










1 Project Details			
Project Name:	Waddington Fell Restoration Scheme		
Written:	Eve Loxham, <i>Ecologist</i>	Approved:	Alice Helyar, <i>Principal Ecologist</i>
Report reference:	Habitat Report Waddington Quarry V2	Date:	12.01.2021
2 Project Drawings			
Waddington Quarry Habitat Map			
Sheet 1			
3 Ecology Surveys			
Surveyors:	Eve Loxham MBiolSci (Hons), GradCIEEM Mark Breaks BSc (Hons)		
Survey date(s):	18/05/2020, 19/05/2020, 20/05/2020		
Survey Method:	<p>The extended Phase 1 habitat survey followed standard methodology (JNCC, 2010 and CIEEM, 2013). All features of ecological significance were target noted and a colour coded map of the habitats on site has been produced.</p> <p>Buildings and structures were assessed in accordance with Collins (2016) with regard to the potential to support bat roosts.</p> <p>Habitat Condition has been assessed in accordance with Natural England Biodiversity Metric (2019).</p> <p>eDNA sampling methods followed Biggs <i>et al.</i> 2015 and samples were sent to Surescreen, Natural England accredited laboratories for eDNA analysis.</p>		
Weather Conditions:	<p>18/05/2020 - Cloud cover (8/8), Wind Beaufort F1, 11°C, light rain.</p> <p>19/05/2020 - Cloud cover (3/8), Wind Beaufort F0-2, 14°C, light rain.</p> <p>20/05/2020 - Cloud cover (0/8), Wind Beaufort F0-2, 20°C, no rain.</p>		
Limitations to the survey:	<p>Densely planted coniferous trees, dense understory vegetation or dense scrub within some woodlands prevented a thorough internal inspection of the habitat to determine the presence of badger setts. This is not considered a significant limitation since further survey for badger sett presence is required once the development boundary is finalised and prior to works commencing. The optimal time for badger sett surveys is autumn and spring. During summer, dense vegetation growth can inhibit the visibility of sett entrances. During winter, badger activity is reduced. This is not considered a significant limitation due to further survey requirements as explained above.</p> <p>Summer months are considered sub-optimal for ground level roost assessment of trees (Collins, 2016). This is due to foliage obscuring parts of the tree. Where this limitation applies, further survey during the optimal months is recommended.</p> <p>Buildings were assessed from outside elevations only for bat roosting potential.</p> <p>Optimal survey months for Phase 1 Habitat Surveys vary between habitat types, e.g. woodlands are best surveyed in spring, grasslands in mid-summer and heathlands in autumn. Where habitats were not surveyed during the optimal time of year, these have been recorded within the target note as requiring further survey.</p> <p>At the edge of the survey boundary, surveys of boundary features (e.g. tree lines, watercourses, hedgerows) were only possible from one elevation.</p> <p>There was no safe access to eDNA sample P20 due to nesting birds and health and safety concerns with the embankment stability.</p>		




4 Target notes	
TN50	
<p>Dry dwarf shrub heath surrounding ponds P16 and P17, is the dominant habitat in the area. The area is unmanaged (the heather is not burnt or maintained), and on relatively flat ground surrounding the ponds, although it slopes upwards to the west, and downwards to the east. Dominant species is ling heather (<i>Calluna vulgaris</i>), with abundant bilberry (<i>Vaccinium myrtillus</i>), and a carpet of mosses (rarely <i>Sphagnum</i>s), several sedge species, mat grass (<i>Lomandra longifolia</i>), crowberry (<i>Empetrum nigrum</i>), willowherb species (<i>Epilobium</i> sp.), foxglove (<i>Digitalis purpurea</i>), broadleaved dock (<i>Rumex obtusifolius</i>), bracken (<i>Pteridium aquilinum</i>), some immature self-seeded rowan (<i>Sorbus aucuparia</i>) and willow (<i>Salix</i> sp.), red fescue (<i>Festuca rubra</i>), heath woodrush (<i>Luzula multiflora</i>) and wavy hair grass (<i>Deschampsia flexuosa</i>). The heather shrub is mature and all of a similar age. The habitat provides opportunities for nesting birds, foraging bats, small mammals, amphibians, reptiles and otter (<i>Lutra lutra</i>) lay-up sites. An abundance of predated frogs and toads were noted at the water edge and hundreds of tadpoles are present within the ponds.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>	
TN51	
<p>Unmanaged mosaic of habitats including semi-improved grassland, marshy grassland and scattered dry dwarf shrub heath. Dominant species include soft rush (<i>Juncus effusus</i>), foxglove, Yorkshire fog (<i>Holcus lanatus</i>) with additional male fern (<i>Dryopteris filix-mas</i>), hard fern (<i>Blechnum spicant</i>), red fescue, marsh thistle (<i>Cirsium palustre</i>), ling heather, <i>Polytrichum</i> mosses, heath woodrush, heath bedstraw (<i>Galium saxatile</i>) and compact rush (<i>Juncus conglomeratus</i>). Potential habitat for nesting birds, small mammals, foraging bats, amphibians, reptiles, otter lay-up sites.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>	
TN52	



