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PLANNING AND ENVIRONMENTAL STATEMENT
VOLUME 2
PART 1

ENVIRONMENTAL REPORTS AND IMPACT ASSESSMENTS

APRIL 2021
AMENDED JUNE 2021 FOR VALIDATION

CONTENTS

APPENDIX A

Landscape and Visual Impact Assessment

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Landscape and Visual Impact Assessment

Project Reference	LLD1955-LPL-REP-001
Prepared by:	JP
Checked By:	JJ
Revision	02
Date:	11.12.20

Planning Issue

EXECUTIVE SUMMARY

i Introduction and Background

Lizard Landscape Design and Ecology has been commissioned by Dudman *(Rock Common)* Ltd to undertake a Landscape and Visual Impact Assessment to assess the relative impact from proposed changes to the approved restoration of mineral workings at Rock Common Quarry, the Hollow, Washington, West Sussex, RH20 3DA, *(Grid Reference: TQ 12507 13493)*.

ii The Assessment

The Proposed Restoration Scheme, *(PRS)* represents a substantive continuation of the present operational hours and rate of vehicle movements to and from the Site, for some eight further years. However, the focus of activity would shift from the sand processing area to the restoration material reception area to the east, with a sustained ***Minor adverse effect*** on local levels of low to moderate relative tranquillity over the duration of the restoration in contrast to the Approved Restoration Scheme, *(ARS)* under which this would substantively cease.

However, over this same period as the PRS progressed, there is anticipated to be a gradual beneficial effect on the visual integrity, identity, scenic quality and tranquillity of the South Downs National Park associated with elevated views from the scarp to the south, looking north across the low weald, *(including from the South Downs Way to the south west).* As described within the Visual Amenity Assessment, *(VIA)* this is due to the relatively incongruous presence of the quarry within the landscape, which draws visual attention by measure of its scale, due to proximity and contrast in terms of its worked, yellow colour and sunken form.

This contrasts with the patchwork of fields, bound by hedgerows and woodland and the undulating wooded low sandstone ridgeline which otherwises provides a coherence to landscape and visual character within this area, and as compositional elements within scenic, panoramic northerly views across the weald, within which the mosaic of woodland and fields form a tapestry, *(increasingly wooded before fading to blue to the horizon)* which contributes to the South Downs National Park Special Quality of a *'Diverse, inspirational landscapes and breath-taking views', (SQ1).*

As the PRS progressed to the concluding stage, the recommended mosaic of open water, heathland and woodland would result in an integrated feature within the landscape, which whilst still reasonably perceived as a restored old mineral site within elevated views, is one within which a more naturalistic, and proportionate in scale mosaic of habitat to that surrounding was affected, resulting in a ***Moderate beneficial effect.*** There are further recommendations provided within **Section 7.0**, both for within and without the Site which, where viable would further reinforce this effect, perhaps to a ***potential residual Major beneficial effect***, should the remnant landform be reinstated to its earlier natural extent, pre quarry working.

This is considered to be an improvement to that resulting from the ARS, which would maintain a distinct separation and incongruity with the surrounding landscape character, due to the sheer scale of the lake, as described within the VIA. This is considered to result in a more limited ***Minor beneficial effect*** on the visual integrity, identity, scenic quality and tranquillity of the South Downs National Park, as described above. There is no precedent for such a large body of water viewed at this proximity to the escarpment, outside of the natural floodplain of major rivers, when in use such as the River Arun, *(some 10km to the west).* The most analagous water body being the artificial Arlington Reservoir, *(some 40km east of the Study Area)* located some 4km offset from the escarpment from Wilmington Hill. The scale of the water body would continue to both physically and visually disrupt the more subtle association between the wooded, low sandstone ridgeline, *(and the remnant extent of this east of the A24, which the Site contributes to)* and surrounding field pattern.

Through reference to **Table 1.1**, the Primary aim of the Concept Restoration Scheme for the ARS, *(under WS/15/97)* is to: *'create a landscape lake for amenity and nature conservation and to integrate the Site into the surrounding landscape'*. With regards the amenity objective it is understood that whilst the ARS does include for a path about the perimeter of the lake, this is likely to require noticeable hazard signs about the lake edge. As identified through reference to the Scoping Opinion Request within **Section 1.0**: *'restoring (and creating) large bodies of deep, open water with steep underwater slopes is no longer current "best practice", not least because they are a danger to the public. [...]'*

In terms of a restored landscape, the benefits from the network of paths within the PRS would be significantly favourable to that resulting from the limited recreational affordance anticipated from the ARS. The ARS would achieve an increased level of relative tranquillity for anticipated recreational users when in proximity to the glassy surface of the large lake, *(albeit hazardous and ecologically poor)*, but without the extent of recreational affordance and diversity of experience which might otherwise be achieved through the more extensive and naturalistic mosaic of water bodies and habitat resulting from the PRS.

It is considered that the approach of the PRS would integrate into the Wealden Greensand landscape of both the Storrington Woods and Heaths, *(LCA WG7, 2020)* which surrounds to the north, whilst extending a mosaic of habitat into the Central Scarp Footslopes, *(LCA WG8, 2020)* which surrounds to the south, which is more in in keeping than the singular large lake proposed under the ARS.

The ARS is considered to present a missed opportunity to maximise the potential for the restoration of the Site. In general a potential ***Major - Moderate beneficial effect*** on local landscape character is considered to result from the PRS, relative to the proposed and associated extent of recommendations which are considered to be viable, in comparison to a more limited ***Minor beneficial effect***, which might be anticipated to result from the ARS.

For recreational users enjoying Rights of Way within the South Downs National Park upon the escarpment and downland edge to the south east as the PRS progressed to the concluding stage, the recommended mosaic of open water, heathland and woodland would result in an integrated feature, which whilst still reasonably perceived as a restored old mineral site within elevated views, is one within which a more naturalistic, and proportionate in scale mosaic of habitat to that surrounding was affected, resulting in a ***Moderate beneficial effect*** on the pleasantness of the view.

This is considered to be an improvement to that resulting from the ARS, which would maintain a distinct separation and incongruity with the surrounding landscape character, due to the sheer scale of the lake, which would maintain an incongruous feature at the scale of the quarry as at present. This is considered to result in a more limited ***Minor beneficial effect*** on the pleasantness of views for the receptors identified above. The scale of the water body would continue to both physically and visually disrupt the more subtle association between the wooded, low sandstone ridgeline and surrounding field pattern.

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FIGURES

Development Site Location.

BASEMAP PRODUCED BY MAGIC ON 07/01/2019 (C) CROWN COPYRIGHT AND DATABASE RIGHTS 2019. ORDNANCE SURVEY 100022861

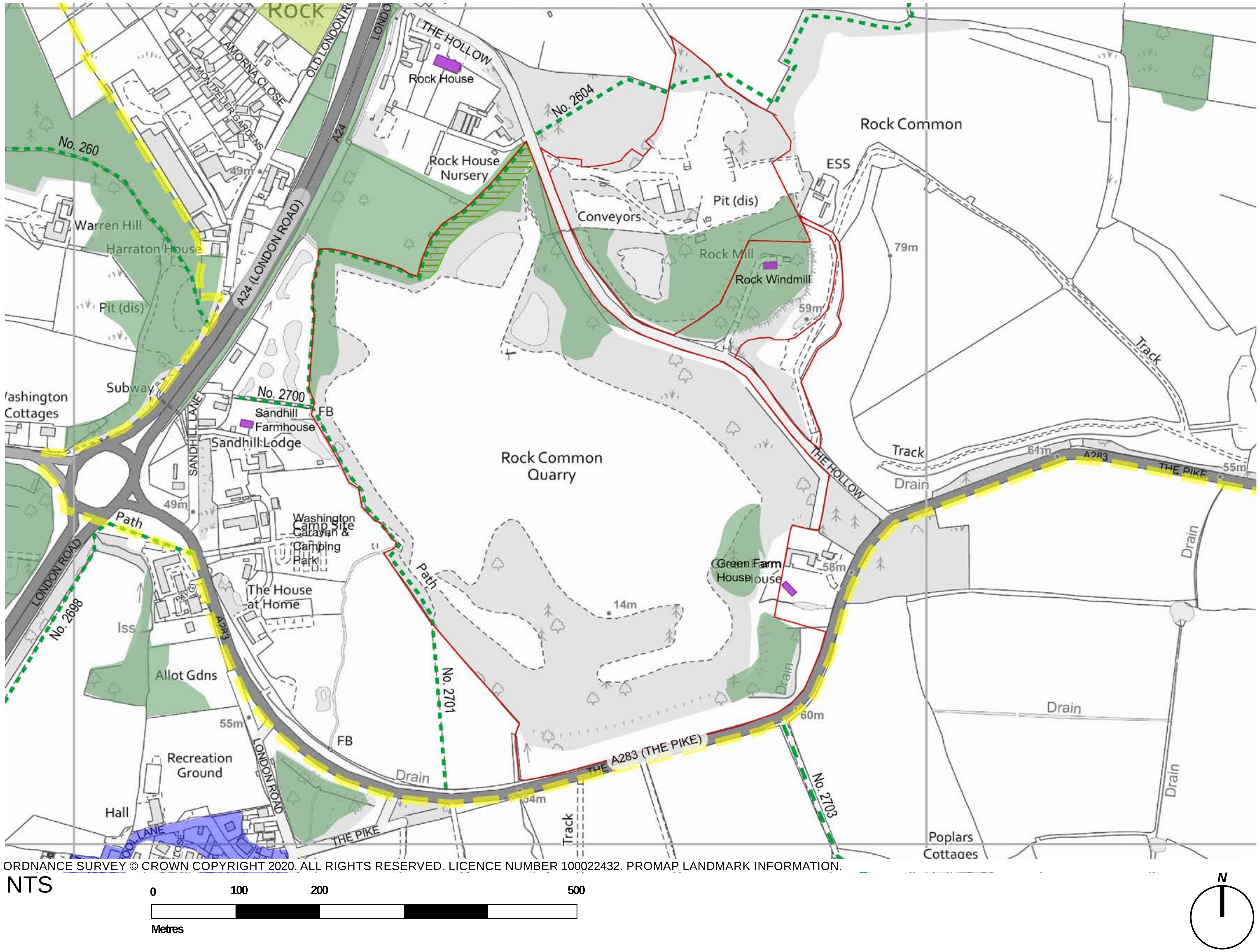
NTS

0 500 1000 2000 m

Metres

N

Figure 1.1. Development Site Location.



ORDNANCE SURVEY © CROWN COPYRIGHT 2020. ALL RIGHTS RESERVED. LICENCE NUMBER 100022432. PROMAP LANDMARK INFORMATION.

Legend

🟥	Site Boundary.
▬ ▬	South Downs National Park, (*south of the dashed yellow line*).
······	Public Footpath.
‒ ‒ ‒	Public Bridleway.
▬	Listed Building *(Grade II)*.
🟪	Conservation Area.
🟩	Deciduous Woodland UK Priority Habitat.
🟩	Traditional Orchard UK Priority Habitat.
▤	Tree Preservation Order.

Figure 1.2. Site and Surrounds.

1.0 INTRODUCTION

General

1.1 Lizard Landscape Design and Ecology, *(LLD)* has been commissioned by Dudman *(Rock Common)* Ltd to undertake a Landscape and Visual Impact Assessment, *(LVIA)* to assess the relative impact from proposed changes to the approved restoration of mineral workings at Rock Common Quarry, the Hollow, Washington, West Sussex, RH20 3DA, *(Grid Reference: TQ 12507 13493)*.

1.2 The LVIA has been undertaken by Joshua Peacock, an Associate Landscape Planner at Lizard Landscape Design and Ecology and a Chartered Landscape Architect with over 18 years of professional experience in LVIA.

1.3 The proposal was screened within the West Sussex County Council, *(WSCC)* Scoping response of 15 November 2019, as falling under part 11*(b)* of Schedule 2 of the EIA Regulations associated. It is anticipated that this LVIA will be submitted as an appendix to the Environmental Statement.

1.4 Separate documents produced by LLD have been produced in response to the Scoping Opinion response. These are referred to within the LVIA where appropriate: *Tree Survey and Protection Measures; Landscape Scheme Design Strategy; Landscape and Woodland Implementation and Long-Term Management Plan.*

The Site

1.5 Through reference to **Figure 1.2**, the Site is best described through reference to Section 3 of the Terrestria Application, which the reader is advised to read alongside of this report.

Report Structure

1.6 Following this introduction, relevant landscape planning policy and landscape planning designations are outlined within **Sections 2.0** and **3.0**.

1.7 The assessment methodology is defined within **Section 4.0**. Existing conditions are described in both **Section 5.0**, which presents published evidence, including a historic map regression and **Section 6.0** which presents the field survey. A descriptive identification of the landscape and visual baseline Landscape and visual receptors is provided to enable the assessment to test the susceptibility of the Site to the proposed Restoration Scheme, drawing comparisons relative to that which might be anticipated from the approved restoration scheme, *(under WS/15/97).*

1.8 Constraints and opportunities, including both primary and secondary mitigation and enhancement are identified within **Section 7.0**. An assessment of anticipated landscape and visual effects both during infill/excavation operations and once restored, is undertaken within **Section 8.0**, informed by the primary mitigation and enhancement and both informing and taking into account any secondary mitigation subsequently recommended through this report. An executive summary is provided to the head of this document.

Potential for Cumulative Effects

1.9 The potential for cumulative intra scheme effects which might be anticipated from heritage and ecology are integrated within the assessment of landscape impact, in advance of these receptor specific reports and EIA chapters being produced.

Appraisal Focus

1.10 The LVIA makes a clear comparison with the landscape and visual impact of the current approved restoration scheme and the proposed restoration scheme, including during both the infill stage and once restored.

Planning Background

1.11 The planning system requires that certain conditions attached to mineral planning permissions be regularly reviewed. These types of applications are known as ‘ROMP’ applications (*Review of Old Mineral Permissions*).

1.12 ROMP applications are not about whether the mineral development is to be permitted or not *(in other words not about the continuation of mineral development),* but are primarily designed to look at whether conditions such as restoration requirements are ‘up to date’ and in accordance with modern *(and best)* practice.

1.13 Through reference to the WSCC Scoping Response it is understood that planning permission was first granted in 1947 to allow sand extraction to continue at part of the site *(the processing area and the Rough landfill)* under an Interim Development Order.

1.14 Planning permissions were subsequently granted between 1953 and 1973 to allow sand extraction in the main pit area south of the Hollow. A ROMP planning permission was granted on 16 September 2004. This allowed excavation to continue until 31 December 2020, *(a date put forward by the operator),* as a shorter period than the 2042 date set out in legislation.

1.15 A ROMP application, supported by an Environmental Statement, *(Golder Associates, January 2007) was* submitted under Application No. DC/401/07 for the development of a non-hazardous waste landfill site at Rock Common Quarry. This was refused on the 13 February 2009. However, there were no explicit reasons provided for refusal on landscape or visual amenity grounds.

The Approved Restoration Scheme *(WS/15/97) and Proposed Restoration*

1.16 A description of the approved restoration and that proposed is provided within Section 3 of the Terrestria Application, which the reader is advised to read alongside of this report.

Scoping Opinion Request

1.17 A Scoping Opinion request was made on the 1 July 2019 to West Sussex County Council, *(WSCC)* as the Minerals Authority for West Sussex under the Town and Country Planning EIA Regulations, 2017.

1.18 Regarding Landscape and Visual Impact, within the Scoping Opinion Response issued by the Council, the following was highlighted by WSCC for consideration:

‘4.9 The proposal has the potential to result in significant visual impacts, and impacts on the landscape, both during infill/ excavation operations and once restored, particularly given its location in close proximity to the South Downs National Park.

4.10 The general approach to undertaking an assessment of landscape and visual impact set out in the Scoping Request is agreed. However, it is very generic, without reference to viewpoint locations, a zone of theoretical visibility, identification of Landscape Character Areas or consideration of the specific impacts the proposal may have, and over what period. It is therefore difficult to provide detailed feedback on what the ES should include.

4.11 Nonetheless, the application should be accompanied by a Landscape and Visual Impact Assessment (LVIA) based on the third edition of Guidelines for Landscape and Visual Impact Assessment (2013). This should inform the landscape and visual impact chapter of the ES. It should consider the potential impacts of the proposed development as a result of changes in the landscape character, and the nature and extent of the visual effects, during both the infill and restoration phases of the development.

4.12 As per paragraph 6.1.7, viewpoints should be agreed with the County Council, though we do not have a Landscape Officer. [...]

4.14 The assessment should identify the sensitivity of the landscape resource and visual receptors, describe the direct and indirect impacts of the proposed development on those resources and receptors, and establish the significance of effect. The landscape assessment should be illustrated by supporting figures to show the relationship between the development and the various landscape character areas and particularly the SDNP.

4.15 The five Grade II Listed Buildings referred to at 2.3.3 are of particular relevance to the proposals, because of their proximity to the quarry, so should be included amongst the viewpoints in the LVIA, and should cross-refer to the Cultural Heritage Impact Assessment - both from the buildings to the quarry and across the quarry to the buildings.

4.16 Clarifying and assessing in detail the impact of the proposal on Chanctonbury Ring Scheduled Monument will be of particular importance, given its elevated position and views into the site.

4.17 The chapter should explore, and evidence, how much the revised site restoration would contribute positively to the setting of the SDNP, both in visual and landscape terms. As noted by the SDNPA: “this will be a fundamental element of the Baseline Studies as it will help to determine the significance of any effects upon the National Park and its Purposes. It will require a synthesis of multiple strands of evidence to produce a holistic understanding of the site.”

4.18 Verified photomontages and visualisations should be provided so that the impact of the proposal on the surrounding area is clear. The site is in close proximity to the SDNPA, public rights of way, major roads, and a dwellings so has significant potential for landscape and visual impact if not managed carefully.

4.19 As with all topics, the LVIA should make a clear comparison with the landscape visual impact of the current approved restoration scheme with the proposed restoration scheme, including during both the infill stage and once restored.

4.20 A range of cross sections should also be provided, including at least one comparing the approved landform with the proposed landform.

4.21 Mitigation and enhancement measures should be clearly detailed, including through an outline landscape masterplan and an Arboricultural Impact Assessment, which should include existing features (trees and hedgerows), any proposed removals in the quarry and processing area, protection measures for those to be retained, and proposed planting, as well as an ongoing programme of maintenance.‘ (Ibid, p6-7) [...]

‘Cumulative and In-Combination Effects

4.63 In addition to the above, and as mentioned in relation to the document structure, the cumulative effects of the development should be included, as well as the in-combination effects (i.e. the potential interaction of impacts - resulting from a combination of effects – such as biodiversity and water impacts) acknowledging the potential for a combination of impacts to result in an impact of greater significance.

4.64 The cumulative impacts of the development should take into account approved and allocated development within at least a 5km radius of the site, and consider the potential combined impacts of the proposals. The cumulative impact of the proposal, along with the previous works on site should also be taken into account (the temporal cumulative impact).’ (Ibid, p11)

1.19 The following scope of technical information requested within the West Sussex County Council Scoping response of 15 November 2019 is not included within this report, but has been referred to in providing the final assessment of effects:

- *Verified photomontages and visualisations, as requested within Paragraph 4.18 of the Scoping Response;*
- *A range of cross sections, including at least one comparing the approved landform with the proposed landform, as requested within Paragraph 4.20 of the Scoping Response.*

Review of Main Differences

1.20 The main differences identified by LLD between the consented approved restoration scheme and that proposed can be identified through reference to the existing and proposed Working Plans and Restoration Plans, respectively provided within **Appendix A** and **Appendix B**. The differences are itemised within **Table 1.1**:

Table 1.1 – Main differences between the approved restoration scheme under WS/15/97 and the proposed restoration scheme regarding landscape and visual matters.		
Difference.	**Approved restoration scheme under WS/15/97.**	**Proposed restoration scheme.**
Restoration Plans.	**Concept Restoration Scheme *(Pleydell Smithyman Limited / R32/06)***	**Final Restoration *(Terrestria Limited / DRCL/RCPA/WP-11)***
Access	*Traffic to and from the sand processing area gained via the junction of The Hollow and the A24 only, for the remainder of the excavation period, (undefined post Dec 2020).*	*Traffic to and from the sand processing area will be restricted to travel via the junction of The Hollow and the A24 only, whilst vehicles delivering restoration material will only use the junction of The Hollow and the A283. This would enable imported material to raise the level of the quarry floor to above that of the natural, groundwater level. Some 2.7 million cubic metres of inert restoration material is proposed to be imported at a rate of up to 345,000 cubic metres/year to restore the Site. This would approximate to an operational period of some eight years.*
Water bodies	*One large and deep lake with the margins to be graded generally to a slope of 50 degrees down to a level of 42 metres AOD at which level a flat bench is to be created before battering-down to the anticipated natural ground water level at 40 metres AOD. The underwater batters are to be graded at 20 degrees.*	*A "dry", restored landform with much shallower, engineered areas of some four water bodies within the quarried area, including one retained from the present. These would variously provide low-key recreational activities and add biodiversity richness and variety. This would be achieved by using the imported material to raise the level of the Quarry floor to a level which will be above that of the natural, groundwater level. The proposed "dry" restoration will be designed so as to create a number of "development platforms" which will, on completion, provide the foundation for the anticipated future development of the site as envisaged in the Wiston Whole Estate Plan. Whilst it is proposed to include a number of shallow lakes as part of the restoration/landscaping it is important to note that these will be "perched" (that is, sitting above the natural ground water level and isolated from it) and there will be no hydraulic continuity with the ground water. It is accepted that the long-term use of the restored land will need to be subject to consultation and planning permission.*
RIGS Interest	*Would be enclosed under graded banks other than to the north east where a small area of the upper exposed face would be retained*	*In order to ensure optimum stability in the long term (to prevent the erosion and collapse of high faces of soft sand) the proposed development will mean that these high exposures will substantively be covered. However, if the upper levels of the Folkestone Formation can be safely left revealed then the final design will try to incorporate this.* *To ensure that the geology of the currently exposed high faces is properly recorded, appropriate measures will be taken prior to infilling encroaching on the geological exposures in order to fully record geological and structural features of interest. The British Geological Survey and the West Sussex Geological Society will be invited to survey and examine the exposed faces in advance of these being covered during restoration.' (2019, Paragraphs 2.3.6 - 2.3.7)*
Recreational Access	*Not clear. However, anticipated to be from the north as existing and then to a limited area of the quarry site about the northern part only, due to the steep gradient of the restored landscape and hazard associated with this.*	*A network of paths would circumnvigate each of the perched lakes within the raised quarry, creating a network of paths, accessed from a meandering pathway down the bank from the north east, with some undefined potential to access from the existing access route from the north east.*
Timeframe to completion for access to public	*Short term. However, there are hazards associated with the depth of the lake, stability of the graded banks within the water body and surrounding which would likely necessitate prevention of recreational access.*	*Some eight years based on the proposed volume of material to be imported, and perhaps ten years for the Site to be fully landscaped.*

Table 1.1 – Main differences between the approved restoration scheme under WS/15/97 and the proposed restoration scheme regarding landscape and visual matters.

Difference.	Approved restoration scheme under WS/15/97.	Proposed restoration scheme.
Restoration Plans.	**Concept Restoration Scheme *(Pleydell Smithyman Limited / R32/06)***	**Final Restoration *(Terrestria Limited / DRCL/RCPA/WP-11)***
Legend and Notes.	The Legend is fairly detailed as are the supporting notes. Notes identify the following: *'**The Aim*** *The Primary aim of the Concept Restoration Scheme is to create a landscape lake for amenity and nature conservation and to integrate the Site into the surrounding landscape in accordance with West Sussex County Council's Landscape Management Guidelines for Wooded Heath Ridges within the Developed Margins of the Weald / Downland Margin of the Wealden Fringe Region. Consistent with this Aim, the Concept Restoration Scheme includes the following elements:* ***1. Topography*** *Grading of exposed faces and slopes above water level to enable integration of the restored Site into the surrounding land levels. Specifically:* *a) Within the Mineral Extraction Area the proposal is to create, generally 50 degree sand faces down to 40m aOD, with a 5m wide bench (to be used as a circular walkway around the restored lake) followed by 20 degree slopes to the base of the quarry workings. (Notable exceptions to these profiles would be the existing over steepened sand faces and Gault Clay overburden slopes - see Drawing No.s [...]* *b) Within the Plant Site Area, the proposal is to merge the area into the adjoining undistburbed ground.* ***2. Landform*** *Creation of a central landscaped lake with associated stable landform, using only materials currently available on Site. Through appropriate 'grading' of the quarry margin, the restored landform will help assimilate the A283 Storrington to Washington section of the 'Low Folkestone Sand Ridgeline' .* ***3. Landscape*** *Provision of terrestrial and aquatic habitats and land uses to enhance the wildlife and recreational potential of the Site. The proposed scheme will reinforce and complement existing vegetation around the periphery of the Site to strengthen local character. The key landscape types will comprise: (a) Heathland, (b) Woodland, (c) Open Water.* ***4. Vegetation Management and Planting*** *Other than the Willow / Alder mix required for the Gault Slope stability, re-creation of local vegetation types appropriate to the Weald Downland Margin / Developed Margins Area, existing vegetation around the Site will be strengthened and 'linked' to the new planting to restrict views and strengthen local landscape character. Specific proposals include:* *(a) Conserve, manage and link existing / proposed heathland and woodland areas;* *(b) Establish and manage a varied heathland landscape including trees, areas of bare ground, woodland, scrub and wetland;* *(c) Re-creation and strengthening of the wooded skyline of the south facing ridgeline within the Mineral Extraction Area (i.e. emphasise the 'Low Folkestone Ridgeline' feature by sympathetic tree planting.'*	The Legend is less detailed indicating footpaths only.

2.0 PLANNING POLICY CONTEXT

General

2.1 The following relevant policy has been taken into account by the assessment:

- *National Planning Policy Framework, (February 2019);*
- *West Sussex Joint Minerals Local Plan (July 2018);*
- *West Sussex Waste Local Plan, (April 2014);*
- *Horsham District Planning Framework, (November 2015);*
- *Draft Horsham District Local Plan 2019-2036, (March 2020);*
- *South Downs Local Plan, 2014-2033, (July 2019);*
- *Storrington, Sullington & Washington Neighbourhood Plan 2018-2031, (September, 2019).*

2.2 The Statutory development plan for the Site area includes the relevant policies from the West Sussex Joint Minerals Local Plan, *(July 2018)* and West Sussex Waste Local Plan, *(April 2014)* the Horsham District Planning Framework, (*2015*) supported by the Storrington, Sullington & Washington Neighbourhood Plan 2018-2031, *(2019)*.

2.3 The South Downs Local Plan (2014-33), was adopted on the 2 July 2019, and encloses the Site area, extending to the south across the South Downs National Park. The Draft Horsham District Local Plan 2019-2036, *(March 2020)* is at a very early consultation stage and of very limited weight as a result.

2.4 The key planning policies considered relevant to the Scheme's landscape and visual considerations are summarised below:

National Planning Policy Framework *(February 2019)*

2.5 The Government's current planning policies on land use planning in England are set out in the National Planning Policy Framework (NPPF).

2.6 NPPF Core planning principles in Paragraph 17 highlight that high quality design and a good standard of amenity should be sought whilst taking account of the different roles and character of different areas and the intrinsic character and beauty of the countryside.

2.7 Paragraph 61 of the NPPF highlights that securing high quality and inclusive design includes the connections between people and places and the integration of new development into the natural, built and historic environment alongside of aesthetic considerations.

2.8 Regarding the requirement for good design, Paragraph 64 of the NPPF states that: *'permission should be refused for development of poor design that fails to take the opportunities available for improving the character and quality of an area'.*

2.9 Regarding the conservation and enhancement of the natural environment, Paragraph 109 of the NPPF highlights that the planning system should recognise the wider benefits of ecosystem services and contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes.

2.10 Regarding nationally important landscapes Paragraph 115 highlights that great weight should be given to conserving and enhancing landscape and scenic beauty.

2.11 NPPF paragraphs 126 – 141 include policies in relation to development making a positive contribution to local character and distinctiveness.

2.12 With regards facilitating the sustainable use of minerals, Paragraph 205 within Chapter 17 identifies that:

'... In considering proposals for mineral extraction, minerals planning authorities should:

...b) ensure that there are no unacceptable adverse impacts on the natural and historic environment, human health or aviation safety, and take into account the cumulative effect of multiple impacts from individual Sites and/or from a number of Sites in a locality;

...e) provide for restoration and aftercare at the earliest opportunity, to be carried out to high environmental standards, through the application of appropriate conditions...;

f) consider how to meet any demand for small-scale extraction of building stone at, or close to, relic quarries needed for the repair of heritage assets, taking account of the need to protect designated Sites; and

g) recognise the small-scale nature and impact of building and roofing stone quarries, and the need for a flexible approach to the duration of planning permissions reflecting the intermittent or low rate of working at many Sites.'

West Sussex Joint Minerals Local Plan *(July 2018)*

2.13 Policy M23: Design and Operation of Mineral Developments, identifies that:

'Proposals for minerals development, including ancillary development, will be permitted provided that, where appropriate, the scale, form, layout (including landscaping), and operations take into account the need to:

(a) integrate with and, where possible, enhance adjoining land-uses and minimise potential conflicts between land-uses and activities;

(b) have regard to the local context including: (i) the varied traditions and character of the different parts of West Sussex and the South Downs National Park; (ii) the characteristics of the Site in terms of topography, and natural and man-made features; (iii) the topography, landscape, townscape, streetscape and skyline of the surrounding area; (iv) views into and out of the Site;

(c) include measures to: [...] (iv) ensure resilience and enable adaptation to a changing climate...'

2.14 Policy M24: Restoration and Aftercare, identifies that:

'Proposals for mineral extraction and temporary minerals infrastructure development will be permitted provided that they are accompanied by comprehensive restoration and aftercare schemes that:

(a) ensure that land is restored at the earliest opportunity including, where appropriate, by phased, or progressive restoration;

(b) make provision for high quality and practicable restoration, management, and aftercare;

(c) are appropriate to their locations, maximising benefits taking into account local landscape character, the historic environment, biodiversity gain, priority habitat creation, and wider environmental objectives;

(d) where appropriate, re-instate, and/or re-route, and where possible, improve public rights of way and maximise public amenity benefits;

(e) provide for the removal of all buildings, machinery and plant when no longer required in connection with the principal use unless their removal conflicts with the agreed restoration scheme;

(f) ensure that soil resources are retained, conserved and handled appropriately during operations and restoration;

(g) preserve, maintain and where appropriate, manage, hydrogeological and hydrological conditions to prevent unacceptable impacts on groundwater conditions or increased flood risk.'

West Sussex Waste Local Plan, *(April 2014)*

2.15 Under Vision and Strategic Objectives, the following Strategic Objectives are identified:

- *'Strategic Objective 8: To protect and, where possible, enhance the special landscape and townscape character of West Sussex.'*
- *Strategic Objective 9: To protect the SDNP and the two AONB from unnecessary and inappropriate development.'*
- *Strategic Objective 10: To protect and, where possible, enhance the natural and historic environment and resources of the County.*
- *Strategic Objective 11: To conserve and safeguard the County's important mineral resources.'*

2.16 Policy M8: Recovery Operations involving the Depositing of Inert Waste to Land, identifies that:

'Proposals for recovery operations involving the depositing of inert waste to land (including for the continuation in duration, or the physical extension of, existing operations) will be permitted provided that:

(a) the proposal results in clear benefits for the site and, where possible, the wider area;

[...] (f) there would be no unacceptable impact on natural resources and other environmental constraints;

(g) the proposal accords with Policy W13 (Protected Landscapes);

[...] (i) restoration of the site to a high quality standard would take place in accordance with Policy W20.'

2.17 Policy W11: Character, identifies that: *'Proposals for waste development will be permitted provided that they would not have an unacceptable impact on:*

'(a) the character, distinctiveness, and sense of place of the different areas of the County and that they reflect and, where possible, reinforce the character of the main natural character areas (including the retention of important features or characteristics); and

(b) the separate identity of settlements and distinctive character of towns and villages (including specific areas or neighbourhoods) and development would not lead to their actual or perceived coalescence.'

2.18 Policy W12: High Quality Developments, identifies that:

'Proposals for waste development will be permitted provided that they are of high quality and, where appropriate, the scale, form, and design (including landscaping) take into account the need to:

(a) integrate with and, where possible, enhance adjoining land-uses and minimise potential conflicts between land-uses and activities;

(b) have regard to the local context including: (i) the varied traditions and character of the different parts of West Sussex;

(ii) the characteristics of the site in terms of topography, and natural and man-made features;

(iii) the topography, landscape, townscape, streetscape and skyline of the surrounding area;

(iv) views into and out of the site; and

(v) the use of materials and building styles;

(c) includes measures to maximise water efficiency;

(d) include measures to minimise greenhouse gas emissions, to minimise the use of non-renewable energy, and to maximise the use of lower-carbon energy generation (including heat recovery and the recovery of energy from gas); and

(e) include measures to ensure resilience and enable adaptation to a changing climate.'

2.19 Policy W13: Protected Landscapes, identifies that:

'(a) Proposals for waste development within protected landscapes (the South Downs National Park, the Chichester Harbour Area of Outstanding Natural Beauty (AONB), and the High Weald AONB) will not be permitted unless: (i) the site is allocated for that purpose in an adopted plan; or

(ii) the proposal is for a small-scale facility to meet local needs that can be accommodated without undermining the objectives of the designation; or

(iii) the proposal is for major waste development that accords with part (c) of this Policy.*

(b) Proposals for waste development located outside protected landscapes will be permitted provided that they do not undermine the objectives of the designation.

(c) Proposals for major waste development within protected landscapes will not be permitted unless: (i) there is an overriding need for the development within the designated area; and*

(ii) the need cannot be met in some other way or met outside the designated area; and

(iii) any adverse impacts on the environment, landscape, and recreational opportunities can be satisfactorily mitigated.'

2.20 Policy W14: Biodiversity and Geodiversity, identifies that:

'Proposals for waste development will be permitted provided that:

[...] (c) there are no adverse impacts on areas, sites or features of regional or local biodiversity or geological conservation importance unless the benefits of the development clearly outweigh the impact on the objectives of the designation;

(d) where development would result in the loss of or adversely affect an important area, site or feature, the harm is minimised, mitigated, or compensated for, including, where practicable, the provision of a new resource elsewhere which is of at least equivalent value;

(e) where appropriate, the creation, enhancement, and management of habitats, ecological networks, and ecosystem services is secured consistent with wider environmental objectives including Biodiversity Opportunity Areas and the South Downs Way Ahead Nature Improvement Area; and

(f) where necessary, the investigation, evaluation, and recording of important sites and features is undertaken and, where appropriate, representative features are preserved.

2.21 Policy W15: Historic Environment, identifies that:

'Proposals for waste development will be permitted provided that:

(a) known features of historic or archaeological importance are conserved and, where possible, enhanced unless there are no alternative solutions and there are overriding reasons which outweigh the need to safeguard the value of sites or features; [...]'

2.22 Policy W20: Restoration and Aftercare, identifies that:

'Proposals involving temporary waste development will be permitted provided that they are accompanied by comprehensive schemes that:

(a) make provision for high quality and practicable restoration, management, and aftercare;

(b) are appropriate for their locations, maximising benefits taking into account local landscape character, the historic environment, biodiversity, and wider environmental objectives;

(c) where appropriate, maximise public amenity benefits including re-instatement of, and where possible, improvement of public rights of way;

(d) provide for the removal of all buildings, machinery and plant when they are no longer required in connection with the principal use; and

(e) ensure that that land is restored at the earliest opportunity including, where appropriate, phased, or progressive restoration.'

Horsham District Planning Framework *(2015)*

2.23 Strategic Policy 25: The Natural Environment and Landscape Character, states that 'The Natural Environment and landscape character of the District, including the landscape, landform and development pattern, together with protected landscapes and habitats will be protected against inappropriate development'. Development proposals will be supported, which:

- *'1. Protects, conserves and enhances the landscape and townscape character, taking into account areas identified as being of landscape importance, the individual settlement characteristics, and maintains settlement separation;*
- *2. Maintain and enhances the Green Infrastructure Network and addresses any identified deficiencies in the District;*
- *3. Maintains and enhances the existing network of geological sites and biodiversity, including safeguarding existing designated sites and species, and ensures no net loss of wider biodiversity and provides net gains in biodiversity where possible;*
- *4. Conserve and where possible enhance the setting of the South Downs National Park.'*

2.24 Strategic Policy 26: Countryside Protection, states that:

'Outside built-up area boundaries, the rural character and undeveloped nature of the countryside will be protected against inappropriate development. Any proposal must be essential to its countryside location, and in addition meet one of the following criteria:

- *1. Support the needs of agriculture or forestry;*
- *2. Enable the extraction of minerals or the disposal of waste;*
- *3. Provide for quiet informal recreational use; or*
- *4. Enable the sustainable development of rural areas.'*

2.25 Additionally, *'proposals must be of a scale appropriate to its countryside character and location. Development will be considered acceptable where it does not lead, either individually or cumulatively, to a significant increase in the overall level of activity in the countryside, and protects, and/or conserves, and/or enhances, the key features and characteristics of the landscape character area in which it is located, including;*

- *1. The development pattern of the area, its historical and ecological qualities, tranquillity and sensitivity to change;*
- *2. The pattern of woodlands, fields, hedgerows, trees, waterbodies and other features; and*
- *3. The landform of the area'*

2.26 Policy 28: Replacement Dwellings and House Extensions in the Countryside, states that:

'Outside the defined built-up areas, house extensions, replacement dwellings and ancillary accommodation will be supported if the development can be accommodated appropriately within the curtilage of the existing dwelling. In addition:

- *1. Replacement dwellings will only be supported on a one for one basis and if it can be demonstrated that the property is not derelict;*
- *2. Replacement dwellings should not be disproportionate to the size of the existing dwelling whilst extensions should also, and in addition, be in keeping with the scale and character of the existing dwelling. The cumulative impact of existing extensions will be taken into account;*
- *5. Subsequent extensions to converted agricultural buildings which detract from the original form and character will be resisted.'*

2.27 Policy 30: Protected Landscapes, sets out the following regarding protected landscapes:

- *'1. The natural beauty and public enjoyment of the High Weald AONB and the adjoining South Downs National Park will be conserved and enhanced and opportunities for the understanding and enjoyment of their special qualities will be promoted. Development proposals will be supported in or close to protected landscapes where it can be demonstrated that there will be no adverse impacts to the natural beauty and public enjoyment of these landscapes as well as any relevant cross boundary linkages;*
- *2. Proposals should have regard to any management plans for these areas and must demonstrate:*
  a. How the key landscape features or components of natural beauty will be conserved and enhanced. This includes maintaining local distinctiveness, sense of place and setting of the protected landscapes, and if necessary providing mitigation or compensation measures;
  b. How the public enjoyment of these landscapes will be retained;
  c. How the proposal supports the economy of the protected landscape and will contribute to the social wellbeing of the population who live and work in these areas.'

2.28 Policy 31: Green Infrastructure and Biodiversity, states that:

- *'1. Development will be supported where it can demonstrate that it maintains or enhances the existing network of green infrastructure. Proposals that would result in the loss of existing green infrastructure will be resisted unless it can be demonstrated that new opportunities will be provided that mitigates or compensates for this loss, and ensures that the ecosystem services of the area are retained.*
- *2. Development proposals will be required to contribute to the enhancement of existing biodiversity, and should create and manage new habitats where appropriate. The Council will support new development which retains and /or enhances significant features of nature conservation on development sites. The Council will also support development which makes a positive contribution to biodiversity through the creation of green spaces, and linkages between habitats to create local and regional ecological networks.'*

2.29 Strategic Policy 33: Development Principles, states that *'In order to conserve and enhance the natural and built environment developments shall be required to:*

- *'1. Make efficient use of land, and prioritise the use of previously developed land and buildings whilst respecting any constraints that exist;*
- *2. Ensure that it is designed to avoid unacceptable harm to the amenity of occupiers/users of nearby property and land, for example through overlooking or noise, whilst having regard to the sensitivities of surrounding development;*
- *3. Ensure that the scale, massing and appearance of the development is of a high standard of design and layout and where relevant relates sympathetically with the built surroundings, landscape, open spaces and routes within and adjoining the site, including any impact on the skyline and important views;*
- *4. Are locally distinctive in character, respect the character of the surrounding area (including its overall setting, townscape features, views and green corridors) and, where available and applicable, take account of the recommendations/policies of the relevant Design Statements and Character Assessments;*
- *5. Use high standards of building materials, finishes and landscaping; and includes the provision of street furniture and public art where appropriate;*
- *6. Presume in favour of the retention of existing important landscape and natural features, for example trees, hedges, banks and watercourses. Development must relate sympathetically to the local landscape and justify and mitigate against any losses that may occur through the development;*
- *7. Ensure buildings and spaces are orientated to gain maximum benefit from sunlight and passive solar energy, unless this conflicts with the character of the surrounding townscape, landscape or topography where it is of good quality.'*

2.30 Policy 34: Cultural and Heritage Assets, acknowledges that heritage assets are an irreplaceable resource. With the intention of positive management of proposals which might affect heritage assets, Policy 34 requires development to:

- *'1. Make reference to the significance of the asset, including drawing from research and documentation such as the West Sussex Historic Environment Record;*
- *2. Reflect the current best practice guidance produced by English Heritage and Conservation Area Character Statements;*
- *3. Reinforce the special character of the district's historic environment through appropriate siting, scale, form and design; including the use of traditional materials and techniques;*
- *4. Make a positive contribution to the character and distinctiveness of the area, and ensuring that development in conservation areas is consistent with the special character of those areas;*
- *5. Preserve, and ensure clear legibility of, locally distinctive vernacular building forms and their settings, features, fabric and materials;*
- *6. Secure the viable and sustainable future of heritage assets through continued preservation by uses that are consistent with the significance of the heritage asset;*
- *7. Retain and improves the setting of heritage assets, including views, public rights of way, trees and landscape features, including historic public realm features; and*
- *8. Ensure appropriate archaeological research, investigation, recording and reporting of both above and below-ground archaeology, and retention where required, with any assessment provided as appropriate.'*

Draft Horsham District Local Plan 2019-2036, *(March 2020)*

2.31 The Draft Horsham District Local Plan 2019-2036 *(March 2020)*, is at a very early consultation stage and of very limited weight as a result. The key policy numbers are considered to be:

- *Strategic Policy 11: Tourism Facilities and Visitor Accommodation;*
- *Strategic Policy 25: Environmental Protection;*
- *Strategic Policy 27: The Natural Environment and Landscape Character;*
- *Strategic Policy 28: Countryside Protection;*
- *Strategic Policy 30: Protected Landscapes*
- *Strategic Policy 31: Green Infrastructure and Biodiversity;*
- *Strategic Policy 33: Development Quality;*
- *Strategic Policy 35: Heritage Assets and Managing change in the Historic Environment;*
- *Strategic Policy 37: Climate Change.*

South Downs Local Plan, *(July 2019)*

2.32 Core Policy SD2: Ecosystem Services, identifies that:

'1. Development proposals will be permitted where they have an overall positive impact on the ability of the natural environment to contribute goods and services. This will be achieved through the use of high quality design, and by delivering all opportunities to:

a) Sustainably manage land and water environments;

b) Protect and provide more, better and joined up natural habitats;

c) Conserve water resources and improve water quality;

d) Manage and mitigate the risk of flooding;

e) Improve the National Park's resilience to, and mitigation of, climate change;

f) Increase the ability to store carbon through new planting or other means;

g) Conserve and enhance soils, use soils sustainably and protect the best and most versatile agricultural land;

h) Support the sustainable production and use of food, forestry and raw materials;

i) Reduce levels of pollution;

j) Improve opportunities for peoples' health and wellbeing; and

k) Provide opportunities for access to the natural and cultural resources which contribute to the special qualities.

2. Development proposals must be supported by a statement that sets out how the development proposal impacts, both positively and negatively, on ecosystem services...'

2.33 Strategic Policy SD4: Landscape Character, identifies that:

'1. Development proposals will only be permitted where they conserve and enhance landscape character by demonstrating that:

a) They are informed by landscape character, reflecting the context and type of landscape in which the development is located;

b) The design, layout and scale of proposals conserve and enhance existing landscape and seascape character features which contribute to the distinctive character, pattern and evolution of the landscape;

c) They will safeguard the experiential and amenity qualities of the landscape; and

d) Where planting is considered appropriate, it is consistent with local character, enhances biodiversity, contributes to the delivery of GI and uses native species, unless there are appropriate and justified reasons to select non-native species.

2. Where development proposals are within designed landscapes, or the setting of designed landscapes, (including historic parkscapes and those on the Historic England Register of Historic Parks and Gardens) they should be based on a demonstrable understanding of the design principles of the landscape and should be complementary to it.

3. The settlement pattern and individual identity of settlements and the integrity of predominantly open and undeveloped land between settlements will not be undermined.

4. Green and blue corridors will be safeguarded. Development proposals should identify and take opportunities to create and connect green and blue corridors.

5. The restoration of landscapes where features have been lost or degraded will be supported where it contributes positively to landscape character.'

2.34 Strategic Policy SD5: Design highlights that:

'1. Development proposals will only be permitted where they adopt a landscape-led approach and respect the local character, through sensitive and high quality design that makes a positive contribution to the overall character and appearance of the area. The following design principles should be adopted as appropriate:

a) Integrate with, respect and sympathetically complement the landscape character by ensuring development proposals are demonstrably informed by an assessment of the landscape context; [...]

k) Have regard to avoiding harmful impact upon, or from, any surrounding uses and amenities.'

2.35 Strategic Policy SD6: Safeguarding Views, highlights that:

'1. Development proposals will only be permitted where they preserve the visual integrity, identity and scenic quality of the National Park, in particular by conserving and enhancing key views and views of key landmarks within the National Park.

2. Development proposals will be permitted that conserve and enhance the following view types and patterns identified in the Viewshed Characterisation & Analysis Study:

a) Landmark views to and from viewpoints and tourism and recreational destinations;

b) Views from publically accessible areas which are within, to and from settlements which contribute to the viewers' enjoyment of the National Park;

c) Views from public rights of way, open access land and other publically accessible areas; and *d) Views which include or otherwise relate to specific features relevant to the National Park and its special qualities, such as key landmarks including those identified in Appendix 2 of the Viewshed Characterisation & Analysis Study, heritage assets (either in view or the view from) and biodiversity features.*

3. Development proposals will be permitted provided they conserve and enhance sequential views, and do not result in adverse cumulative impacts within views.'

2.36 Strategic Policy SD7: Relative Tranquillity highlights that:

'1. Development proposals will only be permitted where they conserve and enhance relative tranquillity and should consider the following impacts:

a) Direct impacts that the proposals are likely to cause by changes in the visual and aural environment in the immediate vicinity of the proposals;

b) Indirect impacts that may be caused within the National Park that are remote from the location of the proposals themselves such as vehicular movements; and

c) Experience of users of the PRoW network and other publicly accessible locations.

2. Development proposals in highly tranquil and intermediate tranquillity areas should conserve and enhance, and not cause harm to, relative tranquillity.

3. Development proposals in poor tranquillity areas should take opportunities to enhance relative tranquillity where these exist.'

2.37 The descriptive text for Policy SD7 highlights that in order to assess impacts on relative tranquillity the South Downs Tranquillity Study *(South Downs National Park Authority, 2017)*, should be used as a baseline from which to assess changes in the aural and visual environment which are likely to result from the proposals.

2.38 The descriptive text identifies that:

'...Applications for development proposals in highly tranquil areas should demonstrate that they conserve and enhance, and do not harm, relative tranquillity. Development proposals in areas of intermediate relative tranquillity are the areas which are most vulnerable to change, and should avoid further harm to relative tranquillity and take every opportunity to enhance it. Development proposals in areas of poor tranquillity are often located within or on the edge of urban areas and thus there may be limited scope for enhancing relative tranquillity in these area; opportunities to enhance relative tranquillity should be taken wherever possible.

The extent that proposals conserve and enhance relative tranquillity will be determined by an assessment of the impact on relative tranquillity, which is proportionate to the scale and expected impact of the development in relation to the surrounding context.'

2.39 Strategic Policy SD8: Dark Night Skies, identifies that:

'1. Development proposals will be permitted where they conserve and enhance the intrinsic quality of dark night skies and the integrity of the Dark Sky Core as shown on the Policies Map.

2. Development proposals must demonstrate that all opportunities to reduce light pollution have been taken, and must ensure that the measured and observed sky quality in the surrounding area is not affected, having due regard to the following hierarchy:

a) The installation of lighting is avoided; and

b) If lighting cannot be avoided, it is demonstrated to be necessary and appropriate, for its intended purpose or use:

i. Any adverse impacts are avoided; or

ii. If that is not achievable, then adverse impacts are mitigated to the greatest reasonable extent.

3. Lighting which is proposed to be installed must meet or exceed the level of protection appropriate to the environmental zone, as shown on the Policies Map.[...].'

2.40 Strategic Policy SD9: Biodiversity and Geodiversity, identifies that:

'1. Development proposals will be permitted where they conserve and enhance biodiversity and geodiversity, giving particular regard to ecological networks and areas with high potential for priority habitat restoration or creation. Prior to determination, up-to-date ecological information should be provided which demonstrates that development proposals:

a) Retain, protect and enhance features of biodiversity and geological interest (including supporting habitat and commuting routes through the site and taking due account of any use by migratory species) and ensure appropriate and long-term management of those features;

b) Identify and incorporate opportunities for net gains in biodiversity;

c) Contribute to the restoration and enhancement of existing habitats, the creation of wildlife habitats and the creation of linkages between sites to create and enhance local and regional ecological networks;

d) Protect and support recovery of rare, notable and priority species;

e) Seek to eradicate or control any invasive non-native species present on site;

f) Contribute to the protection, management and enhancement of biodiversity and geodiversity, for example by supporting the delivery of GI and Biodiversity Action Plan targets and enhance Biodiversity Opportunity Areas (BOA); and

g) Comply with the mitigation hierarchy as set out in national policy.

[...] i. Development proposals should identify and incorporate opportunities to conserve, restore and recreate priority habitats and ecological networks. Development proposals should take opportunities to contribute and deliver on the aims and objectives of the relevant biodiversity strategies where possible.'

2.41 Strategic Policy SD12: Historic Environment, identifies that:

'1. Development proposals will only be permitted where they conserve and enhance the historic environment, including through the safeguarding of heritage assets and their setting.

[...] 3. Development proposals which affect heritage assets (whether designated or non-designated) or their setting will be determined with regard to the significance of the asset, including the long-term conservation and enhancement of that asset.

4. Development proposals will be permitted where they enhance or better reveal the significance of heritage assets, particularly where they are considered to be at risk of irreversible harm or loss.

5. Development proposals which appropriately re-use redundant or under-used heritage assets with the optimal viable use, which secures their long-term conservation and enhancement, including of their setting, will be supported.

6. Development proposals for enabling development that would otherwise conflict with other planning policies but which would secure the future conservation of a heritage asset will be permitted provided:

a) The proposals will not materially harm the heritage values of the asset or its setting;

b) It can be demonstrated that alternative solutions have failed;

c) The proposed development is the minimum necessary to protect the significance of the heritage asset;

d) It meets the tests and criteria set out in Historic England guidance Enabling Development and the Conservation of Significant Places;

e) It is subject to a legal agreement to secure the restoration of the asset; and

f) It enables public appreciation of the saved heritage asset...'

2.42 Development Management Policy SD13: Listed Buildings, identifies that:

'1. Development proposals which affect a listed building or its setting will only be permitted and listed building consent granted where:

a) They preserve and enhance the significance of the listed building and its setting by demonstrating that loss of historic fabric and detail of significance, including internal features, floor plans and the integrity of the rooms, is avoided; or

b) Harm to the significance of the listed building or its setting is considered to be outweighed by public benefits by the Authority, when appropriate mitigation measures will be expected, including archaeological investigation (including a written report) or recording.

2. Development proposals will be refused planning permission and/or listed building consent where they cause substantial harm to a listed building or its setting.'

2.43 Development Management Policy SD15: Conservation Areas, identifies that:

'1. Development proposals within a conservation area, or within its setting, will only be permitted where they preserve or enhance the special architectural or historic interest, character or appearance of the conservation area. Sufficient information to support an informed assessment should be provided on the following matters:

a) The relevant conservation area appraisal and management plan;

b) Overall settlement layout and relationship to established landscape setting;

c) Historic pattern of thoroughfares, roads, paths and open spaces, where these provide evidence of the historic evolution of the settlement, and the historic street scene;

d) Distinctive character zones within the settlement;

e) Mix of building types and uses, if significant to the historic evolution of the settlement;

f) Use of locally distinctive building materials, styles or techniques;

g) Historic elevation features including fenestration, or shop fronts, where applicable;

h) Significant trees, landscape features, boundary treatments, open space, and focal points; and

i) Existing views and vistas through the settlement, views of the skyline and views into and out of the conservation area.

2. Within a conservation area, development proposals which involve the total or substantial demolition of buildings or structures will only be permitted where it is sufficiently demonstrated that:

a) The current buildings or structures make no positive contribution to the special architectural or historic interest, character or appearance of the conservation area; and

b) The replacement would make an equal or greater contribution to the character and appearance of the conservation area.'

2.44 Strategic Policy SD17: Protection of the Water Environment, identifies that:

'1. Development proposals that affect groundwater, surface water features, and watercourse corridors will not be permitted unless they conserve and enhance the following:

a) Water quality and quantity, and help achieve requirements of the European Water Framework Directive, or its replacement;

b) Ability of groundwater, surface water features and watercourse corridors to function by natural processes throughout seasonal variations, within the immediate vicinity, and both upstream and downstream of the site of the proposal; and

c) Specifically for surface water features and watercourse corridors:

i. Biodiversity;

ii. Historic significance;

iii. Character, appearance, and setting;

iv. Public access to and along the waterway for recreational opportunities; and

v. Ability for maintenance of the watercourse, including for flood risk management purposes.

2. Development within Groundwater Source Protection Zones (SPZs) will only be permitted provided that there is no adverse impact on the quality of the groundwater source, and provided there is no risk to its ability to maintain a water supply.

3. Development proposals must incorporate measures to eliminate risk of pollution to groundwater, surface water and watercourse corridor features which would harm their ecological and/or chemical status.

4. Development proposals for the provision of agricultural reservoirs that aid demand management, water efficiency and water storage will be permitted where they are compatible with the National Park purposes.'

2.45 Strategic Policy SD20: Walking, Cycling and Equestrian Routes, states that:

'1. Development proposals will be permitted provided they contribute to a network of attractive and functional non-motorised travel routes, with appropriate signage, throughout the National Park. [...]

6. Development proposals will be permitted provided that they:

a) Maintain existing public rights of way; and

b) Conserve and enhance the amenity value and tranquillity of, and views from, non-motorised travel routes and access land.'

Storrington, Sullington & Washington Neighbourhood Plan 2018-2031, *(September, 2019)*

2.46 For Washington opportunities are identified, including the following:

'There is potential to maximise the location of the Parish as 'The Heart of the Downs' and support is being offered from the South Downs National Park to assist with this. This would encourage tourism and associated business to the area. The Plan would support the improvement and installation of cycle paths, footpaths and bridleways between settlements for daily use such as commuting and recreational uses.[...]'

2.47 Policy 8: Countryside Protection, identifies that:

'New development shall protect the views shown on the Green Gap and Views Map and where appropriate also identify through a robust master planning process where new views to the surrounding countryside can be provided through the design and layout of streets and spaces.'

2.48 Policy 15: Green Infrastructure & Biodiversity, identifies that:

'Development proposals must ensure the green infrastructure assets of the Parishes are protected and maintained, and wherever possible, enhanced. Development proposals will be supported, provided their layout and landscape schemes have regard to the following principles as appropriate:

i. Existing hedgerows, trees, banks, ponds, watercourses and other important landscape and natural features must be retained wherever possible to encourage wildlife and for visual reasons; any hedgerow replacement must be with indigenous species, e.g. avoiding the use of coniferous plants;

ii. Development proposals should demonstrate that appropriate consideration has been given to providing for wildlife and that, wherever possible, sustainable proposals to protect wildlife interests have been incorporated into the design;

iii. All trees are important to the setting of the parishes and to wildlife and so regard must be had to their retention or replacement with indigenous species to retain that setting;

iv. Schemes must retain existing green corridors, ponds and other important wildlife habitats and the opportunity for a landscape scheme to provide a new green corridor to achieve ecological connectivity between open countryside and an existing wildlife habitat in a developed area, should be realised where it is practical;

v. Landscape schemes should provide for the effective screening of new developments, including providing for their ongoing maintenance;

vi. Landscape design proposals should seek to create multifunctional networks of spaces and features which connect with surrounding and existing biodiversity corridors;

vii. New development should minimise the need to travel and through good design and site layouts prioritise the needs of pedestrians and cyclists, minimising the distance to local transport modes and maximising opportunities to connect with existing pedestrian and cycle networks;

viii. Sustainable urban drainage measures should be integrated within the landscape design as part of a multifunctional layout. Where possible this should incorporate appropriate surface water features.'

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Figure 3.1. Planning Designations

3.0 LANDSCAPE PLANNING DESIGNATIONS

3.1 Landscape planning designations within the Study Area are described below and their location shown on **Figures 3.1 - 3.3** as appropriate.

National Park

3.2 National Parks are designated under the National Parks and Access to the Countryside Act 1949, amended in the Environment Act 1995. The purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well being of those living within them. Through reference to **Figure 3.1**, the Site is located some 30-50m north of the South Downs National Park, which circles the Site at an offset to the west and extends on rising ground up the chalk escarpment to the south.

3.3 The statutory purposes and duty of the South Downs National Park are as follows:

- *'Purpose 1: To conserve and enhance the natural beauty, wildlife and cultural heritage of the area.*
- *Purpose 2: To promote opportunities for the understanding and enjoyment of the special qualities of the National Park by the public.*
- *Duty: To seek to foster the social and economic wellbeing of the local communities within the National Park in pursuit of our purposes'*

3.4 The South Downs National Park vision for the year 2050 is that:

- ‘*The iconic English lowland landscapes and heritage will have been conserved and greatly enhanced. These inspirational and distinctive places, where people live, work, farm and relax, are adapting well to the impacts of climate change and other pressures;*
- *People will understand, value, and look after the vital natural services that the National Park provides. Large areas of high-quality and well-managed habitat will form a network supporting wildlife throughout the landscape;*
- *Opportunities will exist for everyone to discover, enjoy, understand and value the National Park and its special qualities. The relationship between people and landscape will enhance their lives and inspire them to become actively involved in caring for it and using its resources more responsibly;*
- *Its special qualities will underpin the economic and social wellbeing of the communities in and around it, which will be more self-sustaining and empowered to shape their own future. Its villages and market towns will be thriving centres for residents, visitors and businesses and supporting the wider rural community;*
- *Successful farming, forestry, tourism and other business activities within the National Park will actively contribute to, and derive economic benefit from, its unique identity and special qualities.’*

3.5 The Special Qualities (SQ) of the South Downs National Park comprise:

- *SQ1 - ‘Diverse, inspirational landscapes and breath-taking views;*
- *SQ2 - ‘A rich variety of wildlife and habitats including rare and internationally important species’;*
- *SQ3 - ‘Tranquil and unspoilt places’;*
- *SQ4 - ‘An environment shaped by centuries of farming and embracing new enterprise’;*
- *SQ5 - ‘Great opportunities for recreational activities and learning experiences’;*
- *SQ6 - ‘Well-conserved historical features and a rich cultural heritage’;*
- *SQ7 - ‘Distinctive towns and villages, and communities with real pride in their area.’*

International Dark Sky Reserves

3.6 Through reference to the International Dark Sky Association *(IDA)* an IDA International Dark Sky Reserve *(IDSR)* is a:

‘Public or private land possessing an exceptional or distinguished quality of starry nights and nocturnal environment that is specifically protected for its scientific, natural, educational, cultural, heritage and/or public enjoyment. Reserves consist of a core area meeting minimum criteria for sky quality and natural darkness, and a peripheral area that supports dark sky preservation in the core. Reserves are formed through a partnership of multiple land managers who have recognized the value of the natural nighttime environment through regulations and long-term planning.’

3.7 The South Downs IDSR was designated in May 2016. It is protected under Strategic Policy SD8: Dark Night Skies, of the South Downs Local Plan: 2014-33, *(July 2019)* and under Policy 3: Protect and enhance tranquillity and dark night skies, of the 2014-2019 SDNP Partnership Management Plan.

3.8 Through reference to the South Downs National Park Strategic Policy SD8: Dark Night Skies, the Dark Night Skies Policy Map identifies that the part of the Study Area within the South Downs National Park forms part of the Transition Zone (E1b). The 2km Buffer Zone, (E1a) is located just outside of the Study Area to the west, with the Dark Night Sky Core Area 2km beyond this.

Scheduled Monuments, Listed Buildings and Conservation Areas

3.9 Scheduled Monuments have statutory protection under the Ancient Monuments and Archaeological Areas Act 1979 as amended. Listed buildings and Conservation Areas have statutory protection under the Planning (Listed Buildings and Conservation Areas) Act 1990.

Scheduled Monuments

3.10 There are a number of Scheduled Monuments associated with the ridge line of the scarp face to the south of the Site dating from the Late Neolithic period to the Late Bronze Age. Principal among these is Chanctonbury Ring hillfort and Romano-Celtic temples, which is located some 1.5km to the south east of the Site.

3.11 The National Heritage List for England *(NHLE)* description includes the following reasons for designation and details for Chanctonbury Ring hillfort and Romano-Celtic temples:

*'**Reasons for Designation** - [...]. Romano-Celtic temples were built to meet the spiritual needs of the communities they served by venerating the god or spirit considered to dwell in a particular place. The temple building was regarded as the treasure house of its deity and priests rather than as a congregational building and any religious activities, including private worship, commumal gatherings, sanctuary and healing, took place outside. Romano-Celtic temples included the temple building and a surrounding sacred precinct or temenos which could be square, circular, rectangular or polygonal in ground plan. The temple building invariably faced due east and was the focus of the site, although it did not necessarily occupy the central position in the temenos.*

[...] Chanctonbury Ring hillfort and Romano-Celtic temples survive well, despite some disturbance by World War II activities and the action of tree roots, and part excavation has shown the monument to contain archaeological remains and environmental evidence relating to the ways in which it was constructed and used.

The monument forms part of a group of prehistoric, Roman and early medieval earthworks situated on Chanctonbury Hill, including two cross dykes and a number of round barrows and hlaews or Saxon barrows, which are the subjects of separate schedulings. The close association of these monuments will provide important evidence for the changing relationships between ceremonial and burial practices and land division in this area of downland over a period of c.1,500 years.

***Details** - The monument includes a slight univallate hillfort dating to the Early Iron Age, reused during the later Roman period as a temple precinct and situated towards the middle of a roughly west-east aligned chalk ridge forming part of the Sussex Downs. The hillfort and temple, which survive as earthworks and buried remains, enjoy extensive views towards the Channel coast c.8km to the south and the Weald to the north. The roughly circular hillfort defences enclose an area of c.1.5ha and are formed by a bank c.10m wide and up to c.0.8m high, surrounded by a ditch around 8m wide and c.0.7m deep.*

Subsequent quarrying and the siting of four anti-aircraft gun emplacements on the monument during World War II have caused some disturbance to the southern and south western ramparts. Investigations carried out in 1909 showed the bank to be constructed of dumped chalk rubble and flinty-clay excavated from the surrounding ditch. A simple 6m wide gap in the ramparts on the eastern side of the monument represents the original entrance. The analysis of pottery sherds found in the ditch and contemporary refuse pits uncovered by the 1909 excavations and during further investigations in 1977, 1989 and 1990, suggests that the hillfort was in use from the sixth to fourth centuries BC. [...]

After a period of abandonment between the mid- fourth century BC and the mid-first century AD, the hillfort ramparts were revamped and a revetment of regular chalk blocks was built along the inner side of the bank. The earlier fort was then reused as a temenos, or sacred precinct, within which at least two Romano-Celtic temples were constructed. These were discovered during the 1909 excavations, surviving mainly as buried wall footings of mortared flint rubble.

The centrally located main temple building was west-east aligned and had a rectangular central cella, or inner chamber, measuring c.9m by c.7m, surrounded to the west, north and east by an ambulatory, or enclosed covered walkway with a rammed chalk floor c.3m wide. The external face of the ambulatory wall was found to have been rendered with red plaster. The entrance to the building was on its eastern side, in line with the original gateway through the hillfort ramparts. Around 5m to the north east was a small NNE-SSW aligned rectangular structure measuring c.3m by c.1m with a door its NNE side, interpreted as an oven or furnace. Around 6m to the north east was a large circular rubbish pit c.3.5m in diameter. Finds associated with the temple include fragments of clay roof tile, window glass, oyster shells, pottery sherds and coins, which suggest that it was in use from the mid-first to late fourth centuries AD.

The second temple building was c.30m to the south west of the central temple and was also west-east aligned. Although much of the building material was removed after the temple had fallen out of use, the 1990 investigations indicated that it was polygonal in shape, with sides measuring c.8m. The temple had an attached rectangular annexe on its eastern side, with a tessellated floor of greensand cubes.

Quantities of bone fragments originating exclusively from the heads and jaws of pigs were found within the temple, suggesting that it may have been dedicated to a cult of the boar.

The monument is a well known local landscape feature, visible on the skyline as the site of a stand of beech trees first planted in 1760 by the then owner, Charles Goring. The trees have been continually replanted by the Goring family up to the present day. [...]'

3.12 The NHLE description includes the following details for the Cross dyke 420m west of Chanctonbury Ring hillfort, Scheduled Monument:

'[...] The monument includes a north-south aligned cross dyke which runs for c.106m across a chalk ridge which forms part of the Sussex Downs. The cross dyke has a ditch c.5m wide and c.0.7m deep, flanked on its eastern side by a bank c.7m wide. This survives to a height of c.0.5m. To the north, the earthworks fade out gradually as the ground slopes away, whilst the southern end is formed by a well-defined, rounded terminal. The cross dyke has been levelled near its centre and towards its southern end by two downland tracks which cross the monument, although the ditch will survive here in buried form. [...] A sherd of pottery found at the base of the bank indicated that the cross dyke may date to the Roman period (c.AD 43-450)..[...]'.

Listed Buildings

3.13 The Grade I Listed Buncton Chapel of All Saints is located within an enclosed situation some 1.7km to the east of the Site. The NHLE description provides the following details: '*Chancel and nave with bellcote. Nave and chancel arch Norman with remains of Norman arcading outside. Chancel C13.'*

3.14 The Grade II* Listed The Parish Church of St Mary is located within an enclosed situation some 700m south west of the Site. The NHLE description provides the following details: '*Tower C15. Otherwise largely rebuilt by Gordon Hills in 1866-7, except for the north arcade of the nave, which is C12.'*

3.15 There are a number of Grade II Listed Buildings within close proximity of all site boundaries, and further Grade II Listed Buildings dispersed within the surrounding Study Area, including a higher density within the Washington Conservation Area.

3.16 Sandhill Farmhouse is located some 80m west of the western Site boundary. The NHLE description provides the following details: ‘*Two parallel ranges. Front range C17. Two storeys. Three windows. Coursed stone. Tiled roof. Horizontally-sliding sash windows. Back range Cl8-19.'*

3.17 Green Farmhouse is located some 20m off the south eastern Site boundary within an inset area. The NHLE description provides the following details: ‘*Two parallel ranges. East range C18. Two storeys. Three windows. Ironstone with red brick dressings, quoins and, stringcourse. Tiled roof. Casement windows. West range C19 and tile-hung.’*

3.18 Rock Windmill is located some 30m off the north eastern Site boundary. The NHLE description provides the following details: ‘*Dated 1827. Mill of smock type converted into a house. Roundhouse painted brick, above tarred weather-boarding now covered with bitumastic. The roundhouse has been enlarged to serve as part of the dwelling. Octagonal pointed cap with wooden platform round it. Sweeps and fantail missing. Modern windows. No machinery inside. John Ireland, composer, formerly lived here.’*

3.19 Rock House is located some 125m off the north western edge of the Site. The NHLE description provides the following details: ‘*Early C19. Two storeys. Three windows. Stuccoed. Eaves cornice. Hipped slate roof. Altered casement windows. Good doorway with side lights flanked by narrow pilasters, semi-circular fanlight, flat hood on brackets and door of six fielded panels..’*

<u>Conservation Areas</u>

3.20 The Washington Conservation Area *(CA)* comprises the historical core of Washington village, which is located between 350m to 800m to the south west of the Site.

Sites of Special Scientific Interest

3.21 Sites of Special Scientific Interest *(SSSI)* are designated under the Wildlife and Countryside Act 1981 *(as amended)*, to notify an area of land of special interest by reason of any of its flora, fauna, or geological or physiographical features.

3.22 The Chanctonbury Hill SSSI is located some 1km to the south east of the Site upon the steeply inclined, wooded escarpment. The citation includes the following interest features:

'This site lies on the steep chalk escarpment of the South Downs and is dominated by a nationally uncommon woodland type. There are also areas of chalk grassland, another habitat that has a restricted distribution nationally. The site supports a rich community of breeding birds. [...]’

3.23 The Sullington Warren SSSI is located within the wider study area, north of the A283 some 3km to the north west of the Site. The citation for the SSSI identifies the following interest features: *‘a range of heathland habitats including both wet and dry heath, grassland, scrub and woodland. The woodland carries a rich community of breeding birds.’*

3.24 The Chantry Mill SSSI is located within the wider study area, south of the A283 some 3km to the west of the Site. The citation for the SSSI identifies the following interest features: *‘provides the best available exposure of the unusual “iron-grit” horizon which characterises the Gault/Folkestone Beds junction in this part of Sussex and which contrasts strongly with the type of transition seen between these formations elsewhere in south-east England.’*

Registered Common Land

3.25 The Commons Act 2006 protects Registered Common Land against encroachment and unauthorised development. The Countryside and Rights of Way Act 2000, *(CRoW Act)* gives the public right of access to land mapped as Registered Common Land. An area of Washington Common some 750m to the west of the Site is registered as Common Land No. CL258.

Regionally Important Geological and Geomorphological Sites

3.26 Regionally Important Geological and Geomorphological Sites *(RIGS)* is a non statutory designation which identifies the most important places for geology and geomorphology outside statutorily protected land such as Sites of Special Scientific Interest. The aim of RIGS is to recognise and protect important Earth science and landscape features for future generations to enjoy by drawing attention to the importance of the site and the value in protecting its future.

3.27 Within West Sussex, sites were identified by a panel working at the Booth Museum of Natural History in Brighton from 1993 to 2006. From 2011, the RIGS database has been managed by the Sussex Geodiversity Partnership, with site information being made available through the Internet, *(see https://geodiversitysussex.org.uk/)*

3.28 Rock Common Quarry is identified with Sussex RIGS No. TQ11/41, with following information against the RIGS Designation Criteria:

- *‘Stratigraphy: this quarry is in the Folkestone Beds of the Lower Greensand, and the Gault (which is not accessible), of the Lower Cretaceous. These sediments are interpreted as having been deposited within shallow seas, swept by strong tidal currents.*
- *Sedimentology: the sediments consist of poorly cemented sand; red, orange and yellow in colour; rich in quartz. There is an iron grit bed of ironstone.*
- *Sedimentary Structures: there are few bedding structures visible. There are scours (interpreted as reactivation surfaces) with cross sets, clay drapes and neap-spring bundles.*
- *Palaeontology: Skolithos burrows have been noted beneath scours. There are also Gault fossils.*
- *Educational value: this large quarry is approximately 500m by 250m and the exposures are up to 40m high, thus offering large clean exposures of Folkestone sand. The site is of importance for palaeoenvironmental studies.’*

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Legend

☐ Site Boundary.

▬ South Downs National Park, (*south of the dashed yellow line*).

🟩 Priority Habitat Inventory: Deciduous Woodland.

🟩 Priority Habitat Inventory: Traditional Orchard.

🟫 Lowland Calcareous Grassland Priority Habitat.

▨ Open Mosaic Habitats on Previously Developed Land Priority Habitat. (Draft)

Figure 3.2. Priority Habitat.

Ancient Woodland and Veteran Trees

3.29 Ancient Woodland, Ancient or veteran trees are recognised as a material consideration in the planning process by the National Planning Policy Framework, but do not have statutory protection.

3.30 Ancient Woodland is defined within the NPPF *(2019)* as: 'an area that has been wooded continuously since at least 1600 AD. It includes ancient semi-natural woodland and plantations on ancient woodland sites *(PAWS)'*.

3.31 Ancient or veteran trees are defined within the NPPF *(2019)* as: *'A tree which, because of its age, size and condition, is of exceptional biodiversity, cultural or heritage value. All ancient trees are veteran trees. Not all veteran trees are old enough to be ancient, but are old relative to other trees of the same species. Very few trees of any species reach the ancient life-stage.'*

3.32 There are veteran and notable trees identified within the Woodland Trust Ancient Tree Inventory within the surrounding area.

3.33 Much of the woodland along the scarp face of the South Downs, including Combe Holt and Planted Field, some 700m to the south of the Site are recognised as Ancient Woodland, within the Natural England Ancient Woodland Inventory, *(last updated 02 July 2020).*

Tree Preservation Orders

3.34 Tree Preservation Orders *(TPO)* are made under the Town and Country Planning Act 1990 and the Town and Country Planning *(Tree Preservation) (England)* Regulations 2012 by a local planning authority to protect trees which bring significant amenity benefit to the local area.

3.35 Through reference to the Horsham District Interactive Map *(accessed 28/08/2020)* the belt of woodland along the north western edge of the Site is subject to Area TPO No. 0204. This area is shown on **Figure 1.2**.

UK Habitat of Principal Importance

3.36 UK Priority Habitats are recognised as a material consideration in the planning process by the National Planning Policy Framework, but do not have statutory protection.

3.37 Through reference to **Figure 3.2**, there are patches of Natural Environment and Rural Communities Act *(2006)* Section 41 habitats of principal importance identified within Natural England's Priority Habitat Inventory.

3.38 There is a relatively substantial coverage of woodland within the immediately surrounding landscape, which is identified within Natural England's Priority Habitats Inventory v2.1 as UK Priority Habitat Deciduous Woodland. This includes small patches of woodland within the eastern edge of the Site, adjacent to Green Farm House, a belt which fringes the north western edge of the Site and the southern half of the Site north of The Hollow, about a pond. Two patches of Traditional Orchards are shown to the west of the A24, north west of the Site.

3.39 Good Quality Semi-Improved Grassland, *(Non Priority)* is shown extending across the quarry site and in more dispersed blocks within the surrounding Study area. Irregularly shaped patches of Lowland Calcareous Grassland Priority Habitat are dispersed across the downland to the south of the Study Area.

3.40 There is a draft allocation of Open Mosaic Habitats on Previously Developed Land, with low certainty of presence across the Site area and that of the former municipal landfills known as Windmill, the Rock and the Rough to the north east of the Site.

Sussex Biodiversity Opportunity Areas

3.41 Biodiversity Opportunity Areas *(BOA's)* are extensive areas where improved habitat management, as well as efforts to restore and re-create Priority Habitats are likely to be most effective in enabling recovery of Priority Species and Priority Habitats.

3.42 The Sussex Wildlife Trust identifies two separate BOAs within the Study Area. Through reference to **Figure 3.3**, the Lower Arun Watershed BOA, *(BOA 25)* is located across the Site, and extending to east and west, with the northern edge of the Site providing the northern boundary against which the northern part of the Study Area. The Central Downs Arun to Adur BOA, *(BOA 24)* extends along the lower and upper scarp face of the downs across the southern part of the Study Area, abutting BOA25 to the north.

3.43 The presence of the easterly extent of the Arun Watershed BOA is a misnomer due to the watercourses, prime amongst which is the Honeybridge Stream does not drain to the Arun, but to the River Adur.

3.44 The Lower Arun Watershed BOA is described as follows:

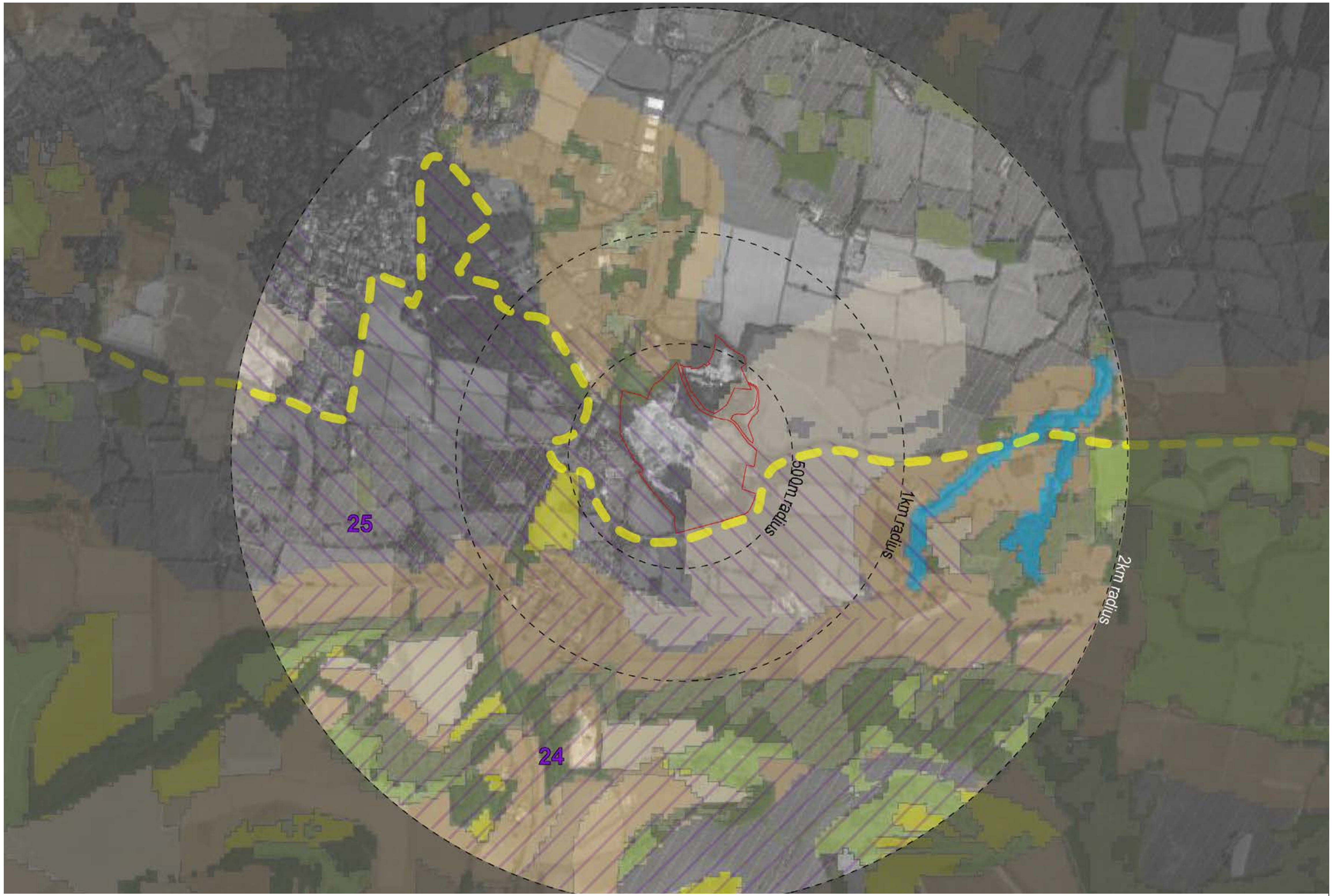
'This area at the foot of the South Downs is an important watershed between two Sussex catchments, the Adur and the Arun, and represents the chalk headstreams of the two catchments. The southern limit of this area is dictated by the edge of the chalk geology and the northern edge follows the conurbations of Storrington, Sullington and West Chiltington. The area has a mosaic of heathlands and woodlands, including Sullington Warren, and there is evidence that the heathy character was once more extensive. The watershed contains an area identified to be rich in arable plants.'

3.45 The following potential BAP habitat is identified for the Lower Arun Watershed BOA: *Lowland calcareous grassland; Lowland heathland; Lowland meadows; Reedbeds; Woodland.*

3.46 Cherry Laurel *(Prunus laurocerasus)* is identified among other non-native invasive species recorded within the last ten years.

3.47 Opportunities are identified including:

- *'Wetland habitat management;*
- *Restoration and creation;*
- *Heathland restoration;*
- *Ecological networks.'*



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Legend

- 🟥 Site Boundary.
- ▬ South Downs National Park, (*south of the dashed yellow line*).

National Habitat Network Types, *(2019).*

- 🟫 Network Enhancement Zone 1.
- ⬜ Network Expansion Zone.
- 🟨 Habitat Restoration-Creation.
- 🟩 Traditional Orchards.
- 🟩 PHI - Other.
- 🟩 Ancient Woodland.
- 🟩 Wood Pasture and Parkland.

Sussex Biodiversity Opportunity Areas.

- ▨ 25 Lower Arun Watershed BOA, *(BOA 25).*
- ▨ 24 Central Downs Arun to Adur BOA, *(BOA 24).*

Figure 3.3. National Habitat Networks (Natural England, 2019).

National Habitat Networks

3.48 The National Habitat Networks (England) dataset was published by Natural England on the 24 October 2019. This is described as:

'a spatial dataset that describes the geographic extent and location of Habitat Networks for 18 priority habitats based primarily, but not exclusively, on the priority habitat inventory (PHI v2.1) with additional data added in relation to habitat creation and potential areas for restoration. The maps are created following a standardised process that incorporates a range of data layers and identifies specific locations for a range of actions to help improve the ecological resilience for each of the habitats/habitat networks.'

3.49 Through reference to the Combined Habitats Networks Map User Guidance Document v.1:

'Natural England has sought to create a straightforward and repeatable method to produce habitat network maps that include components that address where there is potential to create or restore habitat and elements that help identify priorities for action. This project has developed National Habitat Network (NHN) maps for England based on the existing priority habitat inventories. The habitat network maps are intended to be used alongside other datasets and local knowledge, to plan future habitat creation and restoration at a landscape scale.'

3.50 Through reference to the Combined Habitats Networks Map User Guidance Document v.1, a single map was produced to combine the 18 individual priority habitat maps to help facilitate interpretation and understanding of how the individual networks operate together. The associated areas within the Study Area are described through reference to **Figure 3.3**.

3.51 The eastern part of the Site is identified as a Network Expansion Zone, which extends further to the north east and towards the scarp face of the downs to the south. Along the scarp face there is an area identified as a Network Enhancement Zone 1. A further belt of comparably identified landscape occurs from the north of the Site northwards.

3.52 Through reference to the Combined Habitats Networks Map User Guidance Document v.1, Network Enhancement Zone 1 is generically defined as:

'Land connecting existing patches of primary and associated habitats which is likely to be suitable for creation of the primary habitat. Factors affecting suitability include: proximity to primary habitat, land use (urban/rural), soil type, slope and proximity to coast. Action in this zone can help to expand and join up existing habitat patches and improve the connections between them.', (Ibid, p4)

4.0 METHODOLOGY

General

4.1 This assessment has been prepared with reference to the following guidance:

- *An approach to landscape sensitivity assessment – to inform spatial planning and land management. (Natural England, June 2019);*
- *Landscape Character Assessment - Guidance for England and Scotland (Scottish Natural Heritage and The Countryside Agency, 2002); An Approach to Landscape Character Assessment, (Natural England, 2014);*
- *Guidelines for Landscape and Visual Impact Assessment, Third Edition, published by the Institute of Environmental Management and Assessment and the Landscape Institute, 2013 (GLVIA3);*
- *Visual representation of development proposals, Technical Guidance Note 06/19, published by the Landscape Institute, 17 September 2019.*

4.2 In accordance with GLVIA3, the following distinct but inter-related assessments are undertaken:

- *Assessment of landscape character effects – assessing effects of the proposal on landscape as a resource through: 'changes to physical areas/features of the landscape and/or the aesthetic, perceptual and experiential characteristics that make different landscapes distinctive...;*
- *Assessment of visual amenity effects – assessing effects of the proposal on views available to people and their general visual amenity through: 'changes in the context and character of views as a result of the change or loss of existing elements of the landscape and/or the introduction of new elements'.*

The Study Area

4.3 The extent of the Wider Study Area is defined by the Scheme's Zone of Theoretical Visibility *(ZTV)*. The ZTV defines the potential visibility of the Scheme based on landform, determined during the desktop survey and analysis from reference to Ordnance Survey mapping and Google Earth Viewshed output. The ZTV is primarily used to identify viewpoints or areas to be visited during the field survey.

4.4 Through reference to the field survey and review of resulting photographs a Zone of Visual Influence *(ZVI)* is identified, which identifies the extent of land that is visually connected with the Site, viewed from the public realm, taking into account landform, vegetation, built structure and distance.

4.5 Viewpoints not considered to comprise any visibility towards the Site are scheduled within **Appendix H**, without any further assessment of impact. The Study Area is subsequently defined to enable a proportionate evaluation of likely effects on landscape and views.

Field Survey

4.6 The field survey work was carried out in clear weather conditions on the 16th and 19th June 2020, when vegetation was in leaf, followed up by a further site visit on the 1 October 2020, when vegetation was substantially in leaf.

Landscape Character

4.7 Existing landscape character assessments are reviewed to inform the baseline in advance of the field survey work. This informs the description of landscape character across the study area, which through reference to landscape planning designations provides the baseline of qualitative and quantitative information against which the potential landscape effects of the Scheme can be predicted.

4.8 Within this Study the term 'landscape' is synonymous with its definition within the European Landscape Convention as: *'An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'*. The Convention is very wide in scope and covers: *'natural, rural, urban and peri-urban areas, which include land, inland water and marine areas.'*

Visual Amenity

4.9 Viewpoints are selected to represent a range of potential visual effects which may occur from the proposed development and demonstrate long, medium and short distance views. Short distance views are categorised based on the viewpoint being within 500m of the Site, mid-distance, *(500m-1km)* or long-distance views, *(beyond 1km).*

4.10 Viewpoints are identified as either representative, illustrative or specific. Representative viewpoints are selected to best represent the nature of a view and where the effects are unlikely to differ across an area. Illustrative viewpoints are otherwise used to demonstrate an effect restricted to that particular location. Where a viewpoint is particularly noteworthy and sometimes promoted, associated with a designated landscape or feature, then this may be identified as a specific viewpoint.

4.11 The photographs have been taken using a Canon EOS 650D Digital SLR Camera with an 18-55m lens, which was manually set to the 35mm film camera equivalent focal length of 50mm, *(approximately 31mm at 1.6x conversion)* at each shot.

4.12 The viewpoint images, *(See **Appendix F**)* have been taken at approximately 1.7m above ground for consistency and in order to replicate the view an average sized person would experience in that location. The date, time, weather, lighting conditions and direction of view has been recorded including the approximate ground level and Ordnance Survey grid coordinates.

4.13 A series of single shot photographs have been composed to form panoramic photographs using the cylindrical projection function in Adobe Photoshop. The images are marginally cropped to remove white space from the surrounding edges, to enable the composition of the visual components to be clearly presented.

4.14 The viewpoint photographs are presented to be viewed upon an A3 size of paper *(420 x 297mm)*, held at arms length. Based upon variables introduced from differing arm length of between 300mm - 500mm, the resulting relative scale of visual components are presented to approximate with the extent of that visible to a viewer within the landscape.

Assessment Criteria

General

4.15 The framework shown in **Table 1** is used as a guide to inform the identification of adverse or beneficial effect thresholds from the differing combinations of levels of landscape and visual receptor sensitivity and magnitude of change:

Table 1 – Effect Thresholds Framework

Magnitude	**Sensitivity *(Nature of receptor)***		
	High	**Medium**	**Low**
High	Significant	Major	Moderate
Medium	Major	Moderate	Minor
Low	Moderate	Minor	Negligible

4.16 Note: **Table 1** is only a framework to aid consistency of reporting and provide an initial indication of the likely effect from a consideration of the nature of the receptor and the magnitude of change, undertaken as part of the assessment of effects. Note that the respective effects represent levels on a continuum or continuous graduation, requiring application of professional opinion to lead on the assessment of effect.

4.17 The following **Tables 2** and **3** are used to respectively inform consideration of value, and susceptibility:

Table 2 – Value Criteria

Value	**Criteria**
High	Area and/or features/or views with distinctive characteristics, in good condition with no potential for substitution. Strong sense of cohesion with no or few detracting features. These are likely to be, but not necessarily, within a National Park or Area of Outstanding Natural Beauty.
Medium	Area and/or features/or views with distinctive characteristics or association, in good condition, with limited potential for substitution. Sense of cohesion with few detracting features. These may be locally designated or recognised within district level landscape characterisation.
Low	Area and/or features/or views with typical characteristics, in good to moderate condition, with limited potential for substitution.
Very Low	Area and/or features/or views in fair to poor condition which have undergone change to the extent that they no longer have a distinctive local character or have become degraded.

Table 3 – Susceptibility Criteria

Susceptibility	**Criteria**
High	Area and/or features/or views considered resilient to relatively small changes.
Medium	Area and/or features/or views considered reasonably tolerant of change.
Low	Area and/or features/or views considered potentially tolerant of substantial change.

Landscape Impact Assessment

Nature of Landscape Receptors (Sensitivity)

4.18 Within The Guidelines for Landscape and Visual Impact Assessment *(GLVIA3)* Sensitivity is defined as: *'A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor', (p158).* It is recommended within GLVIA3, that the *'nature of receptor' should be used as shorthand in place of the term 'sensitivity', (p37).*

4.19 Landscape components against which the susceptibility of the landscape to the proposed development might be appraised are identified by LLD through reference to planning policy, designations, and landscape characterisation, including aspects such as scenic quality and tranquillity amongst other considerations, as relevant.

4.20 Reference is made to Box 5.1, *(p84, GLVIA3)* which provides a range of factors that can assist in the identification of valued landscapes as follows:

- *'**Landscape quality (condition)**: A measure of the physical state of the landscape. It may include the extent to which typical character is represented in individual areas, the intactness of the landscape and the condition of individual elements;*
- ***Scenic quality**: The term used to describe landscapes that appeal primarily to the senses (primarily but not wholly the visual senses);*
- ***Rarity**: The presence of rare elements or features in the landscape or the presence of a rare Landscape Character Type;*
- ***Representativeness**: Whether the landscape contains a particular character and / or features or elements which are considered particularly important examples;*
- ***Conservation interests**: The presence of features of wildlife; earth science; archaeological; historical or cultural interest can add to the value of the landscape as well as having value in their own right;*
- ***Recreation value**: Evidence that the landscape is valued for recreational activity where experience of the landscape is important;*
- ***Perceptual aspects**: A landscape may be valued for its perceptual qualities, notably wildness and / or tranquillity;*
- ***Associations**: Some landscapes are associated with particular people, such as artists or writers.'*

4.21 Regarding susceptibility of landscape receptors, GLVIA3 identifies that: *'Since landscape effects in LVIA are particular to both the specific landscape in question and the specific nature of the proposed development, the assessment of susceptibility must be tailored to the project. It should not be recorded as part of the landscape baseline but should be considered as part of the assessment of effects.' (p89).* Susceptibility is defined as: *'The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences', (GLVIA, p158).*

4.22 This definition is understood by LLD to comprise a consideration of the resilience, *(or capacity)* of the landscape component / area to the proposed change, taking into account the reversibility of the change, or whether the receptor could be easily recreated or substituted elsewhere. It would follow that the Sensitivity of the landscape receptor is Low, *(low susceptibility / high resilience)* if undue negative consequences were not likely. The opposite being that Sensitivity would be High if negative consequences were likely *(high susceptibility / low resilience to the Scenario / Scheme)*.

4.23 The allocation of sensitivity is subsequently defined through reference to **Table 4** in a progressive way through a process of firming up the value of the landscape receptors identified, and balancing a consideration of the susceptibility of these components to the specific proposals through retrospective consideration from a point where the magnitude of impact can be anticipated.

Table 4 - Landscape Sensitivity Criteria

Sensitivity	**Criteria**
High	Landscape area or feature of high - medium value, with limited potential to accommodate the proposal without Major-Moderate adverse effects. The Scheme would be out of scale / cause a noticeable deterioration to a landscape area / associated feature of recognised quality / scenic qualities.
Medium	Landscape area or feature of medium value, with some potential to accommodate the proposal with limited Moderate-Minor adverse effects resulting. The Scheme would not quite fit / cause a perceptible deterioration to a landscape area / associated feature which contributes to local landscape character
Low	Landscape area or feature of medium - low value, with potential to accommodate the proposal with limited Minor adverse effects resulting. The Scheme would complement the scale, landform and pattern of a landscape area or associated feature; maintain existing landscape quality.

Magnitude of Landscape Impact

4.24 Impacts are defined through considering the magnitude of change anticipated, taking into account size and scale, geographic extent, duration and reversibility.

4.25 The criteria in **Table 5** are used to identify magnitude of landscape change:

Table 5 – Magnitude of Landscape Change Criteria

Magnitude	**Criteria**
High	Notable change in key landscape characteristics and features over an extensive area ranging to a very intensive change over a more limited area.
Medium	Partial changes in key landscape characteristics and features over a wide area ranging to notable changes in a more limited area.
Low	Minor or virtually imperceptible change in any area of landscape characteristics and features.

4.26 The magnitude of change to landscape character depends upon the nature, scale and duration of change. Duration is judged on a scale as follows: short, *(0-5 Years)* medium, *(5-10 years)* and long, *(10-25 years).* The duration over which change is anticipated to differ is defined through reference to the timeframe within which mitigatory or enhancement planting might be considered.

4.27 Where primary mitigation this would form part of the Scheme. Where secondary this duration enables a consideration of how the magnitude of change would change as a result of recommended mitigation and enhancement.

Landscape Effect

4.28 Effects are defined as the consequences of impacts taking into account the nature of the landscape receptor and magnitude of change.

4.29 The criteria in **Table 6** are used to define the nature of the landscape effect:

Table 6 - Landscape Effect Criteria Definitions

Effect	**Definition**
Significant Major adverse	The proposed Scheme would result in effects that are at a complete variance with the landform, scale and pattern of the landscape; would permanently degrade, diminish or destroy the integrity of valued characteristic features, elements and/or their setting; would cause a very high quality landscape to be permanently changed and its quality diminished.
Major adverse	The proposed Scheme would result in effects that are at a considerable variance to the landscape scale, landform and pattern degrading the integrity of the landscape; would be substantially damaging to a high quality landscape.
Moderate adverse	The proposed Scheme would be out of scale with the landscape or at odds with the local pattern and landform; would be damaging to a landscape of recognised quality.
Minor adverse	The proposed Scheme would not quite fit into the landform and scale of the landscape; would affect an area of recognised landscape character.
Negligible	The proposed Scheme would complement the scale, landform and pattern of the landscape; maintain existing landscape quality.
Minor beneficial	The proposed Scheme has the potential to improve the landscape quality and character; fit in with the scale, landform and pattern of the landscape; enable the restoration of valued characteristic features partially lost through other land uses.
Moderate beneficial	The proposed Scheme would have the potential to fit very well with the landscape character; improve the quality of the landscape through removal of damage caused by existing land uses.

Visual Impact Assessment

4.30 The visual effect of any proposal depends on both the nature of the visual receptor and susceptibility to the magnitude of change anticipated.

Nature of Visual Amenity Receptor

4.31 The people whose visual amenity is defined are referred to as visual amenity receptors. Visual receptors are commonly grouped based on either the nature of the visibility which they are afforded towards the Site, which may be further subdivided based upon distance and orientation.

4.32 To enable a description of the nature of the visual amenity afforded to people, the nature of use and any values associated with the visual amenity are identified. This includes the identification of any landscape features within the view, which may emphasise the value associated with the features contribution to the views compositional balance.

4.33 The compositional balance of the view is initially described, taking into account considerations of form, scale, mass, line, height, colour and texture as appropriate, which is often defined by the association between horizontal elements such as the skyline and vertical elements such as tree groups and built form. The contribution or presence of elements associated with the Site are then described, to enable their present contribution to the view to be identified. Landscape quality, *(condition)* may also be identified as part of the description of the view, with susceptibility to change subsequently informed by this.

4.34 The following criteria in **Table 7** are used to identify the likely Sensitivity of visual receptors, albeit limited by the generic language within. As with Landscape Sensitivity, the allocation of Sensitivity is defined in a progressive way through a process of firming up the nature of the landscape receptors associated with or relevant to the Site, and balancing a consideration of the susceptibility of these components to the specific proposals through retrospective consideration from a point where the magnitude of impact can be anticipated on the character of the view:

Table 7 – Visual Sensitivity Criteria

Sensitivity	**Criteria**
High	Receptors experiencing views of high value importance and/or who will notice any change to visual amenity from the Scheme by reason of the nature of use and their expectations associated with that view. Such as those who are engaged in outdoor recreation, including users of public rights of way and visitors to heritage assets.
Medium	Receptors experiencing incidental views not critical to amenity and / or the nature of the view towards the Scheme is not a primary consideration of the users. Such as users of pavements and those engaged in sport or at work.
Low	Receptors where the changed view is unimportant / irrelevant and / or are not sensitive to change. Such as vehicular users on road, rail or other transport routes.

Magnitude of Visual Impact

4.35 The magnitude of change to visual amenity depends upon the size and scale, geographic extent, duration and reversibility of the proposed change.

4.36 Duration is judged on a scale as follows: short, *(0-5 Years)* medium, *(5-10 years)* and long, *(10-25 years).* This is based on the timeframe within which it is considered likely that any specific proposed tree and shrub planting would reach a satisfactory height and density to filter or reduce intervening views. The criteria in **Table 8** are used to identify magnitude of visual change:

Table 8 – Magnitude of Visual Change Criteria

Magnitude	**Criteria**
High	Where the proposed Scheme or elements of the Scheme will dominate the view and fundamentally change its composition in terms of form, scale and mass, line, height, colour and texture.
Medium	Where the proposed Scheme or elements of the Scheme will be noticeable in the view, affecting its composition in terms of form, scale and mass, line, height, colour and texture.
Low	Where the proposed Scheme or elements of the Scheme will be perceptible as a minor element within the composition, likely to be missed by the casual observer and/or scarcely appreciated.

Visual Amenity Effect

4.37 Whilst landscape value associated with the components of a view is taken into account within the visual amenity assessment, the focus is upon the overall pleasantness of the view in terms of the visual character and compositional balance.

4.38 The criteria in **Table 9** are used to define the nature of the visual effect:

Table 9 – Visual Effect Criteria Definitions

Effect	**Definition**
Significant adverse	Where the Scheme would cause a significant deterioration to the character of an existing promoted view.
Major adverse	Where the Scheme would cause a significant deterioration to the character of the existing view.
Moderate adverse	Where the Scheme would cause a noticeable deterioration to the character of the existing view.
Minor adverse	Where the Scheme would cause a barely perceptible deterioration to the character of the existing view.
Negligible	No discernible deterioration or improvement in the existing view.
Minor beneficial	Where the Scheme would cause a barely perceptible improvement to the character of the existing view.
Moderate beneficial	Where the Scheme would cause a noticeable improvement to the character of the existing view.

Cumulative Effects

4.39 Cumulative effects are considered where relevant, further to the assessment of landscape and visual effects.

4.40 Where relevant to the decision, approved and allocated development within the Study Area or where identified by the Regulatory Authority would be considered for potential inter-scheme cumulative landscape and visual effects.

4.41 Where appropriate the potential for intra-scheme cumulative effects would be considered, relative to the separate assessment by others of for example, ecological or heritage impacts.

5.0 EXISTING CONDITIONS - PUBLISHED EVIDENCE

Published Landscape Character Studies

5.1 A review of published Landscape Character Assessment information and relevant published evidence within the Study Area has been undertaken to provide an understanding of the landscape character context for the Study Area. This includes the following relevant documents:

- *National Character Areas (September 2014);*
- *West Sussex Landscape Sensitivity for Potential Mineral and Waste Sites (LUC, 2011);*
- *Landscape Character Assessment of West Sussex (2003 / Updated 15 January 2020);*
- *Local Distinctiveness Study of West Sussex (2003 / Updated 29 May 2019);*
- *Horsham District Landscape Character Assessment (CBA, October 2003);*
- *South Downs National Park Integrated Landscape Character Assessment (LUC for the South Downs Joint Committee, Updated 2020);*
- *The South Downs National Park: View Characterisation and Analysis Study (LUC, 2015);*
- *Sussex Historic Landscape Characterisation (Bannister, August 2010).*

5.2 The Horsham District Landscape Capacity Assessment *(HDC, April 2014)* has been scoped out from the review due to the absence of any characterisation within the Study Area.

Other Evidence

- *Wiston Whole Estate Plan 2017-2030, (Rural Solutions / Wiston Estate, 2017);*
- *South Downs National Park Tranquillity Study (2017) Relative Tranquillity Mapping (CPRE 2006 and SDNPA 2017 combined);*
- *Historic Mapping - Yeakell and Gardner (1778-1783) / Ordnance Survey (1879 / 1916 / 1961 / 1982 / 2020).*

National Character Areas, *(September 2014)*

5.3 The Sites are situated to the south of the Wealden Greensand National Character Area *(NCA 120)*, along the northern edge of the South Downs National Character Area *(NCA125)*.

5.4 NCA 125 is described as a: *'… 'whale-backed' spine of chalk stretching from the Hampshire Downs in the west to the coastal cliffs of Beachy Head in East Sussex.... a landscape of contrasts. Dramatic white chalk cliffs and downland create a sense of openness. Enclosure and remoteness can be found in woodland and even in close proximity to urban areas.'*

5.5 Landscape attributes of NCA 125 are identified to include:

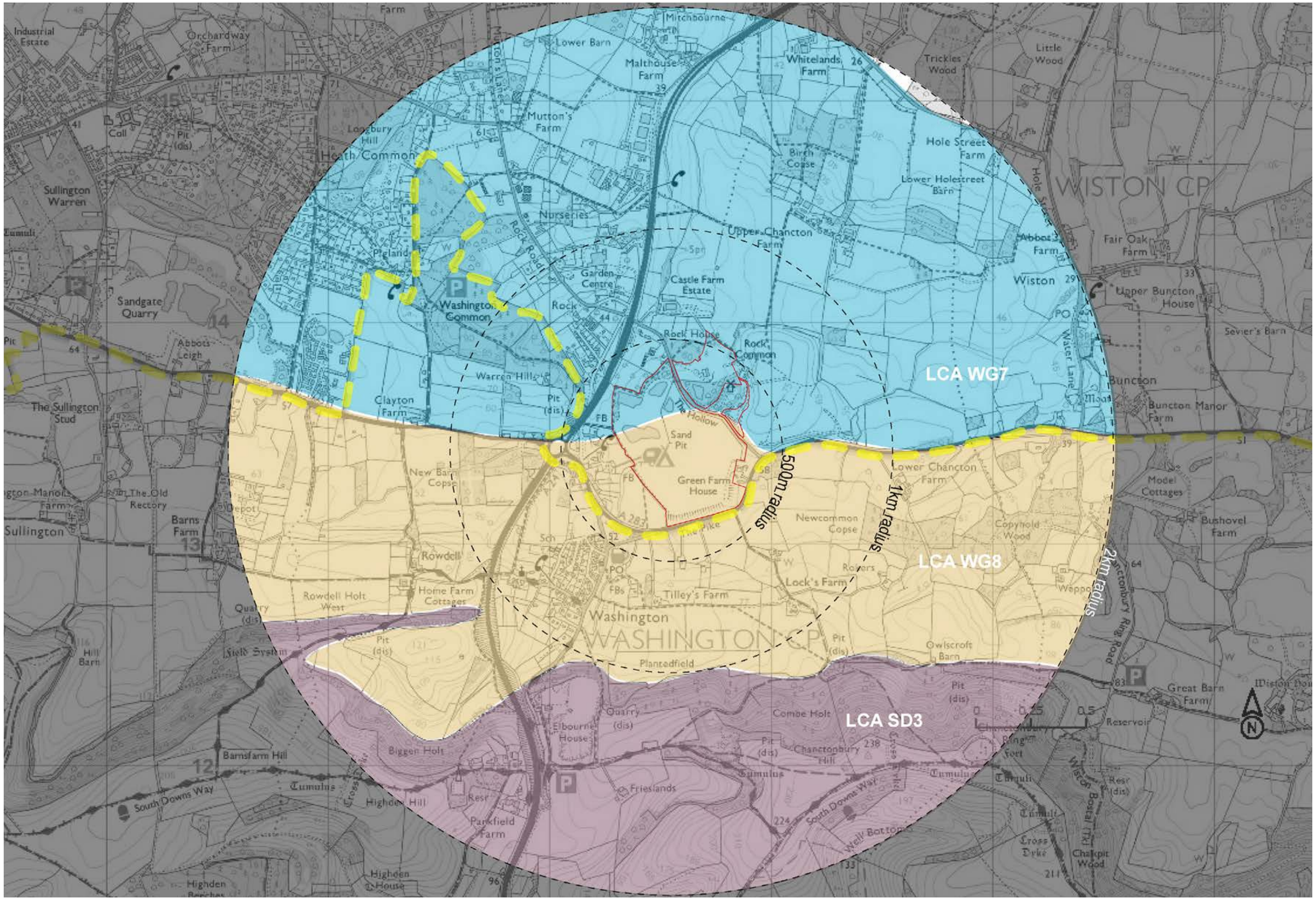
- *'A broad elevated east-west chalk ridge with a steep north-facing scarp slope and a gentle southerly dip slope, cut by numerous dry valleys and combes;*
- *[...] Large areas of ancient and broadleaved woodland within*
- *the western half of the NCA, and localised areas in the east;*
- *[...] Prominent and accessible heritage assets;*
- *[...] Drove roads and ancient routes along the accessible downland tops that provide rights of way and contribute to recreation.'*

5.6 Opportunities identified for NCA 125 include:

- *'[...] Conserve the tranquillity and special character of the chalk ridge, conserving the dispersed downland settlement pattern and traditional flint vernacular, as well as drove roads and ancient routes along the accessible downland tops that afford panoramic views over the downs and the Low Weald;*
- *Manage recreational pressures to protect historic rights of way and tranquillity.*
- *[...] Conserve distinctive earthwork features that include bronze-age barrows and iron-age hill forts, and restoring and managing historic estate and parkland landscapes that are a particular feature of the central downs;[...]'*

5.7 Regarding climate change within NCA125, the following are identified as drivers of change:

- *'Hotter, drier summers, changing precipitation patterns and extreme events such as flooding are likely to have the most significant impact upon the area, resulting in impacts on landscape character and a range of ecosystem services including water availability, food production, biodiversity, climate regulation and sense of place;*
- *Rivers, chalk streams and ponds may dry out due to drought and experience changes in flow. Combined with influx of large quantities of sediment this may lead to substantial changes in slope and channel morphologies. There is greater potential for drying out of winterbournes in their upper courses, with impacts upon associated wetlands;*
- *Increased erosion from heavy rain is likely to affect soils on the chalk ridges, valleys and combes. The chalk outcrops, cliffs and valleys will experience impacts on the geomorphological processes operating here;*
- *[...] Species-rich chalk grassland and associated rare chalk heath habitats may see changes in habitat and species composition with greater incidents of parching and effects of drought;*
- *The current condition and fragmentation of habitats make adaptation to climate change difficult for the species dependent upon them; species migration between habitat patches is limited by the distance and any barriers between them and loss of small or isolated habitats can lead to local extinctions of populations, notably in unimproved chalk grassland;*
- *Potential shifts northwards in species range, bringing new species into the NCA and potential losses of other species;*
- *Broadleaved and ancient woodland may see changes in composition of vegetation types and ground flora. Drought-sensitive species such as beech are particularly vulnerable and may be lost over time. This habitat may also be impacted by increased incidence of disease, disruption in synchronicity between species interactions, changes in range of current native species, new and increasing pest species, increased forest fires and loss of mature trees to wind blow;*
- *Loss of condition of designated sites and BAP habitat may also occur. Planting of non-native tree species may lead to decreases in condition and species composition of woodland; [...] (Ibid, p33)*



MAP DATA ©2019 GOOGLE. IMAGE CAPTURE: JUNE 2018, LANDSAT / COPERNICUS.

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Legend

☐ Site Boundary.

▬ ▬ South Downs National Park, (*south of the dashed yellow line*).

Landscape Character Assessment of West Sussex *(2003)*:

🟦 Storrington Woods and Heaths, *(LCA WG7)*.

🟨 Central Scarp Footslopes, *(LCA WG8)*.

🟪 Central Downs, *(LCA SD3)*.

Figure 5.1. West Sussex Landscape Character Areas (2003)

West Sussex Landscape Sensitivity for Potential Mineral and Waste Sites, *(LUC, 2011)*

5.8 The 2011 Study identifies that: *'For all Sites, the main aim of restoration should be to restore, enhance and improve the landscape pattern, visual amenity, and habitat value of the Site. Where possible, improved access and recreational opportunities should be sought as part of the process of restoration.'*

Landscape Character Assessment of West Sussex, *(2003 Updated 15 January 2020)*

5.9 In 2003, West Sussex County Council produced The West Sussex Landscape Character Assessment and Guidelines, which identified and described the various landscape character areas for the county of West Sussex, *(supported by A Strategy for the West Sussex Landscape, October 2005)*. The Landscape Assessment divided West Sussex into 42 Landscape Character Areas, *(LCAs)* which form the basis for the West Sussex Land Management Guidelines.

5.10 Through reference to **Figure 5.1** the Site is substantively located within the Central Scarp Footslopes, *(LCA WG8)* of the Wealden Greensand, which extends in a latitudinal strip to the north of the Central Downs, *(LCA SD3)* of the South Downs. The northern part of the Site is located within the Storrington Woods and Heaths, *(LCA WG7)* of the Wealden Greensand.

5.11 The Central Scarp Footslopes, *(LCA WG8)* is described as extending:

'[...] between Amberley and Steyning at the foot of the adjacent chalk escarpment. Its landscape often appears diminished and intricate in scale when set against the bold chalk ridge above. The field and vegetation patterns, lying over sandstone and clay, are complex. Large, straight-edged arable fields contrast with a pattern of smaller, irregular pastures and arable fields, and narrow linear woodlands near the streams, creating sudden transitions. The A24 trunk road crosses the area north to south and the A283 follows part of the northern boundary. Despite this, and the presence of the line of towns and villages of Amberley, Storrington, Washington and Steyning, much of the area retains a secluded and tranquil character..'

5.12 Land Management Guidelines are headlined with: *'Conserve and maintain the open character of the scarp footslopes and views to scarp slope'*. Additional guidelines include:

- *'Conserve the largely secluded, tranquil character of the area;*
- *Maintain the historic character of the area, including small-scale field patterns, historic parkland, sunken lanes and hedgebanks;*
- *Maintain and restore hedgerows, especially in arable farmland;*
- *Conserve and manage distinctive habitats including coppice woodlands, streamside woodlands, and vegetation around springs, ponds and small marshes;*
- *Restore linear woodland across arable farmland to link with existing woodlands;*
- *Aim to create good linkages via trees, woodland and hedgerows across land parcels;*
- *Encourage the planting of tree groups around farm buildings and single oak trees in arable fields;*
- *Encourage restoration of arable to pasture in areas with former parkland trees;*
- *Seek to reduce the extent, intensity and impact of horse-grazing;*
- *Conserve and enhance the character and setting of small villages and farmsteads;*
- *Consider the cumulative impact on landscape character of small developments and land use change. Avoid the introduction of suburban styles and materials;*
- *Ensure any new development is well integrated into the wider landscape. Use small woodland and new hedgerow planting as appropriate;*
- *Conserve, manage and restore the historic parkland landscapes at Wiston;*
- *Plant thick hedgerows, hedgerow trees and tree belts in the southern fringes of Storrington to screen the area and link up with hanger woodlands where appropriate;*
- *Manage road verges to promote nature conservation importance;*
- *Conserve and enhance rights of way network.'*

5.13 The Central Downs, *(LCA SD3)* is described as extending:

'[...] from the Arun Valley in the west to the Adur valley in the east. It is a distinctive landscape of exposed rolling chalk hills with a steep north facing escarpment and softer dip slope to the south.'

5.14 Land Management Guidelines are headlined with: *'Conserve and enhance the predominantly open and largely tranquil character of the area and its wide views.'* Additional guidelines include:

- *'Maintain the strong historic character of the area, including typical features such as archaeological monuments and their settings, ancient chalk tracks, windmills and dew ponds;*
- *[...] Conserve and enhance the experience of the South Downs Way long distance path and other rights of way. [...]'*

5.15 The Storrington Woods and Heaths, *(LCA WG7)* is described as extending:

'[...] between Fittleworth and Storrington in the middle of the County. It has a distinctive landform of low ridges alternating with shallow valleys, reflecting a complex geology of sandstone and clay. Heavily wooded ridges to the south are interspersed with small patches of heathland. [...]. Despite the presence of sand quarries, abandoned glasshouses, and surburban development at Storrington, Pulborough and West Chiltington, much of the area retains a predominantly undeveloped character.'

5.16 Land Management Guidelines are headlined with: *'Conserve the rich mosaic of woodland and heathland habitats, encouraging heathland landscape restoration and woodland management. Ensure that new development is well-integrated within the landscape.'* Additional guidelines include:

- *'Conserve, manage and link up existing heathland and woodland. Maintain and manage a varied heathland landscape including bare areas, woodland, scrub and wet heath;*
- *Maintain historic character, including patterns of small irregular fields and historic parks;*
- *Conserve and enhance the predominantly undeveloped character;*

- *Conserve the character of narrow sunken lanes;*
- *[...] Maintain and manage existing woodlands, heathlands, and streamside woodlands to create a mosaic of heathland habitats;*
- *Recreate heathland wherever possible, prioritising areas which will increase connectivity;*
- *Encourage woodland, tree belt, hedgerow and hedgerow tree planting in arable farmland and around urban and village edges, farm buildings, industrial sites and along major roads. Aim for a wooded network;*
- *Encourage woodland tree planting on the low Folkestone Sand ridge along the Storrington to Washington stretch of the A283;*
- *Ensure appropriate screening of all quarry works by planting, carried out in advance of quarrying wherever possible;*
- *Restore sand quarries to heathland habitats;*
- *Ensure that any improvements to the quarry roads are at a suitable scale to be well integrated into the ridge top viewpoints;*
- *Consider the cumulative impact on landscape character of small developments and land use change. Avoid the introduction of suburban styles and materials;*
- *Ensure any new development is well integrated into the wider landscape. Use woodland and hedgerow planting as appropriate.'*

Local Distinctiveness Study of West Sussex, *(2003 / Updated 29 May 2019)*

5.17 Produced to complement the West Sussex Landscape Character Assessment *(2003)*, the Distinctiveness Study provides guidelines for the West Sussex Landscape Character Types. However, these are less extensive than provided within the Landscape Character Assessment, *(2003).* Regarding the overall character of the Wealden Greensand, this is described as:

'essentially a medieval landscape with a small scale, intimate and mysterious character which is in striking contrast to the openness of the rolling chalk hills of the neighbouring South Downs. Its varied and complex landscape is comprised of a combination of clays, sand and sandstones which have produced an undulating topography of scarp and dip slopes, well wooded with ancient mixed woodland of oak, ash, hazel, field maple and birch.'

