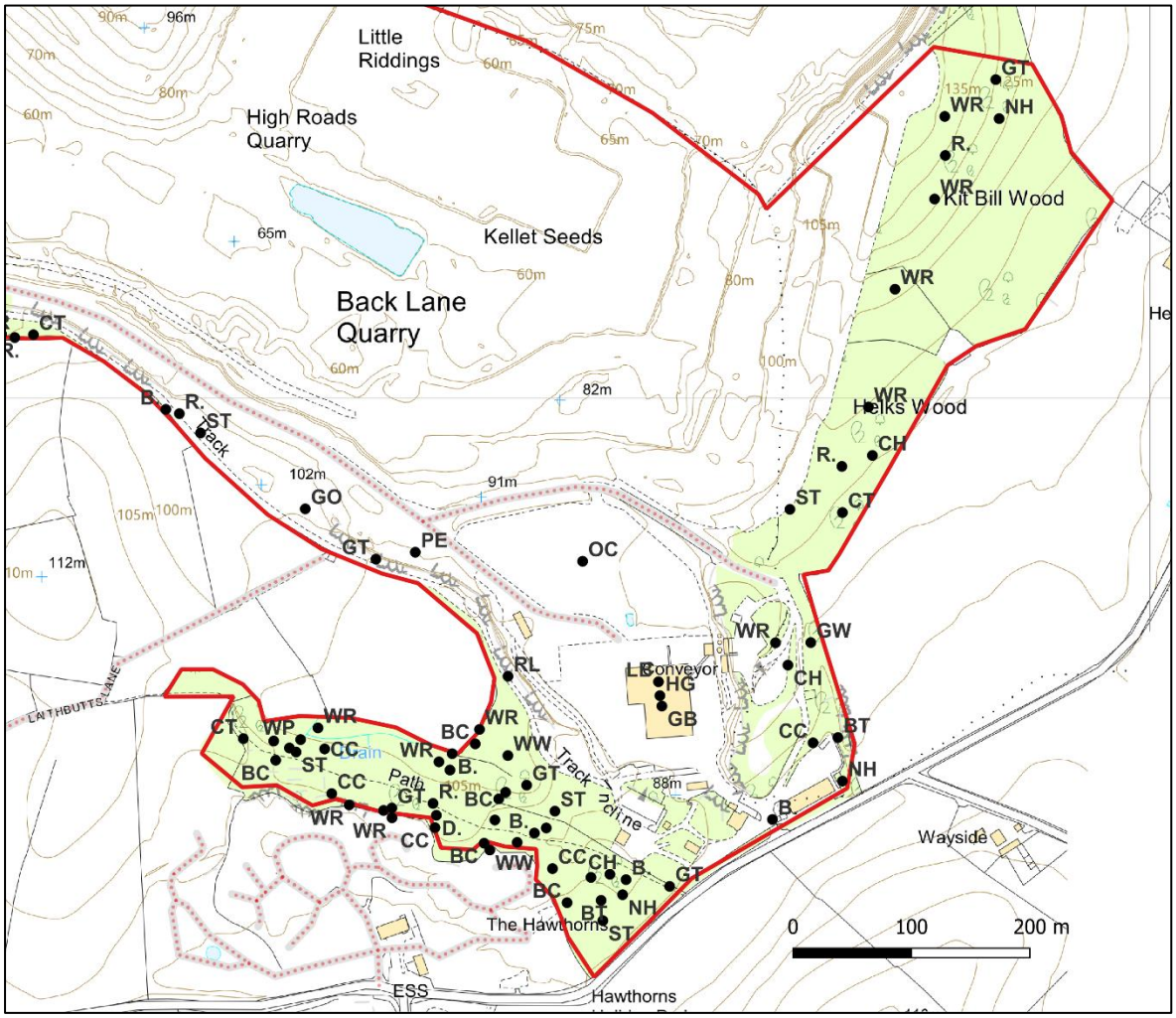
Figure 2, Breeding bird territories west (territories estimated using all records from 4 visits, see Appendix 1 for raw data)



Scrub specialists such as willow warbler and garden warbler were much less abundant, reflecting the limited extent of scrub at the quarry. Four tit species bred throughout wooded areas, with blue, coal and great tit all present in good numbers.

