

**APPENDIX 1** 

## TINCORN HILL QUARRY - SORN, EAST AYRSHIRE Landscape and Visual Scoping



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## **1 LANDSCAPE AND VISUAL ASSESSMENT SCOPING**

## 1.1 Introduction

Mullin Design Associates, Chartered Landscape Architects, have been appointed to establish potential landscape and visual impacts/effects arising from proposed extension and deepening of an existing hard rock quarry operation at, Tincorn Hill Quarry (also known as Sorn Quarry), in East Ayrshire.

The proposal site is circa 2.3km to the Northeast of Sorn, and 5.3km Northeast of Auchinleck, at grid reference NS 58246 26889 (Quarry entrance). The proposal would include circa 12.7 -hectare lateral extension and subsequent deepening of the extended quarry floor to a maximum depth of 222m AOD.

The project will involve an iterative design process that will consider the proposed development against the existing baseline conditions, and identify potential mitigation measures to avoid or minimise negative landscape and visual impact.

This Landscape and Visual Scoping Report has been prepared by Pete Mullin, BA (Hons) CMLI, MILI Chartered Landscape Architect and principal of Mullin Design Associates. Pete has produced several hundred Landscape and Visual Impact Assessments during 25 years in the profession and is a recognised specialist within the mineral sector.

It is proposed that a landscape and visual impact assessment will be carried out. This study will be structured in the following subsections:

- **Methodology** explanation of how the assessment has been undertaken, with reference to methodology, terminology, assessment criteria, and planning policy.
- **Receiving Environment** or Landscape and Visual Context baseline description, classification and evaluation of the existing landscape character containing the application site and an assessment of visual amenity, with identification of visual receptors.
- **Project Description** description of aspects of the proposed development which have the potential to cause a landscape and/or visual effect and measures which will be incorporated to mitigate or avoid greater potential effects.
- **Assessment of Impacts** an outline of potential landscape and visual impacts with proposed mitigation measures and cumulative impacts.

Residual Impacts and impact summary.

## 1.2 Methodology

#### 1.2.1 Method of Assessment & Guidelines

The landscape and visual assessment will be carried out in accordance and with reference to best practice guidance documents and information sources including the following :

- Guidelines for Landscape and Visual Impact Assessment (GLVIA), Third Edition, edited by The Landscape Institute and Institute of Environmental Management and Assessment (2013);
- Landscape Character Assessment Guidance (2002) Countryside Agency in conjunction with Scottish Natural Heritage
- Landscape Character Topic papers 1 to 9 (Various Dates). Published by The Countryside Agency and Scottish Natural Heritage
- National Planning Framework 4
- East Ayrshire Local Development Plan 2017
- East Ayrshire Minerals Local Development Plan (MLDP) 2020
- Proposed East Ayrshire Local Development Plan 2
- Nature Scotland Landscape Character Assessments for Ayrshire
- Inventory of Gardens and Designed Landscapes in Scotland;
- Pastmap mapping database;
- Ordnance Survey maps;
- Digital sources of mapping and aerial photography;

Finally as recommended the landscape and visual assessment will incorporate both desk and fieldbased studies, and has been compiled and interpreted by an experienced landscape professional.

#### 1.2.2 Assessment Sequence

Desk Study (Stage 1)

This landscape & visual assessment will be undertaken in the following stages:

- 1 Analysis of Baseline data, maps and plans;
  - 2 Consultation of Policy Documentation;
  - 3 Zone of Visual Influence (Theoretical);
  - 4 Identification of Potential Visual Receptors;
  - 5 Consider Initial Mitigation (if appropriate)

| • | Field Study          | 6  | Confirmation of Visual Receptors;        |
|---|----------------------|----|--|
|   |                      | 7  | Photo Survey from Visual Receptors;      |
|   |                      | 8  | Zone of Visual Influence (Actual/Field); |
|   |                      | 9  | Confirmation of Landscape Character;     |
|   |                      | 10 | Establish Landscape Sensitivity;         |
|   |                      |    |  |
| • | Desk Study (Stage 2) | 11 | Analysis of Field Survey data;           |
|   |                      | 12 | Viewpoint Analysis;                      |
|   |                      | 13 | Consider Mitigation and,                 |
|   |                      |    |  |
| • | Desk Study (Stage 3) | 14 | Report Preparation.                      |

#### 1.2.3 Assessment Criteria

The proposed assessment criteria for the Landscape and Visual Impact Assessment is set out in Appendix 1.

The significance of identified landscape and visual effects will be checked against a matrix, (see example below) which measures the magnitude of change against landscape or visual sensitivity. The resulting impacts are classed Major, Moderate-Major, Moderate, Minor, Negligible/None.

Therefore, as the sensitivity of a landscape increases from Low to High, and the Magnitude of Change increases from Very Low to Very High the predicted impacts increase.

The example matrix table below is used to summarise the findings from the criteria tables. By combining sensitively (along the top) with predicted magnitude of change (along the side) a predicted impact/ effect is reached. This format is applicable to both landscape impacts and visual impacts.

#### Table 1 - Matrix Example

| Example Matrix<br>(Professional<br>judgement applied at<br>every stage of<br>assessment and<br>matrix only used to<br>check consistency.) |           | Sensitivity |                               |            |                               |                   |
|---|-----------|-------------|-------------------------------|------------|-------------------------------|-------------------|
|   |           | High        | High /<br>Medium              | Medium     | Medium –<br>Low               | Low               |
|   | Very High | Major       | $\leftarrow \rightarrow$      | Major      | $\leftarrow \rightarrow$      | Mod-major         |
| e   | High      | Major       | $\leftarrow \rightarrow$      | Mod-major  | $\leftarrow \rightarrow$      | Moderate          |
| agnituc   | Medium    | Mod-major   | $\leftarrow \rightarrow$      | Moderate   | $\leftarrow \rightarrow$      | Minor             |
| Σ   | Low       | Moderate    | $\leftrightarrow \rightarrow$ | Minor      | $\leftrightarrow \rightarrow$ | Negligible        |
|   | Very Low  | Minor       | $\leftrightarrow$             | Negligible | $\leftrightarrow$             | Negligible / None |

Intermediate sensitivity ratings (as per the criteria) would lead to a series of effects that lie between those stated above if a matrix was applied to the assessment. Professional judgement is then used to determine the degree of effect, e.g. high-medium sensitivity combined with medium magnitude would equate to a Moderate+ effect and a decision needs to be made to determine if this effect is Moderate or Moderate-Major. Intermediate magnitude ratings can also be arrived at during the assessment and a similar method is also applied here. Effects above Moderate are considered **Significant** (presented in dark grey in the example matrix).

Where intermediate effects are arrived at, particular care should be taken at the upper and lower limits of the significance threshold i.e. between Moderate and Moderate-Major (presented in lighter grey in the example matrix). These effects may require additional explanation as to why the decision was made to judge the effect as either significant or not significant.

In addition to the impacts which sensitivity combined with the magnitude of change generate, there are a number of other factors which will be taken into account when preparing the landscape and visual assessment. For example, development is often viewed as permanent and/or perceived to have a negative impact, it is therefore important to consider that change generated by a development can be temporary, short-term or indeed reversible and may in many cases deliver beneficial outcomes. The assessment would also consider and identifies both the 'Type' and 'Duration' of the potential impacts.

## **1.3 Receiving Environment**

The Landscape is about the relationship between people and place. Understanding the character of a landscape allows us to identify its 'sense of place', and the things that distinguish it from other places. All landscape has economic, social and environmental value; landscape characterisation provides a mechanism and baseline from which landscapes can be valued and their sensitivity and capacity to accommodate various development typologies gauged. Collectively this information assists with positive decision making when considering future appearance and function. This section establishes the landscape and visual context (or baseline) of the proposed development.

#### 1.3.1 Baseline Study – Site description

The permitted boundary of Tincorn Hill Quarry extends to 23.4ha with the proposed extension covering circa 12.7 Ha, currently to the North and East of the existing extraction area on land occupied by moorland and improved grazing pasture.

#### 1.3.2 Baseline Study - Landscape Character Types

The landscape character type associated with the area of further mineral working at the site has been identified by Natural Scot (Scottish Natural Heritage) as LCT 78 Plateau Moorland Ayrshire. The existing quarry excavation is located on the boundary of this landscape type and Landscape Character Type 68 Lowland River Boundaries Ayrshire with the site access road located within this character type.

Key characteristic of the Plateau Moorland Character Type can be described as:

- Topography is comparatively level with extensive plateaux rising to soft contoured ridges.
- Underlain by basalts to the east and greywackes to the south-west.
- Covered by blanket bog, heather and grass moorland, with extensive mosses and peatland forming an important component of this landscape type.
- Frequent extensive areas of coniferous forest of uniform age which, in places, have significantly modified the original character of these areas in terms of colour, texture and views.
- Largely undeveloped with a sparse network of roads.
- Wind farm development on the north-eastern margins.

• Open, exposed and rather remote landscape, wild in character, although this is lessened in places by the presence of wind turbines and associated infrastructure.

Views are open and medium to longer distance depending on undulations in the local topography.

To the south the existing quarry, as the landscape character changes to the *Lowland River Boundaries* Landscape Character Type, the site is bounded by mature shelter belts and extensive new forestry with the ground falling towards the right bank of the River Ayr. There is extensive new forestry planting (Scots Pine compartment then Sitka Spuce compartments) on the improved ground to the south of the quarry falling to the B743.

With reference to East Ayrshire Local Development Plan 2017 the site is within an area designated as 'Sensitive Landscape Area' protected under ENV 7 and ENV 8 (see below) *The East Ayrshire Local Development Plan Background Paper: Sensitive Landscape Areas (March 2015)* describes the key elements of this designation as it relates to the area surrounding the site encompassing:

The Lowland Rive Valley Landscape Type due to the presence of attractive Estates (Sorn Castle) and designed landscapes interspersed with riparian woodlands, small field parcels and winding roads. Significant tracts of natural woodland given a sense of naturalness and seclusion.

The plateau moorland character type where the open expansive nature of the upland plateau contrasts dramatically to the rolling lowland landscape and contributes significantly to the diversity of the landscape that can be experienced when travelling through East Ayrshire.



#### Figure 1 – Extract from East Ayrshire Development Plan

#### Policy ENV 7: Wild Land and Sensitive Landscape Areas

Areas of wild land, as identified on the 2014 SNH map of wild land areas, have little or no scope to accommodate new development and are safeguarded on the LDP maps. Any development proposed must be able to demonstrate that any adverse effects on the qualities of wild land can be substantially overcome by siting, design or other mitigation.

The Council will give priority and prime consideration to the protection and enhancement of the landscape in its consideration of development proposals within the Sensitive Landscape Areas identified on the LDP maps.

Any development deemed to have unacceptable impacts on wild land and SLAs will not be supported by the Council. All development proposals within these areas will also require to be assessed against policy ENV 8: Protecting and Enhancing the Landscape.

#### Policy ENV8: Protecting and Enhancing the Landscape

The protection and enhancement of East Ayrshire's landscape character as identified in the Ayrshire Landscape Character Assessment will be a key consideration in assessing the appropriateness of development proposals in the rural area. The Council will require that:

(i) Development proposals are sited and designed to respect the nature and landscape character of the area and to minimise visual impact. Particular attention will be paid to size, scale, layout, materials, design, finish and colour.

(ii) Where visual impacts are unavoidable, development proposals should include adequate mitigation measures to minimise such impacts on the landscape.

(iii) Particular features that contribute to the value, quality and character of the landscape are conserved and enhanced. Development that would result in the loss of valuable landscape features, to such an extent that character and value of the landscape, are unacceptably diminished, will not be supported. Such landscape features include:

a. Settings of settlements and buildings within the landscape;

b. Skylines, distinctive landform features, landmark hills and prominent views;

- c. Woodlands, hedgerows and trees;
- d. Field patterns and means of enclosure, including dry stone dykes; and

e. Rights of way and footpaths Development that would create unacceptable visual intrusion or irreparable damage to landscape character will not be supported by the Council.

#### 1.3.3 Baseline Study – Visual

When establishing the extent of the proposed developments visibility, there are a number of recognised stages:

- The first is generally conducted through desk study via utilisation of digital terrain models or printed mapping to generate Zone of Theoretical Visibility (ZTVI) analysis. This provides the assessor with a worst-case scenario of potential visibility, recognising that the exercise does not account for potential screening influence of vegetation, manmade structures or indeed low level localised topographical variation.
- With ZTVI prepared, the next stage is to consider potential visual receptors. Again, this can initially be carried out as a desk study to identify potential properties, road intersections, historic sites or OS marked viewpoints etc. which may be important to the assessment.
- The next stage generally is to test and refine desk study analysis in the field. Consideration of
  the surrounding landscape from a high point within the proposed development site is often a
  logical starting point for field work. From an elevated location, the assessor (comparing with
  ZTVI mapping) can identify points in the wider landscape from which the site is most likely to
  be visible. This exercise is known as intervisibility and forms the basis of defining the actual
  visual envelope. The final stage is to consider visibility of the subject site from the surrounding
  landscape. This generally involves assessment and photography from fixed key locations as
  identified, along with sequential views experienced along pedestrian and vehicle routes.

It would obviously be impossible (indeed unnecessary) to assess potential visibility from every possible angle or potential viewpoint. Therefore, the recognised practice is to identify a selection of viewpoints considered representative of a range of views and viewer types, including residences, transport routes, recreational routes, visitor attractions (including historic monuments), main landscape character types and a variety of distances, aspects, elevations, extents, and sequential routes. These are known as 'key visual receptors' and provide a reliable sample of potential impressions across the study area.

The existing quarry is well contained within the landscape by mature shelter belt planting and via screening provided by existing soil and overburden mounds with views of the existing working quarry limited to the site access road and infrastructure, and limited views of the soil and overburden mounds. No views of the main quarry faces are available.

ZTVI has been created for the overall proposed development site as existing including the predevelopment condition of the extension area and a series of representative viewpoints have been selected for the assessment. These are shown MDA Figure 1.1 and detailed in Table 2 below:

| Viewpoi <b>nt</b> | Co-ordinates   | Description   |
|-------------------|----------------|---|
| 1                 | 258130, 628020 | Highpoint along the northern boundary of the extension area (to |
|                   |                | show intervisibility)   |
| 2                 | 257880, 629060 | Hill to the north of the of the site                            |
| 3                 | 258330, 629470 | Blacksidend Cairn   |
| 4                 | 259290, 628510 | West Auchenlongford   |
| 5                 | 258230, 626920 | Site entrance from B743   |
| 6                 | 259660, 627230 | Access to Broxden House from B743                               |
| 7                 | 257900, 625730 | View from road near Woodhead Lodge and Nether Heiler            |
| 8                 | 257630, 624130 | Darnconner Farm   |
| 9                 | 258290, 623070 | Common Cottage  |

## **1.4 Characteristics of the Proposed Development**

The sequence, position and extent of the proposed extension area will be refined iteratively with direct input from the project landscape architect to ensure that the quarry incorporates all primary mitigation measures possible.

This application will include direct design input that:

- Identifies required screening, with potential location of advance screening requirement including temporary screen bunds and or planting;
- Identifies and agrees extraction limits;
- Agrees final quarry shape, form and depth;
- Identifies and agrees stand offs and buffers;
- Agrees phasing and restoration proposals along with direction of extraction;

#### **Advanced mitigation**

Initial mitigation has been proposed following ZTV Analysis detailed in Figure 1.1 which identified that the pre-development the extension could be viewed to the south and east. As a result early mitigation has been introduced into the proposal as part of Phase 1 establishment works involving the construction of a screening bund and associated planting and screening of the eastern and south eastern boundaries of the quarry extension as detailed in JPB Drawing WG853/SR/F/04. The effect of this mitigation is detailed on MDA Figure 1.2 demonstrating that once established screen bunding and planting significantly restricts views of the development.

## **1.5 Identification of Likely Significant Impacts**

#### 1.5.1 Landscape & Visual Impacts

Assessment will establish the sensitivity of specific landscape resources and describe the significance of changes to that landscape as a result of a proposed development. Once the design process is complete and mitigation incorporated the assessment of potential Landscape and Visual Impacts will be considered in the following key phases:-

- 1 Construction Phase (Establishment)
- 2 Operational Phase (Extractive Operations)
- 3 Restoration Phase (Post Extractive Operations)

#### **APPENDIX 1**

The aim of this landscape and visual impact assessment is to identify, evaluate and predict potential key effects arising from the proposed development. The assessment combines sensitivity with predicted magnitude of change, to establish the significance of residual landscape and visual effects. These are based on pre-defined criteria as set out in Tables 1.1 to 1.5 below.

| Class  | Criteria   |  |  |
|--|--|--|--|
| High   | Landscape characteristics or features with little or no capacity to absorb change without      |  |  |
|  | fundamentally altering their present character.  |  |  |
|  | Landscape designated for its international or national landscape value.                        |  |  |
|  | Outstanding example in the area of well cared for landscape or set of features.                |  |  |
| High –   | Landscape characteristics or features with a low capacity to absorb change without             |  |  |
| Medium   | fundamentally altering their present character.  |  |  |
|  | Landscape designated for regional or county-wide landscape value where the characteristics     |  |  |
|  | or qualities that provided the basis for their designation are apparent. Good example in the   |  |  |
|  | area of reasonably well cared for landscape with notable landscape features.                   |  |  |
| Medium Landscape characteristics or features with moderate capacity to absorb change |  |  |  |
|  | fundamentally altering their present character.  |  |  |
|  | Landscape designated for its local landscape value or a regional designated landscape where    |  |  |
|  | the characteristics and qualities that led to the designation of the area are less apparent or |  |  |
|  | are partially eroded or an undesignated landscape which may be valued locally – for exan       |  |  |
|  | an important open space.   |  |  |
|  | An example of a landscape or a set of features which is neutral or mixed character.            |  |  |
| Medium –   | Landscape characteristics or features which are reasonably tolerant of change without          |  |  |
| Low  | detriment to their present character.  |  |  |
|  | No landscape designation present or of medium to low local value, or an example of a           |  |  |
|  | common or un-stimulating landscape or set of features and conditions.                          |  |  |
| Low  | Landscape characteristics or features which are tolerant of change without detriment to        |  |  |
|  | their present character.   |  |  |

| Table 1.1 - | Landscape | Sensitivity | Criteria |
|-------------|-----------|-------------|----------|
|             |           |             |          |

| No designation present or of low local value. An example of monotonous unattractive |
|---|
| visually conflicting or degraded landscape or set of features.                      |