Horsham District Landscape Character Assessment, *(CBA, October 2003)*

5.18 The 2003 CBA Study identified 16 District Landscape Character Types *(LCT)*, with subsequent Landscape Character Areas *(LCA)* defined at a scale of 1:25000. The Horsham Characterisation is spatially in keeping with that undertaken within the Landscape Character Assessment of West Sussex *(2003)* as described above through reference to **Figure 5.1**.

5.19 Through reference to **Figure 5.2**, the Site is substantively located within the northern edge of the Amberley to Steyning Farmlands, *(LCA D1)* which extends in a latitudinal strip, as shown on **Figure 5.2**. Further Horsham LCA to the south are not described or shown, due to their being superseded by the SDNP Landscape Characterisation, *(2011).*

5.20 The northern part of the Site is located within the Parham & Storrington Wooded Farmlands and Heaths, *(LCA E1)* of the Pasture/Woodland and Heath Mosaic LCT, which extends to the north west. The Pulborough, Chiltington & Thakeham Farmlands, *(LCA F1)* is located offset to the north, with the Broadford Bridge to Ashington Farmlands, *(LCA J2)* beyond.

Amberley to Steyning Farmlands (LCA D1)

5.21 Key characteristics identified for the Amberley to Steyning Farmland LCA D1 comprise:

- *'Rolling landscape of the low ridges of the upper greensand, and the narrow vale of gault clay;*
- *Overlooked by the chalk escarpment to the south;*
- *Varied patchwork of arable and pasture farmland, with fields of irregular shapes and sizes;*
- *Small north flowing streams in steep narrow valleys;*
- *Sunken lanes with high hedgebanks;*
- *Small springline settlements and farmsteads dispersed along the edge of the greensand ridge;*
- *...Mix of local building materials, including brick and flint, sandstone and thatch.'*

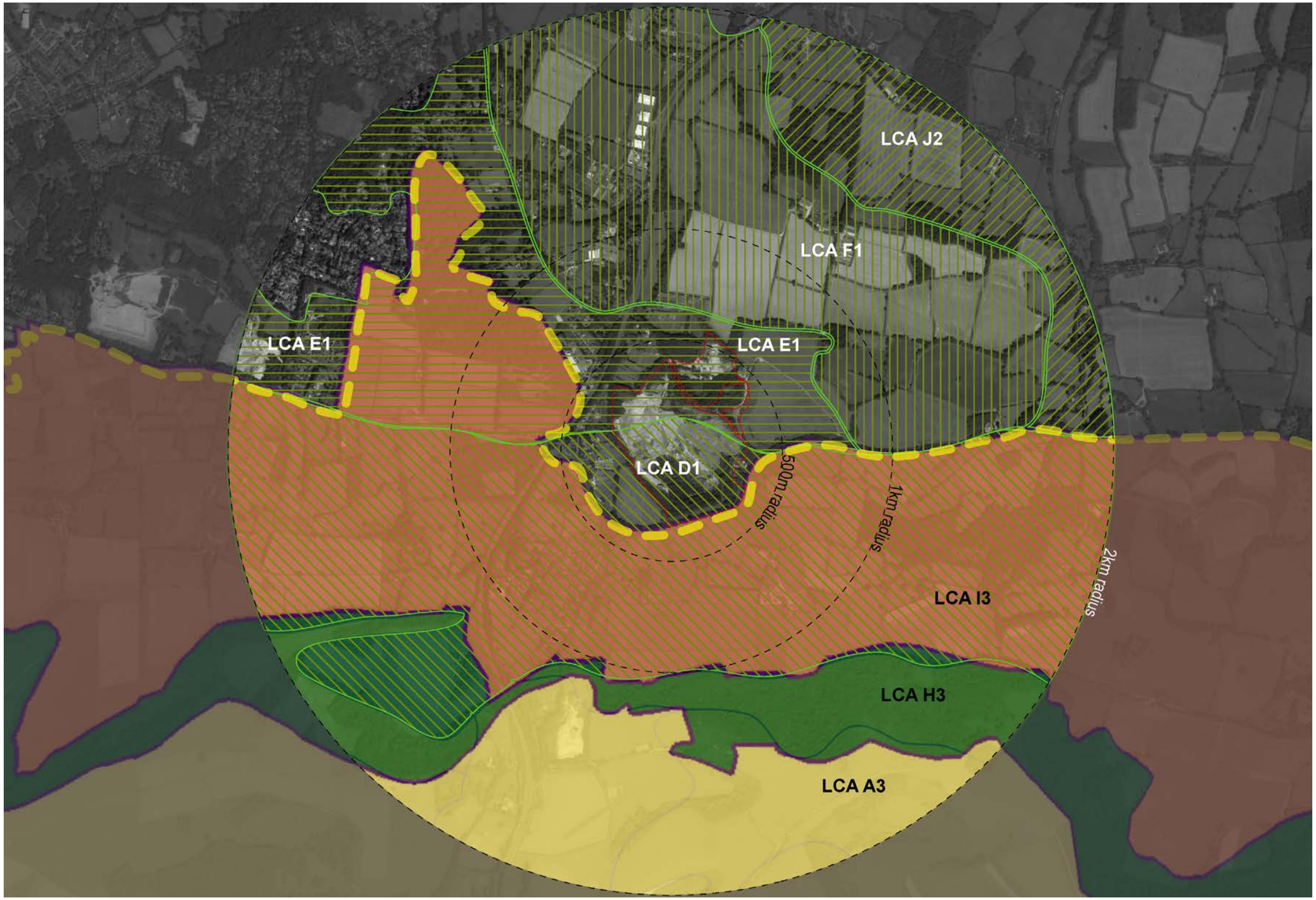
5.22 Key issues for LCA D1 are identified including:

- *'Past and continuing loss of hedgerows in arable farmland;*
- *Decline in condition of hedgerow oaks;*
- *Localised expansion of horse grazing paddocks;*
- *Localised visual and noise intrusion from A283 and A24 truncated, and from small scale industrial sites near Storrington;*
- *Some visual intrusion from urban edges of Storrington;*
- *Potential development pressures on the edge of Storrington and Steyning;*
- *Intrusive modern farm buildings.'*

5.23 Landscape condition for LCA D1 is described as declining overall, due to the: *'openness and prominence of the greensand ridge at the foot of the scarp and due to the vulnerability of small scale historic field patterns in the gault clay vale.'*

5.24 Planning and Landscape Management Guidelines are identified including:

- *'Conserve the rural undeveloped character. Large scale housing and industrial development or cumulative small scale change could substantially damage its character...;*
- *Ensure any appropriate new development responds to the historic settlement pattern of the area and traditional local materials and design;*
- *Conserve and manage the distinctive character of the sunken lanes and their hedgebanks;*
- *Conserve important views from the gault clay vale to historic farmsteads on the greensand ridge e.g. at Sullington;*
- *Conserve and restore the existing hedgerows network. Priorities for restoration of hedgerows are within areas of arable farmland;*
- *Encourage the planting of new small woods, copses in the narrow gault clay vale, as well as the edges of Storrington...;*
- *Encourage planting of irregularly spaced native tree groups around farm buildings...'*



MAP DATA ©2020 GOOGLE. IMAGERY: LANDSAT / COPERNICUS. DATE: JUNE 2018. SOUTH DOWNS LANDSCAPE CHARACTER AREAS KML LAYER SHOWN.

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Legend

▭ Site Boundary.

▬ South Downs National Park, (*south of the dashed yellow line*).

Horsham District Landscape Character Assessment *(CBA, 2003)*:

▤ LCA E1 - Parham & Storrington Wooded Farmlands and Heaths.

▧ LCA D1 - Amberley to Steyning Farmlands.

▥ LCA F1 - Pulborough, Chiltington & Thakeham Farmlands.

▨ LCA J2 - Broadford Bridge to Ashington Farmlands.

South Downs National Park Integrated Landscape Character Assessment *(2011)*:

🟧 LCA I3 - Arun to Adur Scarp Footslopes.

🟩 LCA H3 - Arun to Adur Downs Scarp.

🟨 LCA A3 - Arun to Adur Open Downs.

Figure 5.2. Landscape Character Areas (SDNPA and Horsham)

<u>*Parham & Storrington Wooded Farmlands and Heaths (LCA E1)*</u>

5.25 Key characteristics identified for LCA E1 comprise:

- *'Rolling landform of sandy ridges cut by small narrow stream valleys;*
- *Extensive pine and oak-birch woodland. Linear streamside woods. Samll areas of heathland, such as at Sullington Warren Golf Course;*
- *Small, mostly well hedged pasture fields with mature hedgerow oaks;*
- *Historic parkland of Parham Park with distinctive tree clumps, groves and extensive tree belts;*
- *Major areas of sand and gravel extraction at Sandgate Park and Rock Common;*
- *Scattered farmsteads and cottages along roads. Traditional local materials of sandstone, half timber and plasterand brick.*

5.26 Key issues for LCA E1 are identified including: *'Possible urban development pressures...Visual intrusion of large scale sand and gravel extraction'*. Landscape condition for LCA E1 is described as good overall, but with: *'localised areas of poor or declining condition around Storrington. e.g. associated with sand and gravel extraction.'*

5.27 Overall sensitivity to change for LCA E1 is described as high due to: *'the areas many intrinsic landscape qualities and its general visibility from the chalk escarpment to the south.'*

5.28 Planning and Landscape Management Guidelines for LCA E1 are identified including:

- *'Conserve the undeveloped, rural tranquil character. Any large scale development e.g. housing that results in the loss of small scale field patterns and woodlands would damage character;*
- *Ensure any small scale housing development on the edge of Storrington responds to traditional settlement patterns and local design and materials;*
- *Promote the restoration of sand extraction sites to heathland...;*
- *...establishment of community woodlands near to urban edges;*
- *Conserve and manage the existing hedgerow network to maintain small scale field patterns.'*

<u>*Pulborough, Chiltington and Thakeham Farnlands, (LCA F1)*</u>

5.29 Key characteristics identified for LCA F1 comprise: '

Undulating sandstone ridge; Partly wooded low scarp; Extensive arable and some horticultural land use with glasshouses and mushroom farms; Small orchards and vineyards; Leafy sunken lanes with sandstone exposures; Small historic villages built of sandstone and half timber such as West Chiltington and Thakeham; Scattered small cottages and farmsteads mainly along lanes.'

5.30 Historic features are identified comprising of: *'Straight field boundaries indicating mainly late enclosure; Droveways.'*

5.31 Landscape condition for LCA F1 is described as declining due to loss of hedgerows. Overall sensitivity to change for LCA F1 is described as moderate due to: *'moderate intervisibility and moderate intrinsic landscape qualities. However, the visually prominent northern escarpment, areas with a stronger existing network of hedgerows, and the sunken lanes have a high sensitivity to change.'*

5.32 Planning and Landscape Management Guidelines for LCA F1 are identified including:

- *'Conserve the character of the leafy sunken lanes of the area.*
- *[...] Conserve and manage the existing hedgerow pattern.*
- *Restore hedgerows and plant new hedgerow trees, particularly in areas of arable farmland.*
- *[...] Extend existing woodlands and establish new ones.*
- *[...] Encourage the planting of new orchards.'*

South Downs National Park Integrated Landscape Character Assessment, *(LUC, Updated 2020)*

5.33 Through reference to **Figure 5.2**, the Site abuts the northern edge of the Arun to Adur Scarp Footslopes Landscape Character Area, *(LCA I3)* of the Scarp Footslope Landscape Character Type, which continues at an offset to the east, south and west of the Site.

5.34 Further to the south, character areas are defined by the steep scarp face of the chalk downs and the undulating downland beyond. These areas are respectively defined as the Arun to Adur Major Scarp, *(LCA H3)* of the Major Scarps LCT and the Arun to Adur Open Downland, *(LCA A3)* of the Open Downland LCT beyond.

<u>*Arun to Adur Scarp Footslopes (LCA I3)*</u>

5.35 Integrated key characteristics identified for LCA I3 comprise:

- *'Complex geology comprising bands of chalk, mudstones and sandstones giving rise to a locally undulating lowland landscape at the foot of the northern scarp of the Arun to Adur Downs;*
- *Large, fertile straight-sided arable fields on the Lower Chalk geology at the foot of the scarp, enclosed in the 20th century from open fields and earlier piecemeal enclosures;*
- *Small irregular fields of pasture on the less productive clay soils, which originated as woodland assarts, represent a largely intact late medieval landscape;*
- *Hedgerows with mature hedgerow oaks link closely with the woodland, forming an interlocking network that is of high biodiversity value as well as creating a sense of seclusion and enclosure;*
- *Sandstone outcrops give rise to locally sandy soils which support areas of acid grassland, bracken, gorse, woody scrub, and oak-birch woodland;*
- *Streams, arising from springs at the foot of the Chalk/Upper Greensand flow northwards in narrow, hidden stream valleys, some enshrouded in woodland. Field ponds, mill ponds and designed ponds are common features of the clay;*

- *Villages located on the springline, e.g. Washington, are linked by the A283, which coincides largely with the character area boundary. The steep chalk scarp forms a dramatic backdrop to villages at the scarp foot;*
- *Landscape parks such as Parham are located on the less fertile Gault Clay and Lower Greensand. These add diversity and 'time depth' to the landscape;*
- *A network of public rights of way provides opportunities for countryside access;*
- *The scarp footslopes are visually dominated by the steep chalk scarp to the south, which forms a backdrop to views. Impressive panoramic views from adjacent scarp and downs reveal a pleasingly balanced woodland and farmland mosaic.'*

5.36 Perceptual aspects of the Scarp Footslope Landscape Character Type are described to include a sense of unity resulting from the *'balanced mosaic of arable, pasture and woodland ...as viewed from the adjacent scarp and downs to the south. The interlocking network of woodland, intact hedgerows and hedgerow trees creates a sense of seclusion and enclosure.'*

5.37 Sensitivities identified for LCA I3, including those generically identified for the wider landscape type include:

- *'The intact medieval landscape on the clay, particularly the fields originating as woodland assarts;*
- *The historic picturesque parkland landscapes such as Parham. [...]*
- *The pattern of small irregular fields of pasture and meadow which represent a largely intact late medieval landscape, are of biodiversity value, and would be vulnerable to field expansion or boundary loss;*
- *Intact network of hedgerows, hedgerow oaks, and woodland, which creates a sense of seclusion and enclosure as well as being of high biodiversity value;*
- *Hidden stream valleys and stream side woodland that form important visual and biodiversity features and would be vulnerable to lowering of the water table;*
- *Field ponds, mill ponds and designed ponds which are important visual features and would be vulnerable to lowering of the water table;*
- *Picturesque, nucleated villages exhibiting a consistent palette of building materials (a mixture of flint, brick, rendering and half timber, with clay tile roofs) which provides unity. These could be vulnerable to insensitive, or excessive, built development;*
- *The deeply rural character and intact visual structure of the area which could be vulnerable to the cumulative effect of many piecemeal changes;*
- *Underhill lanes and bostal tracks, often surviving as rough tracks and public rights of way, indicating the course of ancient coaching lanes and droveways. These may be vulnerable to erosion as a result of recreational pressure and particularly from off-road vehicles.'*

5.38 Past change identified for LCA I3, including that generically identified for the wider landscape type includes:

- *'Modern development on the edges of rural villages and introduction of 'suburban' features into the rural landscape including use of exotic tree and shrub species in the past 70 years;*
- *Amalgamation of small fields and hedgerow loss over the past 70 years;*
- *The development of golf courses, reservoirs, and pylons in the 20th century;*
- *...A recent increase in fields used as paddocks resulting in changes in field boundaries and poor quality pasture;*
- *…20th century quarrying of sand (just outside the study area boundary).'*

5.39 Landscape management and development considerations for LCA I3, including those generically identified for the wider landscape type are identified to include:

- *'Consider new woodland planting in more open areas to promote a balance farmland and woodland mosaic. However, avoid harsh woodland edges which are visually intrusive on the lower scarp slopes;*
- *Monitor water flows in the streams and conserve and manage sinuous, linear streamside woodlands and copses, placing emphasis on planting of wetland species;*
- *Conserve the nucleated form of springline villages and limit development along the underhill road that links villages at the foot of the scarp;*
- *Conserve the rural setting to villages - consider using woodland or tree planting to screen development on the edge of villages. In particular conserve the striking undeveloped scarp backdrop to the springline villages;*
- *...Maintain the consistent range of building materials (a mixture of flint, brick, sandstone, clunch, rendering and half timber, with clay tile roofs) which gives the villages a distinctive character;*
- *Take account of views from the adjacent scarps and downs to the south in relation to any change;*
- *Use broadleaved woodland planting to screen built development and quarries.'*

Arun to Adur Major Scarp (LCA H3)

5.40 Relevant characteristics identified for LCA H3, including those generically identified for the wider landscape type include:

- *'A linear landscape forming the northern and eastern edge of the chalk - deeply indented winding belt, with a steep scarp faces and a high prominent ridgeline creating a strong skyline, although this is softened in areas of woodland cover;*
- *Occurs along the full length of the South Downs from the distinctive chalk hangers in Hampshire (Selborne) to meet the sea at the dramatic white cliffs of Beachy Head;*
- *Remarkably consistent in height and slope profile throughout its length as a result of the lithological uniformity of the chalk bedrock;*
- *From open summits there are panoramic views across the lowlands to the north. The scarp forms a distinctive backdrop ridgeline in views from this area – a symbolic feature of the South Downs;*
- *Precipitous upper slopes are grazed grassland, scrub or clothed in dense woodland 'hangers' - mixed farmland extends onto the shallower lower slopes in places;*
- *The scarp contains some of the most extensive areas of chalk grassland habitat within the South Downs;*
- *Notable for the absence of buildings on the slope itself;*

- *Deeply sunken lanes and tracks, known as bostal tracks, cut the escarpment and link the lower land to the chalk uplands. Some 'gaps' cut by valleys form important communication routes;*
- *Large number of recreational sites – frequently associated with hilltop historic monuments or panoramic viewpoints, plus areas of open access land (on chalk grassland);*
- *Occasionally marked by chalk pits on the scarp slopes and masts along the crest which are highly prominent in views.*

5.41 Perceptual aspects of the Major Scarps Landscape Character Type are described to include a unified and harmonious landscape with a muted 'natural' character, where the: *'dramatic scale of the landform and the large swathes of chalk grassland and woodland create a large scale exposed landscape which is dominant in views from an extensive area beyond the South Downs.'*

5.42 Sensitivities identified for LCA H3, including those generically identified for the wider landscape type include:

- *'The open and undeveloped skylines which are highly visible and particularly sensitive to any form of built development or vertical structures such as telecommunication masts, power lines and wind turbines;*
- *The extensive views from the scarps, across adjacent landscape such as the Low Weald, that are vulnerable to change (development, lighting etc) which would affect the special remote character of the scarps;*
- *...The scrub and hanger woodland on the scarps which provide texture, create dramatic shadows, and are of great biodiversity interest...;*
- *The subtle presence of rough sheep tracks and rights of way that zig zag across the open scarps, often representing historic 'bostals', the routes by which sheep were herded between the downland pastures and the scarpfoot arable fields. These are vulnerable to damage by intensive recreational use, notably off road vehicles;*
- *The sense of tranquillity, remoteness and space that results from the overall low incidence of human activity and absence of development;*
- *The steep scarps are extremely prominent in views from adjacent landscapes making them very visually sensitive. Of particular sensitivity is the skyline of the scarp which is most often viewed in against an open sky.*

5.43 Landscape management and development considerations for LCA H3, including those generically identified for the wider landscape type are identified to include: *'Consider the impact of any change (development) in views from the scarp.'*

The South Downs National Park: View Characterisation and Analysis Study, *(LUC, 2015)*

5.44 As a response to the South Downs National Park Authority proposed Strategic Policy SD6: Safeguarding Views, the 2015 study also referred to as the 'SDNP Viewshed Study', identifies the following relevant view types that reflect the special qualities of the National Park: *'Views from the scarp looking north across the Low Weald outside the national park; Views towards the strongly sculptural landform'.*

Views From The Scarp Looking North Across The Low Weald Outside The National Park

5.45 For *'Views from the scarp looking north across the Low Weald outside the national park*', the elevated position on the scarp means this view type represents the stunning panoramic views that are recognised as contributing to the Park's special qualities. The viewtype also reveals the tranquillity of the downs as a result of the lack of intrusive development and sense of space.

5.46 Threats for this view type include: *'changes that affect the iconic habitats of the scarp, disrupt or alter the scale and shape of field patterns, change the distinctive settlement pattern of small historic villages, or form intrusive new developments within the view either by day or night.'*

5.47 Relevant aim and management guidance for this view type includes: '*The relevant aim and management guidance for this view type includes ensuring that any built development is integrated into its rural landscape context using native vegetation such that visibility from the national park is minimised.'*

5.48 The South Downs National Park Authority has identified representative viewpoints within the wider Study Area from No.34 Sullington Hill and No.33 Chantry Hill, located respectively some 3km and 4km to the south west of the Site.

5.49 Representative viewpoint No.33 Chantry Hill is described as '*providing a good vantage point, from which to enjoy panoramic views over the scarp footslopes and the Low Weald. It is noted in the SDILCA as representing views from the Arun to Adur Downs Scarp.*'

5.50 Representative viewpoint No.34 Sullington Hill is described as '*another good vantage point from which to experience panoramic views over the scarp footslopes and the Low Weald, and view the scarp and is noted in the SDILCA as representing views from the Arun to Adur Downs Scarp*'.

Views Towards The Strongly Sculptural Landform

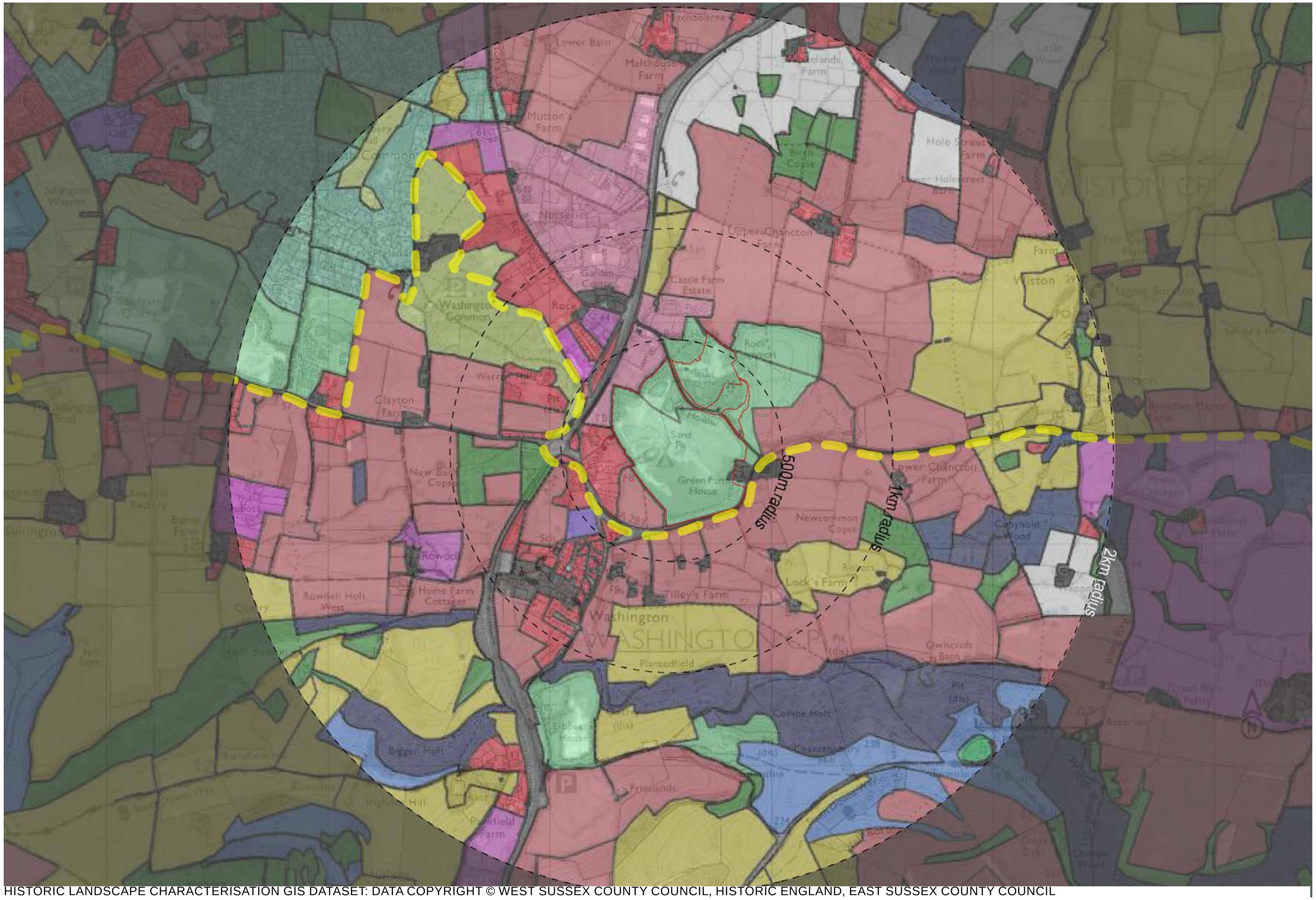
5.51 For *'Views towards the strongly sculptural landform', the strongly sculptural chalk ridge is the key feature and the South Downs is perceived as an undeveloped 'island' within a busier surrounding landscape.'* Special qualities of this view type are: *'the undeveloped and unspoilt nature of the South Downs National Park (the third of the Park's special qualities).'* The aim and management guidance for this view type is to: *'...Maintain the ability to access and appreciate long distance views of the skyline of the South Downs...'* There are no representative viewpoints identified in this location for this view type.

Views of Specific Landmarks

5.52 Chanctonbury Ring is identified as a Landmark *(L9)*. An example of a view towards Chanctonbury Ring is provided as Viewpoint No.23, which is located atop the crest of the escarpment along the South Downs Way Long Distance Footpath, some 400m west of Chanctonbury Ring, from which there is no visibility to the Site.

5.53 Special Qualities of this view type are identified as follows:

'This view type reveals landmarks which are often well-conserved historical features that reveal the rich cultural heritage of the Downs. These features contribute the special qualities of the Park...



HISTORIC LANDSCAPE CHARACTERISATION GIS DATASET: DATA COPYRIGHT © WEST SUSSEX COUNTY COUNCIL, HISTORIC ENGLAND, EAST SUSSEX COUNTY COUNCIL
© OPENSTREETMAP CONTRIBUTORS, SRTM | MAP STYLE: © OPENTOPOMAP (CC-BY-SA).

1:20,000 at A3

N

Legend

☐ Site Boundary.

▬ ▬ South Downs National Park, (*south of the dashed yellow line*).

Sussex Historic Landscape Character (Broad Type / HLC Type (summary))

🟩 Industry / Extraction, (*Extraction - sand).*

🟫 Fieldscapes / Formal Enclosure (*planned / private*).

🟨 Fieldscapes / Informal Fieldscapes; *(modern field amalgamation / isolated enclosure). Unenclosed - Wooded Over common.*

🟪 Horticulture / Nursery *(s)* with Greenhouse *(s).*

⬛ Settlement / Historic core, *(Hamlet)* / Historic dispersed *(Large Farmstead / Common edge settlement).*

🟥 Settlement / Expansion - other.

🟪 Designed Landscape; *(Large landscaped garden).*

🟩 Woodland - Regenerated / Plantations.

⬛ Woodland / Ancient Semi-Natural Woodland;

🟪 Recreation / Sports Fields.

Figure 5.3. Sussex Historic Landscape Character Types (Bannister, 2010)

...This view type often also reveals many of the other special qualities of the South Downs, such as a rich variety of wildlife and habitats (including some of the iconic habitats of the South Downs), a sense of tranquillity, 'unspoilt' landscapes that lack intrusive development, a long history of farming, and picturesque villages..'

5.54 Threats for this view type include: *'changes that affect the ability to see and appreciate the landmarks in these views, or changes that affect the rural setting to the landmarks.'*

5.55 Relevant aim and management guidance for this view type includes:

'Maintain the ability to see and appreciate landmarks in their rural landscape setting; maintain the landmarks as prominent features of views across the Park (and ensure new elements do not compete for prominence); maintain the ability to understand and appreciate landmarks...'

Sussex Historic Landscape Characterisation, *(Bannister, August 2010)*

5.56 The Sussex Historic Landscape Characterisation *(2010)* comprises a GIS data set together with a set of supporting reports and technical guides. The data provides a broad-brush approach to interpreting the historic time-depth of areas, which was based on a desk-based exercise with no checking in the field.

5.57 Historic Landscape Character Types *(HLC)* identified across the Study Area are shown within **Figure 5.3**. This shows that the Site area and that to the north east falls within the Broad Historic Landscape Type of: *'Industry'* and HLC Type of: *'Extraction'*. A summary description is provided with certain confidence of: *'Extraction - sand'*.

5.58 Fieldscapes resulting from planned, private formal enclosure enclose this area from north east to south west, forming part of the dominant historic landscape type within the Study Area, albeit well fractured and interspersed with Informal fieldscapes resulting from both isolated enclosure and modern field amalgamation.

5.59 To the north west of the Site is an area defined as resulting from Horticulture, Nurseries with Greenhouses. This area extends to the north west beyond the A24, where there are areas of historic, dispersed, common edge settlement and a small parcel of designed landscape, comprising of a large landscaped garden. An unimproved/unenclosed wooded over common occurs adjacent.

5.60 To the south west of the Site is an area of Settlement expansion, with an area of Sports Fields. Inset to the south east of the Site is an area of historic dispersed settlement, resulting from a large farmstead, with further patches of this type offset to the south. To the south west of the Study Area is an area characterised as the historic core of settlement, resulting from a hamlet from the Early Medieval / Dark Ages.

5.61 Patches of regenerated or plantation woodland occurs within the surrounding area, whilst a belt of Ancient semi-natural, assarted woodland extends along the steep escarpment to the south.

Wiston Whole Estate Plan 2017-2030, *(Rural Solutions / Wiston Estate, 2017)*

5.62 The Wiston Whole Estate Plan 2017-2030 was approved by the South Downs National Park Authority's Policy and Resource Committee on 20 July 2017. As such the Plan is a material consideration in determining planning applications, described by the SDNPa as providing a contextual background to any development proposals.

5.63 Regarding the environment, likes *(or strengths)* are identified within the Estate Plan, *(2017)* including:

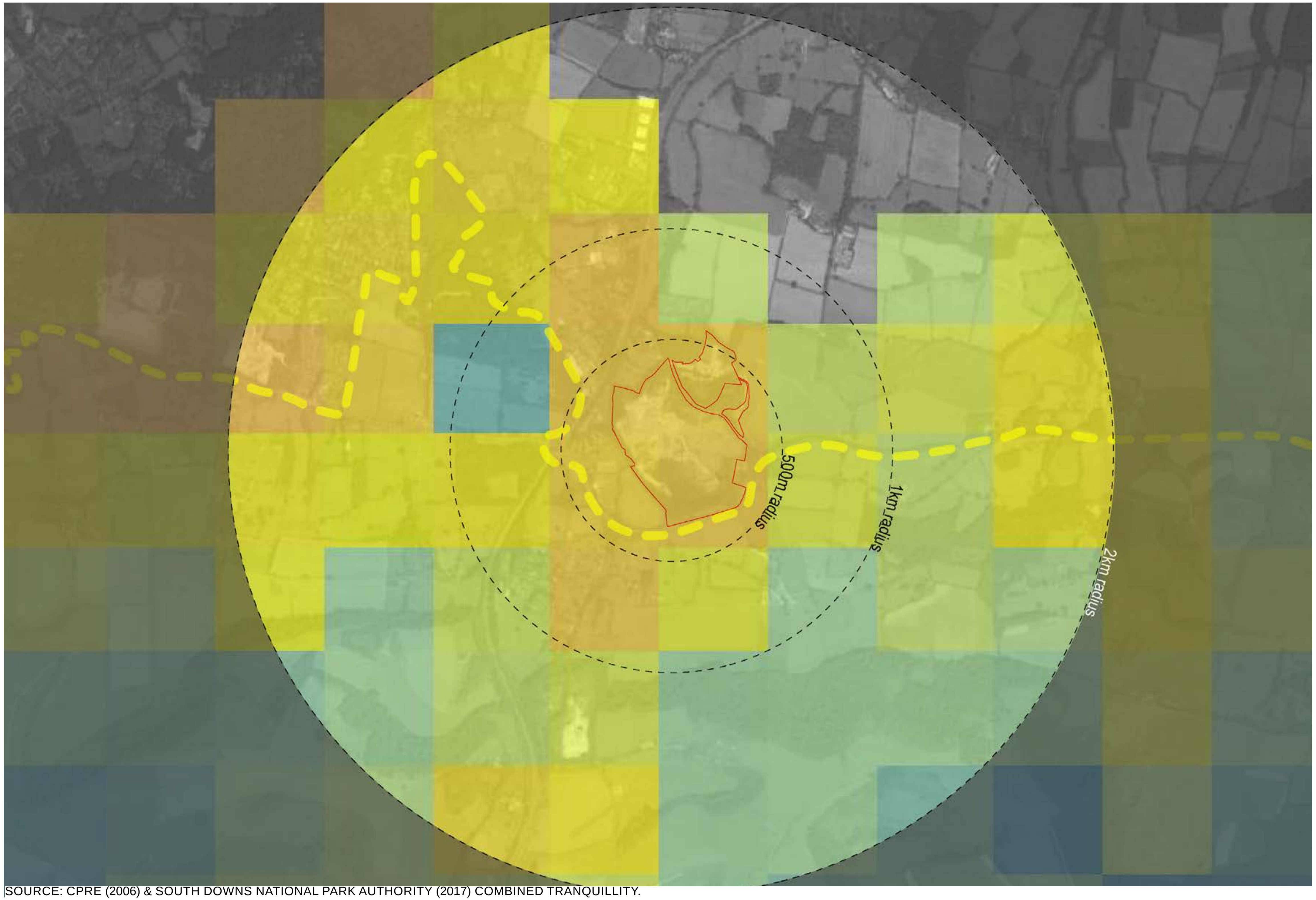
- *'9 of the farms on the estate are in agri-environment schemes (of which 1 is organic);*
- *22% of the estate is made up of woodland, of which 40% is classed as ancient woodland. An application is in progress for Higher Tier Countryside Stewardship across the Wealden woodlands;*
- *The estate is an active and enthusiastic member of the Arun to Adur Farmers Group, which supports a landscape scale approach to conservation management;*
- *The estate has supported and partnered the Steyning Downland Scheme since its inception in 2007, which is seen as one of the best locally engaged conservation charities in the National Park;*
- *The farm is involved in one of the longest running data surveys in the world with the GWCT (Game & Wildlife Conservation Trust);*
- *A place without waste: where everything matters and the potential of people, the land and our built environment is optimised.' (Ibid, p16)*

5.64 Regarding the environment, improvements are identified including:

- *'Restoration of Rock Common Quarry and to regenerate it as a vibrant environmentally engaged tourism site offering a base for people to explore the National Park;*
- *We want to communicate the management practices used on the downland areas, which we intend to do with better signage and more of an online presence;*
- *We plan to take the lead in the development of a new 'Environmental Bank' project at Wiston. This project will develop a formal approach to 'biodiversity offset' and will seek to achieve net gain from relevant development projects (on and off the estate);*
- *We will instigate four "tranquillity" zones across the estate. These are areas where, outside of legal and good stewardship duties, we will not intervene and will allow natural regeneration to occur.' (Ibid, p16)*

5.65 Regarding opportunities for improvement associated with Rock Common Quarry, which is identified as Project Number 7, the following is identified, *(alongside of a relevant extract from the Whole Estate Management Plan, provided as **Appendix G**)*:

'Rock Common Quarry has been in operation for well over 65 years and there have been sandpits in the area for well over 100 years. As the sand reserves come to an end there is an opportunity to regenerate and restore it. Our plan is to create a vibrant environmentally engaged tourism site offering a base for people to explore the National Park.' (Ibid, p22)



SOURCE: CPRE (2006) & SOUTH DOWNS NATIONAL PARK AUTHORITY (2017) COMBINED TRANQUILLITY.
MAP DATA ©2020 GOOGLE. IMAGERY: LANDSAT / COPERNICUS. DATE: JUNE 2018.

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N

Legend

☐ Site Boundary.

▬ ▬ South Downs National Park, (*south of the dashed yellow line*).

South Downs National Park Tranquillity Study (*South Downs National Park Authority, 2017*).

🟦 High tranquillity

🟩

🟨

🟧

🟥 Low tranquillity

CPRE and SDNPA combined tranquillity. The data is mostly from the CPRE 2006 desk based study, with SDNPA field based study results replacing CPRE data for cells that have been surveyed by the SDNPA.

Figure 5.4. Relative Tranquillity (SDNPA, 2017).

5.66 Regarding hydrology associated with Rock Common Quarry, the following is identified:

'Fresh water is a vital resource for drinking water and the chalk downland plays a vital role in purifying millions of litres of water for local communities and wildlife. Sadly, the condition of the area's watercourses are not what we would like it to be.

The estate lies in the west of the Adur catchment where the river network consists of secondary and tertiary streams. The Honeybridge stream is a significant tributary in the north of the estate which incorporates the only section of primary river. The ecological status of this headwater chalk stream within the estate is rated as Moderate (on a scale from 'High' to 'Bad') though the overall rating of the waterbody as a whole is "Poor" on the basis of its fish populations and phosphate levels. One unusual aspect of this stream is that 70,000 litres are being pumped into it every day from Rock Common. This dewatering is an ongoing requirement by the Environment Agency to keep the base of the Windmill and Rough (restored) landfill sites above ground water level.' (ibid, p47)

5.67 Regarding outcomes, the following is highlighted:

'Outcome 1/2: The landscape character of the National Park, its special qualities and local distinctiveness have been conserved and enhanced by effectively managing land and the negative impacts of development and cumulative change. There is increased capacity within the landscape for its natural resources, habitats and species to adapt to the impacts of climate change and other pressures: [...] 'Secure net additional biodiversity and habitat by estate based "Environmental Bank plus" from any development on the estate';

'Outcome 3: A well-managed and better connected network of habitats and increased population and distribution of priority species now exist in the National Park - [...] Play lead part in creating a Water Quality Strategy and implement relevant actions to improve the condition of Honeybridge stream and Northover and Black sewer from poor / moderate towards good; focus on best practice in the area of watershed between the Arun & Western Streams and the Adur Ouse rivers catchments';

'Outcome 4: The condition and status of cultural heritage assets and their settings is significantly enhanced, many more have been discovered and they contribute positively to local distinctiveness and sense of place. - [...] Continued care in the refurbishment of listed buildings and to enable any EPC regulations to be met with appropriate aesthetic measures; Investment in a portfolio of new assets and revenue generating enterprises (Rock Common, North Farm and others) to generate increased surplus to support this expenditure and ongoing maintenance and improvement of historic houses and buildings; Increase estate trading activity to improve protection from capital taxation on inter-generational transfer; Landmark of Chanctonbury Ring is well maintained and there is improved communication on its history and importance.'

Outcome 5: Outstanding visitor experiences are underpinned by a high quality access and sustainable transport network providing benefits such as improved health and wellbeing; Maintain investment and management of visitor infrastructure (car parks, access roads, tracks and trails, footpath equipment); Create new visitor infrastructure, offer and access points to South Downs Way and PROW network from key estate sites with enhanced connectivity such as North Farm, Steyning; Downland Scheme and Rock Common to relieve visitor pressure from minor routes; Investigate the potential to create an off-road cycle route from Washington to North Farm and then to connect to SD Way and wider trail network;

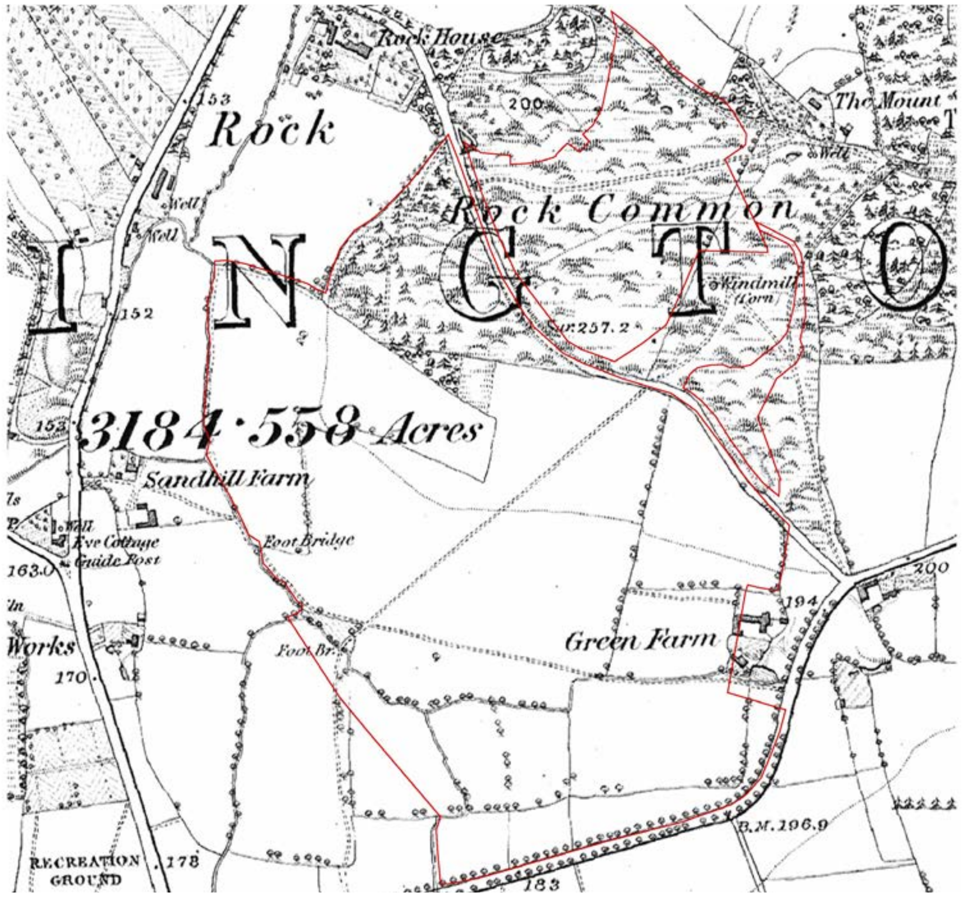
Outcome 6: There is widespread understanding of the special qualities of the National Park and the benefits it provides - Focus on connecting people and place in the development of visitor accommodation and activities at Rock Common. (Ibid, p65-67)

South Downs National Park Tranquillity Study, *(2017)* Relative Tranquillity Mapping, *(CPRE 2006 and SDNPA 2017 combined)*)

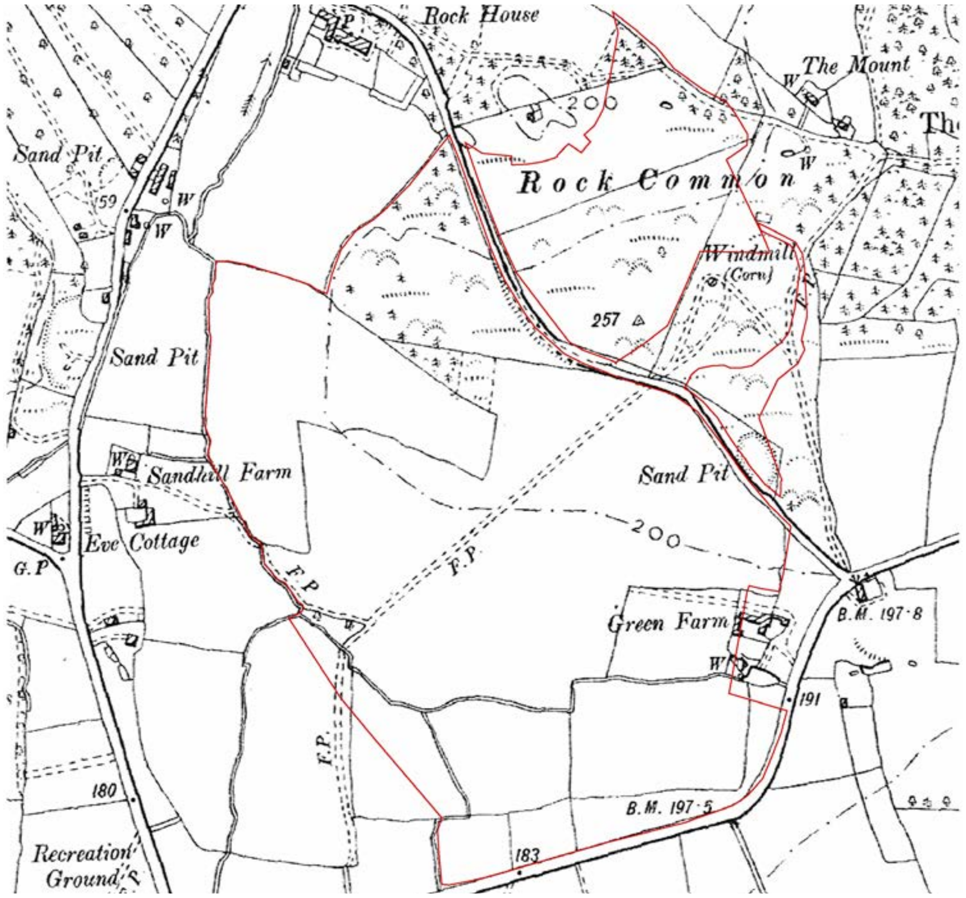
5.68 The Campaign for the Protection of Rural England *(CPRE)* and the South Downs National Park Authority produced, South Downs National Park Tranquillity Study, *(South Downs National Park Authority, 2017)* provides an overview of relative tranquillity across the South Downs National Park. The Study is referred to within the descriptive text for the proposed Strategic Policy SD7: Relative Tranquillity of the Submission version of the South Downs National Park Local Plan, *(January, 2018)*.

5.69 **Figure 5.4** shows moderately low relative tranquillity for the Site within an area of orange pixels. The highest tranquility is shown within the downland of the South Downs outside of the Study Area to south west and south east.

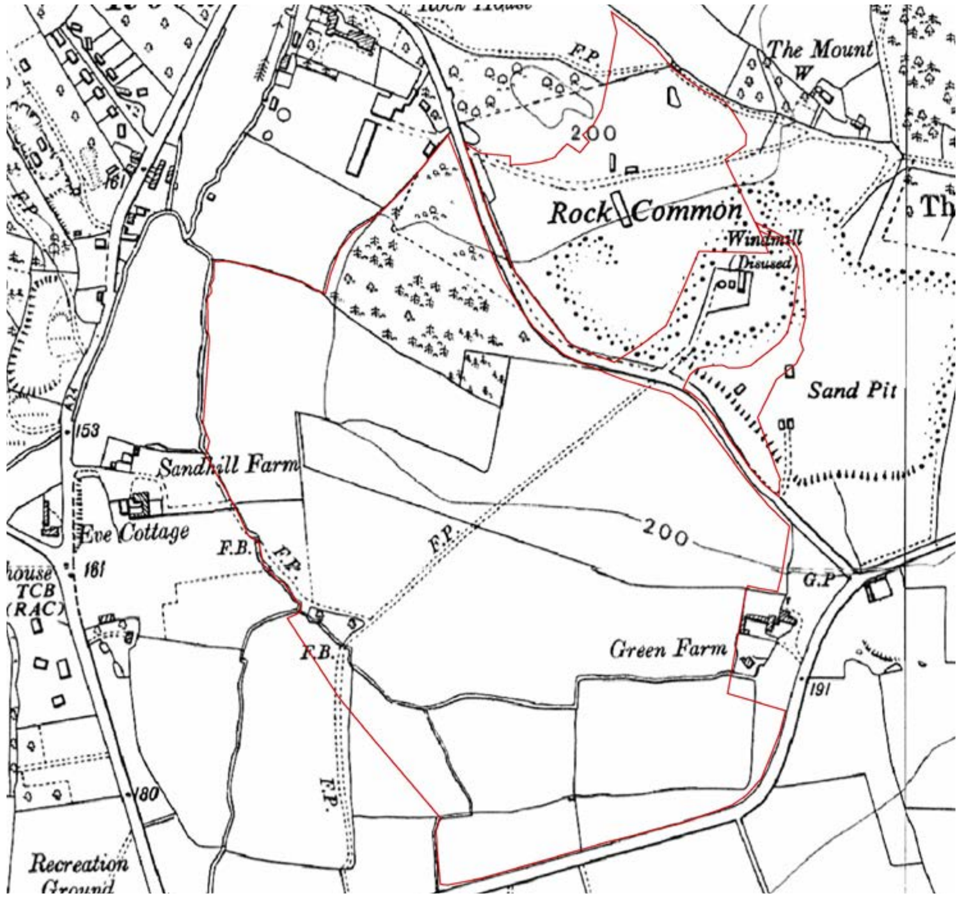
Extract A. Yeakell and Gardner's Sussex 1778-1783. 2inch to 1 mile.



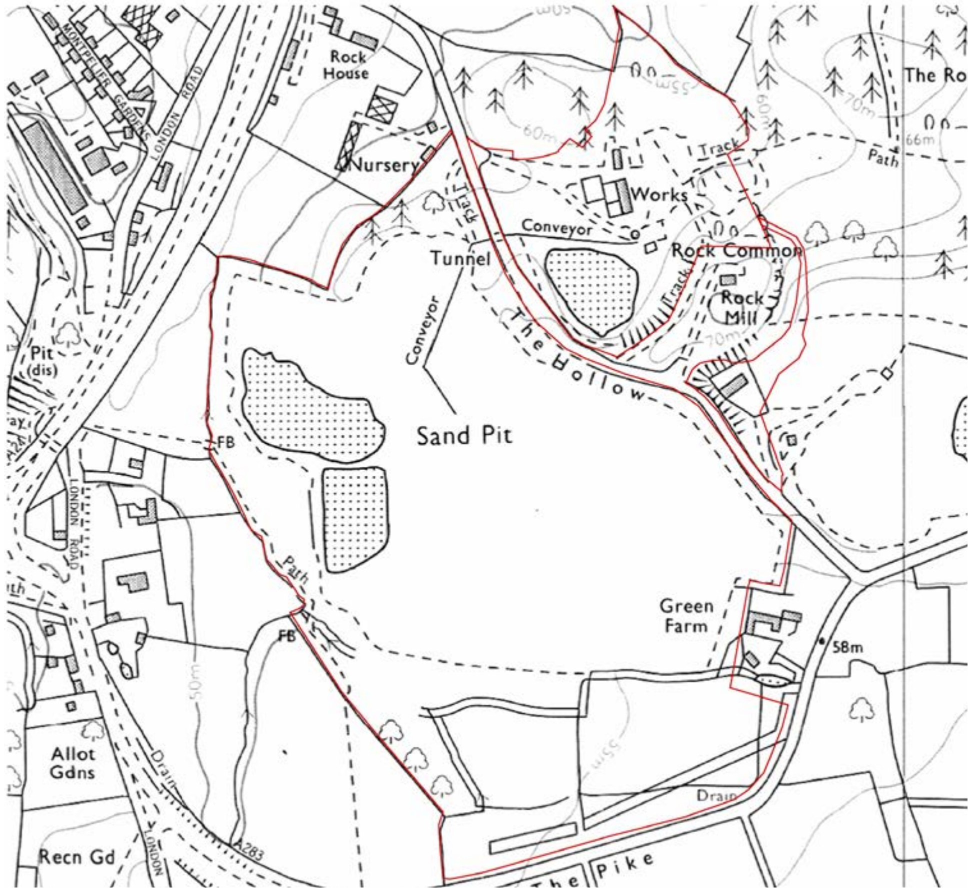
Extract B. 1879 OS map, *(Originally plotted at 1:10,560).*



Extract C. 1916 OS map, *(Originally plotted at 1:10,560).*



Extract D. 1961 OS map, *(Originally plotted at 1:10,000).*



Extract E. 1982 OS map, *(Originally plotted at 1:10,000).*

Extract F. 2020 OS Map (Ordnance Survey © Crown Copyright 2020.

Historic Mapping Review

5.70 A historic map regression is undertaken to inform a review of the historic evolution of the landscape surrounding the Site.

5.71 Various historic maps are provided within **Appendix D**, with extracts, provided across **Extracts A - D**. A current Ordnance Survey Extract is provided in **Extract D**.

1778-1783 Yeakell and Gardner

5.72 Through reference to the Yeakell and Gardner map *(see **Extract A**), (with rough indication of Site area)* an area of unbounded land is apparent across the Site area, within which there are strips of enclosed land, which are subdivided into smaller field parcels.

5.73 That to the south east of the Site area comprising of straight sided boundaries, north of a track way which seems coincident with that of the present day A283, *(The Pike)* and about which the northern extent of Washington Common is shown extending. A building approximately coincident with Green Farm House is shown.

5.74 That to the north west is curved in plan form, about the western end of a latitudinally aligned elevated landform. A track way is shown coincident with the present day alignment of The Hollow. A smaller elevated area is shown to the north of The Hollow, *(which remains to the present day north of the Site boundary).* Built form named The Mount is shown offset to the north east. Built form coincident with Rock House and Sandhill Farmhouse are shown to north west and west. A track approximately coincident with the A24 is shown offset to the west. Areas of rough grassland are shown to the north.

1879 Ordnance Survey Map

5.75 Through reference to the 1879 Ordnance Survey *(OS) (6 inch)* Map, *(see **Extract B**)* the earlier field patterns can be seen in greater detail, with those to the west defined about the Honeybridge Stream, offset east from which there is a tributary stream apparent, which extends west from a pond at Green Farm and drainage ditches to the south west of Green Farm.

5.76 A trackway is shown extending north, *(from the present northerly alignment of Public Footpath No.2701)* over a footbridge which crosses the tributary stream from Green Farm, before aligning north east towards an area of rough grassland and patchy mixed woodland, named Rock Common, located substantially north of The Hollow, within which a Windmill is located, *(Corn).* A further trackway extends eastwards from the footbridge towards the Pike via Green Farm. A further trackway extends along the eastern edge of the Honeybridge Stream, *(along the present alignment of Public Footpath No.2701)*, before crossing via a Footbridge to the south east of Sandhill Farm. An indication of a sand pit is shown north of The Hollow, north of Green Farm. Further sand pits are shown west of London Road. Tree lines are located along the various watercourses and the A283, *(The Pike).* Orchards are shown in strip fields aligned north west from the road coincident with the A24. The Honeywell Stream is shown flowing northwards to the west of Rock House.

1916 Ordnance Survey Map

5.77 Through reference to the 1916 OS Map, *(see **Extract C**)*, the earlier trackways are apparent as Footpaths, apart from that east to Green Farm, which is no longer shown. The earlier sandpit is shown enlarged. There is an indication of less trees across Rock Common. An indication of built form, perhaps an animal enclosure is located atop an elevated point south east of Rock House, *(north of The Hollow).*

1961 Ordnance Survey Map

5.78 Through reference to the 1961 OS Map, *(see **Extract D**)*, the Sand Pit is shown extended around the area previously defined as Rock Common is shown as a Sand Pit, extending east into previous fields to the east of Rock Common and including various buildings associated with the Sand Pit. The area with patchy mixed woodland is only retained to the south west of The Hollow. The Windmill is retained centrally within the Sand Pit, which encloses to all sides, other than to the south where the access to The Hollow is retained. Residential development is shown along one of the previous strip fields within which orchards were located north west of London Road. A greenhouse building is shown to the south of Rock House.

1982 Ordnance Survey Map

5.79 Through reference to the 1982 OS Map, *(see **Extract E**)*, the Sand Pit to the north east of Rock Mill is shown part restored, albeit to an undulating landform, with a cliff edge to the west. The Sand Pit is shown extended further to the east, where standing water is shown. A further area of standing water is shown to the north of The Hollow, *(in the location of the present pond).* Coniferous woodland is shown to the north of the Site.

5.80 The main quarrying area to the south of The Hollow is shown opened up across the previous fieldscape, with a conveyor in place under The Hollow. Areas of standing water are located to the west of this area. The alignment of the A24 is shown, offset east of the earlier London Road, with various highways improvements providing a new curved connection with The Pike, *(A283)* offset to the south west of the Site.

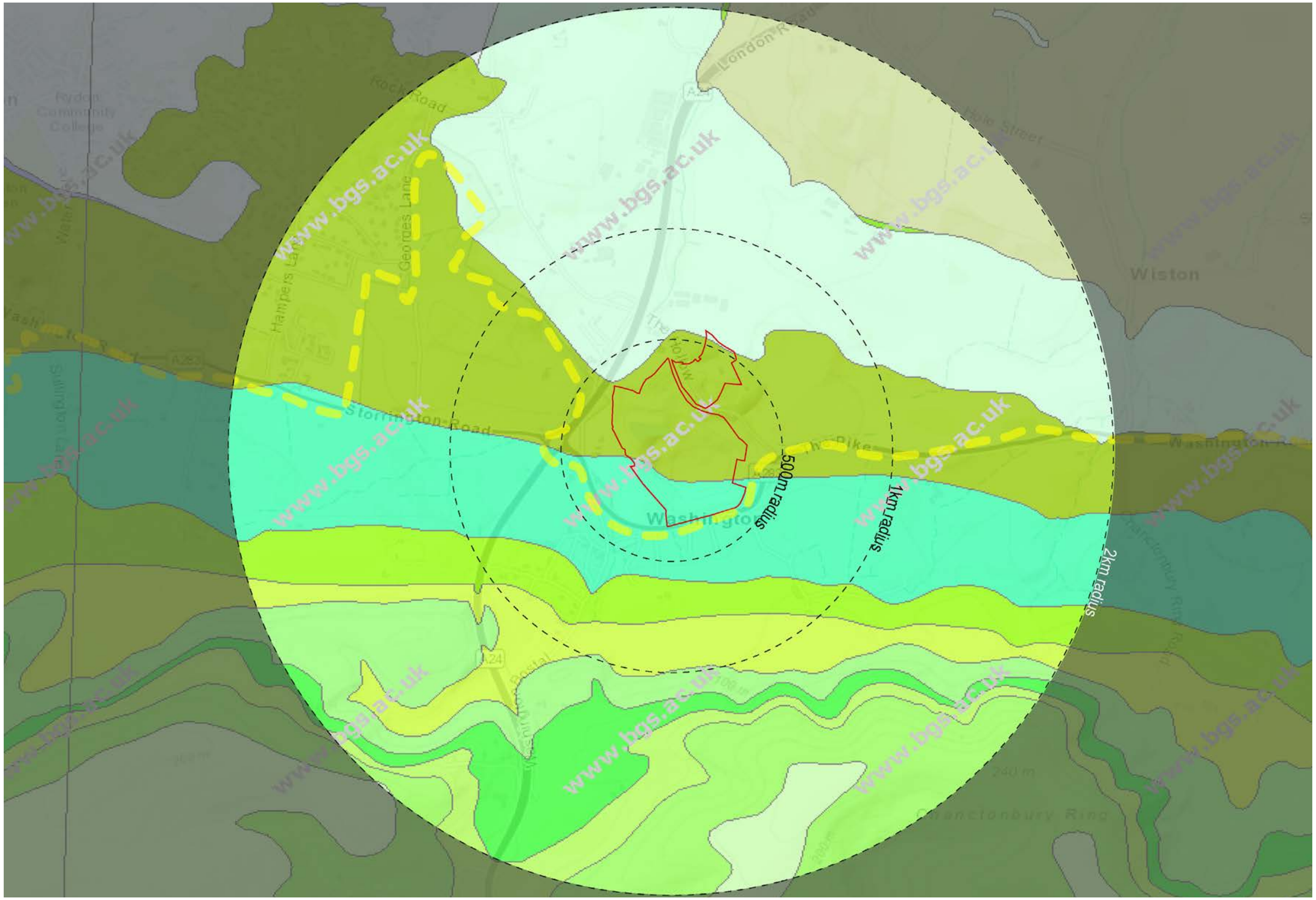
5.81 The Honeywell Stream is no longer shown flowing northwards to the west of Rock House, terminating to the west of the Site.

2020 Ordnance Survey Map

5.82 Through reference to the 2020 OS Map, *(see **Extract F**)*, the Sand Pit to the south of The Hollow, is shown extended further to the south and referred to as Rock Common Quarry. Trees are shown about the perimeter of the Quarry, whilst a couple of ponds are shown to the north of the Site south of The Hollow. A Camp Site is shown to the south west beyond the Honeybridge Stream.

5.83 The Sand Pit to the east of Rock Mill is shown reinstated from previous use as a quarry, with variation in landform shown from 59m to 79m within a short distance from the cliffed edge east of Rock Mill.

5.84 The northerly flow of the Honeybridge Stream is shown again to the west of Rock House, where this continues under The Hollow. However, a culverted section is shown intervening between the northerly flow and an area of ponds north of Sandhil Lodge.



SCREENGRAB FROM GEOLOGY OF BRITAIN VIEWER DEVELOPED BY THE BRITISH GEOLOGICAL SURVEY. (AT: HTTP://MAPAPPS.BGS.AC.UK/GEOLOGYOFBRITAIN/HOME.HTML?)

1:20,000 at A3

N

Legend

☐ Site Boundary.

🟨 South Downs National Park, (*south of the dashed yellow line*).

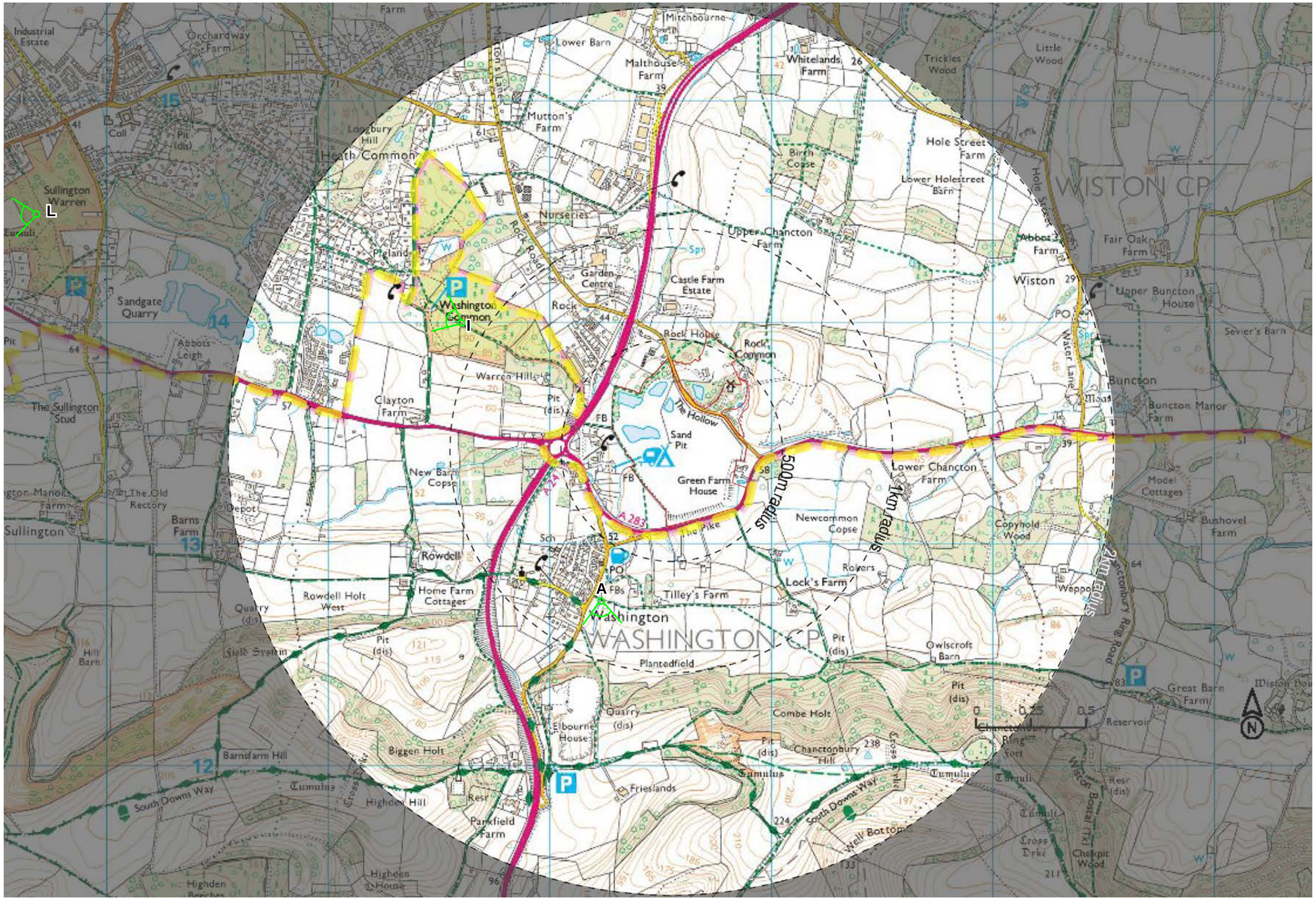
Bedrock Geology - British Geological Survey *(Descriptions from the Geology of Britain Viewer / GIS Dataset)*

🟩 Sandstone, Silty *(Lower Greensand).*

🟩 Sandstone *(Folkestone Formation - Lower Greensand).*

🟩 Mudstone *(Gault Formation).*

Figure 6.1. Bedrock Geology (British Geological Survey, 2020)



MAP DATA ©2020 GOOGLE. IMAGERY: LANDSAT / COPERNICUS. DATE: JUNE 2018.

1:20,000 at A3

Legend

🟥 Site Boundary.

▬ South Downs National Park, (*south of the dashed yellow line*).

A Site and Surrounds Photograph's - Location and Direction. Photograph L - See **Section 6.0**.

Figure 6.2. Study Area.

6.0 EXISTING CONDITIONS - FIELD SURVEY

Scheme Study Area

6.1 The Scheme Study Area is described below through reference to **Figures 6.1** and **6.2**, and Photographs provided within this section. Where Viewpoint Photographs from publicly accessible land are referred to, these are provided within **Appendix F**, through reference to **Figures 6.5** and **6.6**.

Geology and Soils

6.2 Through reference to the Land Uses and Water Resources Chapter within the Environmental Statement, *(Golder Associates, January 2007)* submitted under Planning Application No. DC.401/07, the Site is described as: *'occurring over almost the full north to south extent of the local outcrop of the southerly dipping Folkestone Beds. The southern margins of Rock Common extend into the overlying Gault Clay whilst the northern boundary of the Site approaches the margins of the underlying Sandgate and Hythe Beds outcrop.'*

6.3 Through reference to the Sussex RIGS No. TQ11/41, for Rock Common Quarry the stratigraphy and sedimentology of the quarry is described as: *'in the Folkestone Beds of the Lower Greensand, and the Gault (which is not accessible), of the Lower Cretaceous ...the sediments consist of poorly cemented sand; red, orange and yellow in colour; rich in quartz. There is an iron grit bed of ironstone.'*

6.4 More broadly through reference to the Geology of Britain Viewer, *(at 1:50000 scale)* developed by the British Geological Survey, *(see **Figure 6.1**)* the latitudinally aligned bedrock changes from the silty sandstone of the Lower Greensand to the north of the Site, to the sandstone of the Folkestone formation, across the Site, to the mudstone of the gault formation beyond. Further to the south, the steep major scarp of the grey chalk subgroup, extends to the white chalk subgroup beyond upon the open downs.

6.5 Through reference to the Soilscapes Map *(developed by Cranfield University and sponsored by the Department for Environment, Food and Rural Affairs)* soil type across the southern half of the main quarry to the south of The Hollow *(in keeping with that to east and west)* is shown to have comprised: *'slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils'*.

6.6 A general indication of the plant communities and habitats with which this soil type is associated are identified to include: *'Seasonally wet pastures and woodlands'.*

6.7 The soil type to the remainder of the unexcavated Site and Study Area to the north is understood to comprise: *'Freely draining slightly acid loamy soils'*. A general indication of the plant communities and habitats with which this soil type is associated include*: 'Neutral and acid pastures and deciduous woodlands; acid communities such as bracken and gorse in the uplands'*

Topography

6.8 The quarry is located to the north of the escarpment face of the South Downs, within an undulation formed by a local outcrop of the southerly dipping greensand of the Folkestone Beds, (*Low Folkestone Sand Ridgeline)* which forms a remnant latitudinal feature to a high of 75m above Ordnance Datum, *(aOD)* about the Rock Common Windmill, *(and 70m to the adjacent section of The Hollow to the south)*.

6.9 To either side, east and west of the remnant latitudinal feature, landform falls to a more level ground of some 60m aOD, whilst falling southwards towards the southern extent of the Site about the A283, *(The Pike)*. To the north of the remnant feature landform is sustained at some 60m aOD before dropping to some 30m aOD and 20m aOD beyond, about the more well define upper reaches of the Honeybridge Stream. The lowest point on the base of the quarry is some 12m aOD.

6.10 The ground levels rise to some 75m-100m aOD some 1km south of the Study Area, across the lower scarp, from where the upper scarp of the escarpment continues to the edge of the Study Area to a high of some 238m aOD about Chanctonbury Hill and Chanctonbury Ring to the south east.

6.11 The A24 extends longitudinally north to south, through a dip in the escarpment of the South Downs at some 100m aOD formed of a dry valley, to the east of which landform rises steeply to Chanctonbury Hill and to the west of which rises to Highden Hill and Barnsfarm Hill at some 175m and 205m aOD to the south west of the Study Area. The wooded expanse of Warren Hill rises to the west of the A24 at an elevation of some 80m aOD, rising to 90m aOD.

Hydrology

6.12 Through reference to the Land Uses and Water Resources Chapter within the Environmental Statement, *(2007)* local watercourses in the immediate vicinity are identified through reference to the Environment Agency to include the Honeybridge Stream, Rosbrook Sewer and Clayland Sewer.

6.13 The springhead of the Honeybridge Stream arises some 600m to the south of the Site, at the foot of the major scarp, to the south east of the village of Washington, *(see **Figure 6.2** and **Photograph A**)*.

6.14 The watercourse is culverted under the western end of The Pike, east of London Road, to the north of which a brick structure dam is located, *(see **Photograph B**)* and from where the flow of the Honeybridge Stream might be compared with that contributed to by the pumped water discharged from that accumulated within the Rock Common Quarry bottom, *(see **Photograph C**)* and over a further structure further north, *(see **Photograph F**)*.

6.15 The Land Uses and Water Resources Chapter within the Environmental Statement, *(2007)* identifies that the *'vast majority of the surface water flow in the Honeybridge Stream is the discharge of abstracted water from Rock Common Quarry.[...] pumped at a rate of approximately 67 litres per second' (Ibid, p6-11, p6-19)*

6.16 The ground water accumulated within the Rock Common Quarry bottom is pumped out to the Honeybridge Stream to create a pool, *(see **Photograph D**), (and within which an informal recreational play space by users of the adjacent Washington Caravan & Camping Park occurs).*

6.17 The stream continues within a sunken channel along the eastern edge of the campground, west of Public Footpath No. 2701, *(see **Photograph E**)* along the western edge of the Site.

6.18 North of the short waterfall over the sill upstream of a footbridge crossing of the Honeybridge Stream, *(for Public Footpath No. 2700), (see **Photograph F**)* the water from the stream accumulates within a private wetland area to the north of Sandhill Farmhouse, *(see **Photograph G**).*

Photograph A. *Wetted, upper channel of the Honeybridge Stream, viewed south from Public Footpath No. 2089, (Location shown on* ***Figure 6.1)****.*

Photograph B. Curved *brick wall structure, with flow focused to the centre holding the Honeybridge Stream, upstream of that culverted under the western end of The Pike, east of London Road.*

Photograph C. *Sunken channel of the Honeybridge Stream, to the west of Public Footpath No. 2700, contributed to by the pumped water discharged from that accumulated within the Rock Common Quarry bottom.*

Photograph D. *Water pool associated with the pumped water, informally made into a recreational play space by users of the Washington Caravan & Camping Park.*

Photograph E. *Sunken channel of the Honeybridge Stream, to the west of Public Footpath No. 2700, east of the Washington Caravan & Camping Park.*

Photograph F. *Short waterfall upstream of the footbridge crossing of the Honeybridge Stream from Public Footpath No. 2700, west of Public Footpath No. 2701, overhung by hazel and hawthorn.*

***Photograph G.** Private wetland area with ducks to the north of Sandhill Farmhouse from Public Footpath No. 2700, surrounded by grey poplar trees.*

***Photograph H.** Eastern access off the Processing Area towards the former Windmill Landfill site,*

Photograph I. Warren Hill. *Public footpath 2630 across National Trust woodland, Washington Common © Peter Holmes. Licensed for reuse under Creative Commons Licence. Source: https://www.geograph.org.uk/photo/3565137*

***Photograph J.** Westerly view, within pine and birch woodland, within a longitudinal belt about the perimeter of the former waste sites, from Public Footpath No. 2604.*

***Photograph K.** Access to the former Windmill Landfill site off The Hollow.*

***Photograph L.** Sullington Warren - Heathland with larch, fringed with mixed deciduous and coniferous trees - (Located some 3km to the north west along the Sandstone Folkestone Formation), (Location shown on **Figure 6.1**).*

Figure 6.3. Site and Surrounds-Photograph's Location and Direction.

6.19 The wetland area is additionally contributed to from a stream which arises east of Barns Farm, some 1.5km to the south west, and is culverted under the A24 / A283 roundabout, from where it runs within a ditch along the eastern edge of the A24 to discharge into the stream to the north of the private wetland, where the Honeybridge Stream enters a culverted section alongside the A24 embankment, reopening out to the west of Rock House Nursery.

Landscape Character

6.20 The Study Area forms a landscape of contrast, with the elevation and tranquillity of the open downs and upper scarp face of the South Downs to the south, contrasting with a more intimate landscape on the lower scarp about the springhead of the Honeybridge Stream about the small village of Washington.

6.21 These scarp face landscapes are again contrasted with the more busy landscape about the well used The Pike, *(A283)* and London Road, *(A24)* to the north, which respectively underline and extend across the undulating greensand landform about the northern half of the Study Area.

6.22 The suburban spread east of Storrington extends to the north west, interspersed with the wooded, enclosed areas of Washington Common*,* whilst the hamlet of Rock occurs to the west of the A24, within an area previously in use as orchards.

6.23 Sand quarrying has occurred within Rock Common, leading to the present extent of the Sand Quarry, throughout the Twentieth Century and early Twenty First Century, from the late Nineteenth Century. This has left a large hole within the landform, displacing the historic, latitudinal landform apparent through reference to the Yeakell and Gardner’s Sussex 1778-1783 map.

6.24 The earlier sand quarrying north east of The Hollow and east of the Rock Common Windmill has been subject to use as the former municipal landfills known as Windmill, the Rock and the Rough throughout the late Twentieth Century. The landfills have been restored to a longitudinally aligned landform, with rock faces exposed to the west and rising to a high of some 75m aOD, consistent with that upon which the Rock Windmill is located to the west. Rock Common Quarry remains operational with supply of aggregates for the construction industry resulting in heavy vehicle movements in its vicinity.

6.25 To the west of the Study Area, beyond the A24 a comparable landform, to that anticipated before quarrying operations across the Site and surrounds occurs at Warren Hill, *(see **Photograph I**)*. Whilst some 3km to the north west of the Site, along the sandstone ridge within the wider study area, Sullington Warren, *(see **Photograph L**)* presents a characteristic mosaic of habitat including: *‘a range of heathland habitats including both wet and dry heath, grassland, scrub and woodland.’* This mosaic of habitat is in keeping with that described as an opportunity within the The Lower Arun Watershed Biodiversity Opportunity Area.

6.26 The various *(Grade II Listed)* Buildings within close proximity to the Site are well enclosed within vegetation, with limited intervisibility with boundary vegetation surrounding the Site, *(Sandhill Farmhouse 80m west of the western Site boundary / Green Farmhouse 20m off the south eastern Site boundary / Rock Windmill 30m off the north eastern Site boundary / Rock House 125m off the north western edge of the Site).*

6.27 North west of the Site, beyond intervening fields is an area accessed off the western end of The Hollow named The Rock Business Park, *(see **Viewpoint No.06**).*

Perceptual qualities

6.28 For the majority of the Study Area the strongly sculptural chalk ridge defined by the high points of Chanctonbury Hill and Chanctonbury Ring to the south and south east and Barnsfarm Hill to the south west of the Study Area. The chalk ridge is the key feature within a busier surrounding landscape, with southerly glimpsed views towards this landform from the A24 and the A283 and from sections of rights of way, (*see **Viewpoint’s No. 10** and **17***).

6.29 Panoramic northerly views across the weald, with scenic qualities are otherwise gained when upon the upper part of the lower scarp below the wooded upper escarpment, *(see **Viewpoint’s No. 26**)* or substantively from the west of the rising crest, north west of Chanctonbury Hill, *(see **Viewpoint’s No. 19** - **22**)* or north eastern edge of Highden Hill and Barnsfarm Hill, *(where the South Downs Way extends along rights of way)*, *(see **Viewpoint’s No. 28** and **29**).*

6.30 Within views from the crest, in some places the quarry draws visual attention by measure of its relative scale, due to proximity and contrast in terms of its yellow colour and sunken form from that of the patchwork of fields, bound by hedgerows, field oaks and woodland blocks which otherwise surround, and within which incidents of built form punctuate.

6.31 There is a high level of relative tranquillity and sense of place associated with the chalk escarpment and scenic, panoramic northerly views across the weald from this, due to the elevation of the view and mosaic of woodland and fields which form a tapestry, fading to blue along the far horizon line and the perspective this provides from the chalk grassland turf underfoot associated with the South Downs sheep pastures.

6.32 Through reference to **Viewpoints No. 21, 23** and **24**, the restoration of former municipal landfills known as Windmill, the Rock and the Rough, *(following on from the earlier mineral workings)* presents a relatively incongruous landform within these views, which is highlighted by the atypical north westerly aligned track, which rises up and over the landform.

6.33 This is inconsistent with the small scale field pattern within surrounding fields to the north east about to the south, which are historically characterised by Bannister, *(2010)* as resulting from formal enclosure.

6.34 Through reference to **Figure 6.2**, these fields are small to medium in size, with longitudinal field boundaries which generally align in a north north-easterly direction, while latitudinal boundaries align on an east south-easterly direction.

6.35 The longitudinally aligned restoration is additionally considered to be inconsistent with the prevailing east-west alignment of the greensand ridge, *(see **Figure 6.1**)*, which forms a remnant latitudinal feature in this location as a local outcrop of the southerly dipping greensand of the Folkestone Beds, *(Low Folkestone Sand Ridgeline) (which is more sustained to the west of the A24, within the wider study area).*

6.36 A relatively low level of relative tranquillity occurs when adjacent to the well trafficked roads of the A283, *(The Hollow)* and the A24, *(London Road),* due to the noise and speed of traffic and lack of a consistent verge.

6.37 A moderate level of relative tranquillity was experienced along Public Footpath No. 2701 or Public Footpath No. 2604 further to the north, due to the natural elements of flowing water along the Honeybridge Stream, woodland or open fields sequentially experienced from south to north.

The Site

6.38 The Site is described through reference to Site Photographs, provided within **Appendix C** for the sand processing area located to the north of The Hollow, and **Appendix D** for the quarried area south of The Hollow. The location and orientation of photographs can be identified through reference to **Figure 6.3**.

Site Boundaries and Features

6.39 The 33.64 hectare Site comprises of a quarry working area of 27.19 hectares, a sand processing area of 5.52 hectares, and associated access to the former Windmill Landfill site access of 0.93 hectares. The Site is located within a semi-rural location located east of the A24, *(London Road)* and north of the A283, *(The Pike)* north east of the village of Washington.

6.40 The Site forms part of the Wiston Estate, which extends across the South Downs to the south of the Study Area. The Hollow, a hard standing roadway, lined to the west with mature trees and vegetation, passes through the Site connecting the south bound A24 with the A283 to the east. Upon the southern side of The Hollow, there is a veteran oak at the most sunken part of the road, *(see **Photograph D12**)*.

The Quarry, (south of The Hollow)

6.41 Through reference to the historic mapping review, there is a time depth associated with the sunken lane and its association with the underling remnant landform over which it rises and falls.

6.42 The extent of landform prior to quarrying activities can be visualised through reference to **Photographs D7** and **D10**, with that remnant extent to the right of view, visualised extending at a comparable level across the quarry to centre left of view, before falling to the Site boundary. The prior natural landform can be gauged through reference to **Extracts A** and **C** above.

6.43 The quarry has been excavated since the 1920s and is now at varying depths, with the extant permission, *(WS/15/97)* allowing excavation to 10m AOD. This has resulted in a very deep pit which requires pumping to depress the natural groundwater level to allow it to be worked in the 'dry', *(see **Photograph D9**)*.

6.44 Below the pumped level a shallow lake has established within the quarry bottom. About the southern edge of the lake where there is a sandy margin, there is a moderate level of relative tranquillity contributed by the reflective, glassy surface of the water and the presence of both waterfowl and dragonfly about the margins. However, the sound of the pump, does distract from this, comparable to the level of a background hum of road traffic.

6.45 There are two perched water bodies adjacent to the upper access into the quarry. One of these is located to the west on a higher level, *(see **Photograph D2**)* whilst a further is located adjacent to the end of the conveyor, *(see **Photograph D5**)* where the sand arisings are loaded and conveyed towards the sand processing area, north of The Hollow, *(see **Photograph D4**)*. These water bodies are fringed with reeds, with willow and birch to the perimeter.

6.46 From the elevated northern parts of the quarry, particularly to the north east, *(approximately level with the adjacent, slightly sunken The Hollow, upon the remnant original latitudinal landform (Low Folkestone Sand Ridgeline)), (see **Photograph D11**)* the chalk ridge presented by the South Downs escarpment can be viewed, punctuated by the Landmark feature of the wooded Chanctonbury Ring. This provides a sense of place across the quarry through association with the South Downs National Park, *(see **Photographs D3** and **D4**)*.

6.47 The natural qualities of the patches of habitat present on Site including reed fringed water bodies, gorse scrub, birch woodland and mixed deciduous woodland, introduce visual variety and complexity, albeit dominated by the enclosing cliff faces of the surrounding quarry, against which the chalk downs, or lake in the quarry bottom otherwise provide a generally limited counterbalance.

6.48 The quarry is non statutorily designated as a Regionally Important Geological Site, *(RIGS)* because of its importance for the study of geology and geomorphology, which is understood to be associated with the stratigraphy. The value of this is described as of educational interest for palaeoenvironmental studies, with large clean exposures of sand from the Folkestone Beds of the Lower Greensand to some 40m in elevation, *(see **Photographs D8** and **D9**)*.

6.49 Within 30-50 metres south of the southern site boundary is the boundary of the South Downs National Park, which extends along the south side of the A283, *(The Pike)*. Along the southern part of the Site is a belt of trees on fairly level ground comprising of mature alder, birch, oak and pine planted in rows, with more dispersed mature trees inset and alongside of The Pike.

6.50 A belt of woodland along the north western edge of the Site adacent to the Site is subject to Area TPO No. 0204.

Sand Processing Area, (north of The Hollow)

6.51 Public Footpath No. 2604 continues to the north of The Hollow and then through the northern corner of the Site and beyond to the north, *(see **Viewpoints No 06 - 10**)*. There is no sense of the sand processing activities beyond, other than from occasional vehicle movements, with the northern part of the Site through which the Footpath extends forming an oak and birch woodland, with dense bramble scrub in parts.

6.52 The conveyor extends from the quarry to the south, under The Hollow within a tunnel, and along the edge of an area of elevated ground, *(see **Photograph C6**)* towards the sand processing machinery within the sand processing area to the north of The Hollow, *(see **Photographs C7-C11**)*. The sand processing machinery and supporting building dominates the area, *(see **Photographs C2-C3**)* with stockpiles located about an area cleared of topsoil and levelled, surrounded with a banked landform to north east, and pine woodland which fringes the Site to the north west, *(see **Photographs C3-C5**)*.

6.53 To the south of the sand processing area is an early quarry excavation, *(post 1916, pre 1961)* within which a reed and willow fringed pond has established, *(see **Photographs C13**)*. Through reference to the 1916 OS Map, *(see **Extract C**)* the landform historically overlying this excavation formed the high point of the surrounding landform at some 257 ft, *(78 metres)*.

6.54 South east of the pond, a woodland comprising of sycamore, birch, Scots pine and horse chestnut trees cloaks a gradually sloping landform, becoming steeper to the eastern boundary, to an almost vertical bank offset to the west of the *(Grade II Listed)* Rock Windmill, *(see **Photograph C12**)*.

6.55 The landform otherwise steeply falls away to the north, where the sand processing machinery is located beyond an intervening ditch of standing water, whilst a wooded bank extends about to the north east.

6.56 There is an earlier access point to the east of the area, through to the former Windmill Landfill site, following on from the earlier mineral workings, *(see **Photograph H**)*. Adjacent to this and beyond a close boarded fence is an Environmental Management Compound, associated with the ongoing environmental monitoring of the landfill site, which additionally generates electricity. This is located to the north of the area of the Site comprising of the access to the former Windmill Landfill site, throughout which a 10m deep depression has been retained to the west of the Windmill landfill, *(see **Appendix C, Photographs 15 - 22**)*. This area is referred to as 'the Valley' in an amendment to the approved restoration plan, which received consent under WSCC/16/15/WS for the retention of this and the access track within to the Environmental Management Compound. The former Windmill Landfill site is accessed off The Hollow, *(see **Photograph K**)*.

Nature of Landscape Receptors

6.57 Landscape components, against which the susceptibility of the Site to the proposed development might be appraised, are identified by LLD through reference to planning policy, designations, and landscape characterisation, *(with some weighting, relative to the value criteria provided within the methodology)* to comprise the following:

- ***Medium Value*** *- Contribution from the remnant latitudinal landform of the low sandstone ridgeline, (and to which the landform immediately surrounding Hollow Lane is representative), to landscape character, as a continuation of that to the west about Warren Hill, both with wooded crests, and the coherence and structure this provides individually and sequentially with that to the west as a landscape feature with time depth, about which field pattern, hydrology, historic built form and the alignment of roadways including the A24 (London Road) and the A283, (The Pike) have been influenced and defined;*

- ***Medium Value*** *- Contribution from the remnant latitudinal landform of the low sandstone ridgeline, to visual character in combination with that to the west about Warren Hill, both with wooded crests, as a compositional element when viewed from the upper scarp and downland crest to the south, south east and south west; Contribution of this to the visual integrity, identity, scenic quality and tranquillity of the South Downs National Park associated with elevated views from the scarp, looking north across the low weald, (including from the South Downs Way to the south west) under the South Downs Local Plan, (July 2019) Strategic Policy SD6: Safeguarding Views and SD7: Relative Tranquillity);*

- ***Medium Value*** *- Contribution from the woodland belt north of the A283, (The Pike) to concealing the quarry working beyond and preserving the setting of both the Washingtion Conservation Area and (Grade II Listed Buildings within), including that of Green Farm House to the south east;*

- ***Medium - Low Value*** *- Contribution from the treed embankment to the west of the quarry to concealing the quarry working from the wider setting of the (Grade II Listed) Sandhill Farmhouse and to a lesser extent that further to the north subject to subject to Area TPO No. 0204 of the (Grade II Listed) Rock House;*

- ***Medium Value*** *- Contribution from the woodland to the east of the sand processing facility at elevation to concealing the processing facility from the setting of the (Grade II Listed) Rock Windmill;*

- ***Medium Value*** *- Contribution from the treed boundary to south west and north in framing views for users of the Public Footpaths in these locations towards the Landmark feature of the wooded Chanctonbury Ring atop the chalk escarpment and the sense of place and special qualities of the South Downs National Park;*

- ***Medium Value*** *- Contribution to sense of place within the quarry from visibility towards the Landmark feature of the wooded Chanctonbury Ring atop the chalk escarpment and the special qualities of the South Downs National Park; Primarily from the grassed plateau to the north east of the quarry, but also from elevated parts of the quarry to the north west;*

- ***Medium Value*** *- Contribution to sense of place from the natural qualities of the patches of habitat present within the quarry and its perimeter, including reed fringed water bodies, gorse scrub, birch woodland and mixed deciduous woodland, introduce visual variety and complexity within the quarry;*

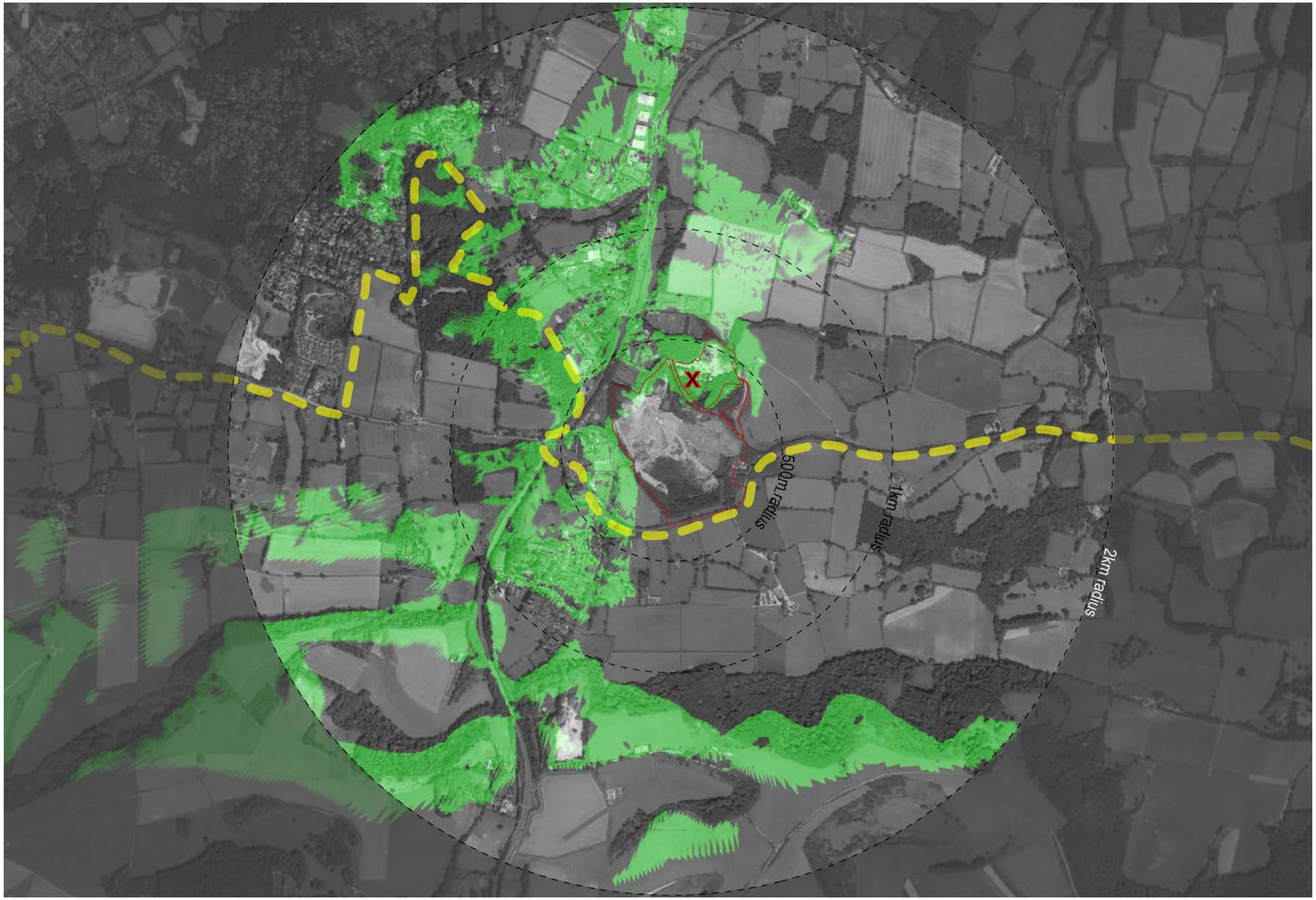
- ***High Value*** *- High level of relative tranquillity and sense of place associated with the chalk escarpment and scenic, panoramic northerly views across the weald from this, due to the elevation of the views and the mosaic of woodland and fields which form a tapestry, increasingly wooded before fading to blue along the far horizon line and the perspective this provides in line with the South Downs National Park Special Quality of a 'Diverse, inspirational landscapes and breath-taking views', (SQ1);*

- ***Low Value*** *- A moderate level of relative tranquillity along Public Footpath No. 2701, due to the natural elements of flowing water along the Honeybridge Stream, (albeit artificially supplemented by pumping from Rock Common);*

- ***Medium Value*** *- Time depth associated with the sunken lane of The Hollow and its association with the underling remnant landform over which it rises and falls; Including the presence of a veteran oak tree along the southern bank of the sunken profile of The Hollow;*

- ***Low Value*** *- Contribution of maturing coniferous trees to the north west of the Sand Processing Area, north of The Hollow as part of coniferous woodland habitat consistent with the sandstone ridgeline, particularly in southerly views from Public Footpaths within open fields to the north of the Site;*

- ***Medium Value*** *- Contribution from the large clean exposures of sand from the Folkestone Beds of the Lower Greensand to some 40m in elevation about the south of the quarry to educational interest in palaeoenvironmental studies, non statutorily designated for geological value as Rock Common Quarry, Sussex Regionally Important Geological Site, (RIGS) No. TQ11/41.*



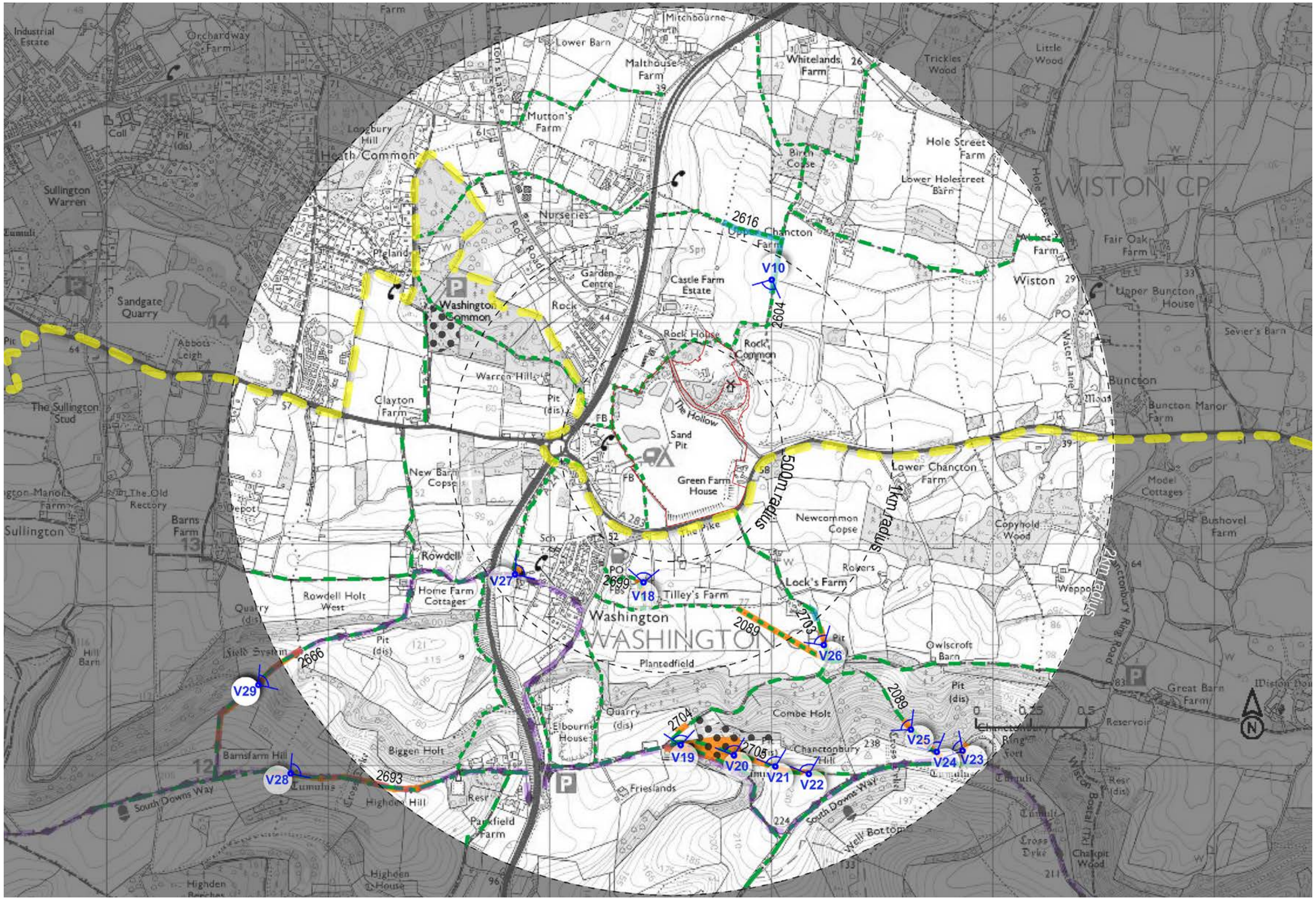
MAP DATA ©2019 GOOGLE. IMAGE CAPTURE: JUNE 2018, LANDSAT / COPERNICUS. GOOGLE VIEWSHED OUTPUT.

1:20,000 at A3

Legend

☐	Site Boundary.
🟨 🟨	South Downs National Park, (*south of the dashed yellow line*).
X	Point of high ground within the Site at some 65m aOD from which viewshed derived.
🟩	Zone of Theoretical Visibility from high ground within the Site. *(Produced through Google Earth Viewshed Tool).*

Figure 6.4. Zone of Theoretical Visibility.



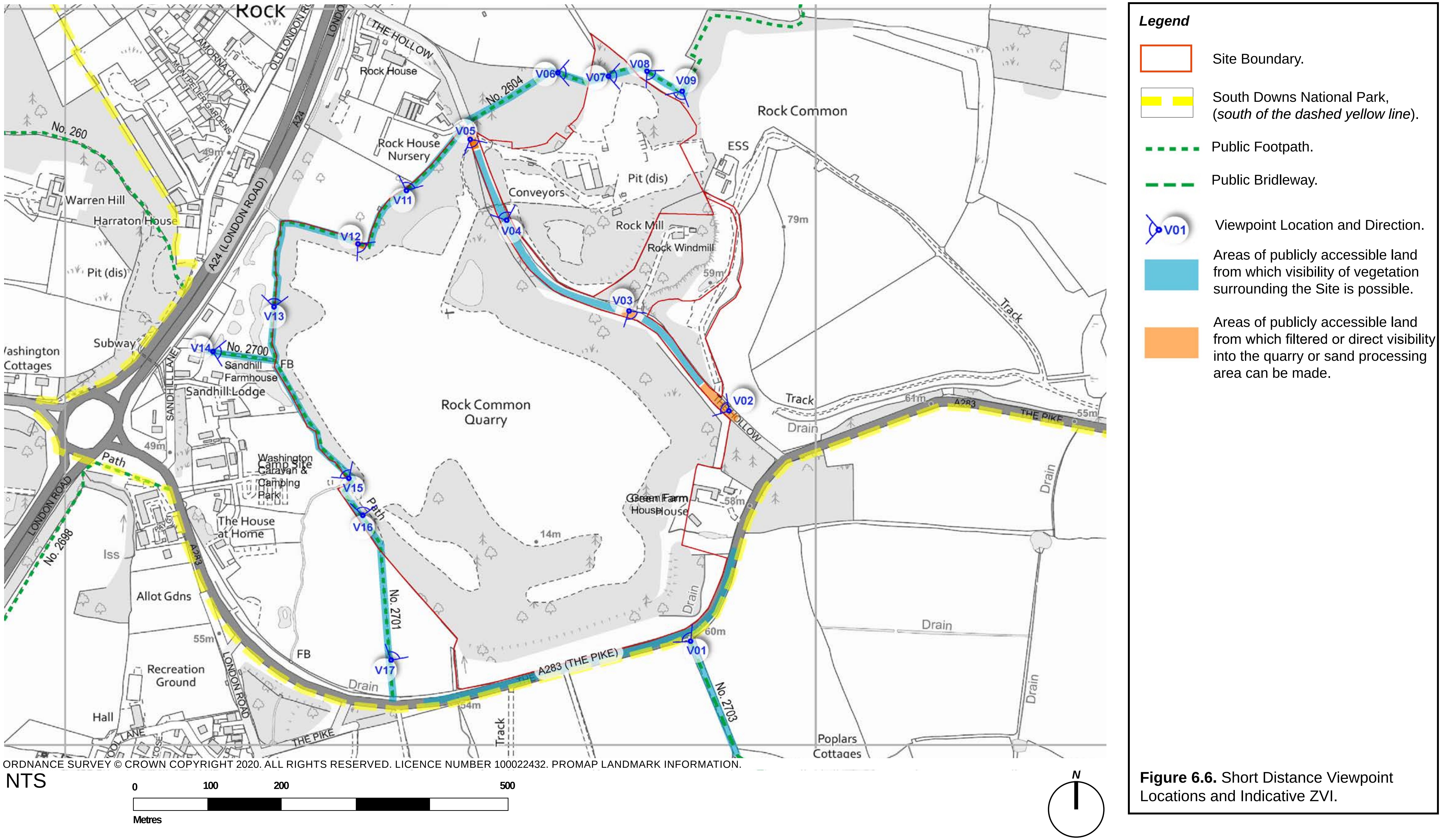
MAP DATA ©2019 GOOGLE. IMAGE CAPTURE: JUNE 2018, LANDSAT / COPERNICUS.

1:20,000 at A3

Legend

▭	Site Boundary.
▬ ▬	South Downs National Park, (*south of the dashed yellow line*).
▬ · ▬	Permissive Byway.
▬ ▬ ▬	South Downs Way Long Distance Footpath.
● ● ●	Open Access Land.
■ ■ ■ ■	Public Footpath.
▬ ▬ ▬	Public Bridleway.
V01	Viewpoint Location and Direction.
🟦	Areas of publicly accessible land from which visibility of vegetation surrounding the Site is possible.
🟧	Areas of publicly accessible land from which filtered or direct visibility into the quarry or sand processing area can be made.

Figure 6.5. Mid - Long Distance Viewpoint Locations and Indicative ZVI.



NTS

Figure 6.6. Short Distance Viewpoint Locations and Indicative ZVI.

Visual Amenity

6.58 Viewpoint Photographs from publicly accessible land are provided within **Appendix F**, through reference to **Figure 6.5** for Mid-long distance views and **Figure 6.6 for** Short distance views.

6.59 Permissive access has historically been provided by the Wiston Estate to Chanctonbury Ring through the HLS Scheme, which is informally sustained with no barrier to access. However, under the present Countryside Stewardship Scheme there are no options to allow payments for public access. There are no formal permissive access off the South Downs Way around Chanctonbury Ring as a result.

6.60 There are a number of Public Rights of Way, *(PRoW)* within the surrounding countryside, including along the western edge of the Site and up and along the edge of the Open Downs to the south. A Public Footpath, *(No. 2710)* extends along the western boundary of the Site towards The Hollow*.* Further PRoW extend towards the western and southern edge of the Site, respectively Public Footpaths No. 2700 and No. 2703.

Nature of Visual Receptors

6.61 A Public Footpath *(No. 2710)* extends along the western boundary of the Site, between The Hollow to the north and the A283, (The Pike) to the south. Visual amenity for local recreational users is variously represented and illustrated by **Viewpoints No. 11, 12, 13, 15, 16** and **17** from north to south.

6.62 For **Viewpoint No. 17**, the tree belt, visually dominated by a line of poplar along the south western edge of the Site can be seen over the intervening field, whilst there is a glimpse to the south east, towards the distant woodland copse atop Chanctonbury Ring.

6.63 Upon entering the woodland belt views are enclosed, other than at a point, where there are glimpses towards the quarry bottom, *(illustrated by **Viewpoint No. 16**).* From the point at which the sunken channel of the Honeybridge Stream draws adjacent to the Footpath, the boundary with the quarry is defined by a tree'd bank, which obscures visibility into the quarry.

6.64 Westward glimpses through the vegetation of hazel and hawthorn and dispersed trees along the banks of the Honeybridge Stream occur to various adjacent land uses, including the mowed grassed area and barbeque stands of the Washington Caravan and Camping Park, *(represented by **Viewpoint No. 15**)* and the private wetland area to east and north of Sandhill Lodge / Farmhouse, *(represented by **Viewpoint No. 13**).* Public Footpath No. 2700 extends east from the A24 to join with Public Footpath No. 2701 east of Sandhill Farmhouse, where there are views towards the tree line along the western edge of the Site over the private wetland area, *(see representative **Viewpoint No. 14**).*

6.65 Further north along Public Bridleway No. 2701, the Honeybridge Stream is departed and landform climbed towards a break in the vegetation, surrounded by coniferous trees, where a glimpse into the quarry can be gained, *(see illustrative **Viewpoint No. 12**).*

6.66 To the east of the Footpath, a steep embankment, which is well tree'd, with an Area TPO designation protecting the trees rises up, whilst the pathway continues along the edge of land within which orchards and pasture / garden land associated with Rock House Nursery is located. The apex of the *(Grade II Listed)* Rock house can just be glimpsed within dense vegetation at the point identified within illustrative **Viewpoint No. 11**.

6.67 Public Footpath No. 2604 continues to the north of The Hollow, *(opposite the northern end of Public Footpath No. 2710)*. A coniferous woodland, which banks towards the Site encloses views, other than to the north of the wooded area, where there is a glimpse across a field in fallow towards the northern tip of the Site, comprising of a scrubby area, with a few trees, to the side of which the Rock Business Park can be glimpsed, *(see illustrative **Viewpoint No. 06**).* The Footpath crosses within the northern tip of the Site, which comprises of an enclosed wooded area, represented by **Viewpoint No. 07**.

6.68 The boundary of the Site can otherwise be identified through reference to representative **Viewpoint No.08**, within a small field margin to the east, with the eastern point where adjacent within a further woodland belt illustrated by **Viewpoint No.09**. The boundary in both cases is well vegetated, with scrub and trees obscuring visibility when in leaf, with potential visibility of the bank beyond about the Site perimeter when out of leaf.

6.69 Further to the north, at mid distance from the Site within the open fieldscape, there is visibility back towards this tree belt along the Site boundary, as part of a woodland belt substantively comprising the birch and pine tree belt upon a mound surrounding the former municipal landfills known as Windmill, the Rock and the Rough. The tree belt is viewed below the chalk downs, upon which the woodland copse at Chanctonbury Ring provides a point of focus to the south east, *(see representative **Viewpoint No. 10**).*

6.70 For primarily vehicular users of The Hollow, visibility is substantively focused upon the rising or falling and turning road, which is enclosed within vegetation. However, there are glimpses through the thinner hedgerow within the Site, which extends along the south side of the road towards the top of the far quarry side, with mixed coniferous and deciduous tree belt atop at points, *(see illustrative **Viewpoints No. 02** and **03**).*

6.71 On the northern edge of the remnant landform, mature deciduous trees border the roadside as part of woodland belts to either side within the Site, *(see representative **Viewpoint No. 04**).* The incident of the access roads to both the quarry to the south and the wider access to the sand processing facility to the north occurs upon level ground beyond, *(see illustrative **Viewpoint No. 05**).*

6.72 Public Bridleway No. 2703 extends north from the scarp footslopes towards the A283, *(The Pike)*. For limited numbers of cyclists and perhaps horse riders, and very limited numbers of perhaps more local recreational users due to the lack of a verge along the A283, there is visibility of the southern edge of the Site comprising of dispersed oak trees both offset from and along a roadside maturing treeline with gaps through to a more dense tree belt beyond, *(illustrated by **Viewpoint No 01**).* This view is considered to be representative for vehicular users of the A283 where adjacent.

6.73 Further to the south along Public Bridleway No. 2703, and converging Public Footpath No. 2809 on the scarp footslopes, *(before the wooded scarp further to the south)* there is visibility towards the sandy upper slope of the north eastern edge of the quarry, *(under vegetation alongside and beyond the elevated part of The Hollow)*, *(see representative **Viewpoint No. 26**)*.

6.74 Within these views the sandy exposure forms an incident within a wooded belt, which undulates in sync with both the remnant underlying landform about The Hollow, (*Low Folkestone Sand Ridgeline)* and that further to the west of the Study Area about Warren Hill, which form a cohesive compositional element upon the skyline. Further more limited visibility towards the undulating treed skyline, contributed to by trees within the Site and a minor glimpse towards an upper sandy exposure to the north east of the quarry can be gained from the south west at a point to the north of *(Grade II Listed)* Tilley's Farm Cottage, along Public Footpath No. 2699-5, *(illustrated by **Viewpoint No 18**).*

6.75 A further point with comparable, albeit more restricted visibility due to foreground vegetation is provided from the churchyard of the *(Grade II* Listed)* The Parish Church of St Mary, within the Washington Conservation Area, *(illustrated by **Viewpoint No 27**).*

6.76 Upon the wooded scarp face of the escarpment there is filtered visibility from the upper part of Public Bridleway No. 2089, within the woodland of Chanctonbury Hill SSSI, towards the eastern part of the sand quarry, enclosed at this angle within a wooded plane, represented by **Viewpoint No. 25**. Further to the south as the crest is reached this visibility opens up to a more panoramic view, represented by **Viewpoint No. 24**.

6.77 Within this view and other panoramic northerly views from along the upper scarp and downland crest, the focus and compositional quality is upon the broad expanse of the weald visible, which comprise of a mosaic of woodland and fields which form a tapestry, increasingly wooded before fading to blue along the far horizon line, set against the more simple foreground of sheep grazed pasture, or wooded edge steeply dropping away.

6.78 Within views from the crest, in some places the quarry draws visual attention by measure of its scale, due to proximity and contrast in terms of its yellow colour and sunken form compared to the patchwork of fields, bound by hedgerows and field oaks and woodland blocks which otherwise surround and against which it presents a marked contrast; *(For example, an overheard comment upon the Site visit came from a younger member of a family on bikes, who was excited to notice the quarry, having perhaps lived in the area and having never previously noticed it at ground level).*

6.79 A comparable view compositionally occurs at points across the upper scarp / open downs of Chanctonbury Hill, albeit differing extents of the quarry and its context are visible as part of these views. From the south east, the nature of this visibility for recreational users enjoying the South Downs National Park are represented by Viewpoint No.24, and illustrated from adjacent to the western edge of Chanctonbury Ring by **Viewpoint No. 23**. Those west of the rising crest, north west of Chanctonbury Hill, are represented by Viewpoint No illustrated by **Viewpoint 21**, and illustrated at the easterly point before visibility is lost as a result of foreshortening from the crest, by **Viewpoint No. 22**.

6.80 It is worth noting that there is no formal permissive access off the South Downs Way around Chanctonbury Ring as a result. Despite this and due to the precedent from earlier access rights a view is provided from the western edge of Chactonbury Ring, illustrated by **Viewpoint No. 23**.

6.81 Upon closer scrutiny there is a further element within these views, associated with the quarry by proximity, which also runs against the grain otherwise presented by field pattern and woodland. That is the restored landscape of the former municipal landfills known as Windmill, the Rock and the Rough, *(following on from the earlier mineral workings)* which presents a relatively incongruous landform within these views, which is visually highlighted by the atypical north westerly aligned track, which rises up and over this restored landform.

6.82 The restored landscape is visually inconsistent with the small scale field pattern of surrounding fields and their prevailing field boundary alignment. It is also inconsistent with the east-west alignment of the greensand ridge, which is most commonly wooded as about the remnant parts of that associated with the Site and that further to the west upon Warren Hill.

6.83 For recreational users enjoying the South Downs National Park further to the south west, and those walking or cycling the South Downs Way, there is more limited visibility of the open quarry and surrounding vegetation due to the increased distance, and reduced proportion of the open quarry visible due to perspective.

6.84 Despite the open quarry forming a less noticeable feature it remains perceptible within the panoramic views, and introduces a contrast with the grain and texture of surrounding fields and woodland, which otherwise extend and grade to the horizon. Visual amenity is represented from points to the north east of Highden Hill by **Viewpoint No. 28** and the north east of Barnsfarm Hill by **Viewpoint No. 29**. At greater distance to the south west, visibility from the north eastern face of Sullington Hill is illustrated by **Viewpoint No. 30**. This latter viewpoint is broadly coincident with that identified within the SDNPA Viewshed Study as Representative View No. 34 - Sullington Hill, *(LUC, 2015).*

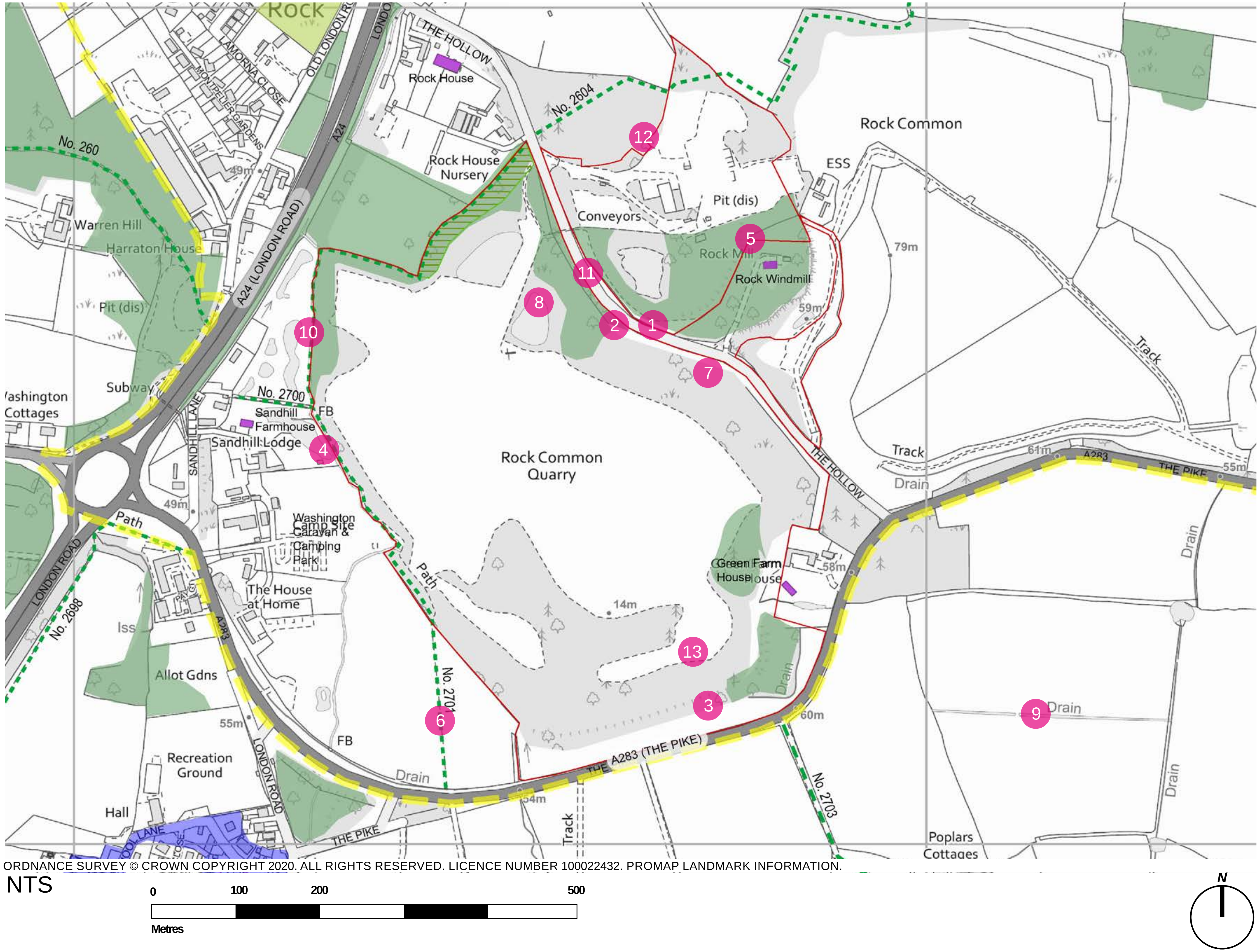
Zone of Visual Influence

6.85 The Zone of Visual Influence *(ZVI)* for the Site, (*see **Figures 6.5** and **6.6**)* was derived from the Zone of Theoretical Visibility, *(see **Figure 6.4**)* and determined as part of the field assessment and desktop analysis of Ordnance Survey mapping, through reference to the Viewpoint photographs.

