



NORTHERN LITHIUM

LUDWELL FARM, WEARDALE

PRELIMINARY ECOLOGICAL APPRAISAL REPORT

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PREPARED BY:

LORRAINE PALMER ASSOCIATE DIRECTOR



**REVIEWED AND
APPROVED BY:**

TIM PALMER TECHNICAL DIRECTOR



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EXECUTIVE SUMMARY

The Preliminary Ecological Appraisal (PEA) of land at Ludwell Farm, Weardale is required to identify ecological constraints associated with exploration works involving the creation of temporary access tracks and boreholes for the abstraction and reinjections of groundwater. The proposals will involve drilling to and extraction of lithium-rich groundwater, offsite processing to extract the lithium and onsite reinjection of the groundwater.

Potential ecological constraints (in the absence of mitigation) are as follows:¹:

Foraging / commuting bats; and

Breeding birds.

Additional assessments, surveys and pre-construction checks have been recommended as necessary to fully inform the planning application (these surveys are currently being undertaken):

Bat activity surveys; and

Breeding bird surveys.

Mitigation² compensation³ and enhancement⁴ opportunities are discussed in the final section of the report, but include the following:

Vegetation clearance undertaken outside of the bird nesting season, or an inspection carried out by an appropriately qualified ecologist.

Regarding overall habitat losses and gains, the proposals are not suitable for assessment of Biodiversity Net Gain (BNG) via application of the DEFRA Metric given their temporary nature. All habitats impacted will be fully re-instated and managed via the current agricultural means, hence there will be no long-term loss of habitat related biodiversity. Net gains will be secured via number of measures for protected species, such as:

Installation of 10x 'woodcrete' bat boxes within mature trees in the wider study area;

¹ The Preliminary Ecological Appraisal (PEA) Report provides an overview of likely effects and, therefore, may not be sufficient to support a planning application on its own. Specialist surveys may be required to fully investigate effects and / or to support an Ecological Impact Assessment (EclA) for projects screened as requiring Environmental Impact Assessment (EIA).

² Mitigation are measures required in order to reduce the severity and magnitude of identified effects to an acceptable level.

³ Compensation is required where effects cannot be fully mitigated.

⁴ Enhancements are required in accordance with national planning policies in order to ensure no net loss of site biodiversity.

Installation of 10 'woodcrete' bird boxes on mature trees; and
Installation of a single tree mounted barn owl box.

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Wardell Armstrong LLP (WA) was commissioned by Northern Lithium to undertake a Preliminary Ecological Appraisal (PEA) in support of a proposal for the abstraction of lithium-rich groundwater, offsite processing to extract the lithium as lithium carbonate and onsite reinjection of the groundwater. The project is located on land at Ludwell Farm, Weardale, County Durham central Ordnance Survey (OS) grid reference NY944381.

1.1.2 This report has been produced with reference to current guidelines for UK Habitat (UKHAB) Classification (Butcher, 2020), Guidelines for Preliminary Ecological Appraisal (CIEEM 2017a) and Code of Practice for Planning and Development (BSI 2013).

1.1.3 The purpose of the Preliminary Ecological Appraisal Report (PEAR) is to satisfy the requirements of the National Planning Policy Framework (NPPF) and in broad terms to undertake the following:

Identify the likely ecological constraints associated with a project;

Identify any mitigation measures likely to be required, following the 'Mitigation Hierarchy'⁵;

Identify any additional surveys that may be required to inform an Ecological Impact Assessment (EclA); and

Identify the opportunities offered by a project to deliver ecological enhancement.

1.1.4 Certain species, habitats and nature conservation sites receive legislative protection, which is detailed fully within Appendix 1. Other species / groups and habitats are notable due to their identification in national and / or local planning policy or via local records. An indicative assessment of potential adverse effects to such receptors is provided, although this is not a substitute for full Ecological Impact Assessment (CIEEM 2018), which may be required to fully inform any subsequent planning application along with additional (Phase II) surveys and assessments.

1.1.5 Provisional mitigation and enhancement opportunities are also discussed, where appropriate.

⁵ As defined in British Standard BS 42020:2013 (BSI 2013)

1.2 Proposed Development

- 1.2.1 The proposed development would involve the abstraction of lithium-rich groundwater from the granite bedrock for offsite processing to extract the lithium prior to reinjection (onsite) of the groundwater.
- 1.2.2 The proposed development will comprise two phases. The first phase will extend for a period of five years and will include both construction (i.e. drilling) and operation (i.e. abstraction and reinjection). At the end of the five years, the boreholes will be capped and subject to periodic monitoring for a period of up to five years. After this, the site will be restored.
- 1.2.3 The proposed development will comprise a total of up to six boreholes, including the two already permitted, within five of the 'exploration borehole' locations. The boreholes will be drilled to a depth of between 500m to a maximum of c1,000m below ground level (bgl), will be between 10cm and up to a maximum of 50cm in diameter and used to test either abstraction or reinjection techniques (as appropriate).
- 1.2.4 Each borehole will be capped with a metal well head, approximately 0.5m in height.
- 1.2.5 The existing gravel access track will be extended to allow access to all exploration borehole locations.
- 1.2.6 The boreholes will be fully cased in steel to the top of the granite to ensure any groundwaters in the overlying limestone and whinstone have no ability to intermix with any saline brines from the underlying granite.
- 1.2.7 During construction, drilling will take place during the daytime only (maximum 0700 to 1900 seven days per week) and the drill would be up to 24m in height. Construction traffic is estimated to be circa five vehicles in and five vehicles out per day. Drilling is estimated to take three-four months.
- 1.2.8 During operation, the abstraction and reinjection wells will be six feet in height, and the monitoring borehole will be circa 30 cm in height. The operational lifespan will be up to five years, with an additional five years of monitoring / testing. The extracted lithium would be used in electric car battery manufacture.
- 1.2.9 The site will be maintained in agricultural (grazing) use for the duration of the development, other than the temporary development pads around each borehole during construction.

1.3 Site Context

- 1.3.1 The exact extent of the proposed redline boundary for the planning application is significantly smaller than the study area (NT15799.001 Application Boundary and Layout of Pilot Investigation Site). For the purposes of this report 'the site' will refer to the study area. The site location is shown in Figure 1 and the proposed study area is shown in Figure 3.
- 1.3.2 Ludwell Farm is at Eastgate, Weardale in County Durham. The farm is located to the south of the A689, the main valley road. The site comprises a number of grazing fields, divided by dry stone walls and mature trees with associated farm buildings and tracks. The farm is bisected by the C74 east to west, a single lane minor road.
- 1.3.3 Beyond the site and to the north of the site is the River Wear into which the Ludwell Burn flows. Areas of woodland are found around the edge of the site and next to the river. Some woodland beyond the study area is designated as Ancient, Semi-Natural and Ancient Replanted Woodland.
- 1.3.4 There are two Special Areas of Conservation (SAC) sites located within 2.5km of the study area, namely, the North Pennine Moors SAC located 1.8km to the south and 2.4km to the north and North Pennine Dale Meadows SAC located 2.1km to the south-east. A further four Sites of Special Scientific Interest (SSSI's) are also present within 2km of the site, the closest of which Fairy Holes Cave SSSI, lies 1.2km to the south-west and Westernhope Burn Wood SSSI, about 0.38km to the west.

2 METHODOLOGY

2.1 Desk Study

2.1.1 The desk study was informed by review of existing available information provided by Ecological Records and Information Centre -North East (ERIC) and from available internet-based resources for a 2km search radius and from the site's central grid reference. The search area was extended to 5km for Special Protected Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites due to their ecological sensitivity. Ordnance Survey (OS) and satellite mapping was also used to gain contextual habitat information.

2.1.2 Specific information was sought for:

Statutory designated sites⁶;

Locally designated sites;

Ancient woodland⁷;

Protected and priority species;

Priority Habitats and Species⁸;

Local Biodiversity Action Plan (LBAP) priority habitats and species.

2.1.3 The ecological desk study was carried out by a full member of CIEEM, who has completed numerous ecological desk studies within the last year.

2.2 Extended UKHab Habitat Survey

2.2.1 WA carried out a UK Habitat (UKHab) Classification Survey of the Site on 12th July 2022. The survey was carried out by an experienced WA ecologist.

2.2.2 The survey broadly followed the 'UK Habitat Classification' methodology as set out in the user manual (Panks et al., 2022) and each of the main habitats were classified according to the relevant criteria including vegetation composition expressed according to the DAFOR system.

2.2.3 In addition to the mapping and description of habitats, the survey was 'extended' to include the incidental observations of protected and / or notable species and the

⁶ Locations provided by MAGIC <http://magic.defra.gov.uk/MagicMap.aspx>

⁷ As defined by Natural England in their Inventory of Ancient Woodlands
http://www.gis.naturalengland.org.uk/pubs/gis/tech_aw.htm

⁸ As defined under Section 41 (England) and Section 42 (Wales) of the Natural Environment and Rural Communities (NERC) Act 2006, which have superseded UK Biodiversity Action Plan lists.

potential for such species to occur onsite (and in the surrounding landscape where relevant) were also recorded onto secure digital media for mapping and data collection. The extended element of the survey was based on professional judgement.

2.2.4 Specific habitat features are mapped on Drawing NT15799/020 with appropriate reference numbers identifying features of particular note. Waterbody locations are provided on Drawing Number NT15799/Figure 5.

2.3 Environmental DNA (eDNA) Survey

2.3.1 One waterbody (WB1) located within 500m of the redline boundary was tested for great crested newt (GCN) environmental DNA (eDNA) on 9th June 2022.

2.3.2 Twenty samples of water were taken from different locations around each waterbody; where each sample was to be collected, a 30ml ladle was used to gently mix the water column, before filling the ladle with water and emptying each sample into a collection bag. This was repeated twenty times.

2.3.3 Efforts were taken to avoid disturbing sediment whilst taking water samples and shallow water (5-10cm) was not sampled. Where possible, water samples were collected from pond areas likely to be used by GCN, such as areas of vegetation for egg-laying or open areas for displaying.

2.3.4 The collection bag was then shaken thoroughly to mix the water and DNA contents. A sterile plastic pipette was used to fill six 50ml sample tubes, stirring the water contents between filling each pipette to homogenise the sample. Once filled, all six sample tubes were shaken thoroughly to mix the DNA and preservative, preventing DNA degradation. Water samples were then sent to an approved laboratory for DNA testing.

2.3.5 Following analysis from an approved laboratory, eDNA identifies the presence / likely absence of GCN to inform whether population size class assessment surveys are required. Following the receipt of samples, Applied Genomics Ltd undertook laboratory analyses consistent with the methods described in Appendix 5 of the DEFRA WC1067 Technical Advice Note (Biggs et al., 2014b) including control analyses for inhibition and degradation.