## Table 1.2 - Visual Sensitivity Criteria

| Class    | Criteria   |
|----------|--|
| High     | Users of outdoor recreational facilities, on recognised national cycling or walking routes or in |
|          | national designated landscapes.  |
|          | Dwellings with views orientated towards the proposed development.                                |
| High –   | Users of outdoor recreational facilities, in locally designated landscapes or on local           |
| Medium   | recreational routes that are well publicised in guide books.                                     |
|          | Road and rail users in nationally designated landscapes or on recognised scenic routes, likely   |
|          | to be travelling to enjoy the view.  |
| Medium   | Users of primary transport road network, orientated towards the Development, likely to be        |
|          | travelling for other purposes than just the view.  |
|          | Dwellings with oblique views of the proposed development.  |
| Medium – | People engaged in active outdoor sports or recreation and less likely to focus on the view.      |
| Low      | Primary transport road network and rail users likely to be travelling to work with oblique       |
|          | views of the Development or users of minor road network.   |
| Low      | People engaged in work activities indoors, with limited opportunity for views of the             |
|          | Development.   |
|          | Road users on minor access roads travelling for other purposes than just the view.               |

## Table 1.3 - Landscape Magnitude Criteria

| Class     | Criteria  |
|-----------|---|
| Very High | Very extensive, highly noticeable change, affecting most key characteristics and dominating |
|           | the experience of the landscape; and,   |
|           | Introduction of highly incongruous development.   |
| High      | Extensive, noticeable change, affecting many key characteristics and the experience of the  |
|           | landscape; and,   |
|           | Introduction of many incongruous elements.  |

| Medium   | Noticeable change to a significant proportion of the landscape, affecting some key     |
|----------|--|
|          | characteristics and the experience of the landscape; and Introduction of some          |
|          | uncharacteristic elements.   |
| Low      | Minor change, affecting some characteristics and the experience of the landscape to an |
|          | extent; and,   |
|          | Introduction of elements that are not uncharacteristic.                                |
| Very Low | Little perceptible change.   |

## Table 1.4 - Visual Magnitude Criteria

| Class     | Criteria  |
|-----------|---|
| Very High | The development would dominate the existing view.   |
| High      | The development would cause a considerable change to the existing view over a wide area or an intensive change over a limited area. |
| Medium    | The development would cause moderate changes to the existing view over a wide area or noticeable change over a limited area.        |
| Low       | The development would cause minor changes to the existing view over a wide area or moderate changes over a limited area.            |
| Very Low  | No real change to perception of the view. Weak, not legible, and/ or indiscernible.   |

## Table 1.5 - Categories of Landscape and Visual Significance of Effect

| Degree of                   | Description of Landscape Effect          | Description of Visual Effect                  |
|-----------------------------|--|---|
| significance                |  |   |
| Major                       | Substantial alteration to                | Major/substantial alteration to               |
|                             | elements/features of the baseline (pre-  | elements/features of the baseline (pre-       |
|                             | development) conditions.                 | development) conditions.                      |
|                             | Notably affect an area of recognised     | Where the proposed development would          |
| national landscape quality. |  | cause a very noticeable alteration in the     |
|                             | Substantial alteration to the character, | existing view.                                |
|                             | scale or pattern of the landscape.       | This would typically occur where the proposed |
|                             |  | development closes an existing view of a      |
|                             |  | landscape of regional or national importance  |

|            |  | and the proposed development would             |  |
|------------|--|--|--|
|            |  | dominate the future view.                      |  |
|            |  |  |  |
| Moderate – | This category is a combination of descriptions of Major listed above and Moderate below. |  |  |
| Major      | These combinations are discussed within the assessment of each landscape or visual       |  |  |
|            | receptor when they occur.  |  |  |
| Moderate   | Alteration to elements/features of the Alteration to one or more elements                |  |  |
|            | baseline conditions.   | of the baseline conditions such that post      |  |
|            | Affects an area of recognised regional   | development character/attributes of the        |  |
|            | landscape quality.   | baseline will be materially changed.           |  |
|            | Alteration to the character, scale or  | This would typically occur where the proposed  |  |
|            | pattern of the local landscape.  | development closes an existing view of a local |  |
|            |  | landscape and the proposed development         |  |
|            |  | would be prominent in the future view.         |  |
| Moderate – | This category is a combination of descriptions of Moderate listed above and Minor below. |  |  |
| Minor      | These combinations are discussed within th   | ne assessment of each landscape or visual      |  |
|            | receptor when they occur.  |  |  |
| Minor      | A minor shift away from baseline A minor shift away from baseline conditions.            |  |  |
|            | conditions.  | This occurs where change arising from the      |  |
|            | The Development partially changes the  | alteration would be discernible but the        |  |
|            | character of the site without  | underlying character / composition /           |  |
|            | compromising the overall existing  | attributes of the baseline condition will be   |  |
|            | landscape character area.  | similar to the pre-development.                |  |
|            |  | It would also occur where the proposed         |  |
|            |  | development newly appears in the view but      |  |
|            |  | not as a point of principal focus or where the |  |
|            |  | proposed development is closely located to     |  |
|            |  | the viewpoint but seen at an acute angle and   |  |
|            |  | at the extremity of the overall view.          |  |
| Negligible | No or very little change from baseline   | Where there is no discernible improvement or   |  |
|            | conditions.  | deterioration in the existing Landscape        |  |
|            |  | Character Area or the view.                    |  |

|           | Change not material, barely           |  |
|-----------|---------------------------------------|--|
|           | distinguishable or indistinguishable. |  |
| No Effect | The Development would not affect the  | The Development would not affect the view. |
|           | landscape receptor.                   |  |

The following terminology has been used were appropriate.

#### Type of Visual Impacts

- Beneficial: A positive impact which will improve or enhance the landscape character or viewpoint.
- **Neutral:** A neutral impact which will neither enhance nor detract from the landscape character or viewpoint.
- Adverse: A negative impact which will have an adverse effect on the existing landscape character or viewpoint.

#### Duration of Impacts

- **Temporary**: Impacts lasting one year or less.
- **Short-term**: Impacts lasting one to seven years.
- Medium-term: Impacts lasting seven to twenty years.
- Long-term: Impacts lasting twenty to fifty years.
- **Permanent**: Impacts lasting over fifty years.

#### **APPENDIX 2**



#### SNH National Landscape Character Assessment

Landscape Character Type 78

**PLATEAU MOORLAND - AYRSHIRE** 



#### Location and Context

The Plateau Moorland - Ayrshire Landscape Character Type occurs on the higher ground of eastern and southern Ayrshire. The eastern area extends along the Ayrshire-Lanarkshire boundary, from the Irvine Valley in the north to the Nith Valley at New Cumnock in the south, and is subdivided by areas of the Upland River Valleys. The southern area includes the open and forested moors around Glen App and Barr Hill, on the boundary of Dumfries and Galloway.

#### **Key Characteristics**

- Topography is comparatively level with extensive plateaux rising to soft contoured ridges.
- Underlain by basalts to the east and greywackes to the south-west.
- Covered by blanket bog, heather and grass moorland, with extensive mosses and peatland forming an important component of this landscape type.
- Frequent extensive areas of coniferous forest of uniform age which, in places, have significantly modified the original character of these areas in terms of colour, texture and views.
- Largely undeveloped with a sparse network of roads.
- Wind farm development on the north-eastern margins.
- Open, exposed and rather remote landscape, wild in character, although this is lessened in places by the presence of wind turbines and associated infrastructure.
- Views are open and medium to longer distance depending on undulations in the local topography.

#### Landscape Character Description

#### Landform

Underlain by basalts, the eastern areas of the *Plateau Moorland – Ayrshire* Landscape Character Type forms the extensive ridge which separates the Ayrshire Basin from the Clyde Basin, extending from near the Garnock Valley to Upper Nithsdale. Underlain by

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SNH National Landscape Character Assessment LCT 78 PLATEAU MOORLAND - AYRSHIRE

greywackes, the southern areas form another large upland in south-west Ayrshire, providing a transition between the foothills and the hills to the south. The topography is comparatively level with extensive plateaux rising to soft contoured ridges.

#### Landcover

Landcover of the *Plateau Moorland* - *Ayrshire* consists of blanket bog, heather and grass moorland. The landscape is of an open, exposed and rather wild character, despite occasional isolated hill farms with sheep and cattle grazing. The landscape type is perhaps exemplified in areas to the north and south of the upper Ayr valley. Mosses, comprising areas of extensive peatland, form an important component of this landscape type occurring, for example, at Fenwick Moss.

The landscape has ideal physical characteristics for large-scale coniferous forest and has been subject to the incremental spread of Sitka spruce forest. Older forests retain the blocky outline characteristic of blanket coniferous forestry, but these are increasingly being replaced by restructured forests designed along more sympathetic lines.

#### Settlement

The largely undeveloped nature of these moorlands is reflected in the sparse network of roads which cross the hills. There is evidence for some medieval and post medieval farmsteads over the areas, such as the example at Munteoch. The area has also been subject to wind farm development which is beginning to alter the landscape character in the plateau moorlands to either side of the Duisk Valley, to the far south as large scale, manmade modern turbines become a defining characteristic of the landscape and erode the remote character.

Coal measures lie beneath parts of the Plateau Moorlands along the eastern side of Ayrshire. Areas around the Ayr valley, for example, have a history of both shallow and deep mining. There are extensive open-cast workings around Cumnock in particular.

#### Perception

This is an expansive, exposed landscape with a rather wild and remote character which would make any development within it highly visible. Views are open and medium to longer distance depending on undulations in the local topography. In forested areas, the dense tree cover has significantly modified the original character of these areas in terms of colour, texture and length of views possible. Newly planted forests appear as dark speckled landscapes from a distance. The open ground and surrounding moorland contrast in their mosaics of brown and ochre colours.

This is one of 389 Landscape Character Types identified at a scale of 1:50 000 as part of a national programme of Landscape Character Assessment republished in 2019.

The area covered by this Landscape Character Type was originally included in the Ayrshire (Land Use Consultants), published 1998.

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SNH National Landscape Character Assessment LCT 78 PLATEAU MOORLAND - AYRSHIRE





#### **Visual Catchment**

As a basic visual principal, development in the landscape become less perceptible with distance. This simply equates to a reduction of the significance of potential visual impacts as one moves further away.

#### Viewpoint Distance 0-2km

Although this is difficult to quantify, it is acceptable to state that a site located approx 2km or less from a viewer is considered close enough to allow identification of significant detail. Any positions in this range with open uninterrupted views of the site would generally receive the greatest visual impacts.

#### Viewpoint Distance 2-5km

The visibility of the site becomes more general, with viewers in open uninterrupted positions able to identify general form, occasionally colour/tone and textural contrast, but losing the more focused detail achievable closer.

#### Viewpoint Distance 5-15km

Visual prominence quickly diminishes. In certain circumstances / light conditions etc have potential to allow certain types of development and material finishes to be perceived. The development increasing becomes part of the general background/distance views.

#### Viewpoint Distance 15km+

Upwards of this distance potential visibility of the development quickly becomes a minor feature within the landscape and considered imperceptible to the average human eye. The development in effect becomes part of the general background/distance views.

Zone of Theoretical Visual Influence (ZTVI) **fig. 1.1** Existing & Viewpoint Locations

## Tincorn Hill Quarry



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#### **Visual Catchment**

As a basic visual principal, development in the landscape become less perceptible with distance. This simply equates to a reduction of the significance of potential visual impacts as one moves further away.

#### Viewpoint Distance 0-2km

Although this is difficult to quantify, it is acceptable to state that a site located approx 2km or less from a viewer is considered close enough to allow identification of significant detail. Any positions in this range with open uninterrupted views of the site would generally receive the greatest visual impacts.

#### Viewpoint Distance 2-5km

The visibility of the site becomes more general, with viewers in open uninterrupted positions able to identify general form, occasionally colour/tone and textural contrast, but losing the more focused detail achievable closer.

#### Viewpoint Distance 5-15km

Visual prominence quickly diminishes. In certain circumstances / light conditions etc have potential to allow certain types of development and material finishes to be perceived. The development increasing becomes part of the general background/distance views.

#### Viewpoint Distance 15km+

Upwards of this distance potential visibility of the development quickly becomes a minor feature within the landscape and considered imperceptible to the average human eye. The development in effect becomes part of the general background/distance views.

## Zone of Theoretical Visual Influence (ZTVI) - Phase 1

fig. 1.2

Tincorn Hill Quarry



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**APPENDIX 2** 



## PRELIMINARY ECOLOGICAL APPRAISAL

# SORN QUARRY



DATE: 16 NOVEMBER 2022 CONTRACT REF: BRE10.22.2616 SITE LOCATION: SORN, MAUCHLINE, KA5 6JF OS GRID REF: NS 579 279 CLIENT: BREEDON

## **ECHOES ECOLOGY LTD**

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### **Document Control**

| Version | Date        | Prepared By                 | Approved By                     |
|---------|-------------|-----------------------------|---------------------------------|
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|         | 2022        | Principal Ecologist         | Managing Director               |

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## **Executive Summary**

Sorn Quarry is located off the B743, east of the village of Sorn, Mauchline, KA5 6JF, central OS grid reference NS 579 279. It is the intention of Breedon, subject to planning permission being approved, to extend the quarry to the north and the east.

Echoes Ecology Ltd was appointed by Breedon to carry out a Preliminary Ecological Appraisal of the proposed extension area at Sorn Quarry (hereafter referred to as the Site). A Habitat Suitability Index survey for great crested newt (*Triturus cristatus*) was also undertaken on all water bodies within 500 metres (m) of the Site with connecting habitat. The survey was completed on 21.10.2022.

Muirkirk and North Lowther Uplands Special Protection Area (SPA) and Muirkirk Uplands Site of Special Scientific Interest (SSSI) are located 1 kilometre (km) north of the Site. The core ranges for the qualifying interests of the SPA (hen harrier (*Circus cyaneus*), shorteared owl (*Asio flammeus*), peregrine falcon (*Falco peregrinus*), golden plover (*Pluvialis apricaria*) and merlin (*Falco columbarius*)) overlap with the Site (Scottish Natural Heritage, 2016) and so there is a risk that the proposal could disturb the qualifying interests of the SPA. The South Strathclyde Raptor Study Group also confirmed that there are historical breeding records of hen harrier to the north of the Site. Breeding bird surveys are recommended and should include upland breeding moorland wader surveys and breeding raptor surveys for hen harrier, short-eared owl and merlin. A Habitats Regulation Appraisal will then need to be completed, informed by the results of the breeding bird surveys.

The quarry manager confirmed that peregrine falcons were nesting in 2022 on the back face of the quarry at NS 57970 27804. The nesting location of the peregrine falcons must be protected from the commencement of occupancy through to at least five weeks post-fledging (Bodnar, 2022). A Species Protection Plan should be prepared to cover peregrine activity in both the works associated with existing active quarry and the new extension area.

The higher ground within the Site, located around the edge of the active quarry, comprised semi-improved acid grassland. As the ground sloped down towards the Harley Burn the habitat transitioned into a mosaic of blanket bog and acid flush over deep peat. An area of raised ground in the north-west corner of the Site consisted of wet heath and the habitat in the east of the Site consisted of marshy grassland and semi-improved acid grassland. Blanket bog is an Annex I and Scottish Biodiversity List (SBL) priority habitat and wet heath and acid flush are SBL priority habitats. Further peat depth surveys will take place to accurately map the areas of deep peat. Once the extent of the deep peat is known these areas should be avoided. A 15m stand-off from the Harley Burn should be implemented to protect the flushes and Harley Burn. Appropriate pollution prevention should also be implemented on Site.

Three lagoons are located within the active quarry and were assessed as having average suitability for great crested newt. A single pond is located 300m north-west of the Site and was assessed as having a below average suitability for great crested newt. eDNA surveys of these water bodies are recommended, to confirm the absence of great crested newt from the Site.

Due the suitability of the habitat for reptiles, any aboveground vegetation should be removed in a precautionary manner, as outlined in Section 6.

If works at the Site do not commence prior to 21.04.2024, then further surveys should be commissioned in order to ascertain that the situation at the Site has not changed.

An Ecological Constraints and Opportunities Plan is presented in Section 7 of this report and summarises the constraints and opportunities for ecological enhancements at the Site.

## Section 1 - Introduction

#### 1.1 Contract Overview

- 1.1.1 Sorn Quarry is located off the B743, east of the village of Sorn, Mauchline, KA5 6JF, central OS grid reference NS 579 279. The quarry lies adjacent to an extensive area of moorland habitat with Blood Moss located to the north, which adjoins the Muirkirk and North Lowther Uplands Special Protection Area (SPA) and the Muirkirk Uplands Sites of Special Scientific Interest (SSSI). A matrix of agricultural fields and tree belts lie to the south, east and west of the quarry. For a Location Plan of the extension area at Sorn Quarry, refer to Appendix I.
- 1.1.2 It is the intention of Breedon, subject to planning permission being approved, to extend the current quarry to the north and east.
- 1.1.3 Echoes Ecology Ltd was appointed by Breedon to carry out a Preliminary Ecological Appraisal of the extension area at Sorn Quarry (hereafter referred to as the Site). A Habitat Suitability Index survey for great crested newt (*Triturus cristatus*) was also undertaken on all water bodies within 500 metres (m) of the Site with connecting habitat.
- 1.1.4 Qualifications and competencies of the author and surveyor are provided in Appendix II.
- 1.1.5 The following documents were provided to Echoes Ecology Ltd in order to assist in carrying out this contract:
  - Quarry extension boundary.

#### 1.2 Survey Aims

- 1.2.1 The aims of the survey were:
  - To complete a desk study to identify protected or notable sites, habitats or species in the vicinity of the Site
  - To record the broad habitat types across the Site and assess their importance
  - To assess the likely presence of protected and notable species at the Site
  - To carry out an initial assessment (Habitat Suitability Index) of water bodies within the Site and a buffer of 500m around the Site to determine the potential for use by great crested newts (GCN)
  - To identify any ecological constraints
  - To recommend any further ecological surveys that may be required
  - To identify opportunities for ecological enhancement.

## **Section 2 - Relevant Policy**

#### 2.1 Scottish Planning Policy

2.1.1 Scottish Planning Policy introduces a presumption in favour of development that protects and conserves the natural environment and states that the planning systems should promote the protection and improvement of the water environment (Scottish Government, 2014).

#### 2.2 East Ayrshire Local Development Plan

- 2.2.1 East Ayrshire LDP Policy ENV6: Nature Conservation, states that developments should conserve and enhance locally designated sites to maintain and improve their ecological and learning value (East Ayrshire Council, 2017). The policy also outlines how development should contribute positively to biodiversity conservation and protect, enhance and maintain local priority habitat and species and existing habitat networks.
- 2.2.2 East Ayrshire LDP Policy ENV10: Carbon Rich Soils, states that in recognition of the role of peatland soils as valuable carbon stores or "sinks", the Council will seek to minimise adverse impacts from development on such soils, including by the release of CO<sub>2</sub> to the atmosphere.

#### 2.3 Scottish Biodiversity Strategy

2.3.1 The Nature Conservation (Scotland) Act 2004 places a 'Biodiversity Duty' on public bodies to further the conservation of biodiversity and it requires Scottish Ministers to designate one or more strategies for the conservation of biodiversity as the Scottish Biodiversity Strategy. 'Scotland's Biodiversity: It's in Your Hands - A strategy for the conservation and enhancement of biodiversity in Scotland' (Scottish Executive, 2004) and '2020 Challenge for Scotland's Biodiversity' (Scottish Government, 2013) together form the Scottish Biodiversity Strategy.