6.86 The ZVI is indicative of the area from which the Site and its restoration is likely to be visible from the public realm, taking into account landform, built form, vegetation and distance. The ZVI is defined as two separate zones as shown on **Figures 6.5** and **6.6**.

6.87 Visibility towards the quarry or sand processing area are substantively confined to glimpses from The Hollow and from points to the west along Public Footpath No. 2701. Visibility is otherwise substantively reserved for elevated viewpoints upon the upper scarp or open downland immediately upon the crest to the west of Chanctonbury Ring, or for a larger area along the north western edge of Chantonbury Hill to the south west.

6.88 Further visibility is gained from the north eastern scarp and open downland about Highden Hill and that to the north east of Barnsfarm Hill, along both of which the South Downs Way and an alternative South Downs Way Route extend.



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Legend

🟥	Site Boundary.
▬ ▬	South Downs National Park, (*south of the dashed yellow line*).
······	Public Footpath.
‒ ‒ ‒	Public Bridleway.
▬	Listed Building *(Grade II)*.
🟦	Conservation Area.
🟩	Deciduous Woodland UK Priority Habitat.
🟩	Traditional Orchard UK Priority Habitat.
▤	Tree Preservation Order.

See **Section 7.0** for supporting description of Constraints.

①	Constraints.

Figure 7.1. Constraints.

7.0 LANDSCAPE CONSTRAINTS AND OPPORTUNITIES

7.1 Landscape constraints and opportunities are identified to communicate the relevant aspects derived from the study through reference to **Figure 6.1** for constraints and **Figure 6.2** for opportunities.

Landscape Constraints

7.2 Landscape components against which the susceptibility of the Site to both the existing and proposed restoration proposals might be appraised are identified by LLD through reference to planning policy, designations, and landscape characterisation, taking into account the special qualities of the South Downs National Park as follows.

7.3 The key landscape constraints, identified for the Site, *(with allocation of sensitivity taking into account the susceptibility of the component to the proposals)* are considered to be:

① ***Medium*** *- Contribution from the remnant latitudinal landform of the low sandstone ridgeline, (and to which the landform immediately surrounding Hollow Lane is representative), to landscape character, as a continuation of that to the west about Warren Hill, both with wooded crests, and the coherence and structure this provides individually and sequentially with that to the west as a landscape feature with time depth, about which field pattern, hydrology, historic built form and the alignment of roadways including the A24 (London Road) and the A283, (The Pike) have been influenced and defined;*

② ***Medium*** *- Contribution from the remnant latitudinal landform of the low sandstone ridgeline, to visual character in combination with that to the west about Warren Hill, both with wooded crests, as a compositional element when viewed from the upper scarp and downland crest to the south, south east and south west; Contribution of this to the visual integrity, identity, scenic quality and tranquillity of the South Downs National Park associated with elevated views from the scarp, looking north across the low weald, (including from the South Downs Way to the south west) under the South Downs Local Plan, (July 2019) Strategic Policy SD6: Safeguarding Views and SD7: Relative Tranquillity);*

③ ***Low*** *- Contribution from the woodland belt north of the A283, (The Pike) to concealing the quarry working beyond and preserving the setting of both the Washingtion Conservation Area and (Grade II Listed Buildings within), including that of Green Farm House to the south east;*

④ ***Low*** *- Contribution from the treed embankment to the west of the quarry to concealing the quarry working from the wider setting of the (Grade II Listed) Sandhill Farmhouse and to a lesser extent that further to the north subject to Area TPO No. 0204 of the (Grade II Listed) Rock House;*

⑤ ***Low*** *- Contribution from the woodland to the east of the sand processing facility at elevation to concealing the processing facility from the setting of the (Grade II Listed) Rock Windmill;*

⑥ ***Low*** *- Contribution from the treed boundary to south west and north in framing views for users of the Public Footpaths in these locations towards the Landmark feature of the wooded Chanctonbury Ring atop the chalk escarpment and the sense of place and special qualities of the South Downs National Park;*

⑦ ***Medium*** *- Contribution to sense of place within the quarry from visibility towards the Landmark feature of the wooded Chanctonbury Ring atop the chalk escarpment and the special qualities of the South Downs National Park; Primarily from the grassed plateau to the north east of the quarry, but also from elevated parts of the quarry to the north west;*

⑧ ***Medium*** *- Contribution to sense of place from the natural qualities of the patches of habitat present within the quarry and its perimeter, including reed fringed water bodies, gorse scrub, birch woodland and mixed deciduous woodland, introduce visual variety and complexity within the quarry;*

⑨ ***Medium*** *- High level of relative tranquillity and sense of place associated with the chalk escarpment and scenic, panoramic northerly views across the weald from this, due to the elevation of the views and the mosaic of woodland and fields which form a tapestry, increasingly wooded before fading to blue along the far horizon line and the perspective this provides in line with the South Downs National Park Special Quality of a 'Diverse, inspirational landscapes and breath-taking views', (SQ1);*

⑩ ***Low*** *- A moderate level of relative tranquillity along Public Footpath No. 2701, due to the natural elements of flowing water along the Honeybridge Stream, (albeit artificially supplemented by pumping from Rock Common);*

⑪ ***Low*** *- Time depth associated with the sunken lane of The Hollow and its association with the underling remnant landform over which it rises and falls; Including the presence of a veteran oak tree along the southern bank of the sunken profile of The Hollow;*

⑫ ***Low*** *- Contribution of maturing coniferous trees to the north west of the Sand Processing Area, north of The Hollow as part of coniferous woodland habitat consistent with the sandstone ridgeline, particularly in southerly views from Public Footpaths within open fields to the north of the Site;*

⑬ ***Medium*** *- Contribution from the large clean exposures of sand from the Folkestone Beds of the Lower Greensand to some 40m in elevation about the south of the quarry to educational interest in palaeoenvironmental studies, non statutorily designated for geological value as Rock Common Quarry, Sussex Regionally Important Geological Site, (RIGS) No. TQ11/41.*

Landscape Opportunities

7.4 Landscape opportunities are defined to both recommend mitigation measures which would avoid, reduce and if possible remedy potential adverse effects from the Proposed Restoration, but also to define Site specific enhancement measures.

7.5 Landscape opportunities which have been integrated into the Scheme approach are identified as primary mitigation, *(and enhancement)*. The residual effects from both time dependent primary mitigation, *(and enhancement)* and secondary mitigation, *(and enhancement)* recommended by this report, are considered within the assessment of landscape and visual effects where applicable.

Primary Mitigation and Enhancement Measures:

① ***Avoid*** *- The more elevated restoration levels would resolve the conflict between the obligation placed on the former operator of the Windmill Landfill Site to maintain water levels below 30m aOD, (relative to the potential risk of water pollution from south-west flowing groundwaters of the Folkestone Beds to leach putrescible waste from the landfill site) by using the imported material to restore levels above that of the natural, groundwater level; (in line with West Sussex Joint Minerals Local Plan (July 2018) Policy M24(g): Restoration and Aftercare);*

② ***Reduce*** *- 'Traffic to and from the sand processing area would be restricted to travel via the junction of The Hollow and the A24 only, whilst vehicles delivering restoration material will only use the junction of The Hollow and the A283 [...].' (Ibid, p10) 'Operational hours would continue as present for this period as follows: 'Monday to Friday 0700 to 1800; Saturday 0700 to 1300 (plant maintenance only 0700 to 1800); There shall be no working or operations at any time on Sundays or Bank or Public Holidays,' (Ibid, p9). Material would be deposited in an area close to the existing conveyor tunnel where it would be checked for compliance before being transferred into the main site using the conveyor tunnel, which runs under The Hollow into the main quarry. This would separate it from sand export movements which travel to / from the site via the A24 to the north';*

③ ***Reduce / Enhance*** *- Regarding the Regionally Important Geological and Geomorphological Site, (RIGS) associated with the quarrying Site: 'the proposal would ensure optimum stability of the quarry faces in the long term (to prevent the erosion and collapse of high faces of soft sand) through restoration with material arisings. However, if the upper levels of the Folkestone Formation can be safely left revealed, the final design would try to incorporate this. To ensure that the geology of the currently exposed high faces is properly recorded, appropriate measures will be taken prior to infilling encroaching on the geological exposures in order to fully record geological and structural features of interest. The British Geological Survey and the West Sussex Geological Society will be invited to survey and examine the exposed faces in advance of these being covered during restoration';*

④ ***Reduce / Enhance*** *- Infilling of quarry edges would result in a safer profile fit to the proposed recreational use, and otherwise particularly relevant along the western edge, where adjacent to Public Footpath No. 2701 and the Washington Caravan and Camping Park, which would minimise the existing potential conflict between land-uses and activities, relative to the hazard presented by the sheer cliff exposure in this location, (in line with West Sussex Joint Minerals Local Plan (July 2018) Policy M23 (a)(b): Design and Operation of Mineral Developments and Policy M24 (c): Restoration and Aftercare);*

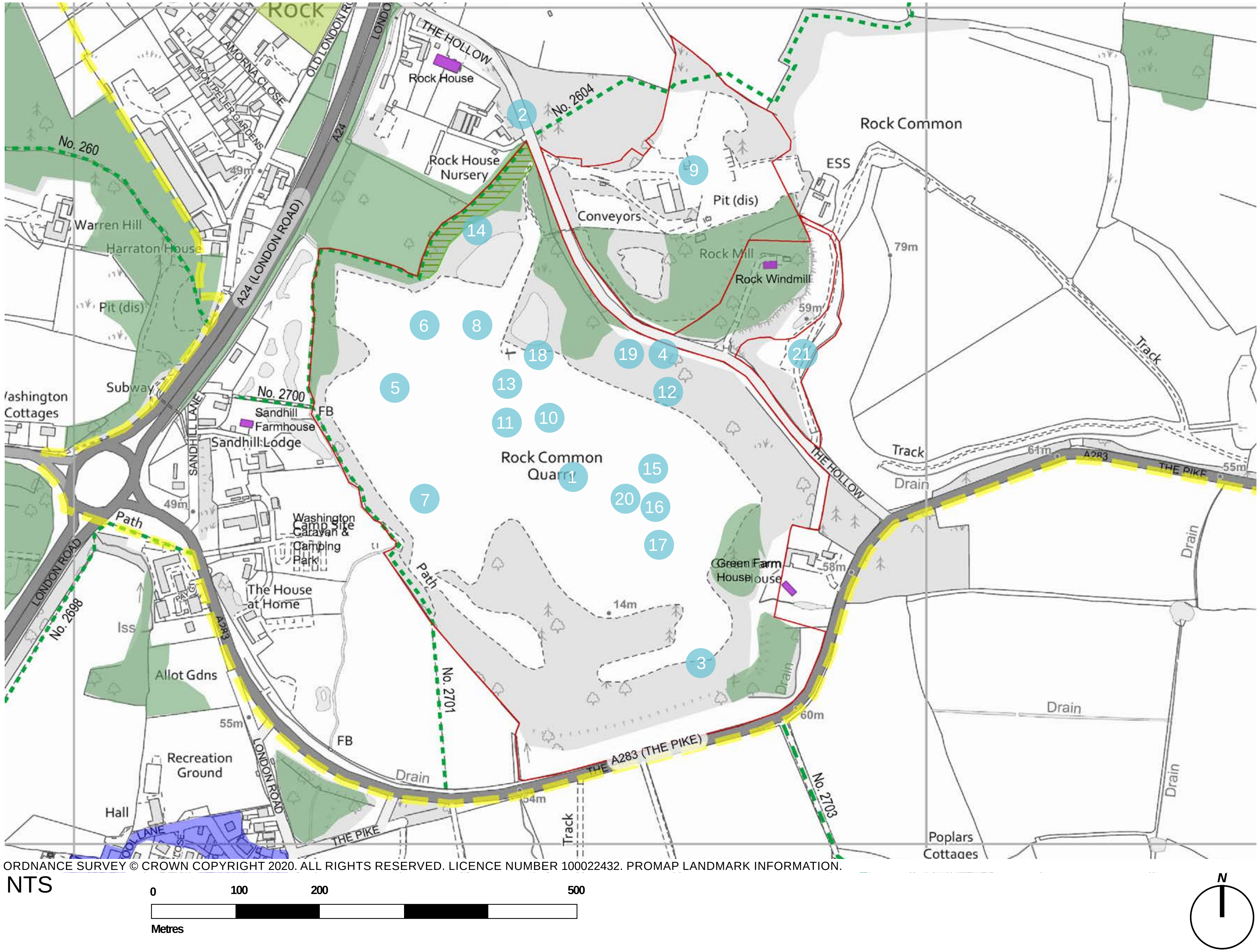
⑤ ***Enhance*** *- The restoration levels would afford much shallower, engineered areas of water, which would be suitable for both low-key recreational activities and biodiversity, resulting in a more productive and sustainable end-use of the restored land;*

⑥ ***Enhance*** *- The restoration would create a number of shallow lakes at varying levels, (perched above ground water levels). This would provide the foundation for anticipated future development as described within the Wiston Whole Estate Plan, comprising: 'an integrated ecological resource and National Park visitor destination co-located with ecotourist accommodation forming a gateway to explore woodland and downland centred experiences';*

⑦ ***Enhance*** *- A network of paths would circumnavigate the perched lakes within the raised quarry, creating a network of paths, accessed from the north east*

⑧ ***Enhance*** *- The restoration would more closely reinstate the latitudinal landform present before quarrying activities occurred, (and to which the landform immediately surrounding Hollow Lane is representative), which would part reinstate the topographic context within which the surrounding roads, historic built form and watercourses initially became established within the landscape, including views of this from elevated ground to the south upon the chalk escarpment and crest within the South Downs National Park, (in line with West Sussex Joint Minerals Local Plan (July 2018) Policy M23(b): Design and Operation of Mineral Developments and Policy M24(c): Restoration and Aftercare and Horsham District Planning Framework (2015) Strategic Policy 26: Countryside Protection and Policy 30: Protected Landscapes);*

⑨ ***Enhance*** *- All buildings, machinery and plant removed from site when no longer required in connection with the principal use, (in line with West Sussex Joint Minerals Local Plan (July 2018) Policy M24(e): Restoration and Aftercare).*



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Legend

▭	Site Boundary.
▬ ▬	South Downs National Park, (*south of the dashed yellow line*).
·····	Public Footpath.
‒ ‒ ‒	Public Bridleway.
▬	Listed Building *(Grade II)*.
🟦	Conservation Area.
🟩	Deciduous Woodland UK Priority Habitat.
🟩	Traditional Orchard UK Priority Habitat.
▤	Tree Preservation Order.

See **Section 7.0** for supporting description of Opportunities.

①	Opportunities.

Figure 7.2. Opportunities.

Secondary Mitigation and Enhancement Measures, recommended by LLD:

10 ***Enhance*** *- Potential to achieve a quality of habitat across a larger area of the Site than previous, which would achieve Priority Habitat of Acid Grassland and Lowland Heath in support of overlying Lower Arun Watershed BOA potential for habitat including: Lowland heathland; Lowland meadows; Reedbeds and Woodland; In common with Sullington Warren this could achieve: 'a range of heathland habitats including both wet and dry heath, grassland, scrub and woodland.'; This would be in keeping with the: 'heavily wooded ridges, interspersed with small patches of heathland', identified as characteristic for the West Sussex Storrington Woods and Heaths, (LCA WG7); This would enhance the setting of the South Downs National Park, through reinforcing multifunctional networks of spaces and features which connect with surrounding and existing biodiversity corridors in line with Horsham District Planning Framework (2015) Strategic Policy 25: The Natural Environment and Landscape Character and Policy 31: Green Infrastructure and Biodiversity and Storrington, Sullington & Washington Neighbourhood Plan 2018-2031, (September, 2019) Policy 15: Green Infrastructure & Biodiversity;*

11 ***Enhance*** *- Reinstate historic footway through reference to the 1879 OS Map (see Extract B) shown extending north, (from the present northerly alignment of Public Footpath No.2701) north east towards the elevated landform of The Hollow, (coincident with the private access drive to Rock Windmill beyond) and off which a north westerly aligned footway might be extended to link with the northern end of Public Footpath No. 2701 at The Hollow;*

12 ***Enhance*** *- Incorporate viewing areas or points from elevated points within the restored landscape towards the Landmark feature of the wooded Chanctonbury Ring atop the chalk escarpment to reinforce and enhance the contribution to sense of place within the quarry and the special qualities of the South Downs National Park this affords;*

13 ***Enhance*** *- Provide a number of sandy beach areas fringing the proposed perched water bodies of the Site as part of a mosaic of marginal habitats, to enable areas where vegetation is less likely to colonise and across which access to the naturalised waters edge might be gained; Otherwise establish marginal areas suitable for reedbed establishment to reinforce a mosaic of habitat across the Site area;*

14 ***Avoid / Enhance*** *- Conserve and enhance areas of good condition and quality deciduous and coniferous woodland (including that to the north western edge of the Site under Area TPO No. 0204), with some thinning as anticipated for recommendation within the Landscape and Woodland Implementation and Long-Term Management Plan, (LLD, 2020);*

15 ***Enhance*** *- Approach to planting mixes to ensure resilience and enable adaptation to a changing climate...' (in line with West Sussex Joint Minerals Local Plan (July 2018) Policy M23(c): Design and Operation of Mineral Developments);*

16 ***Enhance*** *- The network of paths within the PRS would additionally benefit the recommended approach to maintaining an open mosaic type habitat in places across the quarry site, through the informal disturbance of the substrate which would result about the acid grassland and heathland areas;*

17 ***Enhance*** *- The high quality and practicable restoration to be guided through reference to the LLD produced Woodland and Landscape Management Plan, (in line with West Sussex Joint Minerals Local Plan (July 2018) Policy Policy M24(b): Restoration and Aftercare);*

18 ***Enhance*** *- Potential to restore a latitudinal landform in keeping with that prior to quarry working, (as described within* ***Section 6.0****, under Site Boundaries and Features for The Quarry, (south of The Hollow) which would reflect that to the west at Warren Hill and reinstate the geological and historic landscape context within which the landscape evolved and now (Grade II Listed Buildings) and Scheduled Monument of Chanctonbury Ring were situated; This reinstatement of landform could be reinforced through introducing a wooded crest, (as with Warren Hill and Sulington Warren further to the west);*

19 ***Enhance*** *- Consider approach to establishing an area of heathland habitat to the north of the restored quarry site upon the south facing slope, and surrounding through vegetation management and heathland restoration; (for example newly hydraseeded slopes shall be managed to promote a low fertility open sward suitable for allowing the natural regeneration of acid grassland and heathland species; through a management plan which identifies the manner in which the areas subject to heathland restoration would be managed in the short term and long term); with resulting advantageous species to aid pollination and reduce pest species for the agricultural land which surrounds the Site;*

20 ***Enhance*** *- Manage and remove any Schedule 9 aquatic plants such as waterweed and pigmyweed to ensure that the spread of these plants is prevented, as recommended within A Preliminary Ecological Appraisal (Your Environment, March 2015);*

Outside of Site Boundary

21 ***Enhance*** *- Where viable, work with the owner of the previous Municipal landfills to infill 'The Valley' to the west of the landfill (east of Rock Windmill), to create a restored landform, which would present a more cohesive latitudinal alignment, alongside that of the restored Quarry site. This would integrate the present slightly incongruous landform, apparent in long distance views to the south from the edge of open downland.*

8.0 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

General

8.1 This section assesses the landscape and visual effects, which are likely from the Proposed Restoration Scheme, *(PRS)* described in **Section 1.0**, and draws comparisons relative to that which might be anticipated from the Approved Restoration Scheme, *(ARS) (under WS/15/97).*

8.2 The assessment considers the likely effects both during infill/ excavation operations and once restored, through a consideration of receptor susceptibility and magnitude of impact, using the methodology provided in **Section 4.0**.

8.3 Further opportunities are otherwise identified through reference to **Section 7.0,** as recommendations which are likely to further limit or avoid any impact identified, or which might result in enhancement. Where identified, the subsequent anticipated residual effects are identified within this section.

8.4 The potential for cumulative intra scheme effects which might be anticipated from heritage and ecology are integrated within the assessment of landscape impact, in advance of these receptor specific reports and EIA chapters being produced.

8.5 The assessment is undertaken descriptively to maintain the narrative and present the logic as clearly as possible.

Natural Change to the Baseline

8.6 There is considered to be limited natural change to the baseline resulting from the further maturing of tree lines and belts about the perimeter, due to the relative maturity or otherwise limited capacity to mature further due to spatial constraints or thin substrate availability. The shrubby treeline along the southern boundary of the Site with the A283, *(The Pike)* may mature to a greater height without management. The coniferous trees to the north west of the Sand Processing Area will continue to mature with potential increased height and perhaps canopy.

8.7 The present trend of warmer wetter winters and hotter drier summers within the UK, are observed as an ongoing and increasing trend within projections summarised within the 'UKCP18 Headline Findings', *(see: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-headline-findings-2.pdf>).*

Managed Change to the Baseline

8.8 The Restoration of the adjacent Windmill Landfill Site, consented under Application No. WSCC/017/09/WS is substantively complete with regards land profiling. However, the recent planting of native trees and scrub about the Site perimeter are anticipated to be managed until established, beyond which natural change is likely to result in a visual softening, *(where vired from elevated points to the south)* and integration of the valley feature landform retained to the west of the Windmill Landfill, *(east of Rock Windmill).*

Landscape Character

8.9 The PRS represents a substantive continuation of the present operational hours and rate of vehicle movements to and from the Site, for some eight further years. However, the focus of activity would shift from the sand processing area to the restoration material reception area to the east, with a sustained ***Minor adverse effect*** on local levels of low to moderate relative tranquillity over the duration of the restoration in contrast to the ARS under which this would substantively cease.

8.10 However, over this same period as the PRS progressed, there is anticipated to be a gradual beneficial effect on the visual integrity, identity, scenic quality and tranquillity of the South Downs National Park associated with elevated views from the scarp to the south, looking north across the low weald, *(including from the South Downs Way to the south west).* As described within the Visual Amenity Assessment, *(VIA)* this is due to the relatively incongruous presence of the quarry within the landscape, which draws visual attention by measure of its scale, due to proximity and contrast in terms of its worked, yellow colour and sunken form.

8.11 This contrasts with the patchwork of fields, bound by hedgerows and woodland and the undulating wooded low sandstone ridgeline which otherwise provides a coherence to landscape and visual character within this area, and as compositional elements within scenic, panoramic northerly views across the weald, within which the patchwork mosaic of woodland and fields form a tapestry, *(increasingly wooded before fading to blue to the horizon)* which contributes to the South Downs National Park Special Quality of a *'Diverse, inspirational landscapes and breath-taking views', (SQ1).*

8.12 As the PRS progressed to the concluding stage, the recommended mosaic of open water, heathland and woodland would result in an integrated feature, which whilst still reasonably perceived as a restored old mineral site within elevated views, is one within which a more naturalistic, and proportionate in scale mosaic of habitat to that surrounding was affected, resulting in a ***Moderate beneficial effect.*** There are further recommendations provided within **Section 7.0**, both for within and without the Site which, where viable would further reinforce this effect, perhaps to a ***potential residual Major beneficial effect***, should the remnant landform be reinstated to its earlier natural extent, pre quarry working.

8.13 This is considered to be an improvement to that resulting from the ARS, which would maintain a distinct separation and incongruity with the surrounding landscape character, due to the sheer scale of the lake, as described within the VIA. This is considered to result in a more limited ***Minor beneficial effect*** on the visual integrity, identity, scenic quality and tranquillity of the South Downs National Park, as described above. There is no precedent for such a large body of water viewed at this proximity to the escarpment, outside of the natural floodplain of major rivers, when in use such as the River Arun, *(some 10km to the west).* The most analogous water body being the artificial Arlington Reservoir, *(some 40km east of the Study Area)* located some 4km offset from the escarpment from Wilmington Hill. The scale of the water body would continue to both physically and visually disrupt the more subtle association between the wooded, low sandstone ridgeline, *(and the remnant extent of this east of the A24, which the Site contributes to)* and surrounding field pattern.

8.14 Through reference to **Table 1.1**, the Primary aim of the Concept Restoration Scheme for the ARS, *(under WS/15/97)* is to: *'create a landscape lake for amenity and nature conservation and to integrate the Site into the surrounding landscape'*. With regards the amenity objective it is understood that whilst the ARS does include for a path about the perimeter of the lake, this is likely to require noticeable hazard signs about the lake edge. As identified through reference to the Scoping Opinion Request within **Section 1.0**: *'restoring (and creating) large bodies of deep, open water with steep underwater slopes is no longer current "best practice", not least because they are a danger to the public. [...]'*

8.15 In terms of a restored landscape, the benefits from the network of paths within the PRS would be significantly favourable to that resulting from the limited recreational affordance anticipated from the ARS. The ARS would achieve an increased level of relative tranquillity for anticipated recreational users when in proximity to the glassy surface of the large lake, *(albeit hazardous and ecologically poor)* but without the extent of recreational affordance and diversity of experience which might otherwise be achieved through the more extensive and naturalistic mosaic of water bodies and habitat resulting from the PRS.

8.16 With regards the nature conservation objective, the network of paths within the PRS would additionally benefit the recommended approach to maintaining an open mosaic type habitat in places across the quarry site, through the informal disturbance of the substrate which would result about the acid grassland and heathland areas. Whilst not dependent upon the recommended reinstatement of historic landform, the reinstatement of a broader south facing bank would benefit the recommended establishment of an area of heathland habitat to the north of the restored quarry site.

8.17 It is considered that the approach of the PRS would integrate into the Wealden Greensand landscape of both the Storrington Woods and Heaths, *(LCA WG7, 2020)* which surrounds to the north, whilst extending a mosaic of habitat into the Central Scarp Footslopes, *(LCA WG8, 2020)* which surrounds to the south, which is more in in keeping than the singular large lake proposed under the ARS.

8.18 The ARS is considered to present a missed opportunity to maximise the potential for the restoration of the Site. In general a potential ***Major - Moderate beneficial effect*** on local landscape character is considered to result from the PRS, relative to the proposed and associated extent of recommendations which are considered to be viable, in comparison to a more limited ***Minor beneficial effect***, which might be anticipated to result from the ARS.

Visual Amenity

8.19 For local recreational users along Public Footpath, *(No. 2710)* which extends along the western boundary of the Site, between The Hollow to the north and the A283, *(The Pike)* to the south, *(variously represented and illustrated by* ***Viewpoints No. 11, 12, 13, 15, 16*** *and* ***17*** *from north to south),* there is anticipated to be a ***Negligible effect*** on the pleasantness of the view.

8.20 From the two limited points, where glimpsed views into the quarry occur, these would be replaced with a glimpse onto either an expansive water body under the ARS, or under the PRS an area of slowly raising ground under the operational phase, and then a water body once complete. The overall pleasantness of the very limited glimpsed visibility is not considered to be substantively influential on the overall pleasantness of the view for these receptors.

8.21 There is anticipated to be a perceptible difference from the anticipated removal of the hazard signs, *(see* ***Viewpoints No. 12, 15*** *and* ***16****)* which is considered to be viable under the PRS, but potentially not under the ARS, due to the anticipated hazardous nature of the banks and water body beyond. This is considered to represent a ***Minor beneficial effect*** for these receptors under the PRS upon restoration.

8.22 For local recreational users along Public Footpath No. 2604 north of The Hollow, *(variously represented and illustrated by* ***Viewpoints No. 06, 07, 08, 09*** *and* ***10*** *from south to north),* there is anticipated to be a ***Negligible effect*** on the pleasantness of the view. A comparable effect is anticipated for those along the northern edge of Public Bridleway No. 2703 and along the A283, *(The Pike)*.

8.23 For primarily vehicular users of The Hollow, *(see illustrative* ***Viewpoints No. 02*** *and* ***03****)* visibility is substantively focused upon the rising or falling and turning road, which is enclosed within vegetation.

8.24 However, there are glimpses through the thinner hedgerow within the Site, which extends along the south side of the road towards the top of the far quarry side, with mixed coniferous and deciduous tree belt atop at points. From the two limited areas, where glimpsed views into the quarry occur, these would be replaced with a glimpse onto either an expansive water body under the ARS, or under the PRS an area of slowly raising ground under the later operational phase, and then a water body once complete. The overall pleasantness of the very limited glimpsed visibility is not considered to be substantively influential on the overall pleasantness of the view for these receptors, with a ***Negligible effect*** anticipated.

8.25 For primarily vehicular users of The Hollow, adjacent to the access into the sand processing area there would be a ***Minor beneficial effect*** on the glimpsed view into the sand processing area, *(see illustrative* ***Viewpoint No. 05****),* with the focus of heavy vehicles within and about the wide access, replaced with perhaps a recreational car park upon restoration. This localised beneficial effect on visual amenity would be delayed under the PRS for some 8-10 years beyond that which would be achieved under the ARS.

8.26 For visual receptors on the scarp footslopes, primarily those along Public Bridleway No. 2703, and converging Public Footpath No. 2809, to the south, *(see representative* ***Viewpoint No. 26****)* there is visibility towards the sandy upper slope of the north eastern edge of the quarry. Under the ARS, within these views the glimpsed sandy exposure would be retained, with a ***Negligible effect*** anticipated.

8.27 Under the PRS the sandy exposure is proposed to be reprofiled. This is considered to result in a ***Minor beneficial effect*** on the pleasantness of the view upon restoration, due to the visual emphasis which would be placed upon the wooded belt beyond, which undulates in sync with both the remnant underlying landform of the low sandstone ridgeline about The Hollow and that further to the west of the Study Area about Warren Hill, and which forms a cohesive compositional element upon the skyline within these views. This effect would be reinforced further to recommended reinstatement of landform and woodland upon the crest of this, highlighted for consideration within **Section 7.0**.

8.28 Comparable effects are considered to result for more filtered and localised glimpses to the upper sandy exposure from the south west at a point to the north of *(Grade II Listed)* Tilley's Farm Cottage, along Public Footpath No. 2699-5, *(illustrated by* ***Viewpoint No 18****)* and from the churchyard of the *(Grade II* Listed)* The Parish Church of St Mary, within the Washington Conservation Area, *(illustrated by* ***Viewpoint No 27****).*

8.29 For recreational users enjoying Rights of Way within the South Downs National Park upon the escarpment and downland edge to the south east *(variously illustrated and represented by* ***Viewpoints No. 23, 24*** *and* ***25*** *to the west of Chanctonbury Ring),* and to the south upon the rising crest, north west of Chanctonbury Hill, including an area of Open Access Land, *(variously represented and illustrated by* ***Viewpoints No. 19, 20, 21*** *and* ***22****)* the quarry draws visual attention by measure of its scale, due to proximity and contrast in terms of its worked, yellow colour and sunken form. This contrasts with the patchwork of fields, bound by hedgerows and woodland and the undulating wooded low sandstone ridgeline which otherwises provides a coherence to landscape and visual character within this area, and as compositional elements within scenic, panoramic northerly views across the weald, within which the mosaic of woodland and fields form a tapestry,

8.30 Within this view and other panoramic northerly views from along the upper scarp and downland crest, the focus and compositional quality is upon the broad expanse of the weald, which comprises of a mosaic of woodland and fields which form a tapestry, increasingly wooded and then fading to blue along the far horizon line, set against the more simple foreground of sheep grazed pasture, or wooded edge steeply dropping away.

8.31 As the PRS progressed to the concluding stage, the mosaic of open water, heathland and woodland would result in an integrated feature, which whilst still reasonably perceived as a restored old mineral site within elevated views, is one within which a more naturalistic, and proportionate in scale mosaic of habitat to that surrounding was affected, resulting in a ***Moderate beneficial effect*** on the pleasantness of the view.

8.32 There are further recommendations provided within **Section 7.0**, both for within and without the Site which, where viable would further reinforce this effect, perhaps to a ***potential residual Major beneficial effect***, in the mid to long term should the remnant landform be reinstated to its earlier natural extent, pre quarry working and wooded.

8.33 This is considered to be an improvement to that resulting from the ARS, which would maintain a distinct separation and incongruity with the surrounding landscape character, due to the sheer scale of the lake, which would maintain an incongruous feature at the scale of the quarry as at present. This is considered to result in a more limited ***Minor beneficial effect*** on the pleasantness of views for the receptors identified above. The scale of the water body would continue to both physically and visually disrupt the more subtle association between the wooded, low sandstone ridgeline, *(and the remnant extent of this east of the A24, which the Site contributes to)* and surrounding field pattern.

8.34 For recreational users enjoying Rights of Way within the South Downs National Park upon the escarpment and downland edge to the south west including those walking or cycling the South Downs Way, *(variously illustrated and represented by* ***Viewpoints No. 28, 29*** *and* ***30*** *further to the west)* there is more limited visibility of the open quarry and surrounding vegetation due to the increased distance, and reduced proportion of the open quarry visible due to perspective. Despite the open quarry forming a less noticeable feature it remains perceptible within the panoramic views, and introduces a contrast with the grain and texture of surrounding fields and woodland, which otherwise extend and grade to the horizon. A comparable effect to that of viewpoints to the south is anticipated, albeit more limited with increasing distance.

APPENDIX A - CONSENTED RESTORATION PLANS UNDER REF: WS/15/97

Rock Common
Concept Restoration Proposals

General

Mineral has been extracted from Rock Common since the 1920s.The majority of the permitted extraction area has been stripped of soils and overburden with mineral subsequently extracted.
The Quarry landform and its physical potential for restoration has therefore already been established.
The potential for restoring the Site to reflect regional landform features is therefore limited. The ability to recreate locally observed smaller scale character features and wildlife habitats appropriate to the Weald / Downland Margin
Wealden Fringe is attainable.

The Aim

The primary aim of the Concept Restoration Scheme is to create a landscape lake for amenity and nature conservation and to integrate the Site into the surrounding landscape in accordance with West Sussex County Council's Landscape Management Guidelines for Wooded Heath Ridges within the Developed Margins of the Weald / Downland Margin of the Wealden Fringe Region.

Consistent with this Aim, the Concept Restoration Scheme includes the following elements:-

1. Topography:

Grading of exposed faces and slopes above water level to enable integration of the restored Site into the surrounding land levels. Specifically:-

(a) Within the Mineral Extraction Area the proposal is to create, generally, 50° sand faces down to 42m aOD (above Ordnance Datum) with a 5 metre-wide bench (to be used as a circular walkway around the restored lake), followed by 20° slopes to the base of the quarry workings, (Noteable exceptions to these profiles would be the existing over-steepened sand faces and Gault Clay overburden slopes - see Drawing Nos. R32/87 & R32/91.

(b) Within the Plant Site Area, the proposal is to merge the area into the adjoining undisturbed ground.

2. Landform:

Creation of a central landscaped lake with associated stable landform, using only materials currently available on Site. Through appropriate 'grading' of the quarry margins, the restored landform will help assimilate the A283 Storrington to Washington section of the "Low Folkestone Sand Ridgeline".

3. Landscape:

Provision of terrestrial and aquatic habitats and land uses to enhance the wildlife and recreational potential of the Site. The proposed scheme will reinforce and compliment existing vegetation around the periphery of the Site to strengthen local charater. The key landscape types will comprise:

(a) Heathland
(b) Woodland
(c) Open Water

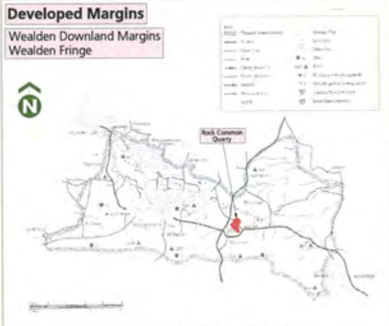
4. Vegetation Management and Planting

Other than the Willow / Alder mix required for Gault Slope stability, re-creation of local vegetation types appropriate to the Weald Downland Margin / Developed Margins Area, existing vegetation around the Site will be strengthened and 'linked' to the new planting to restrict views and strenghthen local landscape character. Specific proposals include:

(a) Conserve, manage and link existing / proposed heathland and woodland areas.

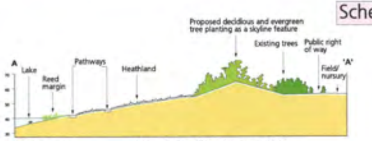
(b) Establish and manage a varied heathland landscape including trees, areas of bare ground, woodland, scrub and wetland.

(c) Re-creation and strengthening of the wooded skyline of the south facing ridgeline within the Mineral Extraction Area (i.e. emphasise the 'Low Folkestone Ridgeline' feature) by sympathetic tree planting.

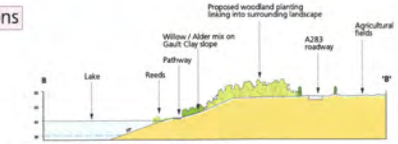


Landscape Designations and Identified Character Area

Schematic Restoration Sections



SECTION A - 'A' Scale: Vertical 1:1250 Horizontal 1:1250



SECTION B - 'B' Scale: Vertical 1:1250 Horizontal 1:1250

SECTION C - 'C' Scale: Vertical 1:1250 Horizontal 1:1250

Tree and Shrub Planting Proposals

The species mix for the scheme is to take account of the final surface material used for restoration. This relates to the amount and placement area of the Lower Greensand, Gault Clay and Marshill Clay

Broadleaved Woodland

Species		% Mix
Quercus robur	English Oak	30
Betula pendula	Silver Birch	15
Betula pubescens	Downy Birch	15
Ilex aquifolium	Holly	5
Sorbus aucuparia	Rowan	5
Populus tremula	Aspen	5
Frangula alnus	Alder Blackthorn	2
Corylus avellana	Hazel	10
Crataegus monogyna	Hawthorn	10
Viburnum opulus	Guelder rose	3
		100%

Broadleaved Woodland Incorporating Evergreen Tree Planting

Quercus robur	English Oak	25
Betula pendula	Silver Birch	15
Pinus sylvestris	Scots Pine	20
Sorbus aucuparia	Rowan	15
Crataegus monogyna	Hawthorn	15
Viburnum opulus	Guelder rose	10
		100%

Trees and shrubs to be planted at 2 metre centres to achieve a gross 2500 stems / hectare in single species groups of 5 to 10 with shrub groups on margins

Oaks to be protected in 1.5 metre high shelters. All other stock to be protected in 0.6 metre high shelters

Willow / Alder Mix on Gault Clay Slopes

Grass Seeding of the Gault Clay shall be undertaken as early as possible in order to establish an initial vegetation cover prior to final tree planting. (See Drawing No R32 / 91)

The final tree planting mix shall include:

Alnus glutinosa	Alder
Alnus incarna	Grey Alder
Salix caprea	Goat Willow
Salix cinerea	Grey Willow
Salix viminalis	Osler

Scrub Heathland Establishment

A heathland habitat is to be established around the periphery of the proposed lake and also within the restored Plant Site Area.
This heathland is to comprise a mosaic of localised heath grassland, and bare ground, including dry, wet and bog heath species. The location of the habitats will be dependent upon the restoration material used, i.e. dry heath on the Lower Greensand, wet and bog heath on the backfilled clay lake margins.

Target Heathland Habitat Species

Dry Heath	Dwarf gorse Heather Bell heather Broom
Wet Heath	Purple Moor Grass Heath rush White beak sedge Cross leaved heath
Bog Heath	Sphagnum moss Bulbous rush Round leaved sundew Oblong leaved sundew

Invasive species, including birch and bracken will be discouraged from encroaching into the heathland scrub.

Legend

―	Rock Common Quarry Site Boundary and Company Landholdings
🟩	Existing tree planting / woodland
A	Section positions
🟪	The Rough / Windmill Landfill Development
🟩	Surrounding land
🟦	Existing stream/pool
● ● ● ● 2701	Existing Public Rights of Way

Restoration Proposals

🟩	Broadleaved Woodland Incorporating Evergreen Tree Planting
🟩	Broadleaved Woodland
🟫	Scrub Heathland Establishment
🟩	Willow / Alder Mix on Gault Clay Slopes
🟨	Rock faces
☐	Restored Lake (Margins protected from wave erosion by ironstone rejects, placed as appropriate)
🟦	Indicative locations of reed and aquatic marginal species
🟫	Access track

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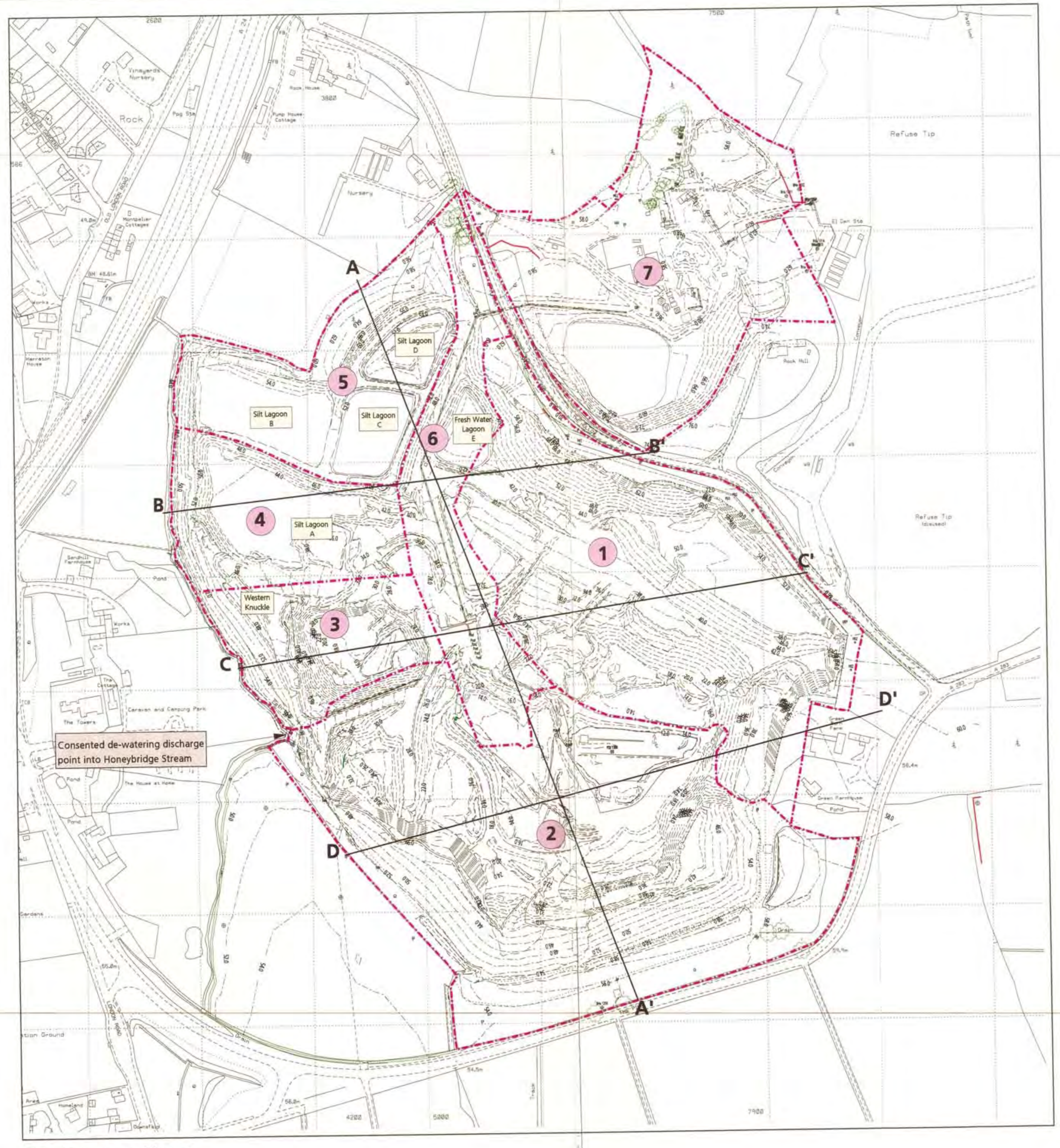
Rock Common

Concept Restoration Scheme

Drawn By	Scale
R.J.S / A.C.J	1 : 2000
Date	**Drawing No**
January 2004	R32 / 86

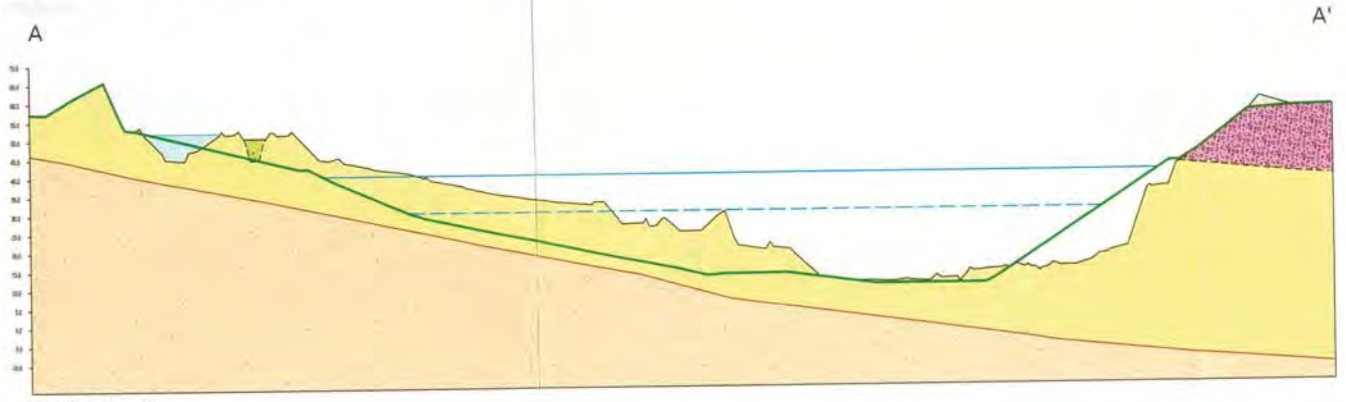


Existing Landform

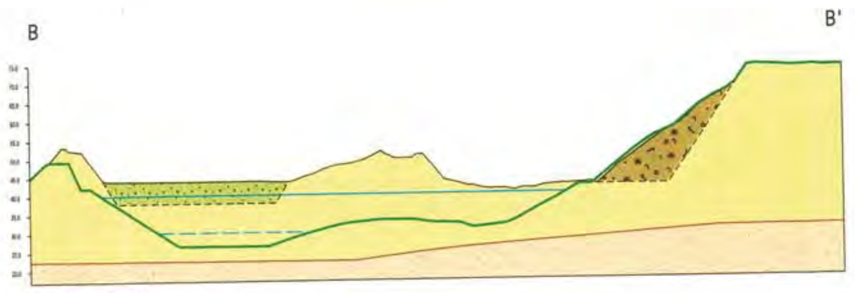
Topographical Survey 18-12-2003
(All levels in Metres Above Ordnance Datum)
Scale 1:2000

Proposed Restoration Landform

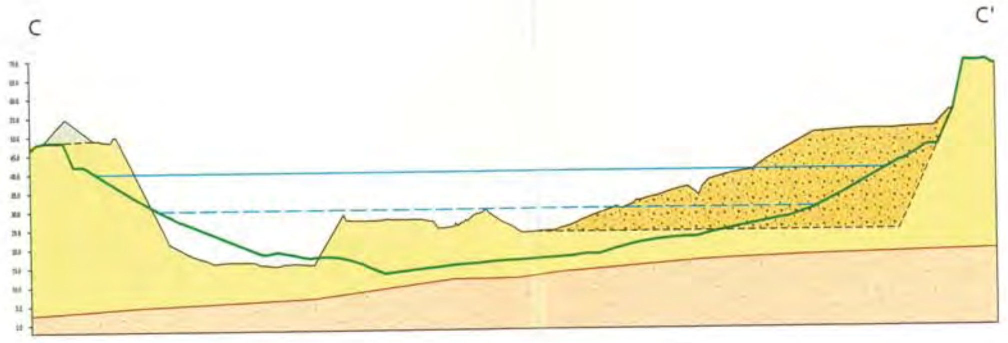
(All levels in Metres Above Ordnance Datum)
Scale 1:2000



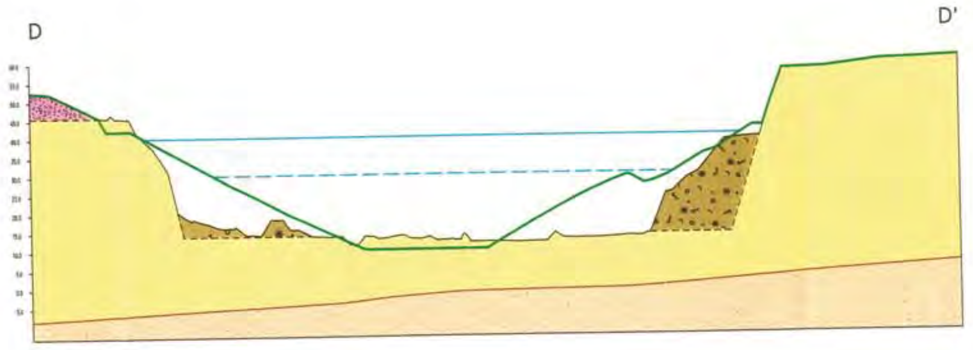
Section A - A'



Section B - B'



Section C - C'



Section D - D'

Plan Legend

- Section positions (A — A')
- ③ Working Areas

Cross Section Legend

Existing Landform

- Topographical survey (18-12-2003)
- Base of Folkestone Sand
- 🟩 Topsoil screening mound
- ▨ Gault Clay
- 🟨 Folkestone Sand
- ▨ Marehill Clay and underlying Sandgate Beds
- ▨ Silt (in Lagoons)
- ▨ Quarry Waste (comprising ironstones, cast out and dried silts, soils, fine sand, and clays with a regenerated vegetation cover).
- ▨ Marehill Clay from "The Rough"

Proposed Restoration Landform

- Proposed Restoration Landform
- Anticipated Lake Water Level assuming no ground water control measures
- Anticipated Maximum Lake Water Level assuming implementation of control measures (as required by the Waste Management Licence for the Windmill Landfill Site).

NB:
In creating the Proposed Restoration Landform (depicted by the solid green line on the cross sections) the working scheme detailed in the ROMPP submission provides for cutting and placement of Restoration Materials comprising Marehill Clay, soils, dry screened sand waste, ironstones and cut sand. Those areas uncoloured below the solid green line and where appropriate,areas where sand is to excavated below the solid green line will be in-filled with the above Restoration Materials. At no time will sand worked below the solid green line exceed 10mAOD in depth. No additional infill is required to achieve the proposed Restoration Landform

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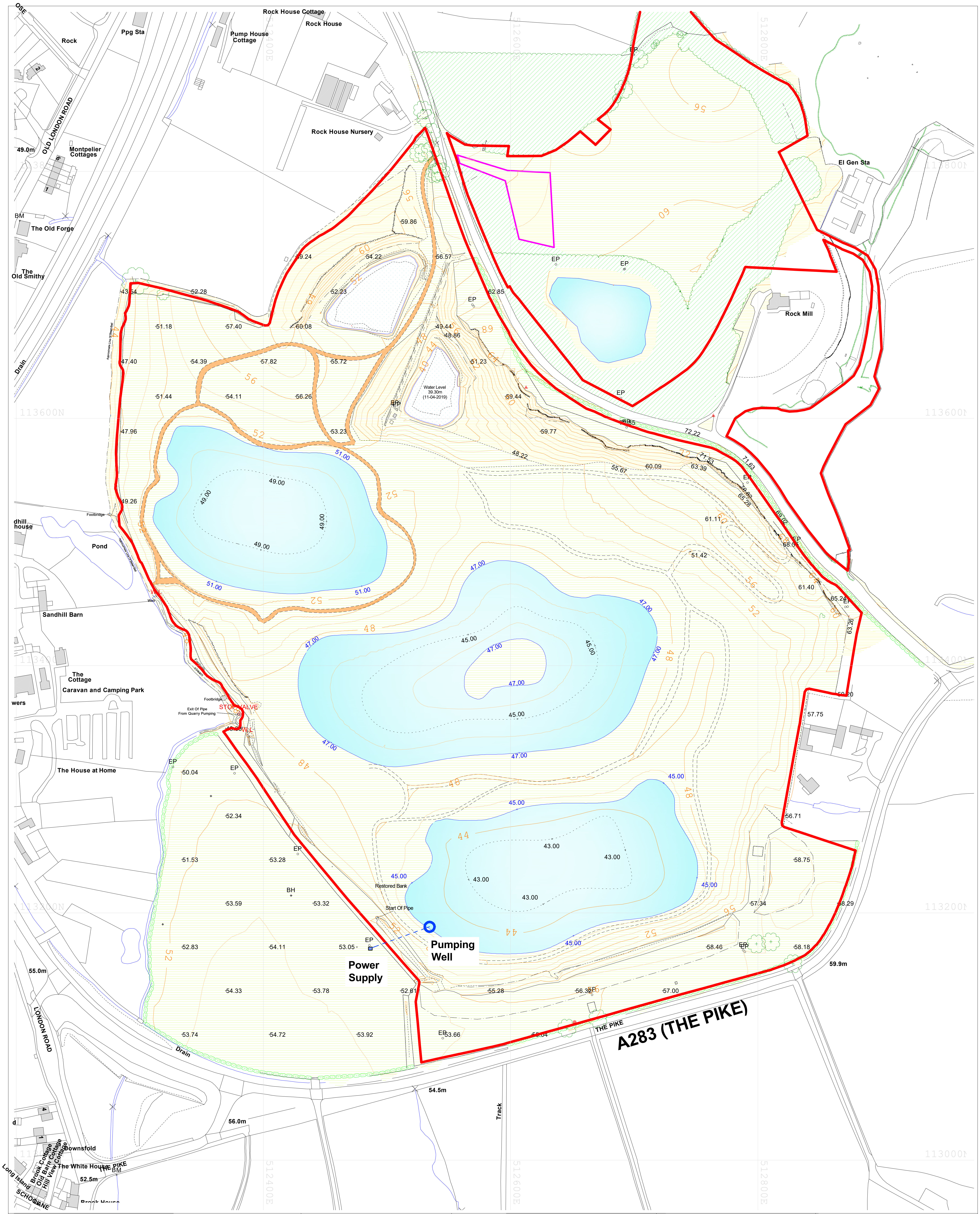
Rock Common

Cross Sections for ROMPP Review

Drawn By **A.W. / B.P.**	Scale **Horizontal 1:2000** **Vertical 1:1000 @ A0**
Date **January 2004**	Drawing No **R32 / 87**

N

APPENDIX B - PROPOSED RESTORATION PLANS



Legend:

- 🟥 Application Area
- ▨ Footpath for informal public access
- ▭ Private use access for maintenance and habitat management
- ▨ Retained hardstanding/site maintenance area

The final routing of footpaths both for informal public access and for private use may change subject to consultation during the application process

SCALE BAR

0 50 100 200

REVISIONS

	Date	Description	By
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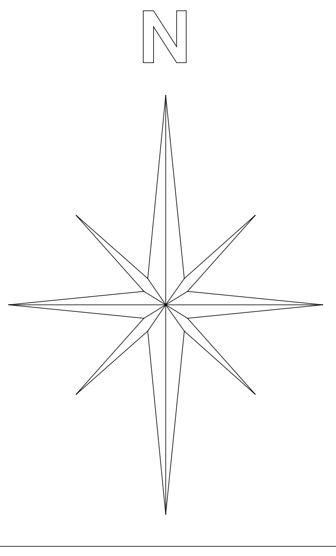

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Client

DUDMAN ROCK COMMON LIMITED

Job Title
Rock Common Quarry

Project Title
Planning application to vary approved restoration

Scale	Date	Drawn by	Checked
1:2000	DEC 20 (v4)	SW	MM

Dwg. title
Final restoration

DWG No.
DRCL/RCRA/WP-11

APPENDIX C - SITE IMAGES - NORTH OF THE HOLLOW

APPENDIX C - SITE IMAGES - NORTH OF THE HOLLOW

Photograph C1 - Easterly view towards the weighbridge from west of The Hollow, showing pine trees to the left and mixed woodland comprising birch, sycamore, oak, cherry, cypress and birch to the right.

Photograph C2 - Easterly view into the sand processing area.

Photograph C3 - Westerly view from the eastern edge of the sand processing area, fringed with scots pine and silver birch.

APPENDIX C - SITE IMAGES - NORTH OF THE HOLLOW

Photograph C4 - Westerly view from the north eastern edge of the sand processing area, fringed with embanked topsoil, with scots pine and silver birch beyond.

Photograph C5 - South westerly view from the north eastern edge of the sand processing area, fringed with embanked topsoil, with scots pine and silver birch beyond. Mixed woodland rises to the high point to centre view, where Rock Windmill is located underlying intervening trees.

Photograph C6 - South easterly view from a cleared area with topsoil mounds, fringed with silver birch trees.

APPENDIX C - SITE IMAGES - NORTH OF THE HOLLOW

Photograph C7. Westerly view of sand processing machinery.

Photograph C8. South westerly view of sand processing machinery, to west of the conveyor.

Photograph C9. Point at which the conveyor runs within a tunnel under The Hollow.

Photograph C10. Conveyor, east of the tunnel under The Hollow.

Photograph C11. Easterly view of the conveyor, glimpsed from the edge of The Hollow.

Photograph C12. Glimpsed view of Rock Windmill, from the eastern edge of the elevated ground within the Site, viewed through intervening tree canopies.

APPENDIX C - SITE IMAGES - NORTH OF THE HOLLOW

Photograph C13 - Open water across a pond with water lilies, fringed to the east with reed beds and with willow to the north. A line of electricity pylons extend through the vegetation and across the sand processing plant beyond.

Photograph C14 - South westerly view towards the ponded area from a wooded with steep incline to east comprising of beech and pine woodland.

Photograph C15a - South westerly view from the access track to the Environmental Management Compound, associated with the ongoing environmental monitoring of the landfill site atop restored landform. The Site is not visible. The wooded copse feature of Chanctonbury Ring is apparent upon the skyline.

Photograph C15b - Westerly view .

Photograph C16 - South westerly view from the access track to the Environmental Management Compound, associated with the ongoing environmental monitoring of the landfill site, to the northern edge of the Site. Access steps are located on rising land to the south of the linking access to the sand processing area, which is located to the west of the Management Compound. The access steps rise to an area north east of The Rock Windmill.

Photograph C17 - North easterly view from the access steps, south of the Environmental Management Compound, to the northern edge of the Site.

Photograph C18a - North easterly view towards the northern edge of the Site, where the gate to the Environmental Management Compound can be glimpsed. The banked edge to the former windmill landfill site rises to east, along the edge of which native species are recently planted.

Photograph C18b - South easterly view along the eastern edge of the Site. The banked edge to the former windmill landfill site rises to east, along the edge of which native species are recently planted. The ridgeline of the south downs can be seen beyond along The Valley.

APPENDIX C - SITE IMAGES - NORTH OF THE HOLLOW

Photograph C19a - South westerly view towards a ponded area, *(see **Photo C21**)* **inset within the wooded cutting to the west of The Valley. Exposed rock face is apparent to the cliffed western edge of The Valley.**

Photograph C20. Ponded area adjacent to the rock cutting to the west of the Site, *(see C19a).*

Photograph C19b - Northerly view long the access track up The Valley.

Photograph C21a - Easterly view towards the banked edge to the former windmill landfill site, along the edge of which native species are recently planted. Access ramps out to the south, where a siding can be seen to left of view.

Photograph C21b - South westerly view of an excavated area to the south west of the Site, which is fringed with trees and includes an elevated concrete platform.

Photograph C22 - South easterly view towards the access rising out to the south of The Valley, where a siding can be seen to left of view.

APPENDIX D - SITE IMAGES - SOUTH OF THE HOLLOW

APPENDIX D - SITE IMAGES - SOUTH OF THE HOLLOW

Photograph D1 - South westerly view along the conveyor towards the distant sculptural ridge of the South Downs escarpment about Chanctonbury Hill.

Photograph D2 - South westerly view along a western aligned track, which terminates further to the west adjacent to a perched pond with reedbed, beyond which Barnsfarm Hill can be seen.

Photograph D3 - South easterly view from the western end of the elevated track shown in Photograph D2, from which Chanctonbury Hill and the wooded feature of Chanctonbury Ring can be seen. The cliffed edge of the quarry can be seen to the west and southern edge of the quarry.

APPENDIX D - SITE IMAGES - SOUTH OF THE HOLLOW

Photograph D4 - South easterly view adjacent to the quarry side end of the conveyor, with electricity transformer adjacent, with birch trees to the right and gorse on sand banks to the right. Chanctonbury Hill and the wooded feature of Chanctonbury Ring can be seen. The cliffed edge of the quarry can be seen to the west of the quarry.

Photograph D5 - North westerly view from atop material arising area adjacent to a birch tree and reed fringed perched pond.

Photograph D6 - Southerly view from within sunken landform to the north west of the Site, with poplar tree line atop the western cliff face.

APPENDIX D - SITE IMAGES - SOUTH OF THE HOLLOW

Photograph D7 - North westerly view towards the north western end of the quarry, with elevated remnant landform to the right of view, (which would have continued across the centre of view originally).

Photograph D8 - South easterly view into the lake about the 10m aOD level, within the southern part of the Site, south of which 40m high exposures extend towards a coniferous woodland fringe about the southern edge of the Site.

Photograph D9 - Southerly view from a sandy margin adjacent to the lake about the 10m aOD level, within the southern part of the Site, south of which 40m high exposures extend towards a coniferous woodland fringe about the southern edge of the Site.

Photograph D10 - North westerly view from the south western end of the quarry site. The poplar tree line can be viewed to left above the quarry edge, whilst the elevated remnant landform to the right of view, (which would have continued across the centre of view originally).can be seen, forming the high point.

Photograph D11 - Elevated north eastern grassed plateau to the north east of the quarry, approximately level with the adjacent, slightly sunken The Hollow, upon the remnant original latitudinal landform, the chalk ridge presented by the South Downs escarpment about Barnsfarm Hill to the south west, and Chanctonbury Hill to the south, punctuated by the Landmark feature of the wooded Chanctonbury Ring, provides a sense of place associated with the SDNP.

Photograph D12 - Veteran oak tree to the south side of The Hollow, *(detail to right)*.

APPENDIX E - HISTORIC MAPPING

Indicative Site Boundary can be considered through reference to the subsequent map, due to surveying differences risking the site boundary highlighting differences which are not accurate.

Yeakell and Gardner's Sussex 1778-1783, 2inch to 1 mile (Extract)
Original publication: 1778-1783
Source accessed 18/06/2020
at: <http://www.envf.port.ac.uk/geo/research/historical/webmap/sussexmap/Yeakell_36.htm>

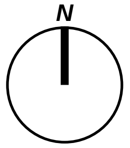
N

NTS

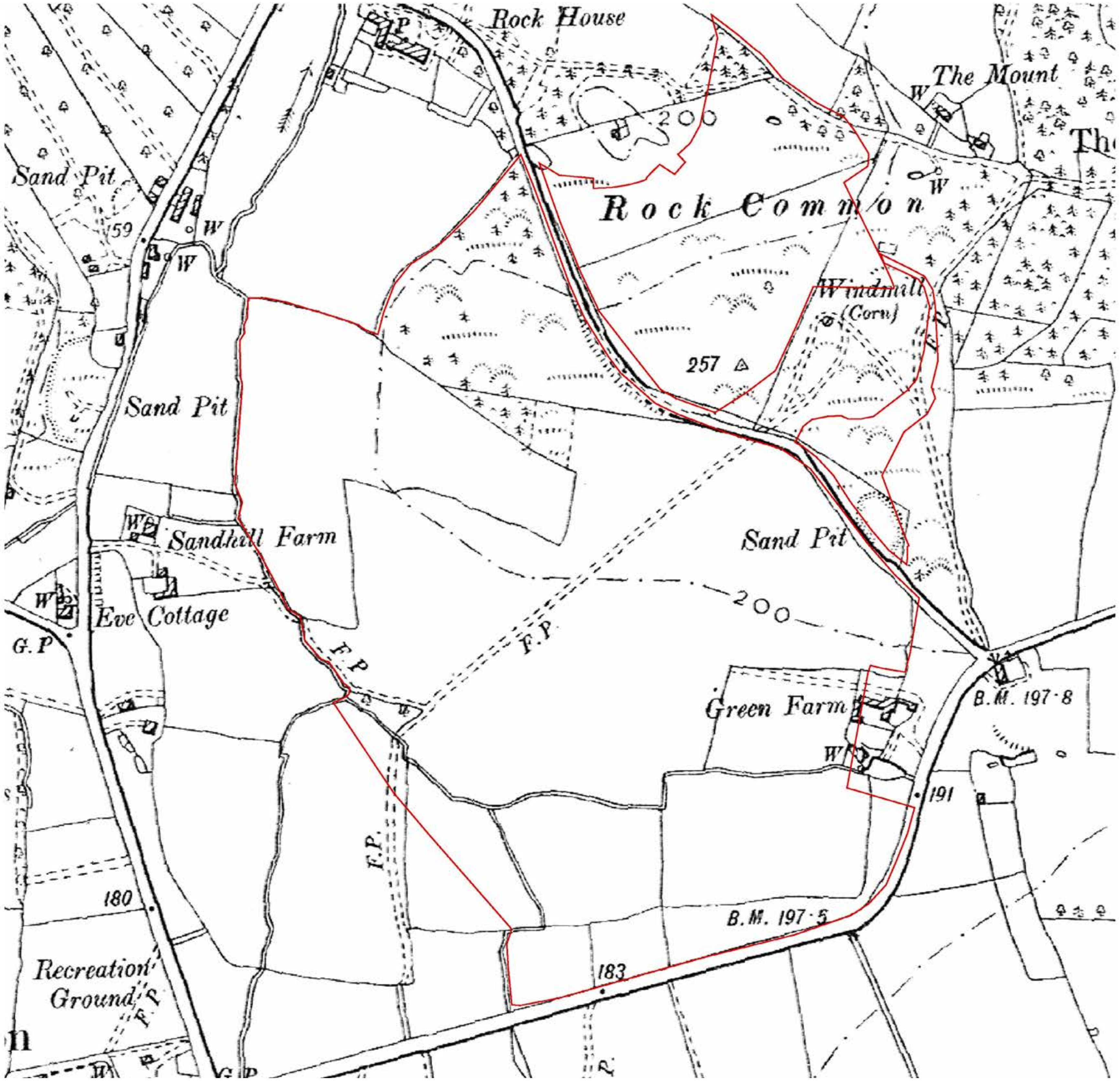
Legend

🟥 Indicative Site Boundary.

1879 OS map, *(Originally plotted at 1:10,560). Landmark.*



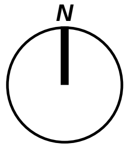
NTS



Legend

🟥 Indicative Site Boundary.

1916 OS map, *(Originally plotted at 1:10,560). Landmark.*



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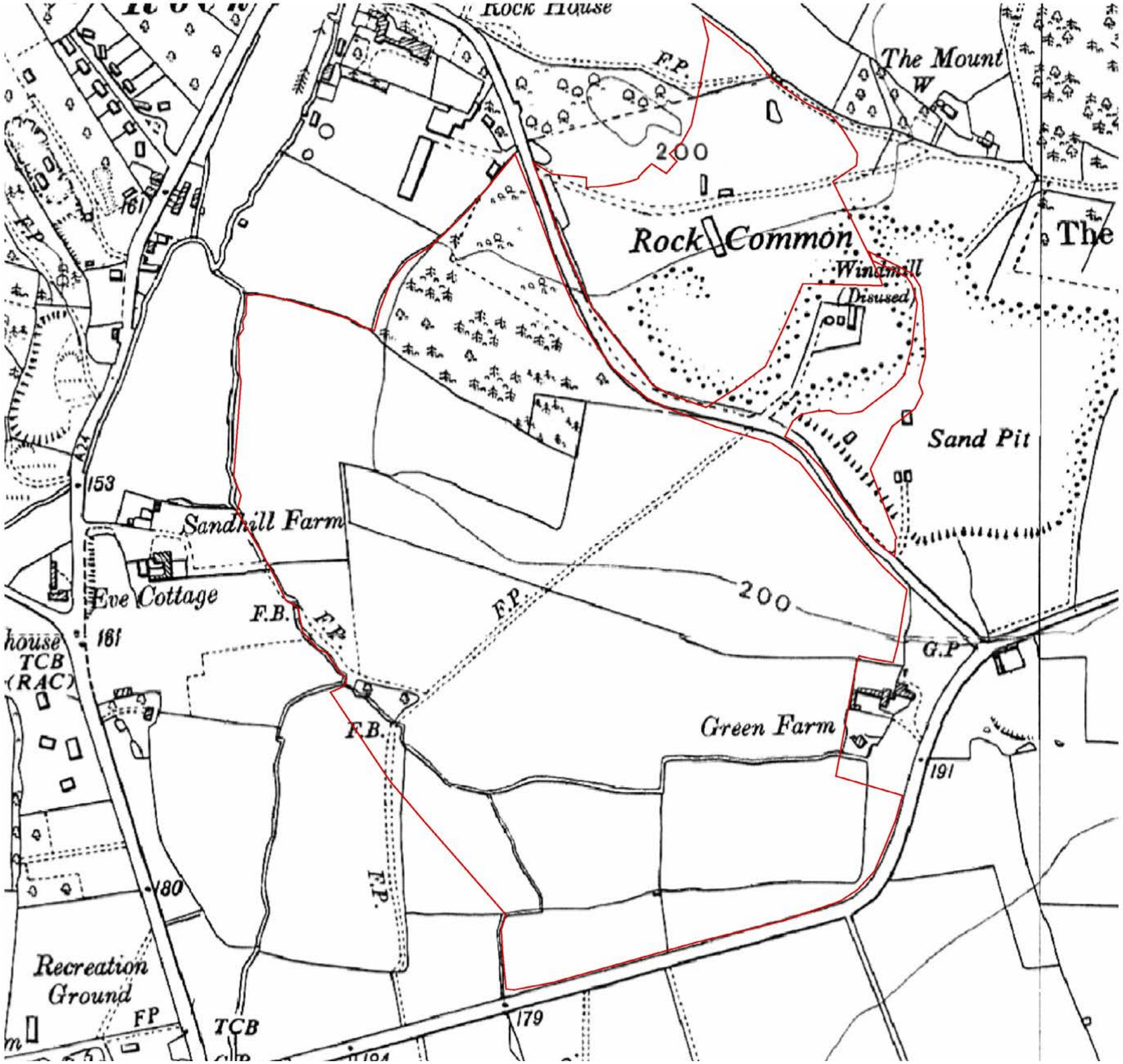


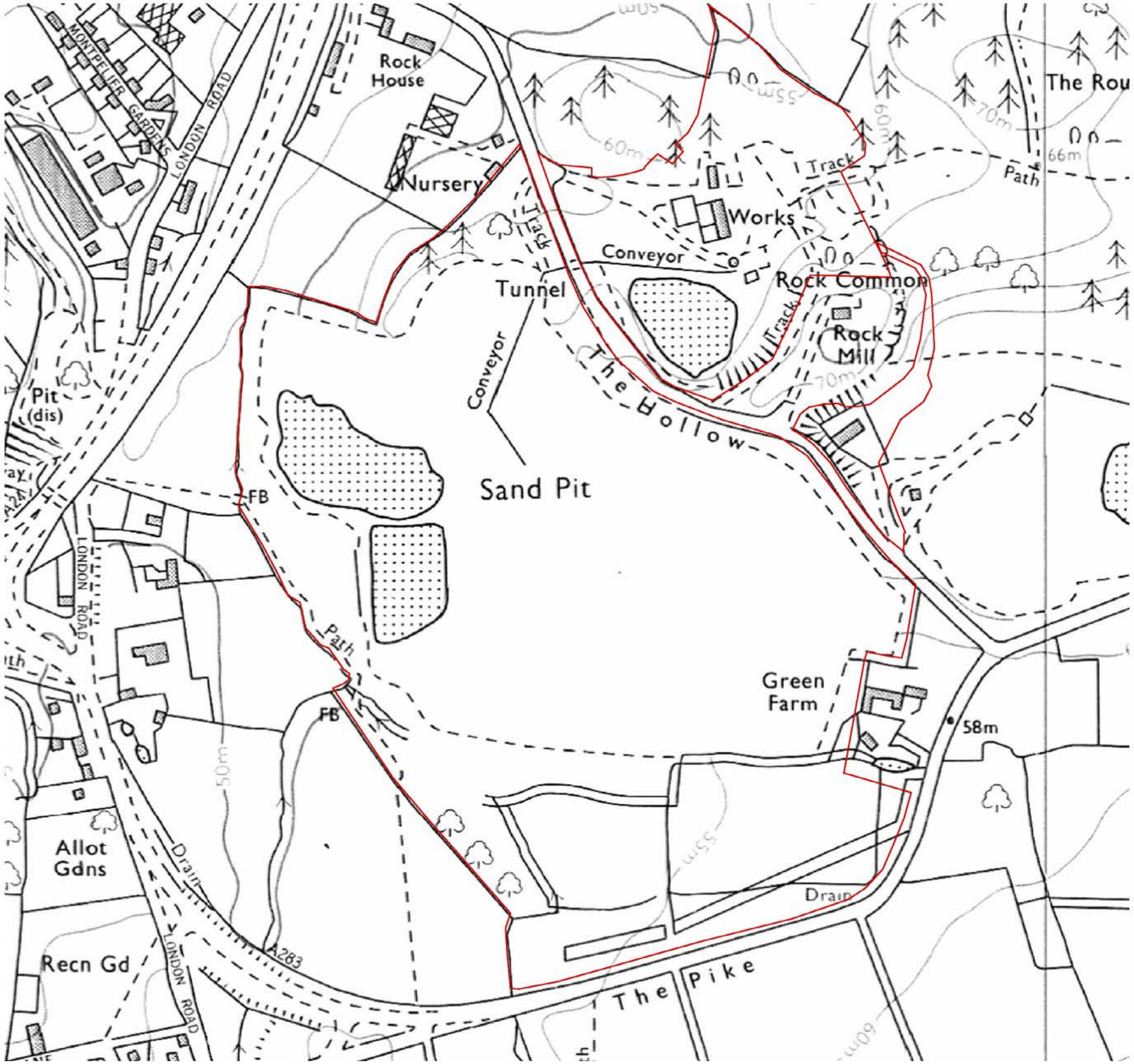
Legend

🟥 Indicative Site Boundary.

1961 OS map, *(Originally plotted at 1:10,000). Landmark.*

N

NTS



Legend

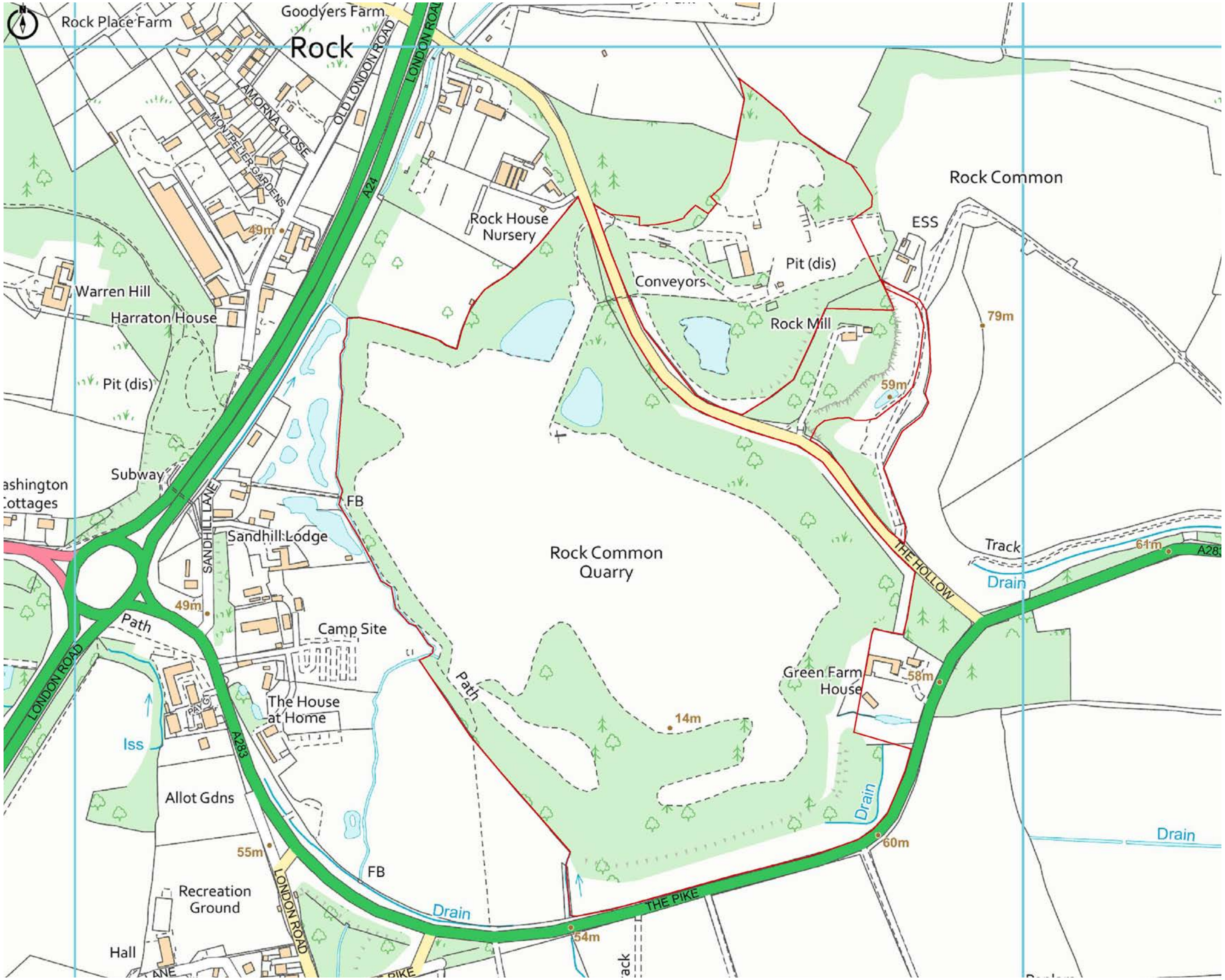
🟥 Indicative Site Boundary.

1982 OS map, *(Originally plotted at 1:10,000). Landmark.*

N

NTS

APPENDIX E - HISTORIC MAPPING



Legend

🟥	Indicative Site Boundary.

2020. OS VectorMap® *(Originally plotted at 1:10,000)*. Map data ©2020 Landmark Information Group Limited. Imagery: Ordnance Survey Crown Copyright 2019. All rights reserved. Licence number 100022432.

N

NTS

APPENDIX F - VIEWPOINT SURVEY

Date: 16 June 2020
Time: 15:49 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 55 metres aOD
Ordnance Survey Grid Coordinates: TQ 12833 13144

***Viewpoint No. 01**: North westerly representative view from the northern end of Public Bridleway No. 2703, adjacent to The Pike, (A283).*

Date: 16 June 2020
Time: 15:54 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 65 metres aOD
Ordnance Survey Grid Coordinates: TQ 12880 13455

***Viewpoint No. 02**: North westerly illustrative view from The Hollow adjacent to the entrance to the former municipal landfills known as Windmill, the Rock and the Rough.*

APPENDIX F - VIEWPOINT SURVEY

Date: 16 June 2020
Time: 15:56 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 70 metres aOD
Ordnance Survey Grid Coordinates: TQ 12754 13587

***Viewpoint No. 03**: South easterly illustrative view from The Hollow adjacent to the southern end of the track / driveway to (Grade II Listed) Rock Windmill.*

Date: 16 June 2020
Time: 15:41 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 60 metres aOD
Ordnance Survey Grid Coordinates: TQ 12589 13705

***Viewpoint No. 04**: North westerly illustrative view from The Hollow adjacent to the conveyor tunnel, which runs under The Hollow between the northern Site area to the quarry.*

Date: 16 June 2020
Time: 11:36 am
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 55 metres aOD
Ordnance Survey Grid Coordinates: TQ 12546 13819

***Viewpoint No. 05**: South easterly illustrative view from The Hollow adjacent to the access to the northern Site area (to left) and quarry (to right).*

Date: 16 June 2020
Time: 12:27 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 55 metres aOD
Ordnance Survey Grid Coordinates: TQ 12654 13917

***Viewpoint No. 06**: Easterly illustrative view from Public Footpath No. 2604 adjacent to the vegetated northern corner of the Site.*

Date: 16 June 2020
Time: 12:29 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 55 metres aOD
Ordnance Survey Grid Coordinates: TQ 12721 13928

Viewpoint No. 07*: Easterly representative view from Public Footpath No. 2604 within the vegetated northern corner of the Site.*

Date: 16 June 2020
Time: 12:30 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 55 metres aOD
Ordnance Survey Grid Coordinates: TQ 12754 13926

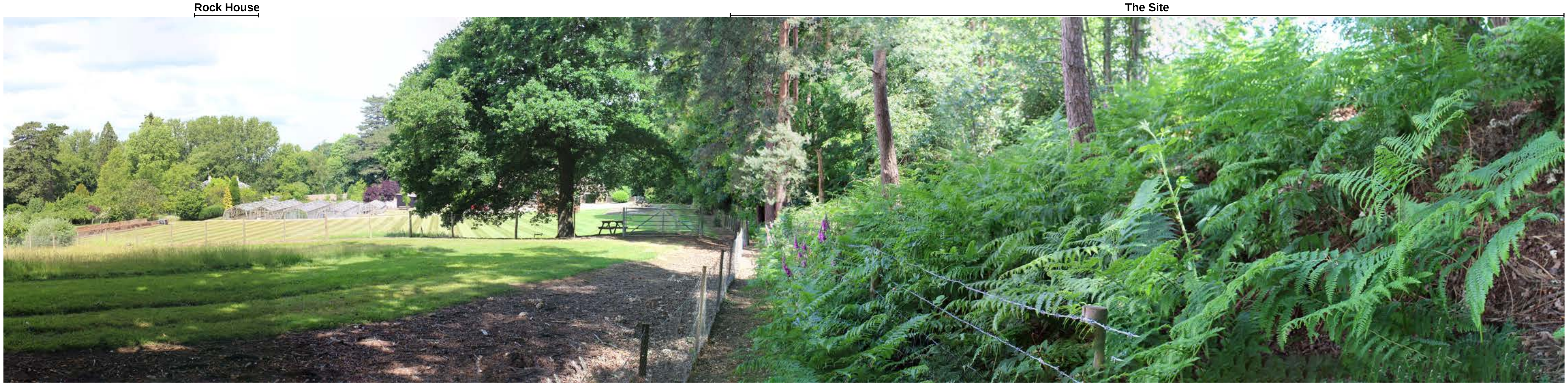
Viewpoint No. 08*: South easterly illustrative view from Public Footpath No. 2604 adjacent to the north eastern, banked and vegetated edge of the Site.*

Date: 16 June 2020
Time: 12:32 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 55 metres aOD
Ordnance Survey Grid Coordinates: TQ 12823 13884

Viewpoint No. 09*: South westerly illustrative view from Public Footpath No. 2604 adjacent to the north eastern, banked and vegetated edge of the Site.*

Date: 16 June 2020
Time: 12:39 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 60 metres aOD
Ordnance Survey Grid Coordinates: TQ 13019 14198

Viewpoint No. 10*: Southerly illustrative panoramic view from Public Footpath No. 2604 south of Upper Chancton Farm.*



Date: 16 June 2020
Time: 12:59 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 55 metres aOD
Ordnance Survey Grid Coordinates: TQ 12452 13754

Viewpoint No. 11*: North easterly representative view from Public Footpath No. 2701 south east of Rock House Nursery. The roofline of the (Grade II Listed) Rock House can just be glimpsed, which is located some 125m off the north western edge of the Site.*

Date: 16 June 2020
Time: 13:02 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 55 metres aOD
Ordnance Survey Grid Coordinates: TQ 12396 13681

Viewpoint No. 12*: South easterly illustrative view from a break in vegetation along Public Footpath No. 2701. The landform of the chalk escarpment can be seen over the Site, about Chanctonbury Hill.*

Date: 16 June 2020
Time: 13:06 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 50 metres aOD
Ordnance Survey Grid Coordinates: TQ 12280 13586

***Viewpoint No. 13**: North westerly representative view from Public Footpath No. 2701 adjacent to the sunken profile of the Honeybridge stream.*

Date: 16 June 2020
Time: 13:13 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 50 metres aOD
Ordnance Survey Grid Coordinates: TQ 12196 13533

***Viewpoint No. 14**: Easterly illustrative view from Public Footpath No. 2700 adjacent to the coniferous vegetation along the boundary to (Grade II Listed) Sandhill Farmhouse, (which is located some 80m west of the western Site boundary).*

Date: 16 June 2020
Time: 13:21 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 50 metres aOD
Ordnance Survey Grid Coordinates: TQ 12315 13452

***Viewpoint No. 15**: North westerly illustrative view from Public Footpath No. 2701 adjacent to the sunken profile of the Honeybridge stream where a play area along the eastern edge of the Washington Caravan & Camping Park is located, and a worn bank with hazard signs is located beyond the boundary fence.*

Date: 16 June 2020
Time: 13:25 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 50 metres aOD
Ordnance Survey Grid Coordinates: TQ 12403 13317

***Viewpoint No. 16**: North easterly illustrative view from Public Footpath No. 2701 adjacent to the thin strip of vegetation along the clifftop of the quarry.*

Date: 16 June 2020
Time: 13:28 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 50 metres aOD
Ordnance Survey Grid Coordinates: TQ 12433 13118

Viewpoint No. 17*: North easterly illustrative view from Public Footpath No. 2701 north of the A283, (The Pike). The wooded clump atop Chanctonbury Ring can be seen to the right of view atop the chalk escarpment.*

Date: 16 June 2020
Time: 13:40 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 65 metres aOD
Ordnance Survey Grid Coordinates: TQ 12397 12826

Viewpoint No. 18*: North easterly illustrative view from Public Footpath No. 2699-5, north of (Grade II Listed) Tilley's Farm Cottage. Part of the upper north eastern face of the quarry can be glimpsed when vegetation is in leaf, with perimeter vegetation otherwise.*

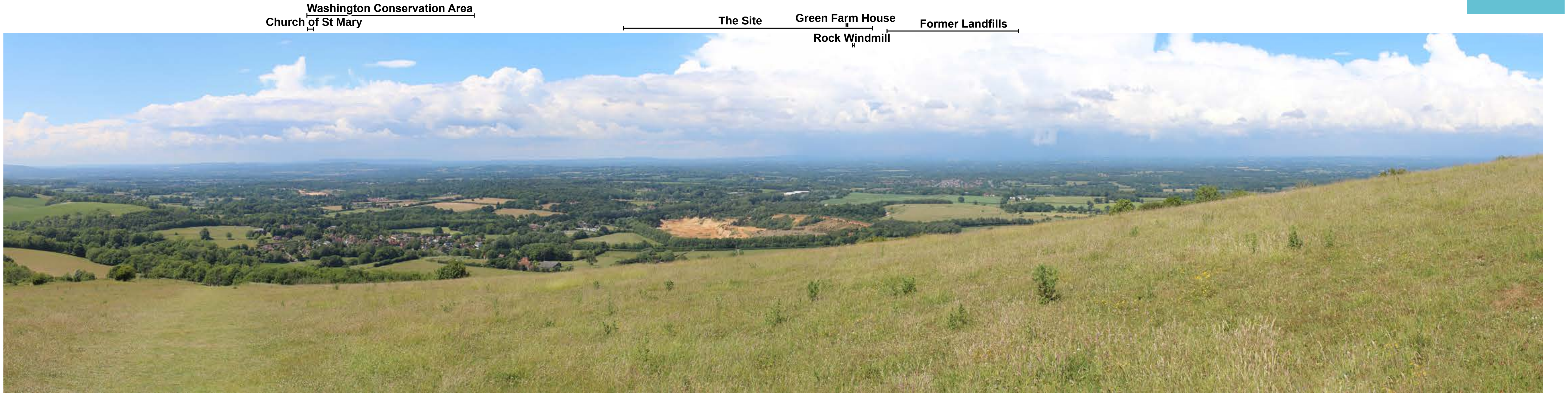
APPENDIX F - VIEWPOINT SURVEY

Date: 16 June 2020
Time: 14:10 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 145 metres aOD
Ordnance Survey Grid Coordinates: TQ 12547 12090

***Viewpoint No. 19**: Northerly illustrative panoramic view from lowest elevation along Public Bridleway No. 2705, south of Public Bridleway No. 2704.*

Date: 16 June 2020
Time: 14:18 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 190 metres aOD
Ordnance Survey Grid Coordinates: TQ 12829 12083

***Viewpoint No. 20**: Northerly representative panoramic view from Open Access Land, through which Public Bridleway No. 2705 extends.*



Date: 16 June 2020
Time: 14:22 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 220 metres aOD
Ordnance Survey Grid Coordinates: TQ 12980 12041

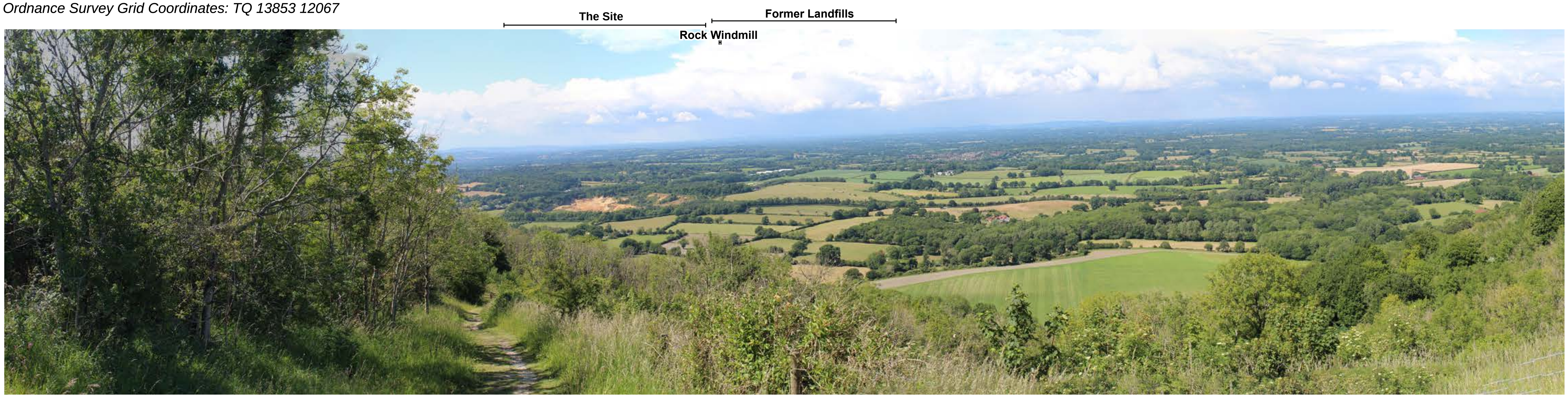
Viewpoint No. 21*: North westerly representative panoramic view from Public Bridleway No. 2705 west of the crest of Chanctonbury Hill.*

Date: 16 June 2020
Time: 14:25 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 230 metres aOD
Ordnance Survey Grid Coordinates: TQ 13130 11973

Viewpoint No. 22*: North westerly illustrative panoramic view from Public Bridleway No. 2705 atop Chanctonbury Hill, before the ridge obscures visibility of the Site.*

Date: 16 June 2020
Time: 15:07 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 235 metres aOD
Ordnance Survey Grid Coordinates: TQ 13853 12067

***Viewpoint No. 23**: North westerly illustrative panoramic view from about the western edge of Chanctonbury Ring Scheduled Monument on land across which the public exercise access, but upon which there is no formal permissive access.*



Date: 16 June 2020
Time: 15:11 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 225 metres aOD
Ordnance Survey Grid Coordinates: TL 09275 12964

***Viewpoint No. 24**: North westerly representative panoramic view from the upper part of Public Bridleway No. 2089, within Chanctonbury Hill SSSI.*

Date: 16 June 2020
Time: 15:15 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 200 metres aOD
Ordnance Survey Grid Coordinates: TQ 13602 12179

***Viewpoint No. 25**: North westerly representative view from the upper part of Public Bridleway No. 2089, within the woodland of Chanctonbury Hill SSSI.*

Date: 16 June 2020
Time: 15:40 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 87 metres aOD
Ordnance Survey Grid Coordinates: TQ 13219 12634

***Viewpoint No. 26**: North westerly representative view from Public Bridleway No. 2703, south of Lock’s Farm.*

Date: 16 June 2020
Time: 16:26 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 65 metres aOD
Ordnance Survey Grid Coordinates: TQ 11844 12863

Viewpoint No. 27*: North easterly illustrative view from within the churchyard to the west of Grade II* Listed The Parish Church of St Mary along the western edge of the Washington Conservation Area.*

Date: 16 June 2020
Time: 17:05 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 190 metres aOD
Ordnance Survey Grid Coordinates: TQ 10770 11984

Viewpoint No. 28*: North easterly representative panoramic view from Highden Hill, along Restricted Byway No. 2693 (South Downs Way National Trail).*

Date: 16 June 2020
Time: 17:23 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility
Approximate Ground Level: 155 metres aOD
Ordnance Survey Grid Coordinates: TQ 10678 12360

***Viewpoint No. 29**: North easterly representative panoramic view from north east of Barnsfarm Hill, along Public Bridleway No. 2666 (South Downs Way National Trail Alternative Route via Washington).*

Date: 27th June 2018
Time: 12:01 pm
Weather: Clear weather conditions
Lighting Conditions: Good visibility, light haze at dist.
Approximate Ground Level: 130 metres AOD
Ordnance Survey Grid Coordinates: TQ 09626 12481

***Viewpoint No. 30** - North easterly representative panoramic view from Public Bridleway No. 2689 on the north eastern face of Sullington Hill, north of SDNPA Viewshed Study Representative View No. 34 - Sullington Hill, (LUC, 2015). The (Grade I) Listed Parish Church of St Mary situated within Sullington Conservation Area is located to front of view.*

APPENDIX G - WISTON WHOLE ESTATE MANAGEMENT PLAN EXTRACT (2017)

7

ECOLOGY VISITOR ECONOMY ECONOMY

Rock Common Quarry

A new ecology focused visitor destination incorporating an eco-lodge development set within the restored sand quarry.

Vision

An integrated ecological resource and National Park visitor destination co-located with eco-tourism accommodation forming a gateway to explore woodland and downland centred experiences.

Objective

To secure the positive re-use of the worked-out sand quarry; add to the stock of visitor accommodation available in the local area and create a visitor hub for the National Park.

- A place for nature; a place without waste, a place for learning and exploration

Outputs

- Fully restored former sand quarry with new habitat and enhanced biodiversity
- New National Park visitor destination and educational resource
- An access point to a network of neighbouring estate experiences across the National Park
- New visitor accommodation and recreational infrastructure
- Jobs and local spending

National Park Outcomes

CORE / MAIN:

Six; widespread understanding of special qualities of the National Park and the benefits it provides.

Eight: more responsibility and action by visitors, residents and businesses to conserve and enhance the special qualities and use resources more widely.

Ten; a diverse and sustainable economy which provides a range of business and employment opportunities, many of which are positively linked to the special qualities of the National Park.

ADDITIONAL / ANCILLARY:

One & Two; increased capacity within the landscape for habitats and species.

Three: better connected networks and an increased population and distribution of priority species.

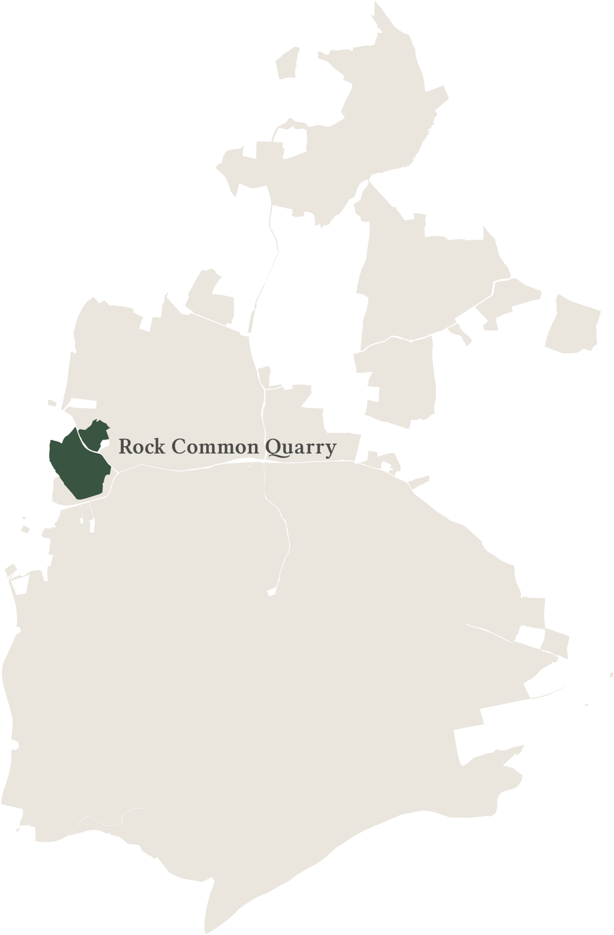
ECOSYSTEM SERVICES:

Supporting; the creation of new habitat to enable biodiversity, soil formation

Provisioning; clean water, energy

Regulating; erosion, pollination

Cultural; tranquillity, inspiration, recreation and tourism services.



ECOLOGY
VISITOR ECONOMY
LANDSCAPE

8

Water Quality Strategy

A landscape scale investigation into the condition and quality of water bodies across the estate leading to a strategy for improvement.

Vision

An evidence based study that can be used as a prompt for wider collaborative action with partners such as the Adur to Arun Farmer's Group, neighbouring estates, the EA, Southern Water and Brighton University to monitor and improve water quality in the catchment.

Objective

Shared understanding and commitment to water quality at landscape scale; greater awareness of the full benefits of water quality including a link to water based products [e.g. beer, food etc.] and promotional opportunities in the visitor economy.

- A place for nature; a place for learning and exploration; a place without waste

Outputs

- Knowledge and evidence on water quality and influences on water quality across the estate particularly in relation to land management
- A plan to monitor and improve water quality over time
- Enhanced understanding of the full benefits that can arise from clean water
- A shared commitment to water quality on a landscape scale

National Park Outcomes

CORE / MAIN:

Two; increased capacity within the landscape for its natural resources, habitats and species to adapt to the impacts of climate change and other pressures.

Three; well managed and better connected network of habitats and increased population and distribution of priority species.

Six; wide spread understanding of the special qualities of the National Park and the benefits it provides.

ADDITIONAL / ANCILLARY:

Eight; more responsibility and action is taken by visitors, residents and businesses to conserve and enhance the special qualities and use resources more wisely.

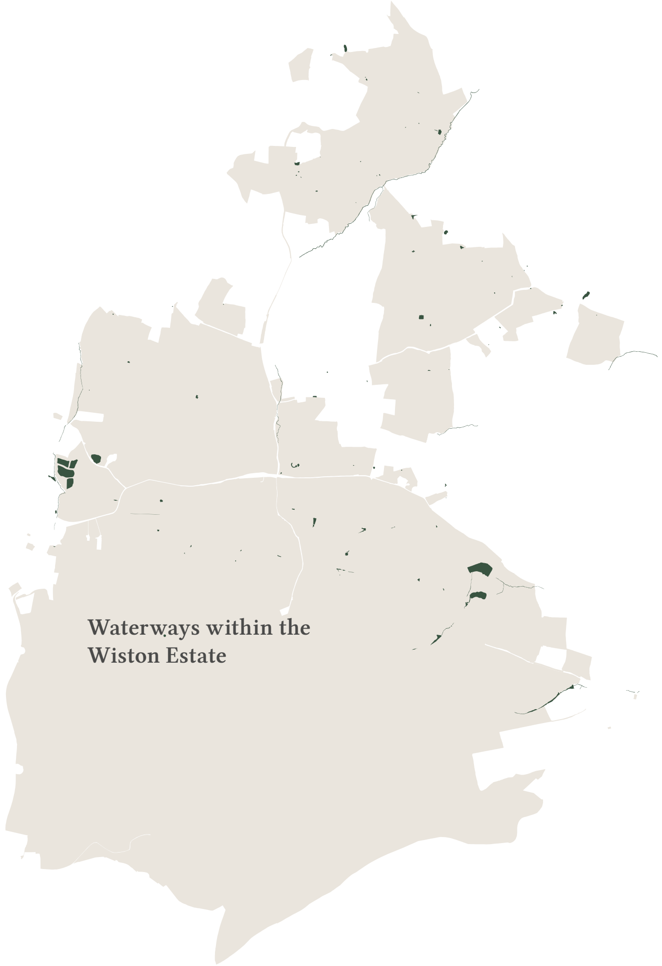
ECOSYSTEM SERVICES:

Supporting; water cycling, nutrient cycling, biodiversity.

Provisioning; water supply,

Cultural; recreation and tourism services.

Regulating; water flow and flood, water quality, disease and pest.



APPENDIX H - NO VISIBILITY SCHEDULE

Ref	Location and Direction of View	View Details	Reasons for exclusion	Image taken
IA	***Location: The A283, (The Pike) adjacent to (Grade II Listed), Green Farm House.*** ***Direction of View: West***	*Date: 16 June 2020* *Time: 15:51 pm* *Weather: Clear weather conditions* *Lighting Conditions: Good visibility* *Approximate Ground Level: 58 metres aOD* *Ordnance Survey Grid Coordinates: TQ 12911 13302*	**Intervening density of vegetation obscures visibility of the Site.**	
IB	***Location: North western edge of Chanctonbury Ring Scheduled Monument, within Wiston Estate Permissive Access Land.*** ***Direction of View: North west***	*Date: 16 June 2020* *Time: 15:02 pm* *Weather: Clear weather conditions* *Lighting Conditions: Good visibility* *Approximate Ground Level: 235 metres aOD* *Ordnance Survey Grid Coordinates: TQ 13958 12138*	**Intervening density of vegetation and landform obscures visibility of the Site.**	

APPENDIX AA

Landscape Masterplan and Strategy

LIZARD

Landscape Design and Ecology

DUDMAN ROCK COMMON LIMITED

ROCK COMMON QUARRY, THE HOLLOW WASHINGTON

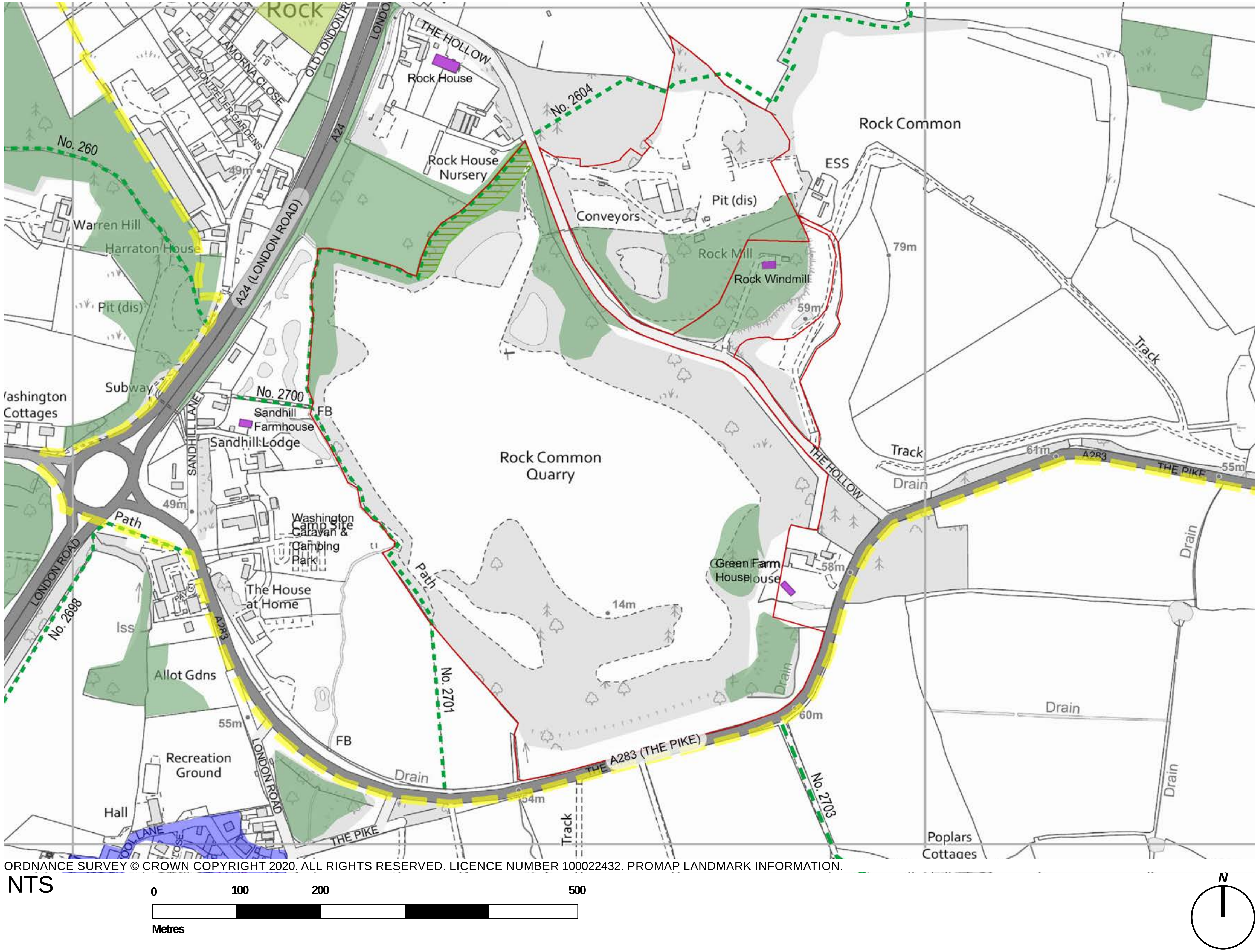
Landscape Design Strategy

Project Reference	LLD1955-LAN-REP-001
Prepared by:	JP
Checked By:	GS
Revision	03
Date:	22.12.2020

Planning Issue

CONTENTS

Figure 1.1. Development Site Location.



Legend

- 🟥 Site Boundary.
- South Downs National Park, (*south of the dashed yellow line*).
- Public Footpath.
- Public Bridleway.
- Listed Building *(Grade II)*.
- Conservation Area.
- Deciduous Woodland UK Priority Habitat.
- Traditional Orchard UK Priority Habitat.
- ▨ Tree Preservation Order.

Figure 1.2. Site and Surrounds.

1.0 INTRODUCTION AND BACKGROUND

General

1.1 Lizard Landscape Design and Ecology (*LLD*) has been commissioned by Dudman Rock Common Limited to develop a Landscape Design Strategy *(LDS)* and Illustrative Landscape Masterplan *(LM)* for the proposed restoration project at Rock Common Quarry, The Hollow, Washington *(Grid Reference: TQ 12507 13493).*

1.2 The LDS was informed by the Landscape and Visual Impact Assessment *(LVIA) (LLD1955-LPL-REP-001-02)* prepared by LLD, further to a site visit to appraise the Site and the surrounding area on the 16th and 19th June 2020, when vegetation was in leaf, followed up by a further site visit on the 1 October 2020, when vegetation was substantially in leaf. The LDS has been undertaken by Joshua Peacock, an Associate Landscape Planner at Lizard Landscape Design and Ecology and a Chartered Landscape Architect, supported by Kian Gharchedaghi, Landscape Architect.

1.3 The LDS has been developed out from the constraints and opportunities developed within the LVIA, defined through reference to planning policy, designations and landscape character. This has been further informed through collaboration with The Ecology Co-op, who are the ecological consultants for the Scheme and developed alongside of this LDS through an Illustrative Landscape Masterplan, *(LLD1955-LAN-REP-001-03)* and a Landscape and Woodland Implementation and Long-Term Management Plan, *(LLD1955-LAN-REP-002-03).*

The Scheme

1.4 A description of the proposed restoration scheme is provided within Section 3 of the Terrestria Application, which the reader is advised to read alongside of this report.

The Design Strategy

1.5 Through reference to the context of the Site ***(Section 2.0)***, design principles are identified as part of a landscape vision statement, ***(Section 3.0)***. The principles are then applied within a strategic landscape framework, ***(Section 4.0)*** which has been spatially developed alongside of the Illustrative Landscape Masterplan for the Site, supported by outline planting schedule within **Appendix A**, and the Landscape and Woodland Implementation and Long-Term Management Plan.

The Site and Surrounds

1.6 Through reference to **Figure 1.2**, the Site is best described through reference to Section 3 of the Terrestria Application, which the reader is advised to read alongside of this report.

Soil and Topography

1.7 Through reference to the Soilscapes Map *(developed by Cranfield University and sponsored by the Department for Environment, Food and Rural Affairs)* soil type across the southern half of the main quarry to the south of The Hollow *(in keeping with that to east and west)* is shown to have comprised: *'slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils'*.

1.8 The soil type to the remainder of the unexcavated Site to the north is understood to comprise: *'Freely draining slightly acid loamy soils'*.

2.0 LANDSCAPE CHARACTER - APPROACH

2.1 An understanding of the contribution of the Site to landscape character is provided within **Section 6.0** of the LLD produced Landscape and Visual Impact Assessment.

2.2 The key landscape constraints, identified for the Site, *(with allocation of sensitivity taking into account the susceptibility of the component to the proposals)* are considered to be:

- ***Medium*** *- Contribution from the remnant latitudinal landform of the low sandstone ridgeline, (and to which the landform immediately surrounding Hollow Lane is representative), to landscape character, as a continuation of that to the west about Warren Hill, both with wooded crests, and the coherence and structure this provides individually and sequentially with that to the west as a landscape feature with time depth, about which field pattern, hydrology, historic built form and the alignment of roadways including the A24 (London Road) and the A283, (The Pike) have been influenced and defined;*
- ***Medium*** *- Contribution from the remnant latitudinal landform of the low sandstone ridgeline, to visual character in combination with that to the west about Warren Hill, both with wooded crests, as a compositional element when viewed from the upper scarp and downland crest to the south, south east and south west; Contribution of this to the visual integrity, identity, scenic quality and tranquillity of the South Downs National Park associated with elevated views from the scarp, looking north across the low weald, (including from the South Downs Way to the south west) under the South Downs Local Plan, (July 2019) Strategic Policy SD6: Safeguarding Views and SD7: Relative Tranquillity);*
- ***Low*** *- Contribution from the woodland belt north of the A283, (The Pike) to concealing the quarry working beyond and preserving the setting of both the Washingtion Conservation Area and (Grade II Listed Buildings within), including that of Green Farm House to the south east;*
- ***Low*** *- Contribution from the treed embankment to the west of the quarry to concealing the quarry working from the wider setting of the (Grade II Listed) Sandhill Farmhouse and to a lesser extent that further to the north subject to Area TPO No. 0204 of the (Grade II Listed) Rock House;*
- ***Low*** *- Contribution from the woodland to the east of the sand processing facility at elevation to concealing the processing facility from the setting of the (Grade II Listed) Rock Windmill;*

- ***Low*** *- Contribution from the treed boundary to south west and north in framing views for users of the Public Footpaths in these locations towards the Landmark feature of the wooded Chanctonbury Ring atop the chalk escarpment and the sense of place and special qualities of the South Downs National Park;*

- ***Medium*** *- Contribution to sense of place within the quarry from visibility towards the Landmark feature of the wooded Chanctonbury Ring atop the chalk escarpment and the special qualities of the South Downs National Park; Primarily from the grassed plateau to the north east of the quarry, but also from elevated parts of the quarry to the north west;*

- ***Medium*** *- Contribution to sense of place from the natural qualities of the patches of habitat present within the quarry and its perimeter, including reed fringed water bodies, gorse scrub, birch woodland and mixed deciduous woodland, introduce visual variety and complexity within the quarry;*

- ***Medium*** *- High level of relative tranquillity and sense of place associated with the chalk escarpment and scenic, panoramic northerly views across the weald from this, due to the elevation of the views and the mosaic of woodland and fields which form a tapestry, increasingly wooded before fading to blue along the far horizon line and the perspective this provides in line with the South Downs National Park Special Quality of a 'Diverse, inspirational landscapes and breath-taking views', (SQ1);*

- ***Low*** *- A moderate level of relative tranquillity along Public Footpath No. 2701, due to the natural elements of flowing water along the Honeybridge Stream, (albeit artificially supplemented by pumping from Rock Common);*

- ***Low*** *- Time depth associated with the sunken lane of The Hollow and its association with the underling remnant landform over which it rises and falls; Including the presence of a veteran oak tree along the southern bank of the sunken profile of The Hollow;*

- ***Low*** *- Contribution of maturing coniferous trees to the north west of the Sand Processing Area, north of The Hollow as part of coniferous woodland habitat consistent with the sandstone ridgeline, particularly in southerly views from Public Footpaths within open fields to the north of the Site;*

- ***Medium*** *- Contribution from the large clean exposures of sand from the Folkestone Beds of the Lower Greensand to some 40m in elevation about the south of the quarry to educational interest in palaeoenvironmental studies, non statutorily designated for geological value as Rock Common Quarry, Sussex Regionally Important Geological Site, (RIGS) No. TQ11/41.*

2.3 Through consultation with the Ecology Co-op the following are considered to be ecologically valuable, ordered in priority:

- *The sand cliffs along the south eastern and eastern section of the quarry. The faces support many thousands of solitary bees with a full species list to be created.*
- *Dormice have also been identified on the southern border of the quarry and it remains possible that they may be present within the woodland in the quarry itself.*
- *There is a large sand martin nesting site, which has repositioned itself to the eastern face of the quarry*
- *There is a population of common reptiles also present on site.*

2.4 Through reference to the Arboricultural Impact Assessment and Method Statement, undertaken by Lizard further to a tree survey, the land surrounding the quarry contains areas of mature woodland described as follows:

'[...] dominated by sycamore, birch, sweet chestnut and Scots pine. Areas of more established native woodland containing oaks, alders and hazels are present further out. Several shelter belts of moderate value, containing mainly poplar trees and Scots pine are also present to field and road edges. Roads and footpaths contain mixed tree and hedge lines, with a number of mature feature trees, mostly oaks. These trees are of moderate to high value, being much older specimens of reasonable form.' (Ibid, p5)

2.5 The majority of the trees surrounding and within the Site are classified as Grade C, other than those to the western boundary which are Grade B and groups to the north which are additionally classified as Grade B.