<p>Unmanaged, dense and continuous bracken which extends down the slope (facing south-east). Potential for nesting birds, small mammals, amphibians, reptiles and otter lay-up sites. There are scattered willow trees within the bracken along with grass species and scattered heather.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>	
TN53	
<p>Rhododendron (<i>Rhododendron</i> sp.; Schedule 9 Wildlife and Countryside Act 1981, as amended) shrub at the pond edge.</p> <p>Habitat Condition (provisional): Poor (Score 1)</p>	
TN54	
<p>Waddington quarry. The rock face extends around the site for approximately 1 km and the average height of the cliff face is approximately 30 m. This quarry has been operational since the 1960s and is therefore inactive in some areas where quarrying has finished, e.g. the northern section of the quarry appears to be less frequently accessed. Vegetation growth within the quarry face itself is sparse and consists of ferns and scattered willow scrub. There is an abundance of fractures within the rock face, which are randomly orientated and are of a range of sizes and depths. These provide suitable potential habitat for nesting birds and roosting bats. The majority of the quarry face is exposed within the landscape; however, some areas are sheltered from the prevailing wind by protruding rocks or natural curves within the rock face. Shallow sloping areas of the quarry face may also be suitable for basking reptiles.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>	

<p>TN55</p>		
<p>Large expanse of open water at the base of the quarry, roughly 200 m by 100 m. A large number of gulls were present at the time of the survey, likely nesting on the adjacent spoil heaps. The water does not appear to support any emergent vegetation and is collected rainwater. This area provides a useful aquatic resource for foraging bats, nesting birds (on the banking), amphibians and reptiles, using nearby habitats.</p> <p>Habitat Condition (provisional): Poor (Score 1)</p>		
<p>TN56</p>		
<p>A vegetated former lagoon, which is in the process of succession, developing from a mosaic of bare ground, scattered scrub, ephemeral / short perennial, and dry dwarf shrub heath towards willow scrub and dry dwarf shrub heath. The former lagoon area is a large, flat expanse which stretches into the centre of the quarry. Species include immature willow scrub, soft rush, crowberry, ling heather, rosebay willowherb (<i>Chamerion angustifolium</i>), several sedge species, birch (<i>Betula</i> sp.) saplings, sheep's fescue (<i>Festuca ovina</i>), ragwort (<i>Jacobaea vulgaris</i>), coltsfoot (<i>Tussilago farfara</i>), marsh thistle, New Zealand willowherb (<i>Epilobium brunnescens</i>), male fern and sheep sorrel (<i>Rumex acetosella</i>). The area is unmanaged and has naturally self-seeded from the surrounding landscape. There is a diverse structure, with some areas bare ground and others dense scrub. It provides suitable habitat for nesting birds, small mammals, reptiles and foraging bats. Rabbit (<i>Oryctolagus cuniculus</i>) or brown hare (<i>Lepus europaeus</i>) footprints were identified along with deer (not identified to species level) prints.</p> <p>Habitat Condition (provisional): Good (Score 3)</p>		
<p>TN57</p>		
<p>Quarry floor consisting of rock and spoil mounds (sand, gravel, silt), with scattered ephemeral / short perennial colonisers, which include New Zealand willowherb, marsh thistle, common daisy (<i>Bellis perennis</i>), rosebay willowherb, Yorkshire fog, <i>Polytrichum</i> moss, marsh thistle, sheep's fescue, wavy hair grass, and ragwort. There are pools of standing</p>		