#### 2.4 Scottish Biodiversity List

2.4.1 The Scottish Biodiversity List (SBL) was published in 2005 and last updated in 2012 (NatureScot, 2020). The aim of the list is to help public bodies carry out their 'Biodiversity Duty', as required by the Nature Conservation (Scotland) Act 2004, by identifying the species and habitats which are the highest priority for biodiversity conservation in Scotland.

#### 2.5 Local Biodiversity Action Plan

2.5.1 Local Biodiversity Action Plan Partnerships were established in the UK following the ratification of the Convention on Biological Diversity in 1992. Each local partnership publishes biodiversity action plans which identify the habitats or species selected as priorities for targeted conservation work. The survey area lies within East Ayrshire, for which there is currently no up to date Local Biodiversity Action Plan.

## Section 3 - Methodology

#### 3.1 Survey Methodology

3.1.1 The survey methods employed were taken from 'Guidelines for Preliminary Ecological Appraisal' (CIEEM, 2017), 'Handbook for Phase 1 Habitat Survey - A Technique for Environmental Audit' (JNCC 2010) and 'Evaluating the Suitability of Habitat for the Great Crested Newt (*Triturus cristatus*)' (Oldham *et al.*, 2000).

#### 3.2 Desk Study

- 3.2.1 A search for nearby designated sites, protected species and species listed on the Scottish Biodiversity List was carried out. This desk study allowed for data within a 2 kilometre (km) radius of the Site to be considered and assisted in evaluating the ecological value of habitats and features present within the survey area. An extended 20km radius was considered for sites that were designated for important bird populations to determine if there was any connectivity through the overlapping of core ranges (Scottish Natural Heritage, 2016). The following resources were consulted:
  - Scottish Biodiversity List (NatureScot, 2020)
  - South West Scotland Environmental Information Centre (SWSEIC)
  - South Strathclyde Raptor Study Group
  - NBN Atlas (NBN Atlas Partnership, 2022)
  - SiteLink (NatureScot, 2022)
  - Echoes Ecology Ltd's 'ScoMam' Database (a database of over 6,000 records of protected species collected by Echoes Ecology Ltd and associate surveyors over 10 years of surveys).

#### 3.3 Preliminary Ecological Appraisal (PEA)

- 3.3.1 A PEA was carried out on 21.10.2022 Heather Simpson CEnv MCIEEM. The weather was dry, with 100% cloud cover, wind of 9-20 mph and a temperature of 13°C.
- 3.3.2 All habitats within the Site were surveyed, plus a buffer of up to 100 metres (m) outwith the Site boundary, where access permitted. Target Notes were used to identify the presence and location of features of particular interest or those too small to map. The abundance of each plant species was recorded using the DAFOR scale (D= Dominant, A= Abundant, LA= Locally Abundant, F= Frequent, O= Occasional, R= Rare). Mires were determined with the aid of a peat probe (i.e. blanket bog is peat deeper than 50 centimetres (cm)). Habitat features indicating the presence, or likely presence, of protected species or other species of nature conservation were also noted.
- 3.3.3 Habitats were mapped using ArcGIS software in line with Phase 1 habitat survey methodology. Aerial photography and OS maps were referred to with a view to aid in the assessment of boundary features and habitat boundaries.
- 3.3.4 A GPS (Garmin eTrex), peat probe and digital camera were used to help map and document the habitats and a hand lens x10 and plant ID books were used to identify plant species.
- 3.3.5 Nomenclature used for higher plants was taken from Stace (2019), for bryophytes, from Blockeel *et al.* (2021) and for lichens from Coppins (2002).

#### 3.4 Habitat Suitability Index (HIS)

3.4.1 All water bodies within 500m of the Site with connecting habitat were surveyed, where access permitted. The HSI is a measure of the likelihood of GCN presence but is not a substitute for newt surveys. Although a low HSI score may indicate that a water body is unlikely to contain newts this is not conclusive and conversely a high score does not mean that GCNs will definitely be present. For full details of the HSI method refer to Appendix III.

## 3.5 Limitations to Survey Work

3.5.1 A comprehensive species list could not be compiled due to the time of year of the survey. However, the species list obtained was sufficient to determine the habitats present.

## Section 4 - Desk Study Results

#### 4.1 Scottish Biodiversity List (SBL)

- 4.1.1 Species listed in the SBL which may be present within or around the Site are as follows:
  - Noctule (*Nyctalus noctula*)
  - Common pipistrelle (*Pipistrellus pipistrellus*)
  - Soprano pipistrelle (*Pipistrellus pygmaeus*)
  - Common toad (*Bufo bufo*)
  - Eurasian otter (Lutra lutra)
  - Great crested newt
  - Water vole (Arvicola amphibius)
  - Eurasian badger (Meles meles)
  - Bird species associated with moorland habitat.

#### 4.2 Designated Sites

4.2.1 A search for nearby designated sites was carried out in October 2022. There are two statutory designated sites located within 2km, Muirkirk and North Lowther Uplands SPA, and Muirkirk Uplands SSSI which are both located 1km to the north of the Site. Full details of the designated sites are shown in Table 4.1 below.

| Table 4.1 - Search results for nearl | by designated sites | (NatureScot, 2022) | ļ |
|--------------------------------------|---------------------|--------------------|---|
|--------------------------------------|---------------------|--------------------|---|

| Name and Distance from Site  | Details  |  |
|--|--|--|
| Muirkirk and North<br>Lowther Uplands:<br>Situated 1km to the North<br>of the Site | Designation: SPA<br>Qualifying interests:<br>Breeding and over-wintering hen harrier ( <i>Circus cyaneus</i> ),<br>breeding short-eared ( <i>Asio flammeus</i> ), breeding peregrine falcon<br>( <i>Falco peregrinus</i> ), breeding golden plover ( <i>Pluvialis apricaria</i> )<br>and breeding merlin ( <i>Falco columbarius</i> ). |  |
| Muirkirk Uplands:<br>Situated 1km to the north<br>of the site                      | Designation: SSSI<br>Notified natural features:<br>Blanket bog and breeding bird assemblage including breeding<br>short-eared owl and breeding and over-wintering hen harrier.   |  |

#### 4.3 Protected Species

- 4.3.1 The SWSEIC Records Centre, NBN Atlas and ScoMam were consulted for records of protected species in October 2022. No records had been received from the SWSEIC Record Centre at the time of writing this report. ScoMam held no records and no records that were commercially available were identified on NBN. It should be noted that a lack of records should not be interpreted as an indication that these species are not present in the area.
- 4.3.2 The South Strathclyde Raptor Study Group confirmed that peregrine falcons were nesting within Sorn Quarry and there are historical breeding records of hen harrier to the north of the Site. The quarry manager confirmed that the peregrine falcons were nesting in 2022 on the back face of the quarry at NS 57970 27804.

## Section 5 - Field Survey Results

#### 5.1 Habitats within the Survey Area

- 5.1.1 The Phase 1 habitat survey map is presented below in Figure 5.1 and Target Notes are presented in Table 5.1.
- 5.1.2 The higher ground around the edge of the active quarry comprised semi-improve acid grassland which was grazed by sheep and cattle (Figure 5.2); full details of this habitat are provided in Target Note (TN) 1. As the ground sloped down towards the Harley Burn the habitat transitioned into a mosaic of blanket bog and acid flush over deep peat (TN 2, Figure 5.3). Purple moor-grass (*Molinia caerulea*) was dominant over the majority of the habitat with frequent heath rush (*Juncus squarrosus*) over extensive carpets of mosses. There were also pockets of sphagnum mosses and areas where mat-grass (*Nardus stricta*) was abundant. An area of raised ground in the northwest corner of the Site consisted of wet heath and contained a similar species composition to the blanket bog habitat alongside Harley Burn (Figure 5.4), but with areas of abundant cross-leaved heath (*Erica tetralix*) and bilberry (*Vaccinium myrtillus*) over carpets of mosses. An extensive area of blanket bog was located to the north of the Harley Burn (Blood Moss).
- 5.1.3 The habitat in the east of the extension area was grazed by cattle and sheep and consisted of marshy grassland and semi-improved acid grassland. The areas of marshy grassland were dominated with sharp-flowered rush (*Juncus acutiflorus*) and had additional species including meadow buttercup (*Ranunculus acris*) and wavy bitter-cress (*Cardamine flexuosa*). Alongside the Harley Burn there was a mosaic of wet heath, dominated by purple moor-grass, and marshy grassland.

#### 5.2 Non-Native Plants Species

5.2.1 No non-native plant species were identified within the survey area. Therefore, non-native plant species are not considered further in this report.

#### 5.3 Protected and Notable Plant Species

5.3.1 The survey did not identify any protected plant species or species listed on the SBL. Therefore, protected and notable plant species are not considered further in this report.

#### 5.4 Bats

5.4.1 There are no structures or trees within the survey area and so no potential roost features for bats are present. The habitats within the site provide suitable foraging and commuting habitat for bats.

#### 5.5 Badger

5.5.1 No evidence of badger was detected within the survey area. Due to the wet heath and blanket bog habitat, the majority of the survey area was unsuitable for sett creation. Badgers are considered absent from the Site and are not considered further in this report.

#### 5.6 Otter and Water Vole

- 5.6.1 The Harley Burn had a narrow channel with very shallow banks and offered no suitable habitat for otter resting sites (Figure 5.5). No evidence of otter was detected within the survey area and so otters are not considered further within this report.
- 5.6.2 The narrow water course offered limited potential for water vole, but the shallow banks could support water vole burrows as they became more substantial at the eastern end of the survey area.

Figure 5.1 - Phase 1 habitat survey map



|                        | l                    |  |   |        |  |
|------------------------|----------------------|--|---|--------|--|
| Target<br>Note<br>(TN) | OS Grid<br>Reference | Description  |   |        |  |
| 1                      | NS 58071<br>27853    | Semi-improved acid grassland is present along the higher ground around<br>the edges of the active quarry. The species composition obtained during<br>the PEA survey is outlined below: |   |        |  |
|                        |                      | Common name Latin Name DAFOR   |   |        |  |
|                        |                      | Mat-grass  | Nardus stricta                          | F      |  |
|                        |                      | Glittering wood-moss   | Hylocomium splendens                    | F      |  |
|                        |                      | Tormentil  | Potentilla erecta                       | 0      |  |
|                        |                      | Heath bedstraw   | Galium saxatile                         | 0      |  |
|                        |                      | Red fescue   | Festuca rubra                           | 0<br>0 |  |
|                        |                      | Neat feather-moss  | Pseudoscleropodium puru                 | m O    |  |
|                        |                      | Springy turf-moss  | Rhytidiadelphus squarrosu               | s O    |  |
|                        |                      | White clover   | Trifolium repens                        | 0      |  |
|                        |                      | Marsh violet   | Viola palustris                         | 0      |  |
|                        |                      | Tufted hair-grass  | Deschampsia cespitosa                   | R      |  |
|                        |                      | Marsh thistle  | Cirsium palustre                        | R      |  |
|                        |                      | Carnation sedge  | Carex panicea                           | R      |  |
|                        |                      | Common mouse-ear   | Cerastium fontanum                      | R      |  |
|                        |                      | Sharp-flowered rush  | Juncus acutiflorus                      | R      |  |
|                        |                      | Soft-rush  | Juncus effusus                          | R      |  |
|                        |                      | Yorkshire-fog  | Holcus lanatus                          | R      |  |
|                        |                      |  |   |        |  |
|                        |                      | below:<br>Species composition in blanket bog:  |   |        |  |
|                        |                      | Common name  | Latin Name                              | DAFOR  |  |
|                        |                      | Purple moor-grass  | Molinia caerulea                        | D      |  |
|                        |                      | Glittering wood-moss   | Hylocomium splendens                    | A      |  |
|                        |                      | Flat-topped bog-moss   | Sphagnum fallax                         | F      |  |
|                        |                      | Heath rush   | Juncus squarrosus                       | F      |  |
|                        |                      | Marsh violet   | Viola palustris                         | 0      |  |
|                        |                      | Springy turf-moss  | Rhytidiadelphus squarrosus              | 0      |  |
|                        |                      |  | Potentilla erecta                       | 0      |  |
|                        |                      |  | Erica tetralix                          | 0      |  |
|                        |                      |  | Polytricnum commune                     | 0      |  |
|                        |                      | Juniper haircap  | Polytrichum juniperinum                 |        |  |
|                        |                      | Mai-grass  | Narous sincia<br>Sphognum conillifolium | 0 - LA |  |
|                        |                      | Runt loaved bog moss   | Sphagnum palustro                       | 0      |  |
|                        |                      | Crapherry  | Vaccinium oxycoccos                     | P      |  |
|                        |                      | Rilherry   | Vaccinium myrtillus                     | R      |  |
|                        |                      | Heather  | Calluna vulgaris                        | R      |  |
|                        |                      | Red fescue   | Festuca rubra                           | R      |  |
|                        |                      | Cladonia sp  | Cladonia sp                             | R      |  |
|                        |                      | Bog bead-moss  | Aulacomnium palustre                    | R      |  |
|                        |                      | Heath milkwort   | Polygala serovilifolia                  | R      |  |
|                        |                      | Bog asphodel   | Narthecium ossifradum                   | R      |  |
|                        |                      | Carnation sedge  | Carex panicea                           | R      |  |

Table 5.1 - Target Notes
| Target<br>Note<br>(TN) | OS Grid<br>Reference | Description                                 |                                 |       |
|------------------------|----------------------|---|---------------------------------|-------|
|                        |                      | Deergrass                                   | Trichophorum germanicum         | R     |
|                        |                      | Star sedge                                  | Carex echinata                  | R     |
|                        |                      | Little Shaggy-moss                          | Rhytidiadelphus loreus          | R     |
|                        |                      | Common cottongrass                          | Eriophorum angustifolium        | R     |
|                        |                      | Species composition in a <b>Common name</b> | cid flush:<br><i>Latin Name</i> | DAFOR |
|                        |                      | Sharp-flowered rush                         | Juncus acutiflorus              | Α     |
|                        |                      | Flat-topped bog-moss                        | Sphagnum fallax                 | F     |
|                        |                      | Common haircap                              | Polytrichum commune             | 0     |
|                        |                      | Yorkshire-fog                               | Holcus lanatus                  | 0     |
|                        |                      | Springy turf-moss                           | Rhytidiadelphus squarrosus      | 0     |

## 5.7 Red Squirrel and Pine Marten

5.7.1 No suitable habitat was recorded within the survey area and so these species are not considered further in the report.

## 5.8 Amphibians

- 5.8.1 Three lagoons are located within the active quarry 250m south of the extension area (Figure 5.6). The lagoons are concrete lined settling ponds which collect water run-off from the active quarry. The tree lines present around the site offices provides connectivity between the three lagoons and the habitats within the Site. The poor water quality resulted in the lagoons only having an average suitability for GCN. Table 5.2 details the HSI scores and overall pond suitability; the locations of the lagoons are presented in Appendix IV.
- 5.8.2 A single pond is located 300m north-west of the extension area within the adjacent moorland habitat (Figure 5.7). It was assessed as having a below average suitability for GCN due to the poor water quality, lack of aquatic macrophytes and isolation from further ponds. Table 5.2 details the HSI scores and overall pond suitability; the location of the pond is presented in Appendix IV.
- 5.8.3 Further lagoons are located alongside the access track into the active quarry roughly 350m south of the Site. As the active quarry lies between these lagoons and the Site, if any GCN are present they are unlikely to access the habitats within the Site. Therefore, no assessment of these lagoons took place.
- 5.8.4 The wet heath, blanket bog and marshy grassland provides suitable commuting and foraging habitat for GCN and the SBL species common toad. Stone walls and loose rocks (Figure 5.8) are present within the Site and these also provide suitable refuge and hibernacula for GCN and common toad.

| Habitat                 | Pond A            |              | Lagoon 1          |              | Lagoon 2          |              | Lagoon 3          |              |
|-------------------------|-------------------|--------------|-------------------|--------------|-------------------|--------------|-------------------|--------------|
| Criteria                | Field<br>Score    | HSI<br>Score | Field<br>Score    | HSI<br>Score | Field<br>Score    | HSI<br>Score | Field<br>Score    | HSI<br>Score |
| SI1 -<br>Location       | В                 | 0.5          | В                 | 0.5          | В                 | 0.5          | В                 | 0.5          |
| SI2 - Pond<br>area      | 250m <sup>2</sup> | 0.5          | 300m <sup>2</sup> | 0.6          | 300m <sup>2</sup> | 0.6          | 300m <sup>2</sup> | 0.6          |
| SI3 - Pond<br>drying    | Never             | 0.9          | Never             | 0.9          | Never             | 0.9          | Never             | 0.9          |
| SI4 - Water<br>quality  | Poor              | 0.33         | Poor              | 0.33         | Poor              | 0.33         | Poor              | 0.33         |
| SI4 - Shade             | 10%               | 1            | 50%               | 1            | 50%               | 1            | 50%               | 1            |
| SI6 - Fowl              | Absent            | 1            | Absent            | 1            | Absent            | 1            | Absent            | 1            |
| SI7 - Fish              | Possible          | 0.67         | Absent            | 1            | Absent            | 1            | Absent            | 1            |
| SI8 - Ponds             | 0.32              | 0.4          | 1.9               | 0.8          | 1.9               | 0.8          | 1.9               | 0.8          |
| SI9 - Terr'l<br>habitat | Moderate          | 0.67         | Moderate          | 0.67         | Moderate          | 0.67         | Moderate          | 0.67         |
| SI10 -<br>Macrophytes   | 2%                | 0.3          | 5%                | 0.3          | 5%                | 0.3          | 5%                | 0.3          |
| Pond<br>Suitability:    | Below<br>Average  | 0.58         | Average           | 0.65         | Average           | 0.65         | Average           | 0.65         |

Table 5.2 - Habitat Suitability Index scores of water bodies

## 5.9 Reptiles

- 5.9.1 The wet heath, blanket bog and marshy grassland provides suitable commuting and foraging habitat for reptiles.
- 5.9.2 Stone walls and loose rocks (Figure 5.8) are present within the Site which will also provide suitable refuge and hibernacula for reptiles.

## 5.10 Birds

5.10.1 The habitat within the Site boundary is such that it would be expected to hold potential for bird species associated with moorland habitat.

## 5.11 Invertebrates

5.11.1 The wet heath, blanket bog and marshy grassland could provide suitable food plants for larval moths and butterflies, and the wildflowers will provide sources of nectar for foraging pollinators.

Figure 5.2 - Semi-improved acid grassland



Figure 5.3 - Blanket bog with an acid flush at far left of photograph



Figure 5.4 - Wet heath



Figure 5.5 - Harley Burn



Figure 5.6 - Quarry lagoons



Figure 5.7 - Pond within the moorland habitat to the north-west of the Site



Figure 5.8 - Stone wall within the Site



# Section 6 - Discussion

## 6.1 Ecological Constraints and Required Mitigation

6.1.1 The following ecological constraints associated with the Site are listed in paragraphs 6.2 to 6.9 below. Legislation with regards to these species is presented in Appendix V.