Peregrines nested along the southern cliff in 2022, close to the block factory at SD51380 68868. Peregrines were at the nest on 29th April, a female brought food into the nest on 24th May and a single, full-grown chick was visible at the nest site on 7th June. The latter had near fully developed wing and tail feathers on this date and fledging was expected within a week of this visit. There were no observations of peregrine on 22nd June. The only other cliff nesting species noted during surveys was jackdaw, which nested in most areas of undisturbed cliff face.

Figure 3, bird territories south, (territories estimated using all records from 4 visits, see Appendix 1 for raw data)



There were few records of open ground species away from the breeze block factory, which hosted breeding lesser black backed (27 nests), herring (7 nests) and great black backed gulls (1 nest). Observations of chicks of each of these species during the June visits suggest that they had some breeding success in 2022. Oystercatcher meets the criteria for 'probable' breeder after an adult was seen displaying / alarming on 29th April, but none were seen after this date and it is likely that any early nesting attempts were unsuccessful. Two observations of red-legged partridge along the southern boundary track suggest that this species bred this year.

3.3 Non-avian wildlife records

Grey squirrel was at Long Riddings wood on 29th April, while a roe deer was present in the same place on 24th May, with another barking roe deer in the north-western woods on 7th June. A probable muntjac was flushed from the Kit Bill Wood on 22nd June, not far from a badger set entrance at SD51778 69059.

Butterfly records included speckled wood, common blue (x2), ringlet and dingy skipper (1 on 22nd June) along the southern boundary track.

3.4 Habitat notes

The scrub and woodland at the north-western corner of the site seems to be spreading into open areas and threatening diverse calcicolous ground flora as a result. Although more scrub is desirable to boost the numbers of scrub-specialist birds at the quarry, this would not be the ideal area for this change, as the loss of uncommon plants would be too great.

Although Long Riddings Wood was good for breeding birds, it lacked scrub / understorey along much of its length and the mature trees were mostly devoid of veteran features such as cracks, holes and dead wood. In contrast, the woodland adjacent to The Hawthorns caravan site was ideal habitat for a number of species, as seen by the densities of bird territories there (see Figure 3). Veteran trees with dead wood and cavities form a discontinuous canopy and sit alongside a fragmented understorey with abundant bramble. Fifteen species bred within this small woodland including 5 pairs of blackcap and 4 pairs of chiffchaff.

Image 1, Open woodland near The Hawthorns with mature oak and an understorey including hazel, elder and hawthorn

Kit Bill and Helks wood provided further contrast, in that it was dominated by young trees with an almost total absence of an understorey, and heavily shaded areas where the ground flora was similarly limited. This was the poorest woodland area in terms of breeding bird variety and abundance.

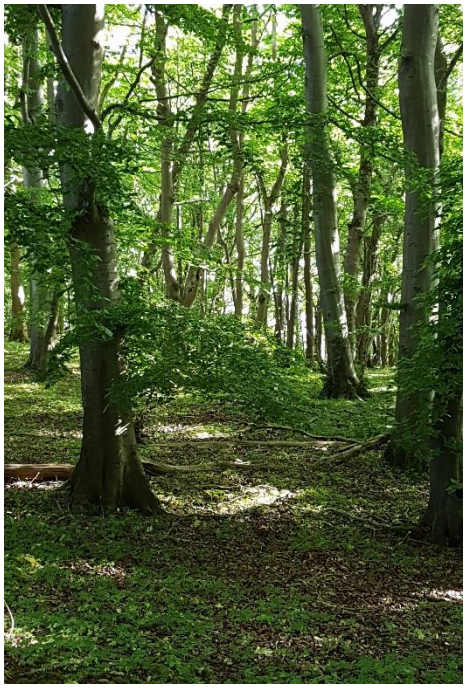


Image 2, a patch of shaded ground in Kit Bill Wood with no understorey and little ground flora