Landscape Opportunities

2.6 Various opportunities are identified within the Landscape and Visual Impact Assessment, *(LLD1955-LPL-REP-001-02)* for mitigation measures which would avoid, reduce and if possible remedy potential adverse effects from the Proposed Restoration, but also to define Site specific enhancement measures. Measures, including those identified as forming secondary mitigation and enhancement measures are developed within this Landscape Strategy alongside of the Illustrative Landscape Masterplan within the Landscape Framework within **Section 4.0**.

Photograph A. *Private wetland area with ducks to the north of Sandhill Farmhouse from Public Footpath No. 2700, surrounded by grey poplar trees.*

Photograph B. Warren Hill. *Public footpath 2630 across National Trust woodland, Washington Common © Peter Holmes. Licensed for reuse under Creative Commons Licence. Source: https://www.geograph.org.uk/photo/3565137*

Photograph C. *Westerly view, within pine and birch woodland, within a longitudinal belt about the perimeter of the former waste sites, from Public Footpath No. 2604.*

Photograph D. *Sullington Warren - Heathland with larch, fringed with mixed deciduous and coniferous trees - (Located some 3km to the north west along the Sandstone Folkestone Formation), (Location shown on* ***Figure 6.1*** *within the LVIA).*

3.0 LANDSCAPE DESIGN STRATEGY

Landscape Vision

3.1 The Landscape Vision develops that defined within the Concept Restoration Scheme, *(Pleydell Smithyman Limited / R32/06)* submitted as part of the Approved restoration scheme under WS/15/97 as follows:

To create an integrated ecological and amenity resource at the foot of the South Downs National Park escarpment, which integrates the Site into the surrounding landscape whilst enhancing sense of place.

Landscape Objectives

3.2 To achieve this the following objectives would be pursued as presented within the Illustrative Landscape Masterplan, *(LLD1955-LAN-REP-001-03)* incorporated as **Figure 4.1**:

- ***A high quality mosaic of habitats across a larger area of the Site*** *- Including a mosaic of lowland heath, acid grassland, scrub and woodland, marginal habitat and patches of open water, within which islands of shingle would protect nesting birds. Areas of sand cliffs along the south eastern and eastern section of the quarry would be retained, which support many thousands of solitary bees, whilst also retaining the upper levels of the Folkestone Formation for educational purposes, protected as a Regionally Important Geological and Geomorphological Site;*

- ***A strong sense of place, accessed through a network of footpaths with varied outlooks*** *- Including viewpoints which provide prospects over the mosaic of habitat within the Site towards the landmark of Chanctonbury Ring to the south east and Highden Hill to the south west. Footpaths within the Site would explore the mosaic of habitats, whilst leading towards sandy beach areas along the waters edge, otherwise fringed with reeds, from which paths would generally be offset to reduce disturbance.*

3.3 This would be in keeping with the heavily wooded ridges, interspersed with small patches of heathland, identified as characteristic for the West Sussex Storrington Woods and Heaths, *(LCA WG7, 2020)* which surrounds to the north, whilst extending a mosaic of habitat into the Central Scarp Footslopes, *(LCA WG8, 2020)* which surrounds to the south.

3.4 It would also enable an aspect and habitat comparable to the lowland dwarf shrub heath of Sullington Warren Site of Special Scientific Interest, located some 2.5km to the west along the local outcrop of the Folkestone Formation, with a smaller area about Washington Common some 800m to the west.

3.5 The setting and recreational access to the South Downs National Park, would be enhanced through establishing a multifunctional networks of spaces and features which connect with surrounding and existing biodiversity corridors. This would support the following policies in particular:

- *Horsham District Planning Framework (2015) Strategic Policy 25: The Natural Environment and Landscape Character;*
- *Horsham District Planning Framework (2015) Strategic Policy 31: Green Infrastructure and Biodiversity, and;*
- *Storrington, Sullington & Washington Neighbourhood Plan 2018-2031, (September, 2019) Policy 15: Green Infrastructure & Biodiversity.*

Design Principles

3.6 The following Design Principles, *(DP)* structure the approach taken within the outline landscape framework, which includes ecological recommendations provided by The Ecology Co-op, *(provided within* ***Section 4.0****).*

- ***Design Principle 1*** *- Materials Management and profiling to utilise suitable materials, including natural materials arising on site to ensure suitable substrate at suitable depth to support proposed habitat, characteristic of the area;*

- ***Design Principle 2*** *- Suitable gradients to be achieved for access for all along pathways and to viewing platforms. About the sandy waters edge this would reduce health and safety risk for anticipated recreational open water swimmers and kayakers entering the water;*

- ***Design Principle 3*** *- Ensure habitat mix specification, (see* ***Table 1****) and method of establishment are suitable for the long term objectives of the Site, informed through consideration of short - mid - long term management actions presented within the Landscape and Woodland Implementation and Long-Term Management Plan, (LLD1955-LAN-REP-002-03).*

MAP DATA ©2019 GOOGLE. IMAGE CAPTURE: JUNE 2018, LANDSAT / COPERNICUS.

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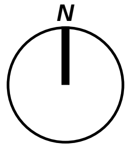


Legend

- 🟥 Development Site Location.
- 🟩 Existing Broadleaved Woodland - To be retained and enhanced.
- 🟩 Broadleaved Acid Woodland - To be planted out.
- 🟩 Native scrub planting - Self seeded / managed.
- 🟪 Lowland Heathland species to be targeted for establishment, further to trials early in phased restoration.
- 🟩 Acid grassland establishment targeted with areas of bare ground left for natural succession to take place.
- ▨ Existing Standing water.
- ⬜ Proposed Standing water.
- ▨ Marginal planting to areas of standing water.
- ▨ Gravel Islands created above standing water level to provide habitat for ground nesting birds.
- 🟨 Sand/Gravel 'Beach' areas to allow interaction with the waterside by visitors.
- Shallow vertical faces to be created using gabions or similar filled with rock and reclaimed material to provide additional sand Martin habitat.
- Soft Cliff faces to be retained as habitat to solitary bees. Any enhancement planting within the proximity should avoid these faces as well as sand Martin nesting sites found to the east.
- Footpaths for informal public access
- Private use access for maintenance and habitat management
- Retained hardstanding/site maintenance area
- ● Viewpoints from high ground across the Site to surrounding chalk escarpment landform including the wooded Chanctonbury Ring.

Figure 4.1. Landscape Masterplan (Illustrative).

4.0 OUTLINE LANDSCAPE FRAMEWORK

4.1 The Landscape Framework is structured through reference to the Design Principles identified within **Section 3.0** and informed by recommendations provided by The Ecology Co-op. These recommendations have been applied iteratively in the development of the final Site layout and presented within the Illustrative Landscape Masterplan produced by LLD.

4.2 The high quality and practicable restoration to be guided through reference to the LLD produced Woodland and Landscape Management Plan, *(in line with West Sussex Joint Minerals Local Plan (July 2018) Policy Policy M24(b): Restoration and Aftercare).*

Applied Design Principle 1 - ***Materials Management and profiling to utilise suitable materials, including natural materials arising on site to ensure suitable substrate at suitable depth to support proposed habitat characteristic of the area:***

- *Retention of Site materials for use as substrate to ensure the habitats developing at the site are characteristic of the area (A depth of at least 400mm of sandy material is anticipated to be required across much of the site); For example lower grade sand materials stockpiled on the site that are not suitable for mineral extraction, (could be a mix of stones, gravels and natural sediments that would otherwise not be used) may still be suitable for use as capping over the imported fill to provide a substrate for habitat creation;* A description of the type of soil profile found underlying heathland habitat is provided within an extract from 'The Habitats and Vegetation in Sussex, *(Rose, 1995, published by The Booth Museum of Natural History), (see* ***Appendix E,*** *within the Woodland and Landscape Management Plan)*
- *Suitable clay material is anticipated to provide the lining for the proposed water bodies, which are understood to be designed to prevent connectivity with ground water, (to prevent putrescible leachate from the adjacent landfill sites from entering); (A depth of at least 400mm of sandy material is anticipated to be required overlying the clay capping layer);*
- *Areas of clay material might be extended beyond the eastern edge of the ponds to allow for the development of areas of wet heath, and to the west of the central and southern ponds to support areas of acid woodland in keeping with the surrounding 'slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils'; distinct from that to the north of the Site, ('Freely draining slightly acid loamy soils');*
- *Gently graded edges and a varied pond profile to suit marginal, emergent and submerged flora within the proposed water bodies with a general slope of 1:10 providing a large draw-down zone with a depth of 10-30 cm, (Through reference to the Amphibian Habitat Management Handbook (ARC, 2011) this is the optimal depth for amphibians and invertebrates);*
- *Proposed sandy beach areas to be designed to a crenellated plan form with grassy banks forming small, enclosed sandy bays. (This should discourage Canada geese through preventing their ability to move from grazing/nesting areas to water without flying and by breaking clear line of sight against predation);*
- *The islands within the water bodies should incorporate a south facing low cliff of 1m in elevation directly over the water, formed out of compacted earth substrate, (perhaps supported by a gabion basket) along their southern edge. This would provide suitable nesting habitat for sand martins amongst other species. (It is understood from The Ecology Co-op that this species has a large nesting site within the quarry, which has recently repositioned itself to the eastern face of the quarry, which is likely to be disturbed by the restoration);*
- *The existing deep pond to the north of the quarry to be partly infilled with material of low mineral content, (to prevent algal blooms) to create a shallower pond than existing, with marginal areas, to improve both biodiversity and health and safety. Use of natural bank stabilisation is anticipated, such as brushwood 'faggots' secured with chestnut stakes; Surrounding ground levels otherwise to be maintained;*
- *Retention of 2m sandy cliff to east and incorporation to south east above restored levels for use as habitat for insects, (As advised by the Ecology Co-op, at present this supports many thousands of solitary bees); The cliff would retain the upper levels of the Folkestone Beds, with some benefit to the educational interest from this, designated as part of the Regionally Important Geological and Geomorphological Site;*
- *Provide a stepped profile to the east, and otherwise where proposed restored landform is relatively steep - This would benefit both substrate retention and invertebrate habitat;*
- *Retain larger stones and gravels to create dispersed features as part of south facing sandy banks, which would introduce variable heating and shading for the surrounding substrate and invertebrate populations.*

Applied Design Principle 2 ***- Suitable gradients to be achieved for access for all along pathways and to viewing platforms. About the sandy waters edge this would reduce health and safety risk for anticipated recreational open water swimmers and kayakers entering the water:***

- *Improve connectivity off the western boundary of the Site to the Rights of Way Network for members of the wider community wishing to access the proposed perimeter walk and viewing areas;*
- *Incorporate viewing areas or points from elevated points within the restored landscape towards the Landmark feature of the wooded Chanctonbury Ring atop the chalk escarpment to reinforce and enhance the contribution to sense of place within the quarry and the special qualities of the South Downs National Park this affords;*
- *Provide a number of enclosed, sandy beach areas, to a crenellated plan form with grassy banks forming small, enclosed sandy bays, to enable areas where access to the naturalised waters edge might be gained;*
- *Gradients of sloping paths and maximum distance between landings (dependent upon the vertical climb), to be informed by the Countryside for All Good Practice Guide, (Fieldfare Trust, 1997, p21) which provides guidance for countryside environments, including rural and working landscapes. This should be referred to in defining the approach to pathways, particularly up the steeper eastern slope, where the gradient should not be greater than 1:10.*

<u>Applied Design Principle 3</u> - Ensure habitat mix specification, (See Table 1) and method of establishment are suitable for the long term objectives of the Site, informed through consideration of short - mid - long term management actions presented within the Landscape and Woodland Implementation and Long-Term Management Plan:

- *Conserve and enhance areas of good condition and quality deciduous and coniferous woodland (including that to the north western edge of the Site under Area TPO No. 0204), with some thinning as anticipated for recommendation within the Landscape and Woodland Implementation and Long-Term Management Plan, (LLD, 2020);*
- *Reinforce the contribution presented by oak trees along the remnant ridge, (as with Warren Hill and Sullington Warren further to the west) through planting trees and making space for trees to establish about the part reinstated crest, (whilst accommodating the areas of sand cliffs to the east of the Site); This would reinforce the wooded skyline of the south facing ridgeline and help assimilate the A283 Storrington to Washington section of the Low Folkestone Sand Ridgeline;*
- *Trial using differing materials and techniques throughout the early phased restoration of the Site to determine suitability for achieving establishment of acid grassland / lowland heathland communities;*
- *Maintain areas of bare sandy ground, of varied topography and vegetation cover through the 8 year transitional phases, and throughout the final restoration to support invertebrate diversity. Retain undisturbed ‘refuge’ areas throughout the restoration to allow insects to complete their life cycles;*
- *Approach to planting mixes to ensure resilience and enable adaptation to a changing climate...’ (in line with West Sussex Joint Minerals Local Plan (July 2018) Policy M23(c): Design and Operation of Mineral Developments);*
- *Acid woodland type habitat comprising of an Oak-Hazel woodland fringed with Birch and Wych Elm, to be established about the edges of the habitat mosaic and in patches to reinforce areas of existing woodland; with patches of myrtle underlying;*
- *Enable scrub to establish naturally within areas to improve structural heterogeneity and edge across the habitat mosaic to provide foraging and refuge opportunities for birds, small mammals and other wildlife; Potentially introduce a small amount of Ulex minor, (Dward furze) as a component of the scrub habitat. This should be managed as clumps, to prevent broader encroachment;*
- *Across the acid grassland area introduce informally dispersed swathes sown with a tussocky grass mix with a high percentage of forbs to incorporate a mosaic of vegetation overlying the Site, whilst encouraging exploration along the resulting edge of grassed and bare ground habitats resulting; This may well maintain areas of bare ground, from resulting recreational disturbance;*
- *Manage staged disturbance of the substrate to support the ecological value and visual interest of the supported invertebrate populations; For example carry out a mowing / strimming maintenance regime of some 20% of the area per year, whilst allowing patches of scrub and tree groups to establish; The network of paths would additionally benefit the recommended approach to maintaining an open mosaic type habitat in places across the quarry site, through the informal disturbance of the substrate which would result about the acid grassland and heathland areas;*
- *Heathland habitat to be established on south facing profiles, with slopes managed to promote a low fertility open sward suitable for allowing the natural regeneration of acid grassland and heathland species through a management plan, with resulting advantageous species to aid pollination and reduce pest species for the agricultural land within the surrounding area and support reptiles;*
- *Leave some areas as bare ground to allow a process of natural colonisation and successional growth;*
- *Establish reedbed within marginal areas of the ponded habitats to reinforce a mosaic of habitat across the Site area; Clumps might be lifted from the existing ponded area to the north of the quarry area, where reedbeds are already well established, (and through advice received from The Ecology Co-op; supports read warblers;*
- *Water levels within the lakes to be sustained, (with some seasonal fluctuation anticipated) using pumped water from a proposed well south west of the lower lake, under an existing agreement to maintain water levels within the Honeywell Stream.*


Betula pendula (Silver birch)

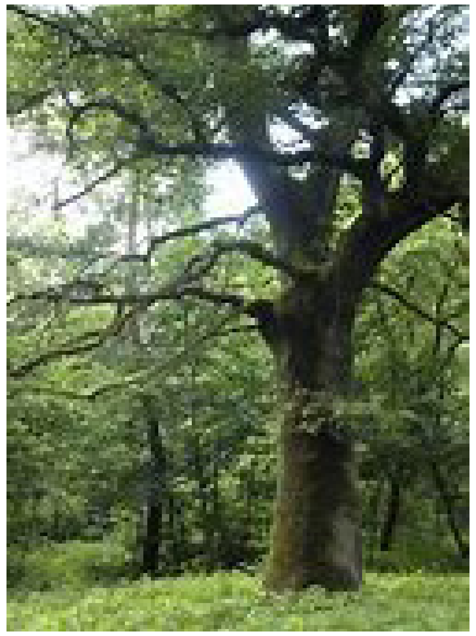

Salix cinerea (Grey Willow)


Frangula alnus (Alder Buckthorn)


Vaccinium myrtillus (Billbery)


Deschampsia flexuosa (Wavy hair grass)


Sorbus Aucuparia (Rowan)


Quercus robur (Pedunculate oak)


Salix caprea (Goat Willow)


Ulmus glabra (Wych elm)


Corylus avellana (Hazel)


Potentilla erecta (Tormentil)


Betula pubescens (Downy Birch)


Myosotis scorpioides
(Water Forget-Me-Not)


Festuca ovina
(fine-leaved sheep fescue)


Ilex aquifolium (English Holly)


Erica tetralix (Cross leaved heath)


Viola lactea (Pale Dog-Violet)

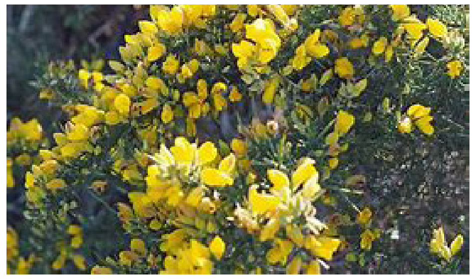

Cerastium arvense (Field Mouse-Ear)


Molinia caerulea (Purple Moor Grass)


Rumex acetosella (Sheeps Sorrel)


Calluna vulgaris (Common heather)


Erica cinerea (Bell Heather)


Ulex minor (Dward furze / gorse)


Mentha aquatica (Water Mint)


Sagittaria sagittifolia (Arrowhead)

Table 1 - Habitat Planting Specification

Group	Species / Product Name	Origins	Root Stock	Mix	Specification
Mixed Broadleaved Acid Woodland	*Quercus robur (Pedunculate oak)*	N	BR	30%	Transplant, 40-60cm height.
	Bilberry, (Vaccinium myrtillus)	N	BR	10%	Transplant, 40-60cm height
	Corylus avellana (Hazel)	N	BR	20%	Transplant, 20-40cm height
	Betula pubescens (Downy birch)	N	BR	5%	Transplant, 40-60cm height
	Betula pendula (Silver birch)	N	BR	5%	Transplant, 40-60cm height
	Sorbus aucuparia (Rowan)	N	BR	5%	Transplant, 40-60cm height
	Ulmus glabra (Wych elm)	N	BR	5%	Transplant, 40-60cm height
	Frangula Alnus (Alder buckthorn)	N	BR	5%	Transplant, 40-60cm height
	Ilex aquifolium (Holly)	N	BR	5%	Transplant, 40-60cm height
	Salix cinerea (Grey willow)	N	BR	5%	Transplant, 40-60cm height
	Salix caprea (Goat willow)	N	BR	5%	Transplant, 40-60cm height
Scrub	*Ulex minor, (Dward furze)*	N	BR	Dispersed patches	Transplant, 20-40cm height
	Bilberry, (Vaccinium myrtillus)	N	BR	Dispersed patches	Transplant, 20-40cm height
	Calluna vulgaris (Ling)	N	BR	Dispersed patches	Transplant, 20-40cm height
Marginal Planting, *(reedfen habitat)*	*Alisma plantago-aquatica (Water plantain)*				Plug planted in dispersed groups of 5-7 plants
	Mentha aquatica (Water mint)				
	Myositis scorpioides (Water forget-me-not)				
	Ranunculus flammula (Lesser spearwort)				
	Sagittaria sagittifolia (Arrowhead)				
	Veronica anagallis-aquatica (Water speedwell)				
	Veronica beccabunga (Brooklime)				
TARGET HEATHLAND HABITAT SPECIES					
Acid heathland	*Calluna vulgaris (Common Heather / Ling)*	Approach to be defined further to the trials using differing materials and techniques throughout the early phased restoration of the Site to determine suitability for achieving establishment of acid grassland / heathland communities.			
	Erica cinerea (Bell Heather)				
	Erica tetralix (Cross-Leaved Heath)				
	Ulex europaeus (Common Gorse)				
	Ulex gallii (Dwarf Gorse)				

Table 1 - Habitat Planting Specification

Group	Species / Product Name	Origins	Root Stock	Mix	Specification
Acid Grassland	*Agrostis capillaris (Common bent grass)*	Approach to be defined further to the trials using differing materials and techniques throughout the early phased restoration of the Site to determine suitability for achieving establishment of acid grassland / lowland heathland communities.			
	Agrostis curtisii (Bristle bent grass)				
	Agrostis vinealis (Brown bent)				
	Anthoxanthum odoratum (Sweet Vernal-Grass)				
	Aphanes arvensis (Parsley Piert)				
	Carex arenaria (Sand Sedge)				
	Cerastium arvense (Field Mouse-Ear)				
	Chamaemlum nobile (Chamomile)				
	Cynosurus cristasus (Crested Dogstail)				
	Deschampsia flexuosa (Wavy Hair Grass)				
	Erodium cicutarium (Common Storksbill)				
	Festuca ovina (Sheep's Fescue)				
	Festuca rubra (Slender Creeping Red Fescue)				
	Filago minima (Small Cudweed)				
	Galium saxatile (Heath Bedstraw)				
	Galium verum (Lady's Bedstraw)				
	Hypochaeris glabra (Smooth Cat's Ear)				
	Hypochaeris radicata (Tomentil)				
	Koeleria macrantha (Crested Hair Grass)				
	Lotus corniculatus (Birds-foot Trefoil)				
	Moenchia erecta (Upright Chickweed)				
	Molinia caerulea (Purple Moor Grass)				
	Myosotis discolor (Changing Forget-me-not)				
	Ornithopus Perpusillus (Little White Birds-foot)				
	Phleum bertolonii (Smaller Cats Tail)				
	Pilosella officinarum (Mouse Ear Hawkweed)				
	Polygala serpyllifolia (Heath Milkwort)				
	Potentilla argentea (Hoary Cinquefoil)				
	Potentilla erecta (Tormentil)				
	Rumex acetosella (Sheep's Sorrel)				
	Silene vulgaris (Bladder Campion)				
	Stellaria pallida (Lesser Chickweed)				
	Teesdalia nudicaulis (Shepherd's Cress)				
	Trifolium ornithoioides (Lesser Birds-foot Clover)				
	Trifolium scabrum (Rough Clover)				
	Trifolium striatum (Knotted Clover)				
	Trifolium subterraneum (Subterranean Clover)				
	Viola lactea (Pale Dog-Violet)				

Landscape Vision:

To create an integrated ecological and amenity resource at the foot of the South Downs National Park escarpment, which integrates the Site into the surrounding landscape whilst enhancing sense of place.

Suggested point of access from Public Footpath No 2701

MAP DATA ©2019 GOOGLE. IMAGE CAPTURE: JUNE 2018, LANDSAT / COPERNICUS.

N

0m 100m 200m 300m

Metres

LEGEND

🟥	Site Boundary

RESTORATION PROPOSALS

🟩	Existing Broadleaved Woodland - To be retained and enhanced.
🟩	Broadleaved Acid Woodland - To be planted out.
🟩	Native scrub planting - Self seeded / managed.
🟪	Lowland Heathland species to be targeted for establishment, further to trials early in phased restoration.
🟩	Acid grassland establishment targeted with areas of bare ground left for natural succession to take place.
▨	Existing Standing water.
🟦	Proposed Standing water.
🟩	Marginal planting to areas of standing water.
🟨	Gravel Islands created above standing water level to provide habitat for ground nesting birds.
🟨	Sand/Gravel 'Beach' areas to allow interaction with the waterside by visitors.
╌	Shallow vertical faces to be created using gabions or similar filled with rock and reclaimed material to provide additional sand Martin habitat.
╌	Soft Cliff faces to be retained as habitat to solitary bees. Any enhancement planting within the proximity should avoid these faces as well as sand Martin nesting sites found to the east.
─	Footpaths for informal public access
─	Private use access for maintenance and habitat management
▨	Retained hardstanding/site maintenance area
● →	Viewpoints from high ground across the Site to surrounding chalk escarpment landform including the wooded Chanctonbury Ring.

PLANNING

Rev	Description	Date	Initials
03	Minor update to pathways	22.12.20	JP
02	Planning Issue	11.12.20	KG
01	Planning Issue	18.11.20	KG
00	Draft Issue	16.10.20	KG

LIZARD
Landscape Design and Ecology

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Client
Dudman Rock Common Limited

Project Title
Rock Common Quarry
The Hollow, Washington

Drawing Title
Landscape Masterplan Strategy (Illustrative)

Scale	*Drawn*	*Approved*	*Date*
1:2000@A1	KG	JP	22.12.2020

Drawing No. **LLD1955-LAN-DWG-001**
Revision 03

Landscape Masterplan Strategy (Illustrative)
Rock Common Quarry, The Hollow, Washington

APPENDIX AB

Landscape and Woodland Management Plan

LIZARD
Landscape Design and Ecology

DUDMAN ROCK COMMON LIMITED

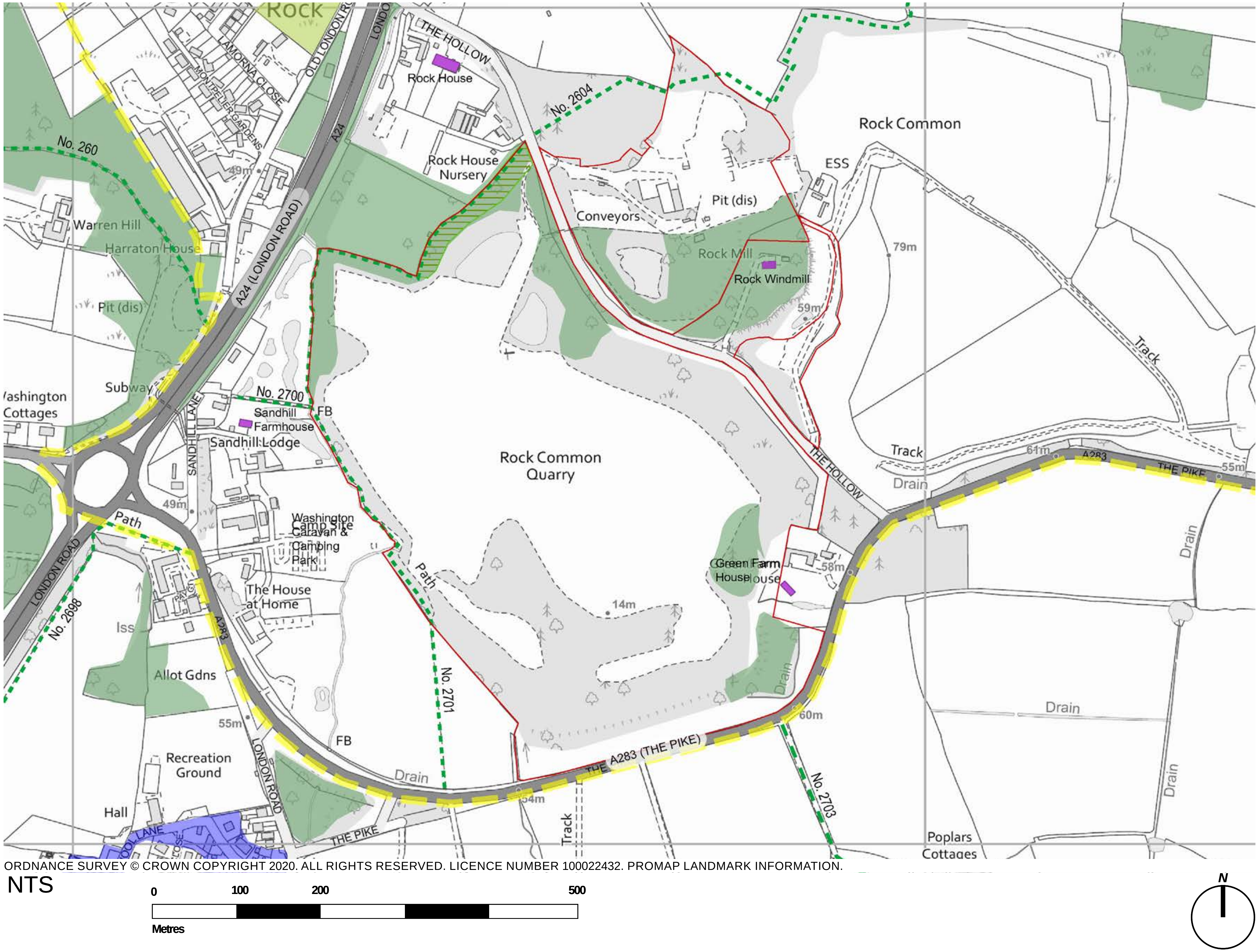
ROCK COMMON QUARRY, THE HOLLOW WASHINGTON

Landscape and Woodland Long Term Management Plan

Project Reference	LLD1955-LAN-REP-001
Prepared by:	JP
Checked By:	GS
Revision	03
Date:	22.12.2020

Planning Issue

CONTENTS



ORDNANCE SURVEY © CROWN COPYRIGHT 2020. ALL RIGHTS RESERVED. LICENCE NUMBER 100022432. PROMAP LANDMARK INFORMATION.

Legend

- 🟥 Site Boundary.
- South Downs National Park, (*south of the dashed yellow line*).
- Public Footpath.
- Public Bridleway.
- Listed Building *(Grade II)*.
- Conservation Area.
- Deciduous Woodland UK Priority Habitat.
- Traditional Orchard UK Priority Habitat.
- Tree Preservation Order.

Figure 1.2. Site and Surrounds.

1.0 INTRODUCTION AND BACKGROUND

General

1.1 Lizard Landscape Design and Ecology (*LLD*) has been commissioned by Dudman Rock Common Limited to develop a Long Term Woodland and Landscape Management Plan, *(LMP).*

1.2 The LMP should be read alongside of the Landscape Design Strategy *(LDS)* and Illustrative Landscape Masterplan *(LM)* for the proposed restoration project at Rock Common Quarry, The Hollow, Washington *(Grid Reference: TQ 12507 13493).*

1.3 The approach has been informed by recommendations from both the Lizard produced Tree Survey and the involvement of the Ecology Co-op.

1.4 The LMP has been undertaken by Joshua Peacock, an Associate Landscape Planner at Lizard Landscape Design and Ecology and a Chartered Landscape Architect, supported by Kian Gharchedaghi, Landscape Architect.

The Scheme

1.5 A description of the proposed restoration scheme is provided within Section 3 of the Terrestria Application, which the reader is advised to read alongside of this report.

The Site and Surrounds

1.6 The Site is best described through reference to Section 3 of the Terrestria Application, which the reader is advised to read alongside of this report.

Soil and Topography

1.7 Through reference to the Soilscapes Map *(developed by Cranfield University and sponsored by the Department for Environment, Food and Rural Affairs)* soil type across the southern half of the main quarry to the south of The Hollow *(in keeping with that to east and west)* is shown to have comprised: *'slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils'*.

1.8 The soil type to the remainder of the unexcavated Site to the north is understood to comprise: *'Freely draining slightly acid loamy soils'*.

Association of habitat with the Folkestone Beds of the Lower Greensand

1.9 Through reference to an extract from: 'The Habitats and Vegetation in Sussex, *(Rose, 1995, published by The Booth Museum of Natural History), (see **Appendix E**)* the landscape of the Folkestone beds are identified as being likely historically wooded with an Oak-Lime-Hazel woodland, which would have been cleared throughout the Mesolithic and by the Bronze age. Associated species of dry heath and wet heath and short sandy turf are provided within the extract.

1.10 In aspect and geology, dependent upon appropriate substrate formation, the Site is considered to have potential for heathland habitat comparable to the lowland dwarf shrub heath of Sullington Warren Site of Special Scientific Interest, located some 2.5km to the west along the local outcrop of the Folkestone Formation, with a smaller area about Washington Common some 800m to the west.

1.11 Through reference to Sandgate Conservation Society webpage, *(visited at: https://www.sandgate-conservation.org.uk/work-sites/sullington-warren-flora/),* the following is identified:

'Much of the work done by the National Trust at Sullington Warren is focused on maintaining, improving and extending the areas of heathland. As well as clearing scrub, brambles, saplings and bracken this also involves the removal of some trees, mainly Scots pine. [...] As well as the heathers and trees here are a number of other plants in the area such as the Hare's Tail Cotton Grass which is found in the wet heath areas, numerous lichen in the dry heaths and the Field Mouse-ear, a plant of dry grassland and therefore relatively rare throughout Sussex. [...] The trees include Scots Pine, Silver Birch and Pedunculate Oak as well as Hazel with the occasional Ash, Mountain Ash (Rowan), Holly and Alder Buckthorn.'

2.0 EXISTING GUIDANCE

General

2.1 A review of relevant guidance has been undertaken including the following, and extracts from the:

- *Lowland Heathland Establishment on Mineral Sites - Nature After Minerals (RSBP / Natural England), (see **Appendix B**);*
- *DoE Reclamation of Damaged Land for Nature Conservation (LUC / Wardell Armstrong, 1996), (see **Appendix C**);*
- *Sussex Wildlife Trusts Pond Creation & Enhancement for Landowners Guidance Note (Mar 2014), (see **Appendix D**).*

Great Crested Newt Conservation Handbook (2001)

2.2 Regarding management of grassland surrounding ponds the Froglife produced Handbook advises that: *'..Where possible it is beneficial to leave a margin of uncut vegetation up to five metres or so in width around some of the pond margins and alongside hedges, streams or other boundaries to ensure the presence of some dense cover throughout the year.'*

Amphibian Habitat Management Handbook (ARC, 2011)

2.3 With regards to pond design, the handbook recommends that: *'Amphibian ponds should ideally contain a range of microhabitats. To create microhabitat diversity within a pond, the design should incorporate: Gently sloping sides; A range of pond depths; An irregular shape.'*

2.4 Regarding the Gently sloping sides the 2011 report recommends a: *'(gradient of 1 in 10 or if possible 1 in 20) to create a wide drawdown zone which encourages a diversity of plants and invertebrates. Shallow areas, less than 10 cm and certainly less than 30 cm deep, support the greatest range of pond plants which in turn create the habitat for most of the pond's invertebrates. Beds of submerged aquatic vegetation provide egg-laying substrates for newts, microhabitat for prey species and refuge from predators. For amphibian ponds it is not necessary for the greatest water depth to exceed 1.2 m.'*

2.5 Regarding management the 2011 report recommends that any pond maintenance works should take place in the winter *(November-February)* when Great Crested Newts will be absent from the pond.

2.6 The presence of any invasive plant species should be carefully controlled. Non-native, pest pond plants include*:*

- *New Zealand pygmyweed, (Crassula helmsii);*
- *Parrot's feather, (Myriophyllum aquaticum);*
- *Floating pennywort, (Hydrocotyle ranunculoides);*
- *Water fern, (Azolla filiculoides);*
- *Waterweeds, (Elodea species);*
- *Curly waterweed, (Lagarosiphon major).*

2.7 Regarding the surrounding terrestrial habitat for amphibians the handbook advises that: *'Juveniles will spend 2/3 years on land before reaching sexual maturity. A varied habitat of tussocky grassland, scrub and trees provide optimal habitat. Fallen deadwood, piles of rubble, tree stumps and mammal holes all provide hibernation sites. Ponds should be linked by strips of optimal habitat to allow migration between them. A belt of trees or scrub several metres to the north of a pond can act as a windbreak and create a warm microclimate around the pond.'*

2.8 Regarding long term management the handbook advises that: *'the pond site should incorporate measures to control scrub and trees to avoid excessive shading. No more than 60% of the pond shoreline, or 25% of the surface of smaller ponds, should be shaded and in most cases less shading is preferable. The southern shoreline is best unshaded.'*

Dormouse Conservation Handbook (2006)

2.9 The 2006 Handbook includes the following advice regarding hedgerows and woodland, paraphrased for clarity: Woodland:

- *'New woodland planting should include a dense understorey of hazel. Woodland should be maintained to create a high species diversity, mosaic of age classes and multi-storey canopy;*
- *Woodland should be managed through coppicing in an 8 years rotation, with young coppice next to old to ensure easy re-colonisation by dormice. Where a high population of deer are present hazel may be pollarded at 1.5m height;*
- *Standards should be thinned when necessary to prevent excessive shading which would reduce understorey density;*
- *Rides within woodland should have a narrow point at least every 70m where trees meet overhead to allow dormouse movement.*

MAP DATA ©2019 GOOGLE. IMAGE CAPTURE: JUNE 2018, LANDSAT / COPERNICUS.

1:8,000 at A3

0m 100m 200m 300m

Metres

N

Legend

☐ Development Site Location.

🟩 **Existing Broadleaved Woodland - To be retained and enhanced.**

🟩 **Broadleaved Acid Woodland - To be planted out.**

🟩 **Native scrub planting - Self seeded / managed.**

🟪 **Lowland Heathland species to be targeted for establishment, further to trials early in phased restoration.**

🟩 **Acid grassland establishment targeted with areas of bare ground left for natural succession to take place.**

▨ **Existing Standing water.**

🟦 **Proposed Standing water.**

🟩 **Marginal planting to areas of standing water.**

🟨 **Gravel Islands created above standing water level to provide habitat for ground nesting birds.**

🟨 **Sand/Gravel 'Beach' areas to allow interaction with the waterside by visitors.**

Shallow vertical faces to be created using gabions or similar filled with rock and reclaimed material to provide additional sand Martin habitat.

Soft Cliff faces to be retained as habitat to solitary bees. Any enhancement planting within the proximity should avoid these faces as well as sand Martin nesting sites found to the east.

Footpaths for informal public access

Private use access for maintenance and habitat management

▨ **Retained hardstanding/site maintenance area**

● **Viewpoints from high ground across the Site to surrounding chalk escarpment landform including the wooded Chanctonbury Ring.**

Figure 3.1. Landscape Masterplan, (Illustrative).

3.0 LANDSCAPE AND WOODLAND MANAGEMENT LONG TERM PLAN

Landscape Vision

3.1 The Landscape Vision defined within the LDS is repeated below:

'To create an integrated ecological and amenity resource at the foot of the South Downs National Park escarpment, which integrates the Site into the surrounding landscape whilst enhancing sense of place.'

Landscape Objectives

3.2 To achieve this the following objectives would be pursued as presented within the LDS, *(and LMS incorporated as* ***Figure 3.1****)*:

- ***A high quality mosaic of habitats across a larger area of the Site*** *- Including a mosaic of lowland heath, acid grassland, scrub and woodland, marginal habitat and patches of open water, within which islands of shingle would protect nesting birds. Areas of sand cliffs along the south eastern and eastern section of the quarry would be retained, which support many thousands of solitary bees, whilst also retaining the upper levels of the Folkestone Formation for educational purposes, protected as a Regionally Important Geological and Geomorphological Site;*

- ***A strong sense of place, accessed through a network of footpaths with varied outlooks*** *- Including viewpoints which provide prospects over the mosaic of habitat within the Site towards the landmark of Chanctonbury Ring to the south east and Highden Hill to the south west. Footpaths within the Site would explore the mosaic of habitats, whilst leading towards sandy beach areas along the waters edge, otherwise fringed with reeds, from which paths would generally be offset to reduce disturbance.*

3.3 This would be in keeping with the heavily wooded ridges, interspersed with small patches of heathland, identified as characteristic for the West Sussex Storrington Woods and Heaths, *(LCA WG7, 2020)* which surrounds to the north, whilst extending a mosaic of habitat into the Central Scarp Footslopes, *(LCA WG8, 2020)* which surrounds to the south.

3.4 The setting and recreational access to the South Downs National Park, would be enhanced through establishing a multifunctional networks of spaces and features which connect with surrounding and existing biodiversity corridors.

Design Principles

3.5 Three Design Principles, *(DP)* are used within the LDS to structure the approach taken within the outline landscape framework, which includes ecological recommendations provided by The Ecology Co-op. The third principle is focused upon within this document:

- ***Design Principle 3*** *- Ensure habitat mix specification and method of establishment are suitable for the long term objectives of the Site, informed through consideration of short - mid - long term management actions presented within the Landscape and Woodland Implementation and Long-Term Management Plan, (LLD1955-LAN-REP-002-03).*

Woodland and Landscape Management Objectives

3.6 The long term objectives for the Habitat types identified within the Illustrative Landscape Masterplan, *(see* ***Figure 3.1****)* are defined as follows, incorporating the biodiversity targets which might be anticipated:

- Habitat Type 1 - Wetland: *Layered submerged and emergent pond habitat with open water and biodiverse marginal habitat to support bustling activity from darting dragonflies, birds and amphibians and recreational activity both within enclosed beach areas and the open water anticipated to comprise of swimming and kayaking;*

- Habitat Type 2: Heathland: *Biodiverse grasslands with areas of bare ground, heath, acid grassland, short turf, tussocky grasses and flowering plants, to sustain a food source and habitat for moths, bees, butterflies, birds and bats; Swathes of colour and subtle movement of insects moving over and within the diverse grassland mosaic and areas of open ground;*

- Habitat Type 3: Woodland: *Extended woodland edge with transitional vegetation and intervening glades for the use of mammals, birds, bats, reptiles, and amphibians; Butterflies and hedgehogs moving along the dappled light about transitional vegetation;*

- Habitat Type 3: Scrub: *Areas of self colonising scrub managed for the use of mammals, birds, bats, reptiles, and amphibians; Nesting birds feeding on brightly coloured berries, foraging newts and hedgehogs in the leaf litter; Diverse transitional edges supporting busy butterflies and moths;*

3.7 The achievement of the long term objectives for each broad habitat type is considered through recommended actions within The Woodland and Landscape Management Schedules, provided within **Appendix A**, supported by the planting lists within Table 1 of the Landscape Design Strategy, *(LLD1955-LAN-REP-001-03).*

3.8 The Phasing of the restoration of the Site, should enable the respective areas within the Illustrative Landscape Masterplan to be established as they come forward. It is assumed that upon phased restoration that the priority within the restored area would be for habitat creation, albeit with allowance for continued access routes. As such, the timeframe within the Schedules provided within **Appendix A**, would occur across a staggered timeframe.

APPENDIX A - WOODLAND AND LANDSCAPE MANAGEMENT SCHEDULES

APPENDIX A - WOODLAND AND LANDSCAPE MANAGEMENT SCHEDULES

AIM	SHORT TERM ACTION (0-5 Yrs)	MID TERM ACTION (5-15 Yrs)	LONG TERM ACTION (15 Yrs +)
Habitat Type 1 - Wetland:			
“Layered submerged and emergent pond habitat with open water and biodiverse marginal habitat to support bustling activity from darting dragonflies, birds and amphibians and recreational activity both within enclosed beach areas and the open water anticipated to comprise of swimming and kayaking.”	**1.1** - Where ponds are to be planted ensure only native species are selected through reference to the Sussex Wildlife Trusts Pond Guidance Note, *(March 2014)* - See **Appendix D** for extract as developed within the outline planting list within the Landscape Design Strategy; Plug planted at 500mm centres.	**1.8** - Clear aquatic plants in Autumn / Winter if necessary to ensure no more than 80% coverage to allow clear water for Great Crested Newt displaying;	
	1.2 - Establish reeds through natural expansion,using reeds pulled from the existing pond to the north to establish small patches where required in late winter/early spring before shoots emerge. Optimal planting time is May/ June, when shoots are green with 2-4 leaves or immediately after harvesting; Consider active deterrence of problem birds *(i.e. geese)* during the vital first year of vegetation establishment. i.e. by covering reed with blackthorn cuttings for example;	**1.9 -** Cut and remove different areas of reeds on a 4–7 year rotation to prevent the build-up of nutrients and dead plant material, which dries out the habitat and causes nutrient enrichment, whilst keeping some reed young and healthy. Use arisings to create debris piles within adjacent areas of scrub.	
	1.3 - Monitor the pond for any Schedule 9 aquatic plants such as waterweed and pigmyweed to ensure that the spread of these plants is prevented; Remove if identified;		
	1.4 - Clear accumulated leaves from the pond surface in autumn; build up of rotting vegetation may lead to algal blooms;		
	1.5 - Utilise a cutting regime to prevent scrub encroachment and any self colonising trees from pond margins, including upon the islands;		
	1.6 - Water levels within the lakes to be sustained, *(with some seasonal fluctuation anticipated to be beneficial to habitat from opening up of muddy banks)* using pumped water from a proposed well south west of the lower lake, under an existing agreement to maintain water levels within the Honeywell Stream.		
	1.7 - Monitor ponds for signs of fish colonisation; presence of fish are majorly detrimental to GCN breeding success. Remove fish if moderate/large numbers are present.		

APPENDIX A - WOODLAND AND LANDSCAPE MANAGEMENT SCHEDULES

AIM	SHORT TERM ACTION (0-5 Yrs)	MID TERM ACTION (5-15 Yrs)	LONG TERM ACTION (15 Yrs +)
Habitat Type 2: Heathland:			
“Biodiverse grasslands with areas of bare ground, heath, acid grassland, short turf, tussocky grasses and flowering plants, to sustain a food source and habitat for moths, bees, butterflies, birds and bats; [...].”	**2.1** - Trial using differing materials and techniques throughout the early phased restoration of the Site on an annual basis to determine suitability for achieving establishment of acid grassland / lowland heathland communities; Such as using seed-rich litter and green hay.	**2.5** - Manage staged disturbance of the substrate to support the ecological value and visual interest of the supported invertebrate populations; For example carry out a mowing / strimming maintenance regime of some 20% of the area per year in March, whilst allowing patches of scrub and tree groups to establish; The network of paths would additionally benefit the recommended approach to maintaining an open mosaic type habitat in places across the quarry site, through the informal disturbance of the substrate which would result about the acid grassland and heathland areas; Leave some areas as bare ground to allow a process of natural colonisation and successional growth;	
	2.2 - Maintain areas of bare sandy ground, of varied topography and vegetation cover through the 8 year transitional phases, and throughout the final restoration to support invertebrate diversity. Retain undisturbed ‘refuge’ areas throughout the restoration to allow insects to complete their life cycle;		
	2.3 - Across the acid grassland area introduce informally dispersed swathes sown with a tussocky grass mix with a high percentage of forbs to incorporate a mosaic of vegetation overlying the Site, whilst encouraging exploration along the resulting edge of grassed and bare ground habitats resulting; This may well maintain areas of bare ground, from resulting recreational disturbance;		
	2.4 - Heathland habitat to be established on south facing profiles, with slopes managed to promote a low fertility open sward suitable for allowing the natural regeneration of acid grassland and heathland species through a management plan, with resulting advantageous species to aid pollination and reduce pest species for the agricultural land within the surrounding area;	**2.6** - Continuous or periodic disturbance of heathland is needed even within the initial 5-year after-care period. Sussex Wildlife Trust or the National Trust should advise and perhaps extend existing management to that within the Site further to their experience at Sullington Warren and Warren Hill.	

AIM	SHORT TERM ACTION (0-5 Yrs)	MID TERM ACTION (5-15 Yrs)	LONG TERM ACTION (15 Yrs +)
Habitat Type 3: Woodland:			
"Extended woodland edge with an acid woodland mix for the use of mammals, birds, bats, reptiles, and amphibians; [...]"	**3.1** - Extend woodland edge with woodland mix and species in keeping with that existing to the northern and southern areas of the Site boundaries respectively, including understorey planting of hazel, to provide dormouse habitat. It is understood that rabbits occur to the east of the Site and deer are frequent visitors within the area. Recommended approach as follows, with additional guidance on making space for hazel coppice. Planting of woodland areas to be guided by the Woodland Trust with potential for woodland grant to part fund tree supply: • Trees should also be planted within 7 days of delivery to ensure the best success rate; • Bare root saplings (between 40 – 60cm) are to be planted with 1.2m tubes and stakes with the shrubs species planted with 75cm spirals and canes, to protect against mammal damage; • Tree species planted in groups of 5-10 at an average 2.5m spacing, within staggered wavy lines. Some can be closer together and some further apart; • Plant trees at a wide enough spacing to allow the establishment of hazel understorey. Protect young hazel with deer proof fence.	**3.4** - Once woodland has established, tree density can be reduced by actively removing certain trees, *(thinning).* Some species benefit from a closed canopy providing high levels of shade and humidity whilst others benefit from a more open canopy. Creating some central areas of closed canopy and a more open-structured perimeter can maximize woodland habitat diversity. The latter can be managed by thinning some trees, regular coppicing, *(cutting stems near ground level)* or pollarding, *(cutting stems at ca. 2 m height).* Thin trees to ensure adequate light for understorey of hazel to be sustained.	
		3.5 - Coppice or pollard hazel on an 8 year rotation.	
	3.2 - Maintain trees by spraying a contact herbicide, around the base of each tree once a year, *(usually in the spring)* with a knapsack sprayer for 2 years after planting. This is to reduce competition from weeds/grass and help the trees establish more quickly. If prefer not to spray herbicides then use mulch mats around each tree or strim the base of the trees approximately twice a year taking care not to damage the stems;	**3.6** - Remove rabbit and deer-proof fencing once the trees have become established;	**3.7** - Remove poorer specimen large trees without obvious ecological features e.g. bat cavities which are casting excessive shade and reducing understorey density.
	3.3 - Leave fallen tree trunks or branches, especially large ones, where they are whenever possible, preferably on the edge of shade or in dappled sunlight, which can help to create habitat for a range of species including woodpeckers, bats, insects, amphibians, *(frogs/toads/newts)* and reptiles, *(snakes, slow worms and lizards)*		

AIM	SHORT TERM ACTION (0-5 Yrs)	MID TERM ACTION (5-15 Yrs)	LONG TERM ACTION (15 Yrs +)
Habitat Type 4: Scrub:			
‘Areas of self colonising scrub managed for the use of mammals, birds, bats, reptiles, and amphibians; [...]"	**4.1** - Enable scrub to establish naturally within areas to improve structural heterogeneity and edge across the habitat mosaic to provide foraging and refuge opportunities for birds, small mammals and other wildlife; Potentially introduce a small amount of Ulex minor, (Dwarf furze), Bilberry, (Vaccinium myrtillus) Calluna vulgaris (Ling) in same species clumps as a component of the scrub habitat about the woodland edges.	**4.3** - Cut back any vegetation from overhanging the pathway or preventing access to some 2m from the path-side.	
		4.4 - Woody vegetation managed as clumps to prevent broader encroachment;	
		4.5 - Dead wood is valuable to a large number of invertebrates. Leave or create scrub piles on the ground.	
	4.2 - Introduce a small amount of Ulex minor, (Dwarf furze) as a component of the scrub habitat. This should be managed as clumps, to prevent broader encroachment.		

APPENDIX B - LOWLAND HEATHLAND ESTABLISHMENT ON MINERAL SITES (RSBP / NE)

LOWLAND HEATHLAND ESTABLISHMENT ON MINERAL SITES

General principles

Lowland heathland is found below 300 m altitude, on generally acidic sandy soils and clays, on which also occur botanically important valley mires. These are internationally rare and vulnerable habitats. Mineral workings with suitable soils are ideal opportunities for creation. It will take upto 20 year for the full assemblage of heathland vegetation and features to develop, but is of real conservation value from the outset, and pioneer vegetation cover can develop in 3-5 years.


Andy Hay (rspb-images.com)

Lowland heathland and mire communities vary in character across the country. It is important to create heathland appropriate to local soil and climate conditions.

Key criteria

Successful heathland establishment will depend on a number of physical criteria:

- **Low soil fertility.** Soil phosphorous (P) availability should be less than 10 mg kg-1 to avoid competition from weeds.
- **Acidic soils.** Lowland heathland creation is only viable on soils with a pH of 3-5.
- Source seeds and turfs from the same vegetation communities (and close proximty where possible) as the target community. Inappropriate species or strains could permanently damage existing heathland. Check the **National Vegetation Classification** for guidance
- **Varied topography**. Create a landform that replicates the natural heathland landscape, including variations in slope and aspect as appropriate.
- **Bare and sparsely vegetated ground** should also be planned into the long-term design for the site as it is host to specialist early pioneer species of plants, invertebrates and birds.
- Wet heath can establish where **seasonal waterlogging** with base poor water occurs.
- Mire vegetation can develop where **waterlogging is permanent**.
- Establishing a **heathland mosaic** and not just heather, which may only be a relatively small part of the typical community.

It's important to establish a heathland mosaic and not just heather, which may be only a relatively small part of the typical community.

Establishment techniques

Soil preparation

Only use topsoil recovered from a heathland in good condition prior to mineral extraction, otherwise establish heathland on mineral substrates that are very low in available minerals. Do not import nutrient rich topsoil or compost.

Natural colonisation

Natural colonisation will occur on very nutrient-poor soils, where an adjacent seed source is available. Seeds blown from adjacent heathland will be very slow to establish, as ericaceous seeds are not adapted for wind blown dispersal. This is an appropriate method if plenty of time is available to establish the habitat.
Weed species (birch/pine seedlings, bracken, rough grasses) need to be kept at low thresholds.

The **mosaic** of acid grassland, bare ground and developing heath that occurs in the interim will have significant wildlife benefits. **Bare and sparsely vegetated ground (Open Mosaic Habitat)** is host to specialist early pioneer species of plants, invertebrates and birds. Bare ground habitat should therefore also be planned into the long-term design for the site.

Topsoil and turf application from a donor site

Topsoil and turf are likely to be only occasionally available because this usually causes severe disturbance to the donor area. However, donor sites that have been under-managed can be restored using turfing and or topsoil stripping as this benefits the donor site by removing accumulated organic litter.

The appropriate statutory conservation agency must be consulted before turfing or scraping on SSSIs. Archaeological authorities should also be contacted to avoid damage to historic interest on the donor site. The least damaging time to lift turfs and topsoil is likely to be late summer or autumn.

Traditionally, small turfs were routinely cut for fuel using alternate (chequerboard) spacing carried out over a long rotation.

Taking turfs to re-establish heathland vegetation

- A seed bank will exist in the upper c.10 cm of undisturbed heathland soil - in the organic horizon immediately below the fresh litter and in the top 5 cm of the mineral soil.
- Laying turfs in a block will establish a total heathland cover, and suppress competition, but scale will be limited by availability of turfs. Instead, space the turfs across the site and rely on seed from them to fill the gaps. This will provide diversity to the vegetation structure.
- Smaller turfs are easier to transport and can be spaced out so seed from them will infill the spaces between. Larger turfs are less prone to desiccation and to damage but can be difficult to transport.
- Dig turfs deep enough to avoid damage to roots (these are close to the surface). Around 10-20cm should suffice but ideally research this on site.
- Turfs need to be lifted, transported and laid before desiccation of the rootstock occurs, and taking care to exclude air pockets beneath the turfs, e.g. with light roller.
- Lift turfs in the autumn/winter, when plants are dormant and there is less risk of desiccation. Turfs should be dug in so the edges are flush with the ground surface to avoid desiccation of the rootstock.
- Where the receptor site is very infertile, the turves may be chopped and spread using the technique described below and roll to press into the soil; this will enable the material to be spread further if need be.
- Watering may be required in dry weather in the year following laying.

Using topsoil to relocate seed material from a donor area

- Remove standing vegetation to 2-5 cm prior to soil removal - fresh organic matter will heat when stored and risks killing the seed. Spread the cut material spread as an additional seed source: cut in autumn (post-flowering) and collect, using suitable machinery (double chop forage harvester or hi-tip type mower).
- Use a machine that will strip material to a determinable depth so that the organic horizon and the seed-bearing soil are taken together plus a few centimetres to ensure all seed material is gathered.
- Lift, transport and lay topsoil in one operation. If it must be stored, prevent heating which if above 50^{o}C will kill ericaceous seeds: storage heaps should be less than 1.5 m high, on free-draining ground, preferably on geotextile sheeting. Ericaceous seeds viability is > 14 months if properly stored, but vegetative material of species such as purple moor-grass or bilberry will not survive storage.
- Spread topsoil using e.g. a manure spreader as this is quick and cost effective. Any clods can be broken up with a light harrow. Alternatively dump piles of material and spread using an excavator or similar.
- An even and complete cover of vegetation is not usually desirable for nature outcomes; it causes an even stand structure.
- Spread material more thinly to give sparser early distribution. Small gaps will infill with seeds from established plants creating a structural diversity.
- On coarse, mineral, substrates with low sand content, spreading fine, sandy, mineral subsoil would help water retention and improve soil-plant nutrient exchange.
- A nurse grass crop (e.g. *Agrostis*) can stabilise vulnerable soil and protect germinating seedlings from desiccation. It is normally only necessary in particularly exposed locations. Chose nurse species that have a

low nutrient demand (so no need for additional fertiliser), and short viability so naturally lose dominance after 3-4 years. The nurse sward should be sparse, with space for heathland species to develop.

  - Sow nurse crop in spring or late summer/ early autumn, by broadcasting onto a moderate seedbed and roll-in with a Cambridge roller.
  - Geotextile sheeting may be needed to stabilise steep slopes.
- Spread topsoil in late winter or early spring, when relatively dry. The first germination can happen relatively quickly and this gives a full growing season.

Litter and brash transfer

Collecting and spreading litter and/ or vegetation containing viable seed of a range of heathland plants is relatively cheap, non-destructive, and repeatable.

Cutting and spreading

- Prepare a relatively compact seedbed on the receptor site - any roughness will help shelter young plants from desiccating winds. A nurse crop should not be necessary on reasonably flat ground as the chopped brash shelters the seedlings.
- On the donor area, cut heath that is well grown but not old to ground level with cut and collect machinery e.g. a double-chop forage harvester – cutting then baling sheds many seeds and thereby reduces success.
- Cut between late September and late November when ripe seeds are in the capsules. Small amounts of topsoil are inevitably picked up, which imports heathland soil microbes and the mycorrhizal fungal associate that is thought to benefit establishment of ericaceous species.
- Transport the cut material to the receptor site and spread it immediately. Store if necessary in low piles to prevent heating.
- Spread the material with e.g. a clean manure-spreader. Tease apart any clods with a light harrow. Use a Cambridge roller to press seeds into the ground to promote better rooting.
- If desired, to establish a quick dense cover, spread material 1 cm deep. Approximately one hectare cut will provide for two hectares of spread. Spread more thinly for less dense cover and the material will go further.
- Heather germination rates are variable - some germinate within six months, others over two years –wait to assess success. Mature ericaceous shrubs produce thousands of seeds per metre square, and the new seedlings are tiny so are easy to miss!

Litter collection

The humic litter from old unmanaged heathland will contain a high number of seeds. Litter removal can be used as part of restoration work on appropriate donor sites.

- Strip litter to the mineral soil surface - regeneration of the donor site will occur from the seedbank.
- Collect material using e.g. a grading blade with a very sensitive control to scrape without digging into the mineral soil, lift into trailers, or
- loosen the litter with a light harrow, let it dry and then vacuum into a trailer
- transport and spread on the receptor site in the same way as heather cuttings

Harvesting and sowing seed from donor sites

Seed harvesting is usually done by specialist contractors. It limits the species imported, but will give good take of heather. Machines brush the seeds from the plants and collect them, with limited damage to the vegetation. Seed is usually cleaned and heat or smoke treated to increase germination. Collection is expensive, but transport and spreading costs will be relatively low because volumes are low. This of all methods will produce uniform stands of heather with low species richness.

Ericaceous seeds are extremely small and light, so a nurse crop of fine grasses may be necessary on exposed areas (see above). It is usually preferable to harvest the whole crop (see above) to provide some mulch with the seed.

Sowing commercially available seed

Unless local progeny can be guaranteed, do not buy commercial seed as this could introduce potentially genetically ‘alien’ heather or create a monoculture of heather, with low wildlife value.

Planting out seedlings and plants

This is labour intensive and often expensive: seedlings need to be collected or grown from seed, hardened off, transplanted and cared for to avoid drought and suppress competition. Recommend using fewer plants at relatively wide spacing; once established, these will seed into and fill gaps (manage any competition). This method could be used to introduce 'missing' species after monitoring of early regeneration.

Long-term management

Keep establishing heathland free from competing plants, and keep soil fertility low. Management must avoid introducing nutrients through incorporation of organic matter.

Options include:

- **Light spring and early summer grazing** – to control competing grasses and shrubs. Timing of introduction is not critical and can be delayed until a problem with the level of competition is identified.
- **Rabbit browsing** – helps to maintain early-successional habitat for plants, invertebrates and birds like woodlark, generating prostrate heather growth, along with open ground. Needs to be at low intensity, otherwise over-grazing will inhibit heather establishment.
- **Rabbit-proof fencing** – to prevent over-grazing if local rabbit population is high. Maintain for about five years until heath vegetation is established.
- **Mowing and removing cuttings** – to reduce grass dominance. The heather will survive in a prostrate form.
- **Herbicide** – necessary to control bracken, optional to control gorse, birch and other weeds.
    - **Asulam**, the most effective herbicide to act on bracken was removed from licence in 2011. It has been provided under emergency licence since, but the possibility remains that it may be withdrawn, if so alternative methods of bracken control must be used.
    - **Glyphosate (Roundup)** is a broad spectrum herbicide which should be spot-sprayed or wiped to avoid killing all surrounding vegetation, including heather. It may not be practical if other ground flora and fauna needs to be protected.
- **Crushing** - use a large roller to crush or break the bracken stem. NB do not undertake where ground nesting birds may be present
- **Cutting** - using a majority of different tools such as a swipe, a mower, brush-cutter or a cut-and-collect system such as a forage harvester. NB do not undertake where ground nesting birds may be present . Both techniques only knock the bracken back, and will require repeat treatment.
- Rushes may be a problem on wet heath, but are controllable by herbicide via weed-wipe or by mowing.

Relevant case studies

Wicken North quarry case study
Sandy Heath quarry case study
Plenmeller

Further reading

A Practical Guide to the Restoration and Management of Lowland Heathland. Symes, N.C. & Day, J. (2003)

APPENDIX C - DOE RECLAMATION OF DAMAGED LAND FOR NATURE CONSERVATION - EXTRACTS

Heathland

What this fact sheet covers

This fact sheet looks at methods for establishing and managing heathland communities. Where possible it distinguishes between the main types of heathland habitat.

Key points

- Heathlands should ideally be re-created where there are existing areas of heathland nearby which can supply a local source of biological material.
- There is an urgent need to restore and create heathland to replace lost and fragmented heathland habitats. This is particularly important on sites which will link isolated areas of existing heathland or will extend small existing heaths.
- Techniques for the creation of new heathlands are relatively well understood and have been successfully put into practice.
- Heathland restoration should aim to create the full complement of species appropriate to the location, topography and ground water conditions, rather than just a cover of heather.
- When creating a heathland habitat consideration should also be given to including edge habitats of scrub and woodland, ponds, and areas of acidic grassland → **FS22**.

Background

Current state of knowledge

Extensive practical research has been undertaken on heathland creation and management. This has included large scale trials for both upland heather moorland and lowland heaths as well as humid and wet heaths. The potential of a variety of substrates for heathland restoration has been investigated including sand and gravel, clays, china clay spoil, colliery spoil, former opencast coal sites, landfill, and farmland. Compared to some other habitat types, there is a much wider information base from which to draw up a specification for heathland creation.

Habitat description

Heathlands are open, relatively treeless landscapes dominated by the dwarf shrub heather *Calluna vulgaris*. They include lowland heaths which have developed on freely drained sandy or gravely materials usually below 250m, as well as upland heaths or moorlands which occur above 250m on peaty soils. They are characterised by thin acid soils of low fertility, which exhibit a degree of podzolisation and pH values in the range 3.5 - 5.5. Heathlands can be divided into wet and dry heaths according to soil wetness. Wet heaths grade into acid mires and blanket peats, whereas dry heaths grade into acid grassland. The National Vegetation Classification (NVC) recognises 14 different types of heath which vary according to local edaphic and climatic factors.

Heathland restoration should aim to create the full complement of species of a particular heathland appropriate to its location, topography and ground water conditions.

Natural colonisation

There is, generally, relatively little research on natural colonisation of heathland.

There is evidence of heathers establishing on damaged land by natural colonisation where there is an appropriate source of propagules. For example, at a reclaimed colliery site in Wakefield, heather (*Calluna vulgaris*) was found to have naturally established on an area of ameliorated spoil bordering a large area of land restored for agriculture. The heathers were considered to have colonised within six years: those on the western edge of the site were approximately six years old while those to the east were younger. This trend suggests that the plants had established from seeds distributed by westerly winds. In Dorset, part of a former landfill site, located on a heathland ridge, has recolonised from the extant natural heathlands surrounding the site.

Evidence suggests that most heathland species do not have efficient long range seed dispersal mechanisms and that where sites lie away from an immediate seed source and a quick effect is required, purposeful introduction may be appropriate.

Methods of introduction

General requirements

This section outlines the main factors to be taken into account when reclaiming damaged land to heathland.

Appropriate types of substrate: These include substrates with a pH of between 3.5 and 5.5 overlying acidic parent materials such as sands and gravels, sandstone and silica sand, or acidic waste such as colliery spoil, china clay wastes and some types of metalliferous waste.

Location: Ideally heathland should be established where there are existing areas of heathland vegetation close by which can provide a local source of biological material for habitat creation. There is an urgent need to restore and create heathland in both lowland and upland areas to replace lost and fragmented habitats. Special consideration should be given to its re-creation on sites where it has been destroyed and where it will link isolated heaths or extend small heaths.

Size: There are no special requirements in terms of size of site, although a larger area will be better in landscape terms and will also be easier to manage. It has been suggested that sites should be at least 10 hectares to be managed as a lowland heathland community (Webb and Veermatt, 1990). Smaller habitats are prone to encroachment of species from surrounding areas. However, even small areas of heathland can provide an important educational resource accepting that this may require special management.

Management: Heathland requires appropriate long term management, combining cutting, burning or grazing. This must be taken into account when proposing to restore a site. The provision of management will be a particularly important consideration in urban areas where traditional land management practices may not be so easily applied.

Site preparation

Topography: Steep slopes will be very susceptible to erosion, particularly in upland areas, and may require special treatments - either regrading or erosion control.

Soils: Some form of acidic plant growing medium will be required. This should have a pH range of 3.5-5.5. Where it is proposed to establish vegetation by soil or turf transfer → **FS12 & FS13**, the equivalent depth of soil (if present) will need to be removed.

Ripping/cultivations: The degree of compaction in the underlying material should be an important consideration in the type of heathland habitat being created. For example, waterlogging resulting from compaction may cause an intended dry heathland to become a humid/wet heath. In consequence, in these situations, either a humid/wet heath should be aimed for from the outset or all areas of compaction should be relieved, if feasible, by deep ripping to a 400mm depth.

Surface compaction can inhibit germination and seedling establishment. Cultivation to at least 100mm depth will be required to create a non-compacted seedbed appropriate for seeding → **FS15**, transfer of litter → **FS14** or natural colonisation → **FS11.**

Stabilisation: Surface erosion is a major problem in the reclamation of heathland. Very young heather seedlings are easily washed away or become desiccated following root exposure caused by erosion around the young plants. Stabilisation to minimise sheet erosion, rainsplash and frost heave is essential. Methods include sowing a companion species (see below), or using cut heather shoots or forestry brashings to create protected micro-sites for seedling establishment. Alternatively, materials such as 'Geojute' can be pegged over the substrate. The use of chemical stabilisers is not recommended.

Nutrient additions: The soils on which heathlands are naturally found are usually very deficient in available phosphorus and often in nitrogen. The extent of nutrient inputs required will depend on the existing fertility of the substrate. Ideally preliminary fertiliser trials should be carried out before heathland restoration is attempted. The aim should be to provide adequate phosphorus for heathland species, particularly *Erica* and *Calluna*, while ensuring nitrogen and phrophorus are not available in amounts that would cause excessive competition from sown companion and colonising grasses. Particular attention should be paid to nutrient inputs in lowland situations which may already be reasonably fertile.

Examples of initial nutrient inputs for heathland restoration include:

- NPK (17:17:17) applied at rates of 100-300 kg/hectare followed by Enmag (high phosphorus) applied at a rate of 150 kg/hectare on raw china clay sand waste.
- ICI No. 5 (17:17:17) applied at 50 kg/hectare followed by Enmag at 100kg/hectare on an upland eroded bare mineral substrate.
- NPK (17:17:17) applied at 62.5kg/hectare followed by superphosphate applied at 15.6 kg/hectare on an upland peat site.

pH and liming: Occasionally, on very acid substrates (pH < 3.5), e.g. acidic colliery spoil, the addition of lime may be required to obtain satisfactory growth from sown companion species. For further information see Land Use Consultants. 1992. '*The Amenity Reclamation of Mineral Workings*', 1992 pp 147-149.

Companion/nurse species: The establishment of a nurse crop may be required to help stabilise the surface as well as provide an appropriate micro-climate for seedling germination. Success has been achieved using *Deschampsia flexuosa* and *Agrostis castellana* var Highland. Sowing rates should be low, a rate of 15-20 kg/hectare is recommended. Success has also been achieved using annual crops, such as rye, barley or wild oat, which die back after one year. Companion species are normally required when vegetation is being established by soil transfer → **FS12**, use of seed rich litter → **FS14** and seeding → **FS15**, and should be sown simultaneously.

Vegetation establishment

A number of techniques for re-creating heathlands have been developed including:

- natural colonisation → **FS11**
- heathland turf transplantation → **FS12**
- heathland topsoil transfer → **FS13**
- heather litter/heather shoots → **FS14**
- harvested or commercial seed → **FS15**
- commercial transplants → **FS16**

Natural colonisation: This may be appropriate on sites lying close to areas of existing heathland. Natural colonisation can be assisted by surface stabilisation and creation of a seedbed with protected micro-sites for germination. In areas close to existing heathland there will often be heathland litter available from heathland management practices which can be used to speed up the process of natural colonisation.

Turf and topsoil transfer: This involves the destruction of heathland habitat and is only appropriate in situations where the habitat will otherwise be destroyed. However, conservation in-situ will always be better than re-establishment elsewhere.

Harvested heather shoots and seed: These are a renewable source of material, and can be obtained as part of routine heathland management. They are, therefore, also a relatively cheap method of establishment.

Commercial seed mixes: These can be considerably more expensive and have the disadvantage that the material is unlikely to be of local provenance. This method is only really appropriate where heathland is being re-established in areas where there are no ready sources of harvested heather shoots/seeds.

Commercial transplants: These are too expensive for use on a large-scale although transplanting of individual plants grown in pots may be used as a way of introducing species not present in the vegetation following the initial colonisation/establishment phase.

Management

Monitoring

Establishment and growth of heather should be monitored. Where grasses and other species are becoming dominant and competing with the heather, remedial action may need to be taken → **7.43 - 7.44**.

Management planning

All short and long term management operations should be guided by a management plan → **FS41.**

Aftercare

Protection: Newly establishing heather is very sensitive to damage, particularly from trampling. Experience has shown that restored areas normally require fencing to keep grazing animals out during the first five years. Continued protection from erosion, e.g. by laying forestry brashings may also be required.

Control of unwanted species: The growth of unwanted species which may compete with heather establishment can be a problem. The disturbance of soils during soil or turf transfer may encourage the germination of undesirable species such as rushes, gorse and birch. Thistles and dock may grow in response to fertiliser additions. In fertile situations grasses (and the nurse crop) may grow at the expense of heather. This can be a particular problem on lowland sites. Unwanted species may need to be removed either by hand pulling or spot herbicide application.

Nutrient additions: On most sites no further additions of nutrients will be required. Soil fertility must remain sufficiently low to ensure that any sown companion grass species die out and native grass species do not become abundant. On very deficient substrates an additional fertiliser input may be required to improve the growth of heather. In these situations the use of a slow release fertiliser with a high phosphorus content is recommended, e.g. Enmag applied at 100 kg/hectare.

Long term management

Most heathlands owe their existence to traditional forms of land management. Without continued management they are liable to quite rapid successional change towards scrub and woodland. Traditional forms of heathland management include grazing, burning or cutting for fuel. Ideally management should be carried out in rotation to create a range of age classes with firebreaks dividing the heathland into smaller blocks. Detailed information on vegetation management is provided in standard texts (e.g. Gimmingham, 1992).

Costs of heathland creation

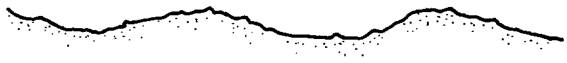
Table FS23.1 The cost of large scale (1500m^2) heathland restoration on abandoned agricultural land at Middlebere Heath, Dorset using three restoration methods (From: Pywell, 1991).

Method	**Costs**			
	Site preparation	**Harvesting, lifting & spreading (£m^2)**	**Transport 17.4 km 10.8 miles(£m^2)**	**Total (£m^2)**
Harvested shoots and seed	£0.07 (rotovating)	£0.10	£0.11	£0.28
Topsoil transfer	£0.24 (soil stripping to 5cm)	£0.17	£0.11	£0.52
Turfing	£0.36 (soil stripping to 15cm)	£1.15	£0.83	£2.34

The costings shown in **Table FS23.1** are for a highly mechanised operation using hired machinery and a labour force of two (including driver). Turf transplantation has a relatively high cost as only a limited amount can be moved in one load and great care is required in loading and unloading each turf. Topsoil and harvested shoots are cheaper as they can be more easily transported and harvested and can be spread over an area 2-3 times greater than the area harvested or stripped. Other costs to be considered include site preparation, transport of material, supervision, monitoring and aftercare management. Treatments, such as topsoil stripping to reduce fertility or to create 'receptor' areas suitable for turf transplantation, are more expensive than other preparatory treatments, such as rotovation.

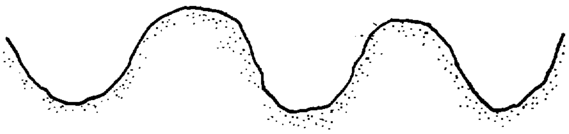
Figure FS 25.1: Shorelines

a) Poor: minimal length



b) Fair

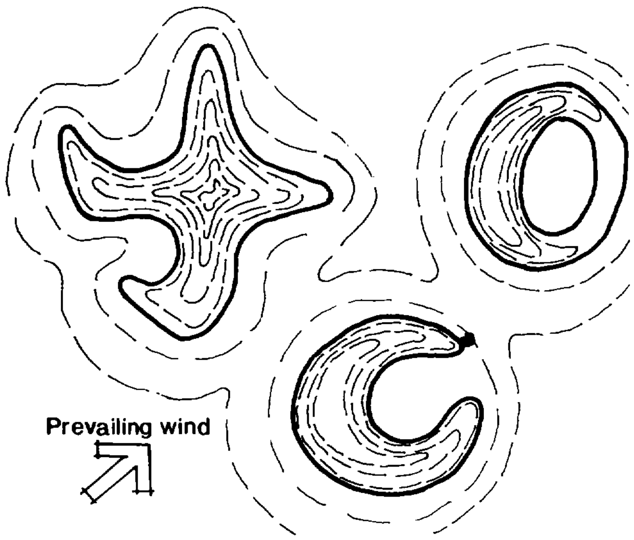
c) Good bay dimensions about 2×2m



d) Excellent bay dimensions about 10×10m
Total length same as (c) but more resistant to erosion, and giving better shelter and cover for wildfowl and waders

From: *Andrews,J and Kinsman,D; Gravel Pit Restoration for Wildlife; RSPB*

Figure FS 25.2: Some appropriate shapes for islands designed for birds



From: *Merritt,A; 1994; Wetlands, Industry and Wildlife; The Wildfowl and Wetland Trust*

Appropriate types of damaged land: Open water bodies are most commonly associated with mineral extraction sites, such as sand and gravel, opencast coal and clay workings where there is a deficit of fill material. They also occur as subsidence flashes over areas of former underground coal workings. Alternatively, water areas may have been purposefully created, for example, as sewage lagoons which then become derelict.

Location: Most lowland locations will be appropriate for encouraging wildfowl. Many birds travel along river valleys either on daily feeding forays or as part of seasonal long distance migration and so water bodies in river valleys are ideally located as ‘stopping off’ places.

Size: All sizes of water body can be valuable for nature conservation, although some species require large areas for feeding/breeding. Generally the length of edge and proportion of shallows will be more important than the surface area of water. Where nature conservation is not the sole objective and the water body is intended to have some recreational use a large water area, within which uses can be spatially zoned is helpful, although in these circumstances, it may be preferable to have a number of smaller water bodies each with a single use → **FS5**.

Management: Management may be required to control succession, provide rotational cutting or occasional excavation of reed beds, maintenance of banksides, islands, vegetated and open shallows, manipulation of water levels and control of fish populations.

Landform creation

Surface and ground water levels vary seasonally and it is important to take this into account when modifying a water body.

Water body shape: A varied irregular shoreline is important especially for birds, with sheltered bays, peninsulas and low profile islands. Areas for roosting wildfowl are best provided by forming long islands or peninsulas. These should have their long axis at 90° to the prevailing wind and should have bare rocky or shingle beaches on their downwind side for loafing birds. Where possible they should be arranged in staggered rows across the lake so that the shelter produced by one island overlaps the next island downwind. The ideal shape for islands is as a horseshoe or semi circular atoll with the mouth facing away from the prevailing wind.

Ideally a variety of underwater habitats should be created during the restoration e.g. by covering parts of the lake bed with a 150-200mm layer of gravel, sand, silt or large boulders/rejects.

APPENDIX D - WETLAND SPECIES LIST (SUSSEX WILDLIFE TRUST)

Native pond plants for your pond

If you wish to plant native species in your pond, here is a list of plants that you might consider.

Plant type	Scientific name	Common name
Oxygenators	*Ceratophyllum demersum* *Myriophyllum spicatum* *Ranunculus aquatilis* *Callitriche stagnalis* *Hottonia palustris* *Potamogeton crispus*	hornwort, spiked water-millfoil, water crowfoot, water starwort, water violet, curled pondweed.
Floating plants	*Polygonum amphibium* *Hydrocharis morsus-ranae* *Potamogeton natans* *Ranunculus aquatilis* *Stratoites aloides*	amphibious bistort, frogbit, broad-leaved pondweed (not small ponds) water crowfoot, water soldier.
Emergent plants	*Menyanthes trifoliata* *Sparganium erectum* *Ranunculus lingua* *Butomus umbellatus* *Iris pseudacorus*	bogbean, branched bur-reed, greater spearwort, flowering rush, yellow flag.
Marginal plants	*Sagittaria sagittifolia* *Veronica beccabunga* *Ranunculus flammula* *Caltha palustris* *Myositis scorpioides* *Mentha aquatica* *Alisma plantago-aquatica* *Veronica anagallis-aquatica*	arrowhead, brooklime, lesser spearwort, marsh marigold, water-forget-me-not, water mint, water plantain, water speedwell.
Marsh & fen plants	*Lysimachia nummularia* *Cardamine pratensis* *Lycopus europaeus Epilobium hirsutum* *Eupatorium cannabinum* *Stachys palustris* *Filipendula ulmaria* *Lythrum salicaria* *Lychnis flos-cuculi* *Junus spp and Carex spp*	creeping jenny, cuckooflower gipsywort, great hairy willow-herb, hemp agrimony, marsh woundwort, meadowsweet, purple loosestrife, ragged robin, rushes and sedges.

APPENDIX E - THE HABITATS AND VEGETATION IN SUSSEX, (ROSE, 1995) - EXTRACT

woods with the rare lichens *Physcia stellaris* and *P. semipinnata;* the wet flushes where Dutch Rush *Equisetum hyemale* grew before World War II no longer seem to produce it, but mass movement of the terrain over the plastic Fairlight Clay beneath may have caused it to fall into the sea. The boulders among the dense *Prunus spinosa* scrub have, however, some remarkable bryophytes, including the very rare *Tortula freibergii, Desmatodon convolutus, Scorpiurum circinatum* and the liverwort *Lophocolea fragrans* - all rare species of Mediterranean affinities; only the *Scorpiurum* is known elsewhere now in Sussex outside this area. Much more puzzling is the presence on some of these boulders, of the antipodean moss *Eriopus apiculatus*, a native of New Zealand, South America and Australia. How did it get there? It is in Tresco gardens too in the Scillies, but many southern hemisphere temperate shrubs are grown there, and it may have come in with them. Covehurst is as about as remote from any horticultural influence as one could imagine in the County, but some antipodean visitor may have introduced it accidentally from his clothing or rucksack!

East of **Cliff End**, Pett (TQ8913), the coast is lowland again, and not very built up, but the small dune area at Pett is now so disturbed that the flora has suffered; *Ammophila* survives between bungalows but *Euphorbia paralias* and *Eryngium maritimum* have gone. East of the sea wall of Pett Level, there lies the most extensive shingle beach in Sussex, between Winchelsea Beach and Rye Harbour. Parts of this area have been quarried for shingle, but its conservation value remains enormous. On the open unconsolidated shingle ridges nearer the sea, Sea Pea *Lathyrus japonicus* is extremely abundant and widespread, though interestingly it was reported as 'nearly extinct' in Sussex in the Wolley-Dod 1937 Flora. *Crambe maritima, Silene maritima* and Yellow Horned Poppy *Glaucium flavum* are also common. On more consolidated shingle further inland, where short *Fescue* turf has developed over shingle producing some humus, a rich flora of spring annuals occurs, including plenty of the following species locally:

Aira praecox and many other more ubiquitous species.
Armeria maritima
T. arvense
Bupleurum tenuissimum
Cerastium semidecandrum
C. diffusum
C. arvense
Cochlearia danica
Erophila verna
Hypochaeris glabra
Medicago minima
M. polymorpha
Moenchia erecta
Poa bulbosa
Sedum anglicum
Saxifraga tridactylites
Stellaria pallida
Teesdalia nudicaulis
Trifolium suffocatum
T. glomeratum
T. micranthum
T. striatum
T. scabrum
T. subterraneum
T. ornithopodioides
Vicia lathyroides
V. lutea

A prostrate form of Herb Robert *Geranium robertianum* is common on the shingle, but no *G. purpureum occurs.* Viper's Bugloss *Echium vulgare* makes a fine show locally in the summer.

There are a number of interesting brackish meadows behind the shingle, near **Camber Castle** (TQ9818). There is not much *Prunus scrub* now. Around old gravel pits *Lactuca saligna* still persists, and in two pits in brackish conditions, there is the very rare *Chenopodium chenopodiodes.* Sea Holly *Eryngium maritimum* occurred till recently near **Rye Harbour** (TQ9318); nearby are White Horehound *Marrubium vulgare* and Henbane *Hyoscyamus niger.*

East of the eastern Rother (which still has some good saltmarsh) there are the best remaining dunes of east Sussex at **Camber** (TQ9418). Parts are damaged by visitors, but to the west, the golf course has played a partially-protective role. Here one can see the newer shingle ridges colonised by Sea Pea *Lathyrus* japonicus. As sand accumulates over these, Sand Couch *Elymus farctus* comes in to fix fore dunes; then the Marram *Ammophila arenaria* arrives, and fixes the main dunes; Sea buckthorn *Hippophae rhamnoides* seems to be natural here. In a large sandy saline low, area Sea-heath *Frankenia laevis* is locally plentiful, and there is (or was) a little Shrubby Sea-blite *Sueda vera* which may originally have been introduced. *Eryngium maritimum* and *Euphorbia paralias* occur with the *Ammophila* in a limited area, as does Lyme Grass *Leymus arenarius*. On fixed dune grassland (with *Poa bulbosa, Koeleria cristata, Medicago minima, Vulpia ciliata* subsp. *ambigua,)* Lizard Orchid *Himantoglossum hircinum* occurs in one area on calcareous sand, and interesting bryophytes occur such as *Pleurochaete squarrosa, Tortula ruralis* subsp. *ruraliformis, Hypnum cupressiforme* var. *tectorum,* and many lichens including *Cladonia gracilis, C. foliacea, C.cervicornis, Coelocaulon aculeatum* and *Leptogium schraderi.*

East of Camber lies the **Dungeness** shingle beach complex (TQ9917). The western end of this - the Midrips - lies in the county of East Sussex, though it is in VC 15, East Kent, so will not be further considered except to say that 1) it has suffered much damage from military use, but 2) still has a good flora of spring annuals similar to that of the Winchelsea - Rye Harbour area on roadsides and tracks.

Inland from Rye, the former tidal estuaries of the Rother, Brede and Tillingham are now freshwater meadows and heavily farmed, but some of the dikes still have good aquatic vegetation with much Greater Water Parsnip *Sium latifolium,* Arrowhead *Sagittaria sagittifolia,* and Marsh Mallow *Althaea officinalis* is still frequent on the damp ground bordering many dikes.

3b. The Upper Greensand and Gault clay

Below the foot of the chalk scarp there is the little scarp of the Upper Greensand, which enters the county NW of Harting and extends intermittently as a regular topographic feature decreasing and thinning towards Eastbourne. It forms a now highly cultivated fertile bench below the chalk scarp with a line of ancient villages along it. However, in places its little scarp bears interesting woodland of Ash, Hazel, Field Maple, Oak and Wych-Elm, on a slightly calcareous sandstone - the Malmstone - used formerly for building. These Upper Greensand scarp woods have been little studied so far in Sussex, unlike in neighbouring Hampshire, where a recent intensive survey has revealed their great botanical interest. Good examples occur about **West Harting**, North of Elsted Church (SU814203) at **Linch Farm** (SU850186), SE of **Duncton** (SU966166), at **Barlavington** (SU974157) and at **Bignor** (SU985150). These woods can nearly all be studied along public footpaths, and should be surveyed more in future. Ferns, particularly Hart's-tongue *Phyllitis scolopendrium,* and both Shield Ferns *Polystichum setiferum* and *P. aculeatum*, are plentiful, with much Moschatel *Adoxa moschatellina,* Ramsons *Allium ursinum,* and Dogs Mercury *Mercuralis perennis;* Foxglove *Digitalis purpurea* is a more calcifuge plant that is common here, indicating that the sandstone is readily leached in places of its rather low lime content. Paris is not recorded but may well occur. The vegetation of the Malmstone can also be well studied on the rocky banks of the hollow lanes that run down its scarp, north of Harting and elsewhere; these, with their fern-rich banks, are in effect linear ancient woodlands. The rare moss *Rhynchostegiella curviseta* is frequently found on these lane banks.

North of the Upper Greensand scarp and extending in a belt c. 1.0-1.5 km wide right across the country as far east as north of Eastbourne, is the outcrop of the Gault clay, a stiff blue clay, hard to work agriculturally even today and thus still with much woodland and pasture. Locally the Gault Clay soils are much more calcareous than the undisturbed Gault. This is due to erosion of a chalky rubble from the chalk scarp in Late Glacial times, produced by solifluction when frozen rubble melted in summer and flowed out in outwash fans over the permanently frozen deeper layers. The woods of the Gault outcrop have been very poorly surveyed in Sussex generally, unlike those in Kent and Hampshire. Thin-spiked Wood-sedge *Carex strigosa* was found in wet rides and streamsides recently (1989 -90) in 12 woodlands on the Gault, or at its junction with the Upper Greensand, from **Nye Wood** (SU798217) in the west to **Danny** (south of Hurstpierpoint) in the east (TQ283147) and will certainly be found in other Gault woods when they are surveyed; I expect *Paris* to be found also in more sites on Gault in West Sussex.

Good examples of woods on Gault that are mostly in part accessible by public footpaths occur at **Nye Wood** (SU797212) **Elsted Rough** (SU826203), **Ingrams Green** (SU851199), **Hoe Copse** (SU886185), West of Graffham (SU919176), **Sutton** (SU985159), East of Washington (TQ145132), **Small Dole** (TQ217123), **Butchers Wood**, Clayton (TQ303147), **Sedlow Wood**, Westmeston (TQ43145) and **Warningore Wood** (proposed SSSI, TQ382140). In such woodlands, if not replanted with conifers, one finds Oak *Quercus robur* standards over coppice of Hazel, Ash and Field Maple, with Hornbeam *Carpinus betulus* in East Sussex. The soils, normally waterlogged or with patches of standing water in winter over the impermeable surface-water-gley soils, carry quite rich ground floras, with much Tufted Hair-grass *Deschampsia caespitosa,* Pendulous Sedge *Carex pendula,* Wood sedge *C. sylvatica,* Meadowsweet *Filipendula ulmaria,* Primrose *Primula vulgaris,* while better drained places have Bluebell *Hyacinthoides non-scripta,* Dogs Mercury *Mercurialis perennis,* Sanicle *Sanicula europaea,* Early Purple Orchid *Orchis mascula* and Wood Millet *Milium effusum.* Many aquatic or marsh plants occur in rides or glades. Few of these woods are still coppiced regularly today. We have listed a number of the Gault woods in the hope that botanists will give them the attention they deserve and have not yet had!

In a few places on the Gault, open formerly grazed roadside commons still occur; the best example is **Heyshott Green** (SU896186) where old grassland still has much Pepper Saxifrage *Silaum silaus,* Sneezewort *Achillea ptarmica,* Wild Chamomile *Chamaemelum nobile* and Common Fleabane *Pulicaria dysenterica,* but Small Fleabane *P .vulgaris* has not been seen for about 40 years there. If the little common was grazed (as in the New Forest) instead of mown, *P. vulgaris* might well reappear from dormant seed, as it has in Surrey.

3c. The Lower Greensand

3c(i) The Folkestone Beds

From the Hampshire border eastwards to Washington, the Folkestone Sand outcrop forms a belt 1.0 to 1.5 km broad. It consists of a series of small undulating or sloping plateaux often capped at about 200 feet above mean sea level (c.60m) by a thick layer of flint pebbles, the plateau gravel, deposited here as part of a prehistoric river flood-plain. The continuity of the belt of low plateaux is interrupted by a series of stream valleys flowing northward from the chalk towards the Rother or Arun, and by a more extensive and complex gap where the Arun cuts south, south of Pulborough; here locally the Folkestone Sand has separate outcrops, one to the north past Fittleworth and Pulborough, and the main one roughly parallel a couple of kilometres to the south. East of Washington, the Folkestone Sand belt becomes so much narrower that it no longer forms a feature supporting semi-natural vegetation, and indeed the lower beds of the Lower Greensand also become narrower and indistinguishable as separate features of the landscape. A narrow ridge, however, of Lower Greensand, can be seen eastwards to the north of Lewes. East of this the Lower Greensand is present as a narrow band north of the Gault as far as north of Eastbourne, but it has little influence on semi-natural vegetation.

The Folkestone Beds are a coarse, ferruginous sand containing beds of ironstone or even sandstone locally. In earlier times they seem to have been forested, probably with open Oak-Lime-Hazel wood, but clearance began locally (as at Iping Common) at least by Mesolithic times, and by the close of the Bronze Age, nearly all of it seems to have been cleared of forest: it was comparatively easy for early man to clear and cultivate on these light soils, while heavier substrates (such as the Gault clay) seem to have retained woodland in many places up to the present day. Early clearance seems to have been for pasture rather than arable; in Bronze Age times, many burial mounds or tumuli were erected on this sandy belt and many can still be seen.

Deterioration through leaching, and perhaps overgrazing of the deforested soils, seems to have led to the formation of the type of soil profile known as a Podsol, though this process may have culminated much later when Ling *Calluna vulgaris* invaded abandoned pastures or arable; certainly most dated podsols seem to have achieved their present form in Iron Age times, about 500 BP or a little later. *Calluna produces* phenolic substances in its litter which actively promote podsol formation. Podsol soil profiles are most easily studied in sections already made, as on the sides of sandpits; there is a good example to be seen in the sandpit on **Ambersham Common** at (SU9101900) north-east of the crossroads. An upper dark layer, composed mostly of *Calluna litter* (Aoo soil horizon), gives way downwards to a dark brown zone consisting of sand stained with colloidal decomposed humus (horizon Ao). Below this there is a zone of bleached sand, highly acidic like the upper organic material-rich zones, and largely devoid of soluble minerals (the Ae horizon). Organic matter appears again in the (Bh horizon) humus layer, from 30 - 100 cm below the surface; this is where the colloidal humus, made soluble by the phenolic substances in the Calluna litter, finally comes to rest. This (B h horizon) layer normally gives way below to the (B s horizon) iron rich layer, where iron (and aluminium) salts leached out of the upper soil profile (after any clay minerals present have decomposed) precipitate out. This (B s horizon) layer may be sometimes hard and impervious enough to hold up water, so that one can find boggy areas on plateaux summits. Beneath this is the C layer, the unaltered red-brown subsoil of Folkestone Sand or else of Plateau Gravel. The dominant vegetation of those heaths that have not been damaged by modern people, nor invaded (through lack of grazing) by bracken or scrub growth, consists of *Calluna,* together with Bell Heather *Erica cinerea* and some Dwarf Furze *Ulex minor* in drier areas, or with Cross-leaved Heath *Erica tetralix* where there is a higher water table.

Associated species of the dry heath are comparatively few, but interesting. Needle Whin *Genista anglica* is occasional, Heath Milkwort *Polygala serpyllifolia* is frequent, Green Ribbed sedge *Carex binervis* is rare (though common on the Ashdown Forest heaths), and several calcifuge grasses occur, particularly by paths or in more open areas, such as Fine-leaved Sheeps-fescue *Festuca tenuifolia,* Wavy Hair-grass *Deschampsia flexuosa,* Heath-grass *Danthonia decumbens.* Bristle Bent *Agrostis curtisii,* so common on the dry heaths of the New Forest, is only known in Sussex on Iping Common, which (apart from the localities at Chobham Common in Surrey) represents its eastern limit in Britain. Beneath the heathers, there is often a well-developed bryophyte carpet; *Hypnum jutlandicum, Pleurozium schreberi,* and *Dicranum scoparium* are the main mosses that are common: the hepatic *Ptilidium ciliare,* once more widespread is now only known at Midhurst Common. The alien moss *Campylopus introflexus* (from the montane tropics) is spreading after fires. A rich variety of lichens, particularly *Cladonia* species, occur on some of the least-disturbed commons, such as Heyshott, Ambersham and Lavington, that have had no severe fires for many years. These include the brown-fruited species:

Cladonia portentosa (common)
C. arbuscula (very local)
C. chlorophaea (common)
C. ciliata var. *tenuis* (frequent)
C. coniocraea (common)
C. crispata (common)
C. furcata (common)
C. glauca (rare)
C. gracilis (rare)
C. squamosa (common)
C. subulata (rare)

and the red fruited *Cladonia* species:

C. coccifera
C. floerkiana
C. macilenta
C. polydactyla
C. sulphurina (Lavington only, very rare)

and the brown lichens:

Coelocaulon aculeatum (local)
C. muricatum (rare).

However, if heather becomes too tall and dense, the lichens decline; so either grazing, mowing or careful burning in March, is necessary to maintain good healthy lichen communities.

Much richer in species are the wet-heath areas where the water table is near or above the surface in winter; these occur on terraces, above seams of clay on gentle slopes where water seeps to the surface, or bordering valley bogs. In such places extra *Cladonia* species, such as *C. strepsilis* (with lead-grey squamules that, uniquely, turn green when a bleach solution is applied) as well as many of those listed above, occur, and also the lichen *Pycnothelia papillaria* (resembling baby molar teeth) occurs in a few places. Rare mosses, such as *Dicranum spurium, Hypnum imponens,* and *Campylopus brevipilus* occur in damp but not very wet heath in a few places. The wet-heath vegetation, developed over a shallow peat layer, is dominated by *Erica tetralix* as mentioned earlier, but besides *Calluna* and Purple Moor-grass *Molinia coerulea* it contains on these West Sussex heaths the following interesting species:

Common Cotton-grass *E. angustifolium*
  (locally in hollows)
Deergrass *Trichophorum (Scirpus) cespitosum)*
  (frequent)
Harestail Cotton-grass *Eriophorum vaginatum*
  (locally abundant)
Oblong-leaved Sundew *D. intermedia* (locally
common in barer hollows)
Round-leaved Sundew *Drosera rotundifolia*
  (very general)
Star sedge *Carex echinata*
White Beak Sedge *Rhynchospora alba*
  (only now at Heyshott, Ambersham
  and Lavington Commons)

Also, Marsh Clubmoss *Lycopodiella (Lepidotis) inundata,* (now only it seems at **Wheatsheaf Common** near Liphook (SU8330) and at **Graffham Common** (SU9219), having recently died out at Trotton, Ambersham, Heyshott, Hurston Warren and Heath Common, Sullington). It has been transplanted back to Heyshott Common however from Wheatsheaf Common, and official approval has also been obtained for the transplant of some plants from Graffham to the more secure habitat of Lavington Common, where it is now flourishing.

The ground in wet-heath communities is normally carpeted with the two *Sphagnum* species that can grow on acid peat which may dry out in summer, *S. compactum* and *S. tenellum,* together with the hepatics *Odontoschisma denudatum* and *Gymnocolea inflata.* Of those species listed above, *Eriophorum vaginatum* and *Rhynchospora alba* are now declining species in Southern Britain; the wet heaths and bogs of the Folkestone Sands (together with the New Forest in Hampshire) form one of their main remaining strongholds in Lowland Britain. *Lycopodiella inundata* is now rare everywhere in Britain except in the New Forest, Woolmer Forest in Hampshire, and Thursley Common in Surrey, and our few remaining sites in Sussex need vigorous management to conserve them. This little clubmoss requires bare peat, shallowly flooded in winter, to survive. In the past, peat cutting provided new habitats continually; now many sites have become too closed with vegetation for it to survive.

Some of the Folkestone Sand heaths have valleys which remain water-logged in all but the driest summers, and here valley bog communities exist on deeper, acid peat. Besides many of the species listed above for the wet heath community, these have extra species growing in the deep *Sphagnum* carpets or in bog pools. These include:

Bog Asphodel *Narthecium ossifragum* (e.g. at
  Ambersham, Hesworth Bog and Heath
  Commons, and at Hurston Warren).
Cranberry *Vaccinium oxycoccos* (Welch's
  Common, New Piece Moor and Hurston
  Warren only now).
Many-stalked Spike-rush *Eleocharis multicaulis*
  (rare,Hurston Warren only)

The valley bog peat is formed by the remains of the Sphagnum species listed below:

S. capillifolium (general) parts
S. magellanicum (very local)
S. papillosum (general)

These three species occurring in hummocks and higher parts. And:

S. auriculatum (pools)
S. cuspidatum (pools)
S. recurvum (wetter 'lawns')
S. subnitens (flush areas)

On the *Sphagnum* grow many small hepatics more or less unique to this habitat, such as:

Calypogeia sphagnicola
Cephalozia connivens
C. lunulifolia
C. macrostachya
Cladopodiella fluitans (in pools)
Kurzia pauciflora
Mylia anomala
Riccardia latifrons (rare, Hurston Warren only)
R. multifidal (in flushes)

Where birch and willow have colonised, *Sphagnum fimbriatum* and (less frequently) *Sphagnum squarrosum* occur.

The major remaining heaths on the Folkestone Beds are as listed below, from west to east:

West Heath Common, north of West Harting, (SU787227) only a small area, with some wet-heath left to the east.

Wheatsheaf Common, SW of Liphook, (SU832303) good wet heath on Golf Course.

Trotton-Iping-Stedham Common, (SSSI, Local Nature Reserve and SWT Reserve, SU8422) a large heath with one good bog at SU848221.

Midhurst Common small but rich area at SU873206; old damp heath.

Heyshott Common (SSSI, SU901193) a fine heath with small valley bog.

Ambersham Common (SSSI, SU9119) extensive heath probably the best one left, with large valley bog at SU907195, and some smaller ones.

Graffham Common (SU926193) a small but good area with *Lycopodiella* on track to east.

Fir Toat Common (SU937196) damp heath with *Dicranum spurium, D. polysetum* and *Hypnum imponens* in open *Pinus* stand.

Lavington Common (SSSI, NT, SU950190) an excellently managed area of dry and wet heathland.

Welch's Common (SWT, SU980175) mostly birch covered but includes an important wet bog with Cranberry and local mosses.

Coates Common (TQ001175) dry heath with sandy open areas; rare moss *Racomitrium ericoides* present at least until about 10 years ago, but area is now sadly overgrown with scrub.

Hesworth Common (TQ004190) much overgrown with birch but retains a small rich valley bog to south.

Greatham Common (TQ004190) much overgrown now; the wet-heath, which formerly had *Gentiana pneumonanthe*, is now overgrown or cultivated land.

Wiggonholt Common (TQ060163) dry, mostly grass-heath where not birch-overgrown, with good spring sand flora, but in need of much clearance.

Bog Common (TQ067156) once with excellent zonation from dry heath to bog and carr, now severely overgrown with pine, birch and *Molinia*, but could be restored by management.

Hurston Warren (part SWT Reserve, TQ74169) has the finest valley bog in West Sussex with *V. oxycoccos*, but former wet heath now completely overgrown by pines.

Sullington Warren (NT, TQ097145) excellent dry *Calluna* heath with wet-heath to east: now well managed; also good grass-heath area.

Heath Common, Sullington (TQ105146) much overgrown since 1950s, when excellent, but still retains good bog and wet-heath species, and being actively and sympathetically managed by the owners.

One last habitat on the Folkestone Sand should be mentioned. This comprises the areas of short sandy turf, once widespread when rabbits were common, now much reduced, but which still in places (e.g. **Wiggonholt**) exist, and have annuals of interest like *Teesdalia nudicaulis, Moenchia erect, Trifolium striatum, T. arvense, T. ornithopodioides, T. subterraneum, Ornithopus perpusillus* and *Hypochoeris glabra.*

In the past, grazing, peat digging, furze, ling and bracken cutting and controlled burning kept these semi-natural communities stable. In this century loss of management (including disappearance of many rabbits due to Myxomatosis) has led to spread of Common Gorse *Ulex europaeus*, Birch *Betula pubescens*, Bracken *Pteridium aquilinum* and Pine *Pinus sylvestris*, so that many former fine open heath areas are now really woodland. Hot accidental (or vandalistic) summer fires can ruin heathland for many years, especially if the peat layer of the soil is burned; after such a fire, Birch finds an ideal seed bed in the ash left and increases dramatically. Severe fire on wet heath will lead to dominance by tussocky *Molinia coerulea* and little else.

Ideal management would include grazing, but this is rarely possible today because of fencing problems. First, encroaching Pine and Birch needs to be removed by felling or pulling up of seedlings. Birch will need use of an arboricide on the stumps after cutting to prevent regrowth. Mowing of very leggy *Calluna* will act as a substitute for grazing to reduce fire risk.

Bracken will need control, where encroaching on Ling, by treatment with specific herbicides such as Asulam.

These prescriptions may, initially, be costly; but our diminishing open heaths in Sussex represent not merely a national, but are part of an international, resource. The 'Anglo-Norman' type of heath (with *Erica cinerea* and *Ulex minor*) has now a very limited distribution. Apart from the New Forest and E Dorset, its main stronghold, the Folkestone Sands of the Hants-Sussex-Surrey border area, and Ashdown Forest represent its other stronghold in Europe now. Only small areas still remain across the Channel in Normandy.

3c(ii) The Sandgate and Bargate Beds

This middle series of deposits of the Lower Greensand outcrops mostly along the valley of the western Sussex Rother. They produce extremely fertile soils; a chain of ancient village settlements follows along their outcrop; hence there is little land uncultivated or semi-natural. However, along the steeper Rother banks, where beds of calcareous Bargate stone outcrop on the slopes above the clay and loam deposits, some very rich and interesting woodlands occur, albeit of small extent. At **Fyning Moor**, Rogate (SU815233) there is a very base-rich wet, flushed Alder wood (which can be viewed from the right of way over the footbridge; the rest is private property). Beneath the Alders, a rich flora of plants that require base-rich flushes occurs, including the following:

Alternate-leaved Golden Saxifrage *Chrysoplenium alternifolium* (confined to the Bargate outcrops in Sussex, requires base-rich conditions, with a good balance of soluble nutrients).
Great Horsetail *Equisetum telmateia*
Greater Chickweed *Stellaria neglecta* (mainly along the Rother, rare elsewhere)
Greater Tussock Sedge *Carex paniculata*
Opposite-leaved Golden Saxifrage *Chrysoplenium oppositifolium* (common in all shaded flushed acid or calcareous areas throughout the county)
Ramsons *Allium ursinum*
Water Avens *Geum rivale* (this has only one other Sussex location now, at Racton)
Wood Forget-me-not *Myosotis sylvatica* (native along the Rother in E. Hants and W. Sussex, otherwise a plant of basic areas in moist woodland on Weald clay in the area N and W of Horsham)

Higher up in the wood on well-drained basic sandy woodland soil, there occur Solomon's Seal *Polygonatum multiflorum* (rare in Sussex and only found as a native in the extreme west), and wild Daffodil *Narcissus pseudo-narcissus; Paris quadrifolia* has been reported.

Similar woodlands to this, but apparently without *Geum rivale*, occur at **Trotton** (SU828223), **Chithurst** (SU840230), **Iping** (SU849226) and (SU856232), and **South Ambersham** (SU921207), all on steep flushed slopes on the Rother banks; such communities are not found elsewhere in the county. Large-flowered Bitter-cress *Cardamine amara* is also present in these Rother-side woods.

West of **Woolbeding** (SU868230) there is another steep riverside woodland, owned by the National Trust. This has calcareous brown forest soils, but is without wet flushes. It has an interesting ground flora under an Ash-Oak canopy, with species more typical of the chalk, such as Nettle-leaved bellflower *Campanula trachelium*. Pale St John's Wort *Hypericum montanum* occurred here in its last Sussex locality in the thirties, but we cannot find it now. Stone-faced banks on the Sandgate Beds at Chithurst have rare hepatics like *Targionia hypophylla* and *Reboulia hemisphaerica*. At Fyning near Rogate, Wall Pennywort *Umbilicus rupestris* has one of its few Sussex sites on a sandy bank. Spreading Bell-flower *Campanula patula* occurs on an open sandy roadside, while Copse Buckwheat *Fallopia dumetorum* occurs in several places on Sandgate Beds subject to periodic coppicing or other disturbance that allows the seed to germinate.

3c(iii) The Hythe Beds

These underlie the Sandgate Beds and are composed, in West Sussex, of alternating bands of acid sandy loam and hard bands of chert and sandstone. The deposit is not thick, but has resisted weathering so much that it includes the highest ground in the county at **Blackdown** (SU919296), 280m. (919ft). The Hythe Beds form a high escarpment, facing north, from near Hill Brow on the Hampshire border in the west, to the Arun valley NE of Fittleworth in the east. At its westernmost point it links with a similar but south-facing escarpment that runs eastward to Blackdown, and then steps back as it were, to continue NE into Surrey. Long ago these two diverging escarpments were joined to form a convex anticline of rock, but weathering has separated them to form a horseshoe shaped scarp exposing the older rocks of the Weald Clay on the low ground between, forming the vale of Milland.

The Hythe Beds in West Sussex (unlike in Kent) are uniformly acidic in character; their soils are either podsols or very acidic sandy brown earths. There is heathland in places on their dip slopes, but unlike the similarly acidic Folkestone sands, there is very little bog or wet terrain, except in one hollow on the summit of Blackdown. This interesting tiny bog is convex and may be a raised bog in origin; it has many *Sphagnum* species and *Eriophorum vaginatum*, (SU930305) especially around two ponds that may be old peat cuttings.

The original vegetation seems likely to have been mostly Sessile Oak *Quercus petraea* - Birch *Betula pubescens* woodland, with an understory of Bilberry *Vaccinium myrtillus*, Heather *Calluna vulgaris*, Waxy Hair-grass *Deschampsia flexuosa* and such plants as Cow-wheat *Melampyrum pratense*, Wood Sage *Teucrium scorodonia*, Wood Sorrel *Oxalis acetosella* and Honeysuckle *Lonicera periclymenum*. Today some fine sessile oak woodland of this type remains, particularly at **Rake Hanger** (SU795266) and at **Durford Heath** (NT, SU7872550). Apart from some similar woodlands on the Hythe Beds SE of Westerham in Kent (much damaged in the October 1987 gale) these are the finest sessile oakwoods in SE England and have a rather 'Welsh' or 'Exmoor' character, which is helped by the high rainfall (c.38 inches per annum). Mountain Ash *Sorbus aucuparia*, Whitebeam *Sorbus aria* and Holly *Ilex aquifolium* are common but Ash, Hazel and Field Maple are rare or absent. Calcifuge ferns such as Hard Fern *Blechnum spicant* are plentiful, especially on banks and gullies and, in damper hollows or valleys Lemon-scented Fern *Oreopteris limbosperma* is locally frequent. Great Woodrush, *Luzula sylvatica*, occurs here and there. The Beard-lichens *Usnea ceratina* and *U. florida* occur on the larger oaks; the latter is very rare in Sussex and now confined to this NW corner of the county.

Most of the Hythe Beds terrain, however, was cleared of its woodland in earlier times, and developed into dry *Calluna-Vaccinium myrtillus* heath with *Erica cinerea*. Some of this remains; one can see its former wide extent on the 1st editions Ordnance Survey maps. Much has been converted into conifer plantations during this century, but other areas of former heath or woodland were planted up with Sweet Chestnut *Castanea sativa* much earlier to create chestnut coppice. Chestnut grows remarkably well on these dry acid soils, and indeed, the Hythe Beds country north of the Midhurst-Petworth road contains what is probably the largest area of this tyype of old artificial woodland, outside Kent, that is still productively worked for the making of pale fencing and poles for various purposes.

The flowering plants of the Hythe Beds are limited in number, compared with the woodlands and heaths of other parts of Sussex; Bluebells and Foxgloves are frequent to locally common except on the poorest soils, but the rich ground floras found even on moderately acidic soils on the clays in Sussex are largely lacking. Primroses *Primula vulgaris*, Moschatel *Adoxa moschatellina*, and Sanicle *Sanicula europea*, are comparatively rare, though Wood-sorrel *Oxalis acetosella* is common. It is in the cryptogamic flora, however, that this region is rich. Apart from the quite good fern flora, there are numerous bryophytes, especially on sheltered banks, including the handsome local mosses *Dicranum majus* and *Plagiothecium undulatum*. Even the chestnut coppice stools have remarkable floras. For example, in North Park Copse (SU8826 and elsewhere), such local mosses as *Dicranum montanum, D. flagellare, D. tauricum, Leucobryum juniperoideum* and *Hertzogiella seligeri* occur on the acid, decomposing wood with commoner species like *Tetraphis pellucida*. These are all species of continental distribution type. However, much of the cryptogamic richness of the Hythe Beds is in more oceanic species which are concentrated in sheltered, north facing scarps, or in gullies which cut down to impervious beds of clay beneath that throw out water as springs. On the north facing scarp NW of **Rondle Wood**, Terwick (SU815255) there is old beechwood with spectacular sheets of the oceanic hepatic *Bazzania trilobata*, growing with much *Leucobryum juniperoideum, Plagiothecium undulatum, Dicranum majus* and the hepatics *Barbiulophozia attenuata* and *Lophozia ventricosa*. A similar steep scarp west of **Bexley Hill** (SU908253) in *Castanea* coppice, also has the *Bazzania* and the other species mentioned, and a fine population of Hay-scented Fern *Dryopteris aemula*. This fern of 'Lusitanian' distribution (Western British Isles, W France, N Spain, Azores etc.) is quite frequent in the High Weald gills (see below) but in West Sussex is confined to two sites only. The other site is on the N facing slope of a gorge in **Wicks Wood**, Chithurst (SU841241) where it grows with bryophyte vegetation similar to that at the two previously described sites but, in addition, boulders on the steep slope have the upland hepatics *Marsupella emarginata* and *M. sprucei*, which are rare in SE England. These *Marsupella* species occur elsewhere on small boulders along the Hythe Beds scarp, the former on rocks by the roadside at **Bexley Hill** (SU910253) and at Bedham on boulders in scarp beech-wood; *Campylostelium saxicola* and *Brachydontium trichoides* are small mosses that also occur rarely on boulders at Bedham, Blackdown, and SE of Brinkwells near Fittleworth. Wicks Wood, mentioned already, is particularly interesting, because the stream gorge there (that of the Hammer stream) has a miniature alluvial flood plain on which a good flora of species typical of richer woodland occurs including *Primula vulgaris, Adoxa* and *Mercurialis perennis*.

Where spring breaks out at the base of the Hythe Beds scarp, rich acidic flush communities may occur under Alders, with bryophytes more characteristic of the High Weald such as *Hookeria lucens* and *Trichocolea tomentella*. Northpark Copse, Brinkwells, and Shulbrede Woods near Linchmere are examples of sites for these species, which occur with Smooth-stalked Sedge *Carex laevigata* and *Chrysoplenium oppositifolium*. Shaded *Sphagnum* bogs (with much *S. palustre*) are present in places with less water movement.

Dry sandy lane banks on the Lower Greensand generally, (but perhaps more on the Sandgate than on the Hythe Beds) may support good communities of Apple-moss *Batramia pomiformis, Eurhynchium schleicheri*, and the rare southern moss *Epipterygium tozeri*. Lichen epiphytes in the old sessile oakwood areas include such interesting species as *Usnea florida, U. ceratina, Thelotrema lepadinum, Haematomma elatinum*, and *Lecanactis abietina* indicating acidic conditions of bark.

3d The Weald Clay Region

This is a stiff clay, grey or brown in colour and of neutral pH which floors the extensive area of the Low Weald forming a great horseshoe around the older rocks (Hastings Beds) of the High Weald. The Weald Clay region is the site of the former Silva Anderida, the primeval Wealden Forest, which seems to have been opened up relatively late in time; though not as late as was formerly thought, since there are various evidences locally of both Roman and earlier human occupation. From latter mediaeval times to the 18th century, it was the site of an intensive iron producing industry. But, rather than causing the clearance of all the former forest as fuel for the furnaces, this seems to have helped to perpetuate much of the (still very extensive) woodland cover as managed coppice woodlands to supply the industry.

Most of the old woodlands that remain on the Weald Clay are former coppice-with standards. Very little of the coppice has been worked for the last 30 years and most of the woods are more like high forest with an overgrown hazel or hornbeam understory. Oak *Quercus robur* is the main overstory tree (with Sessile Oak *Q. petraea* in places) but there is some Ash and Field Maple on better soils and Wild Service tree *Sorbus torminalis* is widespread but not abundant. The coppice is mainly hazel in the west, but from Billingshurst, Rudgwick and about Shipley eastwards, Hornbeam *Carpinus betulus* becomes increasingly the dominant coppiced tree in the Weald, and extends on to the clays of the High Weald too.