## 6.2 Designated Sites

- 6.2.1 Muirkirk and North Lowther Uplands SPA is located 1km north of the Site, with Blood Moss providing habitat connectivity between the SPA and the Site. The qualifying interests include breeding and over-wintering hen harrier, breeding short-eared owl, breeding merlin, breeding peregrine falcon, and breeding golden plover. The conservation objectives of the SPA include the avoidance of any significant disturbance to the qualifying species. The core ranges for hen harrier, short-eared owl and peregrine falcon are 2km, for golden plover is 3km and for merlin is 5km. Therefore, there is a risk that the proposal could disturb the qualifying interests of the SPA if these species utilise the habitats within and around the Site. This is reinforced by the communication from the South Strathclyde Raptor Study Group that there are historical records of breeding hen harrier to the north of the Site. Further survey effort will be required to determine the impact upon the qualifying interests and a Habitats Regulation Appraisal will need to be completed.
- 6.2.2 Muirkirk Uplands SSSI is notified for its blanket bog habitat as well as the populations of shorteared owl and hen harrier. There will be no impact upon the habitats as it is located 1km from the Site and there are no hydrological connections. There is potential for disturbance to the notified bird species as discussed above with regards to the SPA.

#### 6.3 Habitats

- 6.3.1 Blanket bog is an Annex I and SBL priority habitat and wet heath and acid flush are SBL priority habitats. The wet heath habitat resembles *Scirpus cespitosus Erica tetralix* wet heath community (M15) which can occur on both shallow and deep peat. Further peat depth surveys will take place to accurately map the areas of deep peat. Once the extent of the deep peat is known these areas should be avoided.
- 6.3.2 The acid flushes flow through the blanket bog habitat and connect to the Harley Burn. A 15m stand-off from the Harley Burn should be implemented to protect the flushes and Harley Burn. Appropriate pollution prevention should also be implemented on Site.
- 6.3.3 The wet heath should be protected wherever possible, and the permanent exclusion of grazing is also recommended to protect the habitat that can be retained.
- 6.3.4 The semi-improved acid grassland and marshy grassland are considered common and widespread in the area and given the discrete nature of the extension area; the loss of these habitats is not considered to have a significant ecological impact.

### 6.4 Ground Water Dependent Terrestrial Ecosystems

6.4.1 The blanket bog and wet heath are rain-fed mires and not ground water dependent. As the marshy grassland is located adjacent to and downslope of the rain-fed habitats they will also have low groundwater dependency. Surveys at the Site have also confirmed that the geology is such that the habitats cannot be dependent on a groundwater aquifer. Therefore, there are no ecological constraints with regards to ground water dependent terrestrial ecosystems.

## 6.5 Bats

6.5.1 The discrete habitat loss of marshy grassland, wet heath and semi-improved acid grassland is not considered to have a significant impact upon foraging and commuting bats. Therefore, there are no ecological constraints with regards to bats.

### 6.6 Water Vole

6.6.1 As long as the Harley Burn is adequately protected through a 15m stand-off and appropriate pollution prevention, given the limited suitability of the water course for water vole, no further survey is considered necessary.

## 6.7 Amphibians

- 6.7.1 The three lagoons located within the active quarry and the pond located to the north-west of the Site may provide suitable breeding habitat for GCN. The habitats within the Site are suitable for foraging and commuting GCN and so no works should occur until further survey of these water bodies confirms that GCN are absent from the area.
- 6.7.2 The discrete habitat loss is not considered to have a significant impact upon the local population of common toad, and the protection of the Harley Burn plus a 15m corridor will provide this species with a commuting route through the Site.

## 6.8 Reptiles

- 6.8.1 The habitats within the Site were deemed to be suitable for commuting and foraging reptiles, and the stone walls and loose stones may be used by hibernating reptiles. The removal of these habitats without mitigation could lead to the death of reptiles, if they are present at the time of works, which could lead to a potential breach in legislation.
- 6.8.2 The stone walls and exposed rocks should be removed during the reptile active season (March to October). If these features must be moved during the winter months (November to February), the stone walls and exposed rocks will need to be dismantled under the supervision of an Ecologist. If an inactive reptile is found during the dismantling, the feature under which the reptile was found must be carefully replaced and the area delineated; no works will be allowed to take place in this area until the reptile active season (March to October).
- 6.8.3 Any soil stripping and aboveground vegetation should be removed during the winter months between November and February, when reptiles are hibernating below ground or under cover. If soil stripping or vegetation removal is due to be carried out during the reptile active season (March to October) then the vegetation should be cut down to ground level towards retained habitat north, west or east of the Site, to allow reptiles to move out of the area ahead of works. Once the vegetation has be cut the soil can be stripped, but this must also be done towards retained habitat. Due to the structure of the habitats, it is not considered feasible to cut the vegetation in phases.

## 6.9 Birds

- 6.9.1 There is potential for breeding bird associated with moorland habitat including hen harrier, shorteared owl, merlin and golden plover which are qualifying interests of the SPA. The habitat within the Site is not considered suitable for breeding peregrine falcon and given the distance from the SPA and SSSI, no significant disturbance to the wintering population of hen harrier is anticipated. However, further advice from NatureScot is being sought to confirm that there will be no further survey requirements regarding over-wintering hen harrier.
- 6.9.2 The breeding pair of peregrine falcons within Sorn Quarry is not considered to be connected to the SPA. The nesting location must be protected from commencement of occupancy through to at least five weeks post-fledging (Bodnar, 2022). A Species Protection Plan should be prepared

to cover both the works associated with existing active quarry and the new extension area. The Species Protection Plan should outline how the nest is to be adequately protected whilst in use, how any temporary increases in disturbance levels (i.e. during blasting) are managed so they occur outwith the breeding season, and how suitable nesting habitat will remain available to peregrine falcon throughout the operation and restoration of the quarry.

6.9.3 As there is potential for breeding birds which are qualifying interests of the SPA, no vegetation removal should take place until the situation regarding breeding birds has been confirmed through further surveys and the impacts can be fully assessed.

### 6.10 Invertebrates

6.10.1 The discrete habitat loss is not considered to have a significant impact upon the local population of invertebrates, and a 15m corridor of retained habitat along the Harley Burn will ensure there is connectivity through the moorland habitat, past the extension area. Therefore, there are no ecological constraints regarding invertebrates.

## 6.11 Further Surveys

- 6.11.1 Breeding bird surveys are recommended and should include upland breeding moorland wader surveys in line with relevant guidance (Brown and Shepherd, 1993, Gilbert *et al.*, 1998) and breeding raptor surveys for hen harrier, short-eared owl and merlin (Hardey *et al.*, 2009).
- 6.11.2 eDNA surveys of the three lagoons within the active quarry and the one pond to the north-west of the Site is recommended, to confirm the absence of GCN from the Site.
- 6.11.3 The survey work reported upon within this document was carried out 21.10.2022. If works at the Site do not commence prior to 21.04.2024, then further surveys should be commissioned in order to ascertain that the situation at the Site has not changed and thus the conclusions of this report are still valid.

#### 6.12 Opportunities for Enhancement

- 6.12.1 It is anticipated that the quarry void would be restored to a waterbody and so marginal planting comprised of native species is recommended along with ephemeral shallows and reedbeds.
- 6.12.2 It is recommended that the areas around the quarry void are restored to acid grassland/dry heath mosaic using native species and if soil conditions allow, wetland scrapes and ephemeral ditches should be created. Grazing should be excluded to allow the heathland habitat to establish.
- 6.12.3 Reptile and amphibian hibernacula can also be created out of rock piles and placed around the edge of the water body and the existing tree lines.
- 6.12.4 Currently there is no source of artificial lighting within the Site. If such lighting within the proposed development is unavoidable, measures must be taken to prevent light trespass into surrounding habitats.
- 6.12.5 Further opportunities for ecological enhancement will be outlined once the breeding bird surveys have been completed.

# Section 7 - Ecological Constraints and Opportunities Plan

## 7.1 Ecological Constraints and Opportunities Plan

7.1.1 The following table (Table 7.1) summarises the ecological constraints and opportunities relating to the development at Sorn Quarry, for which Breedon and appointed contractors are responsible for delivering.

| Action<br>Point | Ecological Constraints and Opportunities   |                   |  |  |  |
|-----------------|--|-------------------|--|--|--|
| Ecologi         | ological Constraints   |                   |  |  |  |
| AP1             | <b>Muirkirk and North Lowther Uplands SPA</b><br>A Habitats Regulation Appraisal will be required once the breeding<br>bird surveys have been completed to confirm there will be no likely<br>significant effect on the qualifying interests of the SPA (hen harrier,<br>merlin, golden plover, peregrine falcon and short-eared owl).   | Prior to<br>works |  |  |  |
| AP2             | <ul> <li>Habitats Further peat depth surveys will take place to accurately map the areas of deep peat. Once the extent of the deep peat is known these areas should be avoided. The acid flushes flow through the blanket bog habitat and connect to the Harley Burn. A 15m stand-off from the Harley Burn should be implemented to protect the flushes and Harley Burn. Appropriate pollution prevention should also be implemented on Site. The wet heath should be protected wherever possible, and the permanent exclusion of grazing is also recommended to protect any retained habitat.</li></ul>   | Prior to<br>works |  |  |  |
| AP3             | <b>Peregrine Falcon</b><br>The nesting location of the peregrine falcons must be protected from commencement of occupancy through to at least five weeks post-fledging (Bodnar, 2022). A Species Protection Plan should be prepared to cover both the works associated with existing active quarry and the new extension area. The Species Protection Plan should outline how the nest is to be adequate protected whilst in use, how any temporary increases in disturbance levels (i.e. during blasting) are managed so they occur outwith the breeding season, and how suitable nesting habitat will remain available to peregrine falcon throughout the operation and restoration of the quarry. | Prior to<br>works |  |  |  |
| AP4             | <b>Breeding Birds</b><br>Breeding bird surveys are recommended and should include upland<br>breeding moorland wader surveys in line with relevant guidance<br>(Brown and Shepherd, 1993, Gilbert <i>et al.</i> , 1998) and breeding raptor<br>surveys for hen harrier, short-eared owl and merlin (Hardey <i>et al.</i> ,<br>2009).  | Prior to<br>works |  |  |  |
| AP5             | <b>Water Vole</b><br>As long as the Harley Burn is adequately protected through a 15m stand-off and appropriate pollution prevention, no further survey is considered necessary.   | During works      |  |  |  |

Table 7.1 - Ecological Constraints and Opportunities Plan

| Action<br>Point | Ecological Constraints and Opportunities  | Target Date           |
|-----------------|---|-----------------------|
| AP6             | <b>Great Crested Newt</b><br>eDNA surveys of the three lagoons within the active quarry and the<br>one pond to the north-west of the Site are recommended, to confirm<br>the absence of great crested newt from the Site.   | Prior to<br>works     |
| AP7             | .P7 <b>Reptiles</b><br>The stone walls and exposed rocks should be removed during the reptile active season (March to October). If these features must be moved during the winter months (November to February), the stone walls and exposed rocks will need to be dismantled under the supervision of an Ecologist.  |                       |
|                 | during the winter months between November and February, when<br>reptiles are hibernating below ground or under cover. If soil stripping<br>or vegetation removal is due to be carried out during the reptile active<br>season (March to October) then the vegetation should be cut down<br>to ground level towards retained habitat north, west or east of the<br>Site, to allow reptiles to move out of the area ahead of works. Once<br>the vegetation has be cut the soil can be stripped, but this must also<br>be done towards retained habitat. |                       |
| AP8             | <b>Further Surveys</b><br>The survey work reported upon within this document was carried out 21.10.2022. If works at the Site do not commence prior to 21.04.2024, then further surveys should be commissioned in order to ascertain that the situation at the Site has not changed and thus the conclusions of this report are still valid.  | 21.04.2024            |
| Ecologi         | cal Enhancements  |                       |
| AP9             | Habitat Restoration<br>It is anticipated that the quarry void would be restored to a waterbody<br>and so marginal planting comprised of native species is<br>recommended along with ephemeral shallows and reedbeds. It is<br>recommended that the areas around the quarry void are restored to<br>acid grassland/dry heath mosaic. Reptile and amphibian hibernacula<br>can also be created out of rock piles and placed around the edge of<br>the water body and the existing tree lines.   | During<br>restoration |
| AP10            | <b>Lighting</b><br>Currently there is no source of artificial lighting within the Site. If such<br>lighting within the proposed development is unavoidable, measures<br>must be taken to prevent light trespass into surrounding habitats.  | During<br>operation   |

## Section 8 - References

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# Appendix I: Location Plan



# Appendix II: Qualifications and Competencies

II.1.1 The table below contains the relevant qualifications, competencies and experience in relation to the surveyor present on the Site and the author of the report:

| •            |                |   |
|--------------|----------------|---|
| Surveyor and | Qualifications | Relevant Experience   |
| Role         |                |   |
| Heather      | BSc (Hons),    | Heather is an accomplished habitat surveyor with over eight |
| Simpson,     | MSc, CEnv,     | years of experience in carrying out Phase 1 and PEAs and    |
| Surveyor and | MCIEEM         | reporting on surveys.                                       |
| Author       |                |   |

Table II.1: Staff qualifications and competencie

# Appendix III: Habitat Suitability Index

Figure III.1: Habitat Suitability Index (Oldham et al., 2000)

| The Habitat Suitability Index (HSI)  |  |  |  |  |  |
|--|--|--|--|--|--|
| <ul> <li>Based on the ass</li> </ul>   | <ul> <li>Based on the assumption that habitat quality determines newt population size</li> </ul>                         |  |  |  |  |
| • Ten key habitat criteria assessed: Geographic location (SI <sub>1</sub> ), Pond area (SI <sub>2</sub> ), Pond permanence (SI <sub>3</sub> ), Water quality (SI <sub>4</sub> ), Pond shading (SI <sub>5</sub> ), number of waterfowl (SI <sub>6</sub> ), occurrence of fish (SI <sub>7</sub> ), pond density (SI <sub>8</sub> ), terrestrial habitat quality (SI <sub>9</sub> ) and macrophyte content (SI <sub>10</sub> ).   |  |  |  |  |  |
| <ul> <li>Each habitat crite<br/>suitable).</li> </ul>  | <ul> <li>Each habitat criteria is assigned a value between 0 (highly unsuitable) and 1 (highly<br/>suitable).</li> </ul> |  |  |  |  |
| <ul> <li>The geometric mean of these values provides an overall suitability score for the site using the following equation: HSI = (SI<sub>1</sub> * SI<sub>2</sub> * SI<sub>3</sub> * SI<sub>4</sub> * SI<sub>5</sub> * SI<sub>6</sub> * SI<sub>7</sub> * SI<sub>8</sub> * SI<sub>9</sub> * SI<sub>10</sub>) <sup>1/10</sup></li> <li>This score is then used to categorise a water body's suitability for use by great crested newts as shown in the table below.</li> </ul> |  |  |  |  |  |
| HSI Score  | Pond Suitability   |  |  |  |  |
| < 0.5  | Poor   |  |  |  |  |
| 0.5 – 0.59   | Below Average  |  |  |  |  |
| 0.6 - 0.69   | Average  |  |  |  |  |
| 0.7 – 0.79   | Good   |  |  |  |  |
| >0.8   | Excellent  |  |  |  |  |

# Appendix IV: Location of Water Bodies



# Appendix V: Relevant Legislation

## V.1 Annex I Habitats

V.1.1 The Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (Habitats Directive) was adopted in 1992 and promotes the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats listed on Annex I of the Directive at a favourable conservation status, introduce robust protection for those habitats of European importance and contribute to a coherent European ecological network of protected sites by designating Special Areas of Conservation (SACs) for habitats listed on Annex I. In applying these measures Member States are required to take account of economic, social and cultural requirements, as well as regional and local characteristics.

## V.2 Birds

- V.2.1 Birds are protected under UK and European Legislation, including, amongst others, the following:
   Wildlife and Countryside Act 1981 (as amended)
  - The Nature Conservation (Scotland) Act 2004.
- V.2.2 All wild birds (defined as 'any species which is ordinarily resident in or is a visitor to 'the European Territory of any member state' (of the EU)'), their nests and their eggs are protected by law unless an exception is specified in the legislation.
- V.2.3 Basic protection afforded to wild birds makes it an offence, unless specifically excluded, to:
  - Intentionally or recklessly kill, injure or take a wild bird
  - Intentionally or recklessly take, damage or destroy or otherwise interfere with a nest whilst being built or in use
  - Intentionally or recklessly at any other time take, damage, destroy or otherwise interfere with a nest habitually used by any wild bird included in Schedule A1
  - Intentionally or recklessly obstruct or prevent any wild bird from using its nest
  - Intentionally or recklessly take or destroy an egg of a wild bird
  - Have in possession or control any wild bird, dead or alive, or any part of a wild bird taken in contravention to the Wildlife and Countryside Act 1981 or whilst the Protection of Wild Birds Act 1954 was in force
  - Have in possession any live bird of prey of any species in the world unless it is registered and ringed
  - Have in possession or control any bird of a species occurring on Schedule 4 of the Wildlife and Countryside Act 1981 unless registered and in most cases ringed (in accordance with the Secretary of State's regulations)
  - Intentionally or recklessly disturb any wild bird listed on Schedule 1 while it is nest building, or in, on or near a nest containing eggs or young, or disturb the dependent young of such a bird.
  - Intentionally or recklessly or knowingly cause or allow any wild bird which leks included in Schedule 1 to be disturbed while it is doing so
  - Intentionally or recklessly or knowingly cause or allow any wild bird included in Schedule 1A to be harassed
  - Use traps to kill, injure or take wild birds.

## V.3 Water Vole

- V.3.1 Water vole habitat is protected in Scotland by the Wildlife and Countryside Act 1981, as amended by the Nature Conservation Act (Scotland) 2004.
- V.3.2 It is an offence to:
  - Intentionally or recklessly damage or destroy or obstruct access to any structure or place which water voles use for shelter or protection; and
  - Intentionally or recklessly disturb water voles whilst they are using such a place.

## V.4 Reptiles

- V.4.1 In Scotland, reptiles are protected under the Wildlife and Countryside Act 1981 as amended.
- V.4.2 For common reptiles (slow worm *Anguis fragilis*, common lizard *Zootoca vivipara* and adder *Vipera berus*) it is an offence to:
  - Intentionally or recklessly kill or injure
  - Sell, transport for sale or advertise for sale.
- V.4.3 There are no licensing procedures under UK Legislation for permitting derogation of Section 9(5) (and parts of Section 9[1]) for development purposes. However, provision is made within the WCA whereby a person shall to be guilty of an offence if it can be shown that the act was the incidental result of a lawful operations, and could not reasonable have been avoided.