2.3.6 The limitations of this method are as follows:

Sediment, organic matter and pollutants in the sample may affect DNA quality and the qPCR reaction;

The results of the analyses are qualitative and do not indicate anything other than detection or non-detection of great crested newt DNA;

As eDNA may persist for up to several weeks in a water body. Positive results do not imply the pond is currently occupied; and

A negative result for GCN eDNA does not exclude the possibility of presence at levels below the limit of detection

2.4 Evaluation and Assessment of Features

2.4.1 Evaluation of the importance / likely importance of ecological features and the likelihood of impacts affecting important features was made, where possible, using professional judgement in accordance with published guidance (CIEEM 2017b).

2.4.2 Protected and NERC s.41 Priority species were evaluated in order to identify potential adverse effects (in Table 2), based on the following criteria:

Desk study records;

Evidence found during the survey;

Presence, extent, quality and viability of suitable on-site habitat;

Ecological connectivity to viable off-site habitats; and

Perceived impacts of habitat loss/impact to individuals in relation to proposals.

2.4.3 A 'traffic light' system is used (in Table 1 and Table 2) to highlight potential constraints whereby:

Green: No constraints identified.

Amber: Potential constraints, mitigation required.

Red: Constraints identified / Risk of an offence / Further survey required.

2.4.4 The sensitivity of each feature has been evaluated within a geographical context, with each habitat or species falling into one (or more) of the following categories:

International and European;

National (within England);

Regional (North East);

County / Metropolitan (North Yorkshire);

Local (Hambleton);

Site (i.e., within the defined survey area); and

Of negligible importance.

- 2.4.5 When a feature falls into more than one category, it is considered to be within the highest level. Some features can be readily assigned to one of the above categories, particularly sites that support designations. For example, a site with a designation assigned through European legislation, such as a SAC would normally be considered of international importance, a SSSI designated by UK statute would be of national importance and a site designated by a Local Authority would be of county importance.
- 2.4.6 Individual species may be protected under European or National legislation. Such protection is relevant to the assignment of value to such species, but additional factors, such as population size and the nature of the distribution of the species, are also considered.
- 2.5 Nomenclature
- 2.5.1 Vascular plant names follow 'New Flora of the British Isles' (Stace 2010) with vernacular names as provided in the Botanical Society of the British Isles website (BSBI, 2013)⁹. All other flora and fauna names following the National Biodiversity Network (NBN) Atlas (NBN, 2017). The common and scientific name of species / taxa is provided (if available) when first mentioned in the text, with only the vernacular name referred to thereafter.
- 2.6 Caveat
- 2.6.1 Ecological surveys are limited by factors that affect the presence of plants and animals, such as time of year, weather, migration patterns and behaviour. The survey was undertaken in July and, therefore, represents a valid sample of ecological evidence present on that date / season. The report is not designed, nor is it required to present a complete inventory of flora / fauna.
- 2.6.2 In general terms, this report remains valid for up to 2 years from the date of habitat survey, however a walkover survey within this period may be required to demonstrate whether or not the habitats have remained as described.
- 2.6.3 Survey results for European Protected Species (EPS) typically require updates within three months of licence applications being submitted. Additional checks may also be necessary prior to the onset of development work for certain species to ensure legal compliance.

⁹ <http://rbg-web2.rbge.org.uk/BSBI/intro.php>

- 2.6.4 The absence of desk study records is not relied upon to determine absence of a particular species or habitat. Often, the absence of records is a result of under-recording within the given search area and, as such, the experience of the ecologist concerned together with a range of additional factors (in particular, the presence / absence of potentially supporting habitat) is used to infer likely presence / absence of ecological receptors.
- 2.6.5 Grassland fields to the north of the C74 minor road had been cut for hay prior to the survey, which made it difficult to compile a detailed species list. A search for basal rosettes and cut stems was undertaken in combination with additional marginal vegetation to ensure habitat classifications are as accurate as possible.
- 2.7 Quality Assurance & Environmental Management
- 2.7.1 The surveys and assessments have been overseen by and the report checked and verified by a member of CIEEM, whom is bound by its code of professional conduct. All surveys and assessments have been undertaken with reference to the recommendations given in British Standard BS 42020, and as stated within specialist guidance, as appropriate and referenced separately.

3 RESULTS AND EVALUATION

3.1 Statutory and Non- Statutory Conservation Sites

3.1.1 Desk study results for conservation sites are evaluated in Table 1, below. Sites that are considered potentially sensitive to the development proposals by virtue of their supported species or habitat assemblages, the distance / ecological connectivity to the site and the nature of the perceived impacts are discussed in detail in the final sections of the report. Sites for which potential adverse effects are not anticipated are excluded from further assessment.

Table 1: Statutory and Non-Statutory Sites Evaluation

Site Name and Status ¹⁰	Distance from Site	Reason for Designation/identification	Evaluation
North Pennine Moors SAC	1.8km (E) 2.4km (NE)	The North York Moors supports several Annex I habitats including European dry heaths (4030), Juniperus communis formations on heaths or calcareous grasslands (5130), blanket bogs (7130), petrifying springs with tufa formation (7220), siliceous rocky slopes (8220) and old sessile oak woods with Ilex and blechnun (91A0).	The Site lies wholly outside the designated area (all plant will be at least 1.8 KM distant) and, therefore, no direct impacts shall occur. The Impact Risk Zone (IRZ) is not triggered by the discharge of water via the re-injection boreholes as the boreholes will be fully-cased in steel to the top of the granite to ensure any groundwaters in the overlying limestone and whinstone have no ability to intermix with any saline brines from the underlying granite; thereby ensuring no pathway for potential contaminants to travel. It is also noted that the conservation sites are significantly elevated, relative to the application site. Given the nature of the proposed development, no indirect effects through dust or noise are anticipated; no disturbance impacts are predicted to qualifying birds.
North Pennine Moors SPA	1.8km(E) 2.4km (NE)	The site supports four Annex II species including Hen Harrier Circus cyaneus, merlin falco columbarius, Peregrine Falco peregrinus, European golden plover Pluvialis apricaria. During the breeding season the area regularly supports: 2.2% of the British hen harrier population, 10.5% of the British merlin population, 1.3% of the peregrine population and 6.2% of the European golden plover population.	The Site lies wholly outside the designated area (all plant will be at least 1.98 km distant) and, therefore, no direct impacts shall occur. Given the nature of
Bollihope, Pikestone, Eggleston and	1.98km (SE)	The upland block encompassing Bollihope, Pikestone, Eggleston and Woodland Fells one of the most extensive areas of dry heath. In	

¹⁰ SPA – Specially Protected Area, SAC – Special Area for Conservation, Ramsar – site designated under the Ramsar Convention, SSSI – Site of Special Scientific Interest, NNR – National Nature Reserve, LNR – Local Nature Reserve.

Site Name and Status ¹⁰	Distance from Site	Reason for Designation/identification	Evaluation
Woodland Fells SSSI		particular, it demonstrates the west to east transition from blanket mire to dry heath, which is characteristic of these uplands. The presence of wet heath, acid grassland, flushes, relict juniper woodland and small open water bodies increased the habitat diversity of this moorland. As a result, the area supports a nationally important assemblage of moorland breeding birds. These blocks form part of the North Pennines Moorlands proposed Special Protection Area which is of international importance on account of its breeding bird populations, particularly merlin and golden plover.	the proposed development, no indirect effects through dust or noise are anticipated and no disturbance impacts are predicted to qualifying birds; no adverse effects are anticipated.
Westernhope Burn Wood SSSI	0.38km (W)	Semi-natural broadleaved woodland characteristic of the north Pennines. On drier soils ash <i>Fraxinus excelsior</i> and wych elm <i>Ulmus glabra</i> are the dominant species of the canopy, whilst bird cherry <i>Prunus padus</i> , birch <i>Betula</i> sp., rowan <i>Sorbus aucuparia</i> and, to a lesser extent, sycamore <i>Acer pseudoplatanus</i> are frequent components. Hazel <i>Corylus avellana</i> is dominant in the understorey with frequently occurring holly <i>Ilex aquifolium</i> . Beside the burn and valley sides are alder <i>Alnus glutinosa</i> woodland. At the woodland edge there are areas of acidic and calcareous grassland.	The proposed development area lies wholly outside the designated area (at least 0.38km distant, most likely 0.6km distant from proposed trail borehole locations). As the extraction of groundwater shall be undertaken via a boreholes, no indirect effects through, dust and run-off shall occur. The Impact Risk Zones IRZ will not be potentially triggered by the injection of groundwater via the re-injection boreholes as the boreholes will be fully-cased in steel to the top of the granite and; thereby ensuring no pathways and no risk of groundwater pollution.
West Newlandside Meadows SSSI	1.84km E	West Newlandside Meadows support important plant communities characteristic of northern hay-meadows maintained by traditional farming methods. These fields include species-rich grass swards regularly cropped for hay as well as steep uncut banks with calcareous	The proposed development area lies wholly outside the designated area (at least 1.84km distant). As the extraction of groundwater shall be undertaken via borehole, no indirect effects through habitat loss, dust and water run-off shall occur. No negative effects on the designated area are anticipated.

Site Name and Status ¹⁰	Distance from Site	Reason for Designation/identification	Evaluation
		soils supporting a highly diverse plant community. Locally rare species present include adder's-tongue <i>Ophioglossum vulgatum</i> and frog orchid <i>Coeloglossum viride</i> while the nationally rare northern hawk's-beard <i>Crepis mollis</i> is found in considerable quantity.	
Fairy Holes cave SSSI	1.2KM (s)	Fairy Holes Cave is identified as being of national importance for geological conservation. It contains the longest known stream passage in the Yoredale Limestone of the North Pennine Dales. It's simple linear form and the way that it has developed along naturally occurring lines of weakness in the rock are characteristic of caves in that part of Northern England to the north of the Ingleborough-Wharfedale area of North Yorkshire, and it is significant as the best developed example of this type.	This site lies wholly outside the designated area by 1.2km. The proposed works will not have a direct or indirect impact on the geology of this designated site. No adverse effects are anticipated
Sunderland Cleugh LWS	1.8km (NE)	Area of grassland approximately 1.6ha that comprises Northern hawk's beard (<i>Crepis mollis</i>).	This site lies wholly outside the designated area by 1.8km. The site is separated from the development by the A689 carriageway and several fields of farmland habitat. No direct or indirect effects are considered likely as a result of the proposed development.
Horsley Burn Wood LWS	1.5km (SE)	A narrow band of woodland within the valley of the Horsley Burn approximately 20ha in size. Ash <i>Fraxinus excelsior</i> is dominant in the canopy which also contains a large amount of downy birch <i>Betula pubescens</i> . The understorey is well developed with a mixture of rowan <i>Sorbus aucuparia</i> and hazel <i>Corylus avellana</i> with stands of blackthorn <i>Prunus spinosa</i> . The ground flora is varied, despite grazing by sheep in	The proposed development lies wholly outside the designated site. Given the nature of the development no direct or indirect impacts are anticipated.