4.0 SUMMARY AND DISCUSSION

The results of this survey show the value of the semi-natural habitats around the margin of Back Lane Quarry. The quarry floor and active faces are too frequently traversed and worked to provide nesting habitat for birds, and almost all of the 29 breeding species came from the wooded areas around the edges of the quarry. The composition of the avifauna – one dominated by chiffchaff, blackcap and other woodland species shows that these wooded areas are dominated by taller trees, with little associated scrub. These taller trees are still relatively young however and have yet to develop older growth features such as cracks, holes, flaking bark and substantial standing dead wood. Such features would attract additional species such as woodpeckers and raptors, while also improving the woodlands for other groups such as invertebrates and bats. At Kit Bill and Helks Wood, this situation is particularly marked, with very poor woodland structure and a dense, closed canopy of tall young trees providing few opportunities for breeding birds.

Peregrines bred successfully at the southern cliff of the quarry in 2022 and a county data search (see SLE report No. 0922/5) suggested a similar breeding location (SD514 680) as far back as 2003. If any future development is likely to affect this area, consideration should be given to alternative nest sites for this species.

5.0 RECOMMENDATIONS

The poor structure and lack of old growth features at Kit Bill and Helks Wood could be improved upon with management intervention. This poor structure refers to the uniform nature of the woodland, where tall, relatively young trees have formed a closed canopy, throwing dense shade beneath, which limits the development of an understorey of scrub species such as hazel and holly, and also prevents the development of a rich ground flora which could include wood anemone and bluebell. This effect is worse where the canopy trees are beech or sycamore, which have a particularly strong shading effect. The lack of old growth features is due to the smooth, unbroken tree stems of the dominant beech and sycamore trees.

Efforts to improve woodland structure could focus on a few patches of heavily shaded woodland away from exposed limestone pavement. At these locations several trees could be ring-barked and stump treated, with additional trees felled to let light into the woodland floor. Planting of hazel, wych elm, hawthorn, buckthorn or bird cherry could then be undertaken, kick starting the development of a mixed understorey in an area where natural colonisation is unlikely.

The lack of old growth features could be countered by deliberate wounding of beech and sycamore, particularly around those areas identified for woodland structure improvements. Wounding can vary from scoring stems or burrowing into stems with a chainsaw to encourage further natural development of nesting holes, to something slightly more elaborate which will immediately create nesting opportunities (see Mullholland, 2022).

Careful selection of ring-barking areas would be necessary, avoiding frequently traversed areas or trees close to rights of way. Optimal locations in terms of effectiveness would be in areas where tree die-off would result in a substantial increase in light reaching the ground flora.

Elsewhere, at the north-western corner of the quarry, the spread of scrub is a problem, as it will eventually eradicate the rich ground flora here. This ground flora includes wild strawberry, bird’s foot trefoil and common spotted orchid, which will quickly be shaded by rapidly spreading sycamore. Although this is flagged up in order to preserve the botanical

quality of this area, the maintenance of a short-cropped area will also benefit some woodland birds which feed in open areas including thrushes, woodpeckers and jays.

Cliff nesting birds including peregrine appear to have an abundance of nesting options at Back Lane and neighbouring Leapers Wood Quarries, but this year's results and historical peregrine data indicate a preference for the southern cliffs close to the block factory. As a result, any proposed increase in quarrying activity here should be accompanied by a review of peregrine nesting options, with information gathered on all previously used nest sites as well as identification of suitable but as yet unused sites.