<p>water from collected rainfall. These do not contain any emergent or submerged vegetation. Potential habitat for nesting birds and reptile basking on the southern facing, wind protected slopes. Deer and rabbit/hare footprints were observed.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>	
TN58	
<p>Recent land slip at the quarry edge which is approximately 50 m wide. The boundary fence has been replaced and repaired. The resulting land slip has produced large protruding rocks, which provide suitable breeding/roosting ledges for birds of prey such a peregrine (confirmed breeding within the quarry).</p> <p>Habitat Condition (provisional): Not applicable (no assessment required)</p>	
TN59	
<p>Large rock pile at the side of an access trackway which provides suitable refugia for reptiles.</p> <p>Habitat Condition (provisional): Not applicable (no assessment required)</p>	
TN60	
<p>The settling ponds at the northern end of the site are actively used to store water and are also abstracted for current quarrying activities. There appears to be no emergent or submerged vegetation within the water and large amounts of suspended silt are present in the water column. The pond is surrounded by sparsely vegetated bunds (see TN69). Several bird species use the ponds and nest on the nearby bunds and surrounding habitats.</p> <p>Habitat Condition (provisional): Poor (Score 1)</p>	

TN61		
<p>Former active quarry area which now comprises a flat plateau at the top of the quarry, where the habitat is characterised as wet dwarf shrub heath. Dominant species include ling, bilberry, hare's tail cotton grass (<i>Eriophorum vaginatum</i>), <i>Polytrichum</i> sp., <i>Sphagnum</i> mosses (at least four species), crowberry, feather mosses, heath rush (<i>Juncus squarrosus</i>), cross leaved heath (<i>Erica tetralix</i>), wavy hair grass, sheep fescue, several sedge species and heath bedstraw. The ground is tussocky with the grasses and mosses forming mounds. The heather shrub is all of a similar age. The habitat provides potential opportunities for nesting birds, reptiles, small mammals and amphibians. Confirmed common lizard (<i>Zootoca vivipara</i>) sighting. An abundance of green hairstreak butterflies (<i>Callophrys rubi</i>) were noted. Further NVC survey recommended depending on development proposals.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>		
TN62		
<p>Two former lagoons, which now comprise bare earth becoming colonised by scattered short perennial / ephemeral vegetation and soft rush. Potential for nesting birds and reptiles.</p> <p>Habitat Condition (provisional): Poor (Score 1)</p>		
TN63		
<p>Dry dwarf shrub heath upon the exposed quarry face on a steep south-east facing slope. Species present include those listed in TN50. Suitable habitat for reptiles and nesting birds.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>		

TN64			
<p>Small, dry pond choked with a dense covering of vegetation which has dried over the exposed pond floor. Species identified include water crowfoot (<i>Ranunculus aquatilis</i>) and water starwort species. The pond will likely hold water during periods of rainfall and is fringed with soft rush. Potential for nesting birds, amphibians and reptiles; although due to the likelihood of frequent drying out is considered to be unsuitable as an amphibian breeding pond.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>			
TN65			
<p>Continuous bracken on a steep south facing slope over a carpet of mosses. Confirmed presence of common lizard (photographed) amongst the undergrowth. Potential for amphibians, nesting birds and small mammals.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>			
TN66			
<p>Mature willow scrub with a ground layer of dry dwarf shrub heath and scattered soft rush. Potential for small mammals, nesting birds, foraging bats, amphibians and reptiles.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>			

TN67			
<p>Exposed rock pile adjacent to an area of dry dwarf shrub heath within the slope of continuous bracken. Steep south facing slope with potential for reptiles, small mammals and nesting birds. Rocks are sparsely vegetated with ling heather, foxglove, bilberry and cowberry (<i>Vaccinium vitis-idaea</i>).</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>			
TN68	No photo.		
<p>Wet dwarf shrub heath at the flat base of slope, in a roughly circular depression where water is held just beneath the surface. Species include ling, bilberry, cross-leaved heath, common cotton grass (<i>Eriophorum angustifolium</i>), hare's tail cottongrass, wavy hair grass, cranberry (<i>Vaccinium oxycoccos</i>), <i>Sphagnum</i> mosses (at least 4 types), several sedge species, feather mosses, sheep's fescue and carnation sedge (<i>Carex panicea</i>). There are some pools of stagnant water within the habitat. The topography is undulating with mossy hummocks. The heather vegetation is of a similar age throughout. Potential for amphibians, reptiles, nesting birds, small mammals and foraging bats.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>			
TN69			
<p>Ephemeral / short perennial vegetated pathway with spoil bunds either side. The track appears unused currently but once provided access around the site. Species include daisy, ling, willow scrub, wavy hair grass, ribwort plantain (<i>Plantago lanceolata</i>), brooklime (<i>Veronica beccabunga</i>), broadleaved dock, bird's-foot trefoil (<i>Lotus corniculatus</i>), marsh thistle, soft rush, sweet vernal grass (<i>Anthoxanthum odoratum</i>), ragwort, lady's mantle (<i>Alchemilla vulgaris</i>), crowsfoot, square stalked St. John's wort (<i>Hypericum tetrapterum</i>), creeping cinquefoil (<i>Potentilla reptans</i>), silverweed (<i>Argentina anserina</i>), soft rush and yarrow (<i>Achillea millefolium</i>). This habitat is suitable for nesting birds, small mammals, invertebrates and foraging bats.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>			