# GREAT CRESTED NEWT SURVEY SORN QUARRY



DATE: 23 JUNE 2023 CONTRACT REF: BRE11.22.2642 SITE LOCATION: SORN, MAUCHLINE, KA5 6JF OS GRID REF: NS 579 279 CLIENT: BREEDON

# ECHOES ECOLOGY LTD

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## **Document Control**

| Version | Date         | Prepared By  | Approved By  |
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| 1       | 23 June 2023 | HSempson   | Laura carter-baw.                                    |
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## **Executive Summary**

Sorn Quarry is located off the B743, east of the village of Sorn, Mauchline, KA5 6JF, central OS grid reference NS 579 279. It is the intention of Breedon, subject to planning permission being approved, to extend the quarry to the north and the east.

A Habitat Suitability Index survey for great crested newt (*Triturus cristatus*) was undertaken as part of the Preliminary Ecological Appraisal on 21.10.2022 (Echoes Ecology Ltd, 2022). Three lagoons located within the active quarry were assessed as having average suitability for great crested newt and a single pond located 300m north-west of the quarry was assessed as having a below average suitability for great crested newt. eDNA surveys of all four water bodies was recommended, to confirm the absence of great crested newt from the extension area.

Echoes Ecology Ltd was appointed by Breedon to carry out the eDNA surveys of the four water bodies located within 500m of the extension area.

Water was collected for eDNA testing from the water bodies on 18.04.2023. The results did not reveal any great crested newt eDNA in the water samples and therefore it was concluded that they are absent from the survey area. There is no reason relating to great crested newts as to why the proposed extension should not proceed.

If the works do not occur by April 2026, then further surveys should be carried out in order to ensure that the situation regarding great crested newts at the Site has not changed since this report was produced.

# **Section 1 - Introduction**

### 1.1 Contract Overview

- 1.1.1 Sorn Quarry is located off the B743, east of the village of Sorn, Mauchline, KA5 6JF, central OS grid reference NS 579 279. The quarry lies adjacent to an extensive area of moorland habitat with Blood Moss located to the north, which adjoins the Muirkirk and North Lowther Uplands Special Protection Area (SPA) and the Muirkirk Uplands Sites of Special Scientific Interest (SSSI). A matrix of agricultural fields and tree belts lie to the south, east and west of the quarry. For a location plan of Sorn Quarry, refer to Appendix I.
- 1.1.2 It is the intention of Breedon, subject to planning permission being approved, to extend the current quarry to the north and east.
- 1.1.3 A Habitat Suitability Index survey for great crested newt (*Triturus cristatus*) was undertaken as part of the Preliminary Ecological Appraisal on 21.10.2022 (Echoes Ecology Ltd, 2022). Three lagoons located within the active quarry were assessed as having average suitability for great crested newt and a single pond located 300m north-west of the quarry was assessed as having a below average suitability for great crested newt. eDNA surveys of all four water bodies was recommended, to confirm the absence of great crested newt from the extension area. For a location plan of the water bodies, refer to Appendix II.
- 1.1.4 Echoes Ecology Ltd was appointed by Breedon to carry out the eDNA surveys of the four water bodies located within 500m of the extension area.
- 1.1.5 The qualifications and competencies of the main author and surveyors are provided in Appendix III.
- 1.1.6 The following documents have been provided to Echoes Ecology Ltd in order to assist in carrying out this contract:
  - Quarry extension boundary.

## 1.2 Survey Aims

- 1.2.1 The aims of the survey were:
  - To carry out eDNA surveys to determine whether great crested newts are present in the suitable water bodies identified
  - To assess the potential impacts of the development on great crested newts
  - To identify the requirement for further surveys in order to fully assess the impacts on great crested newts
  - To allow likely mitigation or compensation measures to be developed, if relevant.

# Section 2 - Relevant Legislation

### 2.1 Legal Consideration - Great Crested Newts

- 2.1.1 Great crested newts and their breeding and resting sites are protected under UK and European legislation. In Scotland, this is mainly provided by the Conservation (Natural Habitats, &c.) Regulations 1994, as amended. Under this legislation, great crested newts are regarded as European Protected Species (EPS).
- 2.1.2 It is an offence to deliberately or recklessly disturb a great crested newt (including injuring, capturing and/or killing), or damage, obstruct, alter or destroy a great crested newt breeding or rest site.
- 2.1.3 A great crested newt breeding or resting site is protected at all times irrespective as to whether any great crested newts are using the site at a given time. NatureScot should always be consulted by planning authorities if any proposed work could affect great crested newts or their breeding/resting sites. Developers, planners and contractors (as well as everyone else involved) must make every effort to safeguard great crested newts and their habitat.
- 2.1.1 If the work proposed affects great crested newts, their breeding sites or their places of rest, a European Protected Species licence, issued by the licensing authority NatureScot under Regulation 44, will be required so as to permit an otherwise illegal activity. There are three tests that must be satisfied before a licence will be granted, in addition to which mitigation and/or compensation will almost certainly be required. The three tests are:
  - The activity must fall within one of the licensable purposes listed in Regulation 44 (including preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment, and preventing serious damage to livestock, foodstuffs for livestock, crops, vegetables, fruit, growing timber, property or fisheries)
  - There must be no satisfactory alternative
  - The action authorised will not be detrimental to the maintenance of the population of the species at a favourable conservation status in their natural range.

#### 2.2 Scottish Biodiversity List

2.2.1 The Scottish Biodiversity List (SBL) was published in 2005 and last updated in 2012 (NatureScot, 2020). The aim of the list is to help public bodies carry out their 'Biodiversity Duty', as required by the Nature Conservation (Scotland) Act 2004, by identifying the species and habitats which are the highest priority for biodiversity conservation in Scotland.

## Section 3 - Methodology

## 3.1 eDNA Survey

- 3.1.1 The Habitat Suitability Index of the water bodies within 500m of the extension area assessed four water bodies as being potentially suitable for great crested newts. These four water bodies were then subject to eDNA surveys.
- 3.1.2 The eDNA kits were delivered from the laboratories at SureScreen Scientifics Ltd on 16.03.2023. The kits were stored at room temperature and out of direct sunlight before use.
- 3.1.3 Water samples were collected from the four water bodies on 18.04.2023, following the eDNA sample protocol approved by NatureScot (Biggs *et al.*, 2014). For full details on the eDNA sampling protocol refer to Appendix IV. The weather was dry, with 50% cloud cover, Force 3 wind (Beaufort scale) and a temperature of 10°C.
- 3.1.4 After sampling took place, the samples were stored at room temperature and out of direct sunlight and were sent back to the laboratory on 19.04.2023. The samples were analysed by the laboratories using a Real Time qPCR and in accordance with the eDNA sample protocol.

## **Section 4 - Results**

## 4.1 eDNA Survey Results

4.1.1 The eDNA survey results were received on 02.05.2023. No great crested newt DNA was detected in any of the water bodies sampled. The full technical report of the survey results is provided in Appendix V.

## Section 5 - Discussion

### 5.1 Assessment of Effects

- 5.1.1 The survey area contained four water bodies which when assessed were regarded as having average and below average suitability for use by great crested newts. However, eDNA surveys confirmed that great crested newts were absent from the water bodies and so there are no breeding sites within 500m of the extension area. Therefore, great crested newts can be considered as absent from the extension area, and there is no reason relating to great crested newts as to why the proposed extension should not proceed.
- 5.1.2 The terrestrial habitat within the extension area may be suitable for common toad (*Bufo bufo*), which is listed on the Scottish Biodiversity List. However, the discrete habitat loss is not considered to have a significant impact upon the local population of common toad, and the protection of the Harley Burn plus a 15m corridor will provide this species with a commuting route through the Site.

## 5.2 Further Survey

5.2.1 The survey work reported upon within this document was carried out on 18.04.2023. If works at the Site do not commence prior to April 2026, then further surveys should be commissioned to ascertain that the situation regarding great crested newt has not changed and thus the conclusions of this report are still valid.

## **Section 6 - References**

Biggs J., Ewald N., Valentini A., Gaboriaud C., Griffiths R.A., Foster J., Wilkinson J., Arnett A., Williams P. and Dunn F. (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

Echoes Ecology Ltd (2022). **Preliminary Ecological Appraisal, Sorn Quarry**. Submitted to Breedon on 16.11.2022.

NatureScot (2020). Scottish Biodiversity List. Accessed at: https://www.nature.scot/doc/scottish-biodiversity-list on 19.10.2022.

# Appendix I: Location Plan



# Appendix II: Location Plan of Water Bodies



# Appendix III: Qualifications and Competencies

III.1.1 The table below contains the relevant qualifications, competencies and experience in relation to the surveyors present on Site and the author of the report:

| Surveyor and<br>Role                 | Qualifications                      | Relevant<br>Protected<br>Species<br>Licence(s) | Relevant Experience  |
|--------------------------------------|-------------------------------------|--|--|
| Rosanna<br>Hignett, Lead<br>Surveyor | BSc (Hons),<br>MSc, ACIEEM          | N/A  | Rosanna is a capable great crested newt<br>surveyor over three years of experience<br>of surveying for great crested newt and<br>reporting on surveys.               |
| Heather<br>Simpson,<br>Author        | BSc (Hons),<br>MSc, CEnv,<br>MCIEEM | NatureScot<br>Licence (No.<br>221945)          | Heather is an accomplished great<br>crested newt surveyor with over eight<br>years of experience in surveying for<br>great crested newt and reporting on<br>surveys. |
| Kay Paul,<br>Surveyor                | MA                                  | N/A  | Kay has a basic understanding of great<br>crested newt surveys with a years'<br>experience in surveying for great crested<br>newts.                                  |

Table III.1: Staff Qualifications and Competencies

# Appendix IV: eDNA Field Protocol

## IV.1 eDNA Field Protocol (Biggs et al., 2014)

IV.1.1 Field sampling was undertaken by a suitably trained and experienced and licensed great crested newt surveyor. A single visit to the target ponds were completed on 18.04.2023, during the newt breeding season. eDNA samples were collected during the day and in reasonable weather conditions.

## IV.2 Sampling Equipment

- IV.2.1 The eDNA sampling kits were made up of the following equipment:
  - A sterile 30 mL ladle
  - A sterile self-supporting Whirl-Pak plastic bag with 1 L capacity
  - A sterile 15 mL pipette to resample the pond water
  - Six individually labelled sterile 50 mL centrifuge tubes containing 35mL preservative
  - Two pairs of sterile gloves
  - A sample collection form
  - An Eco-pen
  - A large clear bag.
- IV.2.2 Kits were stored at a low room temperature before use in an appropriate solvent store, consistent with Home Office regulations, and were used within two weeks of receipt. One kit was used per pond up to an area of 1 ha.

## IV.3 Field Water Sample Collection Protocol (Taken from Biggs *et al.*, 2014)

- IV.3.1 The field sampling protocol followed the steps outlined below. Gloves were worn at all times during the sampling process and gloves were replaced between sample collection from the pond and pipetting into the sterile sub-sample tubes. Samples were collected without entering the water, which prevents disturbance of the substrate and may limit cross-contamination.
  - Step 1: Identify where 20 samples will be taken from the pond. The location of subsamples should be spaced as evenly as possible around the pond margin, and if possible targeted to areas where there is vegetation which may be being used as egg laying substrate and open water areas which newts may be using for displaying.
  - Step 2: Open the sterile Whirl-Pak bag by tearing off the clear plastic strip c 1cm from the top (along the perforated line), then pulling the tabs. The bag will stand-up by itself.
  - Step 3: Collect 20 samples of 30 mL of pond water from around the pond (see 1 above) using the ladle (fill the ladle) and empty each sample into the Whirl-Pak bag. At the end the Whirl-Pak bag should be just under half full (600 mL).
  - NOTE: Before each ladle sample is taken, the pond water column should be mixed by gently using the ladle to stir the water from the surface to close to the pond bottom without disturbing the sediment on the bed of the pond. It is advisable not to sample very shallow water (less than 5-10 cm deep).
  - Step 4: Once 20 samples have been taken, close the bag securely using the top tabs and shake the Whirl-Pak bag for 10 seconds. This mixes any DNA across the whole water sample.
  - Step 5: Put on a new pair of gloves to keep the next stage as uncontaminated as possible.
  - Step 6: Using the clear plastic pipette provided take c15 mL of water from the Whirl-Pak bag and pipette into a sterile tube containing 35 mL of preservative (i.e. fill tube to the 50 mL mark). Close the tube ensuring the cap is tight.
  - Step 7: Shake the tube vigorously for 10 seconds to mix the sample and preservative. This is essential to prevent DNA degradation. Repeat for each of the 6 conical tubes in the kit. Before taking each sample, stir the water in the bag to homogenize the sample this is because the DNA will constantly sink to the bottom.
- Step 8: Empty the remaining water from the Whirl-Pack bag back into the pond.
- Step 9: The box of preserved sub-samples is then returned at ambient temperature immediately for analysis. If batches of samples are collected and stored prior to analysis they should be refrigerated at 2-4°C. Kits can be stored for up to one month in a refrigerator before analysis. It is not necessary to freeze samples. Freezing may damage storage bottles, which can lead to leaking during transit, and also unnecessarily increases costs by requiring refrigerated transport. The length of time eDNA samples are stored in a refrigerator prior to analysis should be recorded and passed on to the analysing laboratory. Use an appropriate labelling system to ensure that the kits are supplied with a unique reference number.

# Appendix V: eDNA Technical Report



| E16583          |
|-----------------|
| 1               |
| BRE10.22.2616   |
| ECHOES ECOLOGY  |
| Heather Simpson |
|                 |

# **TECHNICAL REPORT**

## ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS (TRITURUS CRISTATUS)

#### **SUMMARY**

When great crested newts (GCN), *Triturus cristatus*, inhabit a pond, they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm GCN habitation or establish GCN absence.

#### **RESULTS**

| Date sample received at Laboratory:<br>Date Reported:<br>Matters Affecting Results: |                         |                  | 2<br>(<br>] | 20/04/2<br>02/05/2<br>None | 2023<br>2023 |      |          |             |                 |   |
|---|-------------------------|------------------|-------------|----------------------------|--------------|------|----------|-------------|-----------------|---|
| Lab Sample<br>No.   | Site Name               | O/S<br>Reference | SIC         |                            | DC           | IC   | Result   | Pos<br>Repl | itive<br>icates |   |
| 0133  | Lagoon 3 Sorn<br>Quarry | I                | Pass        |                            | Pass         | Pass | Negative |             | 0               |   |
| 0134  | Lagoon 1 Sorn<br>Quarry |                  | Pass        |                            | Pass         | Pass | Negative |             | 0               |   |
| 0135  | Lagoon 2 Sorn<br>Quarry |                  | Pass        |                            | Pass         | Pass | Negative |             | 0               |   |
| 0136  | Pond A                  |                  | Pass        |                            | Pass         | Pass | Negative |             | 0               | _ |

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: Chris Troth

Approved by: Jennifer Higginbottom



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#### **METHODOLOGY**

The samples detailed above have been analysed for the presence of GCN eDNA following the protocol stated in DEFRA WC1067 'Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5.' (Biggs et al. 2014). Each of the 6 sub-sample tubes are first centrifuged and pooled together into a single sample which then undergoes DNA extraction. The extracted sample is then analysed using real time PCR (qPCR), which uses species-specific molecular markers to amplify GCN DNA within a sample. These markers are unique to GCN DNA, meaning that there should be no detection of closely related species.

If GCN DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If GCN DNA is not present then amplification does not occur, and a negative result is recorded.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. True positive controls, negative controls and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared and reported. Stages of the DNA analysis are also conducted in different buildings at our premises for added security.

SureScreen Scientifics Ltd is ISO9001 accredited and participate in Natural England's proficiency testing scheme for GCN eDNA testing. We also carry out regular inter-laboratory checks on accuracy of results as part of our quality control procedures.

#### **INTERPRETATION OF RESULTS**

| SIC:    | <b>Sample Integrity Check</b> [Pass/Fail]<br>When samples are received in the laboratory, they are inspected for any tube leakage, suitability of<br>sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to<br>inconclusive results.  |
|---------|---|
| DC:     | <b>Degradation Check</b> [Pass/Fail]<br>Analysis of the spiked DNA marker to see if there has been degradation of the kit or sample between the<br>date it was made to the date of analysis. Degradation of the spiked DNA marker may lead indicate a risk<br>of false negative results.  |
| IC:     | <b>Inhibition Check</b> [Pass/Fail]<br>The presence of inhibitors within a sample are assessed using a DNA marker. If inhibition is detected,<br>samples are purified and re-analysed. Inhibitors cannot always be removed, if the inhibition check fails,<br>the sample should be re-collected.  |
| Result: | <ul> <li>Presence of GCN eDNA [Positive/Negative/Inconclusive]</li> <li>Positive: GCN DNA was identified within the sample, indicative of GCN presence within the sampling location at the time the sample was taken or within the recent past at the sampling location.</li> <li>Positive Replicates: Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for GCN presence. It may be assumed that small fractions of positive analyses suggest low level presence, but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive. 0/12 indicates negative GCN presence.</li> <li>Negative: GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of GCN absence, however, does not exclude the potential for GCN presence below the limit of detection.</li> </ul> |