6.0 REFERENCES AND BIBLIOGRAPHY

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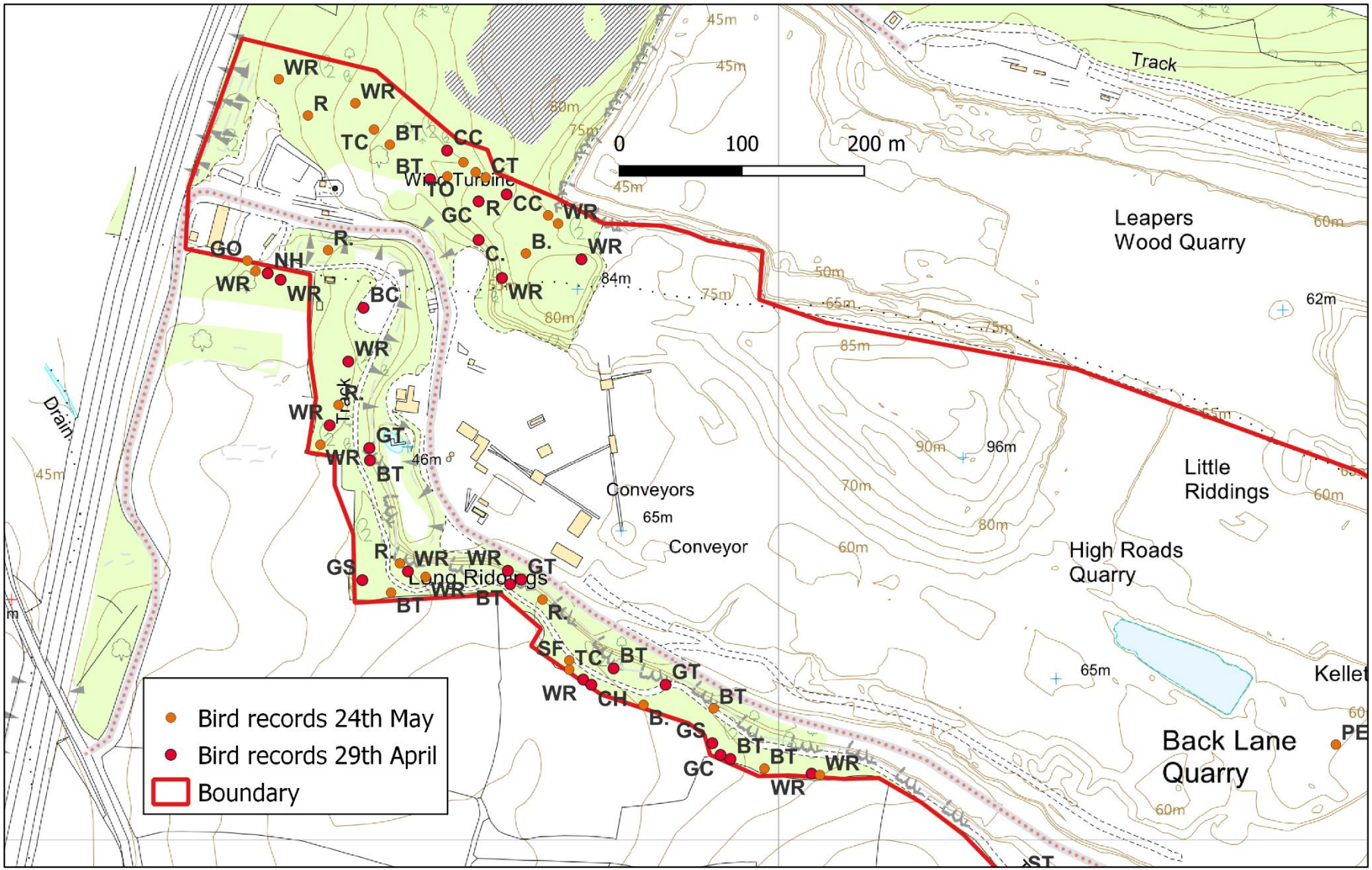
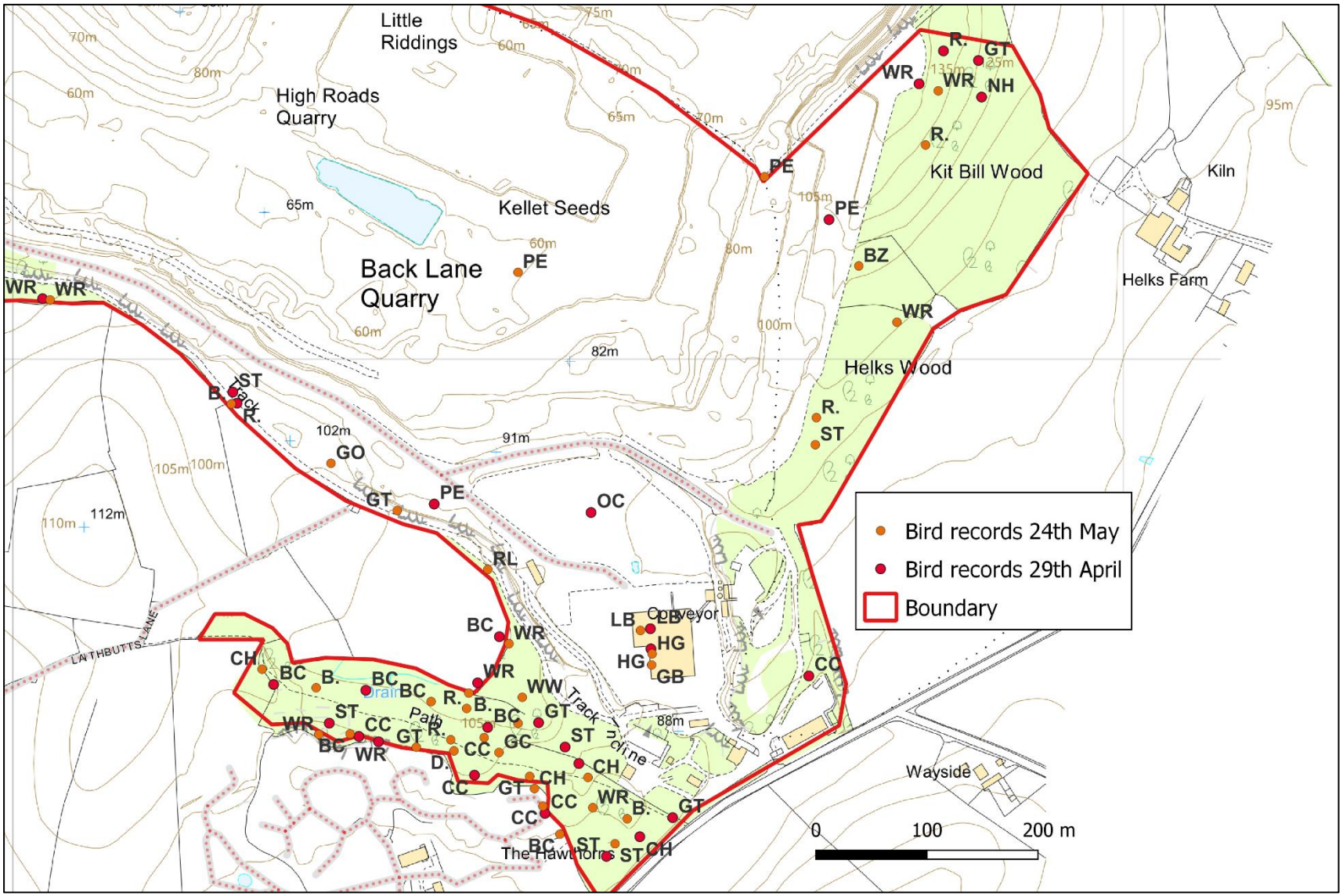