Site Name and Status ¹⁰	Distance from Site	Reason for Designation/identification	Evaluation
		places, and is characteristic of moderately rich soils with ramsons <i>Allium ursinum</i> , wood crane's-bill <i>Geranium sylvaticum</i> , primrose <i>Primula vulgaris</i> and many other species. A burn descends over a number of small waterfalls with deep pools beneath them and steep sided gorges above and these areas are the habitat for a wide variety of mosses and lichens.	

3.1.2 The search area is extended to allow for the inclusion of Impact Risk Zones (IRZs) for SSSIs¹¹. IRZs define areas around SSSI's that could be impacted by development schemes. The zones vary depending on the particular sensitivities of the features for which the SSSI is notified and indicate the types of development proposal that could potentially have adverse impacts. The desk study shows that the application site falls within the IRZ for the North Pennine Moor SPA/Sac and Westernhope Burn Wood SSSI and Fairyholes Cave SSSI, with the following development proposals considered likely to adversely affect the SSSI: airports, slurry lagoons, waste incineration units, sewage treatment works or any discharge of water of more than 20m³/day to ground. In this case, the IRZ will not be triggered due to there being no pathway between the application site and the SSSI's.

3.2 Habitats

3.2.1 All habitats within the survey area are described in Table 2, below, together with an indication of their NERC s41¹² status and inclusion within the Durham Local BAP¹³. The table also provides an evaluation of the sensitivity of the habitats relative to the application proposals.

3.2.2 Habitats that could be subject to adverse effects are discussed in the latter sections of the report. Habitats for which potential adverse effects are not anticipated are excluded from further assessment. The location and extent of habitats is shown on

¹¹<https://data.gov.uk/dataset/ssi-impact-risk-zones>.

¹²Habitats listed under section 41 of the Natural Environment and Rural Communities (NERC) Act as habitats of Principal Importance.

¹³<http://www.neenp.org.uk/natural-environment/durham-priority-species/>.

Drawing NT15799/020, Extended Phase 1 Habitat Survey Results. Representative photographs of each habitat type are provided in Appendix 2.

Table 2: Habitat Description and Evaluation

Habitat Description	UK Hab Classification	Evaluation (Importance)	Impacts
<p><u>Other neutral grassland</u></p> <p>The dominant habitat on the site. The majority of grassland mapped as g3c was cut for hay, so general sward height was low. Fields are typically divided by dry stone walls and occasionally by a post and wire fence. Species included abundant Yorkshire fog <i>Holcus lanatus</i>, frequent perennial rye-grass <i>Lolium perenne</i>, meadow foxtail <i>Alopecurus pratensis</i> and occasional cock's-foot <i>Dactylis glomerata</i>. The grassland fields were typically grass dominated with few herbs.</p> <p>The fields to the north of the C74 minor road comprised a finer neutral grassland vegetation comprising abundant perennial rye-grass, and red fescue <i>Festuca rubra</i> with frequent common bent <i>Agrostis stolonifera</i>, yarrow <i>Alchemilla millifolium</i> and crested dog's-tail <i>Cynosaurus cristatus</i> and occasional cock's-foot <i>Dactylis glomerata</i>, common nettle <i>Urtica dioica</i>, common mouse-ear <i>Cerastium fontanum</i>, creeping and spear thistle <i>Cirsium arvense</i> and <i>Cirsium vulgare</i>.</p> <p>Two large fields to the south of the River Wear are on low-lying floodplain land adjacent to the River Wear. Vegetation comprises abundant perennial rye-grass, crested dog's-tail <i>Cynosaurus cristatus</i>, Yorkshire fog, frequent creeping bent <i>Agrostis stolonifera</i>, occasional sweet vernal grass <i>Anthoxanthum odoratum</i>, germander speedwell <i>Veronica chamaedrys</i> and curled dock <i>Rumex crispus</i> with rarely occurring lesser trefoil and lady's mantle <i>Alchemilla vulgaris</i>. This habitat does not meet the criteria for Floodplain and grazing marsh priority habitat.</p> <p>A small wet flush is present to the west of the survey area which briefly runs through the edge of a field before running offsite. The flush is approximately 0.2m wide and sits in a gully that is ,0.2m deep. The wet flush is covered in grassy</p>	<p><u>Primary Code</u></p> <p>Other neutral grassland (g3c)</p> <p><u>Secondary Codes</u></p> <p>Hay (65) Mesic (118)</p> <p><u>Secondary Codes</u></p> <p>Sheep grazed (60) Mesic (118)</p> <p>Sheep grazed (60) Hay(65) Mesic (118) Neutral grassland with calcicoles (123)</p> <p>Wet (120) Flush (129)</p>	<p>Site</p> <p>Site</p> <p>Site</p> <p>Site</p>	<p>Less than one hectare of grassland habitat shall be temporarily lost to facilitate the proposed development.</p> <p>A temporary linear gravel track will allow access to the boreholes locations. The access track and the borehole exploration areas will be located wholly out of the flood plain (associated with the River Wear).</p> <p>This habitat is considered to be common and widespread in a national and local context and, therefore, no negative effects are considered likely.</p>

Habitat Description	UK Hab Classification	Evaluation (Importance)	Impacts
<p>vegetation comprising frequent floating sweet-grass <i>Glyceria fluitans</i>, creeping bent, perennial rye-grass and tufted hair-grass <i>Deschampsia cespitosa</i>, with occasional marsh marigold <i>Caltha palustre</i>, brooklime <i>Veronica beccabunga</i>, jointed rush <i>Juncus articulatus</i>, meadowsweet <i>Filipendula ulmaria</i> and water forget-me-knot <i>Myosotis scorpioides</i></p>			
<p><u>Arrhenatherum Neutral Grassland</u> A wide strip of tall unmanaged grassland on a steep sloping ground. Grassland comprises abundant false oat-grass, Yorkshire fog and cock's-foot, frequent creeping bent and occasional meadowsweet, common nettle and red clover.</p>	<p><u>Primary Code</u> Arrhenatherum Neutral Grassland g3c5 <u>Secondary codes</u> Mesic (118)</p>		<p>No direct or indirect impacts to this habitat shall occur as a result of the proposed works. No impacts are considered likely.</p>
<p><u>Lolium-Cynosaurus Neutral Grassland</u> The largest area of <i>Lolium cynosaurus</i> grassland is present to the south of the C74 minor road. This parcel of land is on steep sloping ground with several mature scattered ash <i>Fraxinus excelsior</i> and sycamore <i>Acer pseudoplatanus</i> trees. Grassland comprises frequent perennial rye-grass, crested dog's-tail, rough-stalked meadow-grass <i>Poa trivialis</i>, meadow foxtail <i>Alopecurus pratensis</i>, cock's-foot, sweet vernal grass <i>Anthoxanthum odorata</i>, Yorkshire fog and occasional creeping buttercup, white clover <i>Trifolium repens</i>, common sorrel <i>Rumex acetosa</i>, common nettle <i>Urtica dioica</i>, creeping thistle, selfheal <i>Prunella vulgaris</i>, yarrow, marsh thistle <i>Cirsium palustre</i>.</p> <p>A smaller area of sheep-grazed <i>lolium-cynosaurus</i> neutral grassland is present to the north-east. The short sward comprises abundant perennial rye-grass, frequent red fescue, crested dog's-tail and white clover with occasional creeping buttercup. Creeping thistle which occurs occasional had been treated with a herbicide.</p>	<p><u>Primary Code</u> <u>Lolium-Cynosaurus Neutral Grassland (g3c6)</u> <u>Secondary codes</u> Mesic (118) Scattered Trees (11) Sheep grazed (60)</p> <p>Sheep grazed (60) Mesic (118)</p>		<p>No direct or indirect impacts to this habitat shall occur as a result of the proposed works. No impacts are considered likely.</p>

Habitat Description	UK Hab Classification	Evaluation (Importance)	Impacts
<p><u>Holcus - Juncus Neutral Grassland</u></p> <p>A small field of unmanaged neutral grassland habitat comprising abundant Yorkshire fog, frequent soft rush juncus effuses and occasional tufted hair-grass Deschampsia cespitosa, meadowsweet, hogweed Heracleum sphondylium, common nettle and creeping thistle.</p>	<p><u>Primary Code</u></p> <p>Holcus-Juncus Neutral Grassland (g3c8)</p> <p><u>Secondary codes</u></p> <p>Unmanaged (80)</p> <p>Mesic (118)</p>		No direct or indirect impacts to this habitat shall occur as a result of the proposed works. No impacts are considered likely.
<p><u>Modified grassland</u></p> <p>An area of modified grassland on a steep north facing slope. The grassland field is situated to the south-east of the survey area, immediately adjacent to the C74 minor road. Species here include abundant perennial rye-grass frequent Yorkshire fog, with occasional crested dog's-tail, common bent and white clover. Bare ground and common nettle patches are present along the western boundary where sheep take shelter. Field supports less than 10% bare ground.</p>	<p><u>Primary Code</u></p> <p>Modified grassland (g4)</p> <p><u>Secondary codes</u></p> <p>Sheep grazed (60)</p> <p>Mesic (118)</p> <p>Tall herb (16)</p> <p>Fence (69)</p> <p>Bare Ground (73)</p>	Site	No direct or indirect impacts to this habitat shall occur as a result of the proposed works. No impacts are considered likely.
<p><u>Acid Grassland</u></p> <p>Two large areas of acid grassland are present within the survey area to the south of the C74 minor road. The largest area is located to the south-west. The sheep grazed grassland is present on undulating and steeply sloping ground and comprises abundant sheep's fescue festuca ovina, frequent crested dog's-tail, common bent, sweet-vernal grass and occasional white clover and occasional Yorkshire fog. Soils are thinner at the top of the slopes so vegetation appears finer. The lower slopes have more neutral influences within the sward.</p> <p>To the east of the Ludwell Burn is an area of acid grassland on the upper slopes where soils are thin and exposed rocky outcrops are present. Species present are as listed above with additional species of occasional eyebright sp Euphrasia spp, wild strawberry Fragaria veris, tormentil Potentilla erecta, heath bedstraw Gallium saxatile, bird's-foot trefoil Lotus corniculatus and gemander speedwell.</p>	<p><u>Primary Codes</u></p> <p>Other upland acid Grassland (g1b6)</p> <p><u>Secondary codes</u></p> <p>Mesic 118</p> <p>Acidic substrate (135)</p>		All proposed exploratory works are to be undertaken to the north of the C74 minor road. Therefore, no direct or indirect impact shall occur to acid grassland habitat as a result of the proposed works.