One might obtain the impression from smaller scale maps, or from driving through on the main roads, that much of the Low Weald is flat, and of uniform, heavy clay soils. This impression is misleading. The area is not only gently undulating, but is furrowed and channelled in many places with streamlet valleys, which are often steep sided. Lithologically too there is much variation. Within the clay there occur thin beds of fossiliferous flaggy limestone, the 'Paludina' beds, named from the fossil mollusc they contain; these not only create local calcareous conditions, but resist weathering, thus producing a topography of small plateaux and ridges. Non-calcareous sandstone seams are also frequent at several different horizons in the Weald clay and, finally, in the Weald Clay areas not too remote from the Hythe bed scarp, acidic sandy 'head' deposits, containing pieces of Hythe Beds Chert, overlie the clay in places, rendering the conditions more like those of the sandstone areas of the High Weald.

In such a large and complex area, it is not possible to describe many sites in detail. We will concentrate rather on a few well-known sites which are of exceptional interest, and just mention other sites more briefly.

APPENDIX AC

Tree Survey, Arboricultural Impact Assessment, Tree Removal and Protection Plan

LIZARD

Landscape Design and Ecology

ARBORICULTURAL IMPACT ASSESSMENT AND METHOD STATEMENT

ROCK COMMON QUARRY

THE HOLLOW, WASHINGTON

Dudman Rock Common Limited

Rev. 02 **January 2021**

Prepared by	GS
Checked by	JP
Date	29 January 2021
Document Reference	LLD1955-ARB-REP-001
Revision	02
Status	Planning Issue

Contents

Drawings:

LLD1955-ARB-DWG-001-009 – Tree Constraints Plan

LLD1955-ARB-DWG-010-018 – Tree Retention and Protection Plan

Schedule:

LLD1955-ARB-SCH-001 – Existing tree Schedule

1.0 INTRODUCTION

1.1 Lizard Landscape Design and Ecology has been commissioned to undertake a dendrological survey and produce arboricultural documentation for the proposed restoration project at Rock Common Quarry, The Hollow, Washington (*Grid Reference: TQ 12507 13493*).

1.2 The Arboricultural Impact Assessment and Method Statement report provides assessment of the direct and indirect effects of the proposed design and where necessary recommends mitigation.

1.3 The Arboricultural Impact Assessment and Method Statement report for the development at Rock Common Quarry has been prepared by George Sayer MArborA; Project Arboriculturalist at Lizard Landscape Design and Ecology, Worthing.

1.4 This written Arboricultural Impact Assessment and Method Statement should be read in conjunction with the associated tree survey documentation, including *LLD1955-ARB-DWG-001 – Tree Constraints Plan, LLD1955-ARB-SCH-001 – Existing Tree Schedule* and *LLD1955-ARB-DWG-002 – Tree Retention and Protection Plan*.

Existing Site Information

1.5 The site consists of an existing sand and aggregates quarry, which is due to be subject to remediation. Further detail is provided within Section 3 of the Terrestria Application, which the reader is advised to read alongside of this report.

1.6 The soil type across the southern half of the main quarry to the south of The Hollow (in keeping with that to east and west) is shown to have comprised: ‘slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils’. The soil type to the remainder of the unexcavated Site to the north is understood to comprise: ‘Freely draining slightly acid loamy soils’.

Existing Site Vegetation

1.7 The site itself is dominated by the quarry. Over time unused areas of the quarry have been colonized by large areas of bramble, gorse and willow scrub, areas of young trees and woodland, dominated by birches, sycamores and willows.

1.8 The land surrounding the quarry contains areas of more mature woodland dominated by sycamore, birch, sweet chestnut and Scots pine. Areas of more established native woodland containing oaks, alders and hazels are present further out. Several shelter belts of moderate value, containing mainly poplar trees and Scots pine are also present to field and road edges.

1.9 Roads and footpaths contain mixed tree and hedge lines, with a number of mature feature trees, mostly oaks. These trees are of moderate to high value, being much older specimens of reasonable form.

Development Proposal

1.10 This application is being made firstly, to enable the recovery of the remaining reserves of sand and secondly, to permit the importation and placement of suitable, inert classified engineering and restoration materials in order to change the approved restoration of the Quarry and create a “dry”, restored landform. This will be achieved by using the imported material to raise the level of the Quarry floor to a level which will be above that of the natural, groundwater level.

1.11 This is a departure from the already approved restoration of the quarry, described in the application as being “a landscaped lake with the associated quarry margins managed for amenity and nature conservation use”, A full description of the proposed restoration scheme is provided within Section 3 of the Terrestria Application, which the reader is advised to read alongside of this report.

2.0 ARBORICULTURAL IMPACT ASSESSMENT

Impacts of Development Proposals on Existing Vegetation

2.1 The proposals can have an adverse impact on the existing trees by removing them to facilitate the proposal, or in the future, by adversely affecting their potential for retention through disturbance in Root Protection Areas (RPAs) or through future pressures to prune or remove.

2.2 The development proposals would involve the following site operations that could impact upon the existing trees:

- Contractor movements; site access and operations;
- Storage and compound;
- Plant, vehicle and material cleaning;
- Adjustment of the materials conveyor location;
- Infilling of the quarry;
- Alterations to the hydrology of the site and surroundings;
- Alteration of ground levels to the quarry edge;
- Alterations to the materials handling equipment and services adjacent to the quarry;
- Construction of parking areas.

2.3 The proposals involve the partial infilling of the existing quarry area. As such the majority of the vegetation within the quarry currently would require removal. Whilst this is a large area of vegetation, it is dominated by scrub and very immature woodland of low value. Infilling might impact upon trees and woodland on the quarry edges, where levelling and grading would need to take place.

2.4 The proposals include perched ponds on clay caps. This alongside the infilling may alter the local hydrology of the site and immediate surroundings.

2.5 The proposals involve infilling with material from the quarry to the north of the Hollow. This would involve adjustment to the materials conveyor running north-south under the Hollow between the quarry sites. The conveyor would use an existing tunnel under the Hollow, but would require a new handling platform on the south side.

2.6 The proposals include a pumping well with a power supply from an existing pylon to the south-west. The power supply would run through areas of low and moderate value trees.

2.7 A large carpark is proposed within the northern quarry area, with a small parking area just south of the hollow allowing access to the footpaths into the southern section. The large carpark would be within areas clear of vegetation, whilst the small parking area would require removal of a small area of low value treeline.

2.8 A set of footpaths would wind through the site, one of which would run through moderate value woodland. To facilitate this path would require removal of a narrow strip of trees. This path would be the same as that used for management, and would be designed on-site to avoid better condition trees. The impact of the path would be very limited.

Removal of Trees and Vegetation

2.9 The areas of the quarry not subject to recent use have become colonized by scrub formed of bramble, gorse and willow. Some of these areas have matured to woodland of willow, birch and sycamore. These areas provide some limited habitat value, but due to the nature of the site offer no significant arboricultural or visual amenity. The vegetation would require significant management including replanting and thinning to become a higher quality habitat, and much of the vegetation is on unconsolidated slopes significantly limiting its longevity.

2.10 The proposal involves complete removal of 7no. woodland areas and tree groups of low value; partial removal of 4no. woodland areas and tree groups of low value. This removal would total c.3.2Ha. The proposal also involve removal of 2no. moderate value large poplars and partial removal of 2no. moderate value tree groups, totalling c.500m2. The removal of moderate value trees would be a temporary measure with trees being allowed to regrow. The proposals also involve removal of 9no. patches of scrub, totalling c. 4.2Ha. Much of the scrub would be allowed to regrow once the proposals are complete, with higher value heathland and fruiting species included to increase its ecological value.

2.11 The new conveyor into the site would utilize the existing tunnel under the hollow but would require a new handling platform to the south. This would require the removal of a small area of low value trees, and an area of scrub. The visibility of this would be limited, and following the completion of the restoration, these trees and handling platform would be replaced with new planting of the same species.

2.12 A pumping well is proposed to the south-west of the site. Whilst the well is outside of any RPAs, the connection to the power supply runs through an area of low value trees, and a group of moderate value trees. Where possible avoidance measures should be used to minimise unnecessary tree removal, but it is likely that areas of trees here would need cutting back or clearing to enable the connection. The largest trees in the area are two mature hybrid poplars. These are prominent features and should be retained using tree protective barriers and tree surgery works to provide clearance where possible.

2.13 The proposed small parking area would require removal of a small area of low value treeline. Tree protective barriers shall protect retained vegetation from harm during the construction process.

Tree Retention and Protection

2.14 The main features of the site and surrounding which are considered most important for retention are individual mature native trees, considered of high value. These trees tend to line fields, footpaths and roads and to be off-site. The trees are not in the immediate vicinity of the excavated quarry area and would be retained and fully protected by intervening distances, or tree protective barriers where works will come within 15m of the trees.

2.15 Areas of native and mature pine woodland are considered of moderate value. Where possible these areas are proposed to be retained, although due to levels changes some small proportions of these areas may require removal.

2.16 Areas of young trees surrounding the quarry are of limited value at present, with the potential to increase in value as they mature. These areas will be retained where possible, with removal for access and levels changes as required.

Construction in Proximity to Existing Trees

2.17 In the absence of mitigation, alteration to the location of the materials conveyor and access points could damage further areas of low-moderate value woodland and treelines. To prevent this, once removal has taken place tree protective barriers will be installed to each side of the proposed route of the conveyor to protect trees beyond.

2.18 Levelling, infilling, clearance, ground and drainage works shall require large machinery to complete. Sufficient tree removal has been proposed to allow full access for these works. In areas close to high value trees, tree protective barriers would be used to protect trees and RPAs.

2.19 Alterations of level, soils and introduced of perched waterbodies and car parking would all affect the soil hydrology. The existing circumstances are a result of the quarrying and as such the proposals aim to return the land to a more 'natural' situation for the location and geology. All trees within impact distance of such measures are proposed for removal. New levels will be capped with site-won material to match the geology and provide the most similar soil to the original on-site. The site will continue to be a matrix of wet and dry areas as it is now.

2.20 The new conveyor into the site would utilize the existing tunnel under the hollow but would require a new handling platform to the south. This would require the removal of a small area of low value trees, an area of scrub. If trees remain in the vicinity of the handling platform, the construction and operation of this would likely cause damage and failure of trees. Sufficient tree and scrub removal has been proposed to enable construction and operation of the handling platform.

2.21 A new pumping well with power supply are proposed to the south-west of the site.

Tree Loss Mitigation Measures

2.22 The main purpose of the proposal is to provide an integrated natural area with significant opportunities for wildlife and some increased access for leisure. The proposals result in a loss of the overall areas and numbers of trees, but seek to replace densely crowded young saplings with high-quality mixed woodland of high ecological and amenity value. New habitats also include shallow ponds, heathlands, acid grasslands and wetlands.

2.23 The habitats present are largely immature habitats which have arisen as a result of the quarrying works; the proposals intend to return the site to a mosaic of habitats more representative of the location and of higher quality and value. Therefore, whilst the numbers and areas of trees will reduce the arboricultural value of the site should increase in the medium-long term. The proposals include long-term management of the new habitats and retained woodland areas, which would benefit the existing retained trees and woodlands and allow them to mature into optimal habitats. The proposals are considered supportable in arboricultural terms.

3.0 ARBORICULTURAL METHOD STATEMENT

Protection and Retention of Existing Trees and Habitats

3.1 The Contractor shall exercise due care when performing operations beneath the canopy of existing mature trees and vegetation designated for protection and avoid at all times damage to the roots, trunk and branches.

3.2 The Contractor shall train all members of the construction workforce operating within the proximity of valued habitats and make such persons aware that there shall not be, without having sought prior notification, the following operations undertaken within the protected areas:

- Dumping of spoil or rubbish, excavation or disturbance of topsoil, parking of vehicles or plant, storing of materials or placing of temporary accommodation within an area which is the larger of the branch spread of the tree or an area with a radius of half the tree's height, measured from the trunk, and within the specified Root Protection Areas;
- Severance of roots exceeding 25 mm in diameter. If unintentionally severed; notice shall be given and specialist arboricultural advice sought;
- Changes to the level of the ground within the specified Root Protection Areas;
- Vegetation clearance to site boundaries during the bird nesting season (nesting season: March-September inclusive). Any clearance must be undertaken outside nesting season or alternatively under a watching brief from a suitability qualified ecologist.

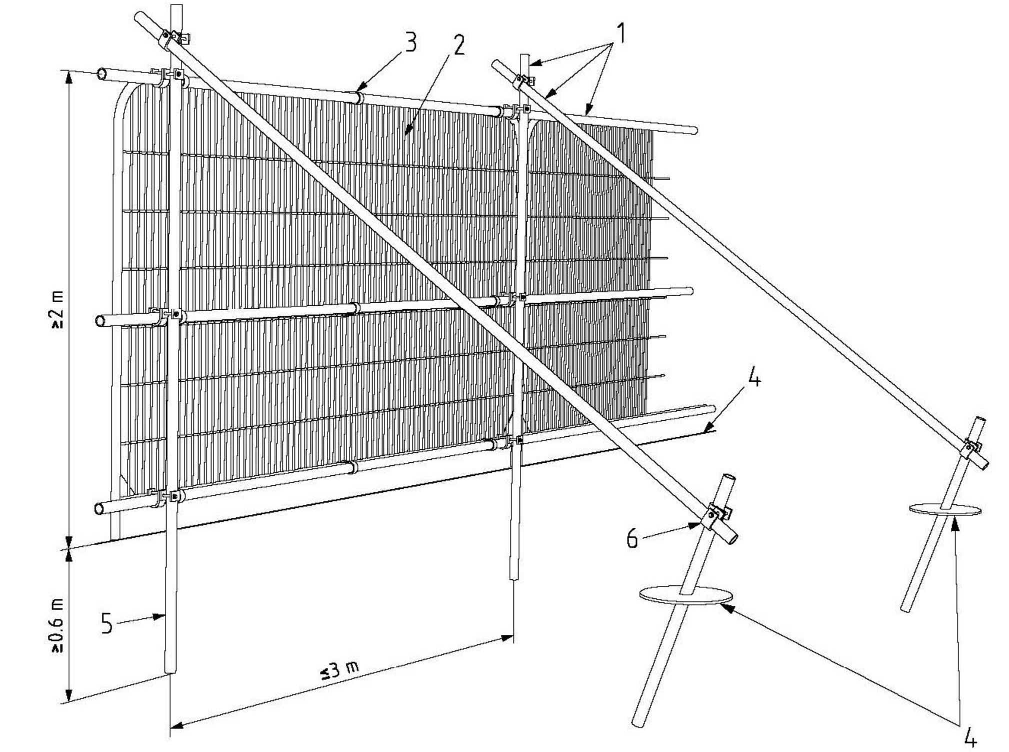
Tree Protection Barriers

3.3 The Contractor shall exercise due care when performing operations beneath the canopy of existing mature trees and vegetation and within the specified Root Protection Areas designated for protection and avoid at all times damage to the roots, trunk and branches of existing trees proposed to be retained.

3.4 All trees to be retained on site shall be protected with barriers erected around the area of mature vegetation in accordance with *BS 5837; 2012; 'Trees in Relation to Design, Demolition and Construction - Recommendations'*. The barrier shall be installed, protected and maintained during the main works by the Contractor who shall be responsible for protecting any area beneath the canopy of the existing trees and within the specified Root Protection Areas.

3.5 The installed protective barrier shall be 2.0 metres minimum height 'Heras' Welded Wire Mesh Fencing secured to a scaffolding framework, set into the existing ground, and positioned to the outside edge of the existing Tree Root Protection Area. Where existing ground conditions do not allow for the above method, the Welded Wire Mesh Fencing Panels may be mounted on concrete or rubber feet, supported on the inner side with stabilizer struts fixed on a block tray or secured with ground pins; and positioned as specified. The barrier should be strained, and fixed to fences, walls, knee rails where possible to provide a complete protected area *(refer to Figure 2 and Figure 3 below; © British Standards Institute 2012)*. All tree protection to be in accordance with *BS 5837: 2012; 'Trees in Relation to Design, Demolition and Construction - Recommendations'* set out as specified within drawings *LLD1955-ARB-DWG-002 – Tree Retention and Protection Plan.*

Figure 2 **Default specification for protective barrier**



Key

1 Standard scaffold poles

2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels

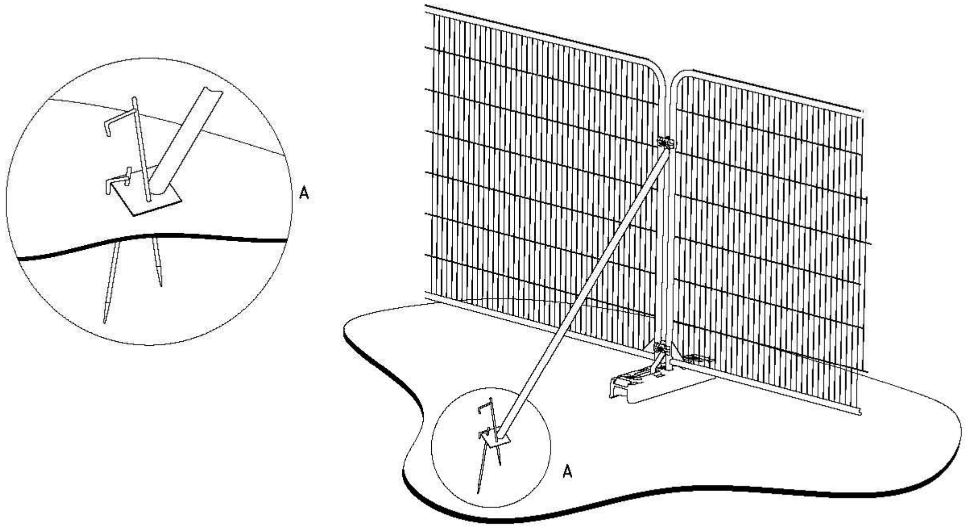
3 Panels secured to uprights and cross-members with wire ties

4 Ground level

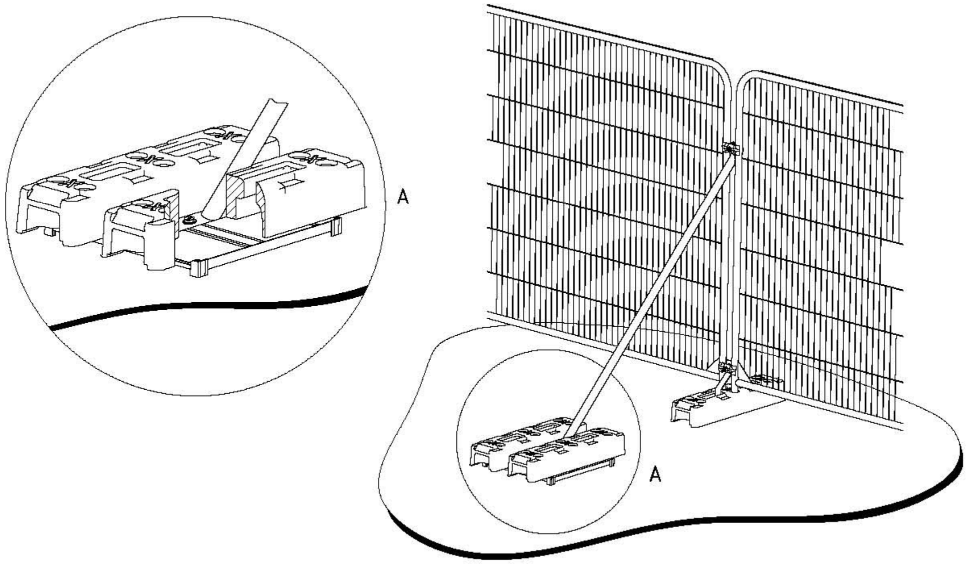
5 Uprights driven into the ground until secure (minimum depth 0.6 m)

6 Standard scaffold clamps

Figure 3 **Examples of above-ground stabilizing systems**



a) Stabilizer strut with base plate secured with ground pins



b) Stabilizer strut mounted on block tray

3.6 Day-glo ribbons shall be maintained during the main works by the Main Contractor attached to the top of the barrier to ensure that the fencing is clearly visible during the works. The tree protection barrier shall display all-weather notices starting '*Construction Exclusion Zone – NO ACCESS*'.

3.7 All such barriers shall be maintained for the full contract period. All necessary excavations, earthworks and cultivation beneath the canopy spread of any existing tree; shrub or hedge shall be undertaken by hand. *No commencement of construction operations should occur prior to the inspection of the installed tree and ground protection by the Landscape / Arboricutural Consultant.* Repositioning of the protective barrier during the course of the contract as the contract works progress shall need prior consultation with the Landscape / Arboricutural Consultant.

3.8 Within the protected areas the following activities must not take place;

- No vehicles are to be used in the fenced off areas;
- No materials are to be stockpiled or stored;
- No chemicals are to be stored;
- No excavation or increase in the soil level shall occur;
- No fires shall be lit on site.

Services in Proximity to Existing Trees

3.9 The location and direction of new services should be designed to allow for services to be routed away from the RPAs of existing trees. Existing service runs should always be used wherever possible.

3.10 Where the proposed routing of services impinges upon the tree RPA of any existing tree to be retained; the routing should be undertaken as a minimum standard in accordance with *NJUG Volume 4, issue 2: 'Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees'*.

3.11 A 'Manual Excavation Method' to be followed to carefully hand dug and route the apparatus most directly to and from the exterior of the RPA radius.

3.12 Services are to be routed together wherever possible to create the minimum impact upon the roots of the existing trees to be retained. Trench excavation across the tree Root Protection Area radius beside an existing tree should be avoided, whereby tree roots would become severed. Where services are to cross the edge of an existing RPA, they should be routed via a hand dug ducting sleeve, avoiding damage to roots.

Contractor Movements. Site access and operations. Storage and Compound Areas

3.13 The Contractor Site Compound shall be located outside of any prescribed tree Root Protection Area and shall be permitted for the storage and securement of materials only within a temporary compound.

3.14 The compound area shall be located so as to not incur damage or injury to the root systems or canopy of any existing trees or vegetation within or adjacent to the site, in accordance with *BS 5837:2012 – 'Trees in Relation to Design, Demolition and Construction – Recommendations'.* All site operations associated with the usage of the compound area shall be undertaken with due care and attention so as to negate damage of the surrounding environment.

3.15 All site operations and construction procedures for the duration of the construction period shall seek to protect the existing site vegetation and root protection areas in accordance with *BS 5837:2012*.

Tree Surgery

3.16 Any significant defects found in the trees during the course of the scheduled work shall be reported to the Landscape Architect / Arboricultural Consultant. All scheduled and arising tree work shall be undertaken by an approved and qualified tree surgeon in accordance with *BS 3998: 2010 'Tree Work: Recommendations'*. Care should be taken to avoid damage to neighbouring trees to be retained. Branches in confined spaces shall be removed and taken down in sections. All arisings shall be transported and disposed of away from site to the Contractor's tip.

Removal of Existing Vegetation

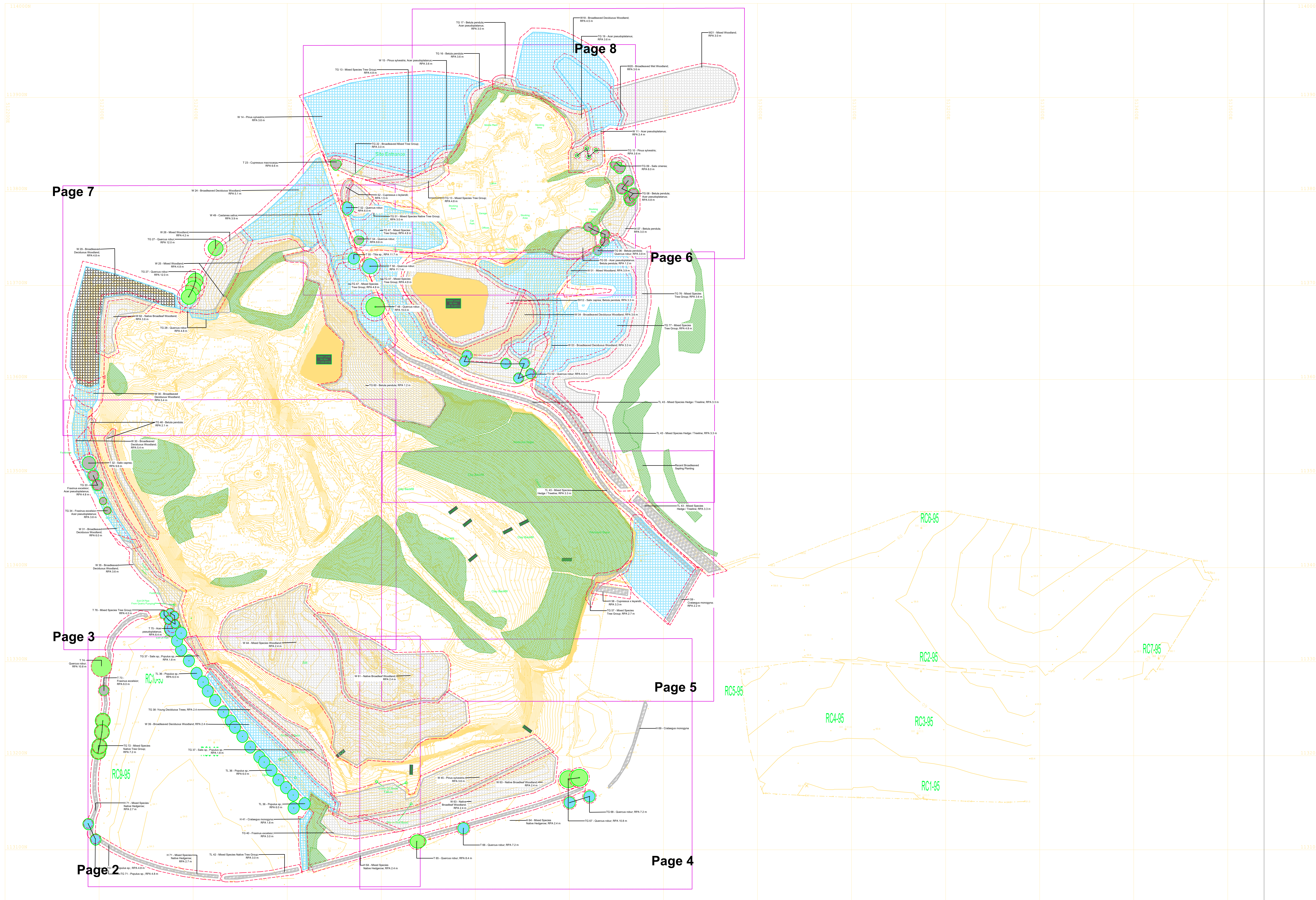
3.17 All existing trees to be designated for removal are to be removed in accordance with the *LLD1955-ARB-DWG-001 – Tree Retention and Protection Plan*. All tree work and removal shall be carried out in accordance with *BS 5837:2012*. Trees designated for removal and felling shall be clearly marked on site with white paint. Prior to the removal and felling of trees, the required work and tree positions shall be agreed on site with the Landscape Architect / Arboricultural Consultant. Trees shall be felled prior to the erection of the Tree Protective Fencing. Care should be taken during the tree removal process to avoid any damage to any trees which are designated to be retained.

3.18 Stumps shall be removed and cut away so that the top of the stump shall be at least 450 mm below the final topsoil level in order that the site can be reinstalled in accordance with the existing site levels. Stumps are to be treated with an approved herbicide to be agreed with the Landscape Architect. Where the depth is greater than 450 mm the areas shall be backfilled with topsoil to the required level.

3.19 The removal of shrub or scrub material within the Root Protection Area of any tree to be retained shall employ a Manual Removal method; the use of hand tools shall be used in order to maintain the ground surface of the Root Protection Area and reduce any damage to existing tree roots within the protected root zone. Adjacent trees shall not be utilised as anchors or levers to facilitate the removal of adjacent vegetation.

3.20 Vegetation clearance to site boundaries should take place outside the bird nesting season (*nesting season: March-September inclusive*) or alternatively under a watching brief from a suitability qualified ecologist.

LLD1955-ARB-DWG-001-009 – Tree Constraints Plan



Page 1 - Overview

Tree Constraints Plan

Rock Common Quarry, Washington, West Sussex

Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
	Tree Root Protection Areas Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'.*
●	**Cat A Trees** Trees of High Quality and Value.
●	**Cat B Trees** Trees of Moderate Quality and Value.
●	**Cat C Trees** Trees of Low quality and Value.
●	**Cat U Trees** Trees Unsuitable for Retention.
▨	**Cat B Hedge** Hedge of moderate Quality and Value.
▨	**Cat C Hedge** Hedge of Low Quality and Value.
▦	**Cat B Woodland / Tree Group** Woodland or group of trees of moderate Quality and Value.
▦	**Cat C Woodland** Woodland or group of trees of Low Quality and Value.
▨	**Scrub** Patches of Scrub Dominated by Species Listed.

DRAFT ISSUE

Rev	Description	Date	Initials
00	Draft Issue	23.10.20	GS

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Client
Dudman Rock Common Limited
Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Constraints Plan
Overview - Page 1 of 9

Scale	*Drawn*	*Approved*	*Date*
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Drawing No	*Revision*
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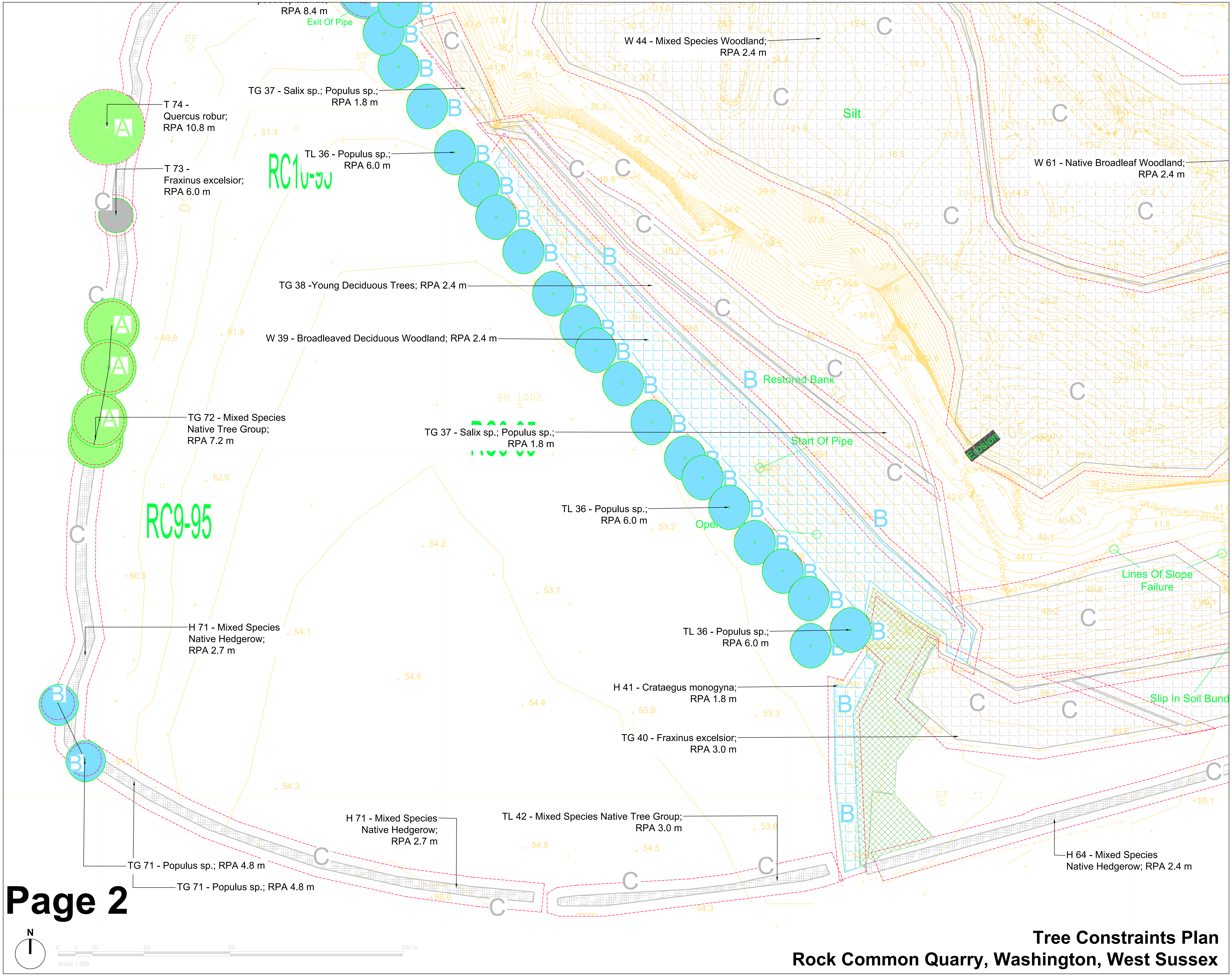

Page 2

Tree Constraints Plan
Rock Common Quarry, Washington, West Sussex

Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
◜	**Tree Root Protection Areas** Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'*.
A	**Cat A Trees** Trees of High Quality and Value.
B	**Cat B Trees** Trees of Moderate Quality and Value.
C	**Cat C Trees** Trees of Low quality and Value.
U	**Cat U Trees** Trees Unsuitable for Retention.
B	**Cat B Hedge** Hedge of moderate Quality and Value.
C	**Cat C Hedge** Hedge of Low Quality and Value.
B	**Cat B Woodland / Tree Group** Woodland or group of trees of moderate Quality and Value.
C	**Cat C Woodland** Woodland or group of trees of Low Quality and Value.
▨	**Scrub** Patches of Scrub Dominated by Species Listed.

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Drawing Title
Tree Constraints Plan
Page 2 of 9

Scale	*Drawn*	*Approved*	*Date*
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Drawing No
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Revision
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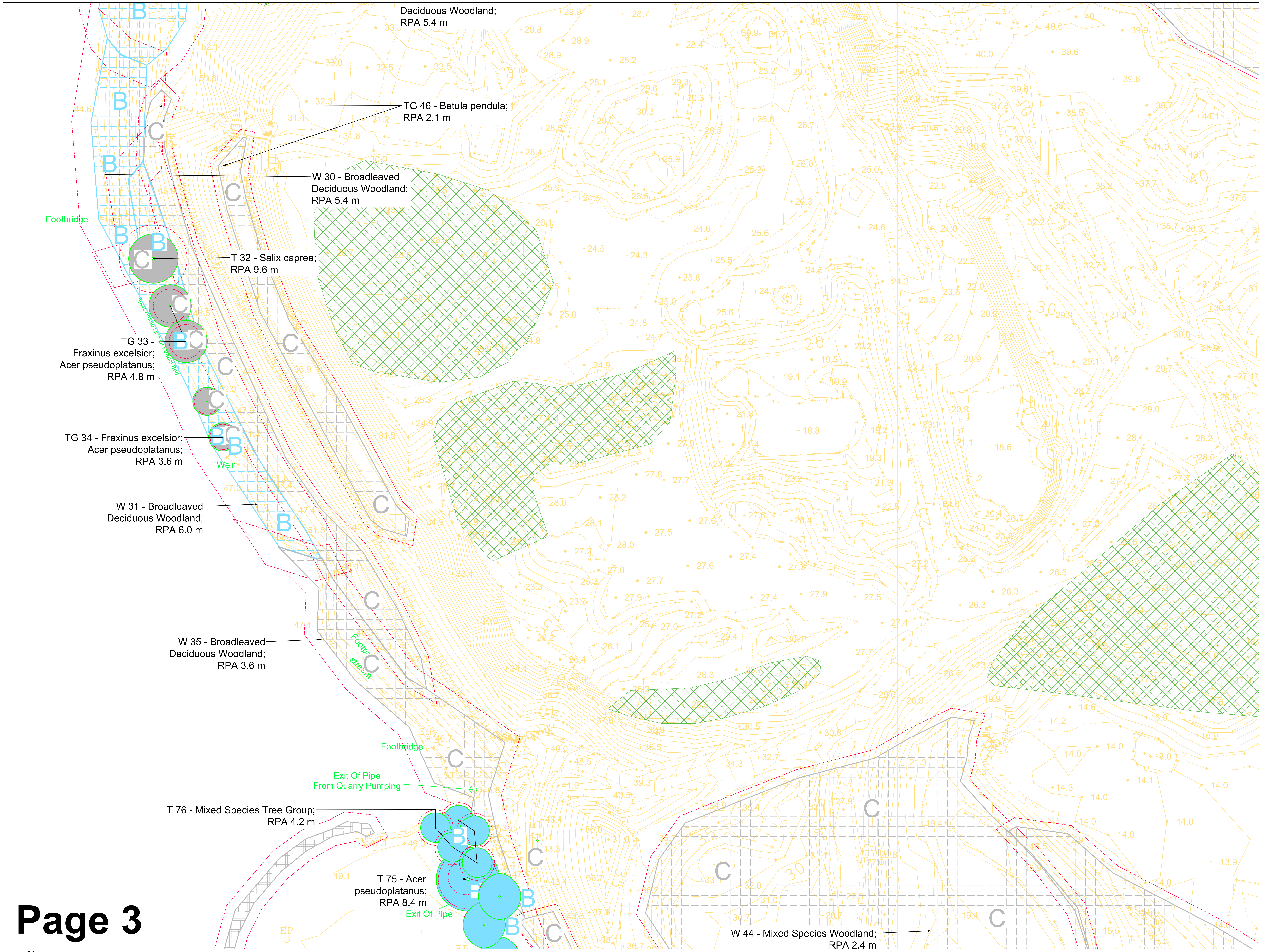

Page 3

Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
	Tree Root Protection Areas Tree Root Protection Areas calculated and specified in accordance with BS 5837:2012 - *'Trees in Relation to Design,Demolition and Construction -Recommendations'.*
●	**Cat A Trees** Trees of High Quality and Value.
●	**Cat B Trees** Trees of Moderate Quality and Value.
●	**Cat C Trees** Trees of Low quality and Value.
●	**Cat U Trees** Trees Unsuitable for Retention.
▨	**Cat B Hedge** Hedge of moderate Quality and Value.
▨	**Cat C Hedge** Hedge of Low Quality and Value.
▦	**Cat B Woodland / Tree Group** Woodland or group of trees of moderate Quality and Value.
▦	**Cat C Woodland** Woodland or group of trees of Low Quality and Value.
▩	**Scrub** Patches of Scrub Dominated by Species Listed.

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Client
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Project Title and Location
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Drawing Title
Tree Constraints Plan
Page 3 of 9

Scale	*Drawn*	*Approved*	*Date*
1:500@A1	GS	JP	23.10.20

Drawing No
LLD1955-ARB-DWG-003
Revision
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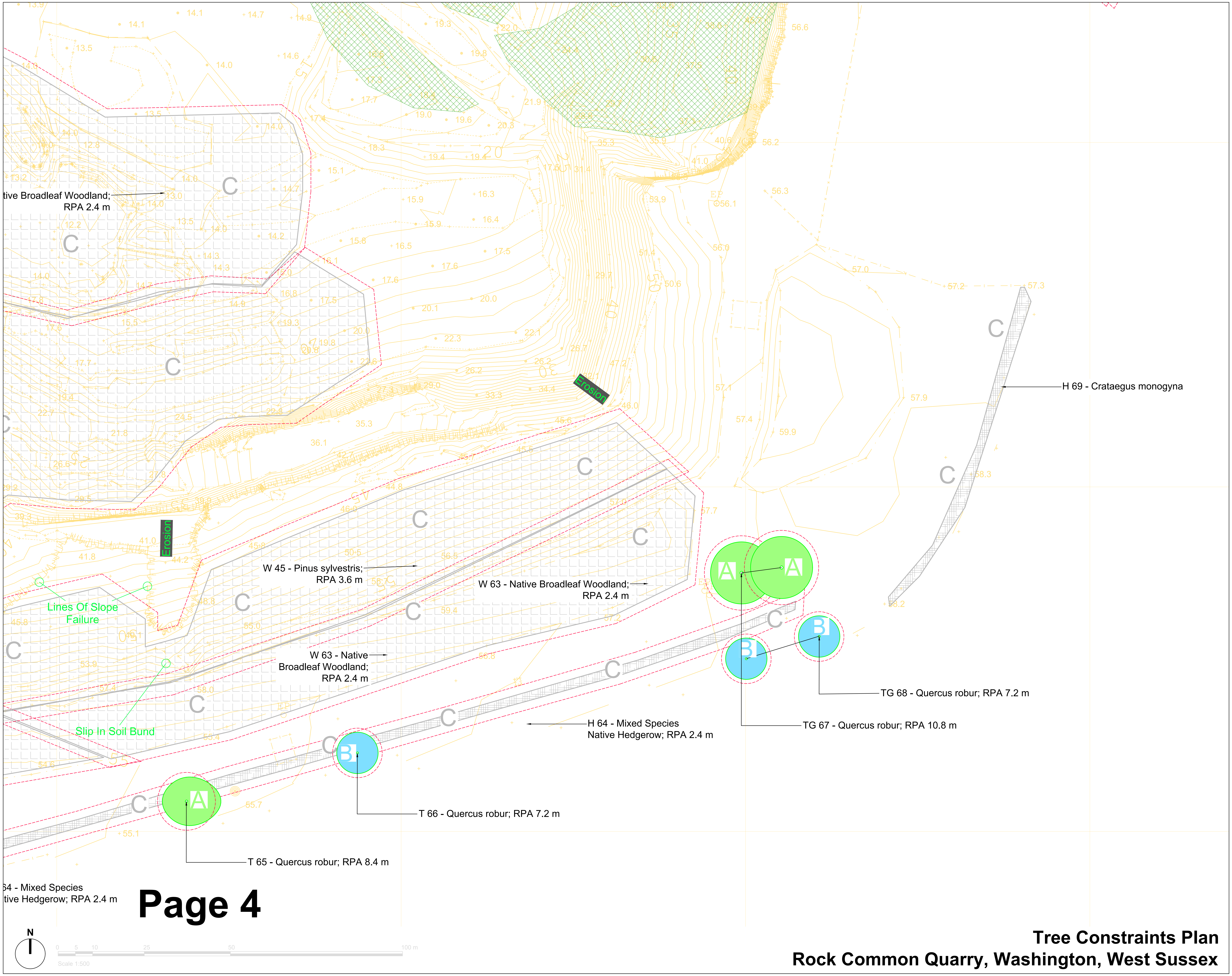
Tree Constraints Plan
Rock Common Quarry, Washington, West Sussex



Page 4

Tree Constraints Plan
Rock Common Quarry, Washington, West Sussex

Legend

T/TG/SH/H **Tree and Shrub Numbers.**

Tree Root Protection Areas
Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'.*

🟢 **Cat A Trees**
Trees of High Quality and Value.

🔵 **Cat B Trees**
Trees of Moderate Quality and Value.

⚪ **Cat C Trees**
Trees of Low quality and Value.

🔴 **Cat U Trees**
Trees Unsuitable for Retention.

▨ **Cat B Hedge**
Hedge of moderate Quality and Value.

▨ **Cat C Hedge**
Hedge of Low Quality and Value.

▦ **Cat B Woodland / Tree Group**
Woodland or group of trees of moderate Quality and Value.

▦ **Cat C Woodland**
Woodland or group of trees of Low Quality and Value.

🟩 **Scrub**
Patches of Scrub Dominated by Species Listed.

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Client
The Dudman Group
Project Title and Location
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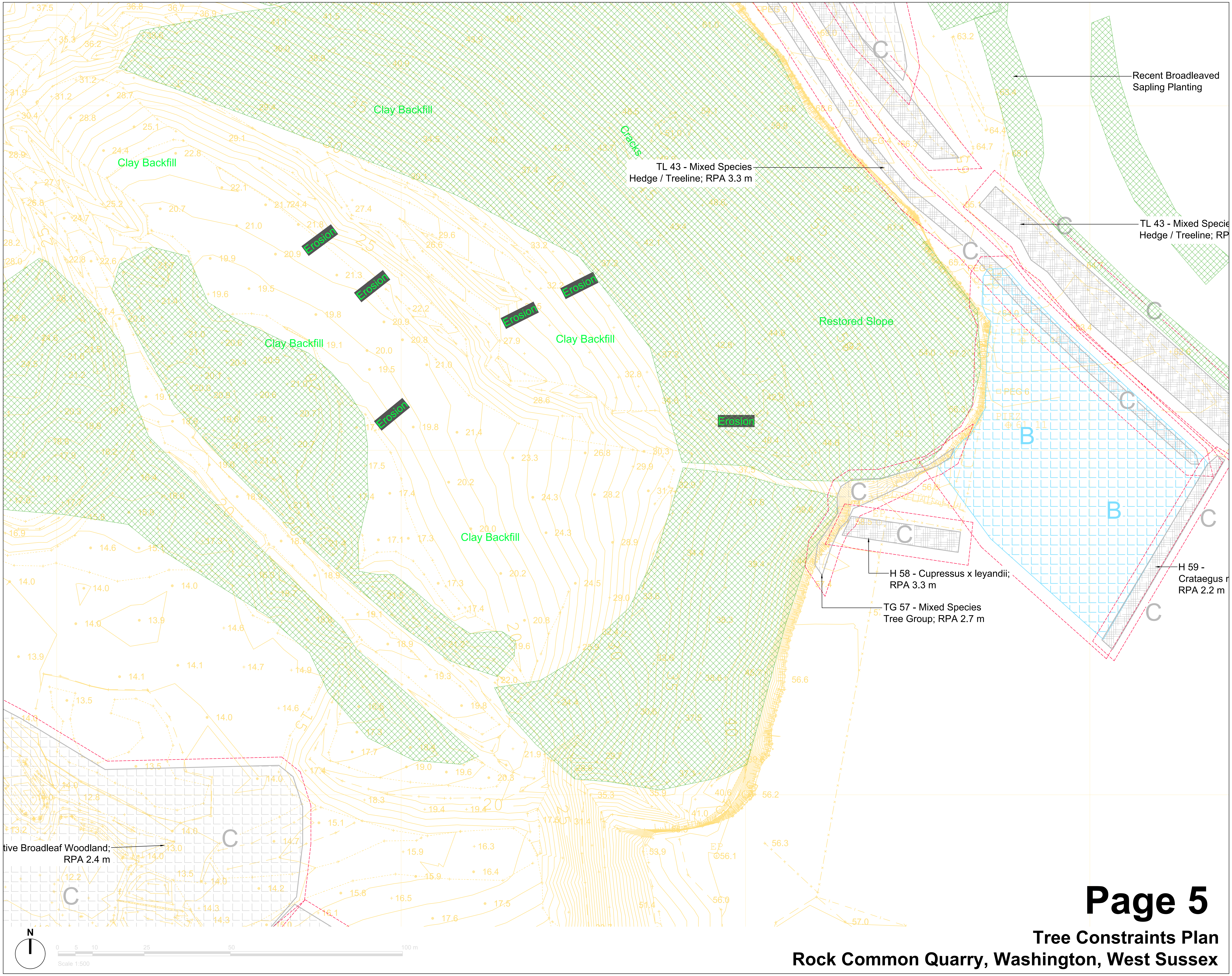
Drawing Title
Tree Constraints Plan
Page 4 of 9

Scale	Drawn	Approved	Date
1:500@A1	GS	JP	23.10.20

Drawing No	Revision
LLD1955-ARB-DWG-004	00



Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
	Tree Root Protection Areas Tree Root Protection Areas calculated and specified in accordance with *BS 5837:201* *- 'Trees in Relation to Design,Demolition and Construction -Recommendations'.*
●	**Cat A Trees** Trees of High Quality and Value.
●	**Cat B Trees** Trees of Moderate Quality and Value.
●	**Cat C Trees** Trees of Low quality and Value.
●	**Cat U Trees** Trees Unsuitable for Retention.
▨	**Cat B Hedge** Hedge of moderate Quality and Value.
▨	**Cat C Hedge** Hedge of Low Quality and Value.
▦	**Cat B Woodland / Tree Group** Woodland or group of trees of moderate Quality and Value.
▦	**Cat C Woodland** Woodland or group of trees of Low Quality and Value.
▩	**Scrub** Patches of Scrub Dominated by Species Listed.

DRAFT ISSUE

Rev	Description	Date	Initials
00	Draft Issue	23.10.20	GS

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Client
Dudman Rock Common Limited
Project Title and Location
Rock Common Quarry
Washington, West Sussex
Drawing Title
Tree Constraints Plan
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Scale	Drawn	Approved	Date
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Drawing No	Revision
LLD1955-ARB-DWG-005	00

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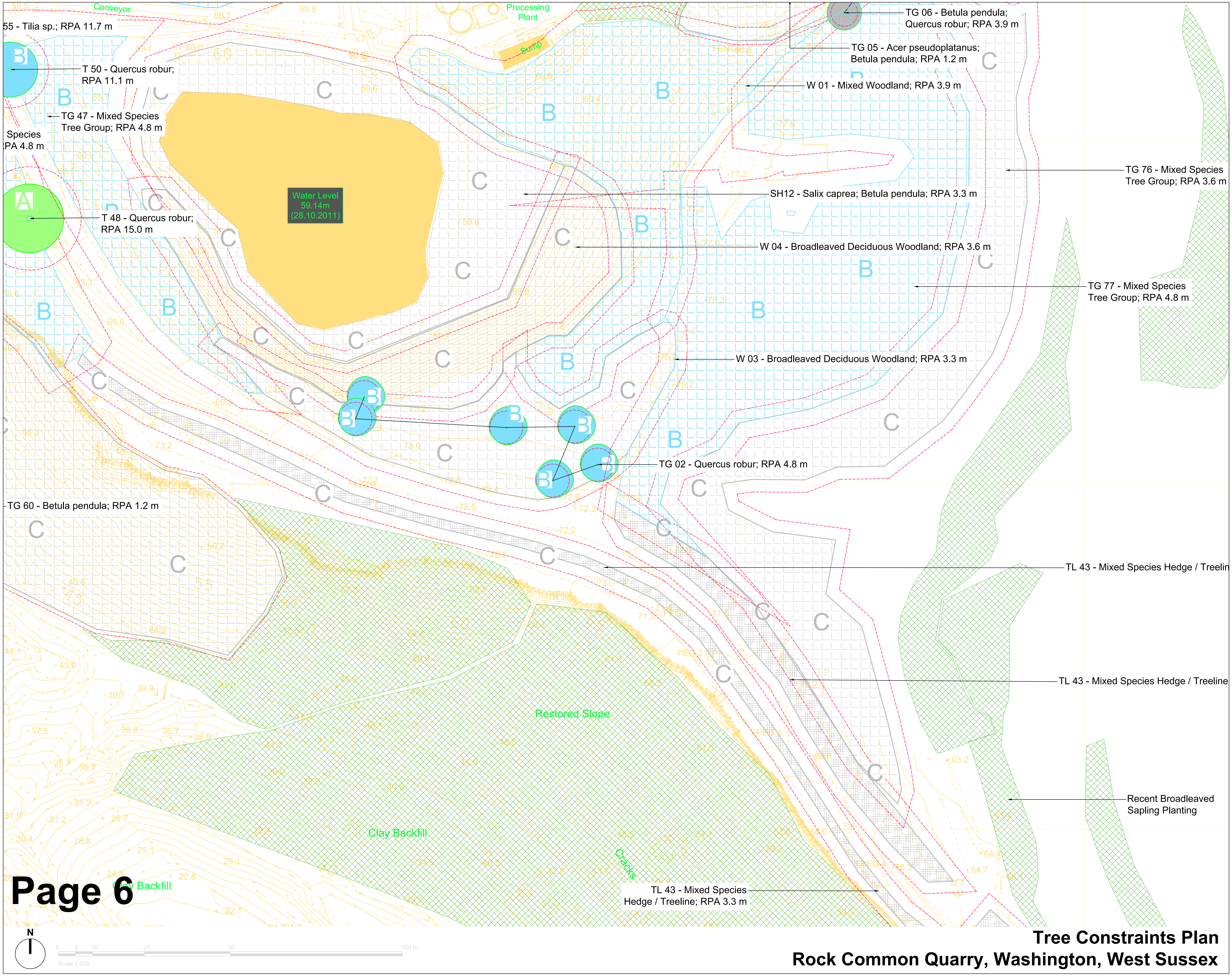
Tree Constraints Plan
Rock Common Quarry, Washington, West Sussex



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Tree Constraints Plan

Rock Common Quarry, Washington, West Sussex

Legend

T/TG/SH/H **Tree and Shrub Numbers.**

Tree Root Protection Areas
Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'.*

Cat A Trees
Trees of High Quality and Value.

Cat B Trees
Trees of Moderate Quality and Value.

Cat C Trees
Trees of Low quality and Value.

Cat U Trees
Trees Unsuitable for Retention.

Cat B Hedge
Hedge of moderate Quality and Value.

Cat C Hedge
Hedge of Low Quality and Value.

Cat B Woodland / Tree Group
Woodland or group of trees of moderate Quality and Value.

Cat C Woodland
Woodland or group of trees of Low Quality and Value.

Scrub
Patches of Scrub Dominated by Species Listed.

DRAFT ISSUE

Rev	Description	Date	Initials
00	Draft Issue	23.10.20	GS

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Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Constraints Plan
Page 6 of 9

Scale	*Drawn*	*Approved*	*Date*
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Drawing No **LLD1955-ARB-DWG-006**
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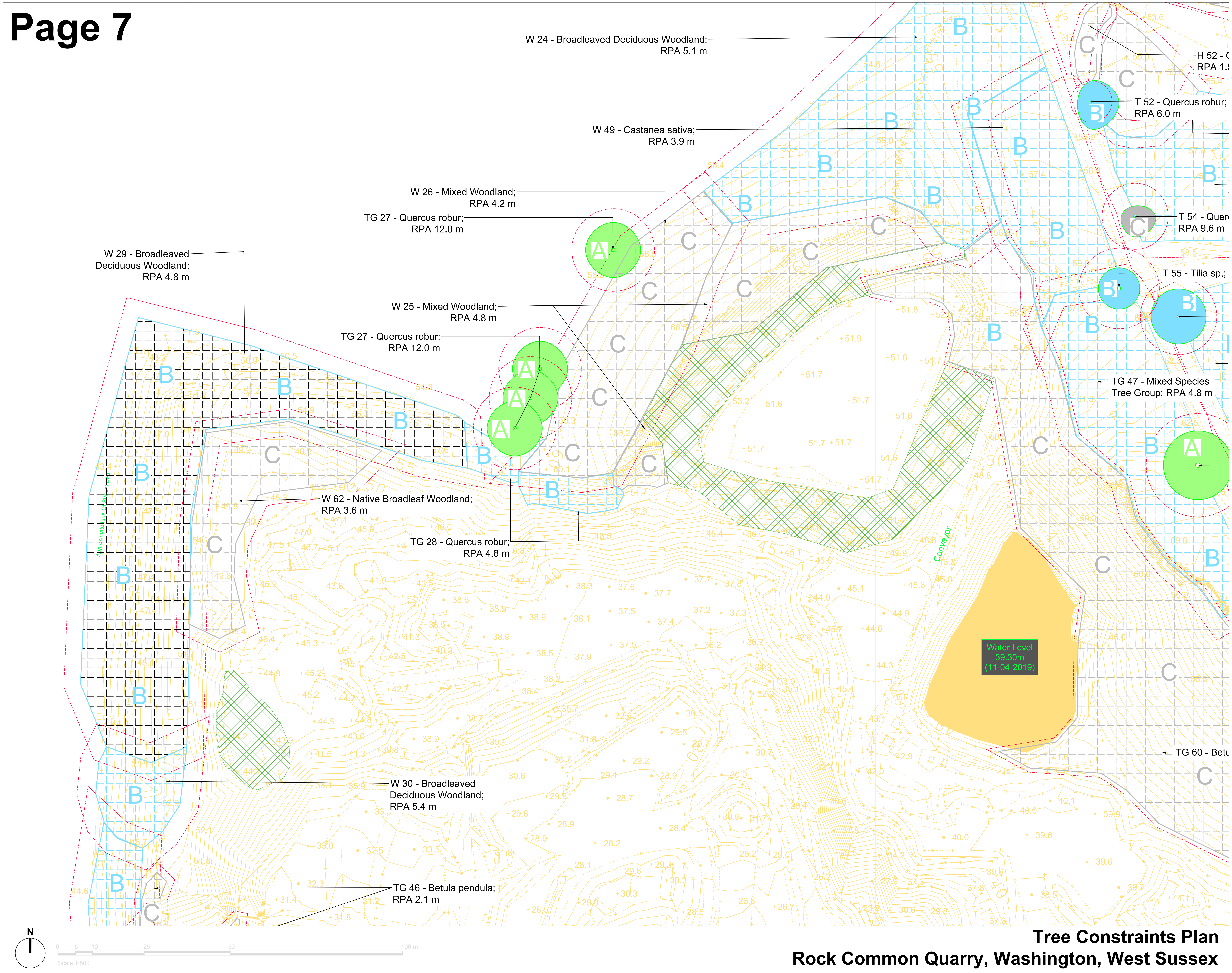

Tree Constraints Plan
Rock Common Quarry, Washington, West Sussex

Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
◌	**Tree Root Protection Areas** Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'.*
🟢	**Cat A Trees** Trees of High Quality and Value.
🔵	**Cat B Trees** Trees of Moderate Quality and Value.
⚪	**Cat C Trees** Trees of Low quality and Value.
🔴	**Cat U Trees** Trees Unsuitable for Retention.
▨	**Cat B Hedge** Hedge of moderate Quality and Value.
▨	**Cat C Hedge** Hedge of Low Quality and Value.
▦	**Cat B Woodland / Tree Group** Woodland or group of trees of moderate Quality and Value.
▦	**Cat C Woodland** Woodland or group of trees of Low Quality and Value.
▩	**Scrub** Patches of Scrub Dominated by Species Listed.

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Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Constraints Plan
Page 7 of 9

Scale	*Drawn*	*Approved*	*Date*
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Drawing No
LLD1955-ARB-DWG-001
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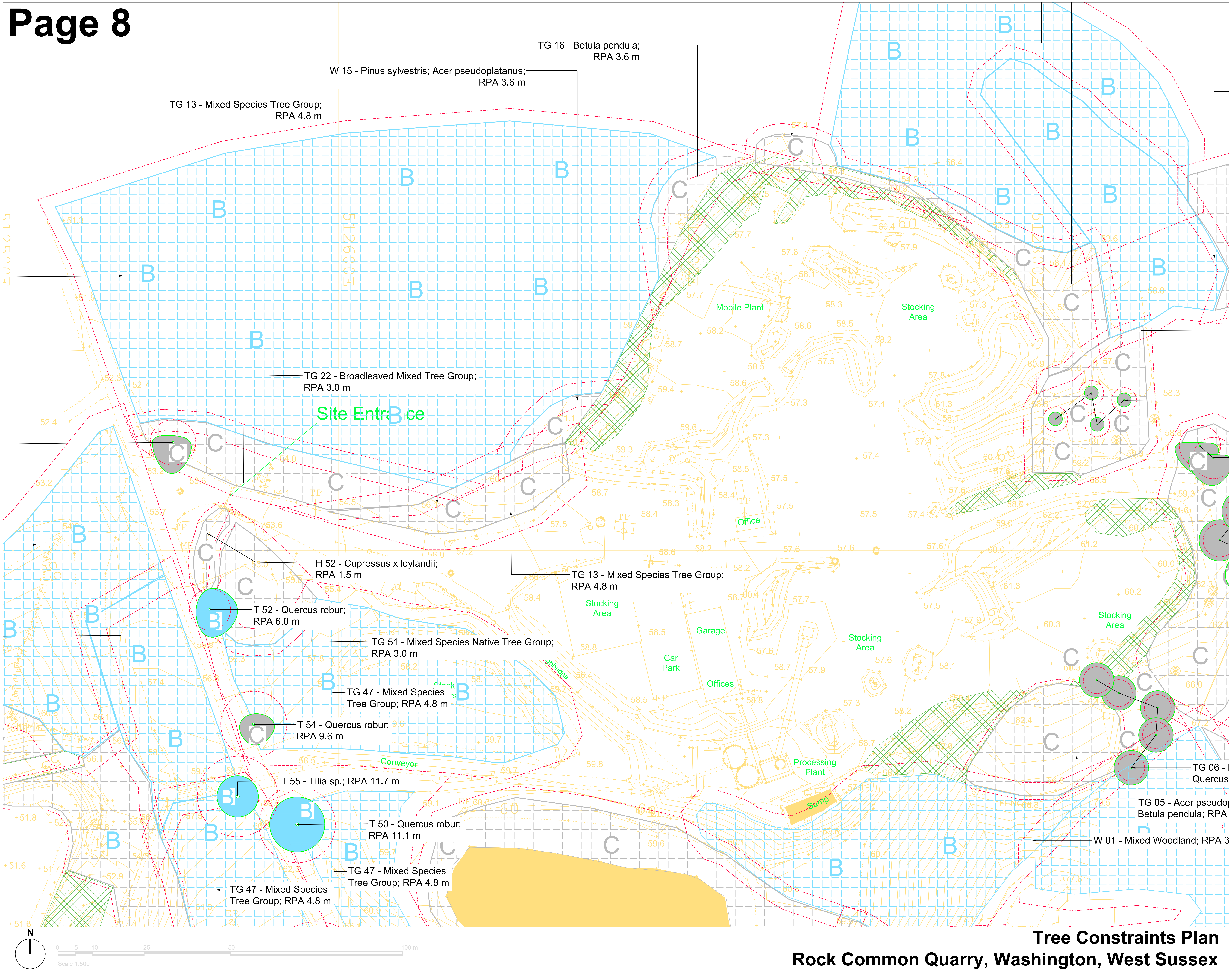

Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
	Tree Root Protection Areas Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'.*
●	**Cat A Trees** Trees of High Quality and Value.
●	**Cat B Trees** Trees of Moderate Quality and Value.
●	**Cat C Trees** Trees of Low quality and Value.
●	**Cat U Trees** Trees Unsuitable for Retention.
▨	**Cat B Hedge** Hedge of moderate Quality and Value.
▨	**Cat C Hedge** Hedge of Low Quality and Value.
▦	**Cat B Woodland / Tree Group** Woodland or group of trees of moderate Quality and Value.
▦	**Cat C Woodland** Woodland or group of trees of Low Quality and Value.
▨	**Scrub** Patches of Scrub Dominated by Species Listed.

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Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Constraints Plan
Page 8 of 9

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Drawing No	*Revision*
LLD1955-ARB-DWG-008	00

Tree Constraints Plan
Rock Common Quarry, Washington, West Sussex

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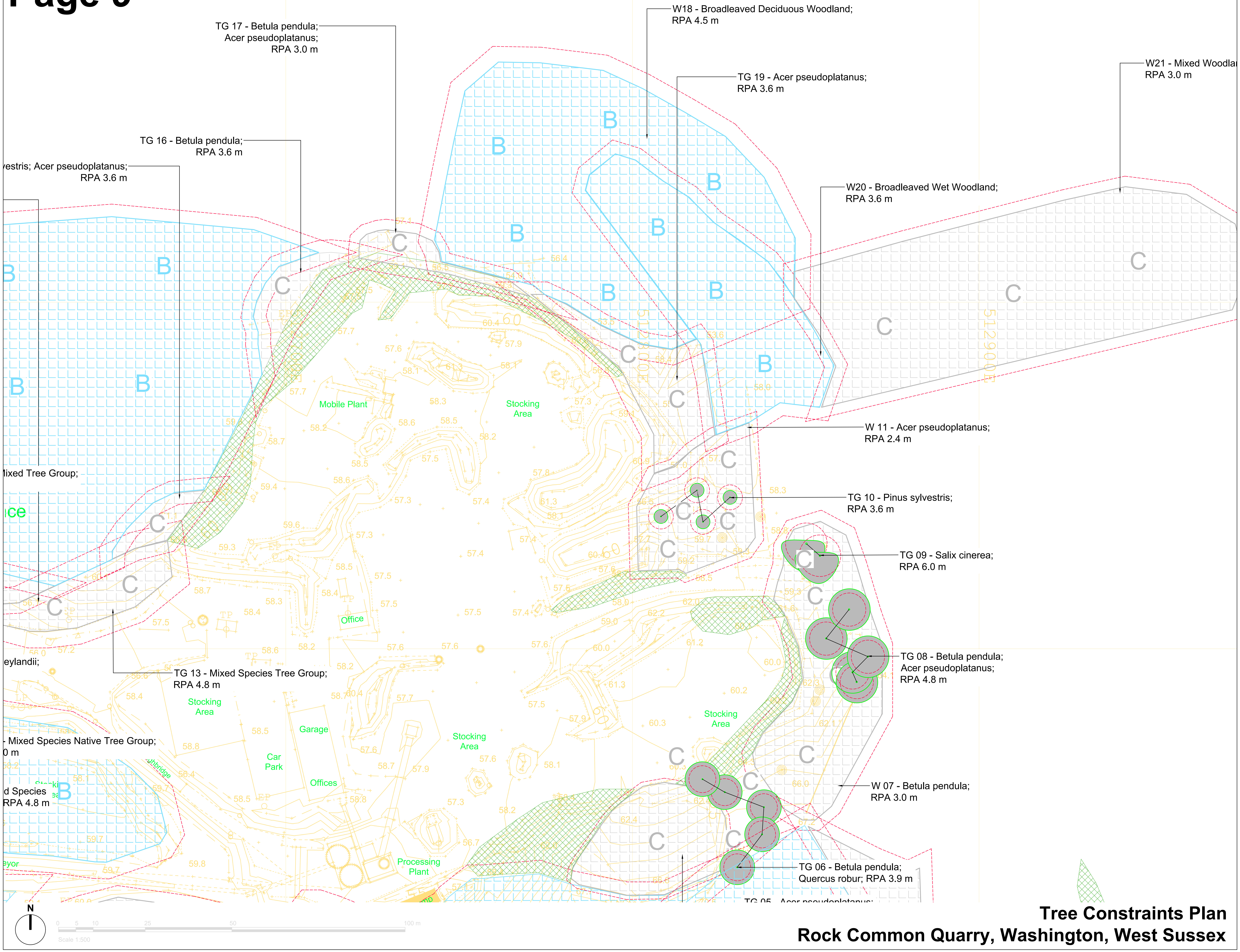

Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
	Tree Root Protection Areas Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012* - *'Trees in Relation to Design,Demolition and Construction -Recommendations'*.
A	**Cat A Trees** Trees of High Quality and Value.
B	**Cat B Trees** Trees of Moderate Quality and Value.
C	**Cat C Trees** Trees of Low quality and Value.
U	**Cat U Trees** Trees Unsuitable for Retention.
B	**Cat B Hedge** Hedge of moderate Quality and Value.
C	**Cat C Hedge** Hedge of Low Quality and Value.
B	**Cat B Woodland / Tree Group** Woodland or group of trees of moderate Quality and Value.
C	**Cat C Woodland** Woodland or group of trees of Low Quality and Value.
▨	**Scrub** Patches of Scrub Dominated by Species Listed.

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Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Constraints Plan
Page 9 of 9

Scale	*Drawn*	*Approved*	*Date*
1:500@A1	GS	JP	23.10.20

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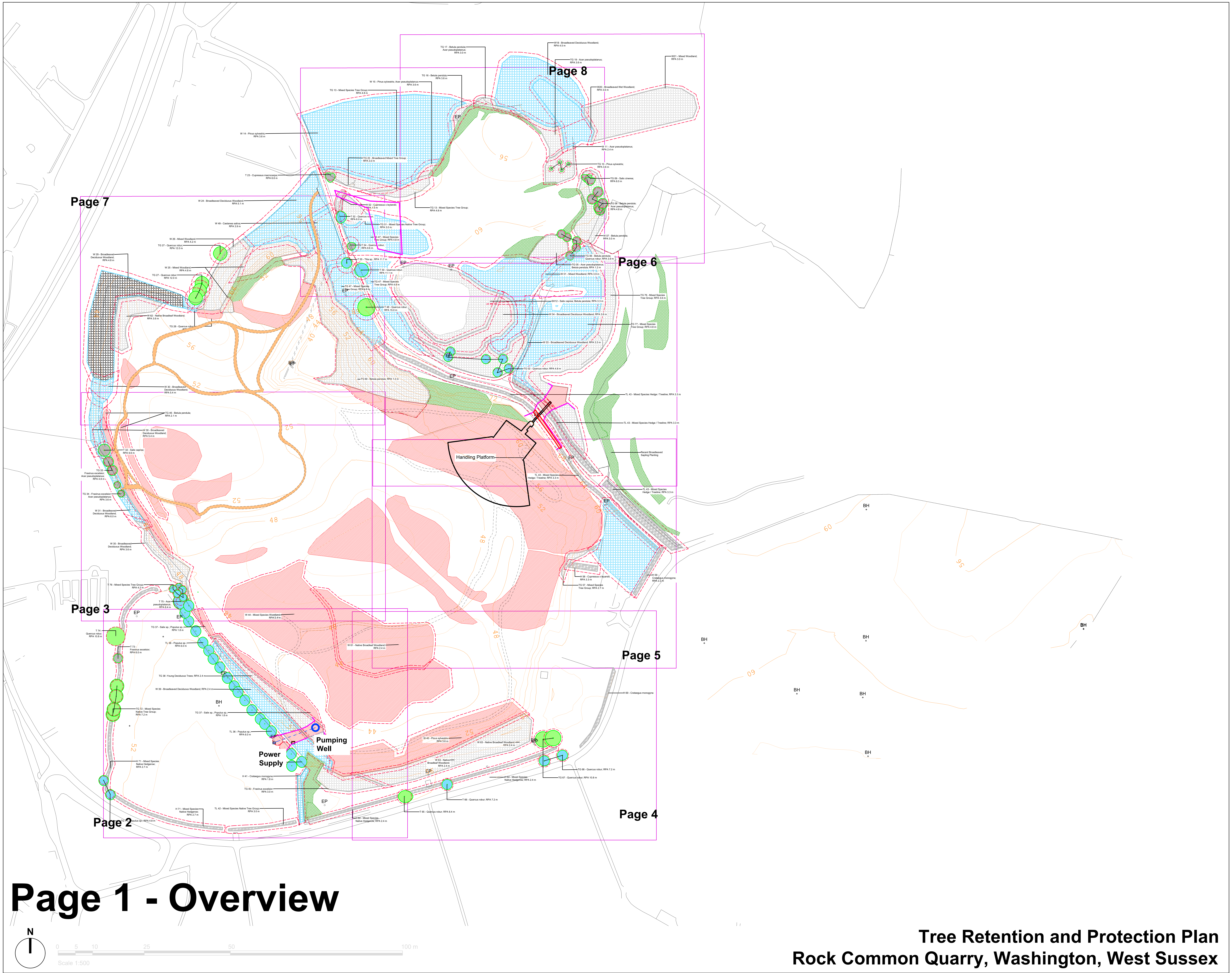
LLD1955-ARB-DWG-009	00

Tree Constraints Plan
Rock Common Quarry, Washington, West Sussex

LLD1955-ARB-DWG-010-018 – Tree Retention and Protection Plan



Page 1 - Overview

Tree Retention and Protection Plan
Rock Common Quarry, Washington, West Sussex

Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
◜	**Tree Root Protection Areas** Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'*.
●	**Cat A Trees** Trees of High Quality and Value.
●	**Cat B Trees** Trees of Moderate Quality and Value.
●	**Cat C Trees** Trees of Low quality and Value.
●	**Cat U Trees** Trees Unsuitable for Retention.
▨	**Cat B Hedge** Hedge of moderate Quality and Value.
▨	**Cat C Hedge** Hedge of Low Quality and Value.
▦	**Cat B Woodland / Tree Group** Woodland or group of trees of moderate Quality and Value.
▦	**Cat C Woodland** Woodland or group of trees of Low Quality and Value.
▩	**Scrub** Patches of Scrub Dominated by Species Listed.
●	**Existing Trees to be Removed** Tree Surgery operations to be in accordance with *BS3998:2010 - 'Tree Works - Recommendations'*.
╱	**Tree Protection Barrier** All Tree Protection and Tree Protection Barriers to be in accordance with *BS 5837:2012 - 'Trees in Relation to Design, Demolition and Construction - Recommendations'*. Tree Protective Barrier to be 2.0 metres height 'Heras' Welded Wire Mesh Fencing secured to a scaffolding framework, set into the existing ground, and positioned to the outside edge of the existing Tree Root Protection Area, or as specified.

Notes:
1. Drawing to be read in colour.
2. For details of existing trees and vegetation refer to: *LLD1955-ARB-SCH-001 - Existing Tree Schedule;*
3. *For assessment of effects of the proposed development on existing trees refer to LLD1955-ARB-REP-001- Arboricultural Impact Assessment and Method Statement;*

PLANNING ISSUE

Rev	Description	Date	Initials
02	Planning Issue	26.01.21	GS
01	Planning Issue	20.11.20	GS
00	Draft Issue	23.10.20	GS

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Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Retention and Protection Plan
Overview - Page 1 of 9

Scale	*Drawn*	*Approved*	*Date*
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Drawing No	*Revision*
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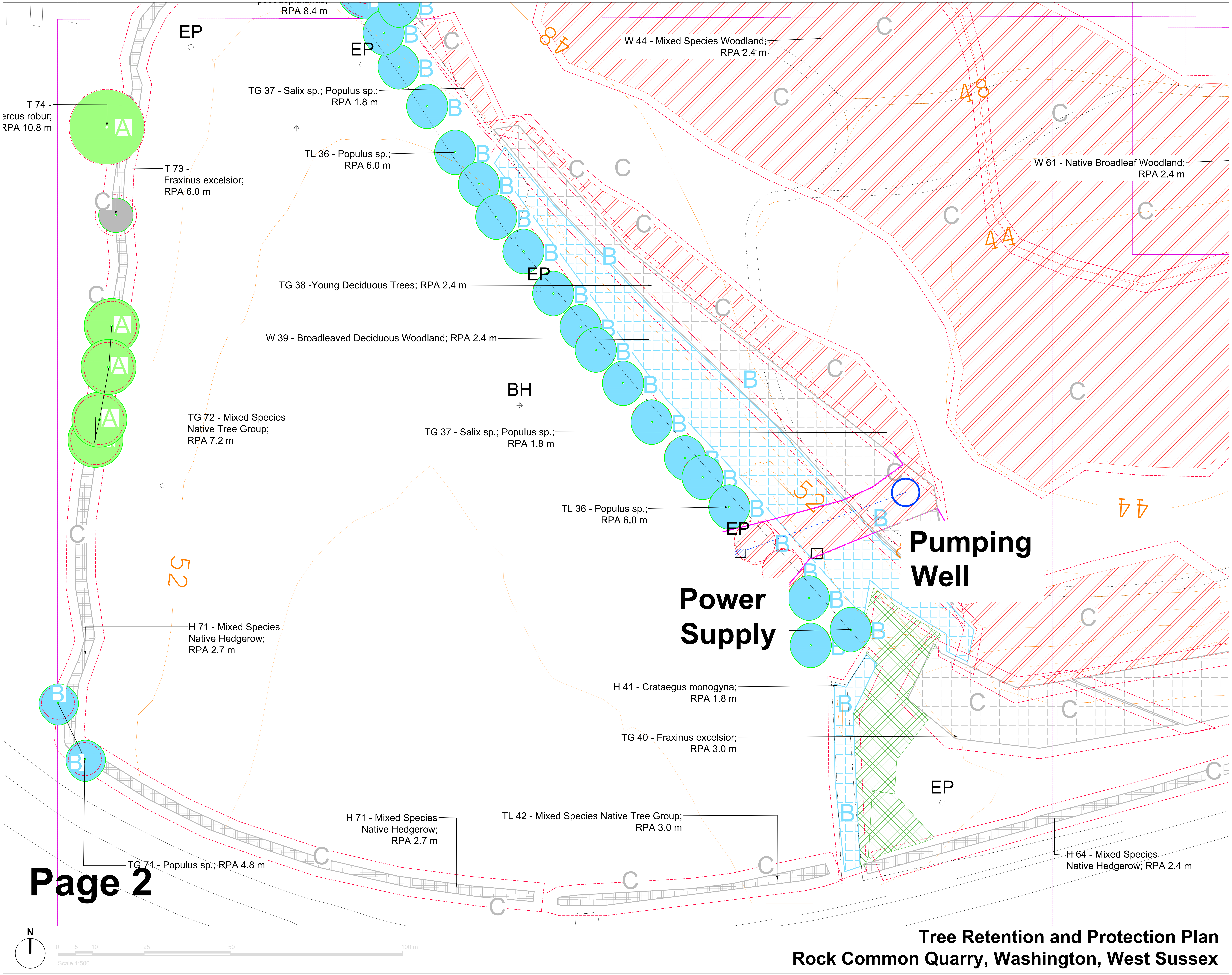

Tree Retention and Protection Plan
Rock Common Quarry, Washington, West Sussex

Legend

- T/TG/SH/H **Tree and Shrub Numbers.**
- **Tree Root Protection Areas**
  Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'*.
- 🟢 **Cat A Trees**
  Trees of High Quality and Value.
- 🔵 **Cat B Trees**
  Trees of Moderate Quality and Value.
- ⚪ **Cat C Trees**
  Trees of Low quality and Value.
- 🔴 **Cat U Trees**
  Trees Unsuitable for Retention.
- 🟦 **Cat B Hedge**
  Hedge of moderate Quality and Value.
- ▨ **Cat C Hedge**
  Hedge of Low Quality and Value.
- 🟦 **Cat B Woodland / Tree Group**
  Woodland or group of trees of moderate Quality and Value.
- ▨ **Cat C Woodland**
  Woodland or group of trees of Low Quality and Value.
- 🟩 **Scrub**
  Patches of Scrub Dominated by Species Listed.
- **Existing Trees to be Removed**
  Tree Surgery operations to be in accordance with *BS3998:2010 - 'Tree Works - Recommendations'.*
- **Tree Protection Barrier**
  All Tree Protection and Tree Protection Barriers to be in accordance with *BS 5837:2012 - 'Trees in Relation to Design, Demolition and Construction - Recommendations'*.
  Tree Protective Barrier to be 2.0 metres height 'Heras' Welded Wire Mesh Fencing secured to a scaffolding framework, set into the existing ground, and positioned to the outside edge of the existing Tree Root Protection Area, or as specified.

Notes:
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2. For details of existing trees and vegetation refer to: *LLD1955-ARB-SCH-001 - Existing Tree Schedule;*
3. *For assessment of effects of the proposed development on existing trees refer to LLD1955-ARB-REP-001- Arboricultural Impact Assessment and Method Statement;*

PLANNING ISSUE

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02	Planning Issue	26.01.21	GS
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00	Draft Issue	23.10.20	GS

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Client
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Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Retention and Protection Plan
Page 2 of 9

Scale	*Drawn*	*Approved*	*Date*
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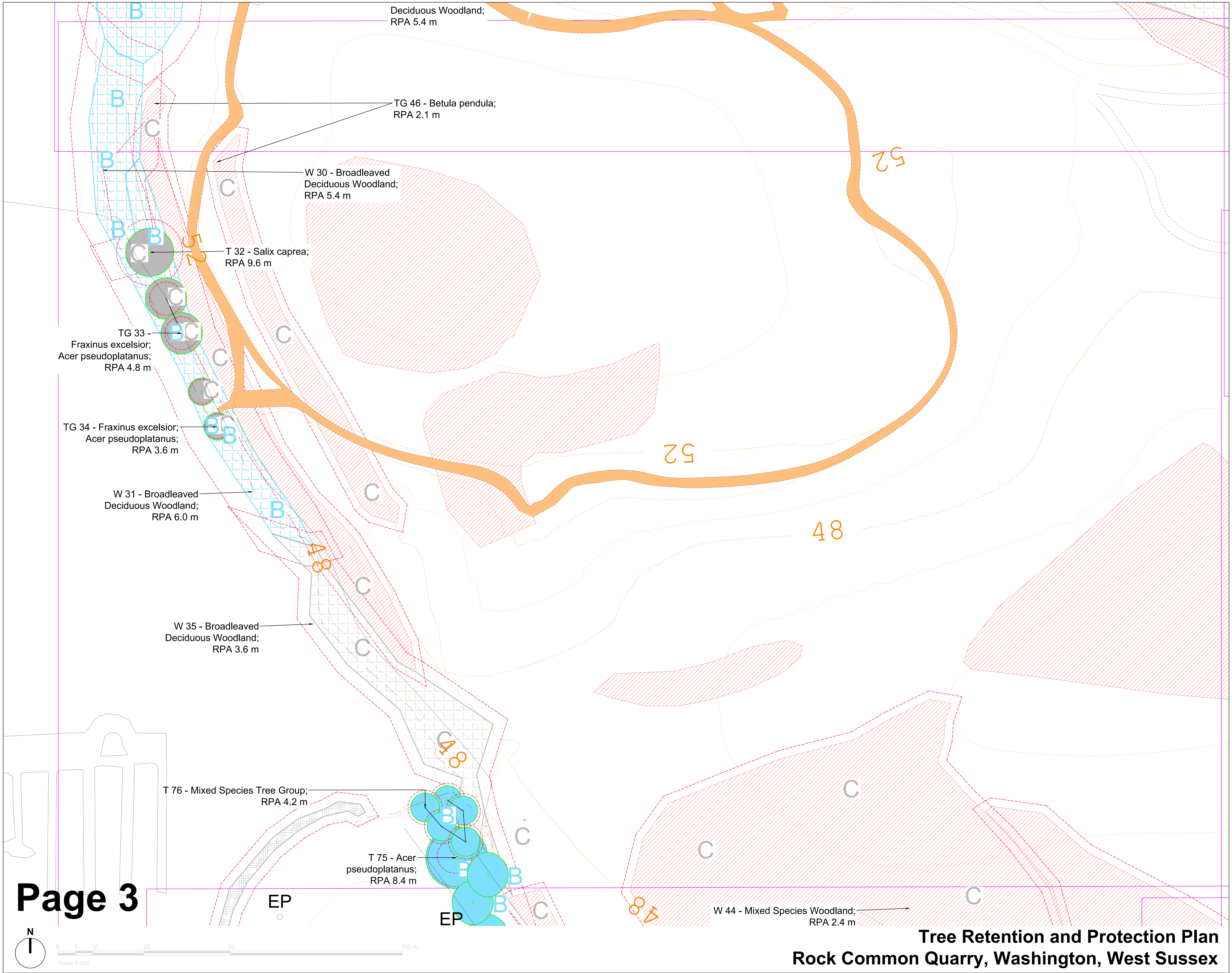
Drawing No	*Revision*
LLD1955-ARB-DWG-011	02



Legend

Tree and Shrub Numbers. (T/TG/SH/H)

Tree Root Protection Areas
Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'*.

Cat A Trees
Trees of High Quality and Value.

Cat B Trees
Trees of Moderate Quality and Value.

Cat C Trees
Trees of Low quality and Value.

Cat U Trees
Trees Unsuitable for Retention.

Cat B Hedge
Hedge of moderate Quality and Value.

Cat C Hedge
Hedge of Low Quality and Value.

Cat B Woodland / Tree Group
Woodland or group of trees of moderate Quality and Value.

Cat C Woodland
Woodland or group of trees of Low Quality and Value.

Scrub
Patches of Scrub Dominated by Species Listed.

Existing Trees to be Removed
Tree Surgery operations to be in accordance with *BS3998:2010 - 'Tree Works - Recommendations'.*

Tree Protection Barrier
All Tree Protection and Tree Protection Barriers to be in accordance with *BS 5837:2012 - 'Trees in Relation to Design, Demolition and Construction - Recommendations'*.
Tree Protective Barrier to be 2.0 metres height 'Heras' Welded Wire Mesh Fencing secured to a scaffolding framework, set into the existing ground, and positioned to the outside edge of the existing Tree Root Protection Area, or as specified.

Notes:
1. Drawing to be read in colour.
2. For details of existing trees and vegetation refer to: *LLD1955-ARB-SCH-001 - Existing Tree Schedule;*
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PLANNING ISSUE

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02	Planning Issue	26.01.21	GS
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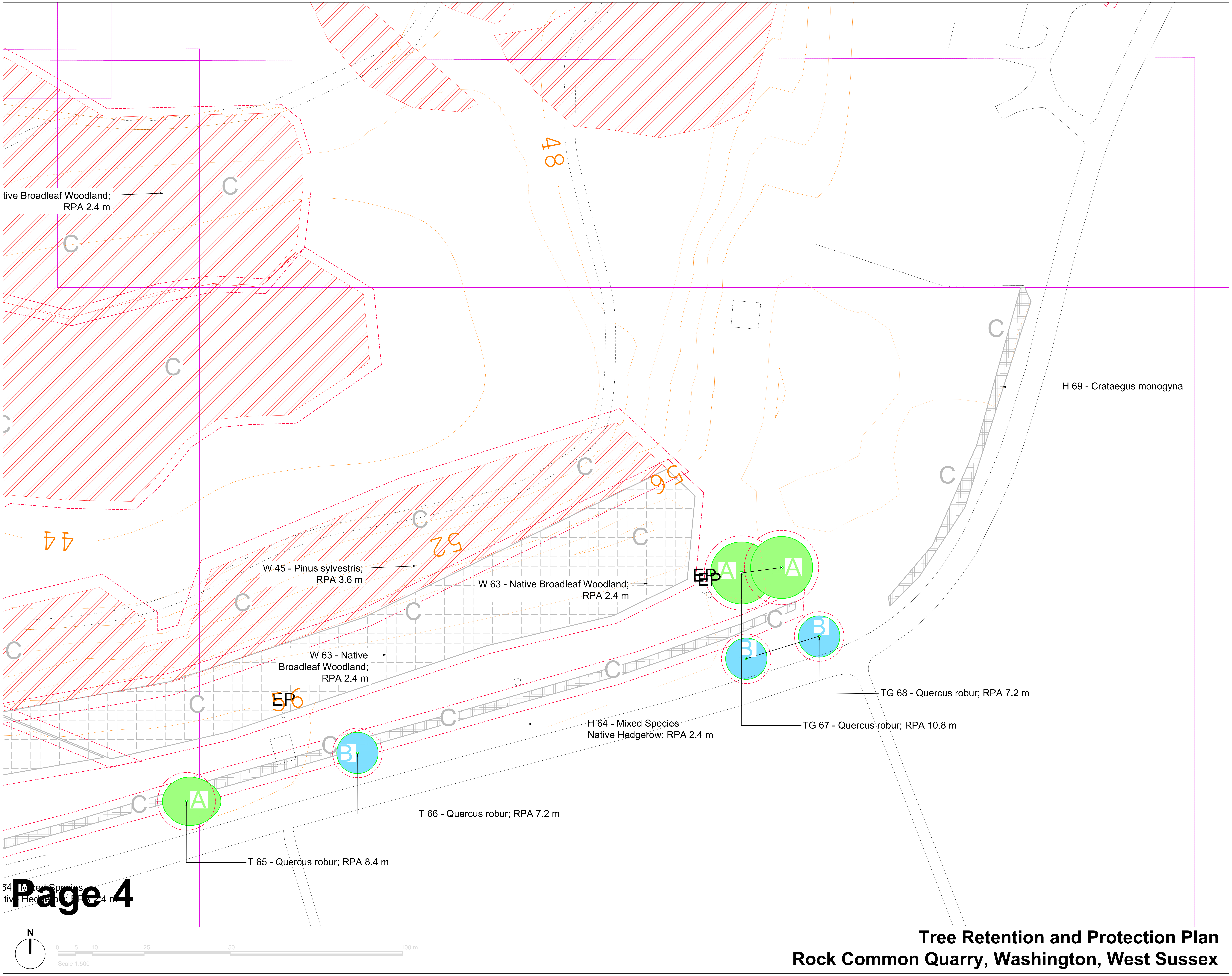
Client
The Dudman Group
Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Retention and Protection Plan
Page 3 of 9

Scale	*Drawn*	*Approved*	*Date*
1:500@A1	GS	JP	23.10.20

Drawing No	*Revision*
LLD1955-ARB-DWG-012	02

Tree Retention and Protection Plan
Rock Common Quarry, Washington, West Sussex



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Tree Retention and Protection Plan
Rock Common Quarry, Washington, West Sussex

Legend

T/T/G/SH/H **Tree and Shrub Numbers.**

Tree Root Protection Areas
Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'.*

Cat A Trees
Trees of High Quality and Value.

Cat B Trees
Trees of Moderate Quality and Value.

Cat C Trees
Trees of Low quality and Value.

Cat U Trees
Trees Unsuitable for Retention.

Cat B Hedge
Hedge of moderate Quality and Value.

Cat C Hedge
Hedge of Low Quality and Value.

Cat B Woodland / Tree Group
Woodland or group of trees of moderate Quality and Value.

Cat C Woodland
Woodland or group of trees of Low Quality and Value.

Scrub
Patches of Scrub Dominated by Species Listed.

Existing Trees to be Removed
Tree Surgery operations to be in accordance with *BS3998:2010 - 'Tree Works - Recommendations'.*

Tree Protection Barrier
All Tree Protection and Tree Protection Barriers to be in accordance with *BS 5837:2012 - 'Trees in Relation to Design, Demolition and Construction - Recommendations'.*
Tree Protective Barrier to be 2.0 metres height 'Heras' Welded Wire Mesh Fencing secured to a scaffolding framework, set into the existing ground, and positioned to the outside edge of the existing Tree Root Protection Area, or as specified.

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02	Planning Issue	26.01.21	GS
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Client
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Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Retention and Protection Plan
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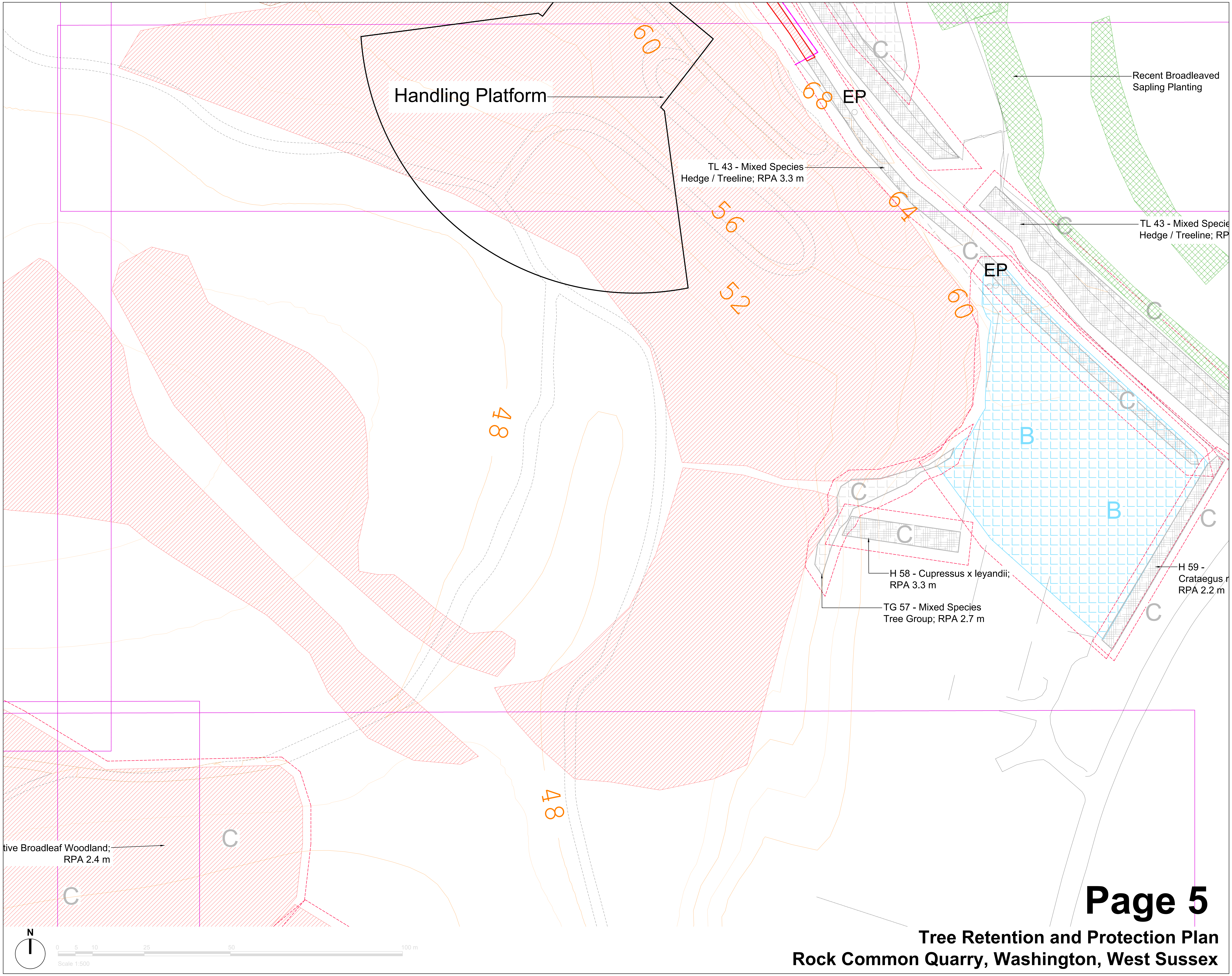
Drawing No
LLD1955-ARB-DWG-013
Revision
02



Page 5

Tree Retention and Protection Plan
Rock Common Quarry, Washington, West Sussex

Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
◜	**Tree Root Protection Areas** Tree Root Protection Areas calculated and specified in accordance with *BS 5837:201* *- 'Trees in Relation to Design,Demolition and Construction -Recommendations'*.
🟢 A	**Cat A Trees** Trees of High Quality and Value.
🔵 B	**Cat B Trees** Trees of Moderate Quality and Value.
● C	**Cat C Trees** Trees of Low quality and Value.
🔴 U	**Cat U Trees** Trees Unsuitable for Retention.
🟦 B	**Cat B Hedge** Hedge of moderate Quality and Value.
▦ C	**Cat C Hedge** Hedge of Low Quality and Value.
▦ B	**Cat B Woodland / Tree Group** Woodland or group of trees of moderate Quality and Value.
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🟩	**Scrub** Patches of Scrub Dominated by Species Listed.
▨	**Existing Trees to be Removed** Tree Surgery operations to be in accordance with *BS3998:2010 - 'Tree Works - Recommendations'.*
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3. *For assessment of effects of the proposed development on existing trees refer to LLD1955-ARB-REP-001- Arboricultural Impact Assessment and Method Statement;*

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Client
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Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Retention and Protection Plan
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Drawing No
LLD1955-ARB-DWG-014
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02

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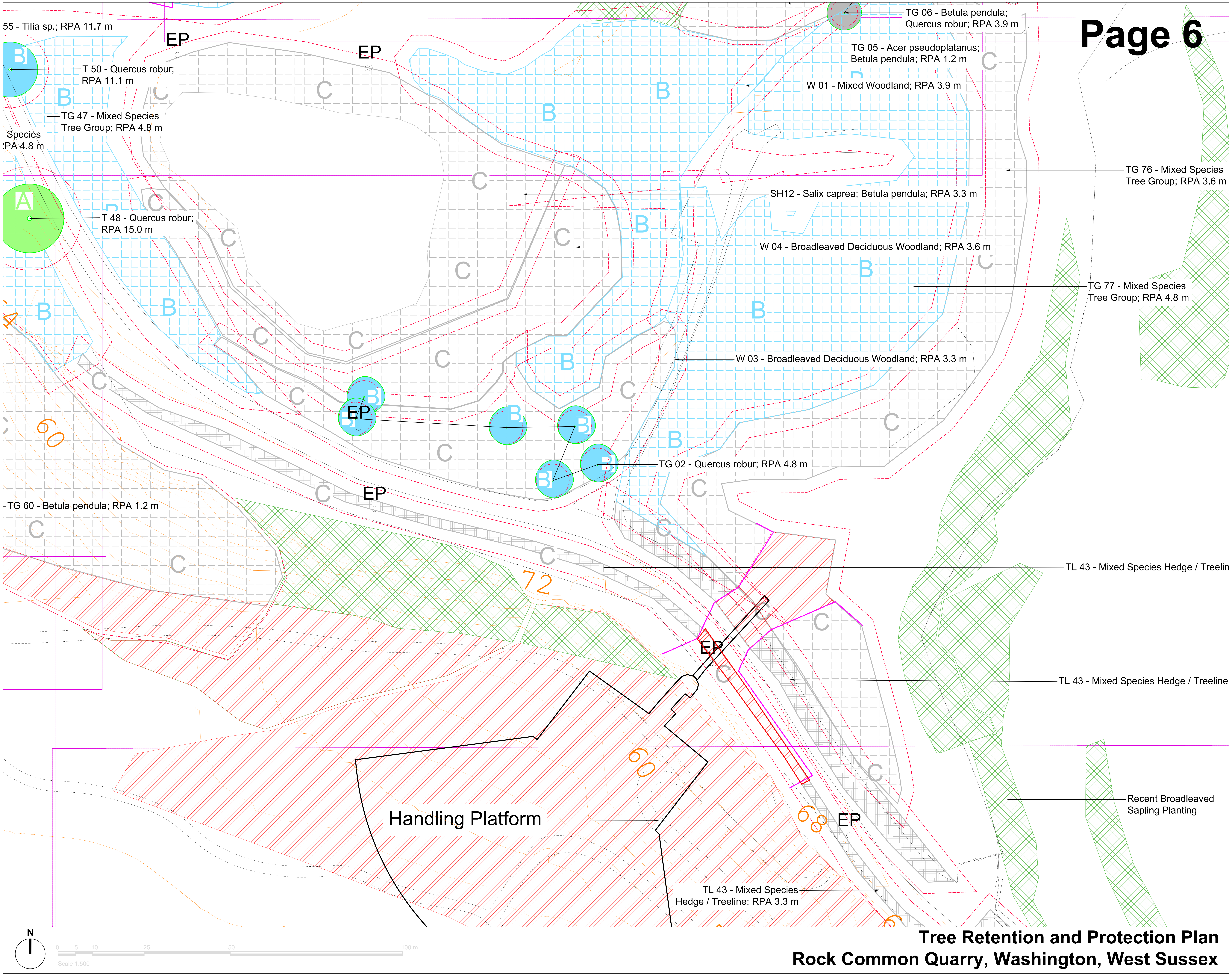

Tree Retention and Protection Plan
Rock Common Quarry, Washington, West Sussex

Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
╌	**Tree Root Protection Areas** Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'*.
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3. *For assessment of effects of the proposed development on existing trees refer to LLD1955-ARB-REP-001- Arboricultural Impact Assessment and Method Statement;*

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Client
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Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Retention and Protection Plan
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Drawing No **LLD1955-ARB-DWG-015**
Revision 02

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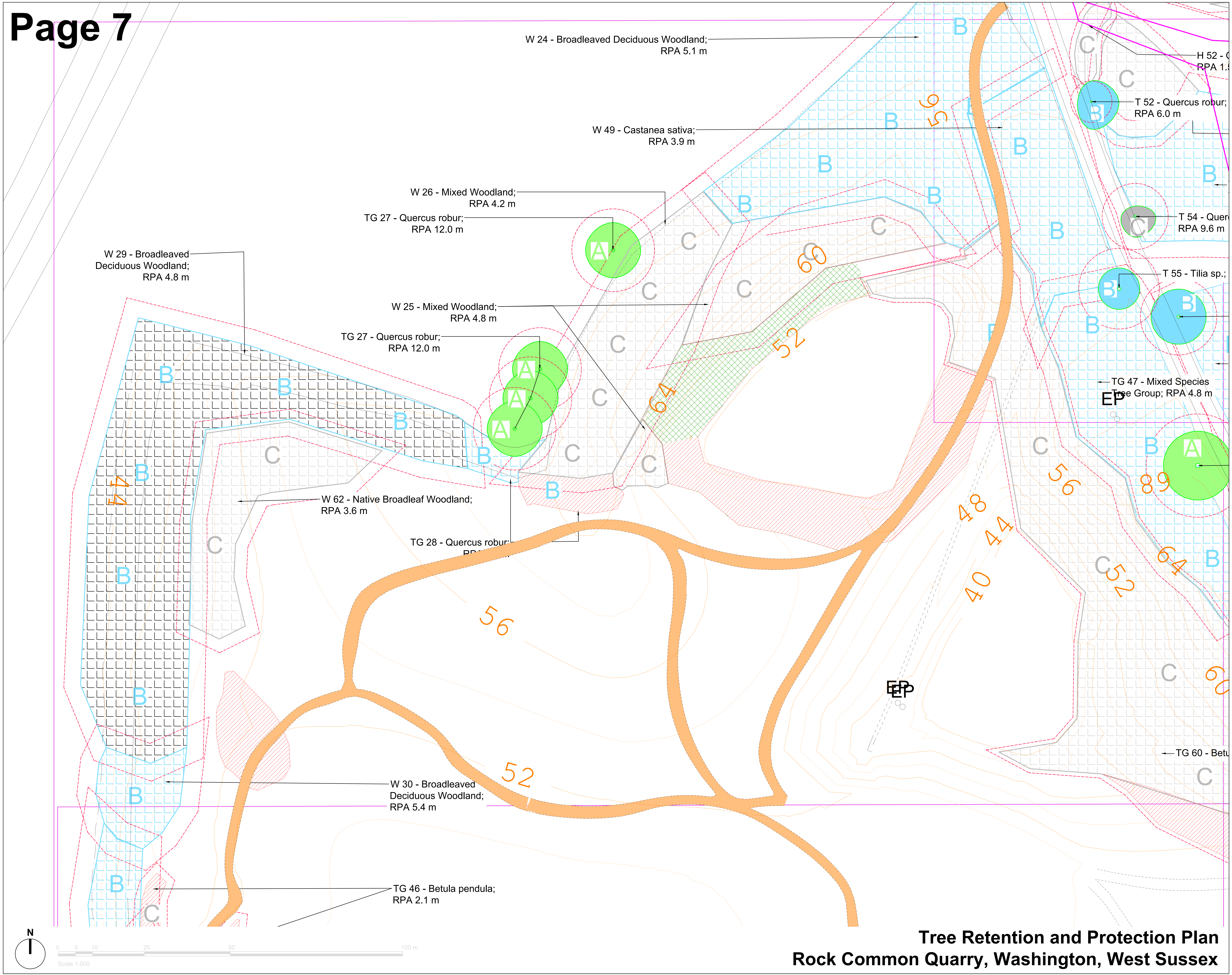

Tree Retention and Protection Plan
Rock Common Quarry, Washington, West Sussex

Legend

T/TG/SH/H	**Tree and Shrub Numbers.**
	Tree Root Protection Areas Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'*.
🟢 A	**Cat A Trees** Trees of High Quality and Value.
🔵 B	**Cat B Trees** Trees of Moderate Quality and Value.
● C	**Cat C Trees** Trees of Low quality and Value.
🔴 U	**Cat U Trees** Trees Unsuitable for Retention.
B	**Cat B Hedge** Hedge of moderate Quality and Value.
C	**Cat C Hedge** Hedge of Low Quality and Value.
B	**Cat B Woodland / Tree Group** Woodland or group of trees of moderate Quality and Value.
C	**Cat C Woodland** Woodland or group of trees of Low Quality and Value.
🟩	**Scrub** Patches of Scrub Dominated by Species Listed.
▨	**Existing Trees to be Removed** Tree Surgery operations to be in accordance with *BS3998:2010 - 'Tree Works - Recommendations'.*
	Tree Protection Barrier All Tree Protection and Tree Protection Barriers to be in accordance with *BS 5837:2012 - 'Trees in Relation to Design, Demolition and Construction - Recommendations'*. Tree Protective Barrier to be 2.0 metres height 'Heras' Welded Wire Mesh Fencing secured to a scaffolding framework, set into the existing ground, and positioned to the outside edge of the existing Tree Root Protection Area, or as specified.

Notes:
1. Drawing to be read in colour.
2. For details of existing trees and vegetation refer to: *LLD1955-ARB-SCH-001 - Existing Tree Schedule;*
3. *For assessment of effects of the proposed development on existing trees refer to LLD1955-ARB-REP-001- Arboricultural Impact Assessment and Method Statement;*

PLANNING ISSUE

Rev	Description	Date	Initials
02	Planning Issue	26.01.21	GS
01	Planning Issue	20.11.20	GS
00	Draft Issue	23.10.20	GS

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Client
Dudman Rock Common Limited
Project Title and Location
Rock Common Quarry
Washington, West Sussex

Drawing Title
Tree Retention and Protection Plan
Page 7 of 9

Scale	*Drawn*	*Approved*	*Date*
1:500@A1	GS	JP	23.10.20

Drawing No
LLD1955-ARB-DWG-016
Revision
02

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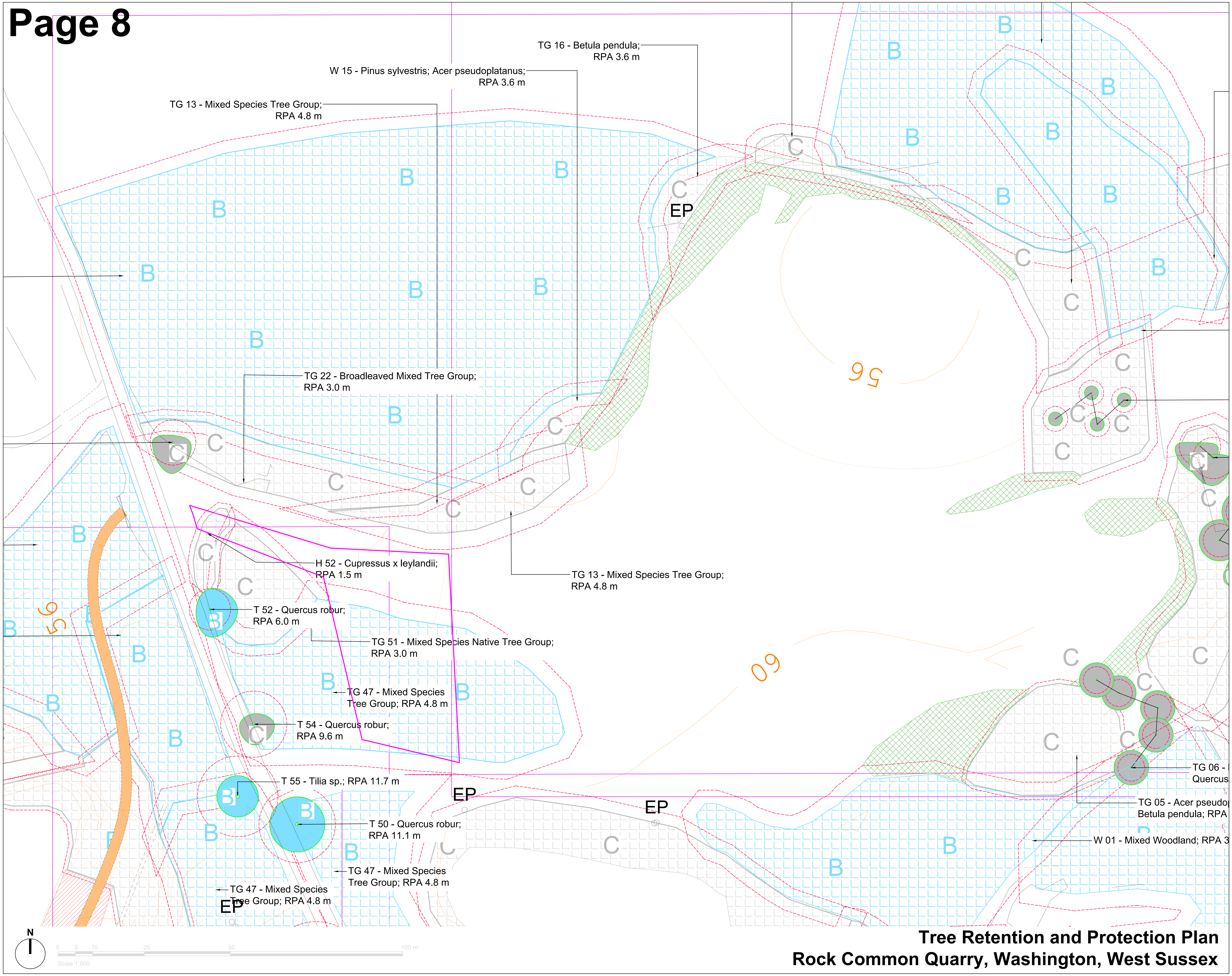

Tree Retention and Protection Plan
Rock Common Quarry, Washington, West Sussex

Legend

T/TG/SH/H **Tree and Shrub Numbers.**

Tree Root Protection Areas
Tree Root Protection Areas calculated and specified in accordance with *BS 5837:2012 - 'Trees in Relation to Design,Demolition and Construction -Recommendations'*.

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Cat B Trees
Trees of Moderate Quality and Value.

Cat C Trees
Trees of Low quality and Value.

Cat U Trees
Trees Unsuitable for Retention.

Cat B Hedge
Hedge of moderate Quality and Value.

Cat C Hedge
Hedge of Low Quality and Value.

Cat B Woodland / Tree Group
Woodland or group of trees
of moderate Quality and Value.

Cat C Woodland
Woodland or group of trees
of Low Quality and Value.

Scrub
Patches of Scrub
Dominated by Species Listed.

Existing Trees to be Removed
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Tree Protective Barrier to be 2.0 metres height 'Heras' Welded Wire Mesh Fencing secured to a scaffolding framework, set into the existing ground, and positioned to the outside edge of the existing Tree Root Protection Area, or as specified.