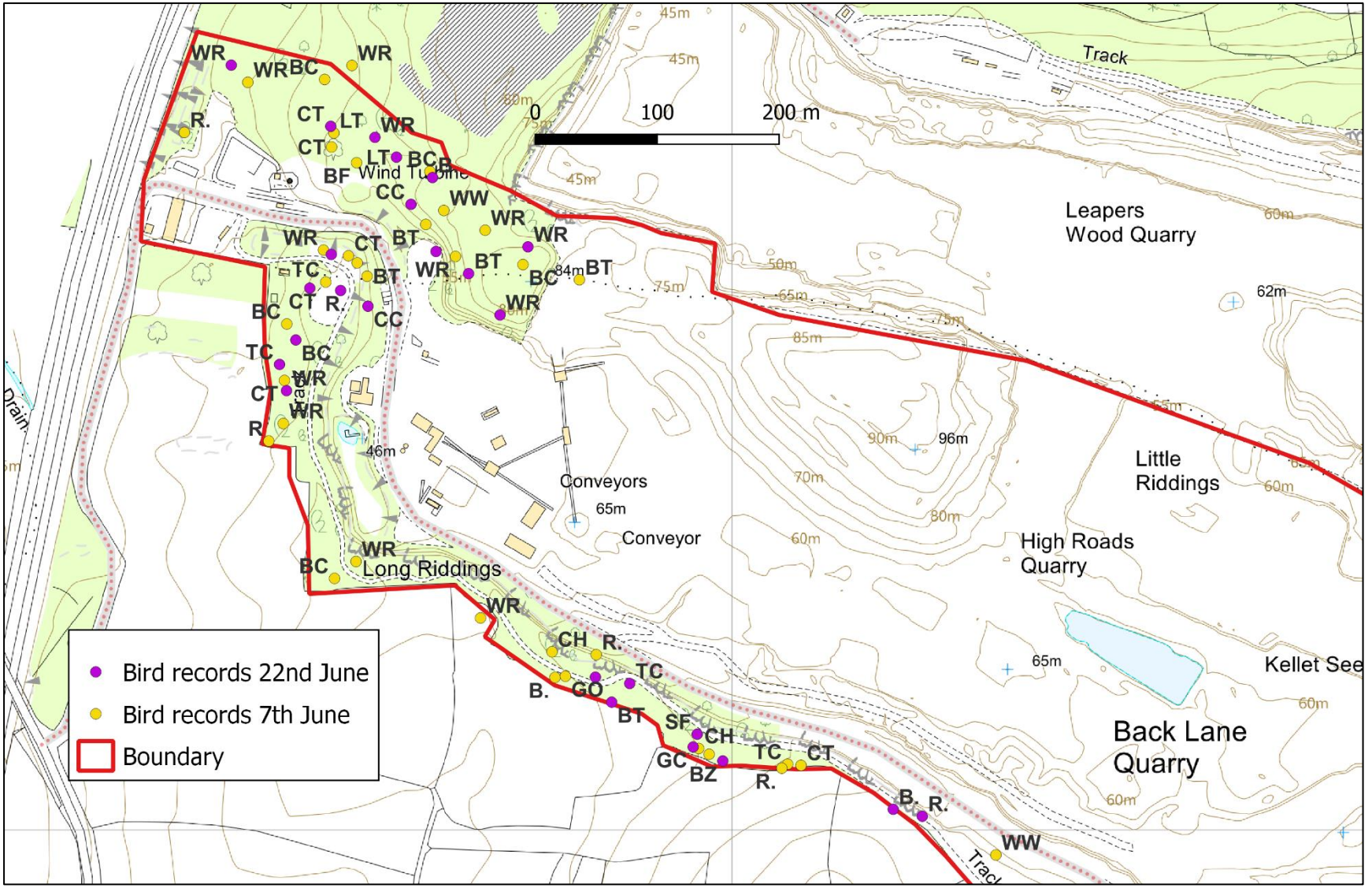
APPENDICES Appendix 1a, Figure 4, April and May raw data west