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**APPENDIX 3** 



# Appendix 3A Peat Probe Data



|           | Easting         | Northing | Depth        |
|-----------|-----------------|----------|--------------|
| 1         | 258148.7        | 627583.3 | 0.22         |
| 2         | 258195          | 627602.4 | 0.12         |
| 3         | 258244          | 627613.3 | 0.01         |
| 4         | 258291.8        | 627623.7 | 0.31         |
| 5         | 258338.3        | 627633.9 | 0.25         |
| 6         | 258295.2        | 627657.9 | 0.28         |
| 7         | 258246.8        | 627657.6 | 0.21         |
| 8         | 258216.6        | 627632.7 | 0.25         |
| 9         | 258165.4        | 627618.4 | 0.18         |
| 10        | 258169.9        | 627656.1 | 0.2          |
| 11        | 258197.2        | 627664   | 0.23         |
| 12        | 258171.8        | 627706.5 | 0.31         |
| 13        | 258220.4        | 627699.9 | 0.25         |
| 14        | 258269.5        | 627692.9 | 0.12         |
| 15        | 258319.7        | 627686.4 | 0.2          |
| 16        | 258354          | 627681.8 | 0.29         |
| 17        | 258358.4        | 627731.8 | 0.23         |
| 18        | 258316.9        | 627736 3 | 0.27         |
| 19        | 258267          | 627743 1 | 0.27         |
| 20        | 258217.6        | 627750 3 | 0.20         |
| 21        | 258169 3        | 627756.8 | 0.52         |
| 22        | 258167.6        | 627807.2 | 0.21         |
| 22        | 258215.8        | 627800.9 | 0.15         |
| 23        | 258264 9        | 627793.8 | 0.20         |
| 25        | 258215 <i>A</i> | 627786.9 | 0.27         |
| 25        | 250515.4        | 627780.8 | 0.27         |
| 20        | 250355.2        | 627830.2 | 0.17         |
| 28        | 250540.2        | 627834 3 | 0.20         |
| 29        | 258247 3        | 627841 4 | 0.19         |
| 30        | 258198.2        | 627848 1 | 0.15         |
| 31        | 258149 7        | 627854 7 | 0.21         |
| 32        | 258120.9        | 627862 9 | 0.50         |
| 22        | 258070.9        | 627860.6 | 0.27         |
| 37        | 258021 0        | 627858 5 | 0.2          |
| 25        | 250021.5        | 627854.6 | 0.14         |
| 36        | 257972.0        | 627857 3 | 0.20         |
| 30        | 257873.3        | 627855 3 | 0.11         |
| 38        | 257873.0        | 627851 3 | 0.10         |
| 30        | 257625.5        | 627850 3 | 0.31         |
| 10        | 257775 2        | 627850.5 | 0.30         |
| 40        | 257676.2        | 627846 5 | 0.37         |
| 41        | 257675.2        | 627842 7 | 0.40         |
| 42        | 257609.8        | 627883 5 | 0.55         |
| 11        | 257634 9        | 627883.6 | 0.20         |
| ++<br>∕\⊑ | 257650 7        | 627881 1 | 0.31         |
| 45<br>AA  | 257055.7        | 627881 0 | 0.57<br>0.20 |
| +0<br>/17 | 257005          | 677004.0 | 0.20         |
| 4/<br>10  | 251103.8        | 67700E 0 | 0.29         |
| 40<br>40  | 257750.0        | 627006 1 | 0.4          |
| 49        | 25//59.8        | 02/886.1 | 0.28         |

| 50 | 257785.2 | 627887.1 | 0.44 |
|----|----------|----------|------|
| 51 | 257810.1 | 627887.5 | 0.3  |
| 52 | 257835.2 | 627887.5 | 0.22 |
| 53 | 257860.1 | 627888.6 | 0.16 |
| 54 | 257885.1 | 627888.9 | 0.22 |
| 55 | 257910   | 627889.5 | 0.02 |
| 56 | 257935.7 | 627889.9 | 0.27 |
| 57 | 257960.2 | 627890.5 | 0.27 |
| 58 | 257985.5 | 627890.9 | 0.44 |
| 59 | 258010.2 | 627891.7 | 0.52 |
| 60 | 258035.8 | 627891.9 | 0.28 |
| 61 | 258060.3 | 627892.6 | 0.3  |
| 62 | 258085.7 | 627893   | 0.24 |
| 63 | 258110.6 | 627893.6 | 0.23 |
| 64 | 258161.4 | 627891.7 | 0.29 |
| 65 | 258186.2 | 627888.1 | 0.24 |
| 66 | 258210.4 | 627883.9 | 0.33 |
| 67 | 258236   | 627881.2 | 0.23 |
| 68 | 258260.8 | 627878   | 0.22 |
| 69 | 258285.9 | 627874.3 | 0.12 |
| 70 | 258311.1 | 627870.8 | 0.18 |
| 71 | 258335.8 | 627867.1 | 0.19 |
| 72 | 258360.2 | 627863.8 | 0.18 |
| 73 | 258363.8 | 627887.9 | 0.34 |
| 74 | 258338.8 | 627891.2 | 0.13 |
| 75 | 258314.7 | 627895.5 | 0.25 |
| 76 | 258289.1 | 627899.2 | 0.25 |
| 77 | 258264.3 | 627902.7 | 0.35 |
| 78 | 258239.5 | 627905.6 | 0.28 |
| 79 | 258214.5 | 627909.2 | 0.3  |
| 80 | 258189.6 | 627912.7 | 0.24 |
| 81 | 258164.6 | 627915.8 | 0.48 |
| 82 | 258147.2 | 627912.8 | 0.34 |
| 83 | 258122.8 | 627917.9 | 0.36 |
| 84 | 258097.5 | 627918.3 | 0.43 |
| 85 | 258072.4 | 627917.8 | 0.83 |
| 86 | 258047.3 | 627917.2 | 0.73 |
| 87 | 258022.3 | 627916.9 | 0.41 |
| 88 | 257997.1 | 627916.2 | 0.35 |
| 89 | 257972.3 | 627915.8 | 0.59 |
| 90 | 257947.5 | 627914.8 | 0.49 |
| 91 | 257922   | 627914.6 | 0.29 |
| 92 | 257897   | 627913.4 | 0.3  |
| 93 | 257872.3 | 627913.8 | 0.36 |
| 94 | 257847.2 | 627913.3 | 0.31 |
| 95 | 257821.8 | 627912.7 | 0.26 |
| 96 | 257797   | 627912.2 | 0.31 |
| 97 | 257772.1 | 627911.5 | 0.2  |
| 98 | 257747.1 | 627911.1 | 0.27 |
| 99 | 257722.1 | 627910.6 | 0.27 |

| 100 | 257697   | 627910.2 | 0.25 |
|-----|----------|----------|------|
| 101 | 257672.1 | 627909.7 | 0.3  |
| 102 | 257646.8 | 627909   | 0.22 |
| 103 | 257621.7 | 627908.6 | 0.21 |
| 104 | 257625.5 | 627933.6 | 0.22 |
| 105 | 257649.4 | 627934.3 | 0.25 |
| 106 | 257675.2 | 627934.6 | 0.29 |
| 107 | 257700.4 | 627935.4 | 0.28 |
| 108 | 257725.6 | 627935.7 | 0.32 |
| 109 | 257750.8 | 627936.3 | 0.3  |
| 110 | 257775.8 | 627936.8 | 0.56 |
| 111 | 257800.7 | 627937.3 | 0.45 |
| 112 | 257825.6 | 627937.9 | 0.26 |
| 113 | 257850.2 | 627937.8 | 0.29 |
| 114 | 257875.6 | 627938.8 | 0.48 |
| 115 | 257900.9 | 627938.9 | 0.45 |
| 163 | 258136.2 | 627893.9 | 0.37 |
| 1   | 258148.7 | 627583.3 | 0.22 |
| 2   | 258195   | 627602.4 | 0.12 |
| 3   | 258244   | 627613.3 | 0.01 |
| 4   | 258291.8 | 627623.7 | 0.31 |
| 5   | 258338.3 | 627633.9 | 0.25 |
| 6   | 258295.2 | 627657.9 | 0.28 |
| 7   | 258246.8 | 627657.6 | 0.21 |
| 8   | 258216.6 | 627632.7 | 0.25 |
| 9   | 258165.4 | 627618.4 | 0.18 |
| 10  | 258169.9 | 627656.1 | 0.2  |
| 11  | 258197.2 | 627664   | 0.23 |
| 12  | 258171.8 | 627706.5 | 0.31 |
| 13  | 258220.4 | 627699.9 | 0.25 |
| 14  | 258269.5 | 627692.9 | 0.12 |
| 15  | 258319.7 | 627686.4 | 0.2  |
| 16  | 258354   | 627681.8 | 0.29 |
| 17  | 258358.4 | 627731.8 | 0.34 |
| 18  | 258316.9 | 627736.3 | 0.27 |
| 19  | 258267   | 627743.1 | 0.26 |
| 20  | 258217.6 | 627750.3 | 0.32 |
| 21  | 258169.3 | 627756.8 | 0.21 |
| 22  | 258167.6 | 627807.2 | 0.13 |
| 23  | 258215.8 | 627800.9 | 0.28 |
| 24  | 258264.9 | 627793.8 | 0.27 |
| 25  | 258315.4 | 627786.9 | 0.27 |
| 26  | 258353.2 | 627780.8 | 0.17 |
| 27  | 258348.2 | 627830.2 | 0.26 |
| 28  | 258297   | 627834.3 | 0.2  |
| 29  | 258247.3 | 627841.4 | 0.19 |
| 30  | 258198.2 | 627848.1 | 0.21 |
| 31  | 258149.7 | 627854.7 | 0.38 |
| 32  | 258120.9 | 627862.9 | 0.27 |
| 33  | 258070.9 | 627860.6 | 0.2  |
|     |          |          |      |

| 34 | 258021.9 | 627858.5 | 0.14 |
|----|----------|----------|------|
| 35 | 257972.8 | 627854.6 | 0.26 |
| 36 | 257923.6 | 627857.3 | 0.11 |
| 37 | 257873.3 | 627855.3 | 0.16 |
| 38 | 257823.9 | 627851.3 | 0.31 |
| 39 | 257774   | 627850.3 | 0.36 |
| 40 | 257725.3 | 627850.1 | 0.37 |
| 41 | 257676.2 | 627846.5 | 0.48 |
| 42 | 257625.3 | 627843.7 | 0.35 |
| 43 | 257609.8 | 627883.5 | 0.28 |
| 44 | 257634.9 | 627883.6 | 0.31 |
| 45 | 257659.7 | 627884.4 | 0.37 |
| 46 | 257685   | 627884.8 | 0.28 |
| 47 | 257709.8 | 627885.5 | 0.29 |
| 48 | 257734.6 | 627885.9 | 0.4  |
| 49 | 257759.8 | 627886.1 | 0.28 |
| 50 | 257785.2 | 627887.1 | 0.44 |
| 51 | 257810.1 | 627887.5 | 0.3  |
| 52 | 257835.2 | 627887.5 | 0.22 |
| 53 | 257860.1 | 627888.6 | 0.16 |
| 54 | 257885.1 | 627888.9 | 0.22 |
| 55 | 257910   | 627889.5 | 0.02 |
| 56 | 257935.7 | 627889.9 | 0.27 |
| 57 | 257960.2 | 627890.5 | 0.27 |
| 58 | 257985.5 | 627890.9 | 0.44 |
| 59 | 258010.2 | 627891.7 | 0.52 |
| 60 | 258035.8 | 627891.9 | 0.28 |
| 61 | 258060.3 | 627892.6 | 0.3  |
| 62 | 258085.7 | 627893   | 0.24 |
| 63 | 258110.6 | 627893.6 | 0.23 |
| 64 | 258161.4 | 627891.7 | 0.29 |
| 65 | 258186.2 | 627888.1 | 0.24 |
| 66 | 258210.4 | 627883.9 | 0.33 |
| 67 | 258236   | 627881.2 | 0.23 |
| 68 | 258260.8 | 627878   | 0.22 |
| 69 | 258285.9 | 627874.3 | 0.12 |
| 70 | 258311.1 | 627870.8 | 0.18 |
| 71 | 258335.8 | 627867.1 | 0.19 |
| 72 | 258360.2 | 627863.8 | 0.18 |
| 73 | 258363.8 | 627887.9 | 0.34 |
| 74 | 258338.8 | 627891.2 | 0.13 |
| 75 | 258314.7 | 627895.5 | 0.25 |
| 76 | 258289.1 | 627899.2 | 0.25 |
| 77 | 258264.3 | 627902.7 | 0.35 |
| 78 | 258239.5 | 627905.6 | 0.28 |
| 79 | 258214.5 | 627909.2 | 0.3  |
| 80 | 258189.6 | 627912.7 | 0.24 |
| 81 | 258164.6 | 627915.8 | 0.48 |
| 82 | 258147.2 | 627912.8 | 0.34 |
| 83 | 258122.8 | 627917.9 | 0.36 |

| 84  | 258097.5 | 627918.3 | 0.43 |
|-----|----------|----------|------|
| 85  | 258072.4 | 627917.8 | 0.83 |
| 86  | 258047.3 | 627917.2 | 0.73 |
| 87  | 258022.3 | 627916.9 | 0.41 |
| 88  | 257997.1 | 627916.2 | 0.35 |
| 89  | 257972.3 | 627915.8 | 0.59 |
| 90  | 257947.5 | 627914.8 | 0.49 |
| 91  | 257922   | 627914.6 | 0.29 |
| 92  | 257897   | 627913.4 | 0.3  |
| 93  | 257872.3 | 627913.8 | 0.36 |
| 94  | 257847.2 | 627913.3 | 0.31 |
| 95  | 257821.8 | 627912.7 | 0.26 |
| 96  | 257797   | 627912.2 | 0.31 |
| 97  | 257772.1 | 627911.5 | 0.2  |
| 98  | 257747.1 | 627911.1 | 0.27 |
| 99  | 257722.1 | 627910.6 | 0.27 |
| 100 | 257697   | 627910.2 | 0.25 |
| 101 | 257672.1 | 627909.7 | 0.3  |
| 102 | 257646.8 | 627909   | 0.22 |
| 103 | 257621.7 | 627908.6 | 0.21 |
| 104 | 257625.5 | 627933.6 | 0.22 |
| 105 | 257649.4 | 627934.3 | 0.25 |
| 106 | 257675.2 | 627934.6 | 0.29 |
| 107 | 257700.4 | 627935.4 | 0.28 |
| 108 | 257725.6 | 627935.7 | 0.32 |
| 109 | 257750.8 | 627936.3 | 0.3  |
| 110 | 257775.8 | 627936.8 | 0.56 |
| 111 | 257800.7 | 627937.3 | 0.45 |
| 112 | 257825.6 | 627937.9 | 0.26 |
| 113 | 257850.2 | 627937.8 | 0.29 |
| 114 | 257875.6 | 627938.8 | 0.48 |
| 115 | 257900.9 | 627938.9 | 0.45 |
| 115 | 257900.9 | 627938.9 | 0.45 |
| 116 | 257925.9 | 627940   | 0.48 |
| 117 | 257950.9 | 627940.1 | 0.48 |
| 118 | 257975.8 | 627940.9 | 0.5  |
| 119 | 258000.9 | 627941.3 | 0.41 |
| 120 | 258025.8 | 627941.8 | 0.54 |
| 121 | 258051   | 627942.3 | 0.79 |
| 122 | 258076   | 627943   | 0.89 |
| 123 | 258101.1 | 627943.3 | 1.56 |
| 124 | 258126   | 627944.1 | 1.05 |
| 125 | 258146.5 | 627938.3 | 0.74 |
| 126 | 258168   | 627940.5 | 0.62 |
| 127 | 258193   | 627937.6 | 0.74 |
| 128 | 258218.1 | 627933.9 | 0.74 |
| 129 | 258242.1 | 627925.3 | 0.6  |
| 130 | 258266.8 | 627923   | 0.36 |
| 131 | 258291.1 | 627919.3 | 0.69 |
| 132 | 258315   | 627911.7 | 0.15 |

| 133           | 258112.9 | 627956.3 | 1.09                     |
|---------------|----------|----------|--------------------------|
| 134           | 258087.9 | 627957   | 1.64                     |
| 135           | 258057.5 | 627958.6 | 1.32                     |
| 136           | 258032.5 | 627960.3 | 0.94                     |
| 137           | 258007.2 | 627961.1 | 0.7                      |
| 138           | 257982.2 | 627963.5 | 0.63                     |
| 139           | 257957.1 | 627962.8 | 1.14                     |
| 140           | 257932.4 | 627962.5 | 1.14                     |
| 141           | 257906.9 | 627964.3 | 0.98                     |
| 142           | 257882   | 627963.7 | 0.94                     |
| 143           | 257857.1 | 627963.5 | 1.13                     |
| 144           | 257832.1 | 627962.9 | 0.56                     |
| 145           | 257806.9 | 627962.4 | 0.66                     |
| 146           | 257781.9 | 627961.9 | 0.65                     |
| 147           | 257756.8 | 627961.4 | 0.48                     |
| 148           | 257731.7 | 627960.9 | 0.27                     |
| 149           | 257706.9 | 627960.4 | 0.31                     |
| 150           | 257681.6 | 627959.8 | 0.35                     |
| 151           | 257656.6 | 627959.3 | 0.38                     |
| 152           | 257631.9 | 627958.7 | 0.41                     |
| 153           | 257644.2 | 627972.8 | 0.4                      |
| 154           | 257669.2 | 627973.2 | 0.35                     |
| 155           | 257693.8 | 627973.9 | 0.25                     |
| 156           | 2577191  | 627974 3 | 0.23                     |
| 157           | 257744 1 | 627974 9 | 0.19                     |
| 158           | 257769.4 | 627975.4 | 0.55                     |
| 159           | 257794 3 | 627975 7 | 0.7                      |
| 160           | 257819.2 | 627976 3 | 0.7                      |
| 161           | 257844   | 627976.9 | 1 18                     |
| 162           | 257869 1 | 627977 4 | 0.92                     |
| 163           | 258136.2 | 627893.9 | 0.52                     |
| 116w          | 257914 1 | 627939 7 | 0.37                     |
| 118e          | 257989 1 | 627943 2 | 0.45                     |
| 118ne         | 257991 7 | 627953.8 | 0.19                     |
| 118w          | 257964.6 | 627941   | 0.02                     |
| 120nw         | 257504.0 | 627952 1 | 0.55                     |
| 12011         | 258026   | 627931 1 | 0.55                     |
| 1205<br>120sw | 258013.4 | 627930.9 | 0.5                      |
| 1203W         | 258013.7 | 627941 4 | 0.47                     |
| 12350         | 258113   | 627934.7 | 0.44                     |
| 174s          | 258125   | 627933.9 | 0.37                     |
| 125s          | 258147   | 627925.7 | 0.40                     |
| 1255<br>12560 | 258157   | 627923.7 | 0.45                     |
| 1255C         | 258136   | 627926.6 | 0.44                     |
| 1265          | 258167.2 | 627920.0 | 0.47                     |
| 1203<br>127s  | 258107.2 | 627926.6 | 0.55                     |
| 1273<br>12750 | 25820193 | 627927 1 | 0.47                     |
| 1275          | 258181 5 | 6279227  | 0.45                     |
| 1289          | 258218 2 | 627922.7 | 0. <del>4</del> 7<br>0 5 |
| 1203          | 258210.2 | 627915 / | 0.J<br>0 10              |
| -233          | 200271.4 | 527515.4 | 0.15                     |

| 129se | 258253.3 | 627915.7 | 0.22 |
|-------|----------|----------|------|
| 129sw | 258229.9 | 627922.1 | 0.42 |
| 130s  | 258266.1 | 627912.9 | 0.25 |
| 131e  | 258304.2 | 627921.2 | 0.42 |
| 131s  | 258291   | 627909.2 | 0.19 |
| 131se | 258303.9 | 627909.2 | 0.14 |
| 131sw | 258278.2 | 627910.5 | 0.22 |
| 137s  | 258006   | 627951.1 | 0.37 |
| 139s  | 257957.7 | 627952.6 | 0.9  |
| 140s  | 257932   | 627950.4 | 0.85 |
| 140sw | 257919.6 | 627952.2 | 0.8  |
| 141s  | 257906.3 | 627951.9 | 0.45 |
| 142s  | 257882.1 | 627951.6 | 0.52 |
| 143s  | 257857.1 | 627951.1 | 0.5  |
| 144s  | 257831.9 | 627950.7 | 0.42 |
| 145s  | 257806.7 | 627950.1 | 0.39 |
| 146s  | 257781.6 | 627949.6 | 0.43 |
| 146w  | 257771.3 | 627961.5 | 0.52 |
| 159w  | 257783   | 627975.8 | 0.56 |
| 59e   | 258023.5 | 627893.2 | 0.41 |
| 59n   | 258011   | 627904.7 | 0.45 |
| 59ne  | 258022.2 | 627904.2 | 0.39 |
| 59nw  | 257998.2 | 627904.3 | 0.44 |
| 59s   | 258010.9 | 627880.8 | 0.25 |
| 59se  | 258022.8 | 627881.5 | 0.23 |
| 59sw  | 257996.8 | 627881.5 | 0.21 |
| 59w   | 257997.3 | 627892.2 | 0.46 |
| 81ne  | 258175.2 | 627922.8 | 0.43 |
| 84n   | 258097.8 | 627929.6 | 0.47 |
| 85e   | 258085.5 | 627918.8 | 0.52 |
| 85ne  | 258086.1 | 627929.8 | 0.54 |
| 85s   | 258072.3 | 627904   | 0.46 |
| 85se  | 258086   | 627904.7 | 0.47 |
| 86nw  | 258040.1 | 627930.6 | 0.58 |
| 86s   | 258047.2 | 627905.7 | 0.22 |
| 86se  | 258058.6 | 627905.8 | 0.27 |
| 86sw  | 258035.3 | 627905.2 | 0.46 |
| 86w   | 258035.1 | 627919.2 | 0.43 |
| 89e   | 257985   | 627916   | 0.4  |
| 89ne  | 257987.6 | 627929.5 | 0.48 |
| 89nw  | 257963.1 | 627927.6 | 0.51 |
| 89s   | 257972.6 | 627901.5 | 0.26 |
| 89se  | 257984.7 | 627902.3 | 0.48 |
| 89sw  | 257961.1 | 627902.7 | 0.42 |
| 90e   | 257958.8 | 627915.3 | 0.42 |
| 90n   | 257947.9 | 627928.2 | 0.45 |