Habitat Description	UK Hab Classification	Evaluation (Importance)	Impacts
<p><u>Broadleaved woodland</u> A linear strip of broadleaved woodland follows the Ludwell Burn through the site to where it meets the River Wear. The woodland comprises mature broadleaved trees which include ash, sycamore, and elm sp Ulmas sp.</p>	<p><u>Primary code</u> Other broadleaved woodland types (w1g7) <u>Secondary codes</u> Native (47)</p>	S41 Local	No direct or indirect impact to woodland shall occur as a result of the proposed development. All works will be sited at least 230m from the woodland habitat along the Ludwell Burn. No adverse effects are anticipated as a result of the proposed works.
<p><u>Line of trees</u> A line of semi-mature sycamore trees is present along the field edge (behind the stone wall boundary).</p>	<p><u>Primary code</u> Line of trees (w1g6)</p>	Site	Access into the proposed working areas shall utilise existing tracks where possible. Any new access routes will avoid mature trees and woodland areas. No adverse effects are anticipated.
<p>Standards Trees Several mature trees and possible veteran trees are present on site scattered in fields and along the Ludwell burn.</p>	<p><u>Primary code</u> n/a <u>Secondary Code</u> Mature tree (1171) Veteran tree? (49)</p>	Local to National	Several standard trees are present. However, the proposed works shall be cited to avoid mature trees and their root protection zones. No adverse effects are anticipated
<p><u>Running Water</u> Ludwell Burn joins the survey area to the north of the C74 minor road and flows in a northly direction until it adjoins the River Wear. From the C74 road bridge the channel varies in width with ranging from 1-4m and supports rocky boulders within the channel. The water level is shallow with a maximum water depth of 0.3m and moderate water flow. The banks are steep and high to the north reducing in height as it adjoins the River Wear. Banks are generally shaded with mature and semi mature trees, namely ash, sycamore and elm sp. The channel bed supports rocky boulders.</p> <p>A small stream is also present along the south-eastern boundary. The source of the stream appears to start just outside of the south-eastern corner of the survey area. Water from a broken pipe located flows down the valley of undulating land creating</p>	<p><u>Primary code</u> Other rivers and streams (r2b) <u>Secondary codes</u> Natural watercourse (411)</p> <p>Artificial watercourse (412)</p>	Local	No direct impacts to the Ludwell Burn or water courses present on site shall occur. The gravel access track and borehole exploration areas are located away from the water courses. On this basis no impacts are considered likely.

Habitat Description	UK Hab Classification	Evaluation (Importance)	Impacts
<p>a wet flush approximately 5m wide to the south reducing in size as it flows down the valley. The stream is culverted beneath the C74 minor road and exits in the centre of a horse grazed field to the north. Vegetation comprises abundant jointed rush <i>Juncus articulatus</i>, moss sp and field horsetail <i>Equisetum arvense</i>, frequent tufted hair grass and occasional marsh thistle <i>Cirsium palustre</i>. The banks vertical and approximately 0.1m high and support grassland vegetation (as detailed for the field habitat).</p> <p>A small stream is present to the west of the Ludwell burn which runs down from the moors. The channel is approximately 0.5-1m wide with a small rocky substrate. The water is shallow approximately 0.01m where visible with almost a trickle flow. Banks are of varying topography ranging from very shallow and low to steep and almost vertical. The channel is densely vegetated with jointed rush.</p>	<p>Natural watercourse (411)</p>		
<p><u>Ephemeral Short Perennial Vegetation</u> An area of previously disturbed land. Gabion stone filled baskets and hard core have been installed to create a flat storage area. Sports colonising vegetation including fescue sp, festuca sp, biting stonecrop sedum sp, common nettle, lesser burdock <i>Arctium minus</i>, Yorkshire fog, broadleaved dock <i>Rumex obtusifolius</i>, meadow foxtail, creeping thistle and prickly thistle <i>Sonchus asper</i>, greater plantain <i>Plantago major</i> and pinappleweed <i>Matricaria discoidea</i>.</p>	<p><u>Primary code</u> Sparsely Vegetated Land (S) <u>Secondary codes</u> Tall herb (16) Ruderal/ephemeral (17) Dry (117)</p>	<p>Site</p>	<p>No direct impact to sparsely vegetated habitat shall occur. This area of ground is of low ecological interest. No negative effects shall occur as a result of the proposed works.</p>
<p><u>Hardstanding</u> A private access track from the C74 minor road which meanders up through the survey area to the former quarry.</p>	<p><u>Primary code</u> Developed land sealed surface (u1b) <u>Secondary codes</u> Bare ground (73) Track (115) Bare ground (73)</p>	<p>Negligible</p>	<p>This habitat is of negligible value for biodiversity No adverse effects shall occur as a result of the proposed works.</p>

Habitat Description	UK Hab Classification	Evaluation (Importance)	Impacts
The C74 minor road is a sealed surface road which runs west to east through the centre of the site.	Road (111)		
<u>Bare ground</u> A recently created access track with a hardcore surface.	<u>Primary code</u> Artificial unvegetated, unsealed surface (u1c) <u>Secondary codes</u> Bare ground (73)	Negligible	This habitat is of negligible value for biodiversity No adverse effects shall occur as a result of the proposed works.
<u>Built features</u> Two stone bridge structures were present along the Ludwell burn. Other built features within the survey area comprise dry stone walls and fences. Dry stone walls are present along the periphery of most field boundaries, road boundaries and along the edges of woodland plantation.	<u>Primary code</u> Built features (u1e) <u>Secondary codes</u> Dry stone wall (67) Fence (69)	Negligible	This habitat is of negligible value for biodiversity No adverse effects shall occur as a result of the proposed works.
<u>Buildings</u> Three buildings are present within the survey area. The farm located of the C74 minor road comprises a disused farmhouse and two associated buildings. Refer to Annexe 3.	<u>Primary code</u> Built features (u1b5) <u>Secondary codes</u> Dry stone wall (67) Abandoned (78)	Site	This habitat is of negligible value for biodiversity No adverse effects shall occur as a result of the proposed works.

3.3 Species

3.3.1 Sightings and / or evidence of protected and / or invasive species from the field survey are described, below.

Birds

3.3.2 All birds recorded during the survey are summarised in Table 3, below, together with a preliminary assessment of potential adverse effects arising from the development. Species for which adverse effects are predicted are indicated in bold text and are discussed in more detail in the discussion section.

3.3.3 All nesting birds are discussed in the final section given the general legislative provisions relating to the protection of active nests.

Table 3: Bird Species Recorded

Common name	Latin name	Status ¹⁴	Supporting Habitat
Blackbird	<i>Turdus merula</i>	-	Woodland, scrub nesting habitat and grassland foraging habitat
Buzzard	<i>Buteo buteo</i>	-	Suitable foraging habitat is present on site within grassland habitat. Limited opportunities for breeding are present on site.
Chaffinch	<i>Fringilla coelebs</i>	-	Large expanses of bare gravel 'island' within large lake could support many breeding pairs.
House martin	<i>Delichon urbicum</i>	RL	Buildings on site could support breeding house martins and grassland and rivers and streams provide suitable foraging habitat.
Lapwing	<i>Vanellus vanellus</i>	RL, s.41	Open grasslands provide suitable breeding/foraging habitat for lapwing
Jay	<i>Garrulus glandarius</i>	-	Woodland and mature trees provide suitable foraging and breeding habitat.
Meadow pipit	<i>Anthus pratensis</i>	AL	Grasslands provide suitable foraging and breeding habitat for this species.
Red legged Partridge	<i>Alectoris rufa</i>	-	Woodland edge and grassland margins provide suitable foraging and breeding habitat for this species.
Robin	<i>Erithacus rubecula</i>	-	Woodland habitat and mature trees are suitable for breeding and grassland provides suitable foraging opportunities.
Wood pigeon	<i>Columba palumbus</i>	-	Woodland habitat and mature trees are suitable for breeding and grassland provides suitable foraging opportunities.

Invasive Plants

3.3.4 No invasive species were recorded during the field survey.

¹⁴ S1 – Schedule 1 Wildlife and Countryside Act, A1 – Annex 1 EU Birds Directive, RL - Birds of Conservation Concern 'red list', AL - Birds of Conservation Concern 'amber list', s.41- species listed under section 41 of the NERC Act as species of principal importance.

3.4 Protected Species Evaluation

3.4.1 Protected and NERC s.41 Priority species are evaluated in order to identify potential adverse effects (in Table 4 below) based on the following criteria:

Desk study records;

Evidence found during the survey;

Presence, extent, quality, and viability of supporting on-site habitat;

Ecological connectivity to viable off-site habitats; and

Perceived impacts of habitat loss/impact to individuals in relation to proposals.

3.4.2 Species for which adverse effects are predicted (shaded red or orange) are discussed in more detail in the Discussion and Recommendations section. Species / taxa for which potential adverse effects are not anticipated (shaded green) are excluded from further assessment.

Receptor(species/taxa)	Description of Desk Study records	Status ¹⁵	Evaluation	Supporting Habitat(s)Present	Potential Adverse Effects
Bats Chiroptera	Common Pipistrelle Pipistrellus Soprano Pipistrelle Pipistrellus pygmaeus Pipistrelle sp Pipistrellus sp Noctule Nyctalus noctula Myotis spp.	EPS, WCA, s.41,	Site	Roosting habitat is present on site within buildings and mature trees. Foraging habitat is present on site around the site periphery particularly the Ludwell Burn and boundary with the River Wear. There is also roosting and foraging opportunities within adjacent habitat.	Moderate quality foraging habitat restricted to more peripheral habitats and watercourses. No direct impact will occur to suitable bat roosting and foraging habitat. Indirect impacts may occur without appropriate mitigation.
Badger Meles meles	✓ ¹⁶	BA	Site	No badger activity was recorded on site. However, suitable foraging and opportunities for sett creation are present on site within field boundaries, stream banks and woodland embankments.	The works are small-scale and located within agricultural land that is unlikely to support any newly created setts. No adverse impacts are predicted.
Brown Hare Lepus europaeus	✓	s.41	Site	This species favours open expanses of pastoral farmland.	No, given the minimal disturbance during development works, the nature of works and the abundance of open habitat within the survey area and wider landscape, no adverse effects are predicted to brown hare populations.
European Hedgehog Erinaceus europaeus	✓	s.41	Site	Woodland edge, stream, river edge habitat.	Adverse effects through minor habitat losses are unlikely to be significant due to the small scale of the development together with the vast availability of equivalent supporting habitats elsewhere in the locality
Dormouse Muscardinus avellanarius	x	EPS, WCA, s.41	n/a	The site is located outside of the dormouse's natural range	Species is likely to be absent.