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Drawing No
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Revision
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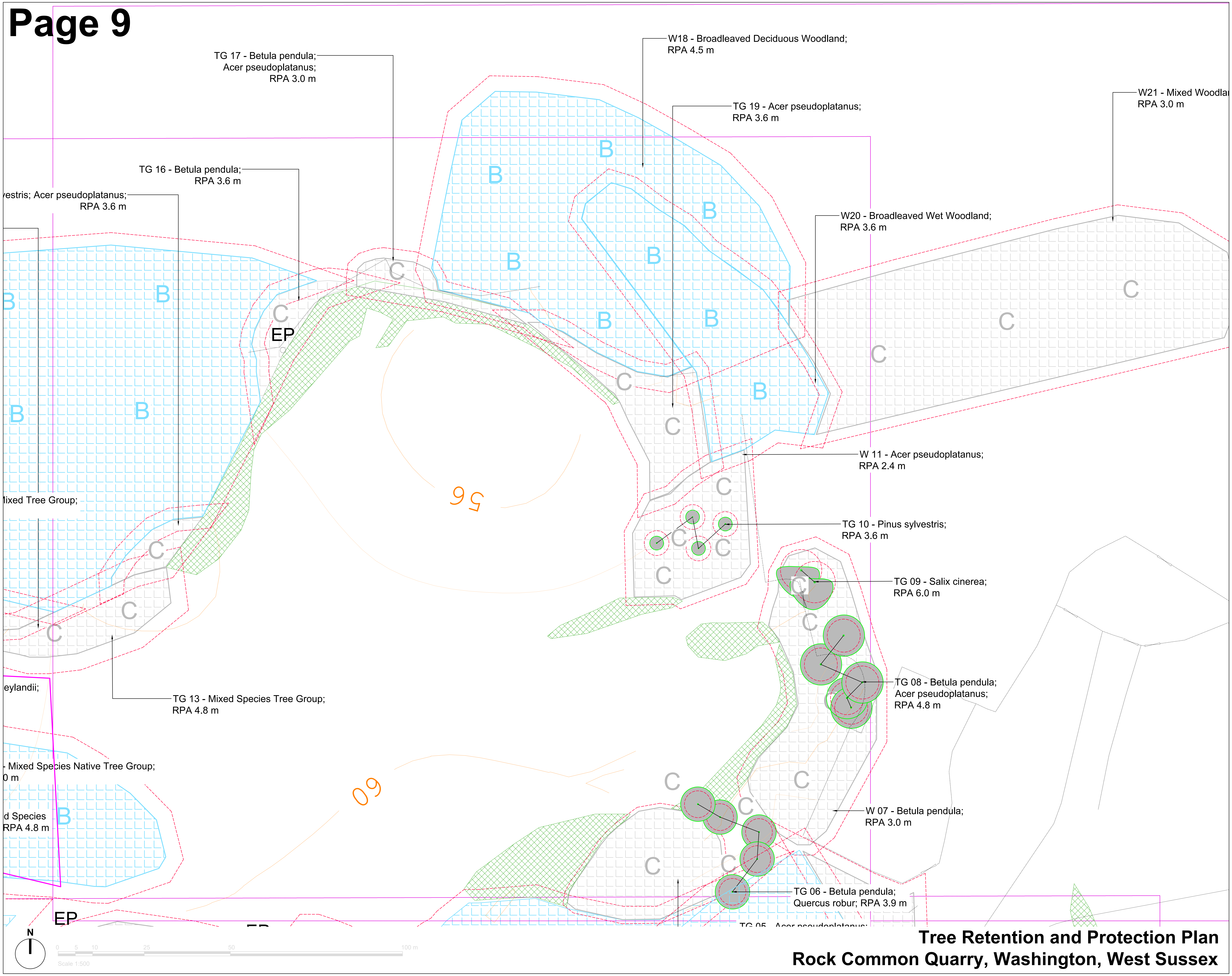

Tree Retention and Protection Plan
Rock Common Quarry, Washington, West Sussex

Legend

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Notes:
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2. For details of existing trees and vegetation refer to: *LLD1955-ARB-SCH-001 - Existing Tree Schedule;*
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Drawing No	*Revision*
LLD1955-ARB-DWG-018	02

LLD1955-ARB-SCH-001 – Existing tree Schedule

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Dudman Rock Common Limited

Rock Common Quarry, The Hollow, Washington

EXISTING TREE SCHEDULE

Project Reference:	LLD1955
Prepared By:	GS
Checked By:	JP
Position:	Associate Landscape Planner
Date	20.11.2020
Revision:	01

November 2020 - Planning Issue

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
W 01	*Mixed Woodland* (Sycamore; Silver Birch; Ash; Pedunculate Oak; **(3.9m Radius of nominal circle; RPA 48m^2)**	302 mm Average	17.0 m Clear Stem Height 4.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 20 + Years	A dense, uneven stand of woodland which follows the uneven topography. A number of fallen trees are noted. The understorey consists of goat willow, buddleia, hawthorn and elder with areas of bramble and scattered ferns. To the top of the plateau bluebells and nettles become frequent.	B 2	**Retain**
TG 02	*Quercus robur* (Pedunculate Oak); **(4.8m Radius of nominal circle; RPA 72m^2)**	382 mm Average	13.0 m Clear Stem Height 2.0 m	N: 6.0 m E: 6.0 m S: 5.0 m W: 5.0 m	Early Mature Estimated Remaining Contribution 20 + Years	A group of 3no. Younger and 3no. Older trees of twisted form, growing on the top of the bank adjacent to the road. The tree nearest the road is an older specimen with significant scarring of the trunk. The trees display broad even crowns.	B 1/2	**Retain**
W 03	*Broadleaved Deciduous Woodland* (Sycamore; Silver Birch); **(3.3m Radius of nominal circle; RPA 34m^2)**	255 mm Average	12.0 m Clear Stem Height 1.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	An area of scrapy specimens of varying ages and generally of poor form. The trees provide limited screening value.	C 2	**Retain**
W 04	*Broadleaved Deciduous Woodland* (Pedunculate Oak; Sycamore; Silver Birch); **(3.6m Radius of nominal circle; RPA 41m^2)**	286 mm Average	19.0 m Clear Stem Height 3.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	An area of tall, slender trees growing on a steep slope. The trees are generally of good form but their longevity is limited by the steepness of the slope. The trees soften the views of the severe gradient and stabilise the ground.	C 2	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
TG 05	*Acer pseudoplatanus; Betula pendula* (Sycamore; Silver Birch) **(1.2m Radius of nominal circle; RPA 5m²)**	95 mm Average	10.0 m Clear Stem Height 2.0 m	As Shown	Young Estimated Remaining Contribution 10 + Years	A young stand of dense saplings, closely spaced with narrow forms. The young trees offer no significant value.	C 2	**Retain**
TG 06	*Betula pendula; Quercus robur* (Silver Birch; Pedunuculate Oak); **(3.9m Radius of nominal circle; RPA 48m²)**	318 mm Average	15.0 m Clear Stem Height 1.0 m	N: 5.0 m E: 5.0 m S: 5.0 m W: 5.0 m	Early Mature Estimated Remaining Contribution 10 + Years	Larger individual trees within woodland areas. The trees are typical woodland forms with several multistem specimens. The trees are larger than surrounding individuals but offer no significant value.	C 2	**Retain**
W 07	*Betula pendula* (Silver Birch); **(3.0m Radius of nominal circle; RPA 28m²)**	239 mm Average	11.0 m Clear Stem Height 2.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	An area of twisted young birch trees with several interspersed beech and sycamore. The trees lean into the site and are evenly spaced.	C 2	**Retain**
TG 08	*Betula pendula; Acer pseudoplatanus* (Silver Birch; Sycamore); **(4.8m Radius of nominal circle; RPA 72m²)**	382 mm Average	12.0 m Clear Stem Height 3.0 m	N: 6.0 m E: 6.0 m S: 6.0 m W: 6.0 m	Early Mature Estimated Remaining Contribution 10 + Years	A group of larger, widely-spaced trees surrounded by small dense saplings. The trees are of varied but generally relatviely poor forms.	C 2	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
TG 09	*Salix cinerea* (Grey Willow) **(6.0m Radius of nominal circle; RPA 113m²)**	477 mm Average	13.0 m Clear Stem Height 0.0 m	N: 1.0 m E: 5.0 m S: 8.0 m W: 7.0 m	Mature Estimated Remaining Contribution 10 + Years	Two trees - one a clump of stems and one a standard form tree. The trees hold all their growth to the south, with lots of internal deadwood noted.	C 3	**Retain**
TG 10	*Pinus sylvestris* (Scot's Pine); **(3.6m Radius of nominal circle; RPA 41m²)**	286 mm Average	12.0 m Clear Stem Height 6.0 m	N: 2.0 m E: 2.0 m S: 2.0 m W: 2.0 m	Semi-Mature Estimated Remaining Contribution 10 + Years	A small stand of pine trees, of upright forms with small high crowns. The trees are of limited value and no significance beyond the site, being still relatviely small.	C 1	**Retain**
W 11	*Acer pseudoplatanus* (Sycamore); **(2.4m Radius of nominal circle; RPA 18m²)**	191 mm Average	14.0 m Clear Stem Height 3.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A dense stand of saplings with several larger trees. A large number of dead trees are noted. The trees are not of good form or value but they provide some limited screening.	C 2	**Retain**
SH 12	*Salix caprea; Betula pendula* (Goat Willow; Silver Birch); **(3.3m Radius of nominal circle; RPA 34m²)**	255 mm Average	15.0 m Clear Stem Height 2.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	An area of scrubby willows with several emergent birch trees and a large number of fallen trees.	C 2	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
TG 13	*Mixed Species Tree Group* (Beech; Cypress; Silver Birch) **(4.8m Radius of nominal circle; RPA 72m²)**	400 mm Average	16.0 m Clear Stem Height 2.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A shelter belt of trees to the edge of the quarry, surrounded by much smaller saplings. Some of the trees exhibit pruning wounds. The trees provide some screening but are not of any significance in the wider context.	C 2	**Retain**
W 14	*Pinus sylvestris* (Scot's Pine); **(3.6m Radius of nominal circle; RPA 41m²)**	300 mm Average	18.0 m Clear Stem Height 8.0 m	As Shown	Early Mature Estimated Remaining Contribution 20 + Years	A large area of Scots Pine woodland. Trees are evenly spaced and generally of good form. A small number of trees have recently been removed. Occasioal coast redwood trees emerge from between the pines and are also of good form.	B 2	**Retain**
W 15	*Pinus sylvestris; Acer pseudoplatanus* (Scot's Pine; Sycamore); **(3.6m Radius of nominal circle; RPA 41m²)**	300 mm Average	16.0 m Clear Stem Height 4.0 m	As Shown	Early Mature Estimated Remaining Contribution 10 + Years	An area of trees of varied forms, growing on a bund at the edge of the quarry. The trees provide some screening but are not of great significance.	C 2	**Retain**
TG 16	*Betula pendula* (Silver Birch); **(3.6m Radius of nominal circle; RPA 41m²)**	300 mm Average	16.0 m Clear Stem Height 2.0 m	As Shown	Early Mature Estimated Remaining Contribution 10 + Years	An area of trees of generally good forms. The trees provide some screening but are not of great significance.	C 2	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
TG 17	*Betula pendula; Acer pseudoplatanus* (Silver Birch; Sycamore) **(3.0m Radius of nominal circle; RPA 28m²)**	250 mm Average	15.0 m Clear Stem Height 2.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A group of trees of varying forms, with mostly young trees growing on a soil mound and several larger trees growing to the edge of the footpath.	C 2	**Retain**
W 18	*Broadleaved Deciduous Woodland* (Sycamore; Silver Birch; Ash; Pedunculate Oak); **(4.5m Radius of nominal circle; RPA 64m²)**	375 mm Average	18.0 m Clear Stem Height 3.0 m	N: 5.0 m E: 5.0 m S: 5.0 m W: 5.0 m	Early Mature Estimated Remaining Contribution 20 + Years	An area of trees of varying species and forms, but generally of good condition providing wildlife habitat and a landscape feature.	B 2	**Retain**
TG 19	*Acer pseudoplatanus* (Sycamore); **(3.6m Radius of nominal circle; RPA 41m²)**	280 mm Average	16.0 m Clear Stem Height 3.0 m	N: 4.0 m E: 4.0 m S: 4.0 m W: 4.0 m	Semi-Mature Estimated Remaining Contribution 10 + Years	A dense stand of trees gorwing between the footpath and a bank. The trees provide a screen but are not of any great significance.	C 2	**Retain**
W 20	*Broadleaved Wet Woodland* (Willow spp.; Hazel; Ash; Pedunculate Oak); **(3.6m Radius of nominal circle; RPA 41m²)**	300 mm Average	17.0 m Clear Stem Height 1.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 20 + Years	An area of natural wet woodland surrouding a stream. The vegetation is of poor arboricultural value but has value for local ecology.	B 2/3	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
W 21	*Mixed Woodland* (Sycamore; Silver Birch; Ash; Hawthorn; Scots Pine) **(3.0m Radius of nominal circle; RPA 28m^2)**	240 mm Average	18.0 m Clear Stem Height 3.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A young woodland area, of mixed overall quality with a large number of ash suffering from dieback. The woodland is in better condition to the north with abundant bluebells noted.	C 2/3	**Retain**
TG 22	*Broadleaved Mixed Tree Group* (Sycamore; Scots Pine; Monterey cypress); **(3.0m Radius of nominal circle; RPA 28m^2)**	250 mm Average	20.0 m Clear Stem Height 2.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A line of screening to the edge of the Scot's pine wood. The trees are mostly small and of varying density and age.	C 2	**Retain**
T 23	*Cupressus macrocarpa* (Monterey Cypress); **(6.6m Radius of nominal circle; RPA 137m^2)**	550 mm	20.0m Clear Stem Height 0.0 m	N: 2.0 m E: 5.0 m S: 9.0 m W: 6.0 m	Mature Estimated Remaining Contribution 10 + Years	A large tree which hangs over the entrance and leans to the south. The tree is large but provides little value to the area.	C 1	**Retain**
W 24	*Broadleaved Deciduous Woodland* (Sycamore; Sweet Chestnut); **(5.1m Radius of nominal circle; RPA 81m^2)**	424 mm Average	20.0 m Clear Stem Height 4.0 m	As Shown	Early Mature Estimated Remaining Contribution 20 + Years	An area of woodland formed mostly of large, overstood coppice trees. A dense groundcover dominated by bluebells is present. The trees are a dominant feature and the woodland appears in reasonable condition.	B 2	**Retain**

Tree No.	*Species*	*Diameter @1.5m*	*Height (approx.)*	*Spread (approx.)*	*Age*	*Condition/Preliminary Recommendations*	*Category*	*Status*
TG 25	*Mixed Woodland* (Rowan; Silver Birch; Scots Pine) **(4.8m Radius of nominal circle; RPA 72m²)**	400 mm Average	18.0 m Clear Stem Height 2.0 m	As Shown	Early Mature Estimated Remaining Contribution 10 + Years	An area of sparse but large trees growing on the bank. A dense carpet of bluebells is present to the ground beneath.	C 2	**Retain**
W 26	*Mixed Woodland* (Scots Pine; Silver Birch); **(4.2m Radius of nominal circle; RPA 55m²)**	350 mm Average	20.0 m Clear Stem Height 6.0 m	As Shown	Early Mature Estimated Remaining Contribution 10 + Years	An area of unevenly spaced trees. Many specimens lean over quarry. The trees are generally of reasonable form but add little to the wider landscape.	C 2	**Retain**
TG 27	*Quercus robur* (Pedunculate Oak); **(12m Radius of nominal circle; RPA 452m²)**	1000 mm Average	19.0 m Clear Stem Height 3.0 m	N: 8.0 m E: 8.0 m S: 8.0 m W: 8.0 m	Mature Estimated Remaining Contribution 40 + Years	Very large, mature oak trees on the edge of the boundary. The trees are overall in good condition and are high value features of the landscape.	A 1	**Retain**
TG 28	*Quercus robur* (Pedunculate Oak); **(4.8m Radius of nominal circle; RPA 72m²)**	400 mm Average	20.0 m Clear Stem Height 2.0 m	As Shown	Early Mature Estimated Remaining Contribution 10 + Years	A group of oak trees growing on the ede of the quarry. Young elm trees are interspersed between the oaks. Most of the trees are of very limited value, although those growing along the footpath are considered of moderate value for the amenity they provide to walkers and their slightly better forms.	B/C 1/2	**Partial Retain / Partial Remove**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
W 29	*Broadleaved Deciduous Woodland* (Pedunculate Oak; Elm, Hazel) **(4.8m Radius of nominal circle; RPA 72m^2)**	400 mm Average	19.0 m Clear Stem Height 3.0 m	As Shown	Early Mature Estimated Remaining Contribution 20 + Years	An area of trees growing on a bank. The understorey is limited. The trees are of varying forms but provide some boundary screening.	B 2	**Retain**
W 30	*Broadleaved Deciduous Woodland* (Common Hawthorn; Hazel; Pedunculate Oak); **(5.4m Radius of nominal circle; RPA 92m^2)**	450 mm Average	14.0 m Clear Stem Height 1.0 m	As Shown	Early Mature Estimated Remaining Contribution 20 + Years	An area of old coppice stools, with several standard oak trees interspersed. The trees are not of good form but they are old and of ecological value.	B 2/3	**Retain**
W 31	*Broadleaved Deciduous Woodland* (Pedunculate Oak; Sycamore; Ash); **(6.0m Radius of nominal circle; RPA 113m^2)**	500 mm Average	20.0 m Clear Stem Height 2.0 m	As Shown	Early Mature Estimated Remaining Contribution 20 + Years	An area of large, dominant tres of reasonable form. The canopies are large and even. The trees are surrounded by hazel and elder scrub with areas of coppice.	B 2	**Retain**
T 32	*Salix caprea* (Goat Willow); **(9.6m Radius of nominal circle; RPA 290m^2)**	800 mm	15.0 m Clear Stem Height 1.0 m	N: 7.0 m E: 7.0 m S: 7.0 m W: 7.0 m	Veteran Estimated Remaining Contribution 10 + Years	A veteran willow, leaning into the quarry. The tree displays a broad, even canopy and a thick gnarled stem. The tree is not of good overall form but is an old example of the species.	C 1	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
TG 33	*Fraxinus excelsior; Acer pseudoplatanus* (Ash; Sycamore) **(4.8m Radius of nominal circle; RPA 72m²)**	400 mm Average	19.0 m Clear Stem Height 3.0 m	N: 6.0 m E: 6.0 m S: 6.0 m W: 6.0 m	Early Mature Estimated Remaining Contribution 10 + Years	A pair of large trees. The ash tree is codominant from the base and displays low vigour. The trees are relatively mature but not of good form or condition.	C 1	**Retain**
TG 34	*Fraxinus excelsior; Acer pseudoplatanus* (Ash; Sycamore); **(3.6m Radius of nominal circle; RPA 41m²)**	300 mm Average	14.0 m Clear Stem Height 1.0 m	N: 4.0 m E: 4.0 m S: 4.0 m W: 4.0 m	Early Mature Estimated Remaining Contribution 10 + Years	A group of low-value trees of reasonable size but poor form. The trees add little to the landscape.	C 1	**Retain**
W 35	*Broadleaved Deciduous Woodland* (Sycamore; Pedunculate Oak; Silver Birch); **(3.6m Radius of nominal circle; RPA 41m²)**	300 mm Average	13.0 m Clear Stem Height 1.0 m	N: 4.0 m E: 4.0 m S: 4.0 m W: 4.0 m	Semi-Mature Estimated Remaining Contribution 10 + Years	An area of scattered trees, growing on the edge of the quarry and providing screening. Hawthorn and blackthorn understorey are present. The trees add little value beyond screening the quarry.	C 2	**Retain**
TL 36	*Populus sp.* (Poplar sp.); **(6.0m Radius of nominal circle; RPA 113m²)**	500 mm Average	20.0 m Clear Stem Height 3.0 m	N: 6.5 m E: 6.0 m S: 6.0 m W: 6.5 m	Early Mature Estimated Remaining Contribution 20 + Years	A line of regular trees of good, straight even form. The trees provide a useful visual screen and are in good condition.	B 2	**Retain**

Tree No.	*Species*	*Diameter @1.5m*	*Height (approx.)*	*Spread (approx.)*	*Age*	*Condition/Preliminary Recommendations*	*Category*	*Status*
TG 37	*Salix sp.; Populus sp.;* (Willow; Poplar) **(1.8m Radius of nominal circle; RPA 10m^2)**	150 mm Average	9.0 m Clear Stem Height 1.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A group of dense, scrubby trees growing on the very edge of the quarry. The tree's size and location limit their value.	C 2	**Remove**
TG 38	*Young Deciduous Trees* (Sycamore; Poplar; Willow; Silver Birch); **(2.4m Radius of nominal circle; RPA 18m^2)**	200 mm Average	12.0 m Clear Stem Height 1.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	An area of mixed, dense but immature trees growing on the edge of the quarry. The trees offer little value being too immature to properly screen the site.	C 1	**Partial Retain / Partial Remove**
W 39	*Broadleaved Deciduous Woodland* (Sycamore; Poplar; Willow; Silver Birch); **(3.6m Radius of nominal circle; RPA 41m^2)**	300 mm Average	15.0 m Clear Stem Height 1.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 20 + Years	An area of mixed, dense but immature trees growing on the edge of the quarry. The trees are slightly larger than others and provide some useful screening.	B 2	**Partial Retain / Partial Remove**
TG 40	*Fraxinus excelsior* (Ash); **(3.0m Radius of nominal circle; RPA 28m^2)**	250 mm Average Average	14.0 m Clear Stem Height 2.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A dense, even stand of trees. Some trees display low vigour and others are dead. The trees add little to the setting.	C 2	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
H 41	*Crataegus monogyna* (Hawthorn); **(1.8m Radius of nominal circle; RPA 10m²)**	150 mm Average	6.0 m Clear Stem Height 0.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 20 + Years	A dense, continuous hawthorn and blackthorn hedge providing a good screen and wildlife habitat.	B 2	**Retain**
TL 42	Mixed Species Native Tree Group; **(3.0m Radius of nominal circle; RPA 28m²)**	250 mm Average	12.0 m Clear Stem Height 1.0 m	As Shown	Early Mature Estimated Remaining Contribution 10 + Years	A roadside treeline of elm, sycamore, ash, willow. The vegetation is of varying density and height. Several ash trees have died. A line of hedge and scrub is present beneath.	C 2	**Retain**
TL 43	Mixed Species Hedge / Treeline; **(3.3m Radius of nominal circle; RPA 34m²)**	255 mm Average	8.0 m Clear Stem Height 1.0 m	N: 3.0 m E: 3.0 m S: 3.0 m W: 3.0 m	Semi-Mature Estimated Remaining Contribution 10 + Years	A small, sparse belt of trees on the top of the bank between the road and quarry. The trees provide little visual amenity or other value.	C 1	**Partial Retain / Partial Remove**
W 44	Mixed Species Woodland; **(2.4m Radius of nominal circle; RPA 18m²)**	178 mm Average	10.0 m Clear Stem Height 2.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A young, dense and vigorous woodland mainly of pine with deciduous trees nearer the water. Access to inspect the woodland was limited. The vegetation provides little value to the wider area being immature.	C 2	**Remove**

Tree No.	Species	Diameter @1.5m	Height (approx.)	Spread (approx.)	Age	Condition/Preliminary Recommendations	Category	Status
W 45	*Pinus sylvestris* (Scot's Pine); **(3.6m Radius of nominal circle; RPA 41m²)**	283 mm Average	14.0 m Clear Stem Height 3.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A dense coniferous woodland. Access to inspect was limited. The vegetation provides some landscape value but is surrounded by larger trees which provide local screening.	C 2	**Remove**
TG 46	*Betula pendula* (Silver Birch); **(2.1m Radius of nominal circle; RPA 14m²)**	175 mm Average	12.0 m Clear Stem Height 2.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	Groups of trees growing on narrow ledges and scree slopes - access to inspect was very limited. The trees appear of good form generally but their locations limit their lifespans.	C 1	**Remove**
TG 47	Mixed Species Tree Group; **(4.8m Radius of nominal circle; RPA 72m²)**	400 mm Average	14.0 m Clear Stem Height 2.0 m	As Shown	Early Mature Estimated Remaining Contribution 20 + Years	Formed of sycamore, false acacia and oak. A wider banked verge with larger trees. The trees are generally of poor form with several false acacia failing. The trees do however provide a feature of the roadway.	B 2	**Retain**
T 48	*Quercus robur* (Pedunculate Oak); **(15m Radius of nominal circle; RPA 707m²)**	1273 mm	20.0 m Clear Stem Height 3.0 m	N: 10.0 m E: 10.0 m S: 10.0 m W: 10.0 m	Mature Estimated Remaining Contribution 40 + Years	A mature tree with many leaders dividing off from 4.0 m height. The base is broad and flared. The crown contains moderate deadwood but is vigorous.	A 1/2	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
W 49	*Castanea sativa* (Sweet Chestnut); **(3.9m Radius of nominal circle; RPA 48m²)**	318 mm Average	16.0 m Clear Stem Height 3.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 20 + Years	An old area of coppice now single and multistemmed trees of verying forms. Some dieback is noted. Overall the trees provide good screening.	B 2	**Retain**
T 50	*Quercus robur* (Pedunculate Oak); **(11.1m Radius of nominal circle; RPA 387m²)**	923 mm	20.0 m Clear Stem Height 8.0 m	N: 8.0 m E: 8.0 m S: 8.0 m W: 8.0 m	Mature Estimated Remaining Contribution 20 + Years	A mature tree of good straight stem and even crown, but sparse with major deadwood held over the road.	B 1	**Retain**
TG 51	Mixed Species Native Tree Group; **(3.0m Radius of nominal circle; RPA 28m²)**	239 mm Average	14.0 m Clear Stem Height 3.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A stand of slender trees which are unevenly spaced. The trees provide some screening.	C 2	**Retain**
T 52	*Quercus robur* (Pedunculate Oak); **(6.0m Radius of nominal circle; RPA 113m²)**	477 mm	19.0 m Clear Stem Height 5.0 m	N: 6.0 m E: 8.0 m S: 8.0 m W: 4.0 m	Early Mature Estimated Remaining Contribution 20 + Years	A tree of good overall form with moderate deadwood held over the road. The crown is vigorous but uneven.	B 1	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
H 53	*Cupressus x leylandii* (Leyland Cypress); **(1.5m Radius of nominal circle; RPA 7m²)**	120 mm Average	10.0 m Clear Stem Height 0.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A line of screening hedge which is becoming slightly outgrown. The hedge provides minor screening value only.	C 2	**Retain**
T 54	*Quercus robur* (Pedunculate Oak); **(9.6m Radius of nominal circle; RPA 290m²)**	796 mm (Estimated)	12.0 m Clear Stem Height 4.0 m	N: 3.0 m E: 6.0 m S: 6.0 m W: 4.0 m	Early Mature Estimated Remaining Contribution 10 + Years	The tree is totally covered in ivy, limiting inspection. The tree is very sparse with major deadwood present.	C 1	**Retain**
T 55	*Tilia sp.* (Lime sp.); **(11.7m Radius of nominal circle; RPA 430m²)**	955 mm	19.0 m Clear Stem Height 4.0 m	N: 6.0 m E: 6.0 m S: 6.0 m W: 6.0 m	Early Mature Estimated Remaining Contribution 10 + Years	The tree presents dense suckers from the base limiting inspection. Several subordinate leaders also emerge from the suckers. The crown is small and sparse.	B 1	**Retain**
W 56	*Pinus sylvestris* (Scot's Pine); **(3.6m Radius of nominal circle; RPA 41m²)**	286 mm Average	18.0 m Clear Stem Height 4.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 20 + Years	A dense shelterbelt of trees, with tall narrow crowns. There is a thin understorey present beneath. Several trees have failed. The trees provide some limited screening.	B 2	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
TG 57	Mixed Species Tree Group; **(2.7m Radius of nominal circle; RPA 23m^2)**	223 mm Average	10.0 m Clear Stem Height 2.0 m	N: 3.0 m E: 2.0 m S: 2.0 m W: 3.0 m	Semi-Mature Estimated Remaining Contribution 10 + Years	Scrappy, small sycamore, elms and oaks on the edge of the quarry. The trees are of reasonable form, generally leaning into the quarry. Several trees are very sparse.	C 1	**Retain**
H 58	*Cupressus x leylandii* (Leyland Cypress); **(3.3m Radius of nominal circle; RPA 34m^2)**	255 mm	9.0 m Clear Stem Height 0.0 m	N: 3.0 m E: 3.0 m S: 3.0 m W: 3.0 m	Semi-Mature Estimated Remaining Contribution 10 + Years	An ornamental hedge of good condition but little value.	C 1	**Retain**
H 59	*Crataegus monogyna* (Hawthorn); **(2.1m Radius of nominal circle; RPA 14m^2)**	159 mm	6.0 m Clear Stem Height 0.0 m	As Shown	Mature Estimated Remaining Contribution 10 + Years	A sparse hegde on the roadside. Several larger sycamores of poor condition are present emerging from the hedge.	C 2	**Retain**
TG 60	*Betula pendula* (Silver Birch); **(1.2m Radius of nominal circle; RPA 5m^2)**	100 mm	10.0 m Clear Stem Height 1.0 m	As Shown	Young Estimated Remaining Contribution 10 + Years	A young patch of trees generally of good form, but no significant visual value. Several small sweet chestnut and goat willow are also present.	C 1	**Partial Retain / Partial Remove**

Tree No.	*Species*	*Diameter @1.5m*	*Height (approx.)*	*Spread (approx.)*	*Age*	*Condition/Preliminary Recommendations*	*Category*	*Status*
W 61	Native Broadleaved Woodland; **(2.4m Radius of nominal circle; RPA 18m²)**	200 mm Average	12.0 m Clear Stem Height 1.0 m	As Shown	Young Estimated Remaining Contribution 10 + Years	An area of pondside trees growing as a dense wet woodland. The birches are generally of good form which the trees growing against the pondside are failing.	C 2	**Remove**
W 62	Native Broadleaved Woodland; **(3.6m Radius of nominal circle; RPA 41m²)**	300 mm Average	14.0 m Clear Stem Height 1.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	An area of young mixed species woodland containing silver birch, oak and goat willow. The trees are of varied forms but detailed inspection was limited by topography. The trees do not provide any significant value.	C 2	**Retain**
W 63	Native Broadleaved Woodland; **(2.4m Radius of nominal circle; RPA 18m²)**	200 mm Average	18.0 m Clear Stem Height 2.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A dense stand of tall trees. The trees are generally of good form and provide some screening, but the trees are yet to mature.	C 2	**Retain**
H 64	Mixed Species Native Hedgerow; **(2.4m Radius of nominal circle; RPA 18m²)**	191 mm	10.0 m Clear Stem Height 0.0 m	As Shown	Early Mature Estimated Remaining Contribution 10 + Years	An uneven hedge mainly of tall elms, and one patch of Italian alder. The hedge provides some screening but is slightly too sparse and thin to be effective.	C 2	

Tree No.	*Species*	*Diameter @1.5m*	*Height (approx.)*	*Spread (approx.)*	*Age*	*Condition/Preliminary Recommendations*	*Category*	*Status*
T 65	*Quercus robur* (Pedunculate Oak); **(8.4m Radius of nominal circle; RPA 222m²)**	700 mm	20.0 m Clear Stem Height 2.0 m	N: 7.0 m E: 10.0 m S: 7.0 m W: 7.0 m	Mature Estimated Remaining Contribution 40 + Years	A mature tree which holds all its growth to the east. The tree is dense and vigorous.	A 2	**Retain**
T 66	*Quercus robur* (Pedunculate Oak); **(7.2m Radius of nominal circle; RPA 163m²)**	600 mm	18.0 m Clear Stem Height 3.0 m	N: 6.0 m E: 6.0 m S: 6.0 m W: 6.0 m	Early Mature Estimated Remaining Contribution 20 + Years	A mature tree on the roadside, displaying an even form with some deadwood.	B 2	**Retain**
TG 67	*Quercus robur* (Pedunculate Oak); **(10.8m Radius of nominal circle; RPA 366m²)**	900 mm Average	20.0 m Clear Stem Height 2.0 m	N: 9.0 m E: 9.0 m S: 9.0 m W: 9.0 m	Mature Estimated Remaining Contribution 20 + Years	Mature trees of good form, with even dense crowns and typical deadwood.	A 1	**Retain**
TG 68	*Quercus robur* (Pedunculate Oak); **(7.2m Radius of nominal circle; RPA 163m²)**	600 mm Average	16.0 m Clear Stem Height 4.0 m	N: 6.0 m E: 6.0 m S: 6.0 m W: 6.0 m	Early Mature Estimated Remaining Contribution 20 + Years	Mature trees on the roadside, displaying fair form with epicormics noted to the stems.	B 2	**Retain**

Tree No.	***Species***	***Diameter @1.5m***	***Height (approx.)***	***Spread (approx.)***	***Age***	***Condition/Preliminary Recommendations***	***Category***	***Status***
H 69	*Crataegus monogyna* (Hawthorn);		1.5 m Clear Stem Height 0.0 m	As Shown	Semi-Mature Estimated Remaining Contribution 10 + Years	A very low, dense hawthorn and blackthorn hedge to the roadside. The vegetation provides low level screening only.	C 2	**Retain**
TG 70	*Populus sp.* (Poplar sp.); **(4.8m Radius of nominal circle; RPA 72m²)**	398 mm Average	20.0 m Clear Stem Height 4.0 m	N: 5.5 m E: 6.0 m S: 6.5 m W: 5.5 m	Mature Estimated Remaining Contribution 20 + Years	Tall trees growing within the hedge. The trees are of reasonable form and vigour and are a visible feature.	B 2	**Retain**
H 71	Mixed Species Native Hedgerow; **(2.7m Radius of nominal circle; RPA 23m²)**	210 mm Average	12.0 m Clear Stem Height 0.0 m	As Shown	Early Mature Estimated Remaining Contribution 10 + Years	A roadside treeline/hedge, which provides some screening but is not sufficiently dense or mature to be a significant feature of value.	C 2	**Retain**
TG 72	Mixed Species Native Tree Group; **(7.2m Radius of nominal circle; RPA 163m²)**	600 mm Average	18.0 m Clear Stem Height 3.0 m	N: 8.0 m E: 8.0 m S: 8.0 m W: 8.0 m	Mature Estimated Remaining Contribution 40 + Years	A line of mature trees within the hedge, of generally good form. The ash trees display some dieback but are still in fair condition.	A 2	**Retain**

Tree No.	*Species*	*Diameter @1.5m*	*Height (approx.)*	*Spread (approx.)*	*Age*	*Condition/Preliminary Recommendations*	*Category*	*Status*
T 73	*Fraxinus excelsior* (Ash); **(6.0m Radius of nominal circle; RPA 113m²)**	500 mm	16.0 m Clear Stem Height 3.0 m	N: 5.0 m E: 5.0 m S: 5.0 m W: 5.0 m	Mature Estimated Remaining Contribution 10 + Years	A gnarled old ash tree, which is sparse and cankered. The tree is of low visual appeal and limited longevity.	C 1	**Retain**
T 74	*Quercus robur* (Pedunculate Oak); **(10.8m Radius of nominal circle; RPA 366m²)**	900 mm	20.0 m Clear Stem Height 3.0 m	N: 11.0 m E: 11.0 m S: 11.0 m W: 11.0 m	Mature Estimated Remaining Contribution 40 + Years	A tree of very good form and vigour. The crown is broad and even. No major defects are noted.	A 1	**Retain**
T 75	*Acer pseudoplatanus* (Sycamore); **(8.4m Radius of nominal circle; RPA 222m²)**	700 mm	18.0 m Clear Stem Height 1.0 m	N: 9.0 m E: 9.0 m S: 9.0 m W: 9.0 m	Mature Estimated Remaining Contribution 20 + Years	A tree holding a broad crown on many stems. The growth is dense and vigorous, creating a visible feature of the site.	B 1	**Retain**
TG 76	Mixed Species Tree Group; **(4.2m Radius of nominal circle; RPA 55m²)**	350 mm Average	18.0 m Clear Stem Height 4.0 m	N: 5.0 m E: 5.0 m S: 5.0 m W: 5.0 m	Early Mature Estimated Remaining Contribution 20 + Years	A patch of trees of reasonable form and vigour, providing a minor feature.	B 2	**Retain**

Tree No.	*Species*	*Diameter @1.5m*	*Height (approx.)*	*Spread (approx.)*	*Age*	*Condition/Preliminary Recommendations*	*Category*	*Status*
TG 77	Mixed Species Tree Group; **(3.6m Radius of nominal circle; RPA 41m²)**	300 mm Average	12.0 m Clear Stem Height 1.0 m	As Shown	Young Estimated Remaining Contribution 10 + Years	A patch of young trees growing on a bank. The trees consist of birches, beech, ash, oak and small elms. The trees provide no significant screening or habitat and have yet to mature.	C 2	**Partial Retain / Partial Remove**
TG 78	Mixed Species Tree Group; **(4.8m Radius of nominal circle; RPA 72m²)**	400 mm Average	14.0 m Clear Stem Height 4.0 m	As Shown	Early Mature Estimated Remaining Contribution 20 + Years	Large trees surrounding Rock Windmill. The trees are mostly oaks, with a small number of coniferous ornaementals including cedars and cypresses. Inspection is limited but the trees are large dominant features of reasonable form, which provide a setting and screening to the Rock Windmill.	B 2	**Retain**

CATEGORY DIVISION - *BS 5837:2012 - 'Trees in Relation to Design, Demolition and Construction - Recommendations'*

Trees to be considered for retention	***1.*** *Mainly Arboricultural Qualities*	***2.*** *Mainly Landscape Qualities*	***3.*** *Mainly cultural values, including conservation*
Category A - *Trees whose retention is most desirable to include; trees of high quality having an estimated longevity of over 40 years;*	- Trees that are particularly good examples of their species, especially if rare or unusual	- Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	- Trees of significant historical, commemorative or other value, or good specimens of rare or unusual species
Category B - *Trees where retention is desirable to include; trees of moderate quality having an estimated longevity of over 20 years;*	- Trees that might be included in the higher category, but because of significant impaired but remediable condition are downgraded	- Trees present in numbers offering a higher collective categorisation than as individually rated; trees occurring in groups but due to situation, offering little contribution in the context of the wider locality	- Trees having some material conservation or cultural value
Category C - *Trees of low quality having an estimated longevity of over 10 year, or young trees with a stem diameter below 150mm;*	- Trees in adequate or impaired condition, or those which can be retained with minimal tree surgery, but not worthy for inclusion in the high or moderate category	- Trees present in numbers without having significant landscape value	- Trees having no material conservation or other cultural value

Trees unsuitable for retention

Category U *- Trees not for retention within the context of existing land use;*

- Trees that are unviable due to serious, irremediable structural defect; early loss is expected due to collapse;
- Trees that are dead or showing signs of significant, immediate, irreversible decline;
- Trees infected with pathogens of significance to health and subsequent safety, and threat thereof to trees nearby;
- Trees of very low quality suppressing the development of those of greater quality;
- Trees that will become unviable after the removal of other trees for reasons above.

CSD *– Combined Stem Diameter;*

- Root Protection Areas calculated for multiple stemmed trees based upon a combined stem diameter in accordance with *BS 5837:2012.*

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APPENDIX B

Hydrology, Hydrogeology and Flood Risk

ROCK COMMON
HYDROGEOLOGICAL ASSESSMENT
ISSUED V1.4

ISSUED v1.4 22/12/2020

FOR THE DUDMAN ROCK COMMON LTD

Reference: 20200313P1

Prepared By:

H2Ogeo

Hydrogeology & Environmental Consultancy

Contents

Executive Summary

H2Ogeo (David Walker) was instructed by Dudman Rock Common Ltd (DRCL) to undertake a Hydrogeological Conceptual Site Model (HCSM) for the Rock Common Quarry, near Washington in West Sussex.

The currently approved restoration scheme (WS/15/97) for Rock Common Quarry is no longer considered appropriate in terms of the final, very deep body of water and the potential for leachate pollution to pass into the lake from the now closed Windmill, Rough and The Rock Landfill sites. An alternative restoration scheme is being considered whereby clean material would be imported to infill the void, to agreed levels, thereby cutting off the potential pollution linkage.

Following submission of the HCSM to the Environment Agency (December 2019) and receipt of their comments (January 2020) further work was undertaken to address the key points.

This further work included construction of a groundwater model (MODFLOW Flex) to understand the hydrogeological regime on site and in the surrounding area to see how it would evolve during and following the proposed restoration.

Site work has included sampling of Controlled Waters and analysis of key compounds including:

- Chloride;
- Ammonia;
- Hydrocarbons; and
- Metals.

Results of the laboratory analysis indicated elevated concentrations of Ammoniacal Nitrogen as N in the discharge water and Honeybridge Stream. Surface water downstream of the Rock Common discharge has similar characteristics to groundwater on site and the discharge makes up over 80% of the flow in the stream.

As requested, groundwater modelling was undertaken to represent the following two scenarios:

- Baseline conditions, i.e. dewatering the open quarry; and
- Infilled sand pit with a reduction and eventual cessation of dewatering.

The pumping arrangements would be maintained throughout restoration in recognition of the significant contribution made to flows and ecology in the Honeybridge Stream. The Wiston Estate and Operator will work closely together with relevant authorities to maintain the ecology of the Honeybridge Stream, cessation of pumping is one of the theoretical scenarios modelled to identify potential impacts.

The combined results of the HCSM, laboratory testing and modelling have enabled assessments of:

- Potential water quality impacts from the historic local landfills;
- Environmental impacts from the fill material and the need for geological barriers;
- The impact of reduced dewatering and import of fill material on local groundwater flows;
- The impact of a rising water table on springs along the Greensand/Weald Clay contact to the north; and
- The impact on local water courses, primarily the Honeybridge Stream, to which the water pumped out of the quarry is discharged to.

The baseline model demonstrated that groundwater contours ranged from 41.00mAOD after 365 Days in the north west of the site along the route of the Honeybridge stream to c10.00mAOD in the base of the quarry after 40 years.

Groundwater flows from north to south and is dominated by the abstraction. Hydraulic gradients are relatively shallow outside the site and steepen once inside the quarry, changing from 38mAOD to 10mAOD at the base, a change of 28m over 300m.

The Honeybridge Stream provides some recharge to groundwater however this effect was observed to lessen as the model progresses past 10 years and drawdown of the water table further into the catchment occurred.

Groundwater heads around the lower permeability Marehill Clay, on the northern boundary of the site, are elevated.

The restoration model indicates when abstraction rates are reduced to 2000m^3/day and groundwater elevations start to recover they will gain approximately 5m elevation over the 365 day period.

At the end of the eight to ten-year restoration period, controlled groundwater under this modelled scenario will have recovered to approximately 26.00mAOD in the former base of the quarry. Approximately two years after cessation of pumping[1] groundwater in the area would be at an elevation of c40mAOD.

The model predicts that throughout an eight-year restoration period, with controlled and reduced groundwater abstraction, the restoration surface remains safely above groundwater limiting contact and minimising risk to Human Health and the Environment.

Recommendations

Further work is proposed as consultations with the Environment Agency’ s National Permitting Team are ongoing. Monitoring requirements from an Environmental Permitting perspective are to be agreed and approval of the relevant regulatory control sought.

A Statement of Limitations is presented in Section 10 of this report.

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[1] The pumping arrangements would be maintained throughout restoration in recognition of the significant contribution made to flows in the Honeybridge Stream, cessation of pumping is one of the modelled scenarios.

1 Introduction

1.1 Background

Rock Common Quarry has been active since the 1920's and has been the subject of many planning permissions granted for sand extraction since the 1950's. The Quarry is currently working in accordance with a permission granted on 16 September 2004 (Ref WS/15/97) which was an application submitted by the then operator, Tarmac Limited, under the provisions of Environment Act 1995 requiring the review of "old mining permissions".

This application is being made firstly, to enable the recovery of the remaining reserves of sand and secondly, to permit the importation and placement of suitable, inert classified engineering and restoration materials in order to change the approved restoration of the Quarry and create a "dry", restored landform.

This Hydrogeological Assessment focuses on assessing the potential impacts associated with the proposed importation and restoration scheme.

On 9 April 2019, H2Ogeo (David Walker) was instructed by Dudman Rock Common Ltd (DRCL) to undertake a Hydrogeological Conceptual Site Model (HCSM) for the Rock Common Site, near Washington in West Sussex.

The HCSM for Rock Common is presented in Annex A and should be read in conjunction with this report.

Following submission of the HCSM to the Environment Agency (EA) and further to a meeting held on the 9 December 2019, a proposal for a Hydrogeological Assessment at Rock Common was prepared to address the EA's comments.

The proposal was accepted on 13 March 2020 and this report has been prepared to accompany the planning application for a revised restoration scheme at Rock Common.

A Statement of Limitations is provided in Section 10 of this report.

1.2 Scope of Work

In their letter dated 22 January 2020, the Environment Agency state that they *"have no objection in principal to the proposed restoration with inert materials on site as proposed, however, there are a number of aspects that need further detail and clarification."*

The scope of work for this project was to deliver the further detail and clarifications requested by the Environment Agency.

These were to assess:

- The existing impact on local springs and watercourses as a result of the existing dewatering operations;
- The potential impacts on the Honeybridge Stream if dewatering and discharge stops, including flows and ecology; and
- Risks of deteriorating groundwater quality as a result of any changes to the pumping regime.

To deliver clarification on these issues field work, further assessments and a groundwater modelling have been undertaken, this report provides assessments of:

- The potential water quality impact from the historic local landfills;
- Environmental impacts from the fill material and the need for geological barriers;
- The impact of reduced dewatering and import of fill material on local groundwater flows;
- The impact of a rising water table on springs along the Lower Greensand/Weald Clay contact; and
- The impact on local water courses, primarily the Honeybridge Stream, to which the water pumped out of the quarry is discharged to.

This report outlines the findings from field work and investigations carried out since January 2020 and presents the findings from the groundwater flow modelling. The report is structured as follows:

- Site Location;
- Potential Impacts on Local Springs;
- Sampling & Analysis;
- Water Quality Results;
- Environmental Impacts of Restoration Material;
- Groundwater Flow Model;
- Summary;
- Statement of Limitations;
- References; and
- Annexes.

2 Site Location

The Quarry is situated within the District of Horsham, West Sussex (NGR TQ51246 11352) approximately 350 metres to the north-east of the village of Washington. At its nearest point the boundary of the South Downs National Park lies approximately 50 metres to the south of the Site following the line of the A283 road.

The location is shown in Figure 1.

The A24 (Worthing to Dorking Road) runs within 100 metres of the western boundary. A narrow, unclassified road (which connects the A283 and A24 and known as “The Hollow”) runs along the north-east boundary of the Quarry.

East of the Quarry and The Hollow are three former landfills known as The Windmill, The Rock and The Rough which have been historically landfilled with municipal waste. The Windmill and The Rock landfill sites were operated using dilute and disperse principals and the Rough is understood to have been an engineered containment operation.

These sites are shown in Figure 2 and all three have been restored with monitoring of gas, leachate and groundwater ongoing.

2.1 Proposed Restoration

The proposal is to permit the importation of suitable, inert classified engineering and restoration materials which will be used to restore the quarry void to a level which would be above the recovery level of the natural ground water and so provide a "dry" restoration landform.

This will equate to approximately 2.7 Million cubic metres of material imported over 8 years[2]. The imported material, once processed, will be placed in 5 metre thick, engineered layers. Material will be placed in the lowest part of the void first, at the southern end of the Quarry.

As levels are raised and as they begin to merge with adjoining, existing quarry floor levels then the "footprint" of the area of fill will increase (spread out). In this way, infilling will generally proceed south to north across the site. The void will be progressively restored similarly in a south to north direction.

Drawings showing the phasing of the proposed restoration are presented in Appendix 4 of Volume 1 in the Environmental Statement.

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[2] Section 3 - Terrestria Limited Application Document

3 Potential Impacts on Local Springs

Springs form along the contact of the Lower Greensand and underlying Weald Clay, Figure 3 presents this boundary north of the site.

As groundwater elevations rise in the Lower Greensand and reach the low permeability contact with the Atherfield Clay and or Weald Clay they issue at surface. Springs originating south of the site have not been considered due to the overlying low permeability Gault Clay separating the hydrogeology of the Folkestone Formation/Lower Greensand from the Upper Greensand and Chalk.

A review of historic mapping indicates six springs along this geological contact presented in Figure 4.

Annex B contains the historical maps dating from 1875 to 2020 and the table below describes the findings of the mapping review:

Table 1 Historic Mapping Review

Name	***Easting***	***Northing***	***Distance from Site***	***Description***	***Map Reference***
Spring Cottages	512436	114561	780m NNW	Spring issuing east then north. Tributary to the Honeybridge Stream. Present on current OS map and renamed Spring Close.	1875 1:10560 2020 1:10000
Spring Copse	512494	115624	1800m N	Spring issuing. Contact with Atherfield Clay and overlying Lower Greensand. Present on current OS mapping.	1875 1:10560 2020 1:10000
Birch Copse	512991	114617	938 NW	Spring issuing at contact of Lower Greensand and Weald Clay, running north. Present on current OS mapping.	1875 1:10560 2020 1:10000
Spring	512608	114345	530m N	Spring issuing from LGS heading west to join Honeybridge Stream	1914 1:10560 2020 1:10000
Folkestone/LGS - Poplar's Cottages/Lock's Farm	513507	113667	750m E	The present day OS map indicates this water course issues from the Folkesotne Formation. Historically its source has been the Upper Greensand overlying the Gault (513257 112846). This was intercepted in the 1970s during the filling of the Windmill Landfill.	1875 1:10560 1980 1:10000 2020 1:10000
South of Lidbetter's Copse	513954	114193	1322m NE	Spring identified on historic mapping and present on current OS maps. Tributary to the Buncton Stream	1875 1:10560 2020 1:10000

Based on the mapping in Annex B the springs that are shown on the early 1875 maps are still present on current OS mapping. This would indicate little change in the wider hydrology of the area due to dewatering as groundwater is still issuing at these locations.

In the event that dewatering was reduced and eventually stopped on site it is anticipated that groundwater would recover to c40mAOD, Figure 5 and the *"Green"* areas represent where ground levels are at or below 40mAOD in the region. The areas where the Lower Greensand and Weald Clay contact is present and land is below 40mAOD are considered the most likely locations for Springs to re-activate in the event of groundwater recovery.

The two main locations in the region, shown in Figure 5, already have an active spring and associated water course mapped on the current OS maps – The Honeybridge Stream and Buncton Stream.

3.1 Spring Summary

There are six spring locations that are shown on the 1875 mapping, these also appear on the 2020 maps. Reactivation of former springs is unlikely as the existing systems have been in situ throughout the dewatering at Rock Common, moreover, in the event that new springs are formed, they are most likely to appear in areas that already have functioning local discharges into the environment.

4 Sampling & Analysis

4.1 Ground and Surface Water Sampling

Two visits were made to site to undertake sampling on the 28 September 2020 and 1 October 2020. Field parameters were collected on both occasions with laboratory samples only being collected on the 1 October 2020.

On the 28 September the weather was dry with some cloud cover and sunny spells, temperatures ranged between 10 and 14°. On the 1 October the weather was sunny with cloud cover and temperatures ranging between 10 and 12°. A chart showing daily rainfall from the Ashington Rain Gauge (E9360) is presented in Figure 6. It shows that there was no rainfall the day before the 28 September and relatively significant rainfall (15mm) the day before 1 October 2020.

The field parameters measured during these two visits were:

- Temperature (°C);
- pH;
- Conductivity (uS/cm);
- Total Dissolved Solids (ppm); and
- Salinity (ppt).

The results of the field parameters are shown in Table 2 and sampling locations presented in Figure 7.

Table 2 Field Parameters

Sample ID	***Date***	***Description***	***Easting***	***Northing***	***Temperature °C***	***pH***	***Conductivity uS/cm***	***TDS ppm***	***Salinity ppt***
RC1	28/09/2020	Groundwater taken from base of Rock Common	512609	113384	15.4	7.45	995	0.7	0.49
HBS1	28/09/2020	Downstream Honeybridge Stream	512264	113686	14.8	7.8	1238	0.894	0.65
HBS2	28/09/2020	Downstream Honeybridge Stream	512221	114284	14.3	7.71	1080	0.771	0.56
HBS3	28/09/2020	Discharge from Rock Common	512382	113367	15.0	7.42	1175	0.84	0.59
HBS4	28/09/2020	Upstream Honeybridge Stream	512362	113348	15.0	8.3	1275	0.905	0.64
HBS5	28/09/2020	Upstream Honeybridge Stream	512306	113118	15.4	8.62	1114	0.797	0.57
HB1	01/10/2020	Upstream Honeybridge Stream	512299	113115	15.5	8.51	2820	2.08	1.45
D1	01/10/2020	Discharge Point	512283	113371	15.5	7.26	2060	1.41	1
HB2	01/10/2020	Downstream Honeybridge Stream	512204	113686	15.6	7.65	1480	1.04	0.73
GW1	01/10/2020	Surface/Groundwater Sample from base of Rock Common	512590	113380	17.6	7.28	1558	1.15	0.81

4.2 Laboratory Analysis

Four samples were collected on the 1 October 2020 and sent to i2 Analytical Laboratory Ltd for analysis of the following determinants:

- Major Ions;

- Metals;
- Ammonium; and
- Total Petroleum Hydrocarbons.

The Chain of Custody for these four samples is presented in Annex C, the results are presented in Annex D and discussed in Section 5.0 below. In addition to the field parameters and laboratory sampling a float test was carried out on the Honeybridge Stream to estimate flow.

Flow at HB1, upstream of the discharge from Rock Common, was calculated to have a flow (Q) value of 0.025m^3/sec and downstream of the discharge the Honeybridge Stream was estimated to have a flow at 0.15m^3/sec. This suggests, on the day of sampling, the discharge from Rock Common was providing a significant contribution to the Honeybridge Stream.

5 Water Quality Results

5.1 Field Parameters

5.1.1 Temperature

Surface water in the Honeybridge Stream ranged from 14.3 to 15.6°C and groundwater sampled from the base of Rock Common ranged from 15.4 to 17.6°C.

5.1.2 pH

The field parameters upstream of the Rock Common Discharge, HBS5, HBS4 and HB1, indicate a slightly alkaline pH ranging from 8.3 to 8.6. The discharge itself, HBS3 and DC1, has values of 7.42 and 7.26 respectively with downstream samples ranging from 7.65 to 7.8.

Groundwater sampled from the base of Rock Common had a pH ranging from 7.28 to 7.45.

The range of pH values along the Honeybridge Stream, discharge point and base of Rock Common indicate a slightly alkaline stream becoming more acidic downstream of the site. Based on the lower values associated with the groundwater recovered from Rock Common and the discharge point it is likely that the discharge is contributing *more* acidic waters to the stream.

5.1.3 Electrical Conductivity - EC

The Electrical Conductivity (EC) data in the Honeybridge Stream indicates the values upstream of the discharge ranged from 1114 to 2820 uS/cm and downstream between 1080 and 1480 uS/cm.

The discharge water itself (DC1 and HBS3) ranged between 1175 and 2060 with groundwater from the site ranging from 995 to 1558.

5.1.4 Total Dissolved Solids - TDS

The TDS values measured on site indicated that following rainfall the TDS on the whole was higher throughout the catchment.

On the 28 September 2020 TDS ranged upstream between 0.797 and 0.905 ppm and on 1 October 2020 it was 2.08 ppm. A similar pattern is true of downstream where, on the 28 September, the TDS ranged from 0.771 to 0.894 ppm and following rainfall on 1 October it equalled 1.04 ppm.

from A comparison of Field Parameters between ground and surface water from the Honeybridge Stream has been made.

5.2 Laboratory Results

The samples from 1 October 2020 were analysed by i2 Analytical Ltd laboratory and reported on the 13 October 2020, the results are presented in Annex D. The four samples consisted of one upstream surface water sample, one downstream surface water sample, one discharge sample and one groundwater derived sample taken from the base of Rock Common.

5.2.1 Major Ions Analysis

The four water samples were tested for major ions and the results are shown in the table below:

Table 3 Major Ions

Concentrations mg/L	***Ca***	***Mg***	***Na***	***K***	***CO3***	***HCO3***	***Cl***	***SO4***	***TDS ppt***
HB1	84	4.2	22	5.8	170	32	37	33.5	2.08
D1	50	7.5	19	3.8	100	10	34	47.9	1.41
HB2	55	7.3	20	4	140	10	36	47.5	1.04
GW1	70	7.8	20	3.7	100	10	37	50.7	1.15

Note: CO3 results were calculated from the CaCO3 data.

An ionic balance was carried out on the six major ions Ca, Mg, Na, Cl, SO4, HCO3 and a summary of % variation provided below in Table 4:

Table 4 Ionic Balance %

Sample ID	***% Balance***
HB1	42
D1	30
HB2	32
GW1	38

As can be seen in Table 4 the major constituents of the samples are unbalanced, a well-balanced groundwater result would typically demonstrate 2 to 5% variation. This result could be a result of heavy rainfall the previous day and/or additional ions contributing to the chemistry of the water samples.

A Piper Diagram has been constructed and is shown in Figure 8. The diagram characterises the relationships between major ions and their presence in the different water bodies tested in the analysis:

- HB1 – Upstream of Rock Common discharge into Honeybridge Stream;
- D1 – Discharge from Rock Common into Honeybridge Stream;
- HB2 – Downstream of Rock Common Discharge into Honeybridge Stream; and
- GW1 – Groundwater from within Rock Common site.

The diagram indicates that the downstream water in the Honeybridge Stream presents similar ionic trends as that measured in the groundwater in Rock Common and the discharge. The upstream water appears lower in Sulphate and higher in Bicarbonate, possibly due to rainfall runoff from higher up the catchment and nearby road.

5.2.2 General Inorganics

The laboratory results are presented in Annex D and summarised below:

Sulphate concentrations were elevated in the downstream, discharge and groundwater samples compared to upstream.

Ammoniacal Nitrogen as N was not detected in HB1 upstream however was present at 230ug/L in the groundwater and discharge samples and present at 190ug/L in the downstream sample. Nitrate was present at slightly elevated concentrations downstream, in the discharge and groundwater samples compared to the upstream result.

The average concentration for Ammoniacal Nitrogen as N in the nearby groundwater surrounding the landfills to the north east was 1.65mg/L in 2018[3].

Bicarbonate was only detected in the upstream HB1 sample, potentially reflecting rainfall on the preceding days.

5.2.3 Metals and Metalloids Analysis

Hexavalent Chromium, Lead and Mercury were reported below detection limits for all four samples.

Cadmium and Selenium were reported below detection limits for HB1 but present in the other three samples.

Arsenic, Chromium and Copper are slightly elevated compared to the downstream, groundwater and discharge water quality samples.

Magnesium, Cadmium, Nickel; Selenium and Zinc are all elevated in the downstream, discharge and groundwater samples.

5.2.4 Total Petroleum Hydrocarbons

No Total Petroleum Hydrocarbons were reported above detection limits.

5.3 Baseline Conditions

The baseline chemistry for groundwater in the Folkestone Formation is presented in Table 5.

Table 5 Baseline Hydrochemistry - Folkestone Formation

Analyte Mg/L	***Min***	***Median***	***Maximum***
pH	6.02	6.6	7.9
SEC uS/cm	157	463	632
Ca	16.6	79.7	109
Mg	1.6	4.1	5.19
Na	6.1	11.6	21.4
K	1.2	2.8	20
Cl	9.6	20	43.5
SO4	9.5	48	67
HCO3	33	147	202
As	0.5	6.5	14
B	10	20.5	44
Cr	0.5	1.15	5.8
Fe	2.5	65	420
Ni	0.1	5	10.9
Pb	0.05	0.4	0.6
Zn	2	12	122

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[3] Table 4 HCSM Annex A.

These baseline concentrations derived from the Baseline Report Series[4] have been plotted with the relevant laboratory's water analysis from Rock Common and are presented in Figure 9.

The majority of data points plot within the baseline range with the exception of HB1 for Sodium and D1, GW1 and HB2 for Nickel. Most of the concentrations exceed the median and are closer to the maximum range for each analyte.

5.4 Windmill Leachate and Groundwater

A comparison of water quality with leachate and groundwater quality at the Windmill Landfill Site was carried out as part of the HCSM and is summarised in Table 6 below:

Table 6 Comparison of 2018 Leachate and Groundwater

Sample ID/Location	***Sample Type***	***Ammoniacal Nitrogen as N mg/L***	***Comments***
LWF11	Leachate Well	600.50	Average concentrations for 2018
LWF12	Leachate Well	3.25	Average concentrations for 2018
BH104	Groundwater Monitoring Well	1.65	Average concentrations for 2018
GW1	Groundwater from Rock Common	0.23	Sampled 1 October 2020
HB1	Upstream of Discharge	<0.015	Below limit of detection
D1	Discharge into Honeybridge Stream	0.23	Sampled 1 October 2020
HB2	Downstream of Discharge	0.19	Sampled 1 October 2020

The Environment Agency also collects water quality data from the surface water feature known as Windmill Tip Point 5 that discharges from the Windmill Tip (Folkestone_LGS in Figure 4).

The mean average concentrations detected for 2019 are shown in Table 7:

Table 7 Summary of EA 2019 Monitoring at Windmill Tip Point 5

Analyte	***Unit***	***Result***
Ammoniacal Nitrogen as N	mg/L	0.052
Nitrate as N	mg/L	6.62
Alkalinity (titration)	mg/L	161.33
Calcium (dissolved)	mg/L	82.09
Magnesium (dissolved)	mg/L	5.49
Copper (dissolved)	ug/L	1.97
Lead (dissolved)	ug/L	0.13
Zinc (dissolved)	ug/L	1.42

5.4.1 Groundwater Elevations – Windmill Landfill Site

Data provided to the Environment Agency from May 2018 has been plotted in Figure 10 of Annex A and shows the groundwater elevations measured on site at the Windmill Landfill Site. Groundwater elevations across the site range from 60mAOD in the north to 20mAOD at the south western boundary.

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[4] The Lower Greensand of Southern England Groundwater Systems and Water Quality Commissioned Report CR/03/273N National Groundwater & Contaminated Land Centre Technical Report NC/99/74/9

Based on these predicted groundwater contours there is a high potential that the base of the landfill is already submerged, particularly in the northern part of the site where groundwater elevations are highest.

5.5 Water Quality Summary

Water quality in the Honeybridge Stream is likely to be influenced by the discharge of Rock Common groundwater.

The groundwater demonstrates baseline characteristics of the Folkestone Formation/Lower Greensand Aquifer however, also contains elevated concentrations of Ammoniacal Nitrogen as N. Ammoniacal Nitrogen as N is a typical constituent of leachate and is present in the landfill leachate and surface and groundwater monitoring data from the Windmill Landfill Site nearby. Ammoniacal Nitrogen as N concentrations measured in the Honeybridge stream and Rock Common groundwater are significantly lower than those present in the leachate and groundwater samples from the Windmill Site[5].

The Honeybridge Stream contains elevated Ammoniacal Nitrogen as N downstream of the discharge point and there is a potentially complete source, pathway receptor linkage.

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[5] HCSM Table 3 and Table 4, H2Ogeo

6 Environmental Impacts of Restoration Material

The proposed material imported will be inert and will not undergo any significant physical, chemical or biological transformation.

The material will not dissolve, burn, physically or chemically react, biodegrade or adversely affect other matter that it comes into contact with, in a way likely to cause environmental pollution or harm to human health.

The total leachability and pollutant content of the waste and the ecotoxicity of the leachate will be insignificant and will not endanger the quality of surface water or groundwater in the region.

7 Groundwater Flow Model

A groundwater flow model has been constructed using Modflow Flex 2015.1 (Modflow) and, using the HCSM as a basis for construction the following scenarios have been tested:

- The impact of reduced dewatering and import of fill material on local groundwater flows.

7.1 Modelling Approach

Modflow is the United States Geological Survey's (USGS) three-dimensional (3D) finite-difference groundwater model. It is considered to be one of the international standards for simulating and predicting groundwater conditions.

To understand the potential effects of reducing dewatering at Rock Common the following approach was adopted:

- Construction of a Baseline Groundwater Flow Model using boundary conditions and input parameters derived from site visits and the HCSM. The Baseline Model aims to be representative of groundwater flow conditions currently on site;
- Testing reduced dewatering values to understand the effects on surrounding groundwater elevations.

The following sections describe the data inputs and boundary conditions selected to construct the Baseline Model.

7.2 Data Inputs

7.2.1 Layout & Geometry

The groundwater model covers an area of 750 Hectares and is shown in Figure 10. The grid, known as the model domain, is made up of 56 100x100m squares.

The site geology, as described, consists of the Folkestone Formation overlying the Lower Greensand that, in turn overlies the Weald Clay. To simplify the geology and observe groundwater trends across the larger area a single layer of aquifer unit has been modelled overlying the Weald Clay Formation. This single layer represents the Folkestone Formation and Lower Greensand combined.

The top of the model has been defined as the surface elevations gathered from LiDAR 2019 Digital Terrain Model data and the model topography is shown in Figure 11.

On the northern face of Rock Common there is a large volume of clayey material consisting of Marehill Clay, see Figure 12. This deposit is not in situ and was reportedly brought into the site by the previous operators. The clays have been built into the model as the nature of the deposit has properties that would impede groundwater flow.

7.3 Boundary Conditions

A series of boundary conditions have been assigned to enable the representation of baseline conditions.

The hydraulic boundary conditions for Rock Common are presented in the table below.

Table 8 Model Boundary Conditions

Boundary Location	***Type of Boundary***	***Head mAOD***	***Rationale***
Northern Boundary	Theoretical Constant Head (CHD)	40.00	Based on anticipated recovery level and springs issuing at the Lower Greensand and Weald Clay contact.

Boundary Location	***Type of Boundary***	***Head mAOD***	***Rationale***
Western Boundary	River	LiDAR Data for elevation	Honeybridge Stream runs south to north along the western boundary of the site.
Southern Boundary	Partial River & Edge of Model	LiDAR elevation	Honeybridge Stream commences south of the site.
Eastern Boundary	Edge of Model	LiDAR elevation	NA
Top of Model	Recharge	195mm/year	The precipitation used is 20% of the annual rainfall record (754mm/year) to reflect effective rainfall for the Ashington Rain Gauge (E9360) over an area of 492Ha to reflect the permeable surface within the model boundary. Climate change is anticipated to impact the intensity and occurrences of rainfall events however the model's resolution does not detect these fluxes. No recharge has been modelled through the Gault Clay to the south or Weald Clay in the north.

7.3.1 Dewatering Regime

The current abstraction at Rock Common discharges to the Honeybridge Stream at a consented rate of 8637m^3/day. The pumping assessment carried out in the HCSM identified the daily rate averaged out at 4000m^3/day.

For the purposes of the model an abstraction rate of 4000m^3/day has been used.

7.3.2 Aquifer Properties

The Greensand aquifer is considered intergranular although does have some fractures that contribute to a higher permeability than that found in the consolidated matrix flow. The table below summarises the range of hydraulic conductivity (K) values:

Table 9 Permeability Values

Geology	***Permeability (k) Metres/Second***		
	Minimum	***Maximum***	***Average***
Greensand	1.16x10^{-09}	1.16x10^{-04}	5.79x10^{-05}

To reflect the variable hydraulic conductivity[6] for the whole of the Lower Greensand, including the higher K Folkestone Formation, a value 1.00x10^{-05}m/sec has been adopted for the model.

The default values for storage have been used in the absence of site specific criteria and these are representative of the literature values quoted by *Allen et al 1997*, they are:

- Specific Storage (Ss) 1x10-05 1/m;
- Specific Yield (Sy) 0.2;
- Effective Porosity 0.14; and
- Total Porosity 0.3.

The underlying Weald Clay and deposit of Marehill Clay were assigned a hydraulic conductivity of 1x10^{-08}m/sec to reflect their low permeability.

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[6] Permeability values for the Folkestone Formation based on http://nora.nerc.ac.uk/13137/1/WD97034.pdf Technical Report WD/97/34

8 Groundwater Modelling Results

8.1 Baseline Model

The model was run under transient conditions to estimate the changing groundwater elevations during the drawdown in the baseline period. The time series is based on 365-day increments and the model was run for 40 years (14600 Days i.e. 1980 to present).

8.2 Baseline Model Findings

Groundwater outside the quarry appears to reach equilibrium in around 20 years however due to the excavation, recharge and pumping regime there is always flux within the quarry itself. This has been observed on occasions when the abstraction has failed or during periods of sustained heavy rainfall.

The outputs for the groundwater head predictions after 1, 10, 20 and 40 years of pumping are presented in Figure 13.

Modelled groundwater contours range from 41.00mAOD (365 Days) north west of the site along the route of the Honeybridge stream to 6.00mAOD in the base of the quarry after 40 years. Groundwater flows from north to south and is dominated by the abstraction. Hydraulic gradients are relatively shallow outside the site and steepen once inside the quarry, changing from 38mAOD to 24mAOD at the base, a change of 14m over 300m.

The Honeybridge Stream provides some recharge to groundwater based on the head contours, the two main areas where this occurs are shown in Figure 14 for Day 365. This effect is reduced as the model progresses past 10 years and drawdown of the water table further into the catchment has occurred.

Groundwater heads around the lower permeability Marehill Clay, on the northern boundary of the site, are elevated. This mounding is a result of a southerly groundwater flow encountering a lower permeability face as groundwater enters the quarry. Over time the mounding effect is likely to becomes less significant as new flow paths form.

8.3 Restoration Model

To represent the proposed restoration and a theoretical reduction in dewatering the abstraction regime has been adapted.

The pumping arrangements would be maintained throughout restoration in recognition of the significant contribution made to flows and ecology in the Honeybridge Stream. The Wiston Estate and Operator will work closely together with relevant authorities to maintain the ecology of the Honeybridge Stream, cessation of pumping is one of the theoretical scenarios modelled to identify potential impacts.

The phasing of the restoration is as follows and presented in Appendix 4 of Volume 1 in the Environmental Statement:

- Phase 1 - 15mAOD completed elevation;
- Phase 2 - 25mAOD completed elevation;
- Phase 3 - 35mAOD completed elevation;
- Phase 4 - Restoring to Final Levels – 43 to 47mAOD;
- Phase 5 – North Western corner restored to 35mAOD;
- Phase 6 – North Western corner restored to 45mAOD;

The restoration has been modelled over an eight-year period and the abstraction has been trimmed to 2000m^3/day average to allow a steady recharge of groundwater into the quarry.

As a conservative measure the model does not simulate any liner at the base of the quarry.

The model was run under transient conditions from 14600 days (40 years) to estimate the changing groundwater elevations during a theoretical cessation of pumping (2000m^3/day for 8 years) and continued, with no pumping from Day 17520 (48 Years) until Day 21170 (58 Years).

Outputs from Year 41 to Year 48 are presented in Figure 15.

8.4 Restoration Model Findings

Abstraction rates are reduced after Year 1 (Day 14962) of restoration to 2000m^3/day and groundwater elevations start to recover. The model indicates groundwater recovers approximately 5m over the 365 day period when abstraction is occurring at the lower rate.

At the end of the eight-year restoration period (Day 17520) controlled groundwater has recovered to approximately 26.00mAOD in the former base of the quarry.

Approximately two years after cessation of pumping (Day 18274) the groundwater in the area is at an elevation of c40mAOD, presented in Figure 16. The area of Marehill Clay presents elevated head pressures however this is unlikely to reflect water table elevations due to the nature of the low permeability deposits.

The model predicts that throughout the 8 year restoration period, with controlled and reduced groundwater abstraction, the restoration surface remains safely above groundwater.

9 Summary & Conclusions

9.1 Impacts on Springs

There are six spring locations that are shown on the 1875 mapping, these also appear on the 2020 maps.

Reactivation of former springs is unlikely as the existing systems have been in situ throughout the dewatering at Rock Common, moreover, in the event that new springs are formed, they are most likely to appear in areas that already have functioning local discharges into the environment.

9.2 Impacts on Water Quality

Water quality in the Honeybridge Stream is influenced by the discharge of Rock Common groundwater, both in terms of quantity and quality. On the day of investigation the discharge accounted for over 80% of the flow in the Honeybridge Stream.

Groundwater demonstrates baseline characteristics of the Folkestone Formation/Lower Greensand Aquifer however, it also contains elevated concentrations of Ammoniacal Nitrogen as N.

Ammoniacal Nitrogen as N is a typical constituent of leachate and is present in the landfill leachate and surface and groundwater monitoring data from the Windmill Landfill Site nearby. Ammoniacal Nitrogen as N concentrations measured in the Honeybridge stream and Rock Common groundwater are significantly lower than those present in the leachate and groundwater samples from the Windmill Site. Groundwater may already be in direct contact with the body of waste to the north and north east, where groundwater elevations are in excess of 50mAOD (May 2018) there is a high possibility that this is the case.

The Honeybridge Stream contains elevated Ammoniacal Nitrogen as N downstream of the discharge point and there is a potentially complete source, pathway receptor linkage.

9.3 Impacts from Restoration Materials

In line with the Environment Agency's guidance the proposed material imported will be inert and will not undergo any significant physical, chemical or biological transformation.

The material will not dissolve, burn, physically or chemically react, biodegrade or adversely affect other matter that it comes into contact with, in a way likely to cause environmental pollution or harm to human health.

The total leachability and pollutant content of the waste and the ecotoxicity of the leachate will be insignificant and will not endanger the quality of surface water or groundwater in the region.

9.4 Groundwater Flow Model

The baseline conditions suggest contours range from 41.07mAOD (365 Days) north west of the site along the route of the Honeybridge stream to 10.89mAOD in the base of the quarry after 40 years.

Groundwater flows from north to south and is dominated by the abstraction. Hydraulic gradients are relatively shallow outside the site and steepen once inside the quarry, changing from 38mAOD to 24mAOD at the base, a change of 14m over 300m.

The Honeybridge Stream provides some recharge to groundwater based on the head contours and this effect is reduced as the model progresses past 10 years and drawdown of the water table further into the catchment has occurred.

Groundwater heads around the lower permeability Marehill Clay, on the northern boundary of the site, are elevated. This mounding is a result of a southerly groundwater flow encountering a lower permeability face as groundwater enters the quarry. Over time the mounding effect is likely to becomes less significant as new flow paths form.

The baseline model reflects the existing situation on site and can also groundwater conditions following the proposed restoration with continued dewatering to 10-12mAOD.

The restoration model indicates when abstraction rates are reduced to 2000m^3/day and groundwater elevations start to recover they will gain approximately 5m elevation over the 365 day period.

At the end of the eight-year restoration period (Day 17520) and cessation of pumping, controlled groundwater will have recovered to approximately 26.00mAOD in the former base of the quarry. Approximately two years after cessation of pumping, groundwater in the area would be at an elevation of c40mAOD. The area of Marehill Clay presents elevated head pressures however this is unlikely to reflect water table elevations due to the nature of the low permeability deposits.

The model predicts that throughout the 8 year restoration period, with controlled and reduced groundwater abstraction, the restoration surface remains safely above groundwater limiting contact and minimising risk to Human Health and the Environment.

It is proposed that the Wiston Estate and Operator work closely with relevant authorities to maintain the ecological demands of the Honeybridge Stream.

9.5 Mitigation and Monitoring

Historic concerns have been raised over elevated Ammoniacal as N concentrations in the Honeybridge Stream and reduced flow in the stream following cessation of the Rock Common Abstraction. The other key environmental concern is a rising water table entering the body of waste north of the site at the former landfill sites.

It is likely, based on the flow gauging, that flows would decrease significantly in the Honeybridge Stream at this point high up in the catchment. There are many other sources that contribute to the stream as it flows down catchment with already active springs and tributaries complementing the flow. The cessation of abstraction must be managed carefully to ensure flow volumes and quality do not adversely impact the stream in the future.

With regards to water quality, the stream at the point of discharge from Rock Common, does not appear to be supported by groundwater and there are potentially other sources of pollution that discharge into it i.e. treated sewage effluent, overland runoff, roads and highways. In summary, with the cessation of the abstraction discharging into the Honeybridge Stream water quality may remain the same or even improve.

The groundwater flow model suggests, with the cessation of abstraction, groundwater within Rock Common could recover to c40mAOD within an eight year period. It is acknowledged that the intention is to maintain the ecological standards within the Honeybridge Stream and therefore cessation is a theoretical scenario to understand the hydrogeological implications of dewatering.

It has been already recommended that the cessation is managed carefully to prevent structural concerns and water quality issues. To this end, in the event that cessation of pumping is proposed in the future, it is recommended that a monitoring network is put in place to assess water elevations and quality during and post restoration.

The Applicant is currently in discussions with the National Permitting Team at the Environment Agency to ascertain the exact monitoring requirements however, at this time, propose the following monitoring schedule:

- Drill and install up to five groundwater monitoring wells around the perimeter of the site with three up-hydraulic gradient and two down-hydraulic gradient;
- Carry out quarterly monitoring of the groundwater elevation and quality, surface water quality of the Honeybridge Stream and quality of the discharge from Rock Common;
- Groundwater elevations to be automatically recorded using data loggers in three of the five groundwater monitoring wells on site and manual gauging on a quarterly basis.

Based on the findings of the investigations and groundwater modelling the proposed restoration scheme, with the correct monitoring and regulatory controls in place, would not pose a risk to Controlled Waters or Human Health.

10 Statement of Limitations

This report was prepared in accordance with the scope of work outlined within this report and is subject to the applicable cost, time and other constraints.

H2Ogeo performed the services on behalf of the Client (Dudman Rock Common Ltd) in a manner consistent with the normal level of care and expertise exercised by members of the environmental profession. No warranties, expressed or implied, are made.

Except as otherwise stated, H2Ogeo's assessment is limited strictly to the scope of work outlined in Section 1.2 and does not evaluate structural or geotechnical conditions of any part of the Site (including any buildings, equipment or infrastructure) or outside the Site boundary.

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http://water.usgs.gov/nrp/gwsoftware/modflow2000/MFDOC/

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http://www.bgs.ac.uk/research/groundwater/shaleGas/aquifersAndShales/maps/aquifers/LowerGreensand.html

https://environment.data.gov.uk/flood-monitoring/doc/rainfall

https://eip.ceh.ac.uk/apps/rainfall/gb.html

https://www.gov.uk/guidance/landfill-operators-environmental-permits/landfills-for-inert-waste

12 Figures

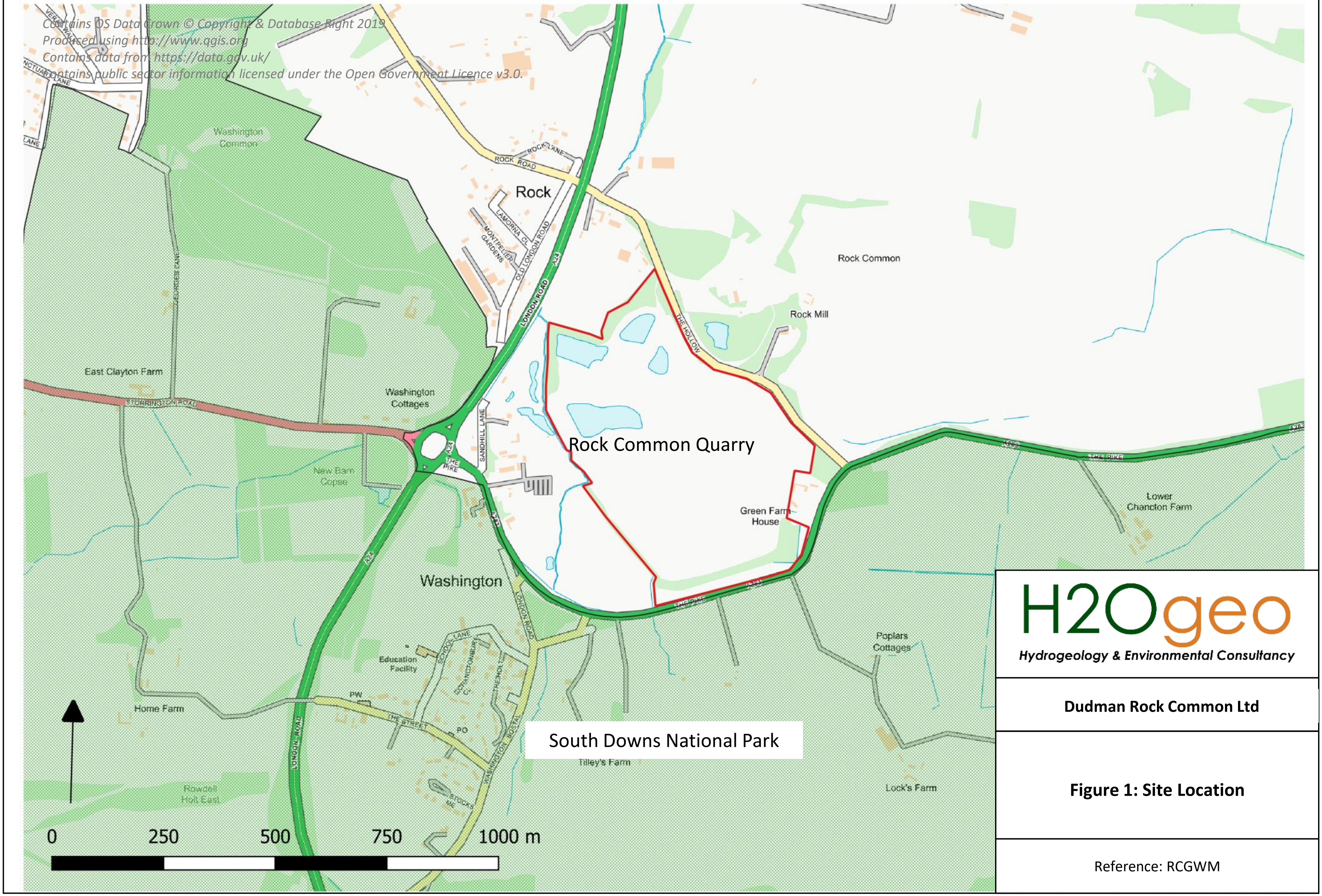

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Figure 1: Site Location

Reference: RCGWM

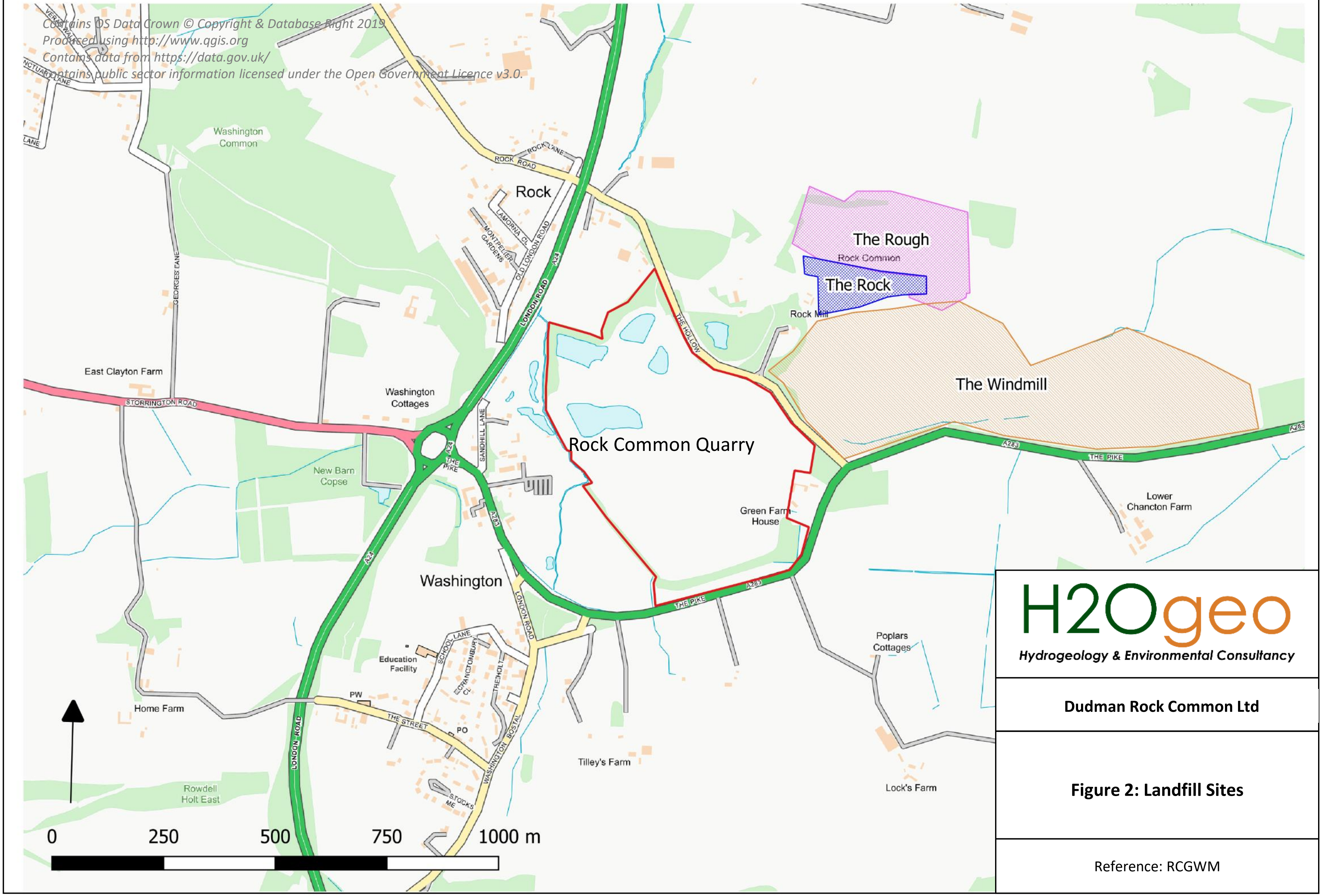

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Figure 2: Landfill Sites

Reference: RCGWM

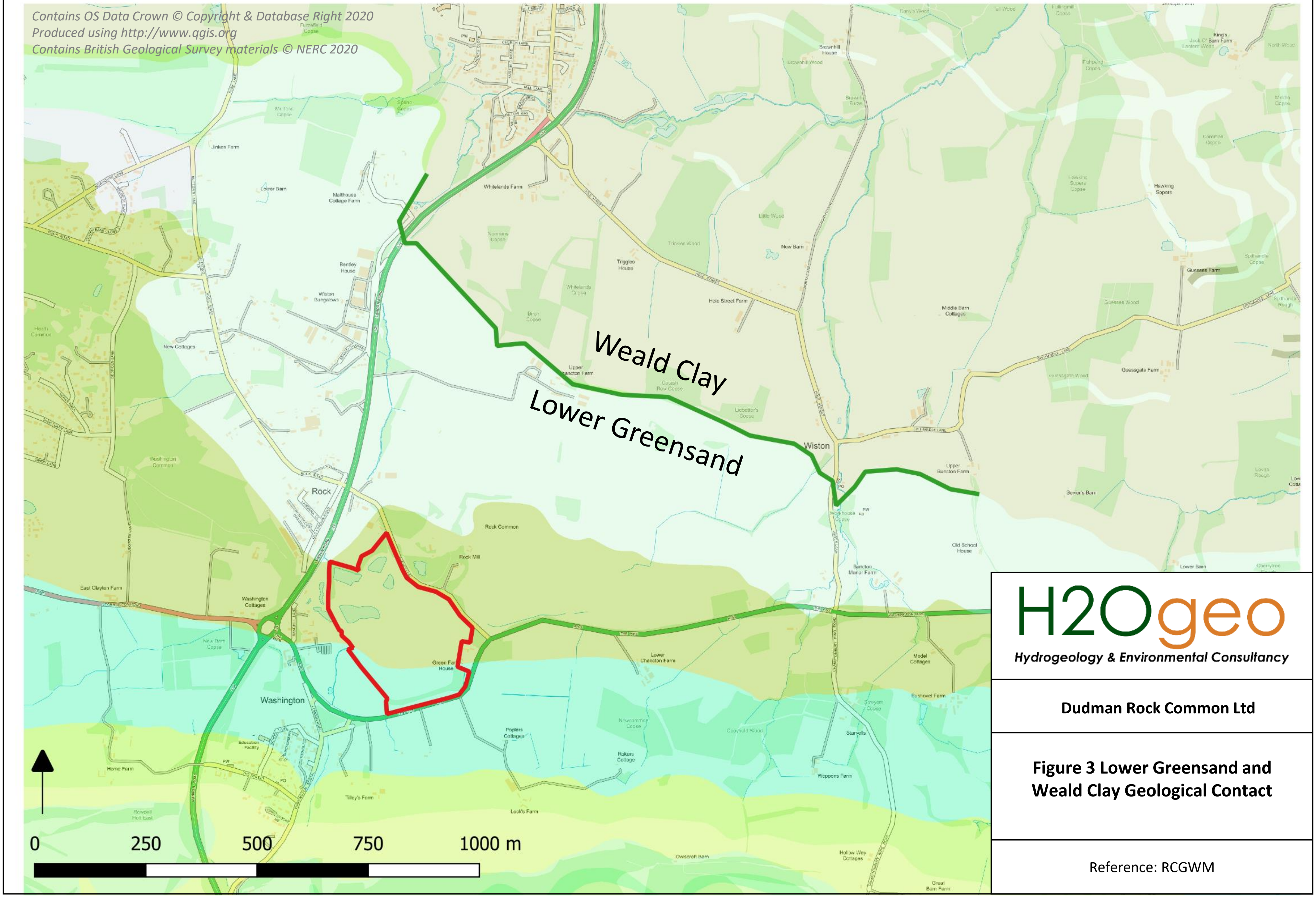

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Figure 3 Lower Greensand and Weald Clay Geological Contact

Reference: RCGWM

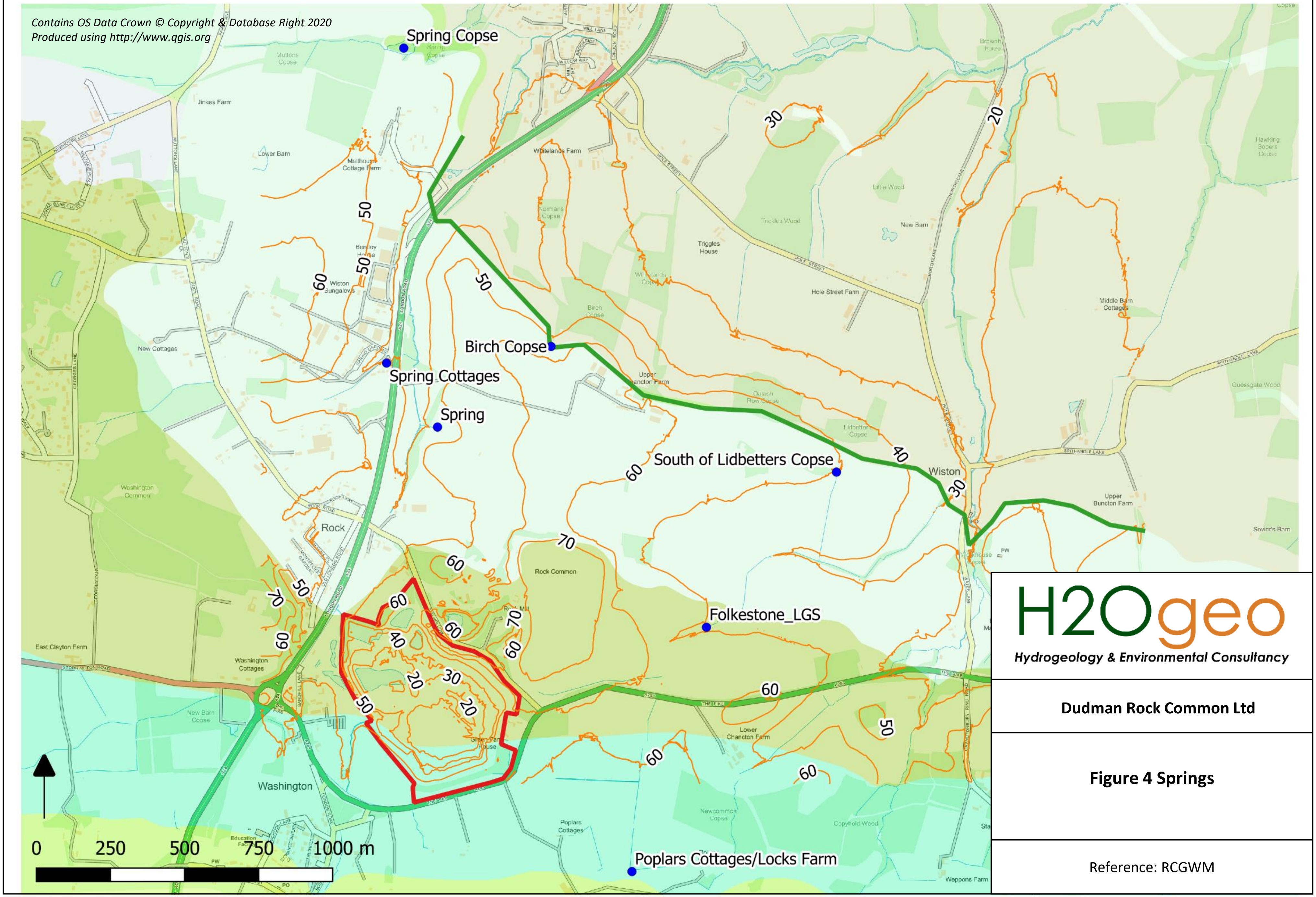

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Figure 4 Springs

Reference: RCGWM

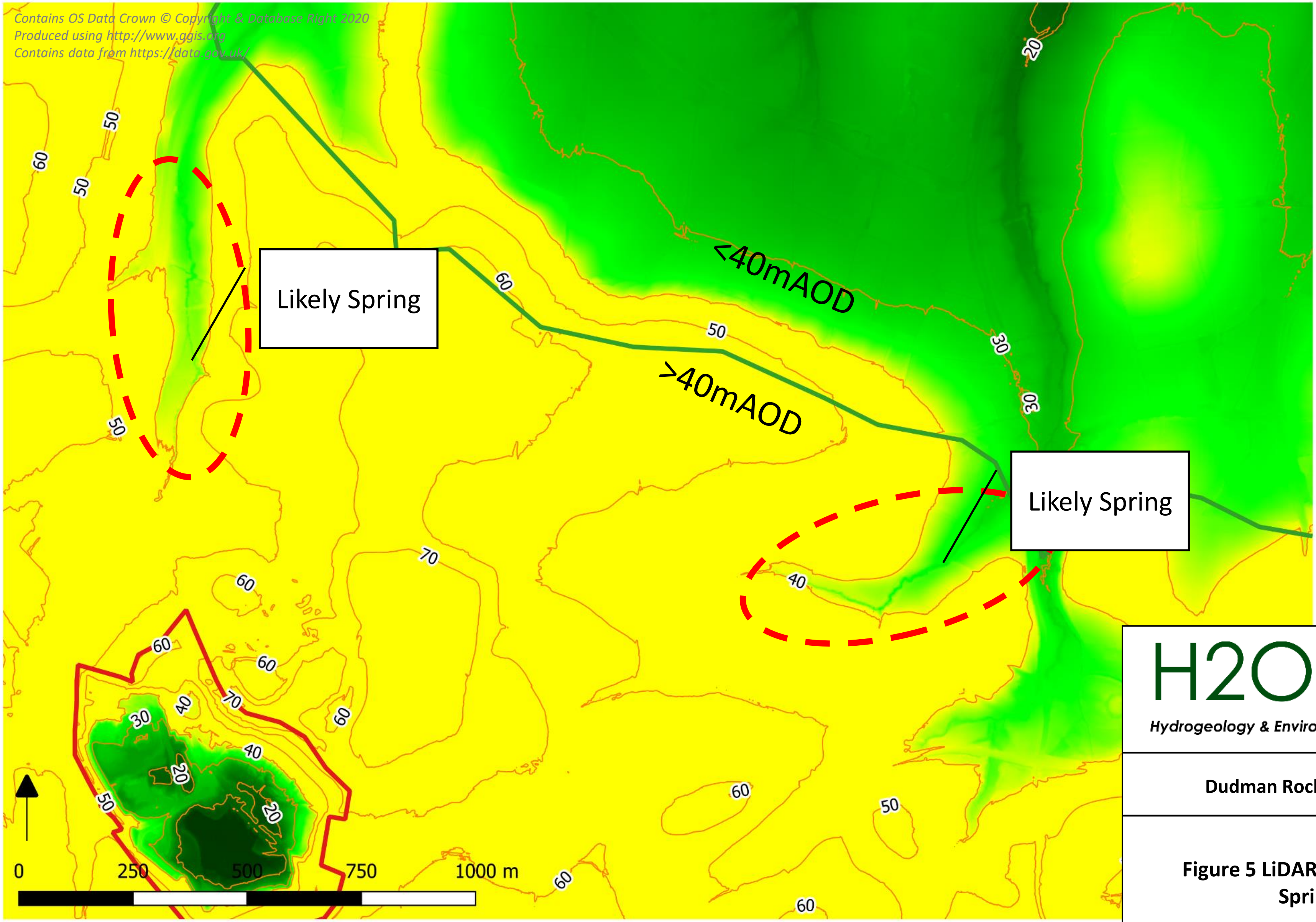

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Figure 5 LiDAR 2019 – Likely Springs

Reference: RCGWM

Contains data from https://data.gov.uk/

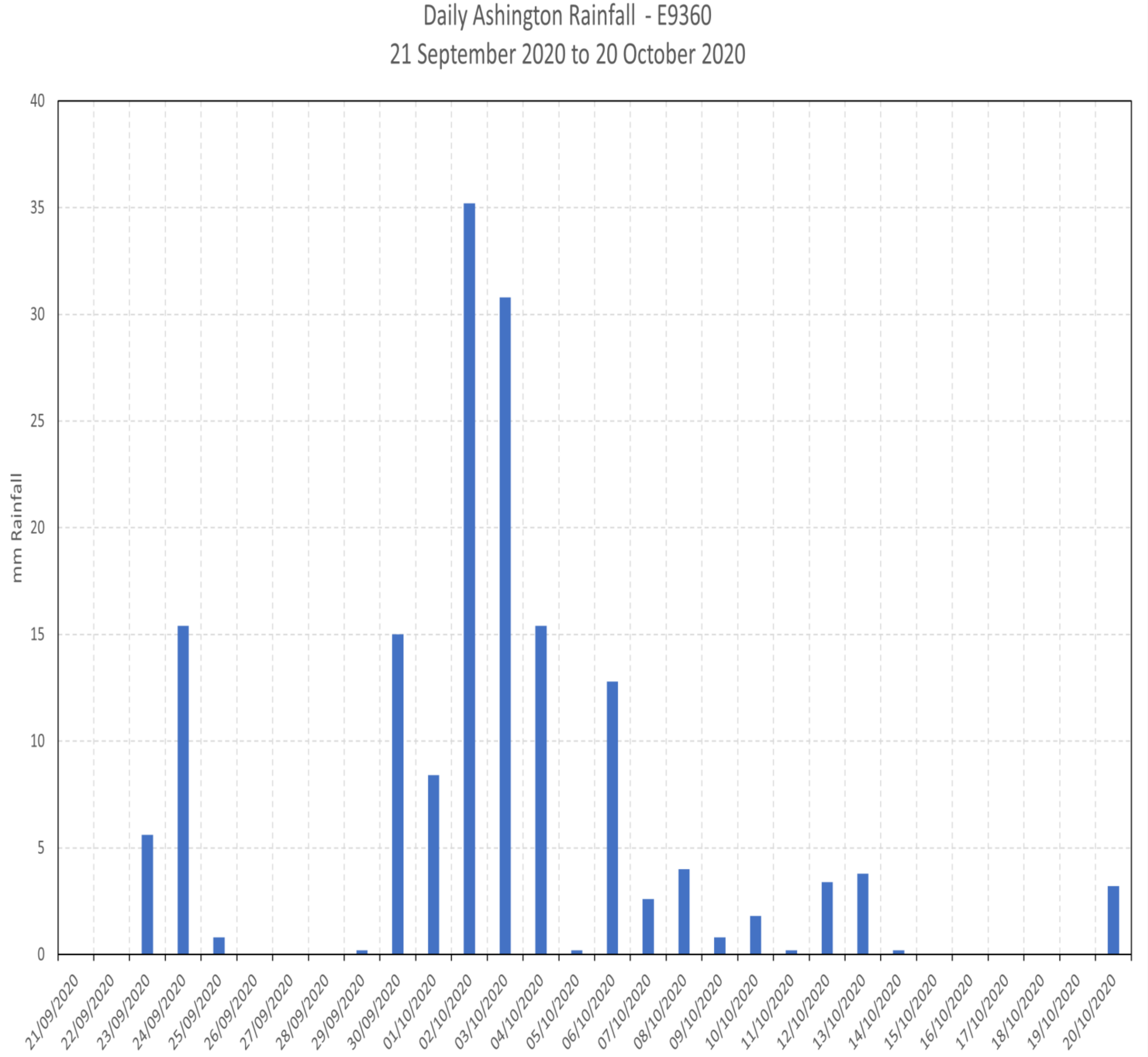

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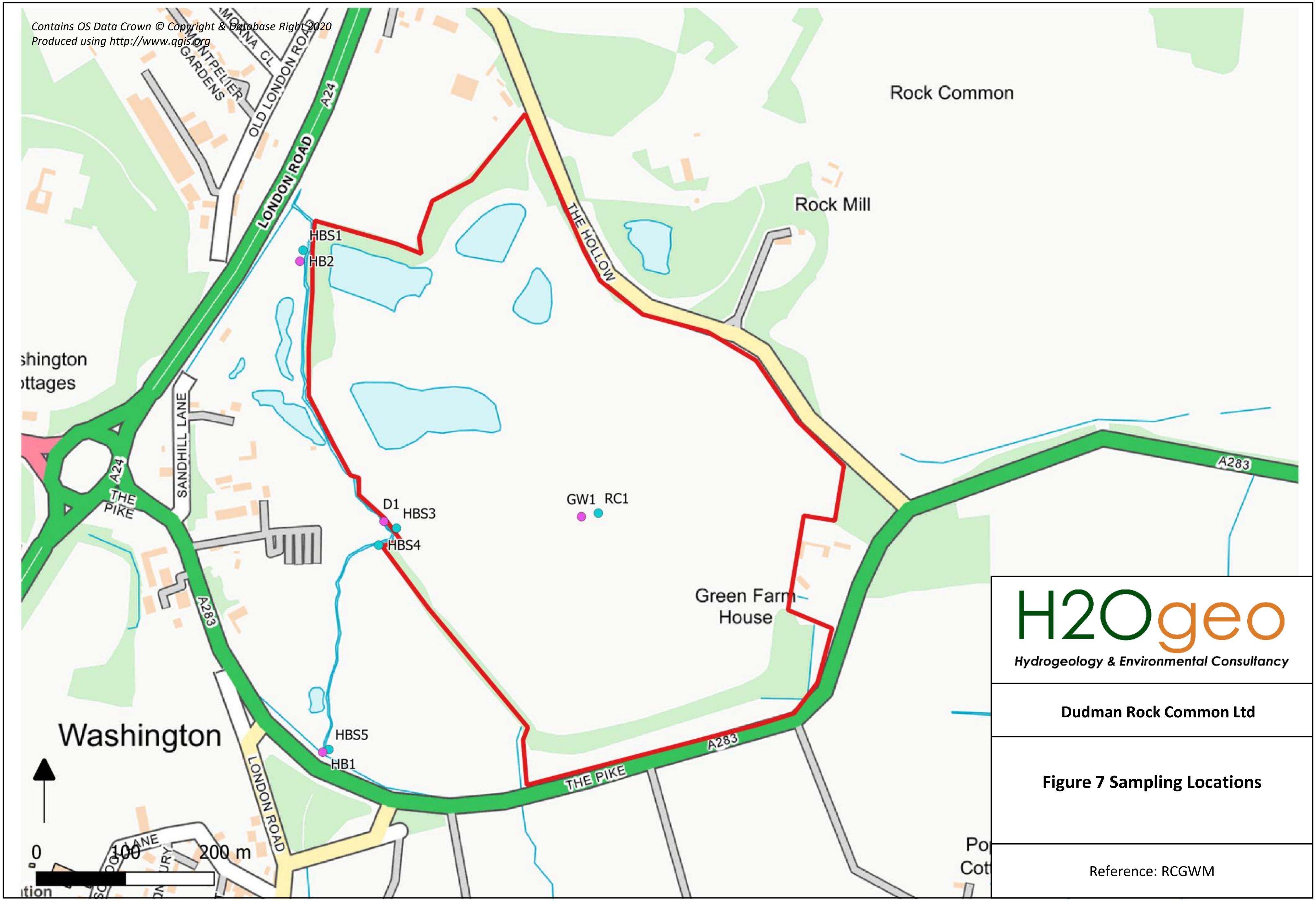
Figure 6 Ashington Rain Gauge

Reference: RCGWM



Contains OS Data Crown © Copyright & Database Right 2020
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Figure 7 Sampling Locations

Reference: RCGWM

Piper Diagram - Water Sampling 1 October 2020

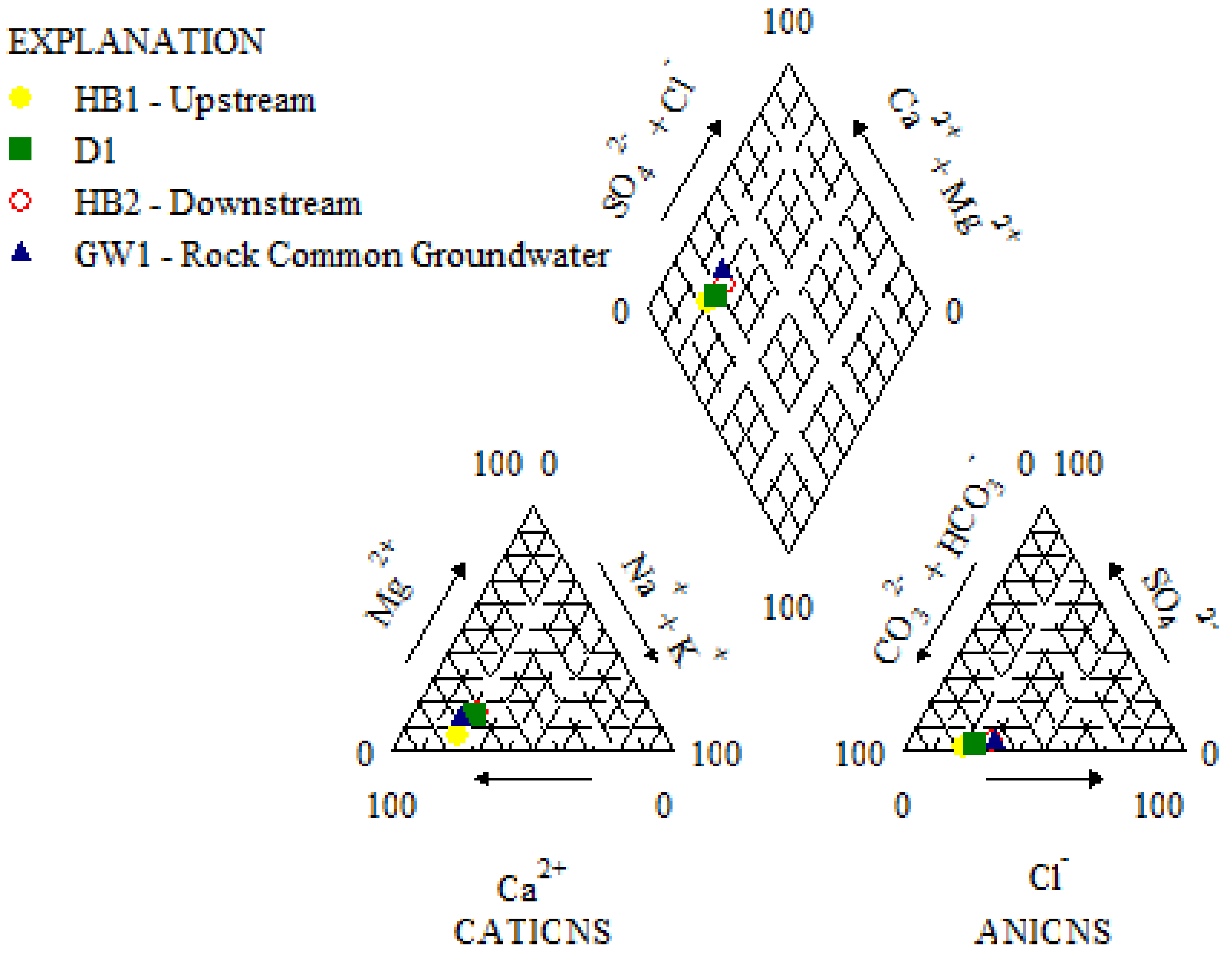

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Figure 8 Piper Diagram

Reference: RCGWM

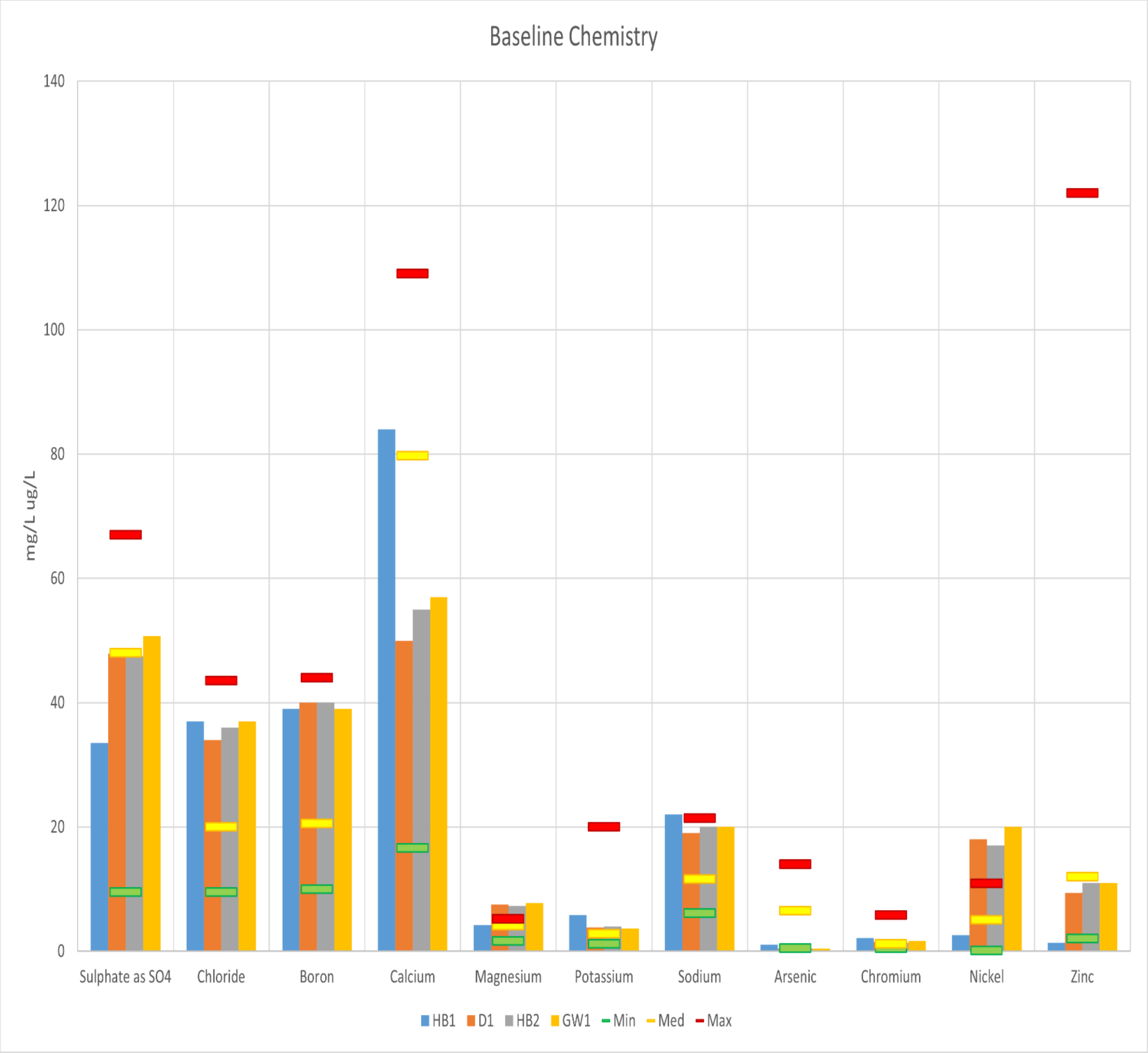

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Figure 9 Baseline Chemistry

Reference: RCGWM

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Figure 10 Model Grid

Reference: RCGWM

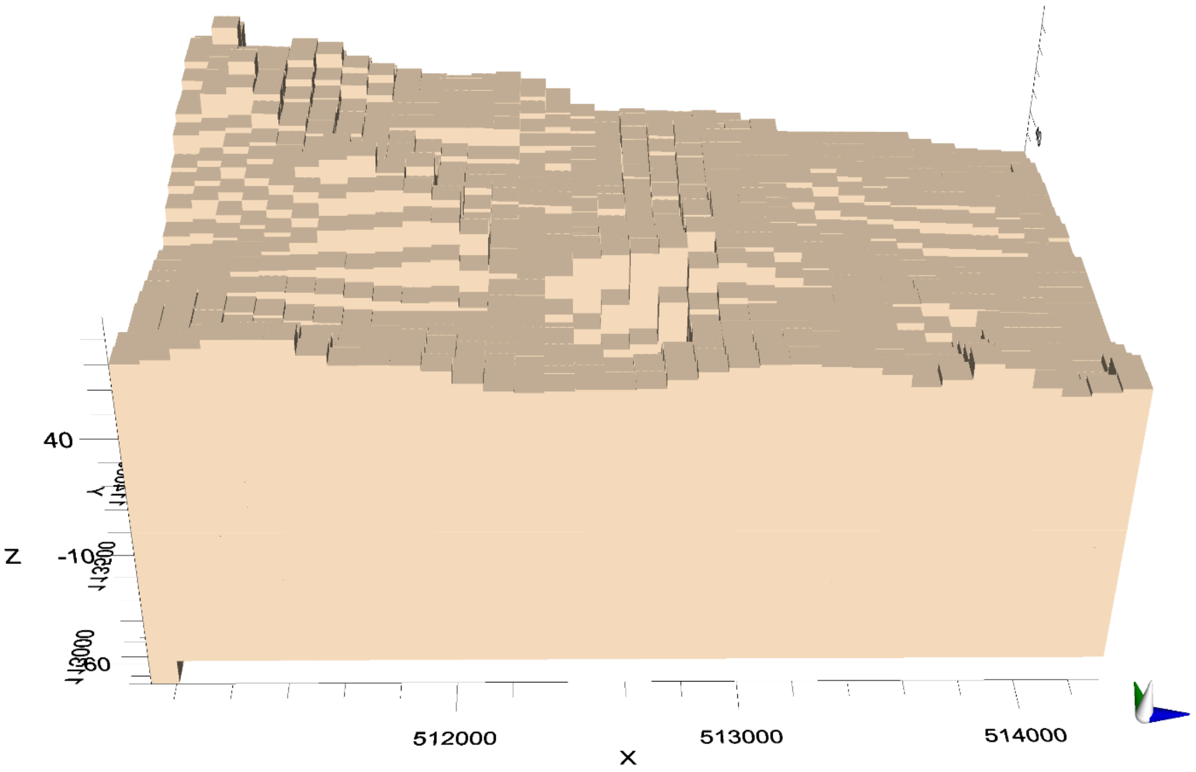

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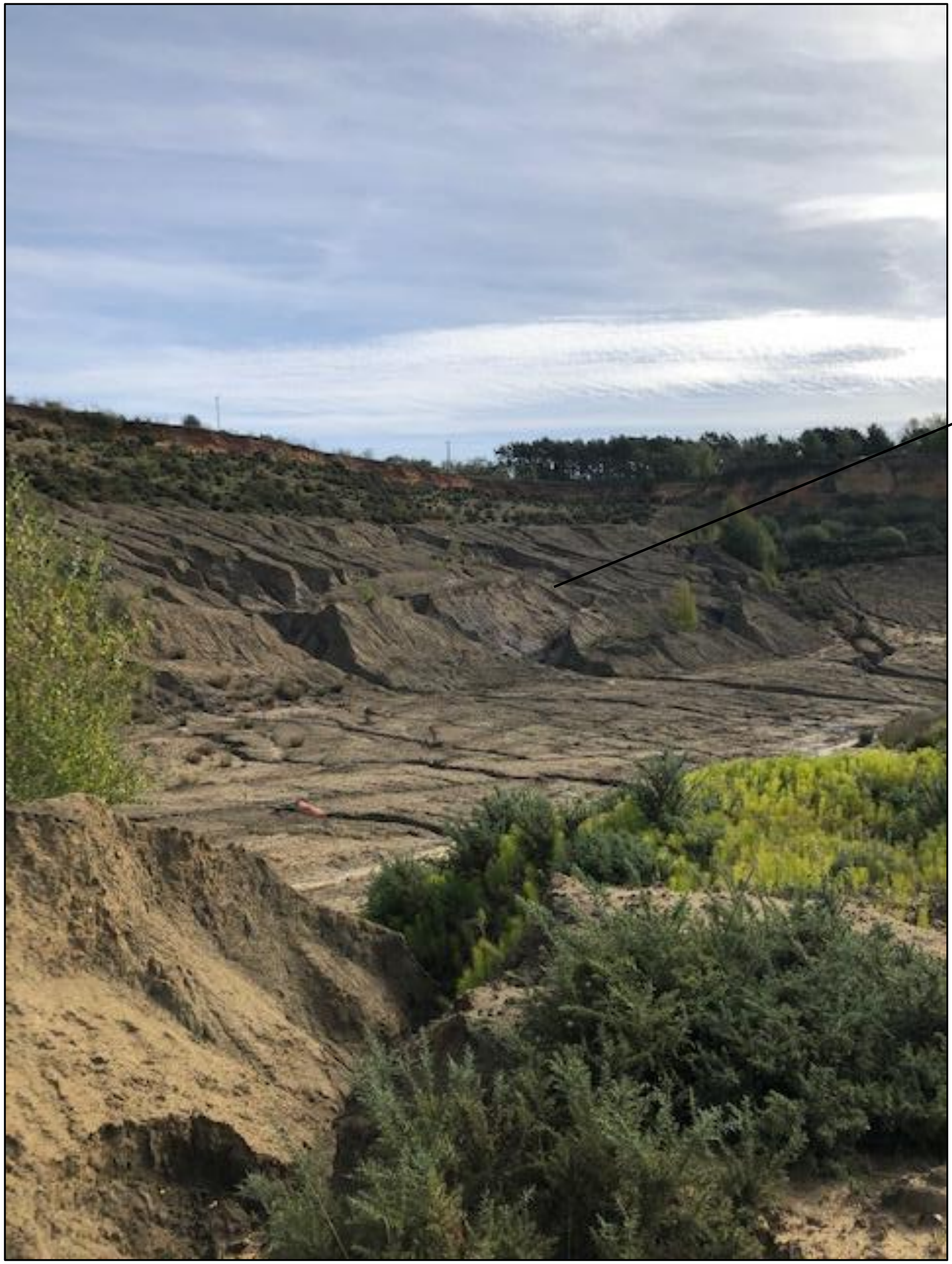
Figure 11 Model Top

Reference: RCGWM



Area of Marehill Clay

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Figure 12 Marehill Clay

Reference: RCGWM

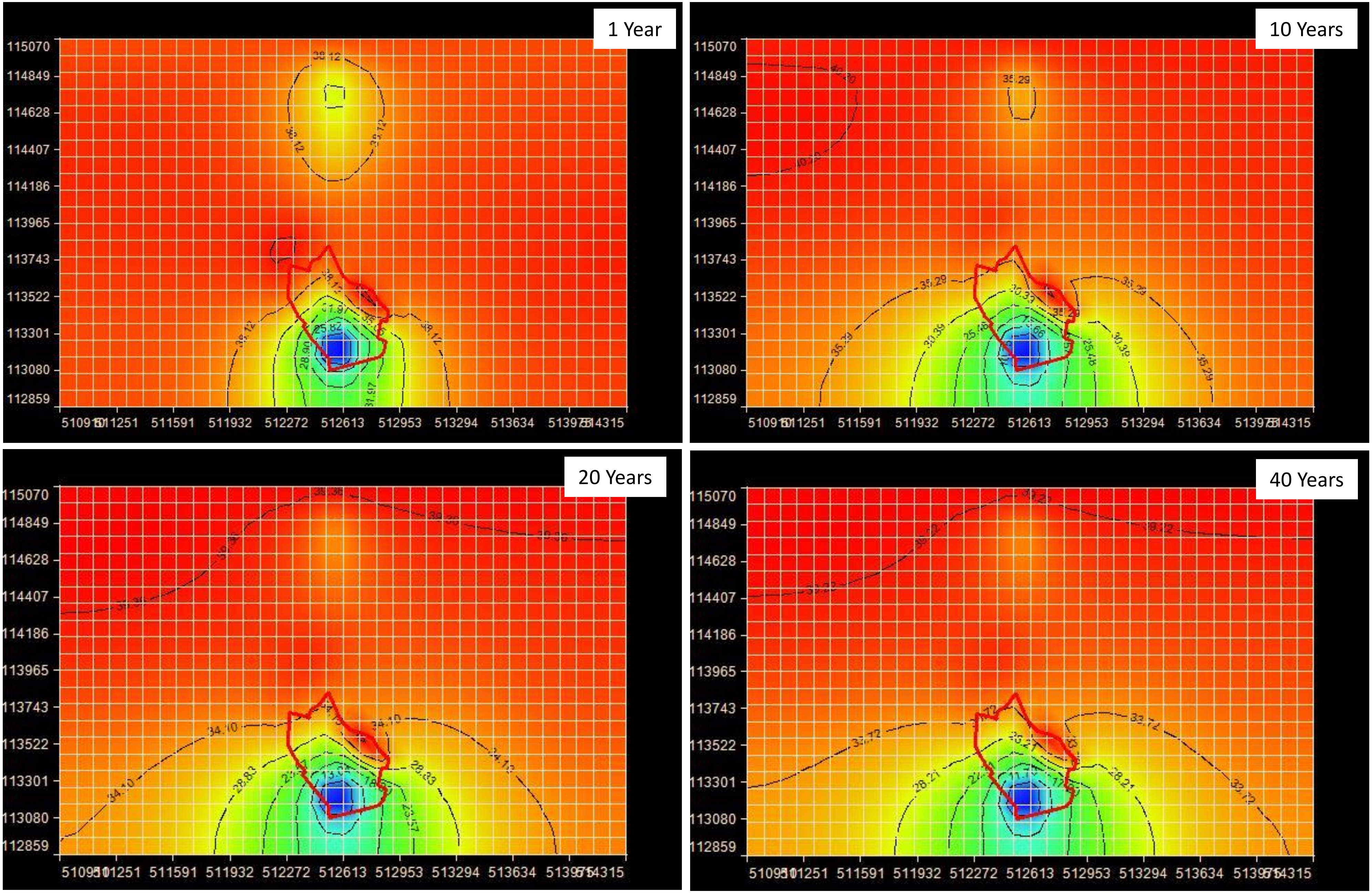

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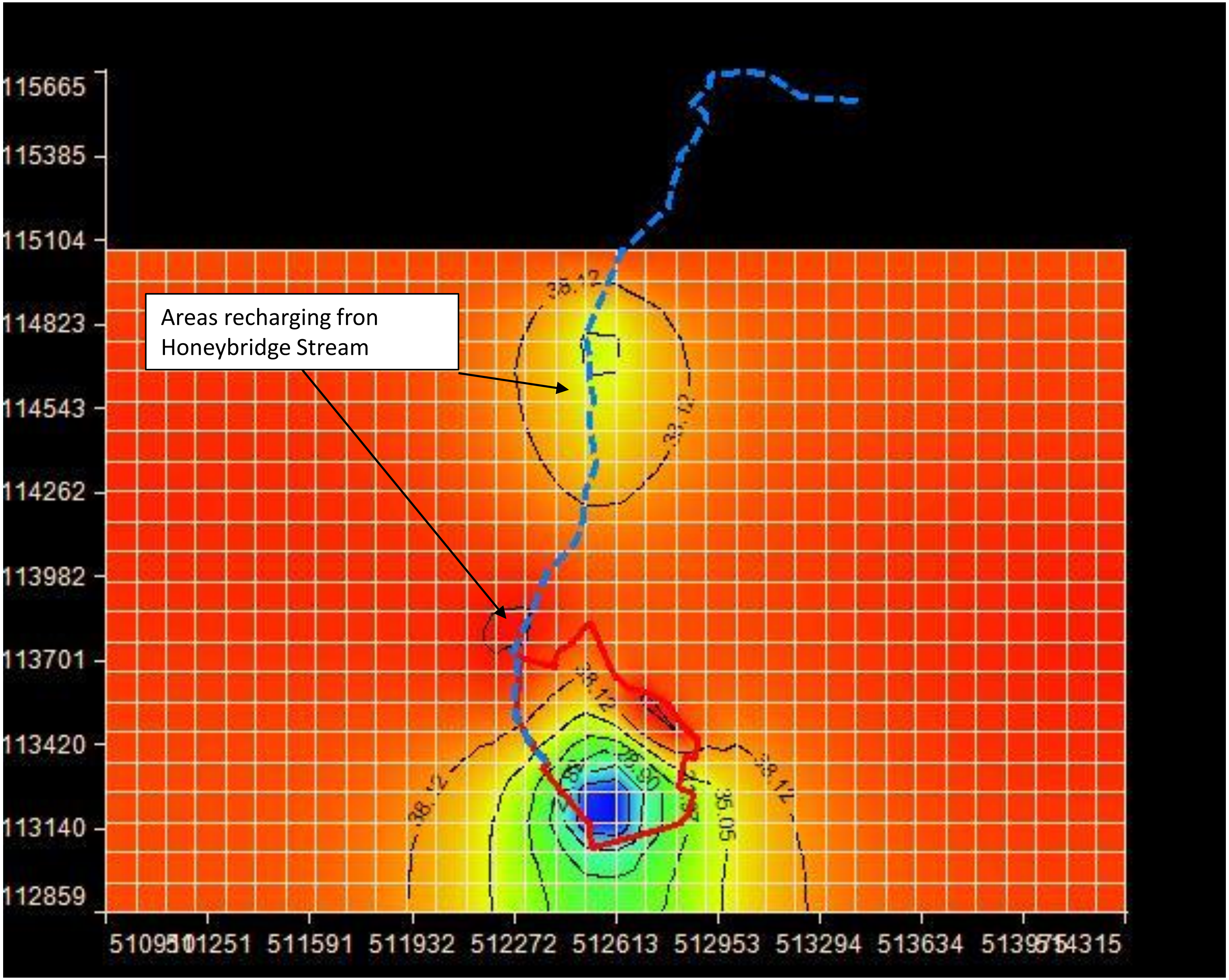
Figure 13 Baseline Outputs

Reference: RCGWM



Areas recharging fron Honeybridge Stream

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Figure 14 Baseline Year 1 Honeybridge Stream

Reference: RCGWM

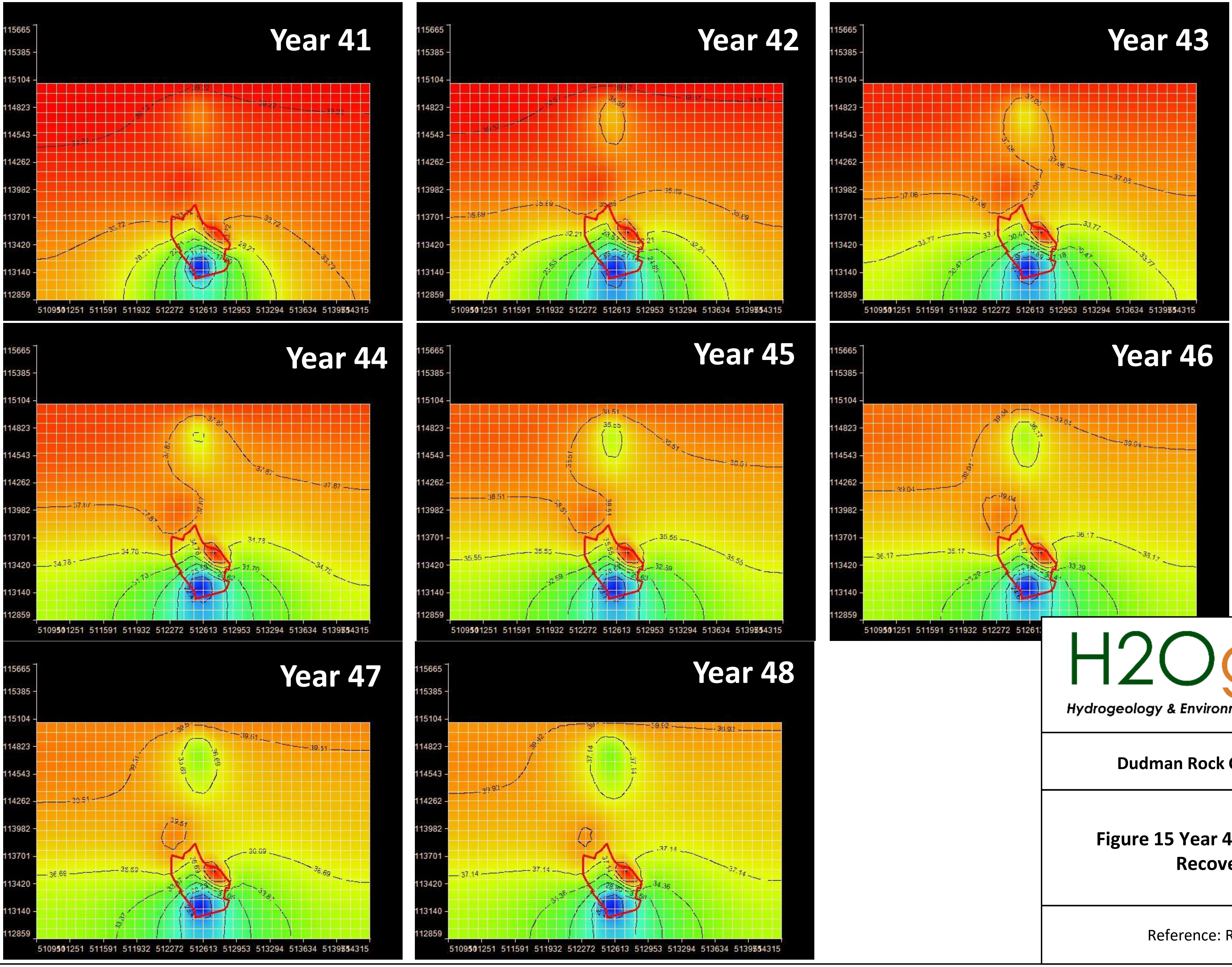

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Figure 15 Year 41 to Year 48 Recovery

Reference: RCGWM

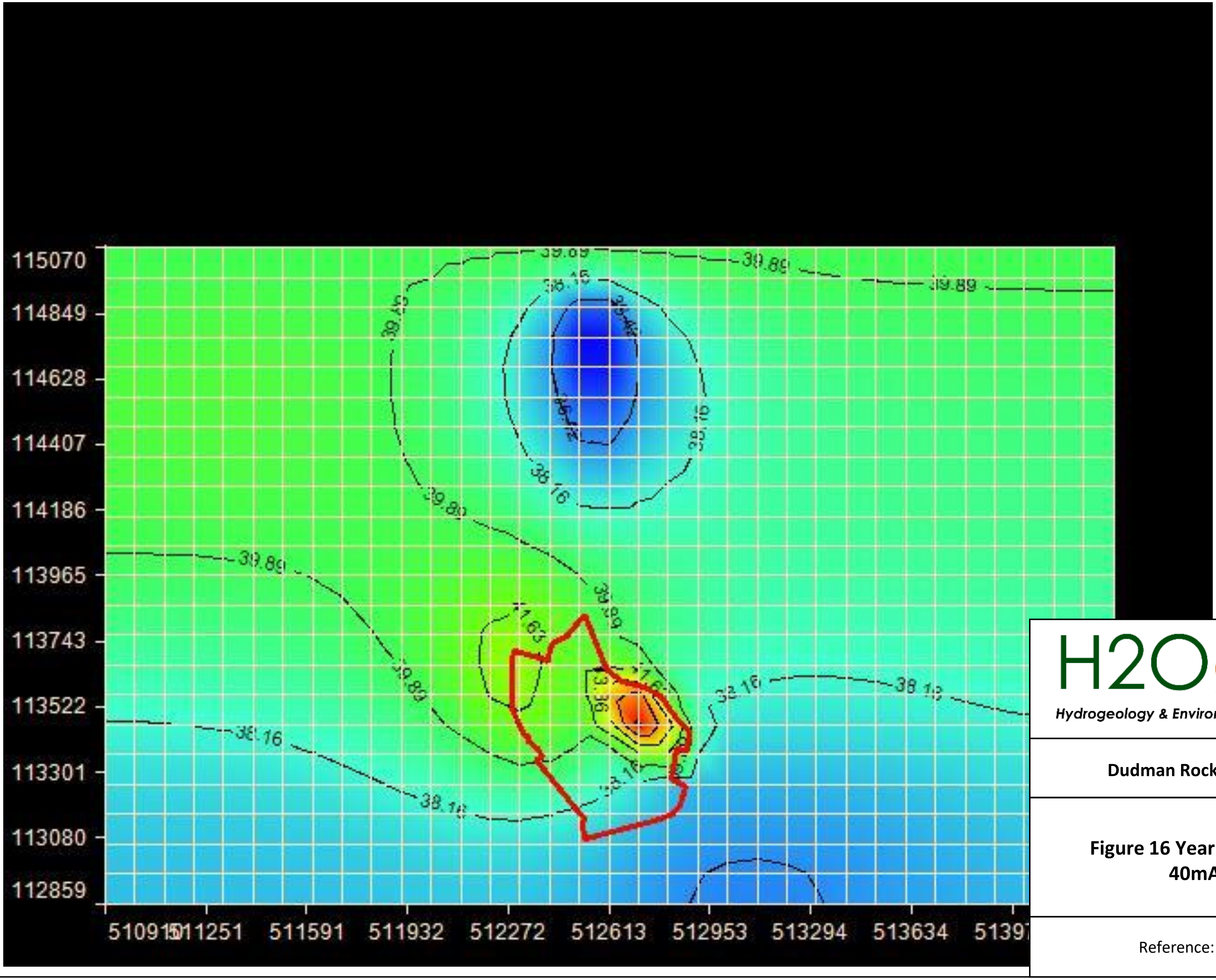

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Figure 16 Year 50 Recovery
40mAOD

Reference: RCGWM

13 Annexes

Annex A – Hydrogeological Conceptual Site Model

Annex B – Historical Mapping

Annex C Chain of Custody

Annex D Laboratory Results

Annex E Phasing of Proposed Restoration

Annex A – Hydrogeological Conceptual Site Model

ROCK COMMON QUARRY

HYDROGEOLOGICAL CONCEPTUAL SITE MODEL

v0.4

Issued: 18 November 2019

For Dudman Rock Common Ltd (DRCL)

Reference: 20190731 MgM Consulting

Prepared By:

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Contents

List of Tables

1 Introduction

H2Ogeo (David Walker) was instructed by Dudman Rock Common Ltd (DRCL) on 9 April 2019 to undertake a Hydrogeological Conceptual Site Model (HCSM) for the Rock Common Quarry, near Washington in West Sussex.