# Appendix 3B Hand pit Logs

| Excavation Method       Dimensions       Ground Level (mOD)       Client         Trial Pit       0.5x0.5m       0.5x0.5m       Breedon Trading Ltd         Location       Dates       16/11/2022       Engineer         Depth<br>(m)       Sample / Tests       Water<br>Depth       Field Records       Level<br>(mOD)       Depth<br>(mOD)       Depth<br>(mOD)       Depth<br>(mOD)       Depth<br>(mOD)  | Job<br>Number<br>WG872<br>Sheet |
|--|---------------------------------|
| Depth<br>(m)     Sample / Tests     Water<br>Depth     Field Records     Level<br>(mOD)     Depth<br>(mOD)     Depth<br>(mOD)     Depth<br>(mOD)     Depth<br>(mOD)  | Sheet                           |
| Depth (m) Sample / Tests Depth Field Records (mOD) (mOD) Depth Description   | 1/1                             |
| (m) (Thickness)  | Legend                          |
| 0.70 B1 Get the set of |                                 |
| Scale (approx)     Logged By     Figure       1:25     MG     W  | /G872.HP01                      |

| <u></u>                 | Johnso         | n Po                  | oole <mark>8</mark> Bloo | mei                 | 1  | Site<br>Sorn Quarry  |  | Trial Pit<br>Number<br>HP02 |
|-------------------------|----------------|-----------------------|--------------------------|---------------------|--|--|--|-----------------------------|
| Excavation<br>Trial Pit | Method         | Dimension<br>0.5x0.5m | <b>ons</b><br>n          | Ground              | Level (mOD   | Client<br>Breedon Trading Ltd  |  | Job<br>Number<br>WG872      |
|                         |                | Location<br>258       | 328.3 E 627637.6 N       | Dates<br>16/11/2022 |  | Engineer   |  | <b>Sheet</b><br>1/1         |
| Depth<br>(m)            | Sample / Tests | Water<br>Depth<br>(m) | Field Records            | Level<br>(mOD)      | Depth<br>(m)<br>(Thickness   | D  | escription   | Legend S                    |
| 0.60                    | В1             |                       |                          |                     | (0.16)<br>0.15<br>0.20)<br>0.35<br><br>0.35)<br><br><br><br><br><br> | Soft consistency brown graveling<br>Soft consistency brown graveling<br>to subrounded, medium to<br>Soft consistency light brow<br>gravelly slightly peaty CLA<br>subrounded cobble. Sand<br>Gravel content subangular<br>coarse.<br>Complete at 0.70m | a layer for sole with route<br>ay silty sandy gravelly CLAY<br>oarse. Gravel content subar<br>coarse.<br>In grey slightly silty very san<br>Y with occasional subangula<br>content medium to coarse.<br>• to subrounded, medium to | igular                      |
|                         |                |                       |                          |                     |  |  |  |                             |
|                         |                |                       |                          |                     |  | Remarks<br>Pit was wet and stable<br>Water seep at 0.3m<br>Pit was terminated due to ot  | ostruction at base   |                             |
| A                       |                | Te                    |                          | 1020                | 2  | Scale (approx)<br>1:25   | Logged By<br>MG  | Figure No.<br>WG872.HP02    |

| ~~~~                    | Johnso         | n Po                  | ole <mark>8</mark> Bloo | Site<br>Sorn Quarry |  | Trial Pit<br>Number<br>HP03   | г<br><b>;</b>   |                        |          |
|-------------------------|----------------|-----------------------|-------------------------|---------------------|--|---|---|------------------------|----------|
| Excavation<br>Trial Pit | Method         | Dimension<br>0.5x0.5m | ons<br>n                | Ground              | Level (mOD   | ) Client<br>Breedon Trading Ltd   |   | Job<br>Number<br>WG872 | r<br>2   |
|                         |                | Location<br>258       | 301.2 E 627732.5 N      | Dates<br>16         | 6/11/2022  | Engineer  |   | <b>Sheet</b><br>1/1    |          |
| Depth<br>(m)            | Sample / Tests | Water<br>Depth<br>(m) | Field Records           | Level<br>(mOD)      | Depth<br>(m)<br>(Thickness                                   | ) D   | escription  | Legend                 | Water    |
| 0.50                    | В1             | (m)                   |                         |                     | (Inickness<br>- (0.25)<br>- 0.25<br>- (0.40)<br>- (0.40)<br> | Dark brown sandy gravelly<br>and small large cobble (0.<br>Soft consistency grey brow<br>occasional subangular to s<br>is medium to corese. Grav<br>subrounded, medium to co<br>excavation<br>Complete at 0.65m | v clayey TOPSOIL with rootle<br>25x0.25x0.15) at 0.15m.<br>vn silty sandy gravelly CLAY<br>subrounded cobble. Sand co<br>el content is subangular to<br>varse. Material is wet on | ts<br>with<br>ntent    | <u>×</u> |
|                         |                |                       |                         |                     |  | Remarks Pit was wet and stable Water seep at 0.2m Pit was terminated due to di  | fficulty digging  | Figure No              |          |
| 14                      |                | and the second        | C. Martin               |                     | 1-1  | 1:25  | MG  | WG872.HP03             |          |

|                         | Johnso         | n Po                  | oole <mark>8</mark> Bloo | 1              | Site<br>Sorn Quarry        |   | -                          | Trial Pit<br>Number<br>HP04 |                        |
|-------------------------|----------------|-----------------------|--------------------------|----------------|----------------------------|---|----------------------------|-----------------------------|------------------------|
| Excavation<br>Trial Pit | Method         | Dimensi<br>0.5x0.5r   | ons<br>m                 | Ground         | Level (mOD)                | Client<br>Breedon Trading Ltd   |                            | Ì                           | Job<br>Number<br>WG872 |
|                         |                | Location<br>258       | ו<br>194.4 E 627757.1 N  | Dates<br>16    | 6/11/2022                  | Engineer  |                            | :                           | Sheet<br>1/1           |
| Depth<br>(m)            | Sample / Tests | Water<br>Depth<br>(m) | Field Records            | Level<br>(mOD) | Depth<br>(m)<br>(Thickness | D   | escription                 | L                           | Kater Kater            |
|                         |                |                       |                          |                |                            | Black brown sandy gravell<br>surface.<br>Firm consistency red brow<br>gravelly CLAY. Sand conte<br>content subangular to sub<br>redium to coarse. Gravel<br>subrounded, medium to cc<br>Complete at 0.70m<br>Remarks<br>Pit was dry and stable<br>No sample taken<br>Pit was terminated due to ot | y clayey TOPSOIL with root | lets at                     |                        |
|                         | - Aller        | 19/32                 |                          | N.             |                            | 1:25  | MG                         | WG87                        | 2.HP04                 |

| <u></u>                 | Johnso         | n Po                  | oole <mark>8</mark> Bloo        | mei            |  | Site<br>Sorn Quarry  |  |                     | Trial Pit<br>Number<br>HP05 |       |
|-------------------------|----------------|-----------------------|---------------------------------|----------------|--|--|--|---------------------|-----------------------------|-------|
| Excavation<br>Trial Pit | Method         | Dimens<br>0.5x0.5     | <b>ions</b><br>m                | Ground         | Level (mOD   | ) Client<br>Breedon Trading Ltd  |  |                     | Job<br>Number<br>WG872      |       |
|                         |                | Location<br>258       | <b>n</b><br>3199.2 E 627822.7 N | Dates<br>16    | 6/11/2022  | Engineer   |  |                     | <b>Sheet</b><br>1/1         |       |
| Depth<br>(m)            | Sample / Tests | Water<br>Depth<br>(m) | Field Records                   | Level<br>(mOD) | Depth<br>(m)<br>(Thickness                         | )<br>)   | escription   |                     | Legend                      | Water |
| 0.25                    | B1             |                       |                                 |                | (0.15)<br>0.15<br>(0.25)<br>0.40<br>(0.15)<br>0.55 | Dark brown sandy gravelly<br>abundance of rootlets.<br>Soft consistency dark brow<br>gravelly slightly peaty CLA<br>content medium to fine. G<br>subrounded, medium to co<br>with slight organic odour.<br>Firm grey brown sandy gra | v clayey TOPSOIL with<br>vn silty slightly sandy slightly<br>Y with occasional rootlet. Sa<br>avel content subangular to<br>barse. Material wet on excav | y<br>and<br>vation, |                             |       |
|                         |                |                       |                                 |                |  | Firm grey brown sandy gra         subangular to subrounded         coarse.         Complete at 0.55m    Remarks Pit was wet and stable Water seep at 0.1m Pit was terminated due to ot   | ostruction at base   | um to<br>edium      |                             |       |
|                         |                |                       |                                 |                |  | Scale (approx)   | Logged By  | Figure              | • No.                       |       |
|                         | The same grant | Sec. 19               | A REPORT OF THE PARTY OF        | - ALAN         | 1.   | 1:25   | MG   | WG8                 | 572.HP05                    |       |

|                         | Johnso         | n Po                  | ole <mark>8</mark> Bloo | 2              | Site<br>Sorn Quarry         |  | Trial Pit<br>Numbe<br>HP06  | t<br>r<br>6                                  |                 |
|-------------------------|----------------|-----------------------|-------------------------|----------------|-----------------------------|--|---|--|-----------------|
| Excavation<br>Trial Pit | Method         | Dimensio<br>0.5x0.5m  | ons<br>I                | Ground         | Level (mOD)                 | Client<br>Breedon Trading Ltd  |   | Job<br>Numbe<br>WG872                        | י <b>r</b><br>2 |
|                         |                | Location<br>2583      | 314.6 E 627813.8 N      | Dates<br>16    | 6/11/2022                   | Engineer   |   | <b>Sheet</b><br>1/1                          |                 |
| Depth<br>(m)            | Sample / Tests | Water<br>Depth<br>(m) | Field Records           | Level<br>(mOD) | Depth<br>(m)<br>(Thickness) | D  | escription  | Legend                                       | Water           |
| 0.30                    | B1             |                       |                         |                |                             | Dark brown sandy gravelly<br>abundance of rootlets<br>Firm consistency grey bro<br>occasional rootlet<br>Soft consistency orange b<br>with occasional subangula<br>content medium to coarse<br>subrounded, medium to co<br>Complete at 0.70m | v clayey TOPSOIL with<br>wn sandy very gravelly CLA<br>rown silty sandy gravelly CL<br>ir to subrounded cobble. Sa<br>Gravel content subangular<br>purse. Material wet on excas | Y with A C C C C C C C C C C C C C C C C C C |                 |
|                         |                |                       |                         |                |                             | Scale (approx)<br>1:25   | Logged By<br>MG   | Figure No.<br>WG872.HP06                     | 3               |

|                         | Johnso         | n Po                  | oole <mark>8</mark> Bloo | C              | Site<br>Sorn Quarry         |  | Trial Pit<br>Number<br>HP07  |                          |
|-------------------------|----------------|-----------------------|--------------------------|----------------|-----------------------------|--|--|--------------------------|
| Excavation<br>Trial Pit | Method         | Dimensi<br>0.5x0.5r   | ons<br>n                 | Ground         | Level (mOD)                 | Client<br>Breedon Trading Ltd  |  | Job<br>Number<br>WG872   |
|                         |                | Location<br>258       | 1<br>317.4 E 627873.1 N  | Dates<br>16    | 6/11/2022                   | Engineer   |  | Sheet<br>1/1             |
| Depth<br>(m)            | Sample / Tests | Water<br>Depth<br>(m) | Field Records            | Level<br>(mOD) | Depth<br>(m)<br>(Thickness) | D  | escription   | Legend Safe              |
| 0.60                    | B1             |                       |                          |                |                             | Dark brown sandy gravelly<br>abundance of rootlets<br>Soft consistency orange b<br>CLAY with occasional rootlet. Sa<br>Gravel content subangula<br>coarse. Rootlet content de<br>Complete at 0.70m | grown silty slightly sandy gravangular to subrounded cobb<br>nd content medium to coars<br>r to subrounded, medium to<br>creases with depth. |                          |
|                         |                | A CONTRACTOR          |                          |                |                             | Scale (approx)<br>1:25   | Logged By<br>MG  | Figure No.<br>WG872.HP07 |

|                         | Johnso         | n Po                  | oole <mark>8</mark> Bloo        |                | Site<br>Sorn Quarry   |   |   | Trial Pit<br>Number<br>HP08 |                                       |
|-------------------------|----------------|-----------------------|---------------------------------|----------------|---|---|---|-----------------------------|---------------------------------------|
| Excavation<br>Trial Pit | Method         | Dimensi<br>0.5x0.5    | <b>ions</b><br>m                | Ground         | Level (mOD  | ) Client<br>Breedon Trading Ltd   |   |                             | Job<br>Number<br>WG872                |
|                         |                | Location<br>258       | <b>n</b><br>8166.6 E 627920.1 N | Dates<br>25    | 5/11/2022   | Engineer  |   |                             | Sheet<br>1/1                          |
| Depth<br>(m)            | Sample / Tests | Water<br>Depth<br>(m) | Field Records                   | Level<br>(mOD) | Depth<br>(m)<br>(Thickness  | )<br>D  | escription  | I                           | Vater V                               |
|                         |                |                       |                                 |                | <br>(0.30)  | Dark brown sandy gravelly abundance of rootlets   | / peaty clayey TOPSOIL wit  | h                           |                                       |
| 0.25                    | B1             |                       |                                 |                | 0.30<br>(0.45)  | Soft consistency grey brow<br>gravelly CLAY with occasi<br>cobble. Sand content med<br>subangular to subrounded | vn silty slightly sandy slightl<br>onal subangular to subroun-<br>ium to fine. Gravel content<br>, medium to fine | y ×<br>ded ;                | ××                                    |
|                         |                |                       |                                 |                | 0.75  | Complete at 0.75m   |   | *<br>                       | · · · · · · · · · · · · · · · · · · · |
|                         |                |                       |                                 |                |   |   |   |                             |                                       |
|                         |                |                       |                                 |                | -<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>- |   |   |                             |                                       |
|                         |                |                       |                                 |                |   | Remarks<br>Pit was dry and stable<br>Pit was terminated due to di   | fficulty digging  |                             |                                       |
| 18 8                    |                |                       |                                 |                | 1000  | Scale (approx)<br>1:25  | Logged By<br>MG   | Figure<br>WG8               | <b>No.</b><br>72.HP08                 |

| <u> </u>  | Johnso         | n Po                  | oole <mark>&amp;</mark> Bloo    | Site<br>Sorn Quarry |   | Trial Pit<br>Number<br>HP09   |  |                        |
|---|----------------|-----------------------|---------------------------------|---------------------|---|---|--|------------------------|
| Excavation<br>Trial Pit                         | Method         | Dimens<br>0.5x0.5     | <b>ions</b><br>m                | Ground              | Level (mOD)   | Client<br>Breedon Trading Ltd   |  | Job<br>Number<br>WG872 |
|   |                | Locatio               | <b>n</b><br>8065.6 E 627637.6 N | Dates<br>25         | 5/11/2022   | Engineer  |  | Sheet<br>1/1           |
| Depth<br>(m)                                    | Sample / Tests | Water<br>Depth<br>(m) | Field Records                   | Level<br>(mOD)      | Depth<br>(m)<br>(Thickness)   | D   | escription   | Legend S               |
| 0.35  | B1             | (m)                   |                                 |                     | (Thickness)<br>- (0.20)<br>- 0.20<br>- 0.20<br>- 0.20<br>- 0.20<br>- 0.60<br> | Brown sandy gravelly pea<br>Dark brown silty sandy gra<br>abundance of rootlets. Sa<br>Gravel content subangula<br>course.<br>Complete at 0.70m | ty clayey TOPSOIL with root<br>aveily peaty CLAY with<br>nd content medium to coars<br>r to subrounded, medium to<br>ficulty digging | tlets                  |
| 19 J. J. S. |                |                       |                                 |                     |   | Scale (approx)  | Logged By  | Figure No.             |
| all         |                | and the second        |                                 |                     | 1:25  | MG  | -<br>WG872.HP09  |                        |