¹⁵ EPS – European Protected Species, WCA – Wildlife and Countryside Act, A1 – Annex 1 (Birds Directive), BA – Protection of Badgers Act, s.41- species listed under section 41 of the NERC Act as species of principal importance.

¹⁶Locations of badger activity are confidential due to the sensitivity of this species.

Receptor(species/taxa)	Description of Desk Study records	Status ¹⁵	Evaluation	Supporting Habitat(s)Present	Potential Adverse Effects
Otter <i>Lutra lutra</i>	✓ several records are present along the River Wear.	EPS, WCA, s.41	Local	Suitable habitat exists along the River Wear habitat and the Ludwell Burn.	No direct impact shall occur to the River Wear or the Ludwell Burn. All exploratory boreholes, re-injection boreholes and temporary access routes and temporary compound areas shall be located at distance >50m from the water courses.
Water Vole <i>Arvicola</i> amphibia	x	WCA, s.41	Local	Some suitable (albeit limited) habitat is present along the River Wear and small streams that connect to the Ludwell burn.	No direct impact shall occur to the River Wear or stream habitats that runs through the survey areas. All exploratory bore holes, re-injection bore holes and associated infrastructure shall be located sufficiently distant (>50m) from watercourses. No negative impacts are considered likely as a result of proposed works.
Reptiles	x	WCA, s.41		Grassland, scrub and woodland edge.	The habitats within the application site are unlikely to support reptiles given that they are subject to regular mowing and / or sheep grazing.
Great Crested Newt <i>Triturus cristatus</i>	x	EPS, WCA, s.41	n/a	Suitable aquatic habitat is present within a pond located immediately adjacent to the north-western boundary and suitable terrestrial habitat is present within the survey area within grassland and broadleaved woodland habitats on site. eDNA surveys undertaken during 2022 produced a negative result for GCN DNA.	Given the negative result of the GCN surveys, GCN are considered to be absent from site. No negative effects are considered likely.
Common Toad <i>Bufo bufo</i>	x	s.41	Site	Suitable habitat is present on site within grassland and broadleaved woodland habitats.	The footprint of the working area is small and individuals/populations are unlikely to be harmed.
White-clawed Crayfish <i>Austroptamobius pallipes</i>	x	EPS, WCA, s.41	Local	River and Burn habitats are suitable for use by White-clawed crayfish.	The River Wear and the Ludwell Burn shall remain unaffected by works. Works shall be at least 50m

Receptor(species/taxa)	Description of Desk Study records	Status ¹⁵	Evaluation	Supporting Habitat(s)Present	Potential Adverse Effects
					distant from the river and stream corridors. No negative effects are considered likely.
Birds	A wide range of BoCC and Red List species and WCA Schedule-listed species including: barn owl, black grouse, lesser redpoll, curlew, lapwing, long-eared owl, starling, skylark	s.41, WCA BoCC	Local	Yes – Foraging and breeding habitat in habitats around periphery of Site and waterbodies throughout.	Small areas of suitable nesting habitat may be lost / disturbed by proposals.
Protected Plant Species	Harebell Melancholy Thistle Field Scabious Crosswort	Red list (NT) ¹⁷	Site	A number of these plant species are present within the boundary of the redline. Most are located along the C74 road verge habitat or around the pond located offsite.	All working areas are located within the footprint of Neutral grassland habitat away from areas know to support the species listed within the desk study report. Access to site will be via existing access routes into site, so all road verge habitat shall be retained. No negative effects are considered likely.
Protected Invertebrate Species	Common darter Rosy rustic Hydreacia micacea	Red list s.41	Site	Some suitable habitat is present on site for the larval stages of common darter namely within the stream habitat, with foraging habitat across the survey area. The Rosy Rustic moth requires marshy areas where foodplants grow specifically dock species. Larvae live beneath the ground and feed on the roots of dock.	The footprint of the boreholes and access route will avoid watercourses and riparian habitats. The areas of the proposed boreholes are dry (not damp) and are unlikely to impact suitable habitat for the Rosy Rustic Moth. No negative effects are considered likely.

¹⁷ Near threatened.

4 DISCUSSION AND RECOMMENDATIONS

4.1 Sensitive Receptors

4.1.1 The following conservation sites, habitats, and species (receptors) have been evaluated as being subject to potential adverse effects:

Foraging / commuting bats;

Birds (barn owl, lesser redpoll, curlew, lapwing, starling and skylark); and

Nesting birds (general).

4.1.2 The nature of potential effects, requirements for further surveys and proposed mitigation / compensation are discussed, below, for each of the identified receptors.

Bats

4.1.3 No suitable roosting habitat (mature trees or buildings) shall be impacted by proposed works, but indirect impacts to foraging and or commuting habitat may occur without appropriate mitigation. Seasonal bat activity surveys are being undertaken to identify species that utilise the local area, the level of bat activity and key habitats. This is reported in full with appropriate mitigation / compensation, where required, within WA, 2022 - Bat Activity Report, 2022.

Birds

4.1.4 The preliminary survey and desk study has confirmed that the site supports a range of bird species, mainly those associated with open grasslands, scrub, hedgerow, and woodland edge, as well as species with more catholic habitat requirements. In order to fully assess the breeding assemblage onsite and how the site is utilised by breeding birds, a full breeding bird survey has been undertaken. This is reported within WA, Breeding Bird Survey Report, 2022.

Nesting Birds

4.1.5 In addition, due to the potential presence of ground nesting bird species (e.g. skylark and meadow pipit) within the site, it is recommended that initial habitat clearance works are undertaken outside of the usual bird breeding season (normally taken to be March – July, inclusive). If such timescales cannot be accommodated, it is recommended that a check for the presence of active nests, and nesting birds should be undertaken by a suitably qualified ecologist prior to the commencement of works. Any active nests should be identified and protected subject to the relevant legal provisions until the nesting attempt is complete.

4.2 Biodiversity Net Gain

- 4.2.1 The NPPF states that development should deliver net gains in biodiversity, though at present, no numerical figure for gains in percentage terms is prescribed / mandated by either national policy or legislation. The Environment Act 2021 will, once fully implemented (est. 2023), mandate that all developments provide a 10% net gain in biodiversity, though it should be noted that Local Authorities are moving toward implementing reflective policies on a shorter timeframe.
- 4.2.2 The proposals are not suitable for assessment of Biodiversity Net Gain (BNG) via application of the DEFRA Metric, because they are temporary in nature and are very small in scale (the entire application area being 0.9ha). However, all habitats impacted will be fully re-instated and the habitats will be managed via the current agricultural rotation. This means that habitat losses will be neutral.
- 4.2.3 The BNG guidance (Panks et al 2022) states the following with regard to temporary losses :
- 4.2.4 'There may be situations where a habitat is impacted by an operation for a short period of time (such as trenching for pipeline or cable-laying or turf-stripping) and afterwards the habitat is restored back to its original state. Where a habitat is disturbed for a short period of time, it may be considered temporary loss if specific criteria are met. If these criteria are met, then the habitat may be recorded as 'retained' within the metric tool'.
- 4.2.5 The criteria are that the habitat should be capable of restoration within 2 years, which in this instance would be the case. As the metric would therefore record this habitat as 'retained' there would be no loss or gain attributed to the activity, and hence no merit in applying the Metric calculator.
- 4.2.6 Biodiversity enhancement will be delivered by incorporating a number of measures for protected species, such as:
- Installation of 10x 'woodcrete' bat boxes within mature trees in the wider study area;
 - Installation of 10 'woodcrete' bird boxes on mature trees; and
 - Installation of a single tree-mounted barn owl box.
- 4.2.7 A planning condition is anticipated that requires a scheme of bat and bird boxes (including location plans) to be delivered, with a range of designs appropriate to the site and as advised by a suitably qualified ecologist. These measures will be completed

prior to Spring 2023, to maximise the opportunity for biodiversity enhancement for the duration of the development.

4.3

6 REFERENCES

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APPENDICES

Appendix 1
Legislation and Policy Summary

Appendix 1 – Legislation and Policy Summary

Legislation for Habitats/Sites

Designated Site/Habitat	Status
Ramsar Sites	Ramsar Sites are wetlands of international importance designated following The Ramsar Convention. RAMSAR sites have the same level of protection as SSSIs under the Wildlife and Countryside Act 1981 (as amended).
SPA (Special Protection Areas)	SPAs seek to protect the habitats of rare and vulnerable European and UK birds. The Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 protect such sites in the UK.
SAC (Special Areas for Conservation)	SACs are strictly protected areas which represent important and threatened habitats in Europe and the UK. The Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 protect such sites in the UK.
SSSI (Sites of Special Scientific Interest)	SSSIs protect the best examples of the UK's flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were renotified under the Wildlife and Countryside Act 1981 (as amended). Modified provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000.
NNR (National Nature Reserves)	NNRs are examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. NNRs are declared by the statutory country conservation agencies under the National Parks and Access to the Countryside Act 1949 and the Wildlife and Countryside Act 1981 (as amended). Legal protection of NNRs is provided under The Wildlife and Countryside Act 1981 (as amended).
Hedgerows	All hedgerows are protected by the Hedgerows Regulations 1997, under which it is an offence to remove or destroy certain hedgerows without planning consent or permission from the Local Planning Authority. These regulations do not apply to any hedgerow within the curtilage of, or marking the boundary of the curtilage of, a dwelling house.
LNR (Local Nature Reserves)	Designated by the National Parks and Access to the Countryside Act 1949, LNRs may be declared for nature conservation by local authorities after consultation with the relevant statutory nature conservation agency. Legal protection of LNRs is provided under The Wildlife and Countryside Act 1981 (as amended).