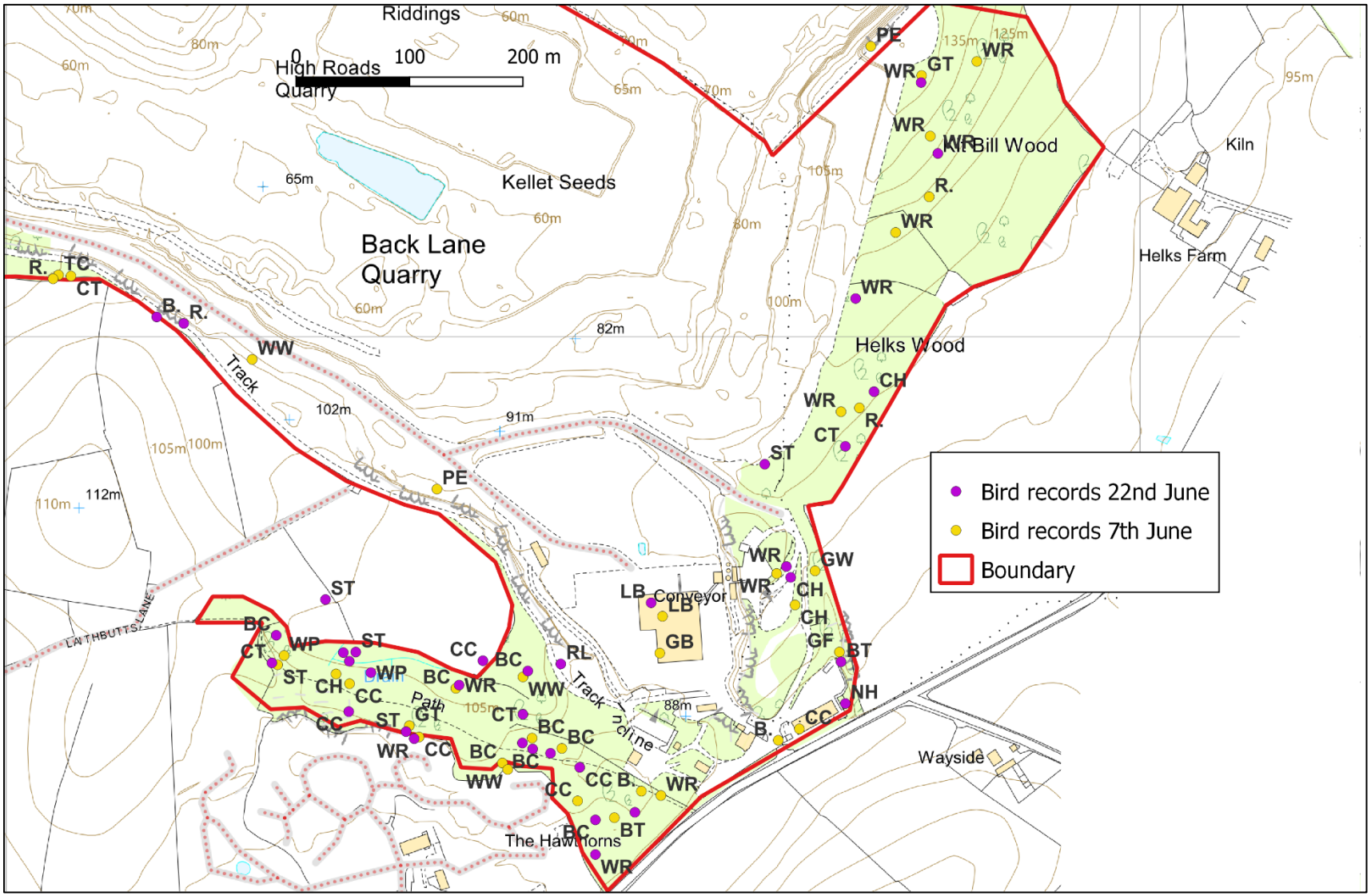
Appendix 1b, Figure 5, April and May raw data east



Appendix 1c, Figure 6, raw data June surveys, west



Appendix 1d, Figure 7, raw data June surveys, east



Appendix 2, Table 2 Observations denoting probable breeding and confirmed breeding

Probable
Singing / displaying bird on suitable habitat
Pair present on suitable habitat
'Alarming' adult suggesting nest or chicks nearby
Aggressive behaviour towards conspecifics or other species
Adult carrying nest material
Adult carrying food
Adult carrying faecal sac
Recently fledged juvenile
Confirmed
Distraction display or feigning injury
Used nest or eggshells found
Recently fledged or downy young
Adults entering or leaving nest-site in circumstances indication occupied nest
Adult carrying faecal sac or food for young
Nest containing eggs
Nest with young, seen or heard