<p>TN70</p>	
<p>Small area of flush surrounding a slow through flow of water between P16 and P17. The habitat is dominated by soft rush with scattered <i>Sphagnum</i> mosses, hemp agrimony (<i>Eupatorium cannabinum</i>) and bulrush (<i>Typha latifolia</i>). Suitable for reptiles, amphibians and nesting birds. To the south of the flush, <i>Sphagnum</i> mosses are absent and the habitat grades into marshy grassland.</p> <p>Habitat Condition (provisional): Good (Score 3)</p>	
<p>TN71</p>	
<p>Ephemeral / short perennial vegetation surrounding a lagoon. Sections of the habitat are located on steep west facing slopes, with patches of bare earth. Species include daisy, common sedge (<i>Carex nigra</i>), marsh thistle, soft rush, willow, ling heather, sheep fescue, common mouse ear, ragwort, rosebay willowherb and birds foot trefoil. Approximately five spikes of common spotted orchid were identified. The vegetation is short and transitions at the lagoon edge to marshy grassland. Suitable for ground nesting birds, reptiles and invertebrates.</p> <p>Habitat Condition (provisional): Moderate (Score 2)</p>	

TN72	
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Mixed plantation woodland on an eastern facing slope at the edge of the boundary. Canopy species include rowan, larch (*Larix decidua*) and alder (*Alnus glutinosa*). The trees are semi-mature and all of a similar age. No potential roosting features for bats were noted. They are planted over dry dwarf shrub heath, dominated by ling. Suitable for nesting birds, small mammals, reptiles, foraging bats and terrestrial amphibian habitat.

Habitat Condition (provisional): Moderate (Score 2)

TN73	<div style="display: flex; justify-content: space-around;">   </div>
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Herb-rich semi-improved neutral grassland verge at the entrance to the quarry with some acidic indicator species. Some areas are recently disturbed as evidenced by locally dominant patches of common nettle (*Urtica dioica*). Species include Yorkshire fog, meadow vetchling (*Lathyrus pratensis*), creeping thistle (*Cirsium arvense*), common nettle, red fescue, cuckoo flower (*Cardamine pratensis*), creeping buttercup, marsh thistle, dandelion (*Taraxacum* agg.), common sorrel, ribwort plantain, heath bedstraw, field woodrush (*Luzula campestris*), common mouse ear (*Cerastium fontanum*) and ragwort. Evidence of use by rabbits is present. Approximately six orchid spikes (possibly marsh orchid (*Dactylorhiza majalis*)) were identified within this area of grassland as well as behind the car parking area. Suitable habitat for nesting birds and small mammals.




Habitat Condition (provisional): Moderate (Score 2)


Watercourses

WC22	<div style="display: flex; justify-content: space-around;">   </div>
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Very slow flowing outfall from pond which flows approximately south-west between two small hillocks. The channel is indistinct and dry in places. The depth is up to 4 cm. The channel is fringed by soft rush with shade provided by willow scrub. Negligible protected species potential but suitable for amphibians in stagnant areas.