Legislation for Species

Species	Legal Status
Creeping Marshwort, Early Gentian, Fen Orchid, Floating-leaved Water Plantain, Killarney Fern, Lady's Slipper, Shore Dock, Slender Naiad, Yellow Marsh Saxifrage	Under the Conservation of Habitats and Species Regulations 2017 (and as amended), it is illegal to deliberately pick, collect, uproot or destroy any such species.
Bats, Dormouse, Otter, Wild Cat, Great Crested Newt, Natterjack Toad, Sand Lizard, Smooth Snake, Large Blue Butterfly	<p>These animals and their breeding sites or resting places are protected under Regulation 41 of the Conservation of Habitats and Species Regulations 2017 (and as amended), which makes it illegal to:</p> <ul style="list-style-type: none"> Deliberately capture, injure or kill any such animal or to deliberately take or destroy their eggs; Deliberately disturb¹⁸ such an animal; and Damage or destroy a breeding site or resting place of such an animal. <p>European Protected Species (EPS) licenses can be granted by Natural England in respect of development to permit activities that would otherwise be unlawful under the Conservation Regulations, providing that the following 3 tests (set out in the EC Habitats Directive) are passed, namely:</p> <ul style="list-style-type: none"> The development is for reasons of overriding public interest; There is no satisfactory alternative; and The favourable conservation status of the species concerned will be maintained and/or enhanced. <p>LPA's must consider the above 3 'tests' when determining whether Planning Permission should be granted for developments likely to cause an offence under the Conservation Regulations.</p>
Bats, Dormouse, Great Crested Newt, Heath Fritillary, High Brown Fritillary, Large Blue, Marsh Fritillary, Natterjack Toad, Pine Martin, Otter, Red Squirrel, Sand Lizard, Smooth Snake, Swallowtail, Water Vole, Wildcat	<p>These animals receive full protection under the Wildlife and Countryside Act 1981 (and as amended), which makes it illegal (subject to certain exceptions) to:</p> <ul style="list-style-type: none"> Intentionally kill, injure or take any such animal; Intentionally or recklessly damage, destroy or obstruct any place used for shelter or protection; and

¹⁸ Under the Conservation Regulations, disturbance of protected animals includes in particular any disturbance which is likely to: (i) impair their ability to survive, breed or reproduce, or to rear or nurture their young or to hibernate or migrate; (ii) significantly affect the local distribution or abundance of the species in question.

Species	Legal Status
	Intentionally or recklessly disturb such animals while they occupy a place used for shelter or protection.
Adder, Common Lizard, Grass Snake, Slow Worm, White-clawed Crayfish	These animals receive partial protection under The Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000), which provide protection against intentional killing or injury of any such animal.
Nesting Birds	All wild birds (as defined by the act) are protected under the Wildlife and Countryside Act 1981 (and as amended), which makes it illegal (subject to exceptions) to: <p style="margin-left: 40px;">Intentionally kill, injure or take any wild bird; Take, damage or destroy the nest (whilst being built or in use) or eggs of any wild bird.</p>
WCA Schedule 1 listed Birds	Additional protection is provided to birds listed on Schedule 1 of the Wildlife and Countryside Act 1981 (and as amended). In addition to the offences detailed above relating to all wild birds, it is illegal to intentionally or recklessly disturb any bird listed on Schedule 1, or their dependent young while nesting.
Badgers	The Protection of Badgers Act 1992 makes it illegal to wilfully kill or injure a Badger, or attempt to do so and to intentionally or recklessly interfere with a Badger sett. This includes: <p style="margin-left: 40px;">damaging or destroying an active sett; obstructing access to a sett; and disturbing a Badger while it is occupying a sett.</p> Licences can be granted to permit sett closure and/or disturbance between July and November inclusive (i.e. outside the sow pregnancy/birth period).
Wild Mammals	The Wild Mammals (Protection) Act 1996 provides legal protection to all wild mammals (as defined by the act) against the following actions: mutilate, kick, beat, nail, or otherwise impale, stab, burn, stone, drown, crush, drag or asphyxiate any wild mammal with intent to inflict unnecessary suffering.
WCA Schedule 9 listed invasive animals (Part 1) and plants (part 2)	Certain species of plants and animals that do not naturally occur in Great Britain have become established in the wild and represent a threat to the natural fauna and flora. Section 14 of the WCA prohibits the release or allowed escape of animals listed in Schedule 9 to the Act and planting, or allowed growth, of any plant listed in Schedule 9 to the Act.

Policy Summary

Section 40 of the Natural Environment and Rural Communities (NERC) Act imposes a legal duty on Planning Authorities to ‘have regard’ to the conservation of biodiversity when considering planning applications.

Section 41 of the NERC Act requires the Secretary of State to publish a list of species and habitats of principal importance for conserving biodiversity in the UK. Such Biodiversity Action Plan (BAP) Habitats and Species (2007) do not offer the species any specific protection but help to highlight the species importance at a national level. This list is used by Local Planning Authorities to identify the species and habitats that should be afforded priority when applying the requirements of the National Planning Policy Framework (NPPF).

The NPPF underpins the Government’s planning policies for England and how these are to be applied. The central theme of the NPPF is a presumption in favour of sustainable development. This presumption does not apply where development requiring Appropriate Assessment because of its potential impact on a habitats site is being planned or determined.

The NPPF states:

Planning policies and decisions should contribute to and enhance the natural and local environment by:

- if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;
- development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons⁵⁸ and a suitable compensation strategy exists; and;

- development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity;
- The following should be given the same protection as habitats sites:
 - a) potential Special Protection Areas and possible Special Areas of Conservation;
 - b) listed or proposed Ramsar sites; and
 - c) sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

The presumption in favour of sustainable development does not apply where development requiring appropriate assessment because of its potential impact on a habitats site is being planned or determined.

The NPPF requires the Planning Authority to have a responsibility to promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets, and identify suitable indicators for monitoring biodiversity in the plan. In addition, the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

Appendix 2

Habitat Photographs

Ludwell Burn (r2b)



Other Neutral grassland (g3c)



Neutral Grassland

Lolium-Cynosaurus (g3c6)



Neutral Grassland

Holcus- Juncus (g3c8)



Neutral grassland *Arrhenatherum* (g3c5)



Other Upland Acid Grassland (g1b6)



Modified grassland (g4)



Hard standing (u1b)



Sparsely vegetated Land (s)



Access tracks (unsealed surface u1c)







Built Structures (u1e)




Appendix 3

Appendix 3

Building /Structure Number	Description	Photo	Suitability for Bats
B1	Unoccupied three story stone farmhouse with pitched roof covered with stone tiles. Many gaps in external stone work and beneath stone roof tiles		High
B2	L shaped disused outbuilding, constructed of block stone with pitched roof covered in stone tiles. Doors and windows missing. Exposed timber beams. Gaps within external stone work, timbers and roof tiles.		High

B3	Single story stone outbuilding with stone tile roof. Gaps within external stonework and beneath stone roof tiles.		High
B4	Stone Bridge Structure over stream with brick arch . Both structures, either side of the vehicle bridge are approximately 1.5m at the highest point above the water level.		Moderate

B5	<p>Road bridge constructed of stone, bridge approximately 3m above water level. Good connectivity to woodland habitat and the River Weardale. Some small gaps in mortar lines (that are visible).</p>	 A photograph showing a stone bridge over a river. The bridge is constructed from large, grey, rectangular stone blocks. The water level is low, and the bridge is approximately 3 meters above it. The surrounding area is lush with green vegetation, including ferns and trees. The bridge has a simple, functional design with a slight arch. The mortar lines between the stones are visible, and there are some small gaps.	Moderate
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Appendix 4

Client: Thomas Frost,
Wardell Armstrong



ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

www.adas.uk

Sample ID: ADAS-2715 Condition on Receipt: Good Volume: Passed
Client Identifier: Ludwell WB1 Description: pond water samples in preservative
Date of Receipt: 13/06/2022 Material Tested: eDNA from pond water samples

Determinant	Result	Method	Date of Analysis
Inhibition Control [†]	2 of 2	Real Time PCR	16/06/2022
Degradation Control [§]	Within Limits	Real Time PCR	16/06/2022
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	16/06/2022
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10 ⁻⁴ ng/μL) [#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by: Dr Helen Rees Report Issued by: Dr Ben Maddison

Signed:



Signed:



Position: Director: Biotechnology Position: MD: Biotechnology

Date of preparation: 21/06/2022 Date of issue: 21/06/2022

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#] Additional positive controls (10⁻¹, 10⁻², 10⁻³ ng/μL) are also routinely run, results not shown here.

Appendix 1: Interpretation of results

Sample Condition

Upon sample receipt we score your samples according to quality: good, low sediment, medium sediment, high sediment, white precipitate, and presence of algae.

There are three reasons as to why sediment should be avoided:

1. It is possible for DNA to persist within the sediment for longer than it would if it was floating in the water which could lead to a false positive result i.e. in this case GCN not recently present but present a long time ago
2. In some cases sediment can cause inhibition of the PCR analysis used to detect GCN eDNA within samples which could lead to an indeterminate result.
3. In some cases sediment can interfere with the DNA extraction procedure resulting in poor recovery of the eDNA which in turn can lead to an indeterminate result.

Algae can make the DNA extraction more difficult to perform so if it can be avoided then this is helpful.

Sometimes samples contain a white precipitate which we have found makes the recovery of eDNA very difficult. This precipitate can be present in such high amounts that it interferes with the eDNA extraction process meaning that we cannot recover the degradation control (nor most likely the eDNA itself) at sufficient levels for the control to be within the acceptable limits for the assay, therefore we have to classify these type of samples as indeterminate.

What do my results mean?

A positive result means that great crested newts are present in the water or have been present in the water in the recent past (eDNA degrades over around 7-21 days).