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|   | Johnso         | n Po                  | oole <mark>&amp;</mark> Bloo           | 1                                     | Site<br>Sorn Quarry         |  | Trial Pit<br>Number<br>HP10   |                        |
|---|----------------|-----------------------|--|---------------------------------------|-----------------------------|--|---|------------------------|
| Excavation<br>Trial Pit   | Method         | Dimensi<br>0.5x0.5r   | ons<br>n                               | Ground                                | Level (mOD)                 | Client<br>Breedon Trading Ltd  |   | Job<br>Number<br>WG872 |
|   |                | Location<br>258       | 1<br>3005.9 E 627891.7 N               | Dates<br>2                            | 5/11/2022                   | Engineer   |   | <b>Sheet</b> 1/1       |
| Depth<br>(m)  | Sample / Tests | Water<br>Depth<br>(m) | Field Records                          | Level<br>(mOD)                        | Depth<br>(m)<br>(Thickness) | D  | escription  | Legend Xater           |
| 0.30  | B1             |                       |  |                                       |                             | Grey brown sandy gravelly<br>and occasional cobble<br>Soft consistency black bro<br>subrounded cobble. Sand<br>Gravel content subangular<br>coarse.<br>Soft consistency grey brow<br>occasional subangular to s<br>medium to coarse. Gravel<br>subrounded, medium to cc<br>Complete at 0.65m | r clayey TOPSOIL with rooth<br>wn silty sandy slightly grave<br>content medium to course.<br>'to subrounded, medium to<br>wn silty sandy gravelly CLAY<br>subrounded cobble. Sand co<br>content subangular to<br>iarse. | ets                    |
|   |                |                       |  | A State                               | 5                           | Scale (approx)   | Logged By   | Figure No.             |
| and the second se | MANA           | Mar St                | 12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 |                             | 1:20   | MG  | vvG8/2.HP10            |

|                         | Johnso         | n Pc                  | ole <mark>8</mark> Bloo | mei            | r  | Site<br>Sorn Quarry  |   | Trial Pit<br>Number<br>HP11 |
|-------------------------|----------------|-----------------------|-------------------------|----------------|--|--|---|-----------------------------|
| Excavation<br>Trial Pit | Method         | Dimensio<br>0.5x0.5n  | <b>ons</b><br>n         | Ground         | Level (mOD                                       | ) Client<br>Breedon Trading Ltd  |   | Job<br>Number<br>WG872      |
|                         |                | Location<br>257       | 970.3 E 627922.9 N      | Dates<br>2     | 5/11/2022  | Engineer   |   | <b>Sheet</b><br>1/1         |
| Depth<br>(m)            | Sample / Tests | Water<br>Depth<br>(m) | Field Records           | Level<br>(mOD) | Depth<br>(m)<br>(Thickness                       | )<br>D   | escription  | Legend S                    |
| 0.45                    | B1             |                       |                         |                | (0.15)<br>- 0.15<br>- 0.15<br>- (0.50)<br>- 0.65 | Grey brown sandy gravely<br>rootlets<br>Soft consistency brown sli<br>CLAY. Sand content mediu | v peaty clayey TOPSOIL wit<br>ghtly silty slight sandy peaty<br>im to coarse. | th                          |
|                         |                |                       |                         |                |  | Remarks  |   |                             |
|                         |                |                       |                         |                |  | Pit was dry and stable   |   |                             |
| 1 . C.                  |                |                       |                         |                | Scale (approx)<br>1:25                           | Logged By<br>MG  | Figure No.<br>WG872.HP11  |                             |

| Johnson                        | n Po                  | oole <mark>&amp;</mark> Bloo | Site<br>Sorn Quarry |                            | Tria<br>Nui<br>HI  | al Pit<br>mber<br>P12  |                       |                   |
|--------------------------------|-----------------------|------------------------------|---------------------|----------------------------|--|--|-----------------------|-------------------|
| Excavation Method<br>Trial Pit | Dimensi<br>0.5x0.5r   | ons<br>n                     | Ground              | Level (mOE                 | ) Client<br>Breedon Trading Ltd  |  | Jot<br>Nu<br>We       | o<br>mber<br>G872 |
|                                | Location<br>258       | 1<br>199.2 E 627822.7 N      | Dates<br>25         | /11/2022                   | Engineer   |  | She                   | eet<br>1/1        |
| Depth<br>(m) Sample / Tests    | Water<br>Depth<br>(m) | Field Records                | Level<br>(mOD)      | Depth<br>(m)<br>(Thickness | .)<br>)  | escription   | Lege                  | Aater<br>Vater    |
| 0.30 B1                        |                       |                              |                     |                            | Dark brown slightly sandy<br>with rootlets<br>Soft consistency dark bro<br>slightly gravelly peaty CLA<br>medium to coarse. Gravel<br>subrounded, medium to co<br>Complete at 0.55m<br>Complete at 0.55m | slightly gravelly clayey TOPs<br>wn slightly silty slightly sandy<br>Y with rootlets. Sand conten<br>content subangular to<br>parse. Material wet on excav | SOIL<br>t<br>ation.   |                   |
|                                | 2                     |                              |                     |                            | Scale (approx)<br>1:25   | Logged By<br>MG  | Figure No.<br>WG872.H | IP12              |

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| ~~~~                    | Johnso         | n Pe                  | oole <mark>&amp;</mark> Bloo    | mei            | 1                          | Site<br>Sorn Quarry   |  |  | Trial Pit<br>Number<br>HP13 |       |
|-------------------------|----------------|-----------------------|---------------------------------|----------------|----------------------------|---|--|--|-----------------------------|-------|
| Excavation<br>Trial Pit | Method         | Dimens<br>0.5x0.5     | ions<br>im                      | Ground         | Level (mOD                 | Client<br>Breedon Trading Ltd   |  |  | Job<br>Number<br>WG872      |       |
|                         |                | Locatio               | <b>n</b><br>7780.9 E 627940.4 N | Dates<br>25    | 5/11/2022                  | Engineer  |  |  | <b>Sheet</b><br>1/1         |       |
| Depth<br>(m)            | Sample / Tests | Water<br>Depth<br>(m) | Field Records                   | Level<br>(mOD) | Depth<br>(m)<br>(Thickness | D   | escription   |  | Legend                      | Water |
| 0.30                    | B1             |                       |                                 |                |                            | Orange brown sandy slight<br>rootlets<br>Brown silty sandy slightly<br>content medium to carse<br>subrounded, medium to ca<br>subrounded, medium to ca<br>Complete at 0.65m | Intly gravelly very peaty CLAY. Sa<br>Gravel content subangular<br>barse. Material wet on excav<br>gravelly CLAY. Sand conten<br>content subangular to<br>barse. Material wet on excav | with<br>indy<br>to<br>ation.<br>t<br>ration. |                             |       |
|                         |                |                       |                                 |                |                            | Scale (approx)<br>1:25  | Logged By<br>MG  | Figure<br>WG8                                | <b>872.HP13</b>             |       |

| ~~~~                    | Johnso         | n Pe                  | oole <mark>&amp;</mark> Bloo    | mer            |                            | Site<br>Sorn Quarry  |   | Trial Pit<br>Number<br>HP14 |       |
|-------------------------|----------------|-----------------------|---------------------------------|----------------|----------------------------|--|---|-----------------------------|-------|
| Excavation<br>Trial Pit | Method         | Dimens<br>0.5x0.5     | <b>ions</b><br>m                | Ground         | Level (mOD                 | Client<br>Breedon Trading Ltd  |   | Job<br>Number<br>WG872      |       |
|                         |                | Locatio               | <b>n</b><br>7791.5 E 627889.6 N | Dates<br>25    | /11/2022                   | Engineer   |   | Sheet<br>1/1                |       |
| Depth<br>(m)            | Sample / Tests | Water<br>Depth<br>(m) | Field Records                   | Level<br>(mOD) | Depth<br>(m)<br>(Thickness | )<br>)   | escription  | Legend S                    | water |
| 0.50                    | B1             |                       |                                 |                | (0.20)<br>0.20<br>(0.35)   | Orange brown sandy grav<br>and large cobble at 0.15<br>Soft consistency dark brov<br>gravelly peaty CLAY. Sanc<br>Gravel content subangula<br>coarse. Material wet on ex | elly clayey TOPSOIL with ro<br>vn slightly silty sandy slightly<br>content medium to coarse.<br>to subrounded, medium to<br>cavation. | otlets                      |       |
| 0.50                    | B1             |                       |                                 |                |                            | Soft consistency grey brow<br>CLAY. Sand content medi<br>subangular to subrounded<br>on excavation.<br>Complete at 0.70m   | fficulty digging  | ly<br>i wet                 |       |
| AL POST                 |                |                       |                                 |                |                            | Scale (approx)<br>1:25   | Logged By<br>MG   | Figure No.<br>WG872.HP14    | _     |

| <u> </u>                       | Johnso         | n Po  | oole <mark>&amp;</mark> Bloo | mei                                 | 1                          | Site<br>Sorn Quarry  |  | 1        | Trial Pit<br>Number<br>HP15 |  |
|--------------------------------|----------------|---|------------------------------|-------------------------------------|----------------------------|--|--|----------|-----------------------------|--|
| Excavation Method<br>Trial Pit |                | Dimensions<br>0.5x0.5m<br>Location<br>257683.6 E 627850.1 N |                              | Ground Level (mOD) Dates 25/11/2022 |                            | Client<br>Breedon Trading Ltd<br>Engineer  |  | ì        | Job<br>Number<br>WG872      |  |
|                                |                |   |                              |                                     |                            |  |  | 5        | Sheet<br>1/1                |  |
| Depth<br>(m)                   | Sample / Tests | Water<br>Depth<br>(m)                                       | Field Records                | Level<br>(mOD)                      | Depth<br>(m)<br>(Thickness | ם  | escription   | Le       | Aater Kater                 |  |
| 0.25                           | B1             |   |                              |                                     |                            | Orange brown sandy grav<br>Soft consistency dark bro<br>peaty CLAY with slight org<br>subangular to subrounded<br>on excavation.<br>Firm consistency grey bro<br>Gravel content subangula<br>coarse. Material wet on ex<br>Complete at 0.75m<br>Complete at 0.75m<br>Remarks<br>Pit was wet and stable<br>Pit was terminated due to di | relly clayey TOPSOIL wn slightly silty sandy gravel anic odour. Gravel content i, medium to coarse. Materia wn very sandy gravelly CLA r to subrounded, medium to ccavation.  fficulty digging | Figure N |                             |  |
|                                | The second     | MX  |                              |                                     |                            | 1:25   | MG   | WG87     | 2.HP15                      |  |

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|                                       | Johnso | n Po   | ole <mark>8</mark> Bloo | mei                                 | 2                           | Site<br>Sorn Quarry   |   |               | Trial P<br>Numbe<br>HP1                | it<br>er<br>6 |
|---------------------------------------|--------|--|-------------------------|-------------------------------------|-----------------------------|---|---|---------------|--|---------------|
| Excavation Method Din<br>Trial Pit Lo |        | Dimensions           0.5x0.5m           Location           258083.2 E 627951.5 N |                         | Ground Level (mOD) Dates 25/11/2022 |                             | ) Client<br>Breedon Trading Ltd<br>Engineer   |   |               | Job<br>Number<br>WG872<br>Sheet<br>1/1 |               |
|                                       |        |  |                         |                                     |                             |   |   |               |  |               |
| Depth<br>(m) Sample / Tests           |        | Water<br>Depth<br>(m) Field Records  |                         | Level<br>(mOD)                      | Depth<br>(m)<br>(Thickness) | Description   |   |               | Legend                                 |               |
|                                       |        |  |                         |                                     |                             | Sandy gravelly peaty clays<br>Soft consistency dark brow<br>slightly gravely very peaty<br>Gravel content subangula<br>coarse. Material wet on ex-<br>Complete at 0.60m | gy TOPSOIL with rootlets<br>vn slightly silty slightly sand<br>cLAY with slight organic or<br>r to subrounded, medium to<br>cavation.<br>fficulty digging | ly<br>dour.   |  |               |
| X                                     | R.     | /  | - AND                   |                                     |                             | Scale (approx)<br>1:25  | Logged By<br>MG   | Figure<br>WG8 | <b>9 No.</b><br>872.HP1                | 6             |



# Appendix 3C Laboratory Analysis

## LABORATORY TEST CERTIFICATE

Certificate No : To :

Client :

22/1302 - 01-1 Michael Galt Johnson Poole & Bloomer

50 Speirs Wharf

Glasgow G4 9TB MATtest Limited

10 Queenslie Point Queenslie Industrial Estate 120 Stepps Road Glasgow G33 3NQ

Tel: 0141 774 4032

email: info@mattest.org Website: www.mattest.org

#### LABORATORY TESTING OF SOIL

#### Introduction

We refer to samples taken from Sorn Quarry and delivered to our laboratory on 29th November 2022.

#### Material & Source

| Sample Reference     | : | See Report Plates          |
|----------------------|---|----------------------------|
| Sampled By           | : | Client                     |
| Sampling Certificate | : | Not Supplied               |
| Location             | : | See Report Plates          |
| Description          | : | See Page 2                 |
| Date Sampled         | : | Not Supplied               |
| Date Tested          | : | 29th November 2022 Onwards |
| Source               | : | WG872 - Sorn Quarry        |

#### Test Results

As Detailed On Page 2 to Page 6 inclusive

#### Comments

The results contained in this report relate to the sample(s) as received Opinions and interpretations expressed herein are outside the scope of UKAS accreditation This report should not be reproduced except in full without the written approval of the laboratory All remaining samples for this project will be disposed of 28 days after issue of this test certificate

#### Remarks



- T.M.

T McLelland (Director)



19/12/2022





| TRIAL PIT | SAMPLE | DEPTH<br>(m) | SAMPLE DESCRIPTION                                    |
|-----------|--------|--------------|---|
| HP8       | В      | 0.25         | Brown PEAT (Von Post Classification - H8)             |
| HP9       | В      | 0.35         | Brown PEAT (Von Post Classification - H8)             |
| HP10      | В      | 0.30         | Brown very clayey PEAT (Von Post Classification - H2) |
| HP11      | В      | 0.45         | Brown PEAT (Von Post Classification - H3)             |
| HP12      | В      | 0.30         | Brown PEAT (Von Post Classification - H7)             |
| HP13      | В      | 0.30         | Brown PEAT (Von Post Classification - H6)             |
| HP14      | В      | 0.30         | Brown PEAT (Von Post Classification - H4)             |
| HP15      | В      | 0.25         | Brown PEAT (Von Post Classification - H8)             |
|           |        |              |   |
|           |        |              |   |
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|           |        |              |   |
|           |        |              |   |
|           |        |              |   |

### SUMMARY OF SAMPLE DESCRIPTIONS

#### JOHNSON POOLE & BLOOMER SORN QUARRY



| TRIAL PIT | SAMPLE | DEPTH<br>(m) | MOISTURE<br>CONTENT<br>(%) |
|-----------|--------|--------------|----------------------------|
| HP8       | В      | 0.25         | 475                        |
| HP9       | В      | 0.35         | 553                        |
| HP10      | В      | 0.30         | 176                        |
| HP11      | В      | 0.45         | 369                        |
| HP12      | В      | 0.30         | 350                        |
| HP13      | В      | 0.30         | 491                        |
| HP14      | В      | 0.30         | 180                        |
| HP15      | В      | 0.25         | 245                        |
|           |        |              |                            |

Tested in accordance with BS 1377: Part 2: 1990: Clause 3

### SUMMARY OF MOISTURE CONTENT TEST RESULTS



| TRIAL PIT | SAMPLE | DEPTH<br>(m) | MOISTURE<br>CONTENT<br>(%) | BULK<br>DENSITY<br>(Mg/m <sup>3</sup> ) | DRY<br>DENSITY<br>(Mg/m <sup>3</sup> ) |
|-----------|--------|--------------|----------------------------|---|--|
| HP8       | В      | 0.25         | 475                        | 1.02                                    | 0.18                                   |
| HP9       | В      | 0.35         | 553                        | 1.12                                    | 0.17                                   |
| HP10      | В      | 0.30         | 176                        | 1.06                                    | 0.38                                   |
| HP11      | В      | 0.45         | 369                        | 1.09                                    | 0.23                                   |
| HP12      | В      | 0.30         | 350                        | 1.01                                    | 0.22                                   |
| HP13      | В      | 0.30         | 491                        | 1.07                                    | 0.18                                   |
| HP14      | В      | 0.30         | 180                        | 1.11                                    | 0.40                                   |
| HP15      | В      | 0.25         | 245                        | 1.13                                    | 0.33                                   |
|           |        |              |                            |   |  |
|           |        |              |                            |   |  |

Tested in accordance with BS1377 Part 2 : 1990 Bulk Density : Linear Measurement

### SUMMARY OF MOISTURE CONTENT AND DENSITY TEST RESULTS


| TRIAL PIT | SAMPLE | DEPTH<br>(m) | SPECIMEN §<br>ORIENTATION | SAMPLE<br>PASSING<br>2mm SIEVE<br>(%) | SULPHIDES<br>DETECTED<br>IN SAMPLE | CHLORIDES<br>DETECTED<br>IN SAMPLE | AVERAGE<br>ORGANIC<br>CONTENT<br>(%) |
|-----------|--------|--------------|---------------------------|---------------------------------------|------------------------------------|------------------------------------|--------------------------------------|
| HP8       | В      | 0.25         | N/A                       | 10                                    | N                                  | N                                  | 23.1                                 |
| HP9       | В      | 0.35         | N/A                       | 9                                     | N                                  | Ν                                  | See LOI                              |
| HP10      | В      | 0.30         | N/A                       | 19                                    | Ν                                  | N                                  | 22.6                                 |
| HP11      | В      | 0.45         | N/A                       | 18                                    | Ν                                  | N                                  | 21.5                                 |
| HP12      | В      | 0.30         | N/A                       | 18                                    | Ν                                  | Ν                                  | 22.7                                 |
| HP13      | В      | 0.30         | N/A                       | 26                                    | Ν                                  | Ν                                  | See LOI                              |
| HP14      | В      | 0.30         | N/A                       | 100                                   | Ν                                  | Ν                                  | 21.8                                 |
| HP15      | В      | 0.25         | N/A                       | 12                                    | Ν                                  | Ν                                  | 23.4                                 |
|           |        |              |                           |                                       |                                    |                                    |                                      |

All samples tested in accordance with Clause 4 of BS 1377: Part 3 : 2018 + A1 2021. All tests performed on fraction of sample passing 2mm sieve

| § Specimen orientation : |   |  |  |  |
|--------------------------|---|--|--|--|
| N/A                      | Not applicable due to preparation method and/or sample type |  |  |  |
| V                        | Cut vertically from undisturbed sample                      |  |  |  |
| Н                        | Cut horizontally from undisturbed sample                    |  |  |  |

## SUMMARY OF ORGANIC MATTER CONTENT TEST RESULTS

## JOHNSON POOLE & BLOOMER SORN QUARRY



| TRIAL PIT | SAMPLE | DEPTH<br>(m) | % MATERIAL<br>LESS THAN<br>2mm | LOSS ON<br>IGNITION<br>(%) |
|-----------|--------|--------------|--------------------------------|----------------------------|
| HP9       | В      | 0.35         | 9                              | 91.6                       |
| HP13      | В      | 0.30         | 26                             | 81.9                       |
|           |        |              |                                |                            |
|           |        |              |                                |                            |
|           |        |              |                                |                            |
|           |        |              |                                |                            |
|           |        |              |                                |                            |
|           |        |              |                                |                            |
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|           |        |              |                                |                            |
|           |        |              |                                |                            |
|           |        |              |                                |                            |
|           |        |              |                                |                            |

All samples tested in accordance with Clause 6 of BS 1377: Part 3: 2018 + A1 2021. All tests performed on fraction of sample passing 2mm sieve

| § Specimen orientation : |   |  |  |
|--------------------------|---|--|--|
| N/A                      | Not applicable due to preparation method and/or sample type |  |  |
| V                        | Cut vertically from undisturbed sample                      |  |  |
| Н                        | Cut horizontally from undisturbed sample                    |  |  |

## SUMMARY OF MASS LOSS ON IGNITION TEST RESULTS