The following report describes the HCSM and a Statement of Limitations is presented in Section 5.

1.1 Background & Scope of Work

The currently approved restoration scheme (WS/15/97) for Rock Common Quarry ("the Site", "the Quarry") is no longer considered appropriate in terms of the final, very deep body of water and the potential for leachate pollution to pass into the lake from the now closed Windmill, Rough and The Rock Landfill sites.

An alternative restoration scheme is being considered whereby clean material would be imported to infill the void, to an agreed level, (approximately 40mAOD) thereby cutting off the potential pollution linkage.

This HCSM assesses the hydrogeological regime at the Site and should be used to inform the understanding of groundwater dynamics currently and post restoration.

1.2 Data Request

A data request was submitted by email to the Environment Agency on 24 April 2019 and information received on the 5 June 2019 and 14 August 2019.

The following data was requested:

- Licensing / Permit data for the Windmill Landfill located at The Pike/The Hollow, Washington, West Sussex;
- Monitoring data associated with the Windmill Landfill Site – Groundwater, Leachate;
- Monitoring reports associated with the Rock Common Sand Pit – groundwater, abstraction licences, discharge consents/permits;
- Groundwater elevation data from within 2Km of national grid reference: TQ 12580 13457
- Water quality results from the Honeybridge Stream;
- Water flow (Q) data of the Honeybridge Stream; and
- Daily rainfall data from 2014 to 2019 from the nearest rain gauge to TQ 12580 13457.

2 Site Setting

2.1 Background

The Site has been worked as an active sand quarry for over 90 years. The Site extends to an area of approximately 23 ha.

The Quarry is situated within the District of Horsham, West Sussex (NGR TQ 51246 11352) approximately 350 metres to the north-east of the village of Washington. At its nearest point the boundary of the South Downs National Park lies approximately 50 metres to the south of the Site following the line of the A283 road. The location is shown in Figure 1.

The A24 (Worthing to Dorking Road) runs within 100 metres of the western boundary. A narrow, unclassified road (which connects the A283 and A24 and known as "The Hollow") runs along the north-east boundary of the Quarry.

East of the Quarry and The Hollow are three former landfills known as The Windmill, The Rock and The Rough which have been historically landfilled with municipal waste. The Windmill and The Rock landfill sites were operated using dilute and disperse principals and the Rough is understood to have been an engineered containment operation.

These sites are shown in Figure 2 and all three have been restored with monitoring of gas, leachate and groundwater ongoing.

2.2 Environmental Designations

The following sites and designations were identified within 2km of the Site and are shown in Figure 3 with more details presented in Annex A[1].

2.2.1 Sites of Specific Scientific Interest (SSSI)

Chanctonbury Hill SSSI.

The SSSI lies on the steep chalk escarpment of the South Downs and is dominated by a nationally uncommon woodland type. There are also areas of chalk grassland, a habitat that has a restricted distribution nationally. The site supports a rich community of breeding birds[2].

2.2.2 Source Protection Zones

There is a Source Protection Zone approximately 1.5km south of the Site, associated with the Chalk Principal Aquifer, and a Public Supply Borehole.

2.2.3 Ancient Woodlands

There are several designated areas of Ancient Woodland within 2km, the closest being 700m south of the Site.

2.2.4 National Parks

The Site is not within the National Park however the South Downs National Park boundary runs along the A283 road south of the Site.

---

[1] https://magic.defra.gov.uk/magicmap.aspx?chosenLayers=lbuildIndex,backdropDIndex,backdropIndex,europeIndex,vmlBWIndex,25kBWIndex,50kBWIndex,250kBWIndex,miniscaleBWIndex,baseIndex&box=510047:112506:514887:114757&useDefaultbackgroundMapping=false

[2] https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1004144.pdf

2.2.5 Regionally Important Geological & Geomorphological Sites (RIGS)

The Rock Common Sand Pit is classified as a Regionally Important Geological Site (Ref: TQ11/41) due to the large-scale exposure of Folkestone Formation. It is conserved and protected by the Town and Country Planning Act 1990 (as amended) though not having the statutory management protection such as Sites of Special Scientific Interest[3].

There are no other sensitive environmental designations within 2km of the Site.

2.3 Topography

Regional topography is dominated by the Chalk escarpment of the South Downs that runs east west at over 200mAOD (Chanctonbury Hill c240mAOD) 1km south of the Site.

The regional topography shown in Figure 4 is based on the Ordnance Survey OS Terrain 50 data set.

The topography on Site is presented in Figure 5. Ground levels surrounding the Site range from 72mAOD on the Hollow Road in the north east of the Site to 52mAOD south of the Site. There are steep, near vertical sides, on the southern and western boundary with falls of 20m+ over less than 50m.

The north and north eastern boundaries have gentler slopes into the Quarry and the maximum base level is approximately 12mAOD in the central southern portion of the pit.

2.4 Geology

The Site is located within the Lower Greensand Bedrock positioned on the southern limb of the Pyecombe Anticline. To the south the Chalk forms the South Downs that overlie the Upper Greensand and Gault Clay. The Gault Clay confines the top section of the Lower Greensand in the south leaving only around 1km to the north unconfined. Further north, approximately 1km the Weald Clay Outcrops.

Structurally the beds dip between 5° and 10° to the south.

The Lower Greensand can be subdivided into Folkestone Formation in the south and the Sandgate and Hythe Beds in the north of the Site. These sediments are interpreted as having been deposited in shallow marine environments with strong tidal currents.

The Folkestone Formation is present with faces up to 30m high overlain by Gault Clay. The Folkestone Formation is a yellow and red fine to medium grained cross-bedded sand with sets ranging from 1 to 3m. The Sandgate and Hythe Beds are grey green, fine grained sandstones and siltstones. The Folkestone Formation and Sandgate Beds are divided in this region by the Marehill Clay.

The geology is presented in Figure 6 and consists of the following sequence:

- Gault Clay;
- Lower Greensand Group;
  - Folkestone Formation;
  - Marehill Clay;
  - Sandgate Beds;
  - Hythe Beds; and
- Weald Clay.

---

[3] Sussex RIGS Ref No TQ11/41

There are Superficial Deposits to the west of the Site that run north along a valley feature, which have been classified as Head Deposits. Head Deposits consist of poorly sorted and poorly stratified, angular rock debris and/or clayey hillwash and soil creep, mantling a hillslope and deposited by solifluction and gelifluction processes[4].

2.5 Hydrogeology

The Lower Greensand aquifer consists of variable sands and sandstones that are commonly glauconitic or iron-rich, with local clay-rich or sandy limestone beds. Yields of up to about 50 l/sec have been obtained and the water is typically soft and iron rich[5]. The Folkestone Formation, within the Lower Greensand Group, is classified as a Principal Aquifer meaning it has a high intergranular permeability. High storage (estimates of the storage coefficient vary from 10-05 to 0.086) within the Folkestone Formation can provide diffuse baseflow to rivers and a characteristic steady groundwater head with minimal seasonal flux.

Estimates for transmissivity in the Lower Greensand range from 33m^2/day to 3400m^2/day with a geometric mean and median of 270m^2/day. These estimates come from 40 locations situated on the Lower Greensand throughout southern England and the aquifer properties are extremely variable.

Hydraulic conductivity in the Lower Greensand is also extremely variable due to the variable cementing and presence of ironstone bands. Literature values presented in *The Physical Properties of Major Aquifers in England and Wales*[6] suggest ranges from 3 to 60m/day and quoted typical values have been suggested as between 12 and 40m/day as typical *(Izatt and Fox (1981)*.

Overall the Folkestone Formation can be considered an intergranular matrix flow aquifer with some element of fracture flow in beds where ironstone or harder sandstones are present. It has a high storage capacity for groundwater and transmits water easily.

There is some evidence indicating the Folkestone Formation and Sandgate and Hythe Beds are hydraulically discrete from one another at the Site. This is based on chemical properties where pH values in the Folkestone Formation are typically lower that those recorded in the Sandgate and Hythe Beds. The Marehill Clay has low permeability characterised by an estimated at 4x10^{-10}m/sec vertical and 4.6x10^{-09}m/sec horizontal hydraulic conductivity (Southern Science 1992). Previous investigations at the Site have indicated an upward head through the Marehill Clay from the Sandgate Beds and into the Folkestone Formation with an estimated leakage of only 2m^3/day.

Springs are noted to issue south of the Site where the Chalk outcrops onto the Gault Clay. The Gault Clay is an unproductive strata and has a low permeability. Where the Gault Clay overlies the southern portion of the Lower Greensand artesian conditions have been noted in the underlying aquifer.

Springs are also known to issue from the contact of the Lower Greensand and Weald Clay where they flow north of the Site to the River Rother.

Other than the dewatering abstractions in the Quarry (see Section 2.8) the closest groundwater abstraction (approximately 1.75km east north east of the Site)(NGR TQ 14450 14240) is licensed to D J Squire and Company Ltd at Washington Garden Centre for the abstraction of up to 40m^3/day (8000m^3/annum) from the Hythe Beds

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[4] https://www.bgs.ac.uk/lexicon/lexicon.cfm?pub=HEAD

[5] http://www.bgs.ac.uk/research/groundwater/shaleGas/aquifersAndShales/maps/aquifers/LowerGreensand.html

[6] http://nora.nerc.ac.uk/13137/1/WD97034.pdf Technical Report WD/97/34

2.6 Hydrology

To the west of the Site is the Honeybridge Stream and to the east is the Buncton Stream, which both flow north and have their confluence approximately 3km north east of the Site (Figure 7).

Limited flow data for the Honeybridge Stream has been obtained from the Environment Agency for the period between 1963 and 1991. It shows a peak flow of $0.329m^3$/second in January 1965 and a mean average flow rate of approximately $0.09m^3$/second during this incomplete 28-year period. The long-term monthly averages are presented in Figure 8 and indicate a recession in recorded flow rates from January, with spikes during summer months and then a rise again in December[7].

2.7 Groundwater Monitoring

The Environment Agency receive quarterly groundwater monitoring data from the Windmill Landfill Site and this is presented in Annex B. Figure 9 shows monitoring points that have been identified from the data collected and a summary of their details, where available, is shown in Table 1.

Table 1 Groundwater Monitoring Points - Windmill Landfill Site

Borehole ID	***Easting***	***Northing***	***Top of Borehole (mAOD)***	***Plumb Depth (mbgl)***	***Toe Elevation (mAOD)***
BH101	512896	113690	60.16	16.29	43.87
BH102	512889	113481	65.89	41.81	24.08
BH103	513076	113452	65.40	44.05	20.00
BH104	513665	113439	61.57	40.46	21.11
BH106	513704	113648	50.73	7.76	42.97
BH107	513467	113643	65.89	5.96	59.93
BH108	513269	113466	57.48	35.02	22.46
BH109	513453	113425	58.51	37.82	20.69
BH110	513573	113686	48.72	4.41	44.31
BH111b	513255	113726	56.4	7.1	49.3
FBB3	512885	113434	63.52	48.7	14.82

Groundwater monitoring elevations from May 2018 have been plotted and are presented in Figure 10. Between February 2018 and November 2018 groundwater elevations ranged from 18.15mAOD in FBB3 and 61.83mAOD in BH107.

Using the May 2018 monitoring data[8], groundwater flow direction beneath the western portion of the Windmill Landfill Site flows from the north east to south west, towards the Quarry. The elevations also indicate that groundwater along the western and southern boundaries (BH104, BH108, BH109 and FBB3), closest to the Site, are significantly lower than those up hydraulic gradient in BH101, BH106, BH111B and BH110. This suggests the dewatering at the Quarry has significant influence on the hydraulic regime.

---

[7] Limited data was made available for this monitoring point.

[8] May 2018 data set is the most complete with relevant borehole measurements.

2.8 Rock Common Dewatering

2.8.1 Historic Groundwater Elevations

A review of previous investigations has suggested the dewatering at the Quarry has suppressed groundwater elevations by 30 to 35m. For the purpose of this HCSM natural groundwater elevations are based on the anticipated levels discussed in the BCL Hydrogeological and Hydrological Assessment[9], assumed to be c40mAOD.

To safely win and work the sands the Site has been actively dewatered since at least 1986. The overall abstraction from the Site was licensed for 6000m^3/day in 1986 with a total daily discharge permitted (EA Consent No: P632/S/86) to the Honeybridge Stream of 8637m^3/day.

The data shown in Figure 11 is the daily pumping volumes achieved from the Site in 2018.

In 2018 Pump 1 ran for 257 days in 2018 and Pump 2 for 278. The average combined daily pumping rate was 4033m^3/day (46.7 Litres/second) with Pump 2 averaging a slightly higher rate than Pump 1, 2590m^3 and 1440m^3 respectively.

For most of 2018 abstraction was dominated by Pump 2 until October 2018 when Pump 1 dominated for the remainder of the year. There appears to be a relationship between rainfall and pumped volumes shown in the cumulative pumping chart, Figure 12.

In 2018 a total of 1472192m^3 of groundwater was abstracted from the Quarry to maintain the water table below the excavation's base level (10 to 12mAOD).

2.9 Leachate Monitoring

Leachate data is collected quarterly from the former Windmill Landfill Site and issued to the Environment Agency. Monitoring data has been received from the Environment Agency for levels of leachate and quality from 17 leachate wells, the locations of which are presented in Figure 9.

2.9.1 Leachate Levels and Thickness

Table 2 below describes the condition of the leachate wells based on the reported monitoring data:

Table 2 Summary of Leachate Wells

No'	***Well ID***	***Top of Well (mAOD)***	***Base of Well (mAOD)***	***Depth of Leachate Well (m)***	***Condition***
1	LWA1	53.18	46.15	7.03	Well Blocked
2	LWA2	52.38	45.26	7.12	Sample point inaccessible
3	LWA4	54.82	-	-	Sample point inaccessible
4	LWA5	56.87	-	-	Sample point inaccessible
5	LWA6	54.69	51.18	3.51	Sample point inaccessible
6	LWB10	66.24	49.39	16.85	Well Dry
7	LWF11	68.03	55.68	12.35	No comments
8	LWF12	69.52	62.02	7.5	No comments
9	LWF18	78.5	71.05	7.45	Well Dry
10	LWF19	75.95	67.6	8.35	Sample point inaccessible
11	LWF9	68.24	0		Well Dry
12	LWGE12	51.33	39.06	12.27	Well Dry
13	LWGE14	58	50.9	7.1	Sample point inaccessible

---

[9] Rock Common Quarry, Hydrogeological and Hydrological Assessment, 15 January 2004, BCL Consultant Hydrogeologists Ltd, prepared for Tarmac Southern Ltd.

No’	Well ID	Top of Well (mAOD)	Base of Well (mAOD)	Depth of Leachate Well (m)	Condition
14	LWGE15	57.62	52.82	4.8	Sample point inaccessible
15	LWGE16	56.88	44.62	12.26	Sample point inaccessible
16	LWGE19	68.32	60.81	7.51	Well Dry
17	LWGE3	56.16	-	-	Historic

Based on a review of the monitoring data seven wells have been monitored over 2018, these are:

- LWB10;
- LWF11;
- LWF12;
- LWF18;
- LWF9;
- LWGE12; and
- LWGE19.

Of these seven wells, one well consistently shows the presence of leachate in 2018, LWF11, with sporadic readings obtained from LWF12 and LWF19.

The leachate thickness in LWF11 varied from 4.64m to 4.2m over the monitoring period.

2.9.2 Leachate Quality

The leachate quality data received for 2018 represents three rounds of monitoring, March, July and December 2018. The average concentrations for 2018 are presented in Table 3 below:

Table 3 Average Leachate Concentrations in 2018

Analyte	Units	LWF11 Average Concentrations	LWF12 Average Concentrations
ALKALINITY AS CaCO3	mg/l	3010.00	150.00
AMMONIACAL NITROGEN	mg/l	600.50	
AMMONIACAL NITROGEN AS N	mg/l		3.25
ARSENIC	mg/l	0.01	
BOD + ATU (5 DAY)	mg/l	43.67	3.33
CADMIUM, TOTAL AS CD	mg/l		
CALCIUM TOTAL AS CA	mg/l	117.00	125.00
CHEMICAL OXYGEN DEMAND	mg/l	689.33	28.33
CHLORIDE AS CL	mg/l	612.00	69.13
CHROMIUM, TOTAL AS CR	mg/l	0.01	
COPPER TOTAL AS CU	mg/l		
ELECTRICAL CONDUCTIVITY	uS/cm	7356.67	1063.33
IRON, TOTAL AS FE	mg/l	3.61	6.87
LEAD TOTAL AS PB	mg/l		
MAGNESIUM AS MG	mg/l	76.93	28.40
MANGANESE AS MN	mg/l	0.26	2.78
NICKEL TOTAL AS NI	mg/l	0.06	0.04
NITROGEN TOTAL OXIDISED AS N	mg/l	0.80	0.70

Analyte	Units	LWF11 Average Concentrations	LWF12 Average Concentrations
pH	Unitless	7.37	6.07
POTASSIUM AS K	mg/l	298.67	8.72
SODIUM AS NA	mg/l	459.33	48.47
SULPHATE AS SO4	mg/l	24.80	395.00
TOTAL ORGANIC CARBON	mg/l	151.73	15.00
ZINC	mg/l	0.08	0.11

The concentrations are indicative of a typical leachate profile with significantly elevated Ammonia, Electrical Conductivity, Chloride and Metals present. The average leachate quality data from 2018 in LWF11 is presented in Table 4 compared to the average groundwater quality concentrations for 2018 in BH14.

Table 4 Average Leachate versus Groundwater Concentrations in 2018

Analyte	Units	Leachate LWF11 Average 2018 Concentrations	Groundwater BH104 Average 2018 Concentrations
ALKALINITY AS CaCO3	mg/l	3010.00	90.9
AMMONIACAL NITROGEN	mg/l	600.50	
AMMONIACAL NITROGEN AS N	mg/l		1.65
ARSENIC	mg/l	0.01	
BOD + ATU (5 DAY)	mg/l	43.67	
CADMIUM, TOTAL AS CD	mg/l		
CALCIUM TOTAL AS CA	mg/l	117.00	32.15
CHEMICAL OXYGEN DEMAND	mg/l	689.33	16.5
CHLORIDE AS CL	mg/l	612.00	54.25
CHROMIUM, TOTAL AS CR	mg/l	0.01	
COPPER TOTAL AS CU	mg/l		
ELECTRICAL CONDUCTIVITY	uS/cm	7356.67	426.5
IRON, TOTAL AS FE	mg/l	3.61	33.33
MAGNESIUM AS MG	mg/l	76.93	9.3
MANGANESE AS MN	mg/l	0.26	0.167
NICKEL TOTAL AS NI	mg/l	0.06	0.011
NITROGEN TOTAL OXIDISED AS N	mg/l	0.80	
pH	Unitless	7.37	5.95
POTASSIUM AS K	mg/l	298.67	6.6
SODIUM AS NA	mg/l	459.33	28.7
SULPHATE AS SO4	mg/l	24.80	51.35
TOTAL ORGANIC CARBON	mg/l	151.73	3.9
ZINC	mg/l	0.08	

It can be seen that average leachate concentrations, on the whole, exceed groundwater concentrations by at least one order of magnitude apart from Total Iron (FE) and Sulphate as SO4.

3 Hydrogeological Conceptual Site Model

A conceptual model is defined as *"A simplified representation of how the real system is believed to behave based on a qualitative analysis of field data. A quantitative conceptual model includes preliminary calculations for key* processes."[10]

The Hydrogeological Conceptual Site Model (HCSM) is presented in Figures 13, 14 and 15 showing the following scenarios:

1. Existing situation;
2. Approved restoration scheme;
3. Proposed restoration scheme.

Each scenario has undergone a source pathway receptor assessment to understand potentially complete linkages.

3.1 Existing Situation

Currently groundwater is dewatered from the base of the Quarry maintaining a dry working platform by forming a cone of depression beneath the former landfill sites to the north east. This scenario is presented in Figure 13.

Abstracted groundwater is pumped to the discharge point at the Honeybridge Stream south west of the Site.

The dewatering system is required to maintain a dry working platform and during down-times anecdotal evidence of groundwater recovery in a matter of hours has been reported.

Figure 13 presents a summary of the potential source pathway receptor linkages associated with the existing situation and these are summarised in Table 5 below:

Table 5 Source Pathway Receptor - Existing Situation

Potential Sources	***Pathways***	***Receptors***
Landfill leachate	Dermal/ingestion Groundwater flow – matrix and fracture flow Dewatering system – discharge & surface water	Site workers during maintenance on pumps, dewatering equipment Groundwater Honeybridge Stream
Contaminated groundwater		
Spills, Incidents in Rock Common Quarry	Dermal/Ingestion/Inhalation Unsaturated zone infiltration Groundwater flow – matrix and fracture flow Dewatering system – discharge & surface water	Site workers Groundwater Honeybridge Stream

---

[10] Environment Agency NC/99/38/2

3.2 Approved Restoration Scheme

The approved restoration scheme is presented in Annex C and the HCSM in Figure 14.

Groundwater would be allowed to recover to natural levels in the Quarry (c40mAOD) with landscaping and planting taking place. The proposed lake would have steep sides and would be approximately 30m deep, unacceptable in today's Quarry Regulations.

Groundwater would no longer be controlled through dewatering and could enter the bodies of waste in the unlined landfills north east of the Site. This has the potential to create a significant pollution risk and receptors would include groundwater, recreational users and surface water in the area.

Table 6 summarises the potential source pathway receptor linkages:

Table 6 Source Pathway Receptor - Existing Situation

Potential Sources	***Pathways***	***Receptors***
Landfill body of waste, landfill leachate, contaminated groundwater	Surface water migration in proposed lake	Lake Water
		Groundwater
		Honeybridge Stream and other surface water bodies receiving groundwater recharge following recovery
		Reactivated springs in the area following groundwater recovery
	Groundwater flow – matrix and fracture flow	Lake Water
		Groundwater
		Honeybridge Stream and other surface water bodies receiving groundwater recharge following recovery
		Reactivated springs in the area following groundwater recovery
	Dermal/Ingestion	Recreational users of the lake and biodiversity in the lake (high ammonia levels, metals)
		General population, including livestock, coming into contact with reactivated springs following groundwater recovery

3.3 Proposed Restoration Scheme

Suitable, inert-classified engineering and restoration materials are proposed to be imported to infill the Site, to an agreed level, (approximately 40mAOD).

A 1m thick engineered clay liner would be installed, incorporating the existing Marehill Clay on the eastern boundary, with inert restoration materials deposited on top. This liner will prevent potentially contaminated groundwater from entering the Site and so remove many of the potential pollution linkages.

It is proposed to extend the headworks of the existing dewatering operations prior to each lift of inert material to maintain the existing cone of depression. Over time dewatering will be phased out and a carefully managed cessation of pumping take place. It is proposed to install monitoring points around the perimeter of the Quarry to ensure that the dewatering remains effective and the cessation of pumping, when relevant, is managed correctly. These monitoring points will be capable of recording groundwater elevations and obtaining groundwater samples for analysis.

Table 7 summarises the potential source pathway receptor linkages associated with the proposed scheme and the HCSM is presented in Figure 15:

Table 7 Source Pathway Receptor – Proposed Scheme

Potential Sources	***Pathways***	***Receptors***
Landfill leachate	Groundwater flow – matrix and fracture flow Dewatering system – discharge & surface water	Site workers during maintenance on pumps, dewatering equipment Groundwater & Honeybridge Stream
Contaminated groundwater		
Spills, Incidents in Rock Common Quarry	Dermal/Ingestion/Inhalation	Site workers

4 Summary

The existing dewatering system is having a significant effect on groundwater elevations, flow direction and hydraulic gradients in the area. Based on previous assessments groundwater would be expected to recover to 40mAOD in Rock Common Sand Pit following cessation of dewatering.

Recovery of groundwater elevations to 40mAOD could have significant environmental impacts through the mobilisation/re-mobilisation of contaminants in the unsaturated zone that have leached from the nearby landfill sites to the north east of the Site. Nearby springs could be reactivated potentially introducing and completing new pollution linkages between impacted groundwater and receptors.

The currently approved lake restoration scheme by Tarmac is no longer considered appropriate. The proposed scheme would consist of an engineered barrier and then infilling of the Quarry void with suitable, inert-classified engineering and restoration materials.

Both the existing situation and currently approved final restoration scheme pose threats to the environment and receptors through the migration of contaminants from the former landfills, leaving steep and exposed faces of the Quarry, creating a deep body of open water and introducing pollutants into the Honeybridge Stream.

4.1 Recommendations

To further the understanding of the hydrogeological regime a groundwater flow model is recommended. It will be necessary to install additional, new piezometers close to the boundary of the Site to obtain groundwater elevation data. This information would be used to construct and calibrate the model as well as providing long-term checks on water levels and quality as necessary.

The model outputs would take account of the existing groundwater regime, the currently approved scheme and the proposed scheme in order to fully and properly inform a decision on how best to proceed in the interests of protecting potential receptors such as groundwater and the environment.

In addition, water samples would be collected from the Honeybridge Stream at two locations, up and down-stream of the dewatering discharge, to understand if there are any current observable effects on water quality.

5 Statement of Limitations

This report was prepared in accordance with the scope of work outlined within this report and is subject to the applicable cost, time and other constraints.

H2Ogeo performed the services on behalf of the Client (Dudman Rock Common Ltd) in a manner consistent with the normal level of care and expertise exercised by members of the environmental profession. No warranties, expressed or implied, are made.

Except as otherwise stated, H2Ogeo's assessment is limited strictly to the scope of work outlined in Section 1.1 and does not evaluate structural or geotechnical conditions of any part of the Site (including any buildings, equipment or infrastructure) or outside the Site boundary.

All conclusions and recommendations made in the report are the professional opinions of H2Ogeo personnel involved with the project and, while normal checking of the accuracy of data has been conducted, H2Ogeo assumes no responsibility or liability for errors in data obtained from external sources, regulatory agencies or any other external sources, nor from occurrences outside the scope of this project.

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6 Figures

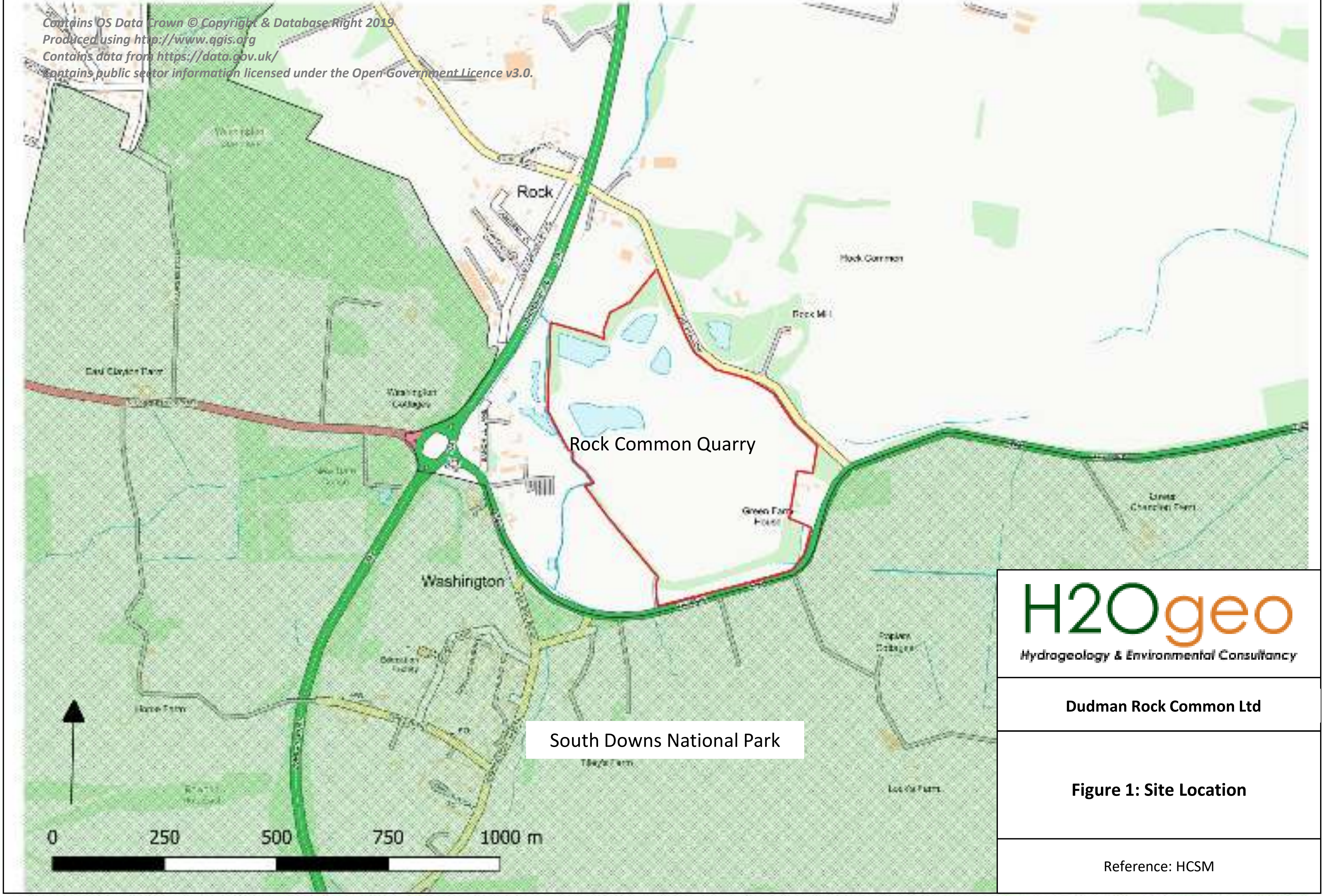

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Figure 1: Site Location

Reference: HCSM

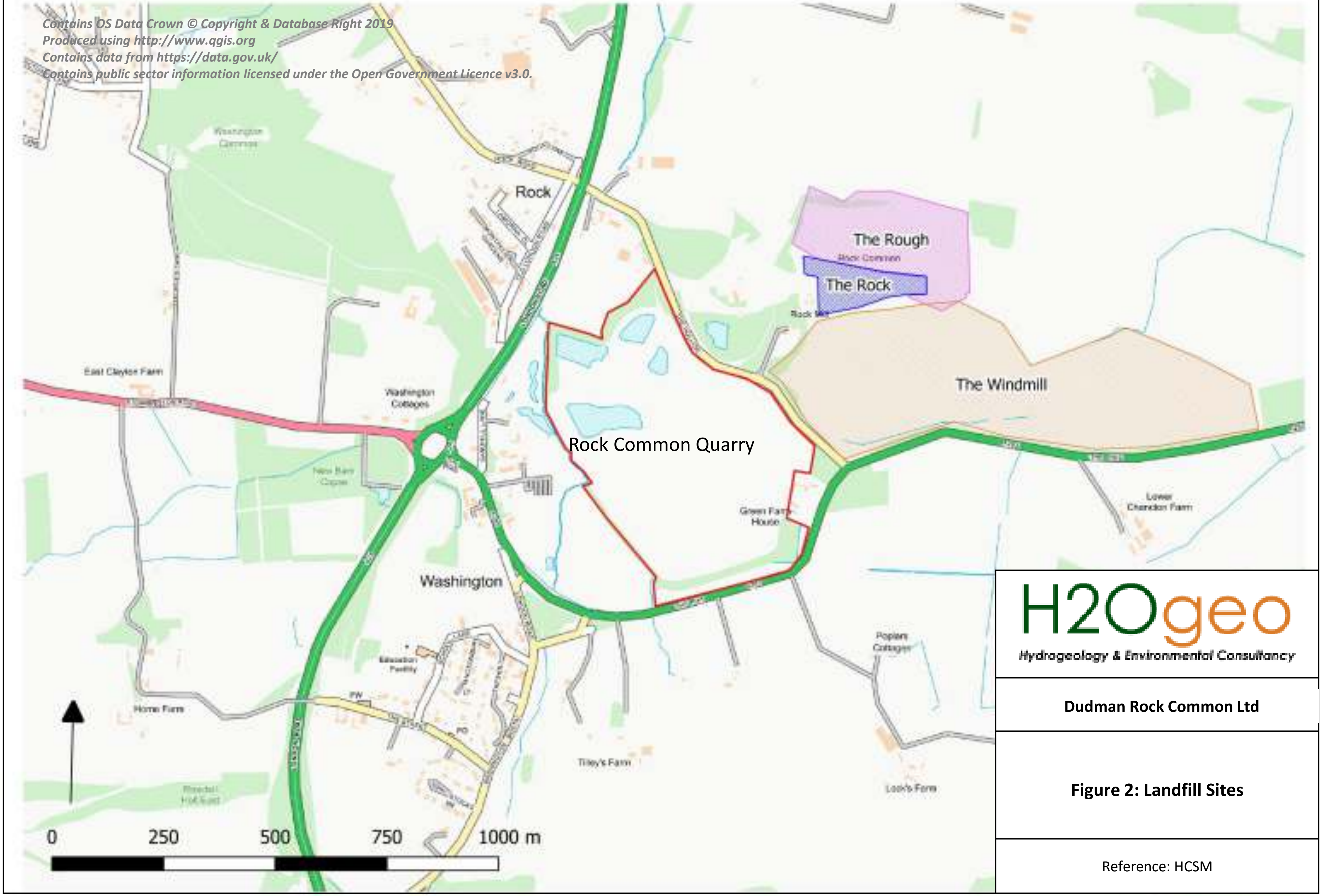

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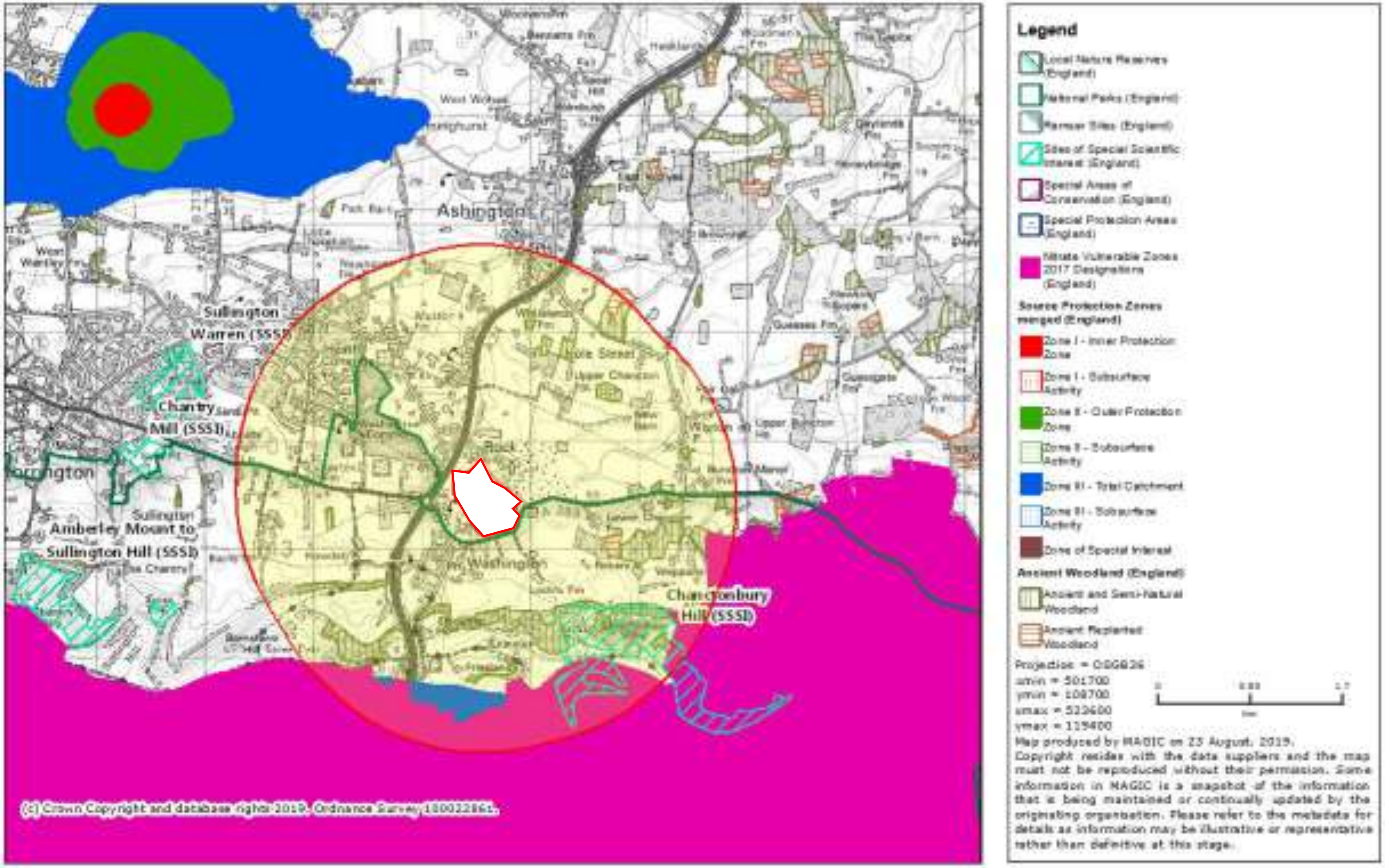
Figure 2: Landfill Sites

Reference: HCSM

MAGIC

Rock Common



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ymax = 119400
Map produced by MAGIC on 23 August, 2019.
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Dudman Rock Common Ltd	**Figure 3: Environmental Designations**	Reference: HCSM

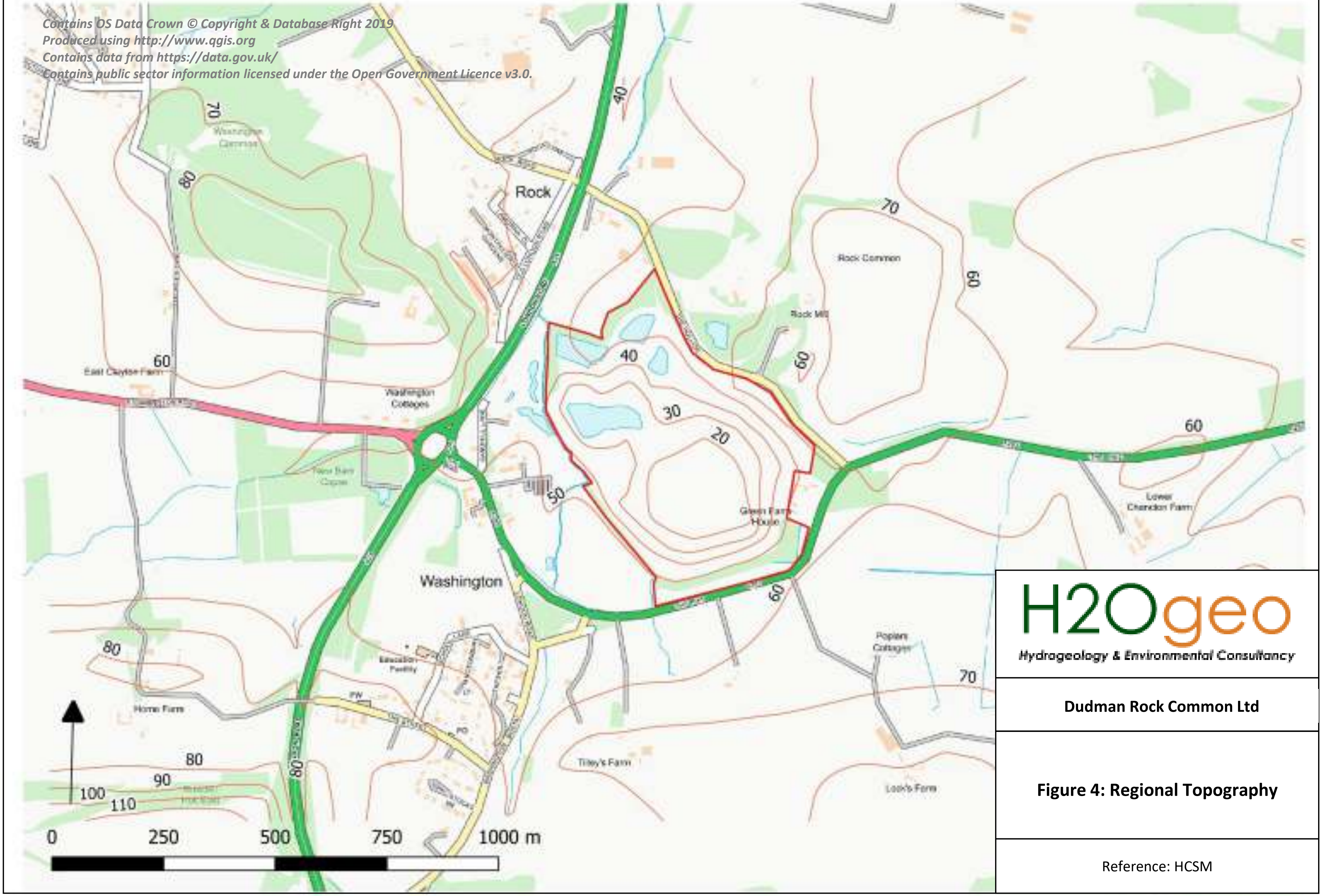

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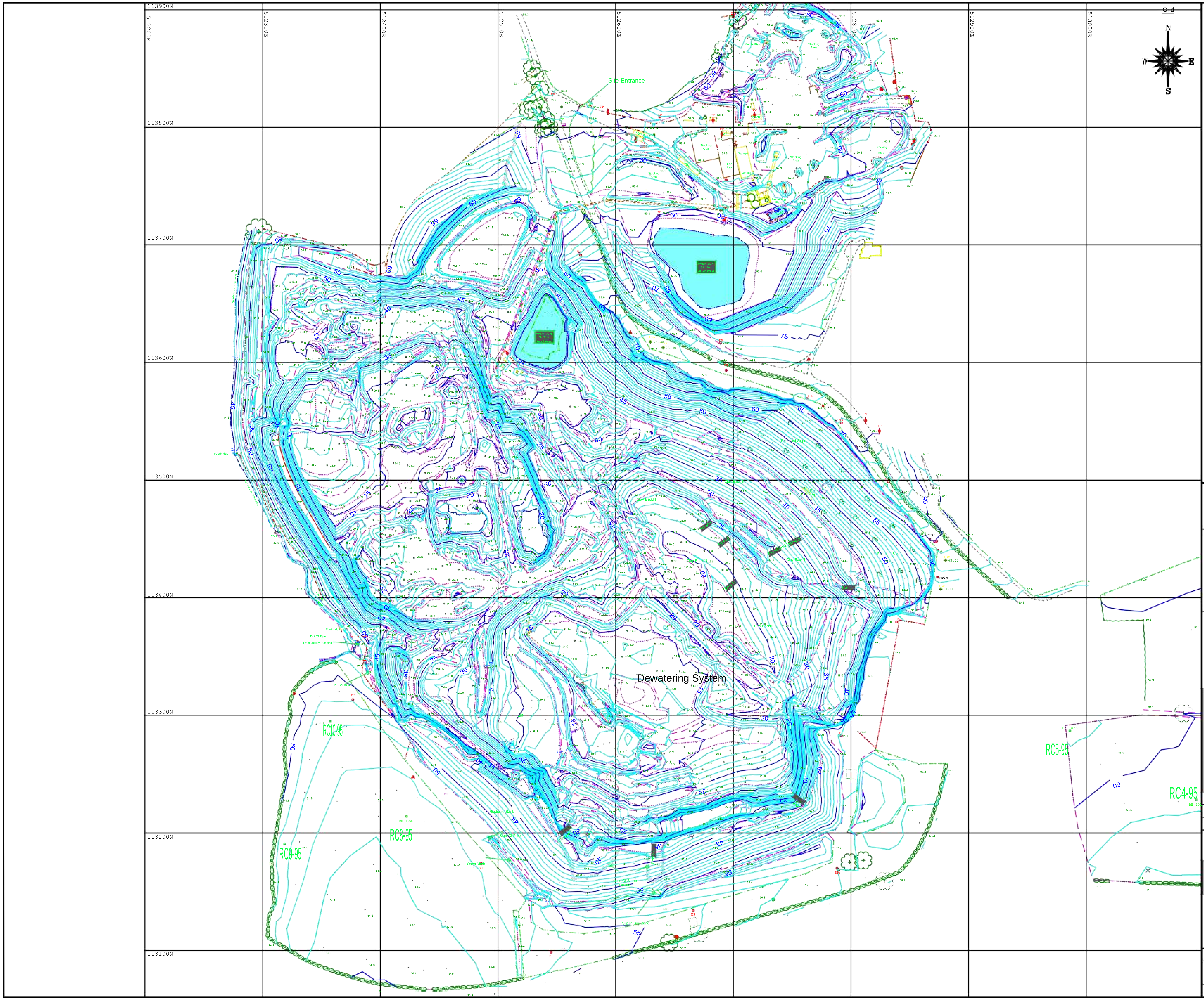
Figure 4: Regional Topography

Reference: HCSM



LEGEND

BANKING	SLOPING MASONRY
BUSHES & HEDGES	STILE
MARSH	WALL Width drawn to scale
TREES 3T / 0.2 / 6 No of Trunks / Dia of Bole / Height of Tree	BUILDING
NOTE:- SPREADS AND HEIGHTS ARE INDICATIVE ONLY	OPEN SIDED BUILDING
GATES (Single, Double)	GLASS ROOFED
RETAINING WALL (RTW)	CONTOURS

ABBREVIATIONS (WHERE APPLICABLE)

AIR VALVE	AV	LETTER BOX	LB
BED LEVEL	BL	MANHOLE	MH
BELISHA BEACON	BB	MARKER	MKR
BOLLARD	B	NOTICE BOARD	NB
BRITISH TELECOM BOX	BTB	NAME PLATE	NP
BRITISH TELECOM MANHOLE	BTMH	OVERHEAD WIRES	OHW
BRICKWORK	BKWK	PARKING METER	PM
BUS STOP	BS	RIDGE LEVEL	RID
CABLE TV	CATV	ROAD SIGN	RS
COVER LEVEL	CL	RODDING EYE	RE
CABLE MARKER	CM	RETAINING WALL	RTW
CONCRETE POST	CP	SLUICE VALVE	SV
DOWN PIPE	DP	STOP COCK	SC
EAVES LEVEL	EAV	SOFFIT LEVEL	SOF
ELECTRICITY CABLE PIT	ELCP	STRUCTURAL SLAB LEVEL	SSL
ELECTRICITY CONTROL BOX	ECB	TREE STUMP	ST
ELECTRICITY POLE	EP	TELEGRAPH POLE	TP
EARTH ROD	ER	TELEPHONE CALL BOX	TCB
FIRE HYDRANT	FH	TOP OF KERB	TK
FLOWER BED	FB	TURNSTILE	TS
FOOTPATH	FP	TRAFFIC LIGHT	TL
FLOOR LEVEL	FL	TOP OF WALL	TW
FLAG STAFF	FS	UNDERGROUND	UG
GAS VALVE	GV	UNABLE TO LIFT	UTL
GULLY	G	UNABLE TO SURVEY	UTS
GULLY OUTLET	GO	VENT PIPE	VP
GATE STOP	GS	WATER METER	WM
INSPECTION COVER	IC	WATER LEVEL	WL
INVERT LEVEL	IL	WASH OUT	WO
LAMP POST	LP	WASTE PIPE	WP
		WATER VALVE	WV
BUILDING		**BUILDING**	
ACCESS HATCH	AH	WINDOW CILL LEVEL	WCL
ARCH HEAD HEIGHT	AHH	WINDOW HEAD LEVEL	WHL
ARCH HEAD LEVEL	AHL	SKYLIGHT	SL
ARCH SPRINGER HEIGHT	ASH	SOIL AND VENT PIPE	SVP
ARCH SPRINGER LEVEL	ASL	THRESHOLD LEVEL	THL
BEAM	BE	WASH BASIN	WB
BEAM HEIGHT	BH	WATER TANK	WT
BEAM HEAD LEVEL	BHL	**FENCES**	
BEAM SOFFIT LEVEL	BSL	BARBED WIRE FENCE	BWF
COLUMN	Col	CORRUGATED IRON FENCE	CIF
CILL TO HEAD	C-H	CLOSE BOARD FENCE	CBF
CEILING LEVEL	CL	CHAIN LINK FENCE	CLF
DOOR HEAD	DH	CHESTNUT PALING FENCE	CPF
DOOR HEAD LEVEL	DHL	FENCE POST	FPO
FIRE ALARM	FA	INTERWOVEN FENCE	IWF
FLOOR TO CILL	F-C	IRON RAILING FENCE	IRF
FALSE CEILING	FC	LARCH LAP FENCE	LLF
FLOOR TO CEILING HEIGHT	1234	POST AND CHAIN FENCE	PCF
FINISHED FLOOR LEVEL	FFL	POST AND RAIL FENCE	PRF
HOSE REEL	HR	POST AND WIRE	PWF
ROOF LEVEL	RL	STEEL PALISADE SECURITY FENCE	SPSF
RADIATOR	Rad	TUBULAR STEEL RAIL	TSRF
RAIN WATER PIPE	RWP		

REV.	NOTES	DWN	DATE

ISO 9001 REGISTERED FIRM
Certificate Number: GB 6562

A MEMBER OF THE SURVEY ASSOCIATION

ISO 14001 REGISTERED FIRM
Certificate Number: GB 11414

Notes:

Grid and levels relate to OS GPS Active Network.

Maltby Land Surveys Ltd

2 QUEENS ROAD
HAYWARDS HEATH
WEST SUSSEX
RH16 1EB

Tel: 01444 416246
Fax: 01444 417697
E-Mail: mls@maltbysurveys.com
WebSite: http://www.maltbysurveys.com

SURVEYED	GEO
DRAWN	NBJ
CHECKED	RAM

DUDMAN GROUP

SCALE
1/1500 (A1 Sheet)

ROCK COMMON, WASHINGTON

FIGURE 5: TOPOGRAPHICAL SURVEY

Job No	Rev	Drawing Number
15/500		15/500/102

Date : APRIL 2019

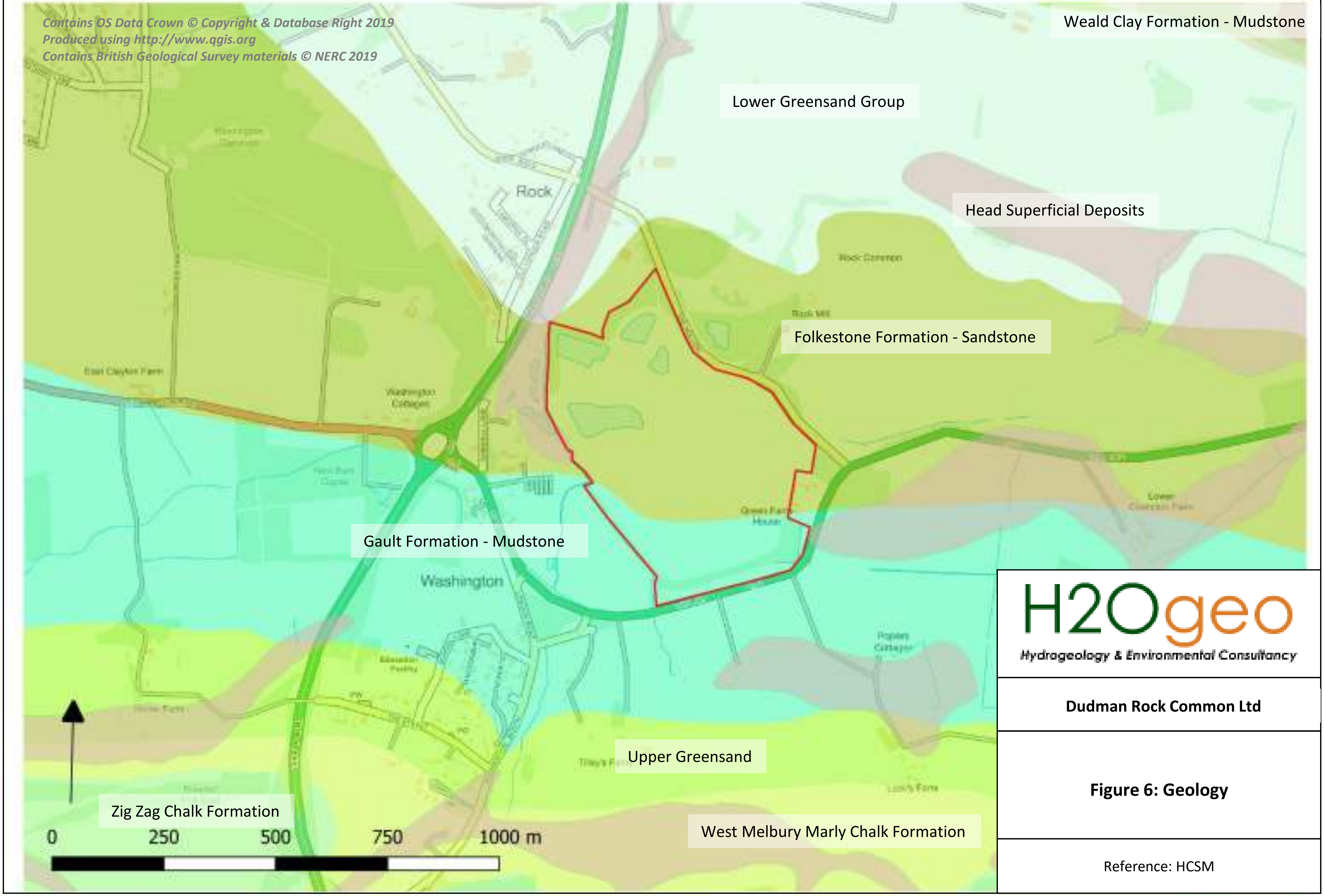


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Figure 6: Geology

Reference: HCSM

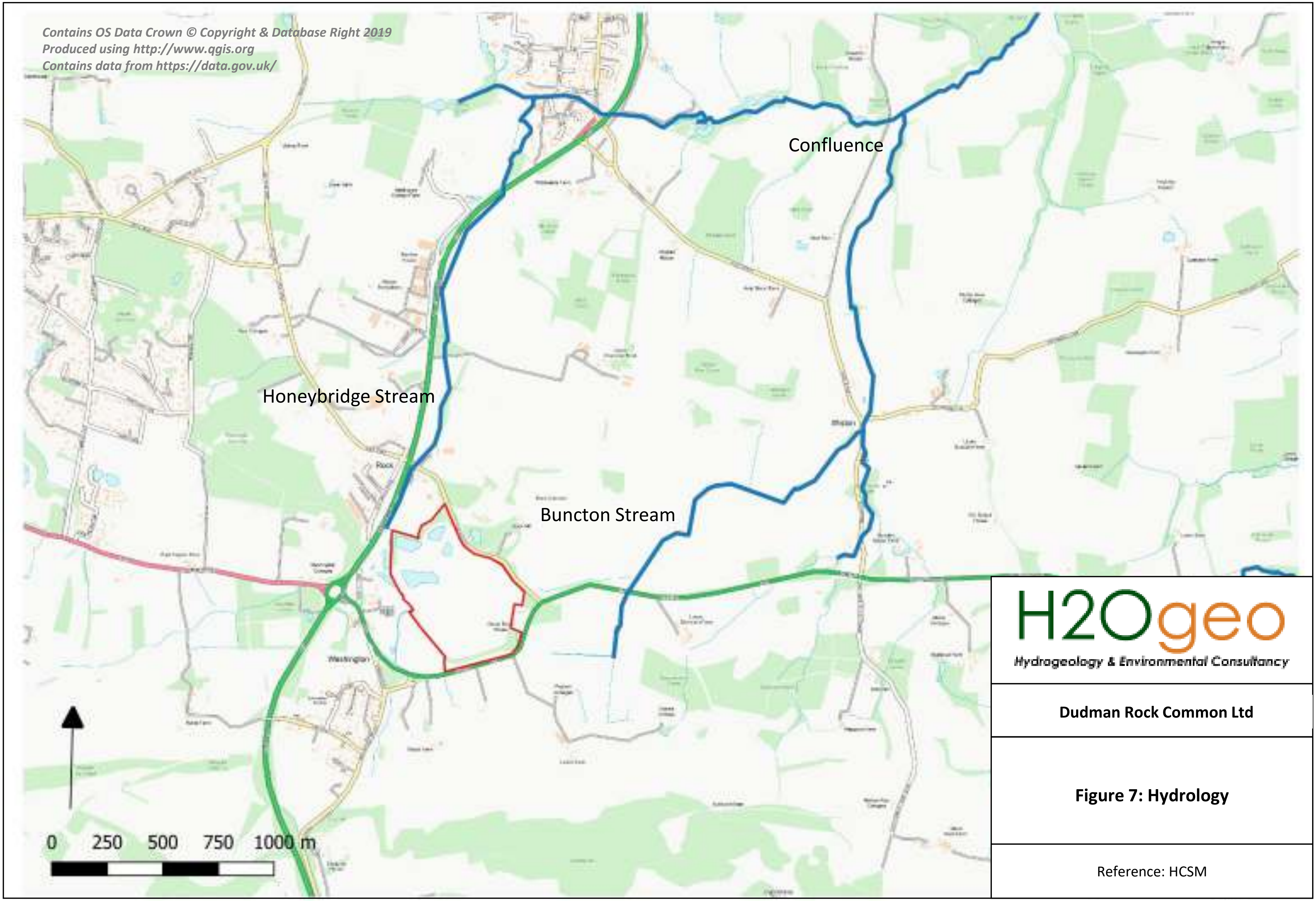

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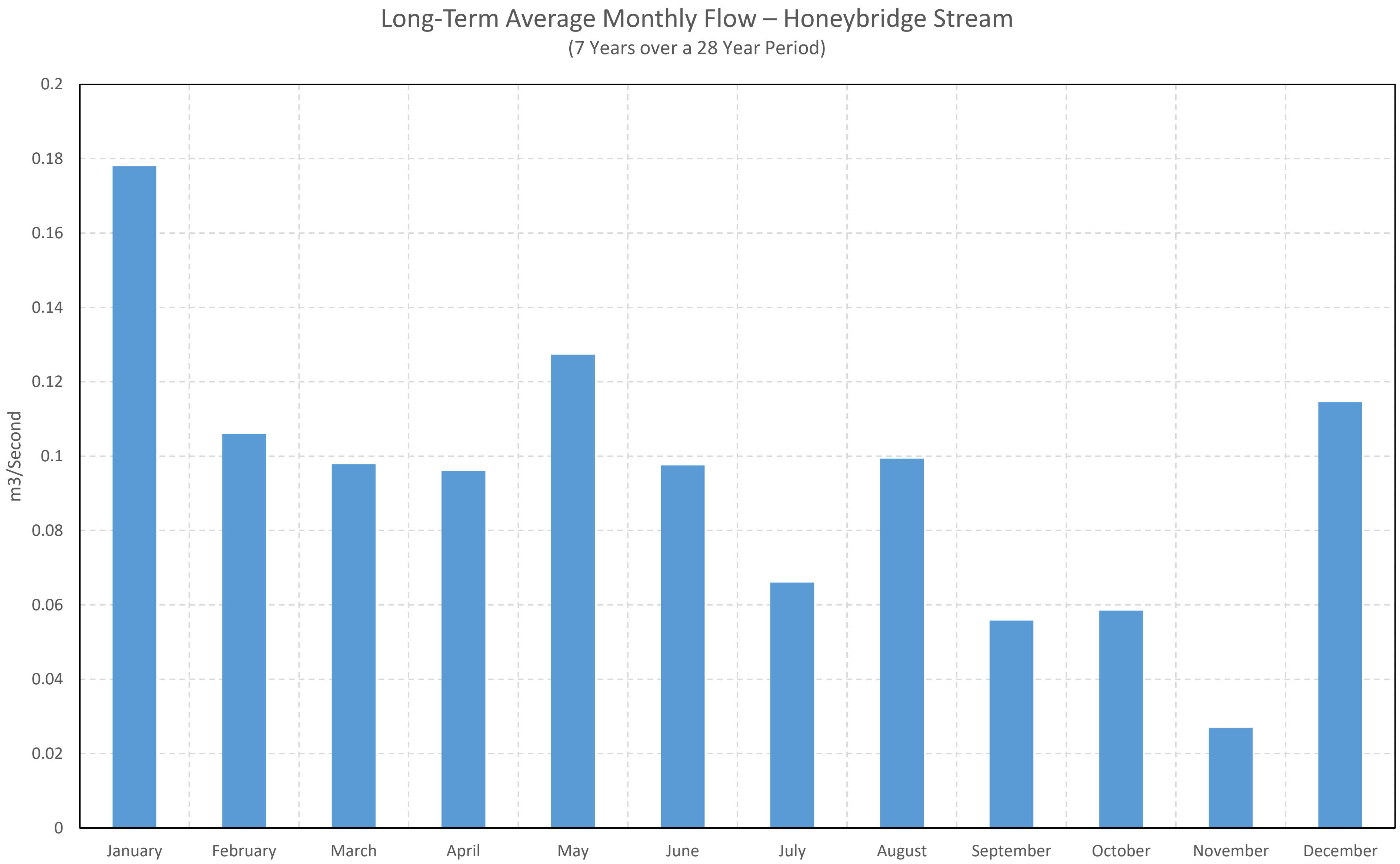
Figure 7: Hydrology

Reference: HCSM



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Dudman Rock Common Ltd	**Figure 8: Long-Term Average Flow Honeybridge Stream**	Reference: HCSM

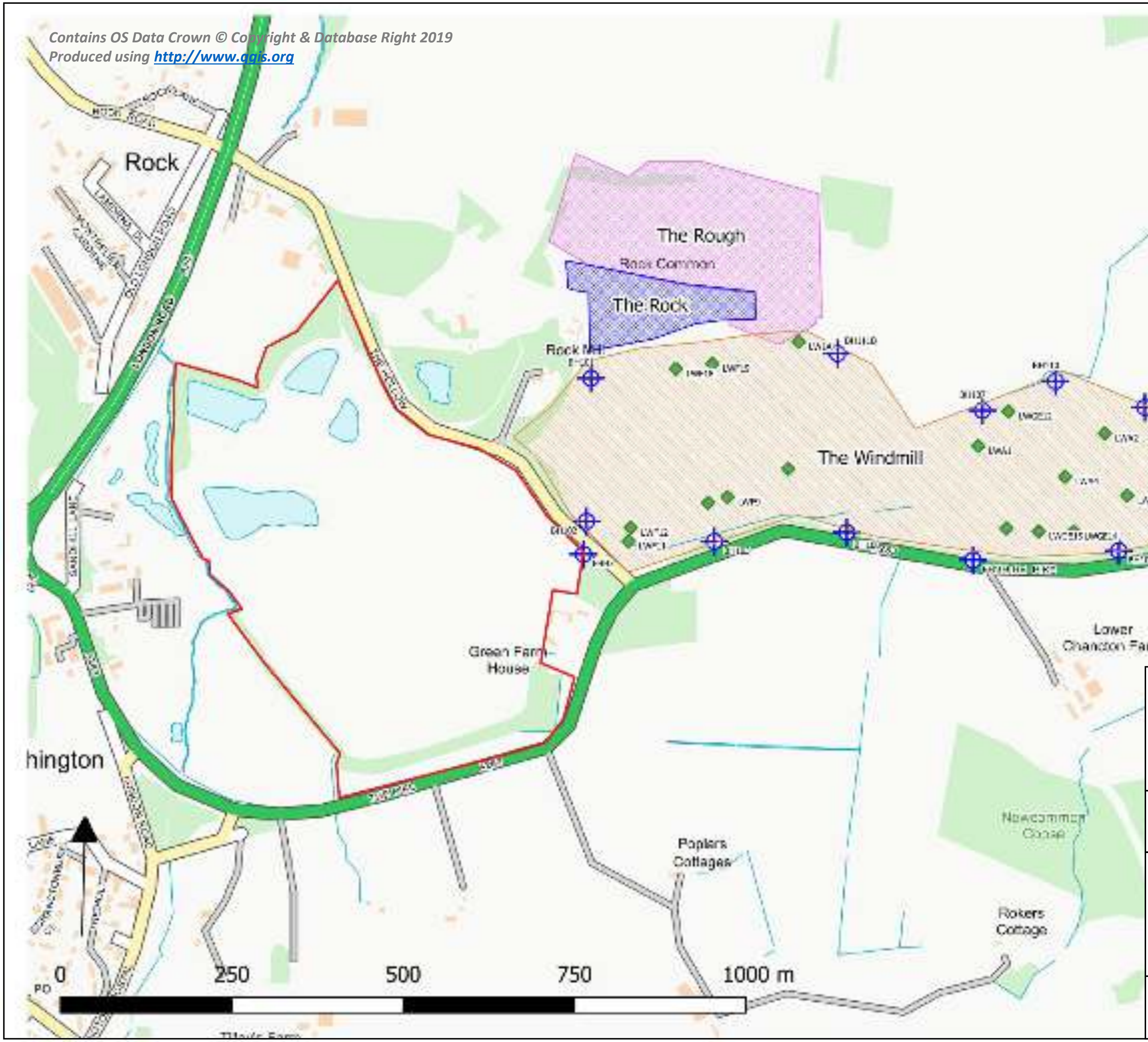

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Figure 9: Groundwater & Leachate Monitoring Points

Reference: HCSM

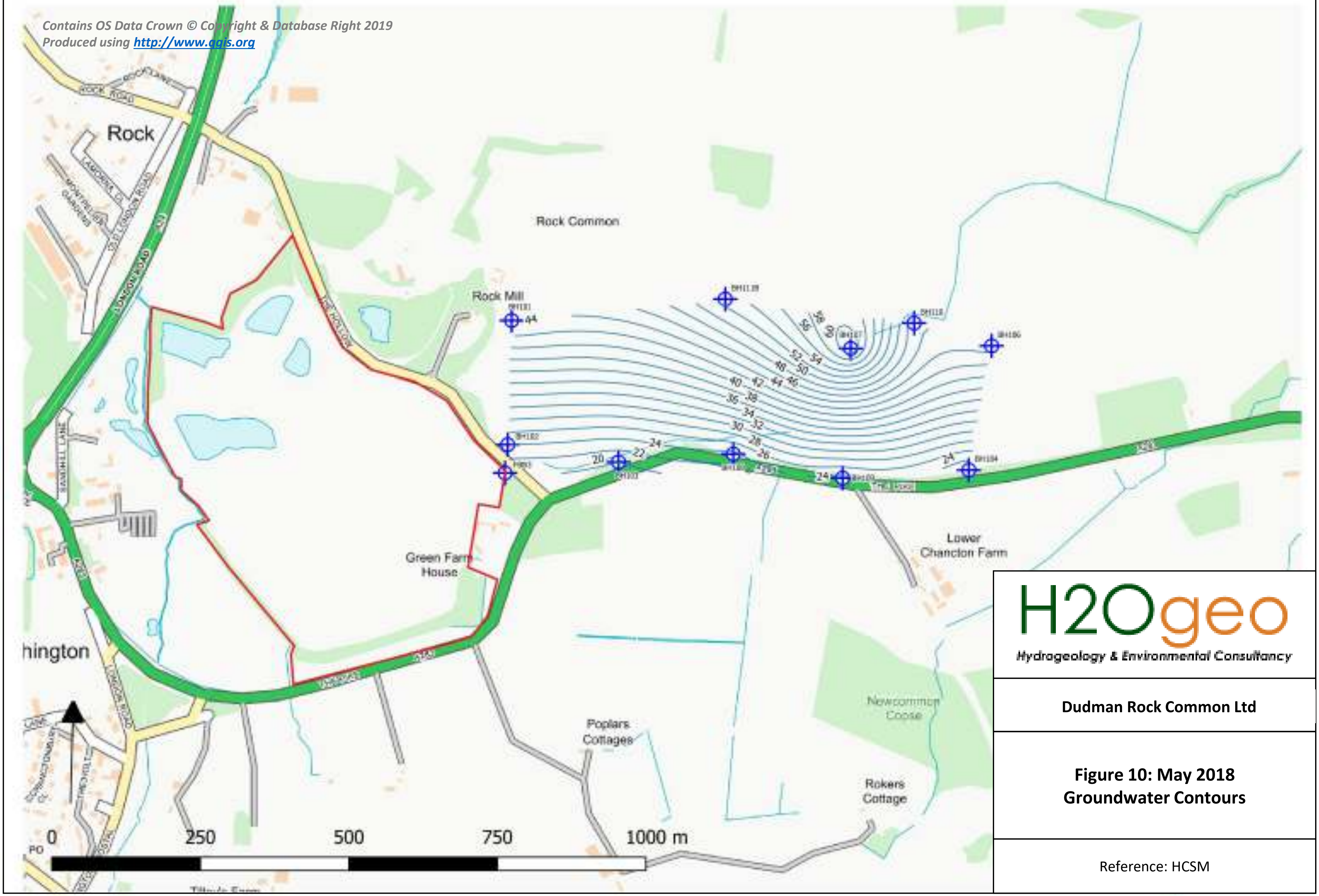

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Figure 10: May 2018 Groundwater Contours

Reference: HCSM

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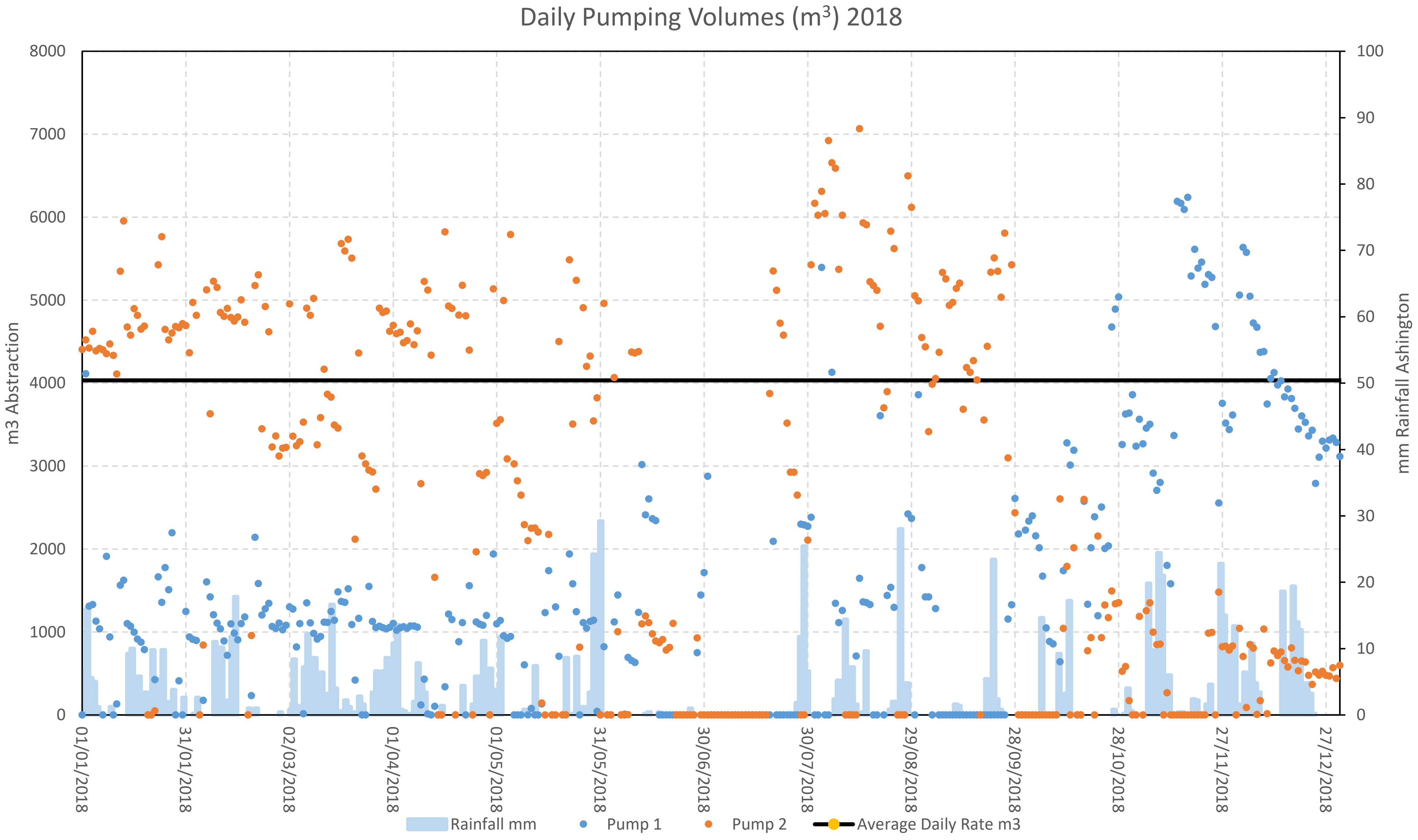

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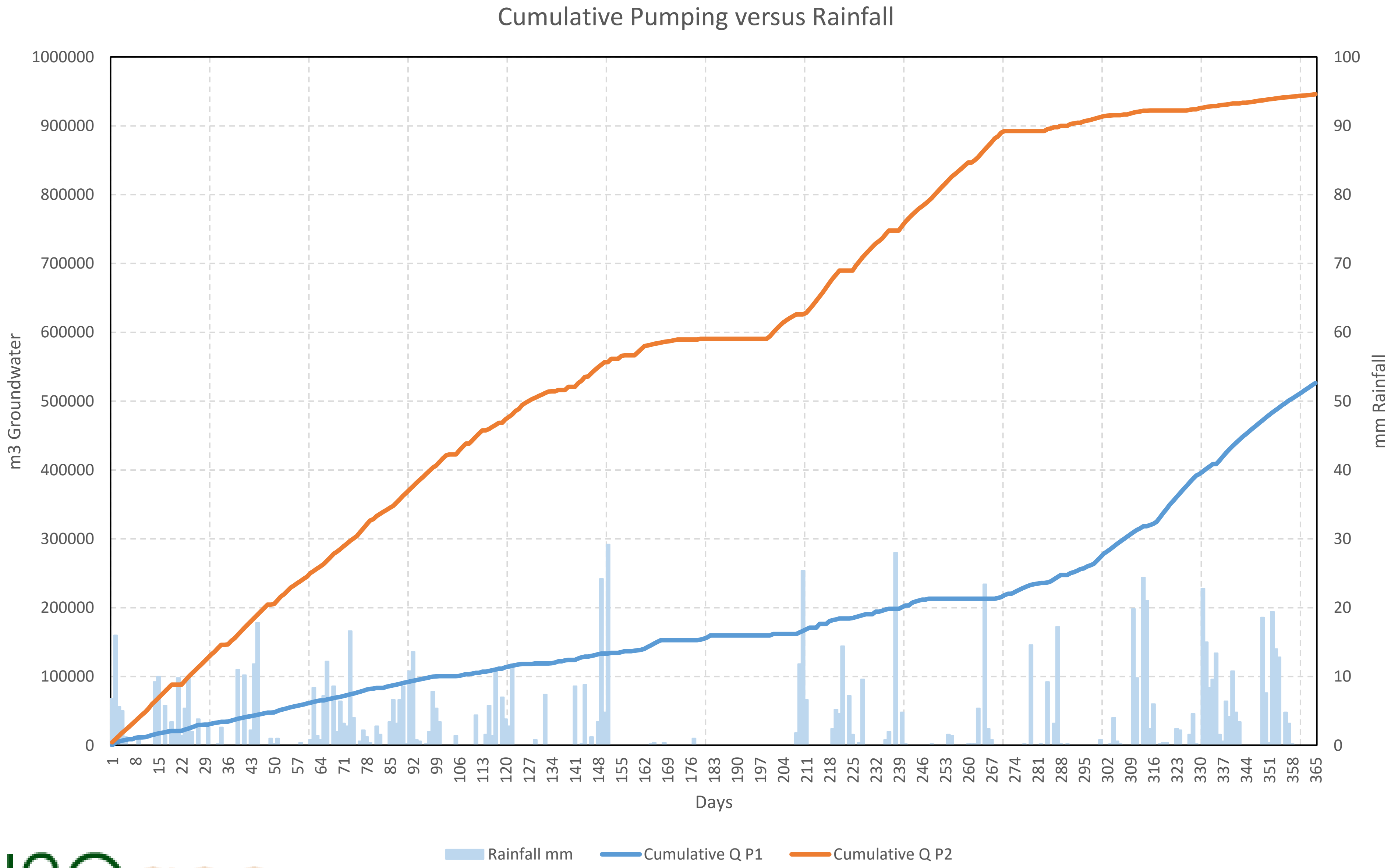
Dudman Rock Common Ltd	**Figure 11: Daily Pumping at Rock Common 2018**	Reference: HCSM



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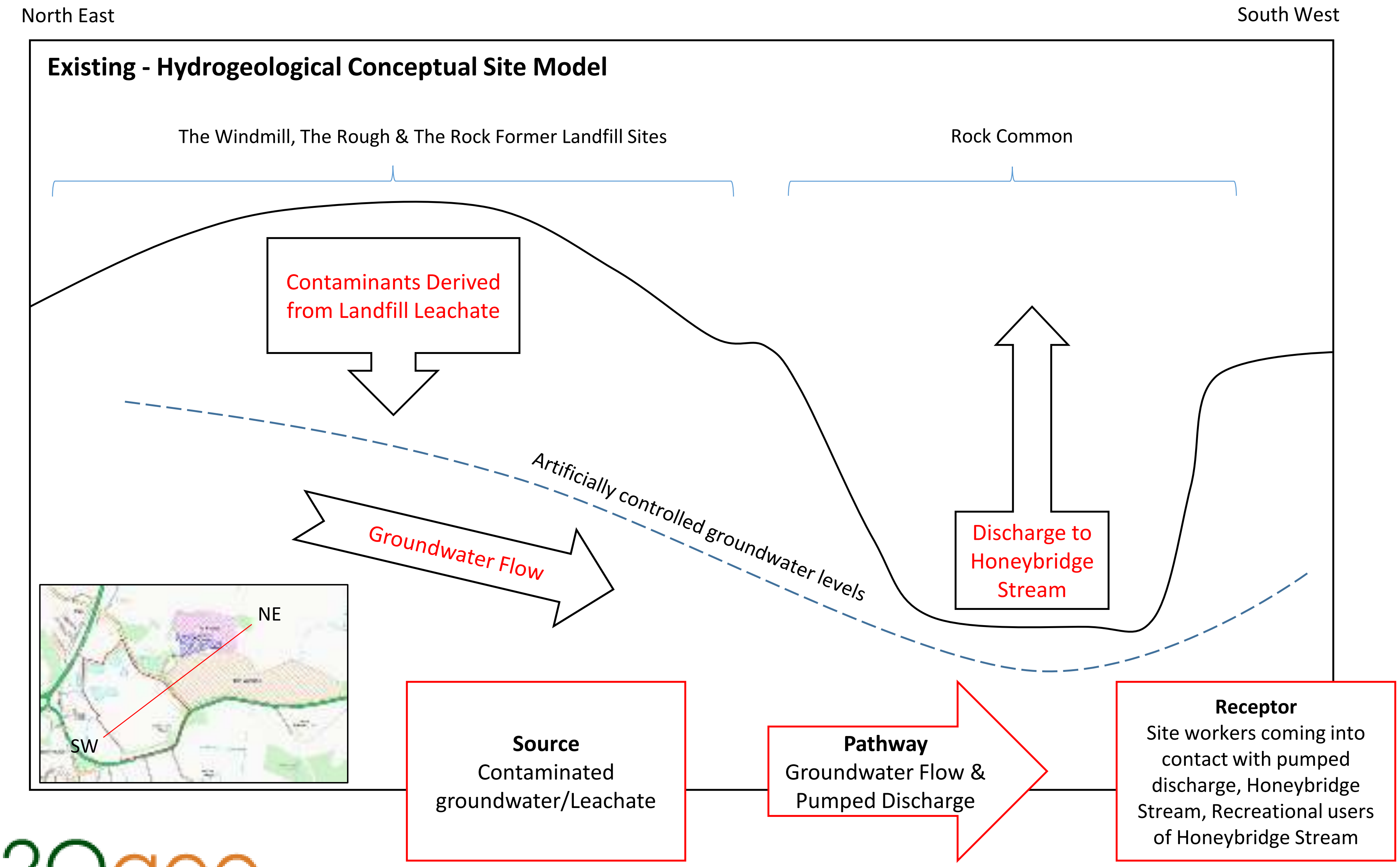
Dudman Rock Common Ltd	**Figure 12: Cumulative Groundwater Pumping at Rock Common 2018**	Reference: HCSM

Existing - Hydrogeological Conceptual Site Model



Source
Contaminated groundwater/Leachate

Pathway
Groundwater Flow & Pumped Discharge

Receptor
Site workers coming into contact with pumped discharge, Honeybridge Stream, Recreational users of Honeybridge Stream

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Dudman Rock Common Ltd	Figure 13: HCSM Existing Situation	Reference: HCSM

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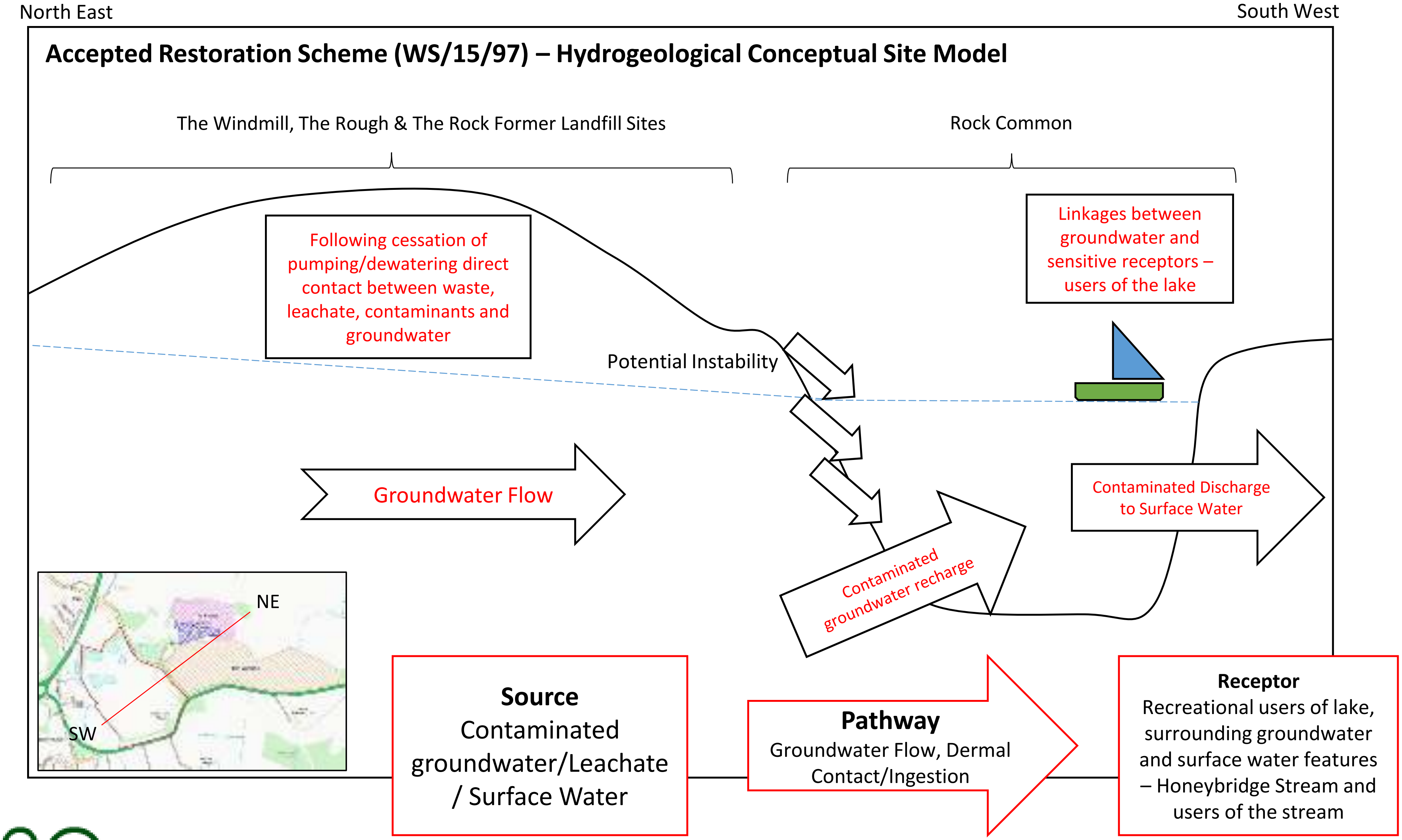
Accepted Restoration Scheme (WS/15/97) – Hydrogeological Conceptual Site Model



Source
Contaminated groundwater/Leachate / Surface Water

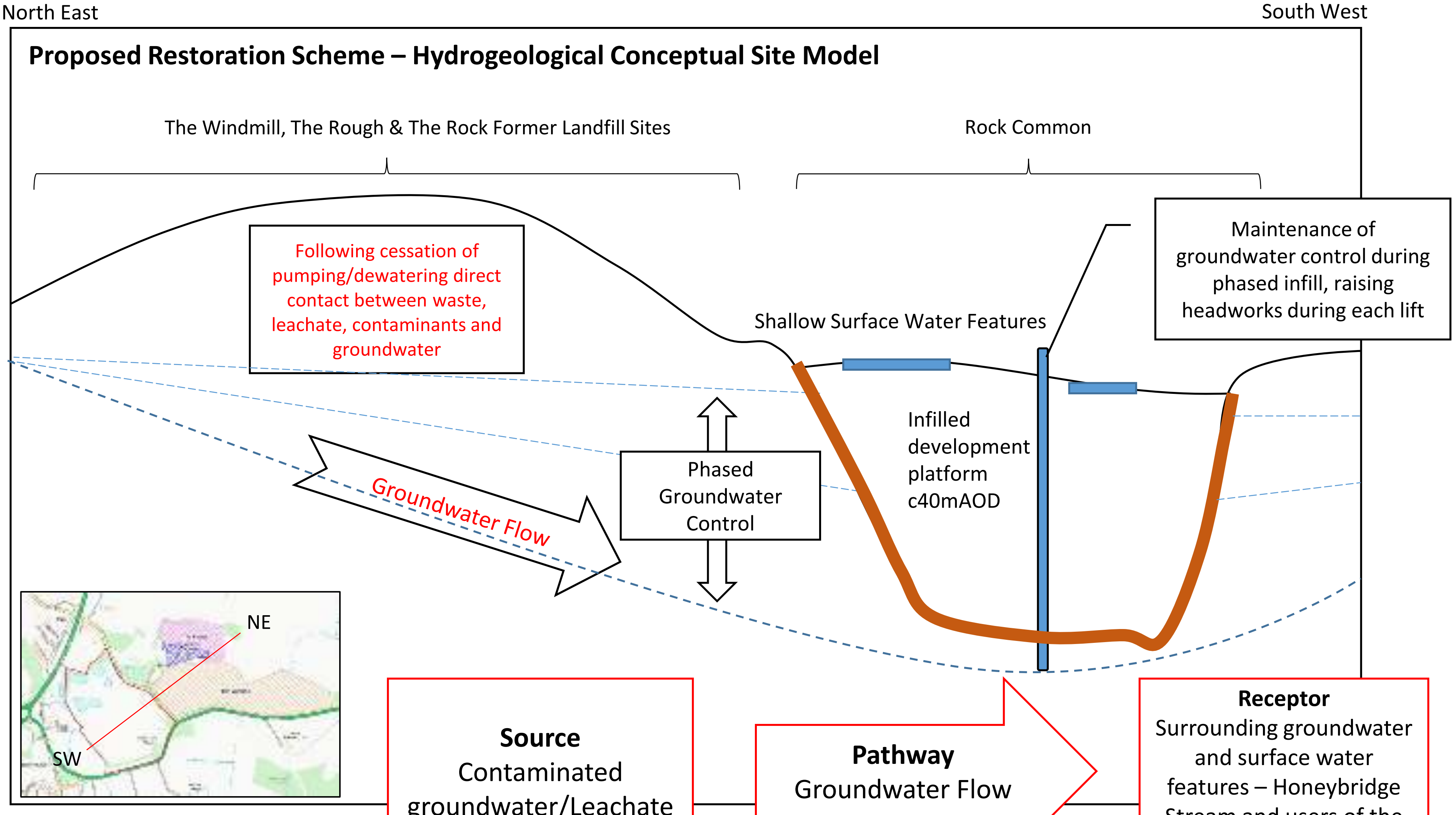
Pathway
Groundwater Flow, Dermal Contact/Ingestion

Receptor
Recreational users of lake, surrounding groundwater and surface water features – Honeybridge Stream and users of the stream

H2Ogeo
Hydrogeology & Environmental Consultancy

Dudman Rock Common Ltd	**Figure 14: HCSM Approved Restoration Scheme**	Reference: HCSM

Proposed Restoration Scheme – Hydrogeological Conceptual Site Model



Following cessation of pumping/dewatering direct contact between waste, leachate, contaminants and groundwater

Maintenance of groundwater control during phased infill, raising headworks during each lift

Source
Contaminated groundwater/Leachate

Pathway
Groundwater Flow

Receptor
Surrounding groundwater and surface water features – Honeybridge Stream and users of the stream

H2Ogeo
Hydrogeology & Environmental Consultancy

Dudman Rock Common Ltd	**Figure 15: HCSM Proposed Restoration Scheme**	Reference: HCSM

Annex A Environmental Designations – MagicMap 2019

Site Check Report Report generated on Fri Aug 23 2019
You selected the location: Centroid Grid Ref: TQ12581346
The following features have been found in your search area:

Ancient Woodland (England)

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478121
Area (Ha)	1.270075

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478892
Area (Ha)	18.18413

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478893
Area (Ha)	1.360004

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478894
Area (Ha)	7.137702

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478898
Area (Ha)	6.233354

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478900
Area (Ha)	9.26645

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478394
Area (Ha)	0.380203

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478395
Area (Ha)	0.691394

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478536
Area (Ha)	1.04431

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478538
Area (Ha)	1.971615

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478539
Area (Ha)	0.570882

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478540
Area (Ha)	0.705518

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478545
Area (Ha)	0.178326

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478547
Area (Ha)	0.914397

Wood Name	

Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478555
Area (Ha)	0.388281

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478560
Area (Ha)	7.297112

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478383
Area (Ha)	0.581073

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478384
Area (Ha)	0.560293

Wood Name	
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478385
Area (Ha)	1.080165

Wood Name	
Theme Name	Ancient Replanted Woodland
Theme ID	1478899
Area (Ha)	3.704809

Wood Name	copyhold wood
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478895
Area (Ha)	5.738445

Wood Name	copyhold wood
Theme Name	Ancient Replanted Woodland
Theme ID	1478896
Area (Ha)	2.770687

Wood Name	rowdell holt west
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478901
Area (Ha)	4.46816

Wood Name	sawyers copse
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478897
Area (Ha)	2.610232

Wood Name	oatash row copse
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478382
Area (Ha)	2.991674

Wood Name	the holts, holts copse, east clay's holt
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478541
Area (Ha)	5.729166

Wood Name	whiteland's copse, lower copse
Theme Name	Ancient & Semi-Natural Woodland
Theme ID	1478122
Area (Ha)	1.812763

Sites of Special Scientific Interest (England)

Name	Chanctonbury Hill SSSI
Reference	1000223
Natural England Contact	Susan Simpson
Natural England Phone Number	0845 600 3078
Hectares	82.69
Citation	1004144
Hyperlink	http://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=s1004144

National Parks (England)

Name	SOUTH DOWNS

Reference	10
Statutory Area in Sq.km.	1653
Hyperlink	http://southdowns.gov.uk/
Date of Confirmation Order	02/11/2009

Source Protection Zones merged (England)

Source Protection Zone Number	3
Source Protection Zone Classification	3
SHAPE_FID	0

Source Protection Zone Number	2
Source Protection Zone Classification	2
SHAPE_FID	0

Nitrate Vulnerable Zones 2017 Designations (England)

Nitrate Vulnerable Zone ID	809
Nitrate Vulnerable Zone Name	Black Sewer NVZ
Type of Nitrate Vulnerable Zone	Surface Water
Status of NVZ since 2013 designations	New
Unique Reference number	S809

Nitrate Vulnerable Zone ID	56
Nitrate Vulnerable Zone Name	Sussex Chalk
Type of Nitrate Vulnerable Zone	Groundwater
Status of NVZ since 2013 designations	Modified
Unique Reference number	G56

Annex B Environment Agency Data

Groundwater & Leachate Thickness for 2018

Sample	Sample_Description	Date	Top_of_borehole	Plumb_Depth	Dip_from_top	Top_of_groundwater	Reason
97002150	BH101	05/02/2018	60.16	16.29	17.27		BOREHOLE DRY
97002120	BH102	05/02/2018	65.89	41.88	42.38		BOREHOLE DRY
97002160	BH103	05/02/2018	65.4	45.4	44.92		BOREHOLE DRY
97002090	BH104	05/02/2018	61.57	40.52	39.29	22.28	
97002060	BH105a	05/02/2018	46.57	5.94	2.34	44.23	
97002050	BH106	05/02/2018	50.73	7.73	5.29	45.44	
97002020	BH107	05/02/2018	65.89	5.87	4.11	61.78	
97002110	BH108	05/02/2018	57.48	35.02	35.57		BOREHOLE DRY
97002100	BH109	05/02/2018	58.51	37.8	35.33	23.18	
97002040	BH110	05/02/2018	48.72	4.38	2.51	46.21	
97002010	BH111b	05/02/2018	56.4	7.21	3.34	53.06	
97002130	FBB3	05/02/2018	63.52	48.94	45.37	18.15	
97002030	W1	05/02/2018	50.25	6.7	2.24	48.01	
97002080	W2	05/02/2018	52.98	21.67	22.07		BOREHOLE DRY
97002070	W8	05/02/2018	42.39				Borehole damaged
97002150	BH101	04/05/2018	60.16	16.29	15.65	44.51	
97002120	BH102	04/05/2018	65.89	41.88	42.19		BOREHOLE DRY
97002160	BH103	04/05/2018	65.4	45.4			Historic
97002090	BH104	04/05/2018	61.57	40.52	39.52	22.05	
97002060	BH105a	04/05/2018	46.57	5.94	2.44	44.13	
97002050	BH106	04/05/2018	50.73	7.73	5.66	45.07	
97002020	BH107	04/05/2018	65.89	5.87	4.06	61.83	
97002110	BH108	04/05/2018	57.48	35.02	34.1	23.38	
97002100	BH109	04/05/2018	58.51	37.8	35.13	23.38	
97002040	BH110	04/05/2018	48.72	4.38	2.25	46.47	
97002010	BH111b	04/05/2018	56.4	7.21	3.48	52.92	
97002130	FBB3	04/05/2018	63.52	48.94	43.35	20.17	
97002030	W1	04/05/2018	50.25	6.7	2.04	48.21	
97002080	W2	04/05/2018	52.98	21.67	22.07		BOREHOLE DRY
97002070	W8	04/05/2018	42.39				Borehole damaged
97002150	BH101	07/08/2018	60.16	16.29	16.29		BOREHOLE DRY
97002120	BH102	07/08/2018	65.89	41.88	41.88		BOREHOLE DRY
97002160	BH103	07/08/2018	65.4	45.4	45.4		BOREHOLE DRY
97002090	BH104	07/08/2018	61.57	40.52	38.76	22.81	
97002060	BH105a	07/08/2018	46.57	5.94	5.77	40.8	
97002050	BH106	07/08/2018	50.73	7.73	7.31	43.42	
97002020	BH107	07/08/2018	65.89	5.87	5.75	60.14	
97002110	BH108	07/08/2018	57.48	35.02	33.76	23.72	
97002100	BH109	07/08/2018	58.51	37.8	35.02	23.49	
97002040	BH110	07/08/2018	48.72	4.38	4.38		BOREHOLE DRY
97002010	BH111b	07/08/2018	56.4	7.21	6.25	50.15	
97002130	FBB3	07/08/2018	63.52	48.94	45.2	18.32	
97002030	W1	07/08/2018	50.25	6.7	6.17		BOREHOLE DRY
97002080	W2	07/08/2018	52.98	21.67	20.95	32.03	
97002070	W8	07/08/2018	42.39				Borehole damaged
97002150	BH101	07/11/2018	60.16	16.29	16.38		BOREHOLE DRY
97002120	BH102	07/11/2018	65.89	41.88	41.88		BOREHOLE DRY
97002160	BH103	07/11/2018	65.4	45.4	45.8		BOREHOLE DRY
97002090	BH104	07/11/2018	61.57	40.52	38.99	22.58	
97002060	BH105a	07/11/2018	46.57	5.94	5.92	40.65	
97002050	BH106	07/11/2018	50.73	7.73	7.74		BOREHOLE DRY
97002020	BH107	07/11/2018	65.89	5.87	5.68		BOREHOLE DRY
97002110	BH108	07/11/2018	57.48	35.02	34.41	23.07	
97002100	BH109	07/11/2018	58.51	37.8	34.82	23.69	
97002040	BH110	07/11/2018	48.72	4.38	4.38		BOREHOLE DRY
97002010	BH111b	07/11/2018	56.4	7.21	7.18	49.22	
97002130	FBB3	07/11/2018	63.52	48.94	45.01	18.51	
97002030	W1	07/11/2018	50.25	6.7	6.16		BOREHOLE DRY
97002080	W2	07/11/2018	52.98	21.67	21.67		BOREHOLE DRY
97002070	W8	07/11/2018	42.39				Borehole damaged

Leachate Thickness (m) - 2018

Well ID	*22 March 2018*	*29 June 2019*	*11 September 2018*	*11 December 2018*
LWA1				
LWA2				
LWA4				
LWA5				
LWA6				
LWB10				
LWF11	4.56	3.71	4.64	4.2
LWF12	0.1			
LWF18				
LWF19			0.94	
LWF9				
LWGE12				
LWGE14				
LWGE15				
LWGE16				
LWGE19				

Annex C Approved Restoration Plan – WS/15/97

Rock Common
Concept Restoration Proposals

General

Mineral has been extracted from Rock Common since the 1920s.The majority of the permitted extraction area has been stripped of soils and overburden with mineral subsequently extracted.
The Quarry landform and its physical potential for restoration has therefore already been established.
The potential for restoring the Site to reflect regional landform features is therefore limited. The ability to recreate locally observed smaller scale character features and wildlife habitats appropriate to the Weald / Downland Margin
Wealden Fringe is attainable.

The Aim

The primary aim of the Concept Restoration Scheme is to create a landscape lake for amenity and nature conservation and to integrate the Site into the surrounding landscape in accordance with West Sussex County Council's Landscape Management Guidelines for Wooded Heath Ridges within the Developed Margins of the Weald / Downland Margin of the Wealden Fringe Region.

Consistent with this Aim, the Concept Restoration Scheme includes the following elements:-

1. Topography:

Grading of exposed faces and slopes above water level to enable integration of the restored Site into the surrounding land levels. Specifically:-

(a) Within the Mineral Extraction Area the proposal is to create, generally, 50° sand faces down to 42m aOD (above Ordnance Datum) with a 5 metre-wide bench (to be used as a circular walkway around the restored lake), followed by 20° slopes to the base of the quarry workings. (Noteable exceptions to these profiles would be the existing over-steepened sand faces and Gault Clay overburden slopes - see Drawing Nos. R32/87 & R32/91)

(b) Within the Plant Site Area, the proposal is to merge the area into the adjoining undisturbed ground.