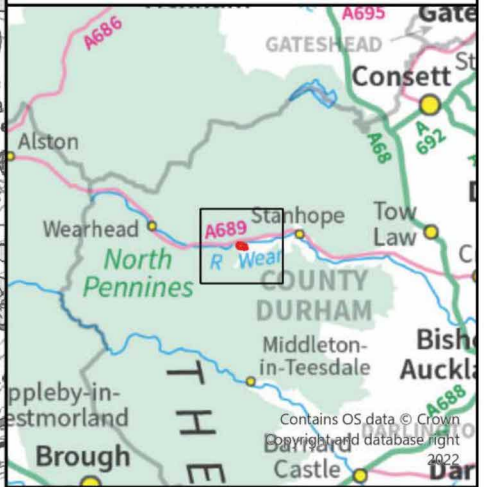
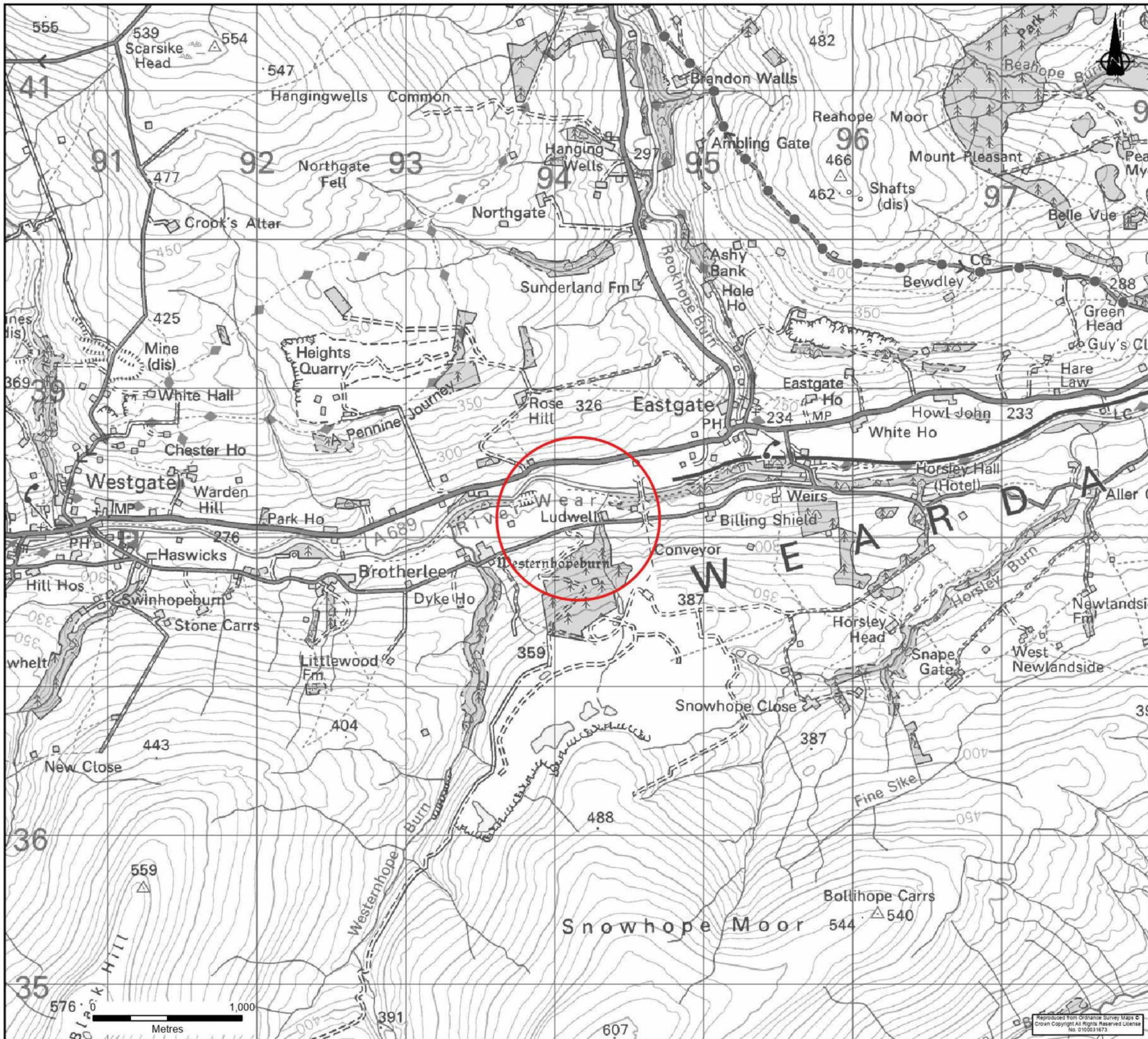
A negative result means that DNA from the great crested newt has not been detected in your sample.

On occasion an inconclusive result will be issued. This occurs where the DNA from the great crested newt has not been detected but the controls have indicated that either: the sample has been degraded and/or the eDNA was not fully extracted (poor recovery); or the PCR inhibited in some way. This may be due to the water chemistry or may be due to the presence of high levels of sediment in samples which can interfere with the DNA extraction process. A re-test could be performed but a fresh sample would need to be obtained. We have successfully performed re-tests on samples which have had high sediment content on the first collection and low sediment content (through improved sample collection) on the re-test. If water chemistry was the cause of the indeterminate then a re-test would most likely also return an inconclusive result.

The results will be recorded as indeterminate if the GCN result is negative and the degradation result is recorded as:

1. evidence of decay - meaning that the degradation control was outside of accepted limits
2. evidence of degradation or residual inhibition - meaning that the degradation control was outside of accepted limits but that this could have been due to inhibitors not being removed sufficiently by the dilution of inhibited samples (according to the technical advice note)

DRAWINGS



Notes:
 Boundaries are indicative.
 Aerial imagery shown for context purposes only.

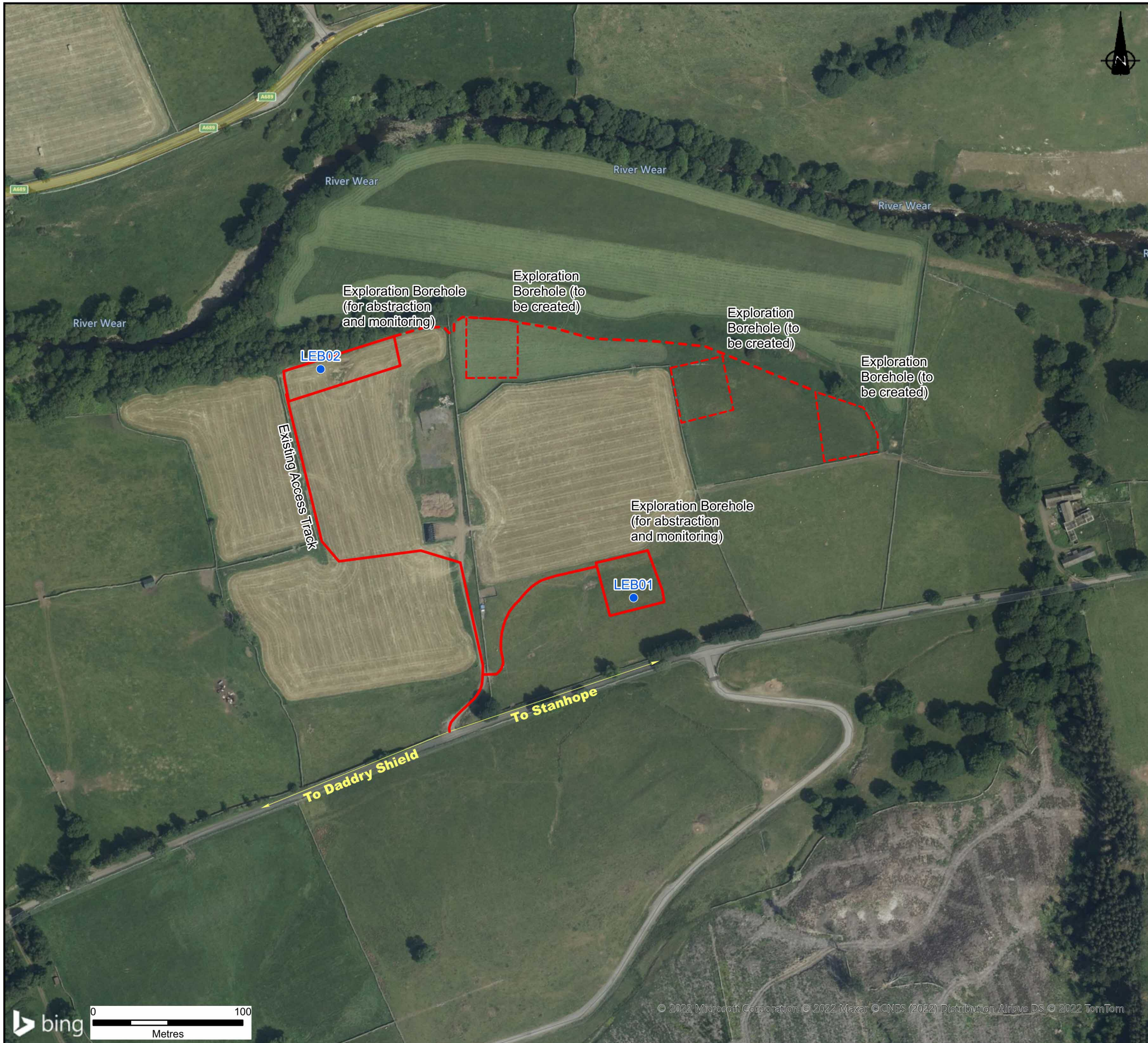
REVISION	DETAILS	DATE	DRAWN	CHECKED	APPROVED



PROJECT
LUDWELL FARM WEARDALE

DRAWING TITLE
**FIGURE 1
 SITE LOCATION**

ORG No.	NT15799/PPPS/FIGURE 1	REV	A
ORG SIZE	A3	SCALE	1:25,000
		DATE	13/09/2022
DRAWN BY	SRW	CHECKED BY	GS
		APPROVED BY	LG



KEY

- Existing exploration boreholes (0.29 ha)
- Proposed location for further exploration boreholes to be created (final location to be submitted in the application) (0.40 ha)
- Existing access track 3m wide (0.13 ha)
- Proposed access track 3m wide (0.09 ha)
- Existing Borehole Location

Notes:

Boundaries are indicative.

Aerial imagery shown for context purposes only.

B	LABEL AMENDMENTS	09/22	SRW	GS	NB
A	FIRST ISSUE	09/22	BRC	GS	NB
REVISION	DETAILS	DATE	DRAWN	CHKD	APPD



PROJECT

LUDWELL FARM WEARDALE

DRAWING TITLE

FIGURE 2
REDLINE BOUNDARY

DRG No.	NT15799/PPPS/FIGURE 2	REV	B
DRG SIZE	A3	SCALE	1:2,500
		DATE	28/09/2022
DRAWN BY	BRC	CHECKED BY	GS
		APPROVED BY	NB





KEY

 Study Area

Notes:

Boundaries are indicative.

Aerial imagery shown for context purposes only.