Habitat condition (provisional): Moderate (Score 2)	
WC23	
<p>A very narrow overflow channel running between ponds/lagoons flowing around a small hillock and then out of the site towards the south. The stream banks are vertical earth banks, up to 30 cm tall and the channel is approximately 10 cm wide. In some areas the channel is indistinguishable beneath the rushes / flush. Fringed by soft rush and continuous bracken in the wider area. Negligible protected species potential.</p> <p>Habitat condition (provisional): Moderate (Score 2)</p>	
Ponds	
P16	
<p>A horseshoe-shaped pond, the last (fourth) in a line of settling ponds (P16 to P19) which is situated on a slope at the southern edge of Waddington Quarry. The pond is large, measuring approximately 40 m x 10 m at the northern half, and 25 m x 20 m at the southern half. The eastern half of the pond in the arch of the horseshoe, has a dense stand of bulrush (<i>Typha latifolia</i>). Additional aquatic plants include brooklime and willowherb. The pond banks are steep sided and undercut in places. The surrounding habitat comprises dry dwarf shrub heath and scattered willow scrub. There is a notable abundance of dead common toads (<i>Bufo bufo</i>) and common frogs (<i>Rana temporaria</i>) showing signs of predation (possibly grey heron (<i>Ardea cinerea</i>) or otter). Hundreds of tadpoles (toad and frog) were noted within the pond. The road is approximately 30 m to the east of the pond and is a known crossing point for toads and frogs during the migration periods. Canada geese (<i>Branta canadensis</i>) were present around the pond at the time of the survey, however their impact is considered to be minor. The depth of the pond is unknown, although it is shallow (approximately 30 cm) at the banks.</p> <p>At the north-western corner of the pond, there is a minor inflow from P17, and at the south-western corner there is a minor outflow of water from the pond itself.</p> <p>eDNA result: Negative</p>	

P17	
<p>A large (60 m x 25 m), oval pond, which is third in the line of settling ponds, situated on a slope at the edge of Waddington Quarry. The surrounding habitat comprises dry dwarf shrub heath and mature willow scrub. Marginal vegetation includes soft rush, bird's-foot trefoil and willowherb sp. There is no aquatic vegetation. As with P16 there are numerous dead toads and frogs around the pond. A minor outflow of water is present in the south-western corner, which was not flowing at the time of survey but connects to P16. The depth of the pond is unknown, although it is shallow (approximately 30 cm) at the banks.</p> <p>eDNA result: Negative</p>	
P18	
<p>A large (65 m x 60 m), roughly square-shaped pond, second in a line of settling ponds situated on a slope at the edge of Waddington Quarry. The water level has recently dropped, and the pond is approximately 80% of the maximum size. The banks comprise a mixture of gradual sloping bare earth banks to steep, undercut heathland vegetation. The pond appears to receive some water from P19 via a pump. Toad tadpoles were identified within the pond. No emergent vegetation was noted. The surrounding habitat includes scattered willow scrub and soft rush.</p> <p>eDNA result: Negative</p>	
P19	
<p>A large rectangular pond (100 m x 30 m) which is first in a line of settling lagoons situated on a slope at the edge of Waddington Quarry. This pond contains a high load of suspended silt, being the closest to the point of input. The water level is high and there is a pump that connects this pond to P18, which is the next in line. At the northern end there is a running inflow pipe which supplies silt laden water from the quarrying activities. The pond is surrounded by vegetated bunds and the banks comprise a combination of steep, undercut heather and scrub, and gently sloping bare earth. Toad and frog tadpoles were identified within the water. There is no emergent vegetation and a small fringing of</p>	

soft rush is present. eDNA result: Negative	
P20	
<p>An extensive 'L' shaped waterbody in the base of Waddington Quarry measuring approximately 100 m by 200 m. This waterbody has been formed by collected rainwater. From vantage points within the quarry, no emergent vegetation was noted within the water. Surrounding habitat includes some semi-natural mosaic of scrub, ephemeral / short perennial and rushes, however the majority of the area comprises bare ground / quarried materials. There is a large amount of sediment build up within the waterbody, with the western area appearing shallower.</p> <p style="color: red;">There was no safe access to eDNA sample the pond due to the presence of active bird nests as well as health and safety concerns with entrapment in the silted sediments along the banks.</p> <p>eDNA result: Not sampled.</p>	

References

- Biggs, J., Ewald, N., Valentini, A., Gaboriaud, C., Dejean, T., Griffiths, R. A., Foster, J., Wilkinson, J. W., Arnell, A., Brotherton, P., Williams, P. & Dunn, F. (2015). *Using eDNA to develop a national citizen science-based monitoring programme for the great crested newt (Triturus cristatus)*. *Biological Conservation*. **183**, 19-28.
- JNCC (1993 revised 2010) *Handbook for Phase 1 Habitat Survey: A technique for environmental audit (reprint)*. Joint Nature Conservation Committee, Peterborough.
- CIEEM (2013) *Guidelines for Preliminary Ecological Appraisal*. Chartered Institute of Ecology and Environmental Management, Winchester.
- Natural England (2019). *The Biodiversity Metric 2.0: Auditing and accounting for biodiversity value: technical supplement (Beta version)*.
- Collins (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition)*. The Bat Conservation Trust, London.