REVISION	DETAILS	DATE	DRAWN	CHECKED	APPROVED



PROJECT

LUDWELL FARM WEARDALE

DRAWING TITLE

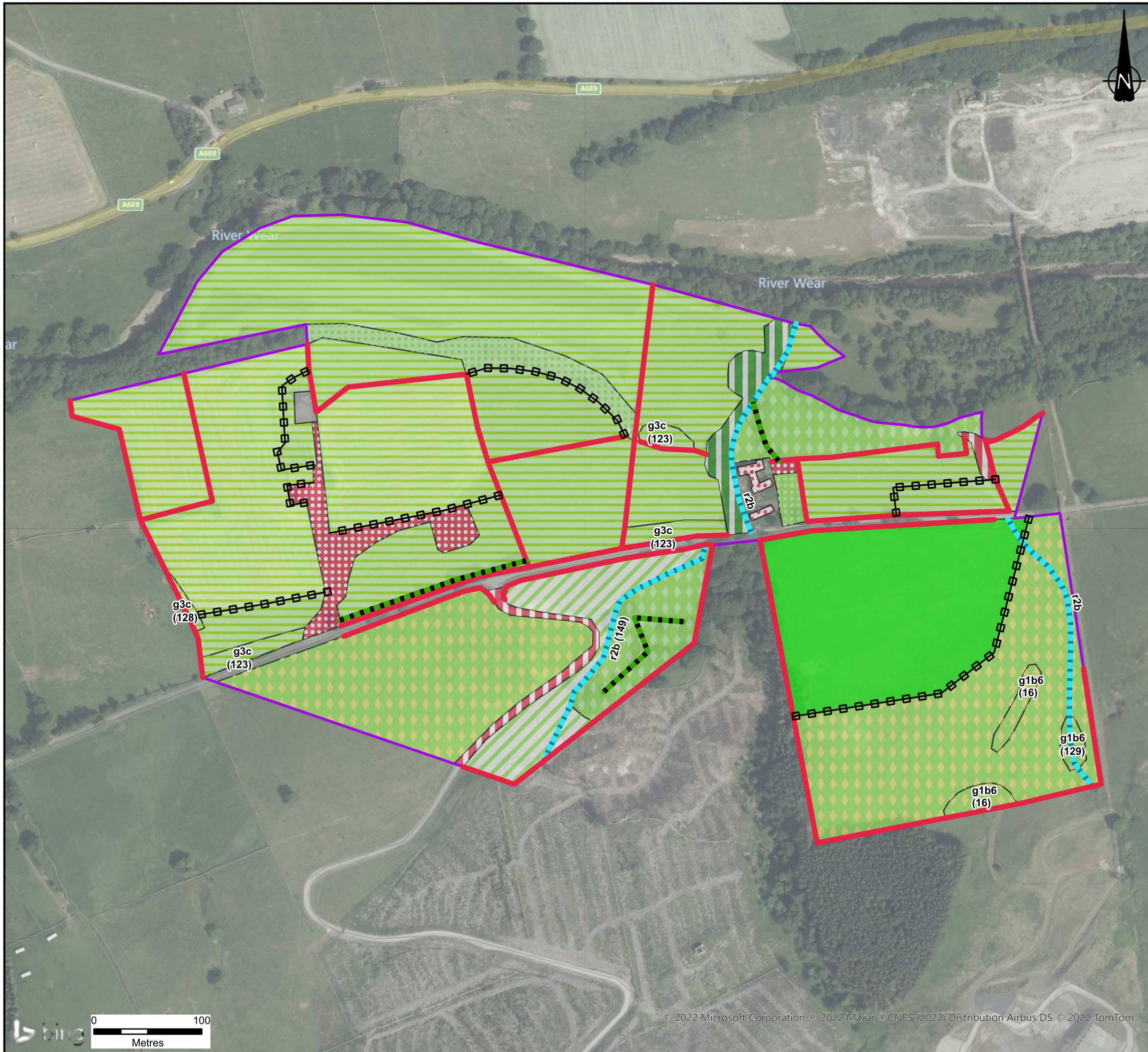
FIGURE 3
STUDY AREA

DRG No. NT15799/PPPS/FIGURE 3 REV A

DRG SIZE A3	SCALE 1:5,000	DATE 13/09/2022
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DRAWN BY HM	CHECKED BY GS	APPROVED BY NB
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KEY

- Study Area
- g1 - acid grassland
- g1b6 - other upland acid grassland
- g3c - other neutral grassland
- g3c5 - Arrhenatherum neutral grassland
- g3c6 - Lolium-Cynosurus neutral grassland
- g3c8 - Holcus-Juncus neutral grassland
- g4 - modified grassland
- s - sparsely vegetated land
- u1b - developed land, sealed surface
- u1b5 - buildings
- u1c - artificial unvegetated unsealed surface
- w1b - upland mixed ashwoods
- r2 - rivers and lakes
- u1e - built linear feature
- w1g6 - line of trees
- Fence

Notes:

Boundaries are indicative. Aerial imagery shown for context purposes only.

Habitats mapped in accordance with UKHab methodology.

REVISION	DETAILS	DATE	DRAWN	CHKD	APPD

CLIENT

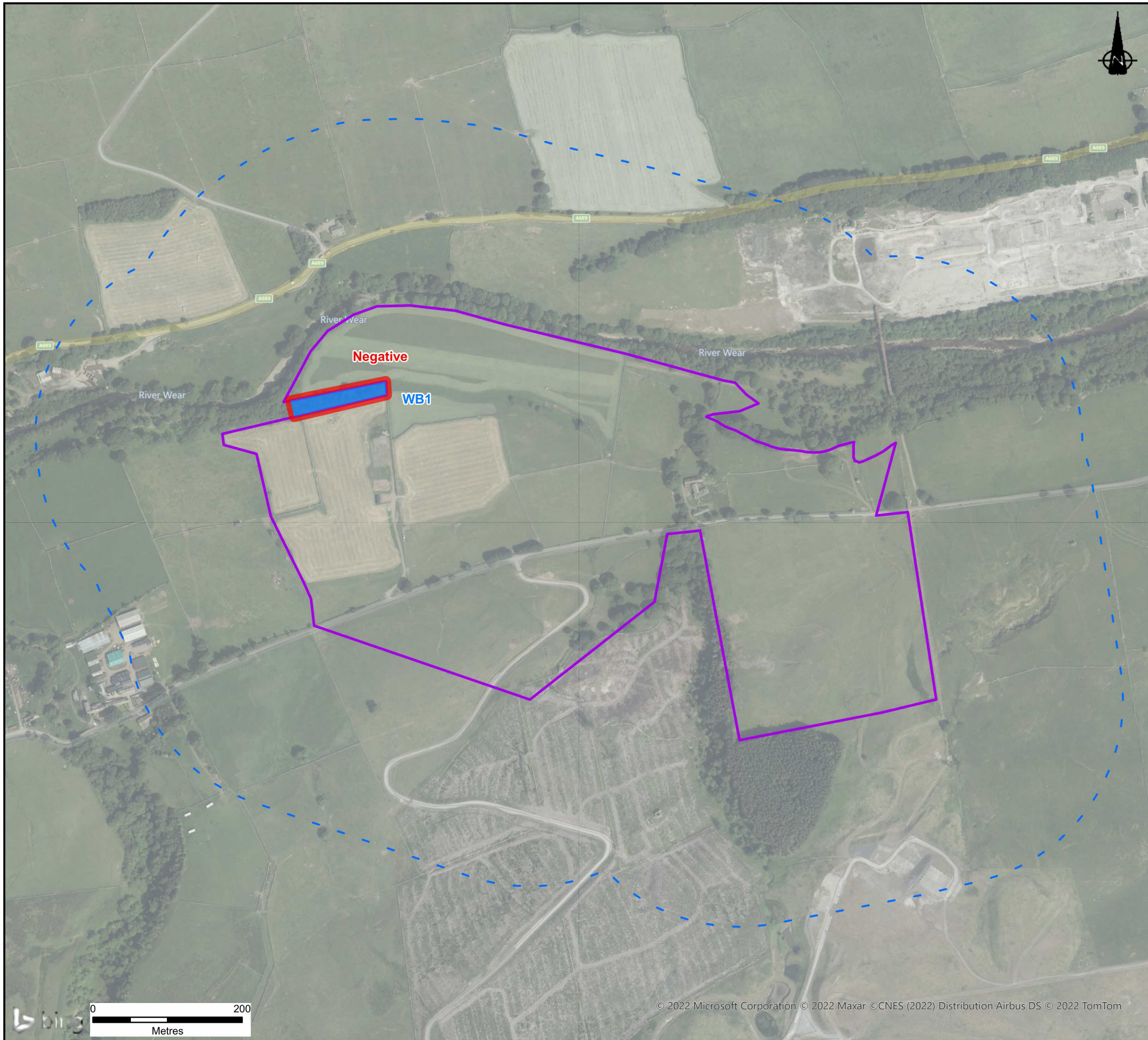
PROJECT

LUDWELL FARM WEARDALE

DRAWING TITLE

FIGURE 4-
UKHAB PLAN

DRG No.	NT15799/020	REV	A
DRG SIZE	A3	SCALE	1:3,500
		DATE	12/10/2022
DRAWN BY	SRW	CHECKED BY	TP
		APPROVED BY	TP



KEY

- Study Area
- 250 m Buffer
- Waterbody
- Negative eDNA Result
- Positive eDNA Result

Notes:

Boundaries are indicative.
Aerial imagery shown for context purposes only.

REVISION	DETAILS	DATE	DRAWN	CHKD	APPD



PROJECT

LUDWELL FARM WEARDALE

DRAWING TITLE

**FIGURE 5
WATERBODY LOCATION PLAN
+
ENVIRONMENTAL DNA (eDNA) RESULTS**

DRG No.	NT15799/SC FIGURE 12	REV	A
DRG SIZE	A3	SCALE	1:5,000
DRAWN BY	BRC	CHECKED BY	TP
		APPROVED BY	TP



STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)1782 276 700

BIRMINGHAM
Two Devon Way
Longbridge Technology Park
Longbridge
Birmingham
B31 2TS
Tel: +44 (0)121 580 0909

BOLTON
41-50 Futura Park
Aspinall Way
Middlebrook
Bolton
BL6 6SU
Tel: +44 (0)1204 227 227

BRISTOL
Desk Lodge
2 Redcliffe Way
Bristol
BS1 6NL
Tel: +44 (0)117 203 4477

BURY ST EDMUNDS
Armstrong House
Lamdin Road
Bury St Edmunds
Suffolk
IP32 6NU
Tel: +44 (0)1284 765 210

CARDIFF
Tudor House
16 Cathedral Road
Cardiff
CF11 9LJ
Tel: +44 (0)292 072 9191

CARLISLE
Marconi Road
Burgh Road Industrial Estate
Carlisle
Cumbria
CA2 7NA
Tel: +44 (0)1228 550 575

EDINBURGH
Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GLASGOW
24 St Vincent Place
Glasgow
G1 2EU
Tel: +44 (0)141 428 4499

LEEDS
36 Park Row
Leeds
LS1 5JL
Tel: +44 (0)113 831 5533

LONDON
Third Floor
46 Chancery Lane
London
WC2A 1JE
Tel: +44 (0)207 242 3243

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

TRURO
Baldhu House
Wheal Jane Earth Science Park
Baldhu
Truro
TR3 6EH
Tel: +44 (0)187 256 0738

International office:

ALMATY
29/6 Satpaev Avenue
Hyatt Regency Hotel
Office Tower
Almaty
Kazakhstan
050040
Tel: +7(727) 334 1310