2. Landform:

Creation of a central landscaped lake with associated stable landform, using only materials currently available on Site. Through appropriate 'grading' of the quarry margins, the restored landform will help assimilate the A283 Storrington to Washington section of the "Low Folkestone Sand Ridgeline".

3. Landscape:

Provision of terrestrial and aquatic habitats and land uses to enhance the wildlife and recreational potential of the Site. The proposed scheme will reinforce and compliment existing vegetation around the periphery of the Site to strengthen local charater. The key landscape types will comprise:

(a) Heathland
(b) Woodland
(c) Open Water

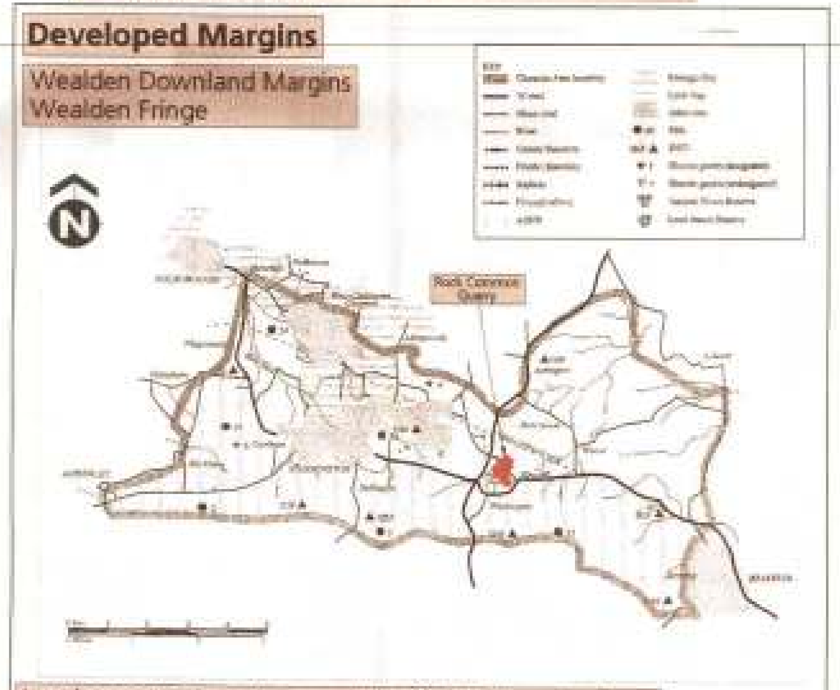
4. Vegetation Management and Planting

Other than the Willow / Alder mix required for Gault Slope stability, re-creation of local vegetation types appropriate to the Weald Downland Margin / Developed Margins Area, existing vegetation around the Site will be strengthened and 'linked' to the new planting to restrict views and strenghthen local landscape character. Specific proposals include:

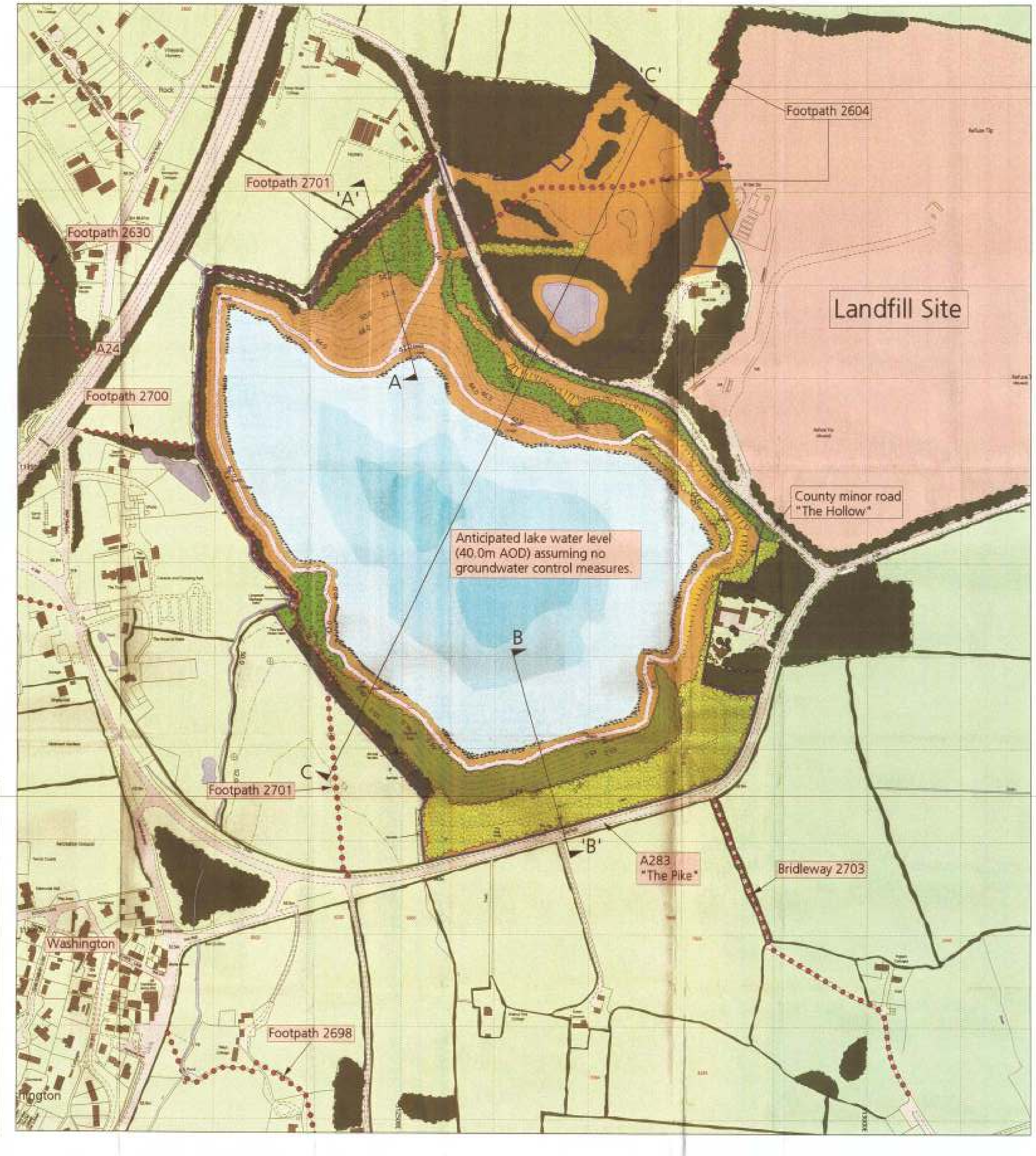
(a) Conserve, manage and link existing / proposed heathland and woodland areas.

(b) Establish and manage a varied heathland landscape including trees, areas of bare ground, woodland, scrub and wetland.

(c) Re-creation and strengthening of the wooded skyline of the south facing ridgeline within the Mineral Extraction Area (i.e. emphasise the 'Low Folkestone Ridgeline' feature) by sympathetic tree planting.



Landscape Designations and Identified Character Area



Tree and Shrub Planting Proposals

The species mix for the scheme is to take account of the final surface material used for restoration. This relates to the amount and placement area of the Lower Greensand, Gault Clay and Marehill Clay.

Broadleaved Woodland

Species		% Mix
Quercus robur	English Oak	30
Betula pendula	Silver Birch	15
Betula pubescens	Downy Birch	15
Ilex aquifolium	Holly	5
Sorbus aucuparia	Rowan	5
Populus tremula	Aspen	5
Frangula alnus	Alder Blackthorn	2
Corylus avellana	Hazel	10
Crataegus monogyna	Hawthorn	10
Viburnum opulus	Guelder rose	3
		100%

Broadleaved Woodland Incorporating Evergreen Tree Planting

Quercus robur	English Oak	25
Betula pendula	Silver Birch	15
Pinus sylvestris	Scots Pine	20
Sorbus aucuparia	Rowan	15
Crataegus monogyna	Hawthorn	15
Viburnum opulus	Guelder rose	10
		100%

Trees and shrubs to be planted at 2 metre centres to achieve a gross 2500 stems / hectare in single species groups of 5 to 10 with shrub groups on margins

Oaks to be protected in 1.5 metre high shelters. All other stock to be protected in 0.6 metre high shelters.

Willow / Alder Mix on Gault Clay Slopes

Grass Seeding of the Gault Clay shall be undertaken as early as possible in order to establish an initial vegetation cover prior to final tree planting. (See Drawing No R32 / 91)

The final tree planting mix shall include:

Alnus glutinosa	Alder
Alnus incarna	Grey Alder
Salix caprea	Goat Willow
Salix cinerea	Grey Willow
Salix viminalis	Osier

Scrub Heathland Establishment

A heathland habitat is to be established around the periphery of the proposed lake and also within the restored Plant Site Area.
This heathland is to comprise a mosaic of localised heath grassland, and bare ground, including dry, wet and bog heath species. The location of the habitats will be dependent upon the restoration material used. i.e. dry heath on the Lower Greensand, wet and bog heath on the backfilled clay lake margins.

Target Heathland Habitat Species

Dry Heath	Dwarf gorse Heather Bell heather Broom
Wet Heath	Purple Moor Grass Heath rush White beak sedge Cross leaved heath
Bog Heath	Sphagnum moss Bulbous rush Round leaved sundew Oblong leaved sundew

Invasive species, including birch and bracken will be discouraged from encroaching into the heathland scrub.

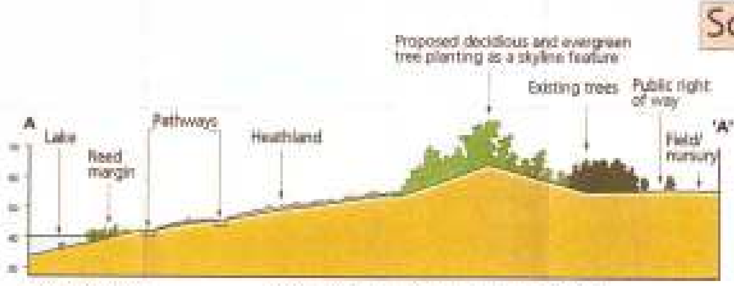
Legend

▭	Rock Common Quarry Site Boundary and Company Landholdings
▨	Existing tree planting / woodland
A	Section positions
🟥	The Rough / Windmill Landfill Development
🟩	Surrounding land
●	Existing stream/pool
● ● ● ● 2701	Existing Public Rights of Way

Restoration Proposals

▨	Broadleaved Woodland Incorporating Evergreen Tree Planting
▨	Broadleaved Woodland
🟫	Scrub Heathland Establishment
▨	Willow / Alder Mix on Gault Clay Slopes
▨	Rock faces
▨	Restored Lake (Margins protected from wave erosion by ironstone rejects, placed as appropriate)
▨	Indicative locations of reed and aquatic marginal species
▨	Access track

Schematic Restoration Sections



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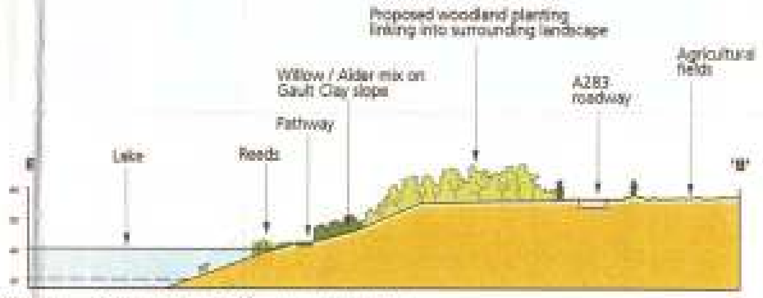

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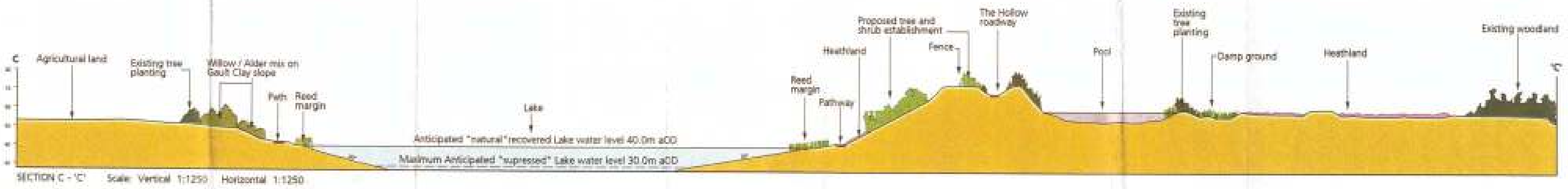

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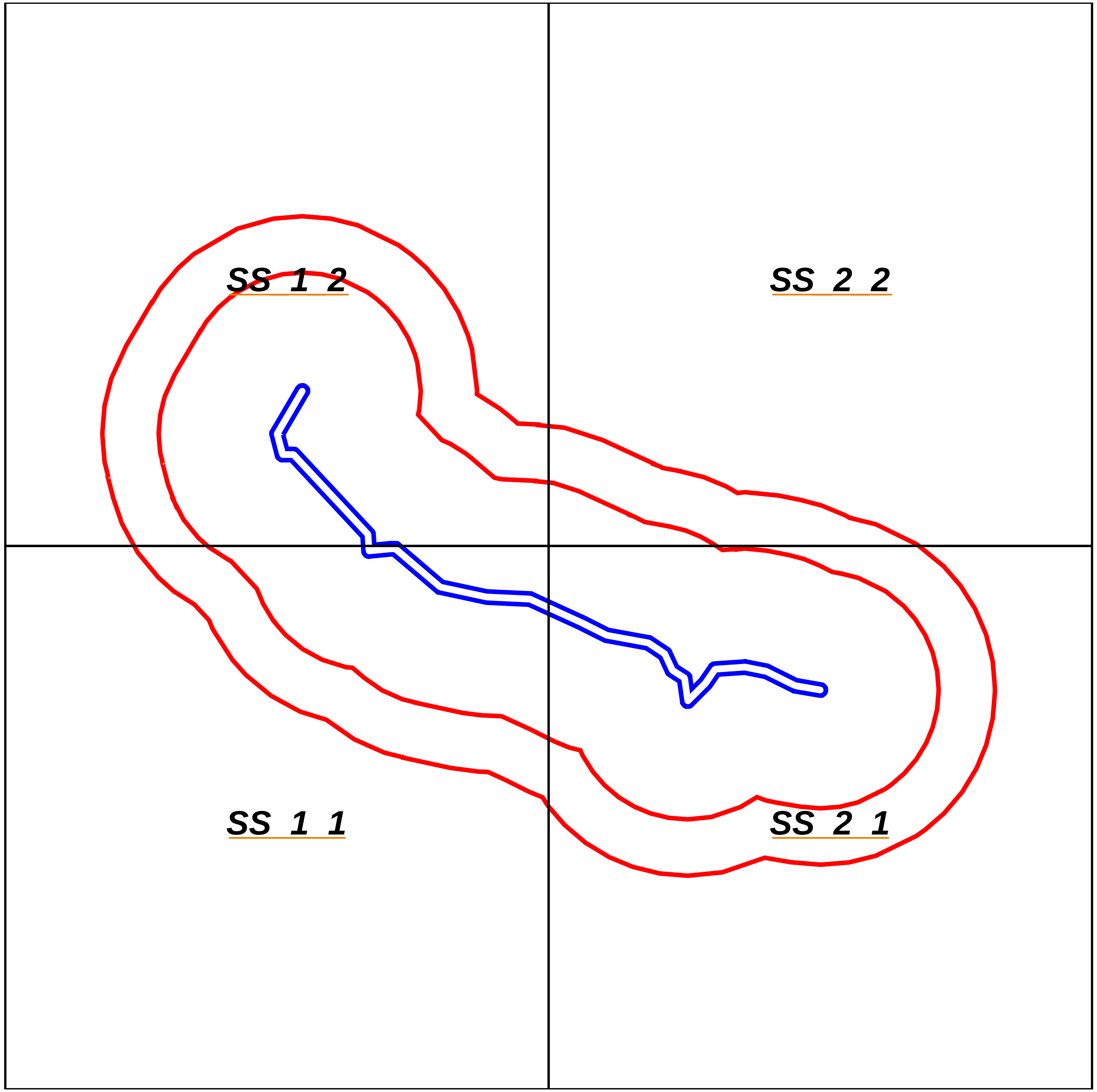
Rock Common

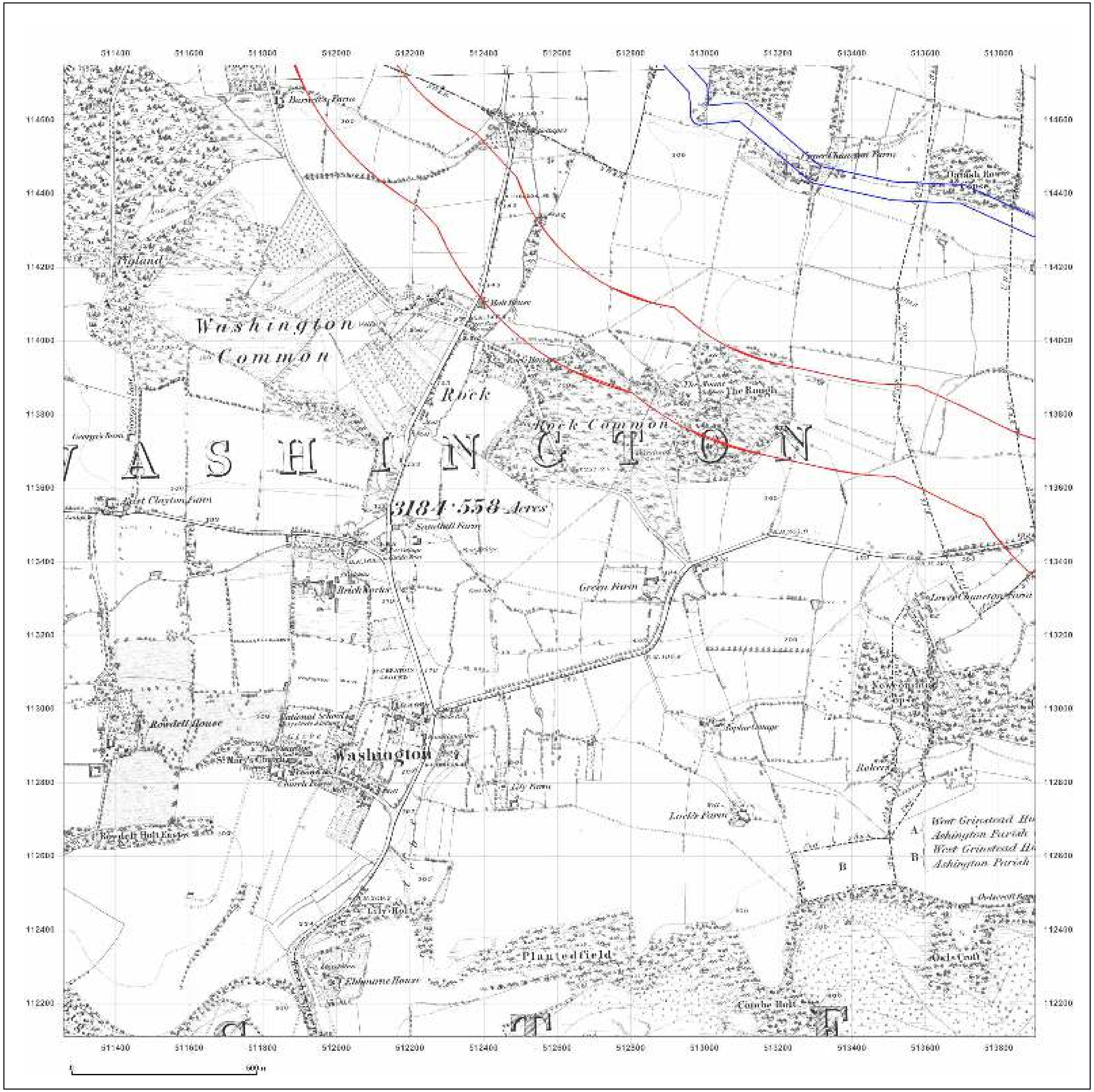
Concept Restoration Scheme

Drawn By	Scale
R.J.S / A.C.J	1 : 2000
Date	**Drawing No**
January 2004	R32 / 86

Annex B – Historic Mapping Groundsure



Small Scale Grid Index



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Printed at:	1:10,560

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Edition N/A
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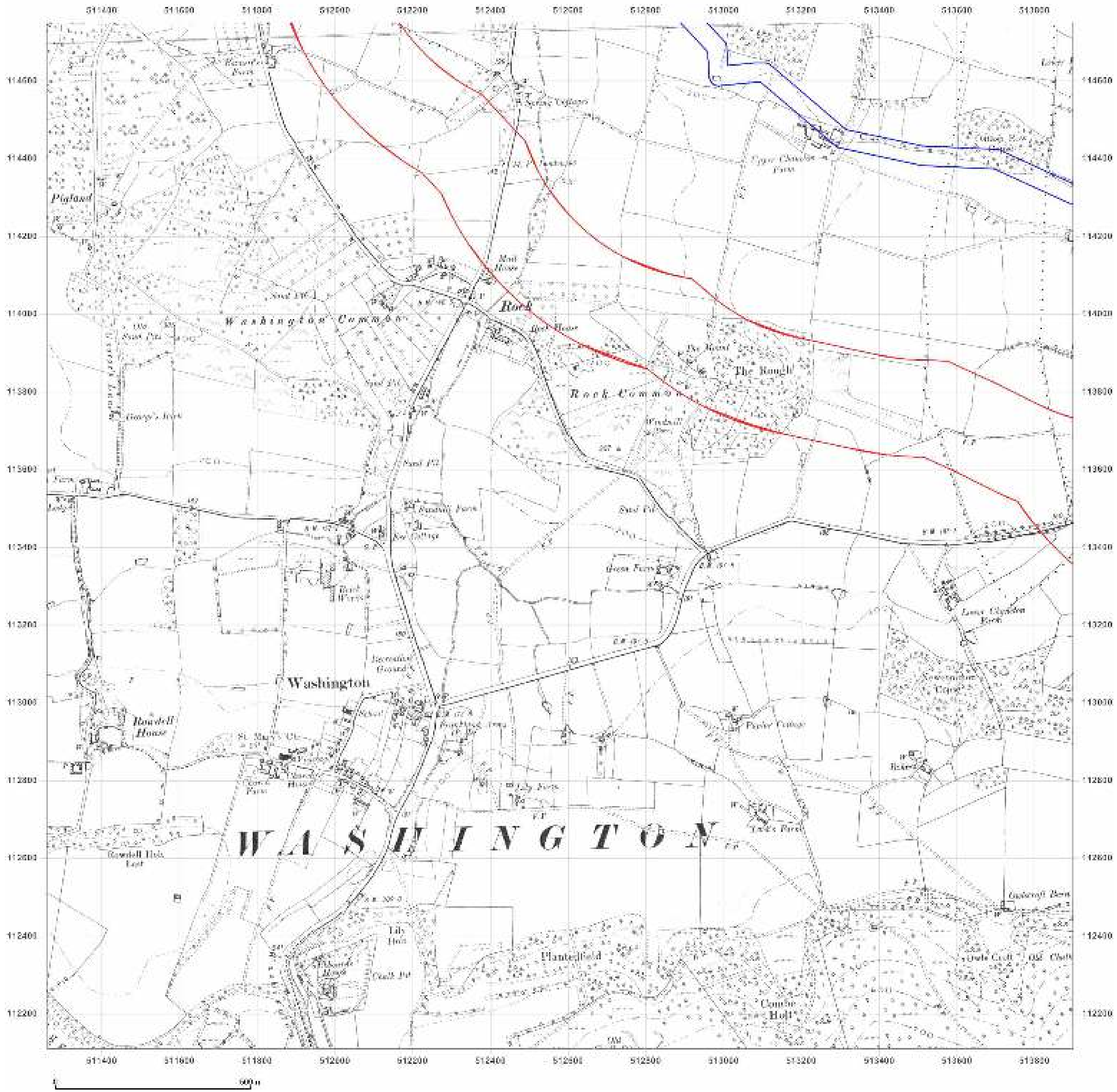

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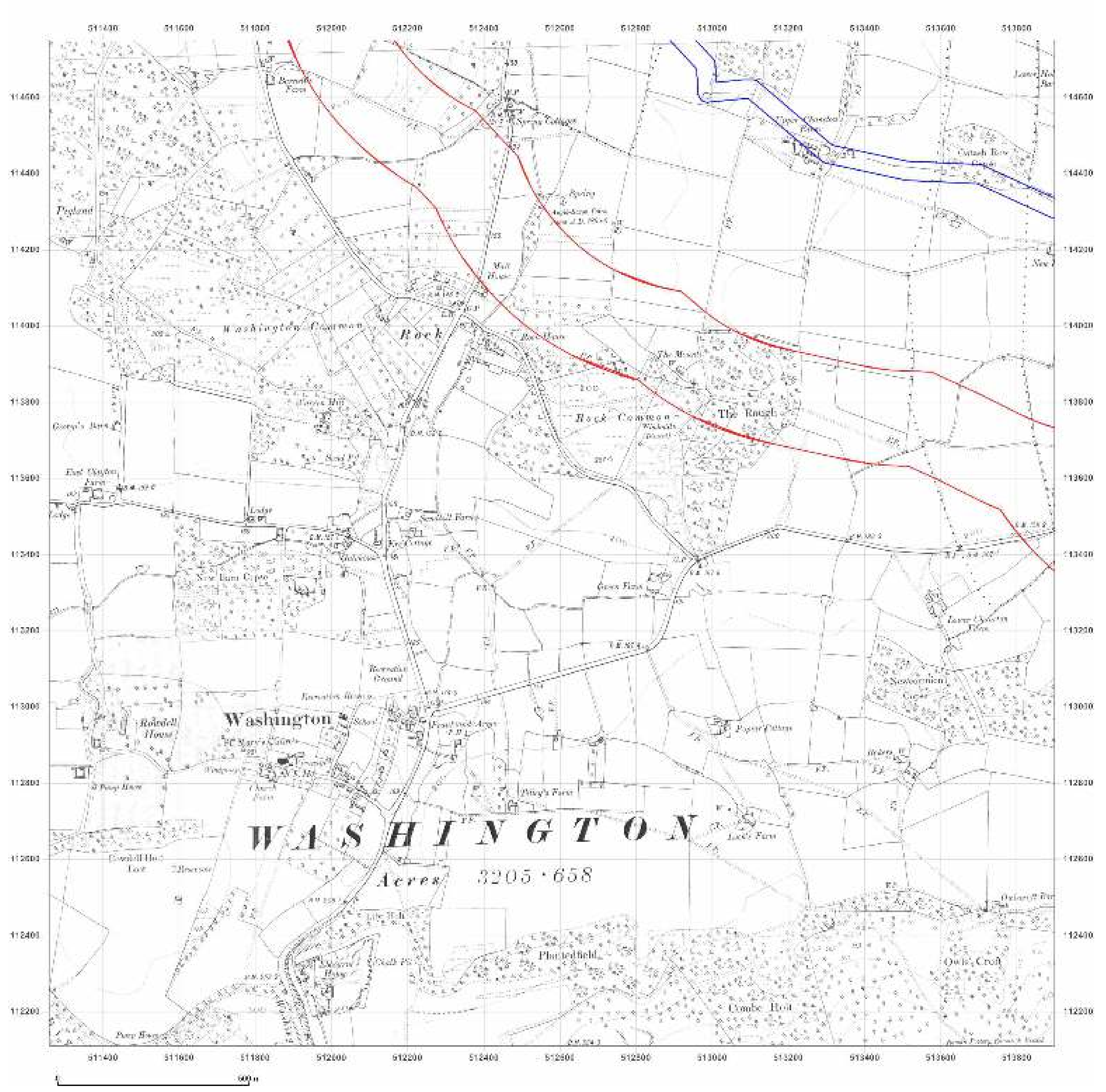

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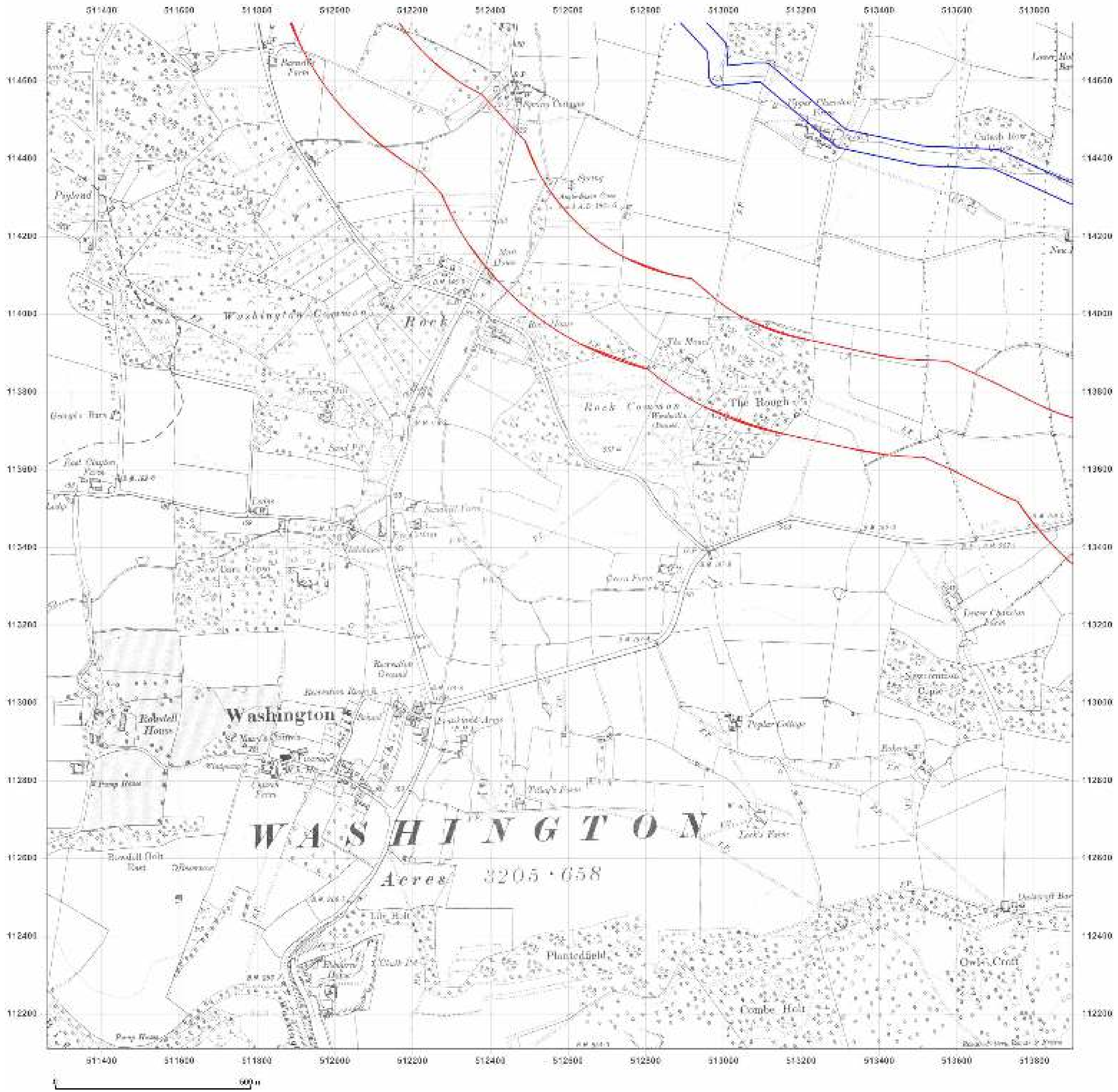

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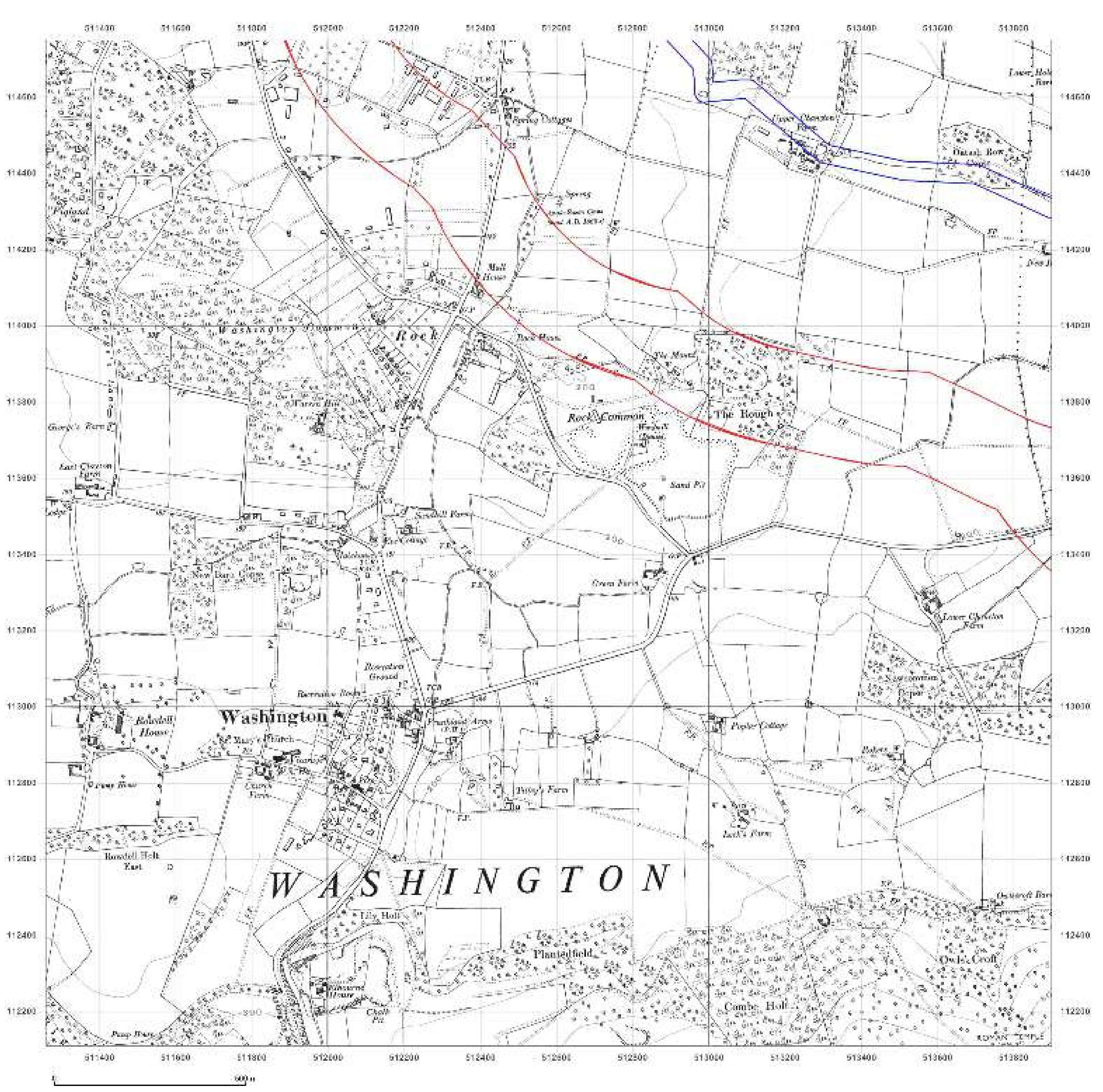

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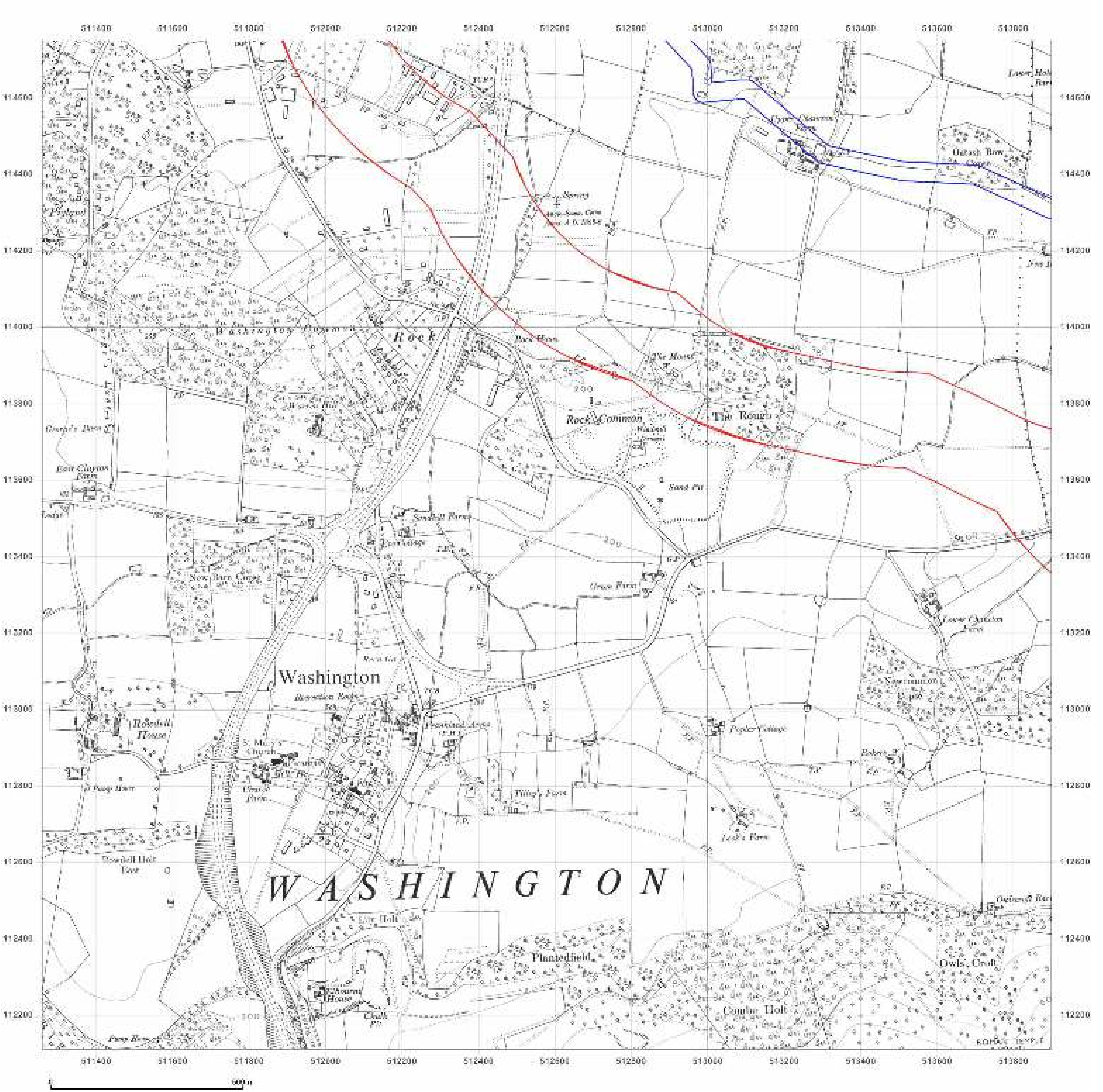

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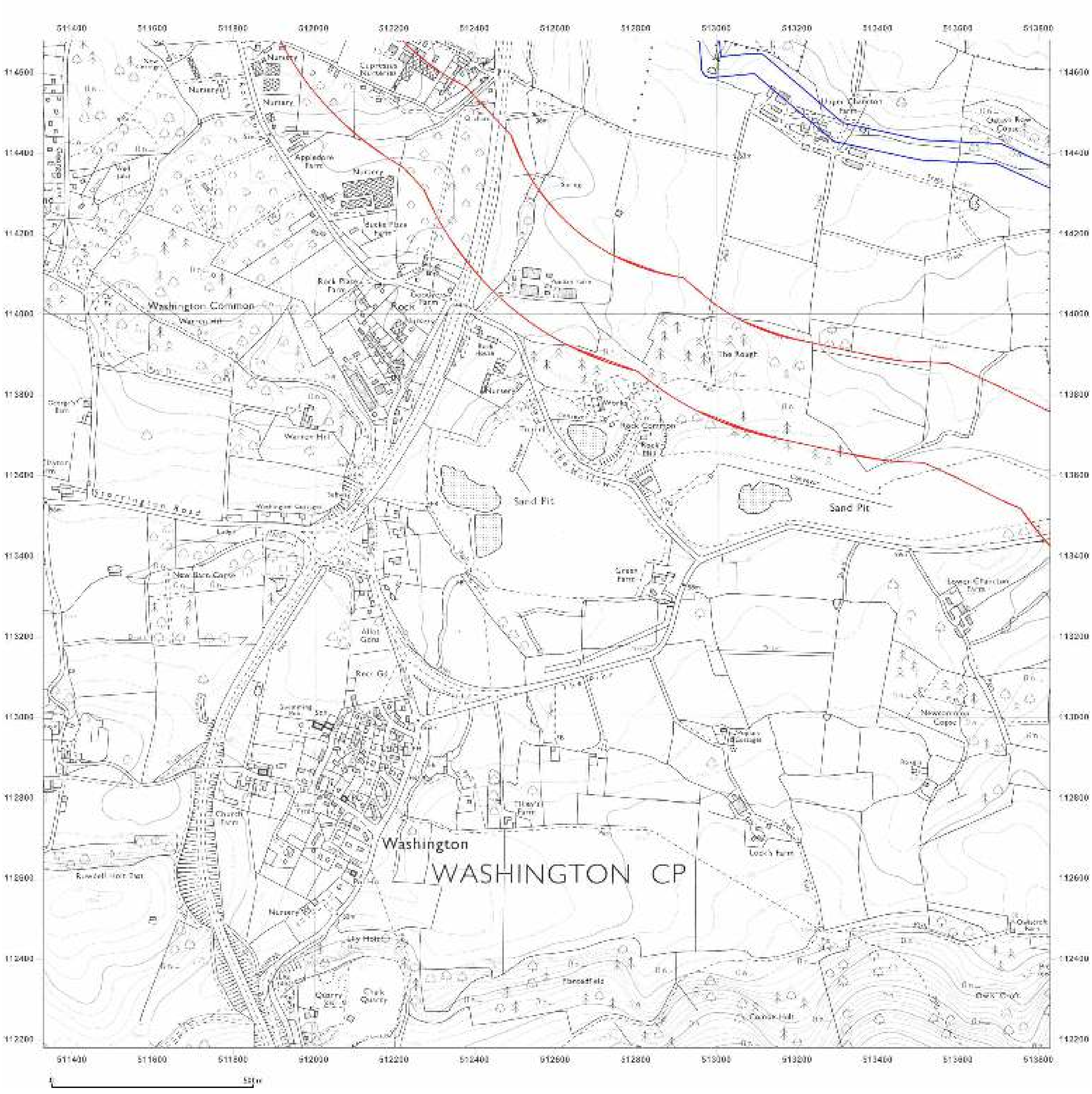

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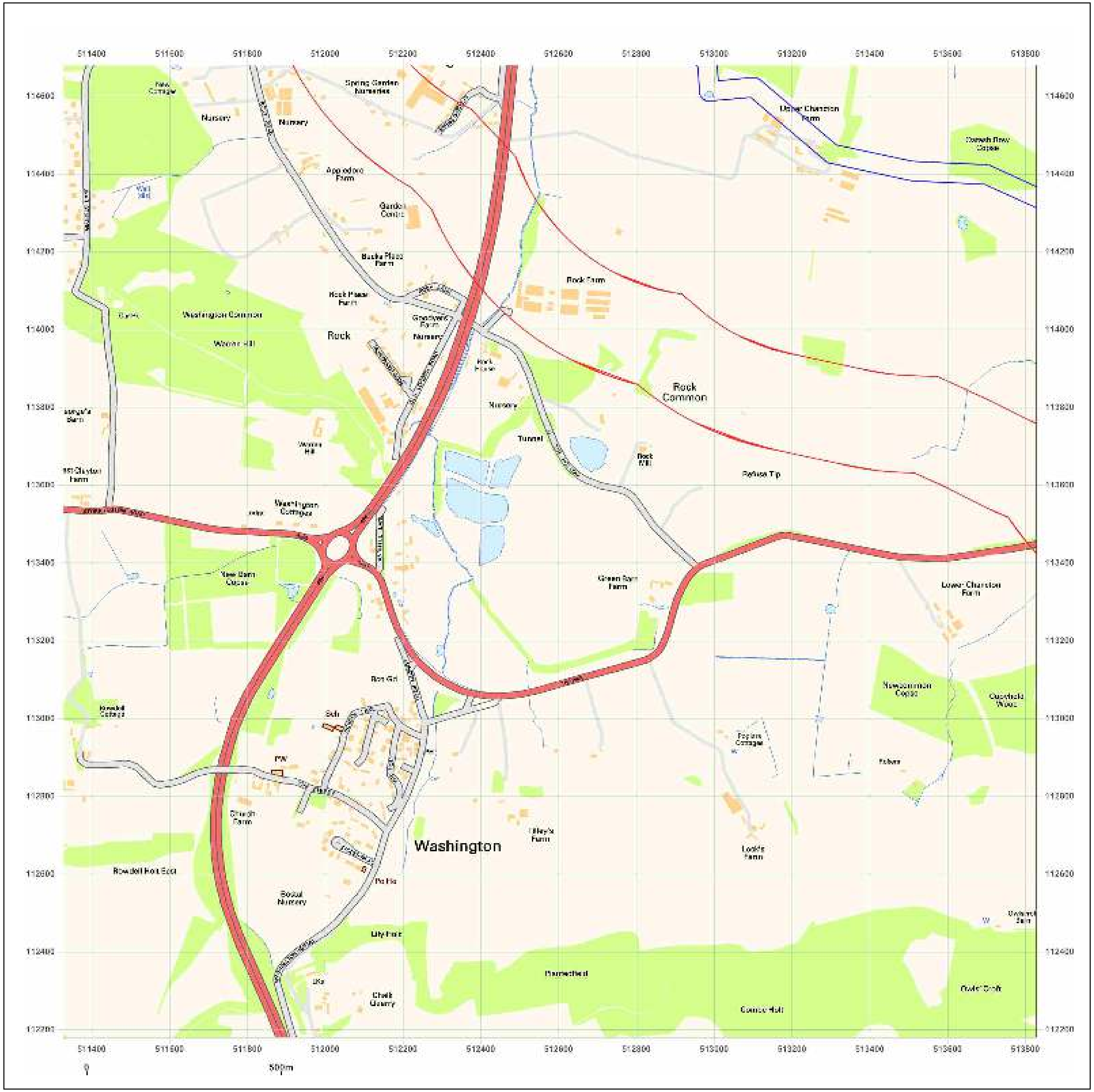

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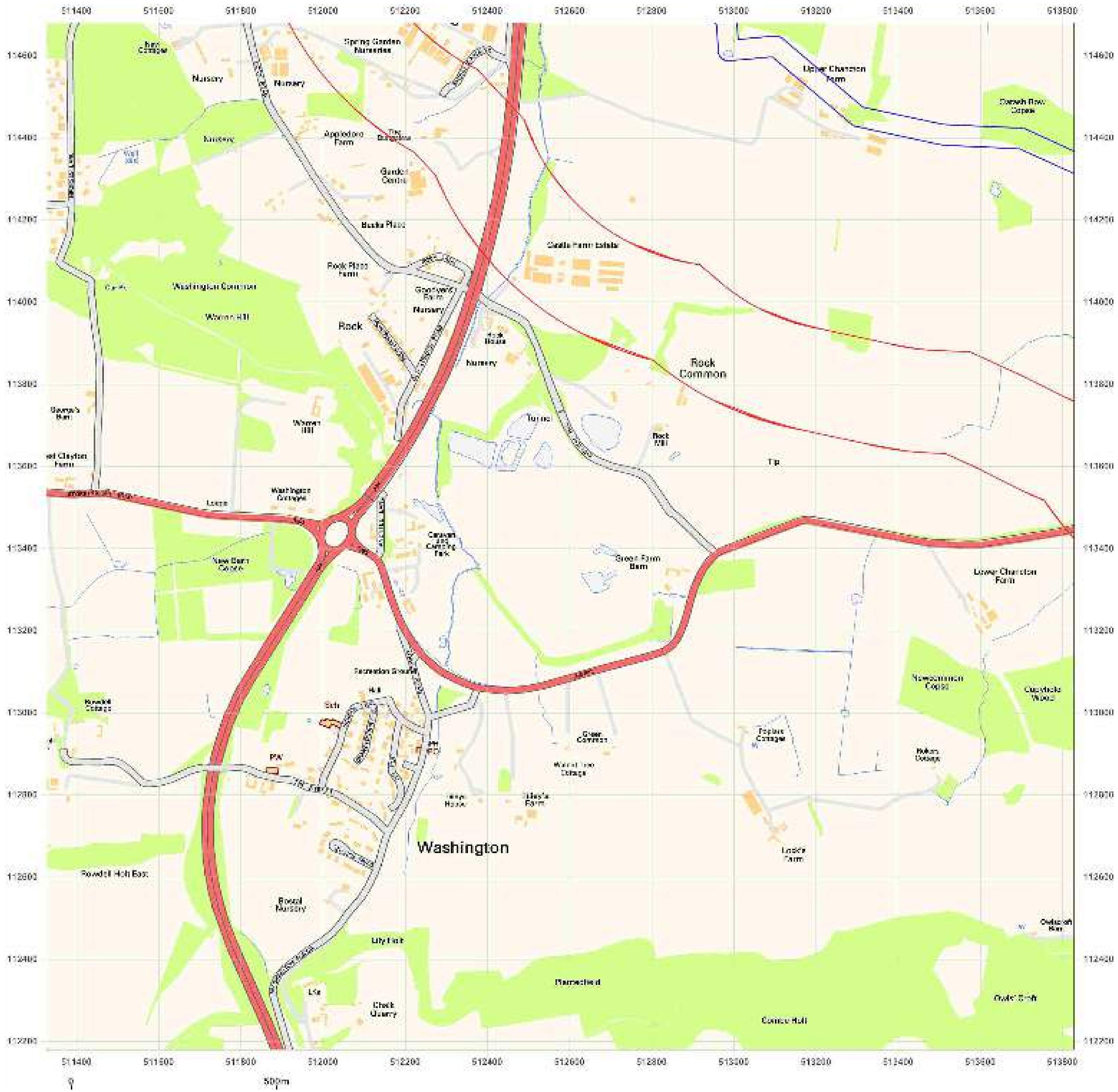

Groundsure

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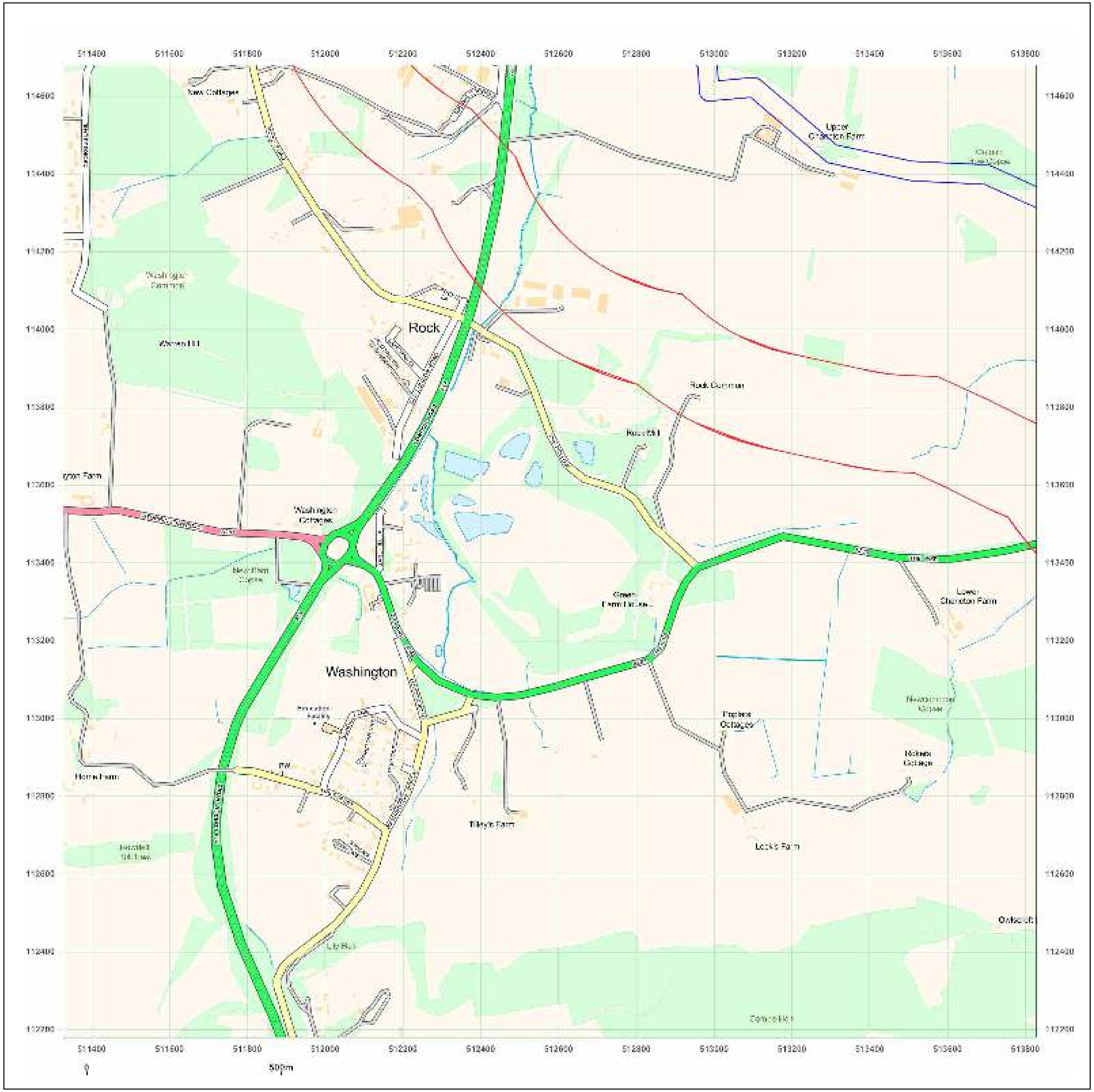

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2020

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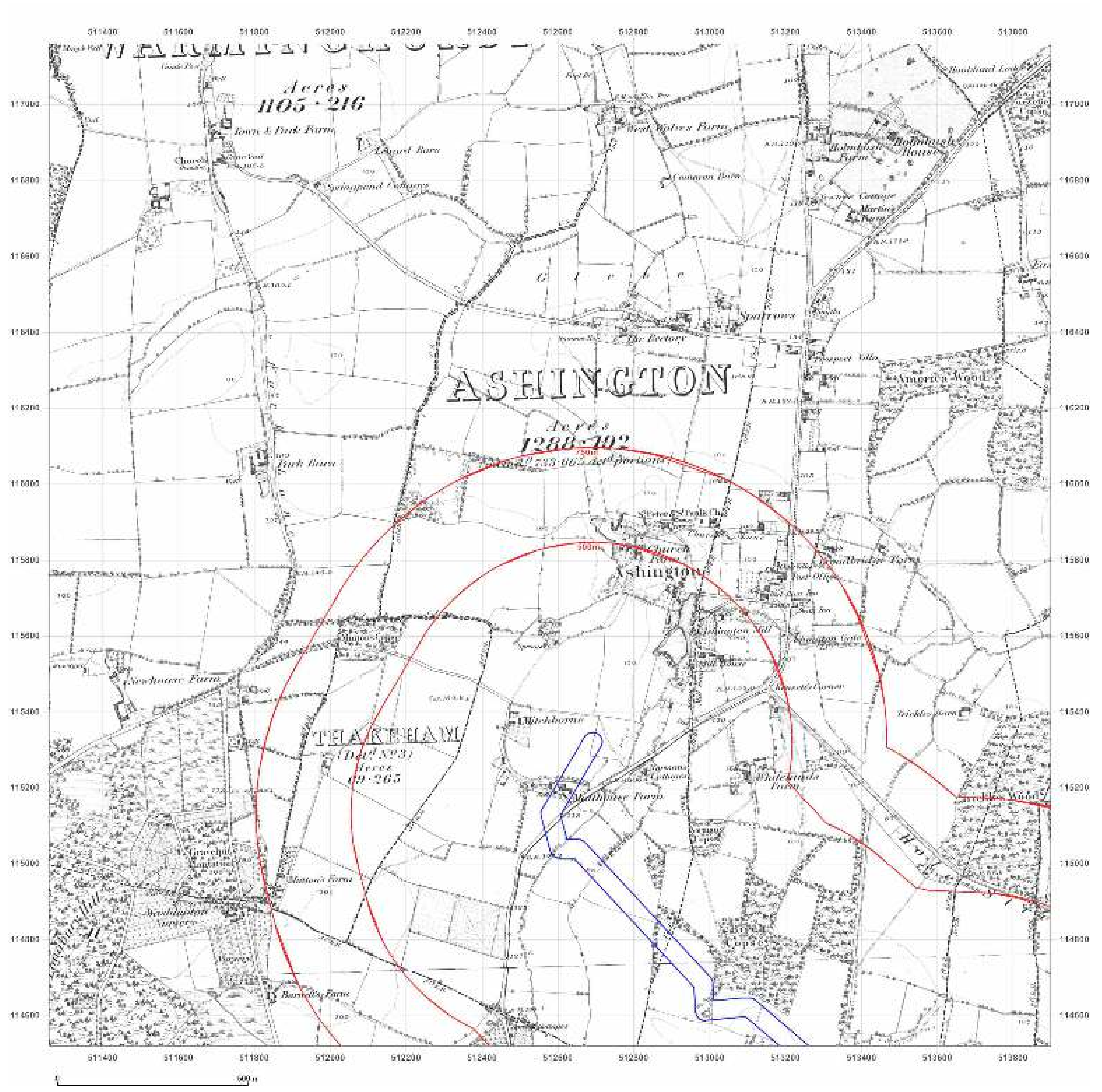

Site Details:

512613.3136663828, 113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_1_2
Grid Ref:	512578, 115839

Map Name:	County Series
Map date:	**1875**
Scale:	1:10,560
Printed at:	1:10,560

N
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Surveyed 1875
Revised 1875
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1875
Edition N/A
Copyright N/A
Levelled N/A

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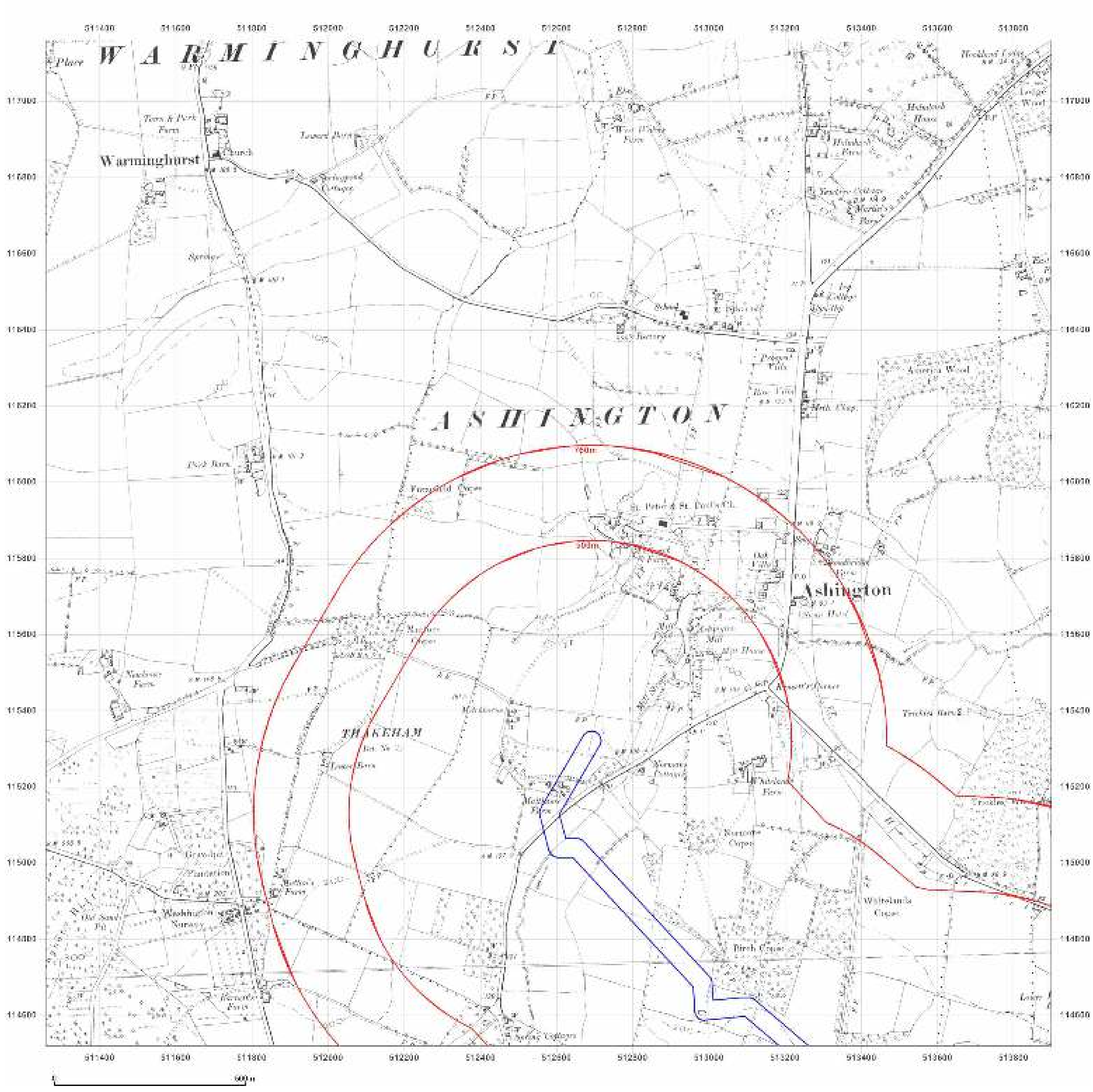

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Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_1_2
Grid Ref:	512578, 115839

Map Name:	County Series
Map date:	**1896**
Scale:	1:10,560
Printed at:	1:10,560

N
W E
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Surveyed 1876
Revised 1896
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1896
Edition N/A
Copyright N/A
Levelled N/A

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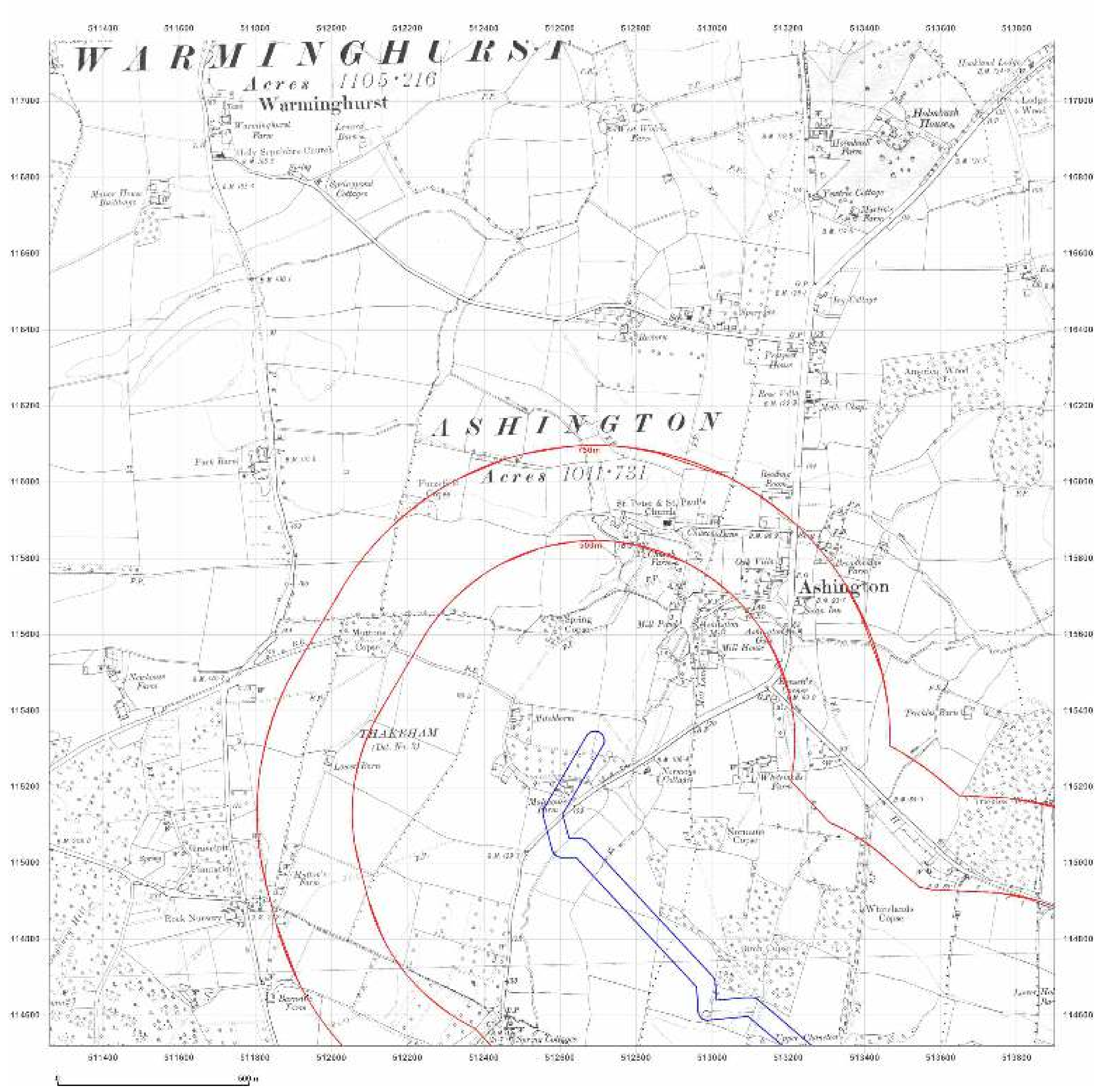

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_1_2
Grid Ref:	512578, 115839
Map Name:	County Series
Map date:	**1909-1914**
Scale:	1:10,560
Printed at:	1:10,560

N
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Surveyed 1875
Revised 1909
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1914
Edition 1914
Copyright N/A
Levelled N/A

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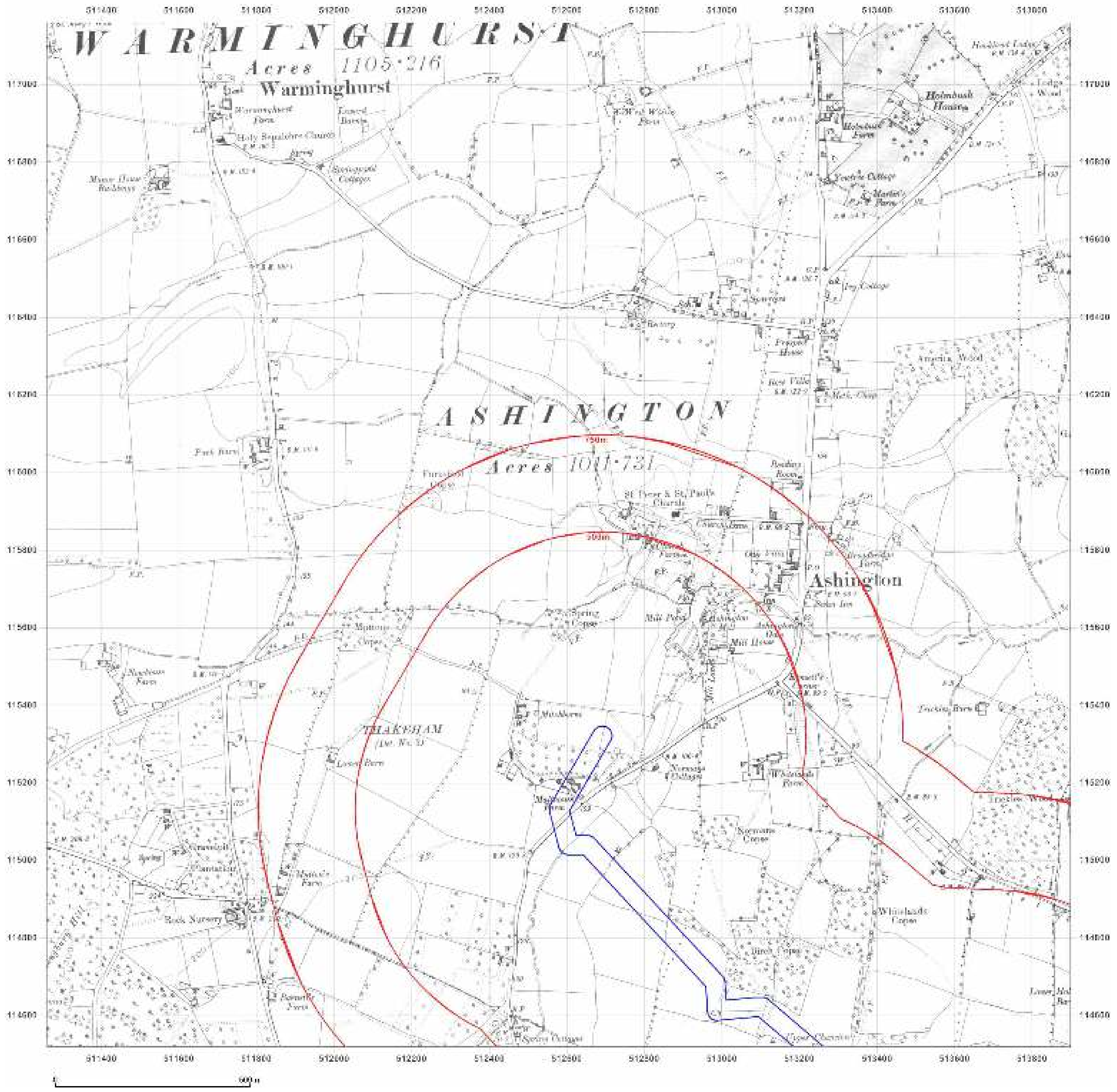

Groundsure INSIGHTS

Site Details:

512613.3136663828, 113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_1_2
Grid Ref:	512578, 115839
Map Name:	County Series
Map date:	**1909-1914**
Scale:	1:10,560
Printed at:	1:10,560

N
W E
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Surveyed 1875
Revised 1909
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1914
Edition N/A
Copyright N/A
Levelled N/A

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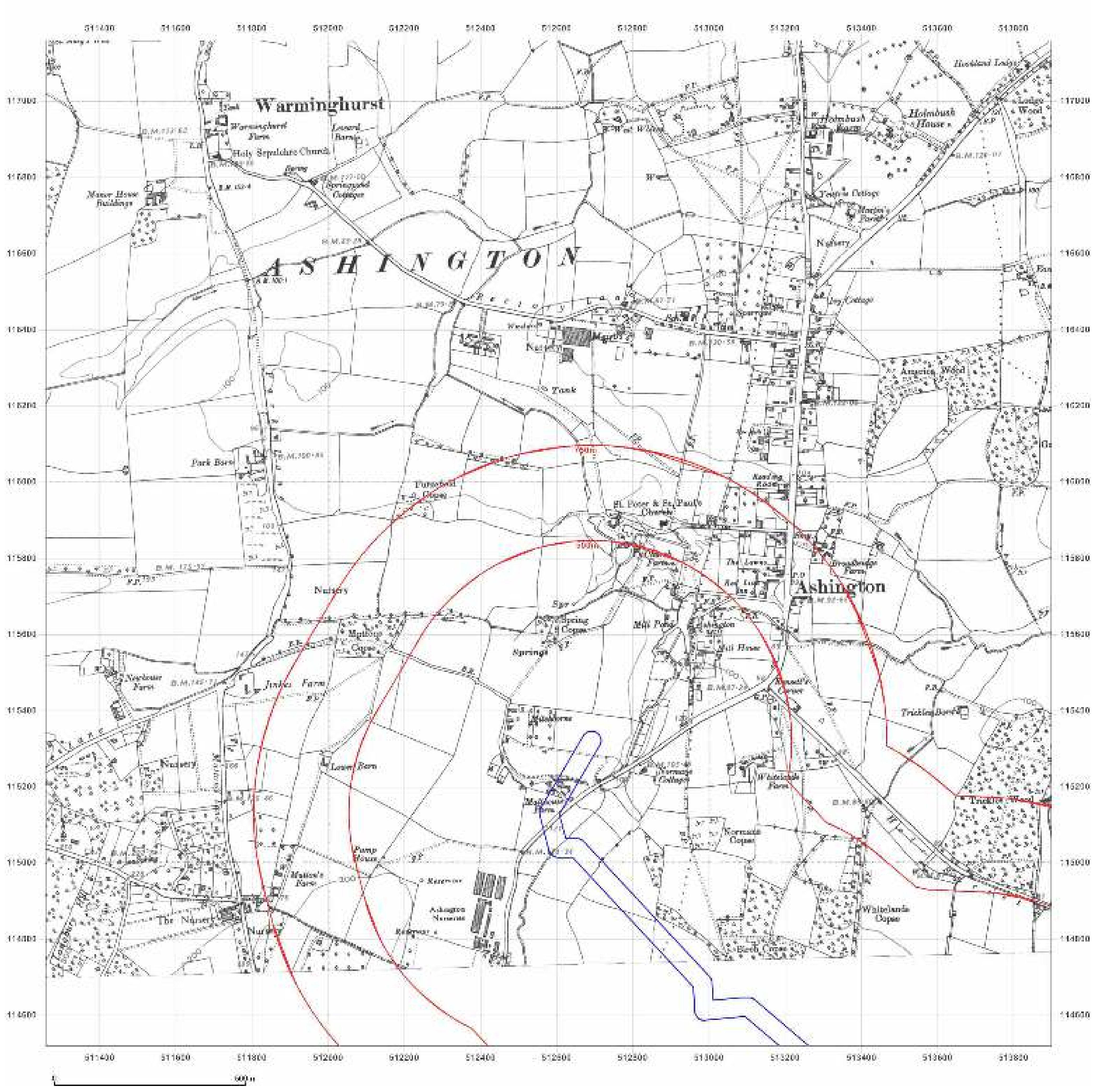

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_1_2
Grid Ref:	512578, 115839

Map Name:	County Series
Map date:	1946
Scale:	1:10,560
Printed at:	1:10,560

N
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Surveyed 1875
Revised 1946
Edition N/A
Copyright N/A
Levelled N/A

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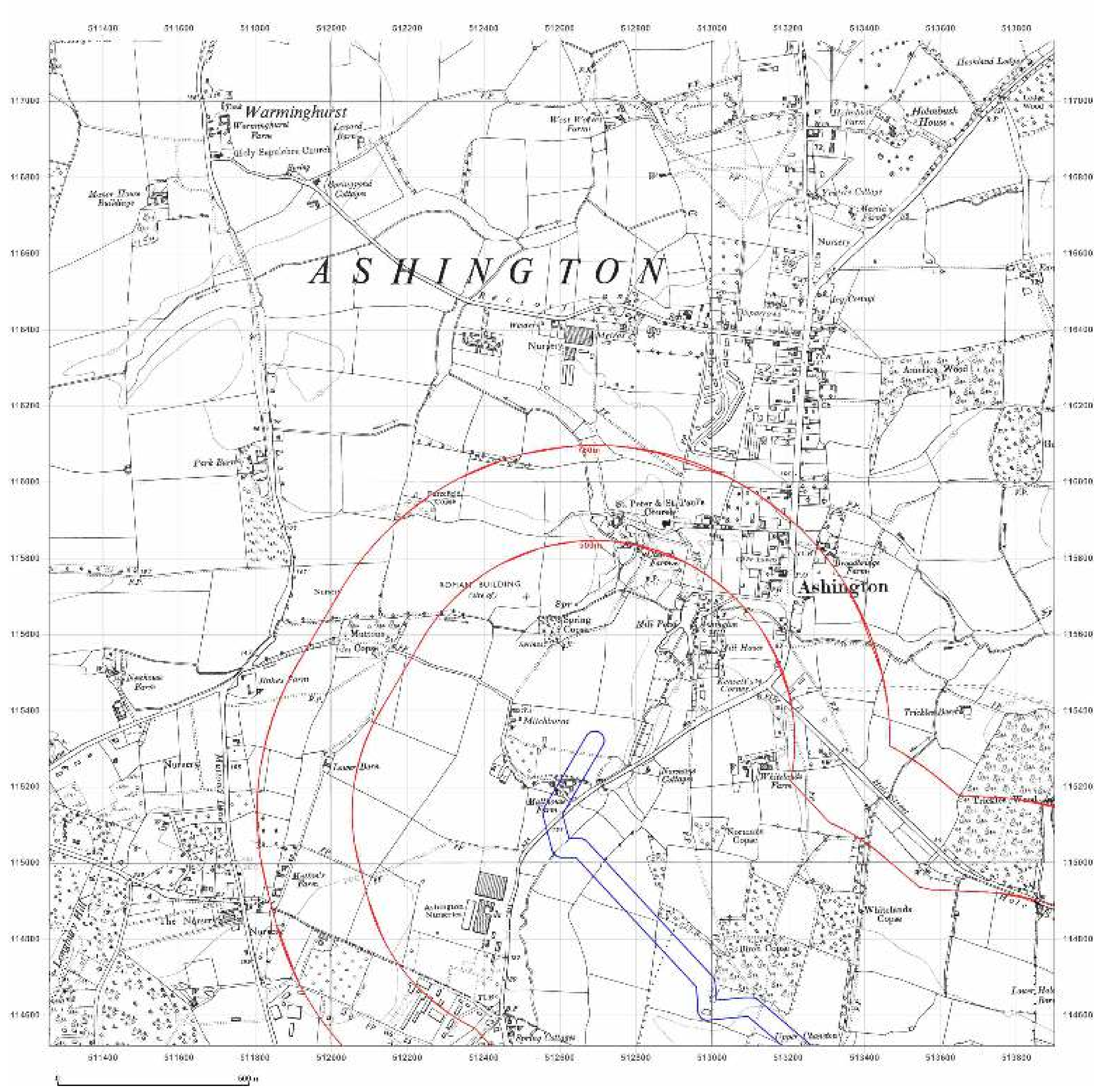

Groundsure INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_1_2
Grid Ref:	512578, 115839

Map Name:	Provisional
Map date:	**1957-1961**
Scale:	1:10,560
Printed at:	1:10,560

N
W E
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Surveyed 1957
Revised 1957
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1957
Revised 1961
Edition N/A
Copyright N/A
Levelled N/A

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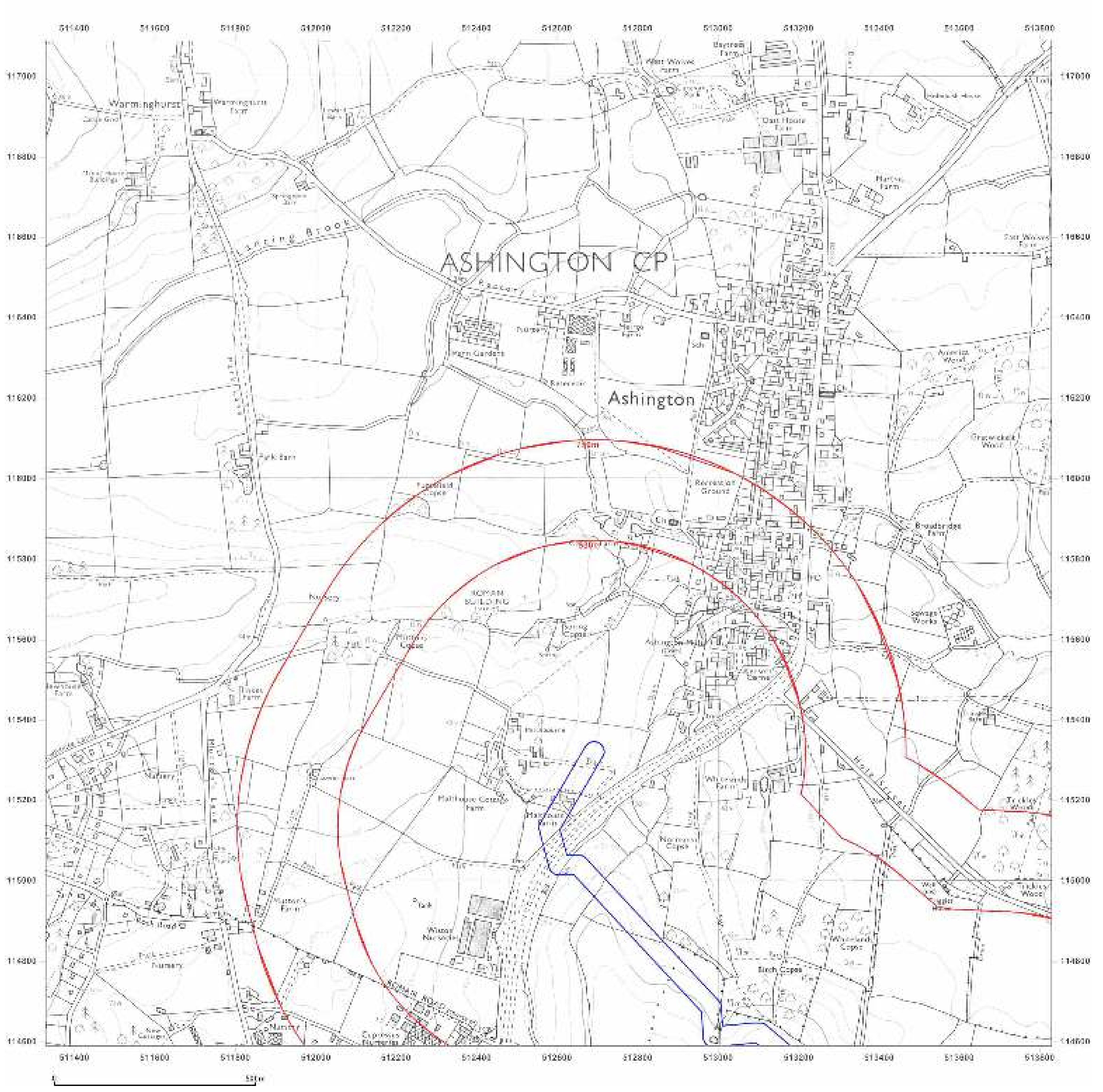

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_1_2
Grid Ref:	512578, 115839

Map Name:	National Grid
Map date:	**1980**
Scale:	1:10,000
Printed at:	1:10,000

N
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Surveyed 1973
Revised 1980
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1971
Revised 1980
Edition N/A
Copyright N/A
Levelled N/A

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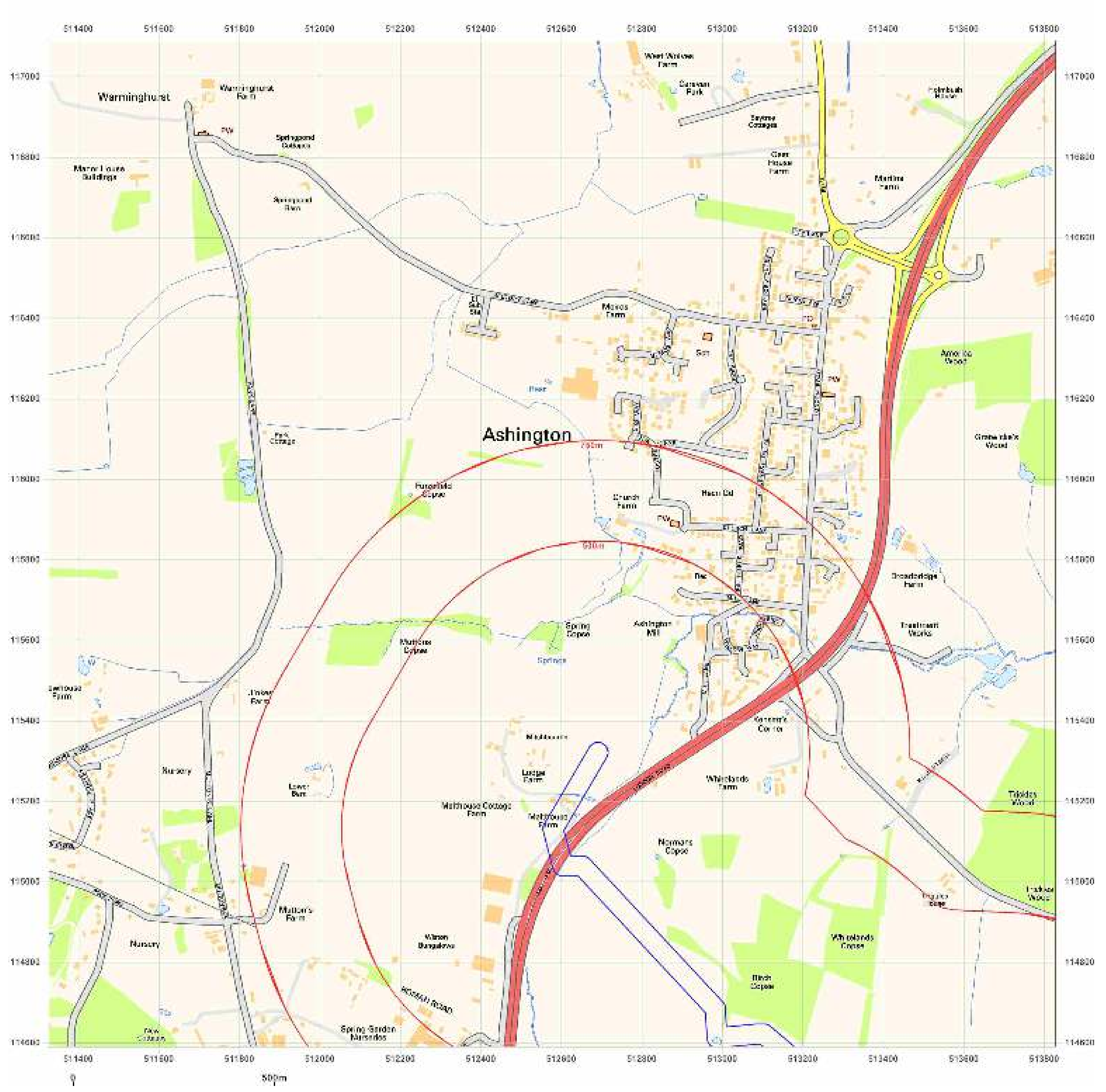

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INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_1_2
Grid Ref:	512578, 115839

Map Name:	National Grid
Map date:	**2001**
Scale:	1:10,000
Printed at:	1:10,000

2001

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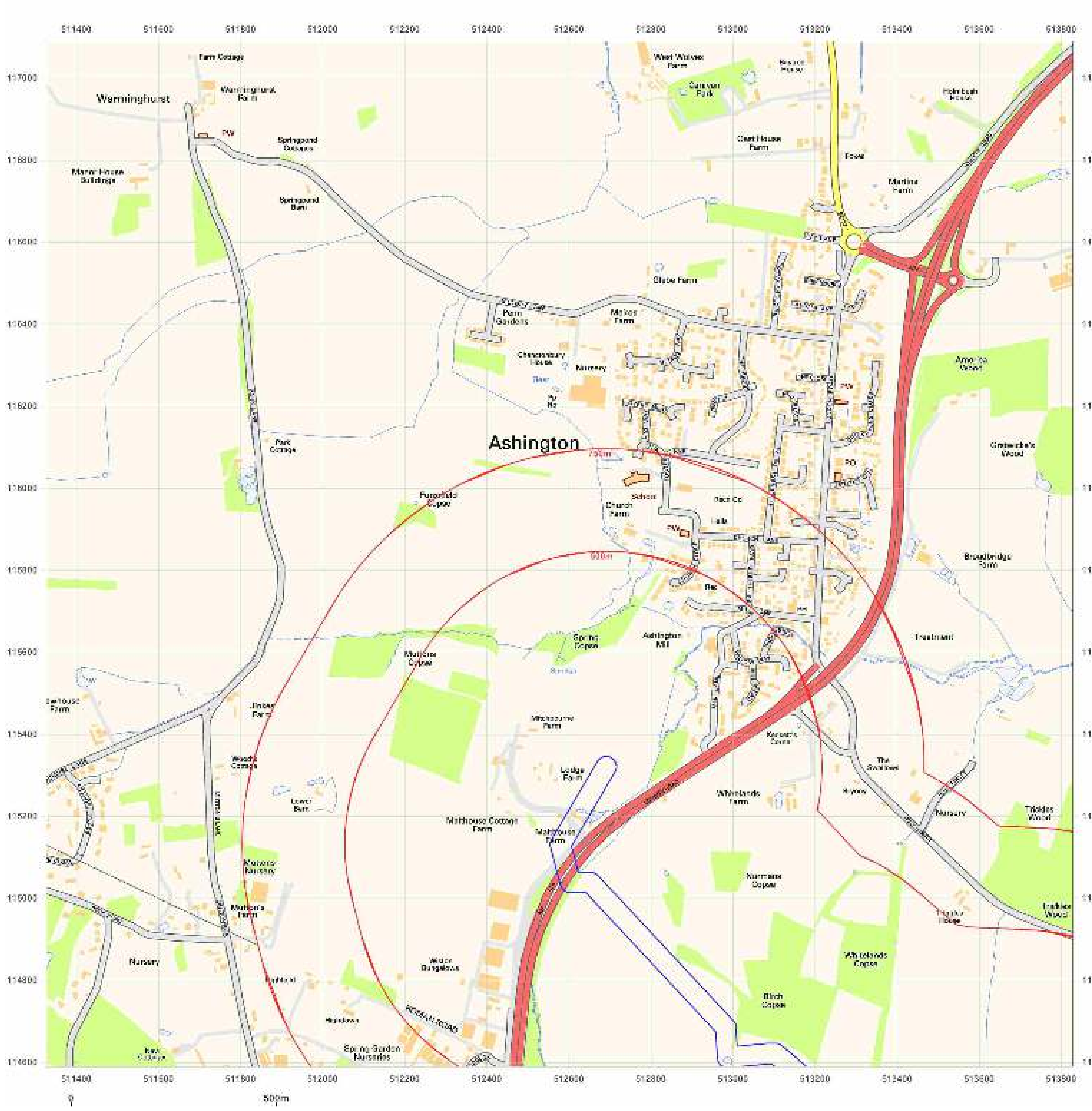

Groundsure
INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_1_2
Grid Ref:	512578, 115839

Map Name:	National Grid
Map date:	**2010**
Scale:	1:10,000
Printed at:	1:10,000

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2010

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Production date: 21 October 2020

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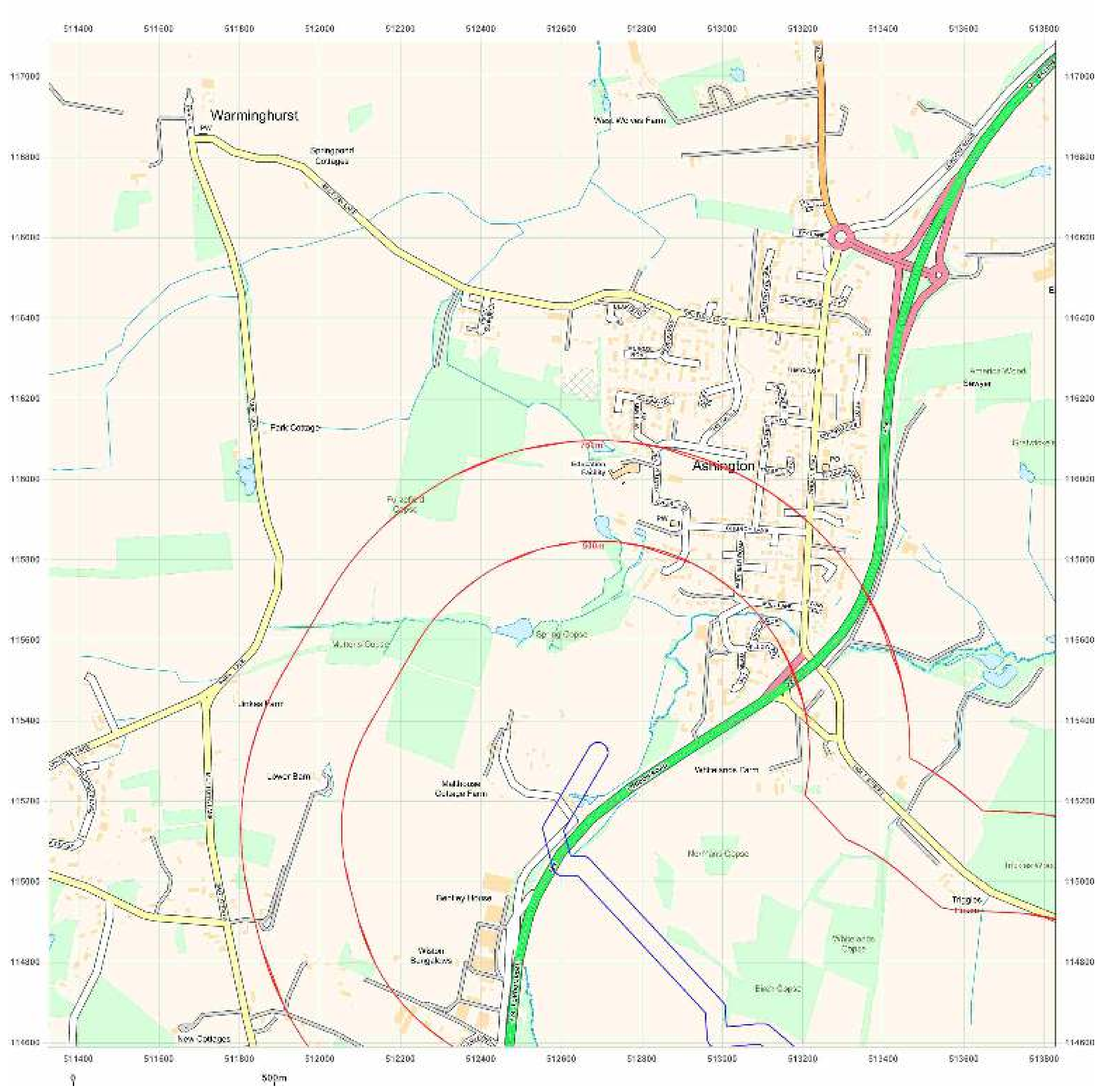

Groundsure
INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_1_2
Grid Ref:	512578, 115839
Map Name:	National Grid
Map date:	2020
Scale:	1:10,000
Printed at:	1:10,000

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2020

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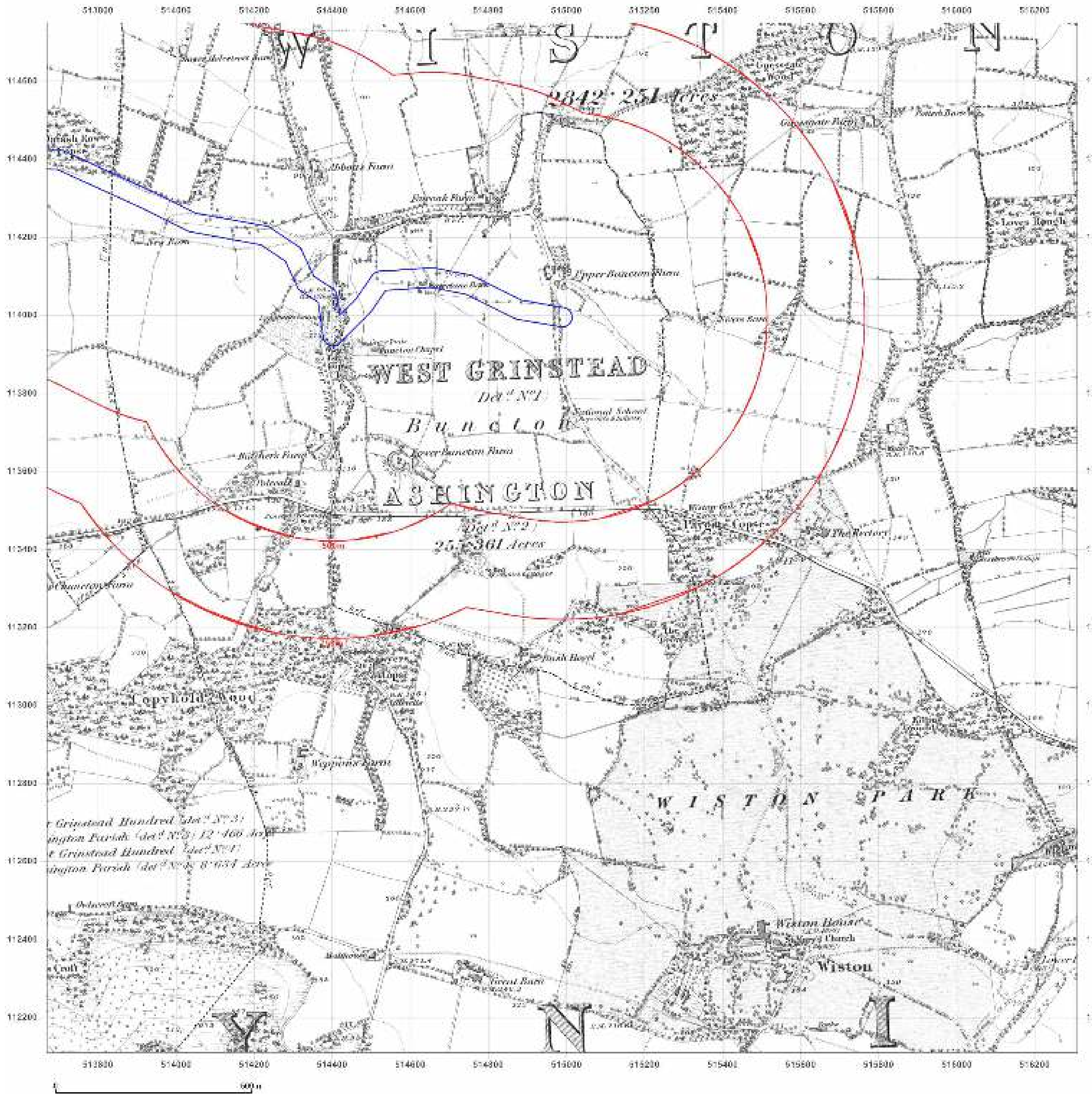

Groundsure
INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_1
Grid Ref:	514988, 113429

Map Name:	County Series
Map date:	**1875**
Scale:	1:10,560
Printed at:	1:10,560

N
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Surveyed 1875
Revised 1875
Edition N/A
Copyright N/A
Levelled N/A

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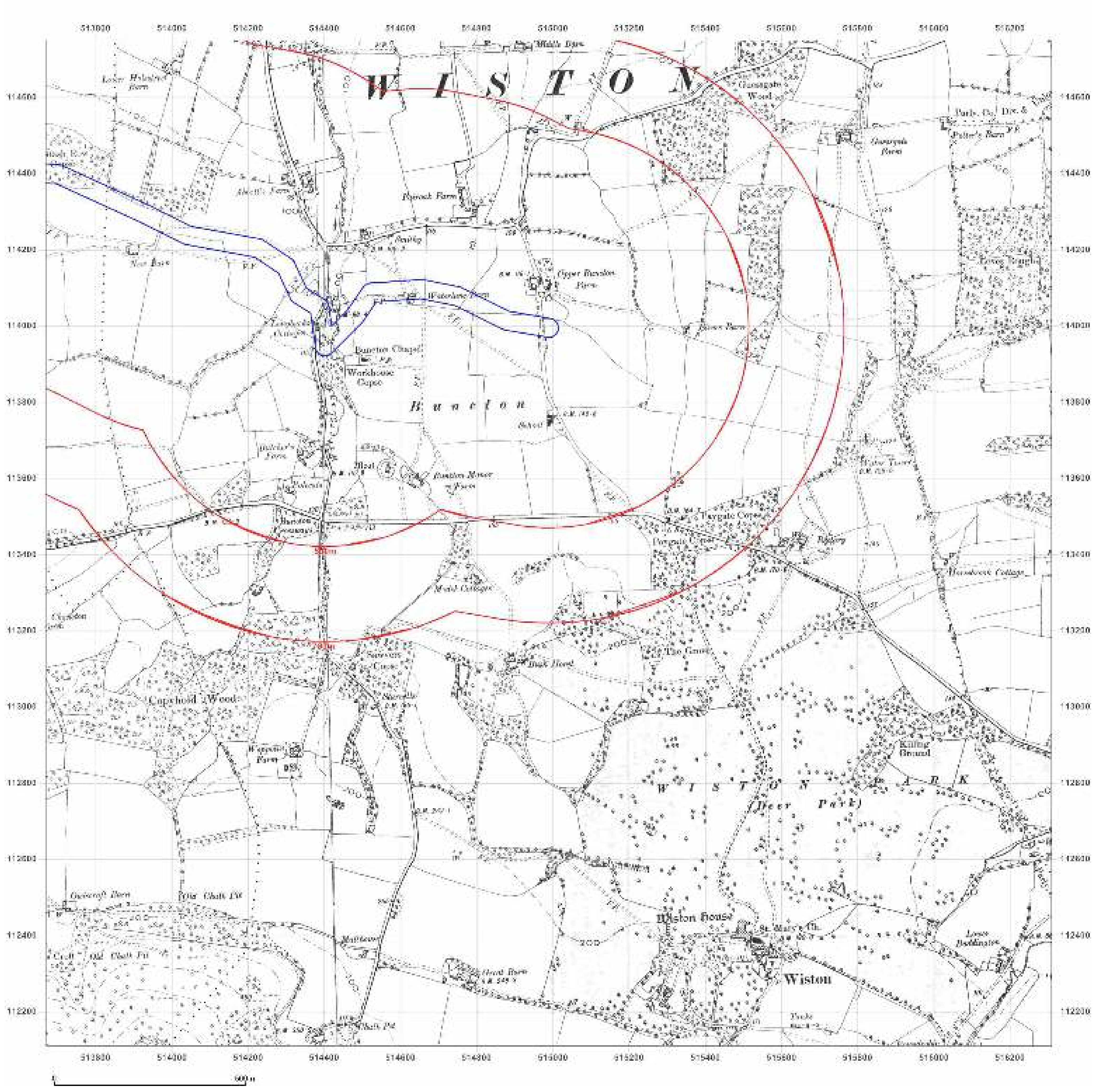

Site Details:

512613.3136663828,
113963.30244818775

Client Ref: RCGWM
Report Ref: GS-7180190_SS_2_1
Grid Ref: 514988, 113429

Map Name: County Series

Map date: **1895-1896**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1875
Revised 1896
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1895
Edition N/A
Copyright N/A
Levelled N/A

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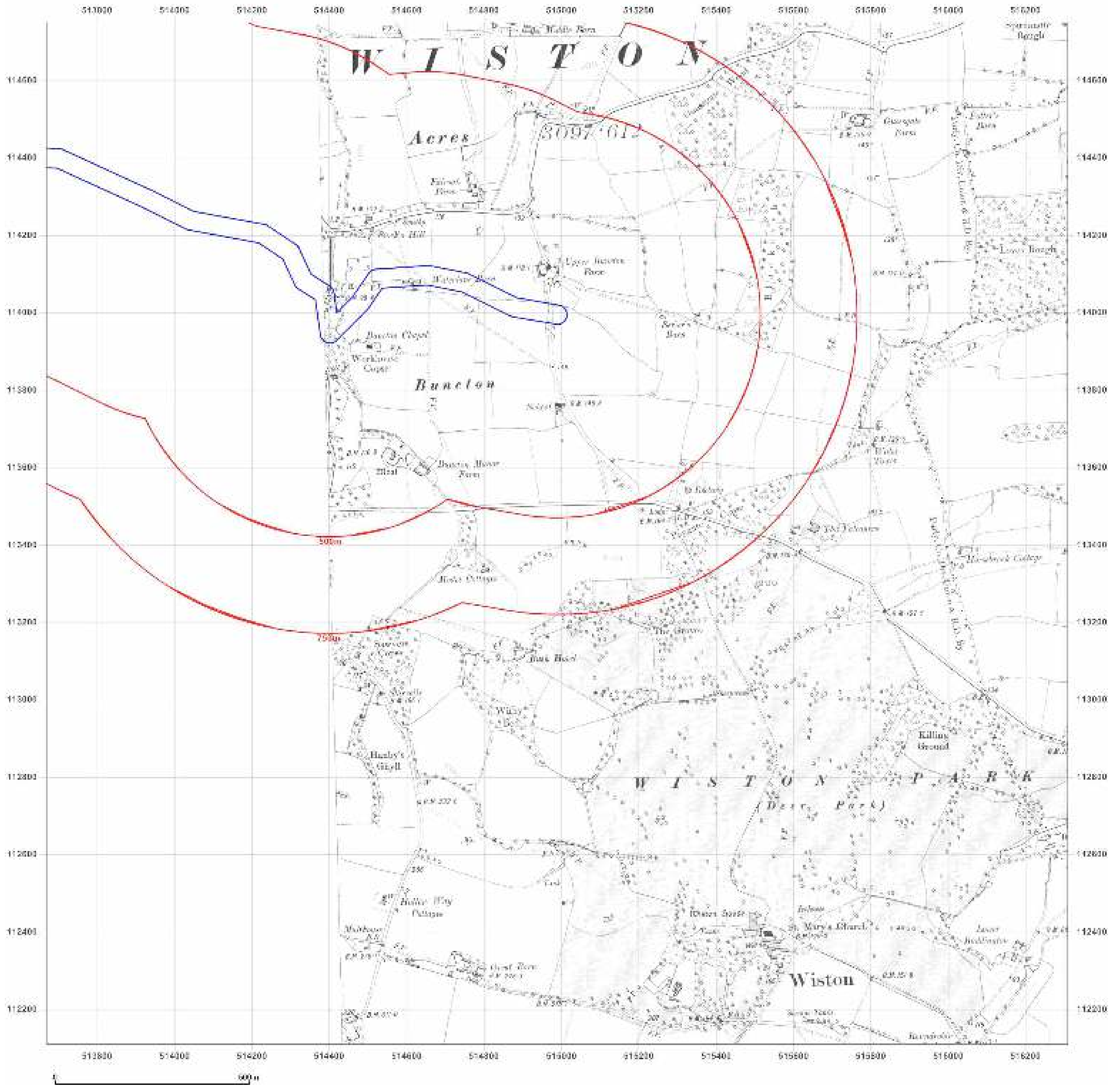

Site Details:

512613.3136663828, 113963.30244818775

Client Ref: RCGWM
Report Ref: GS-7180190_SS_2_1
Grid Ref: 514988, 113429

Map Name: County Series

Map date: **1909-1914**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1875
Revised 1908
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1874
Revised 1914
Edition N/A
Copyright N/A
Levelled N/A

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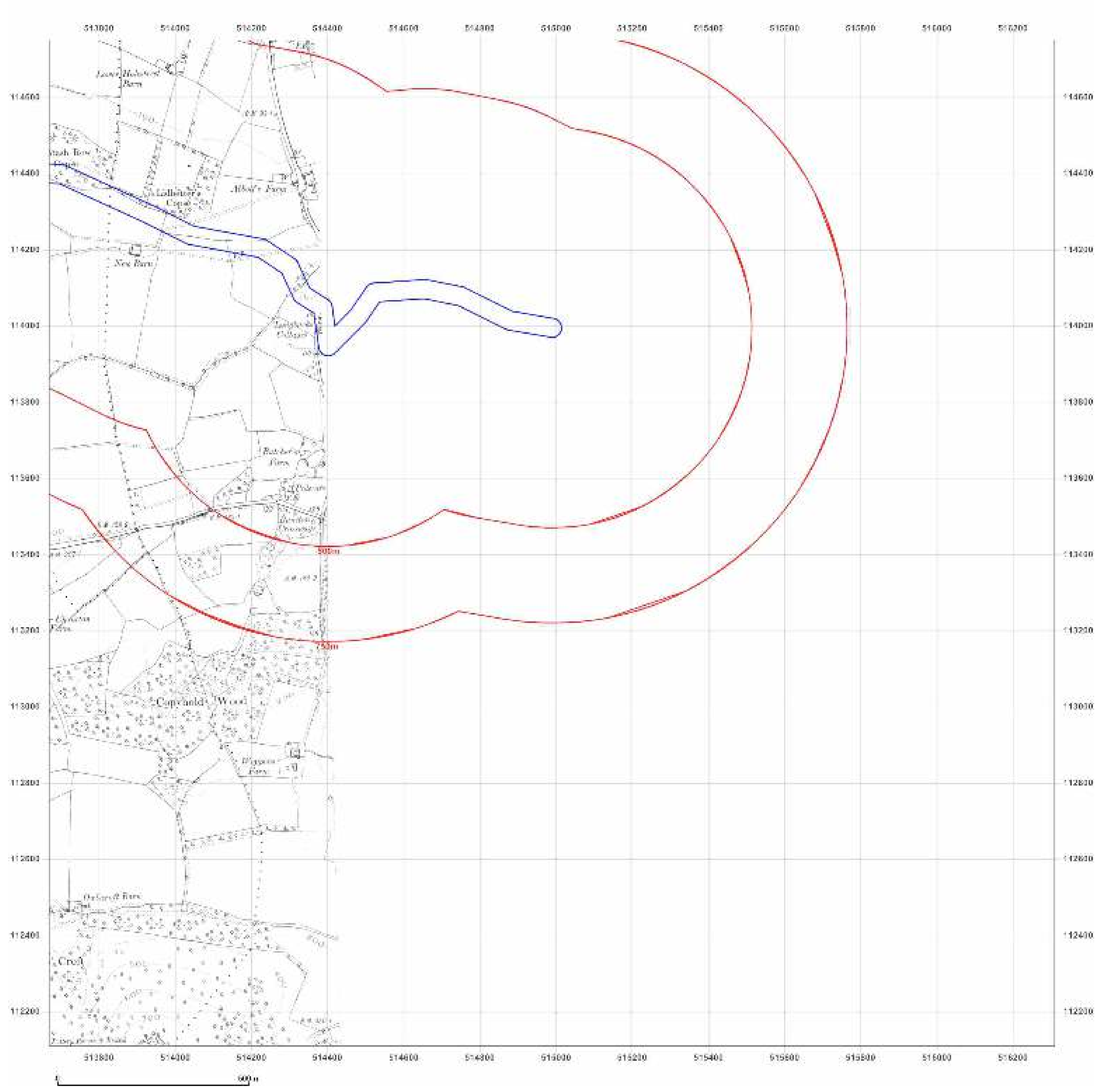

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_1
Grid Ref:	514988, 113429

Map Name:	County Series
Map date:	**1914**
Scale:	1:10,560
Printed at:	1:10,560

N
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Surveyed 1875
Revised 1914
Edition 1914
Copyright N/A
Levelled N/A

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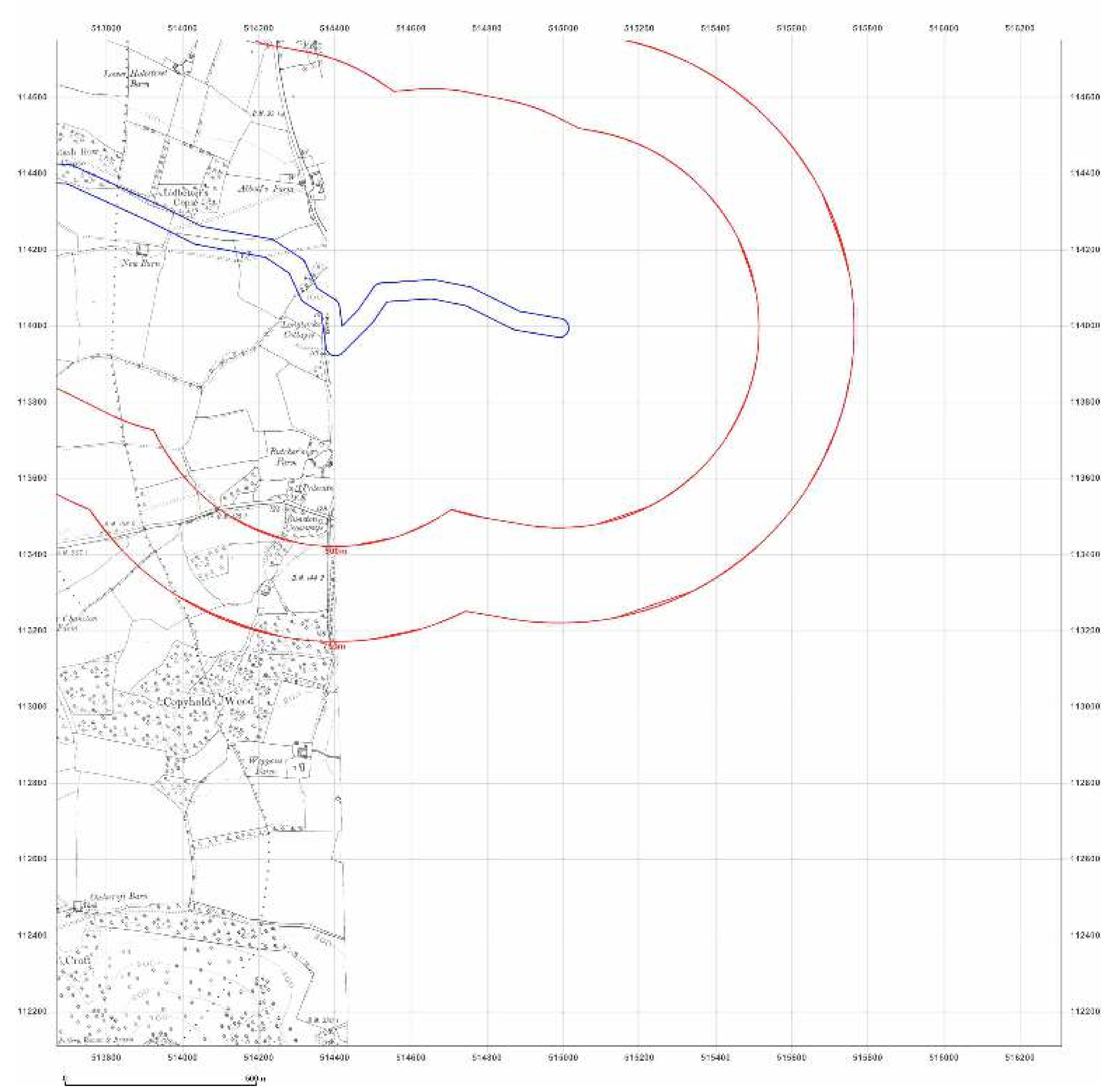

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Site Details:

512613.3136663828,
113963.30244818775

Client Ref: RCGWM
Report Ref: GS-7180190_SS_2_1
Grid Ref: 514988, 113429

Map Name: County Series

Map date: 1914

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1875
Revised 1914
Edition N/A
Copyright N/A
Levelled N/A

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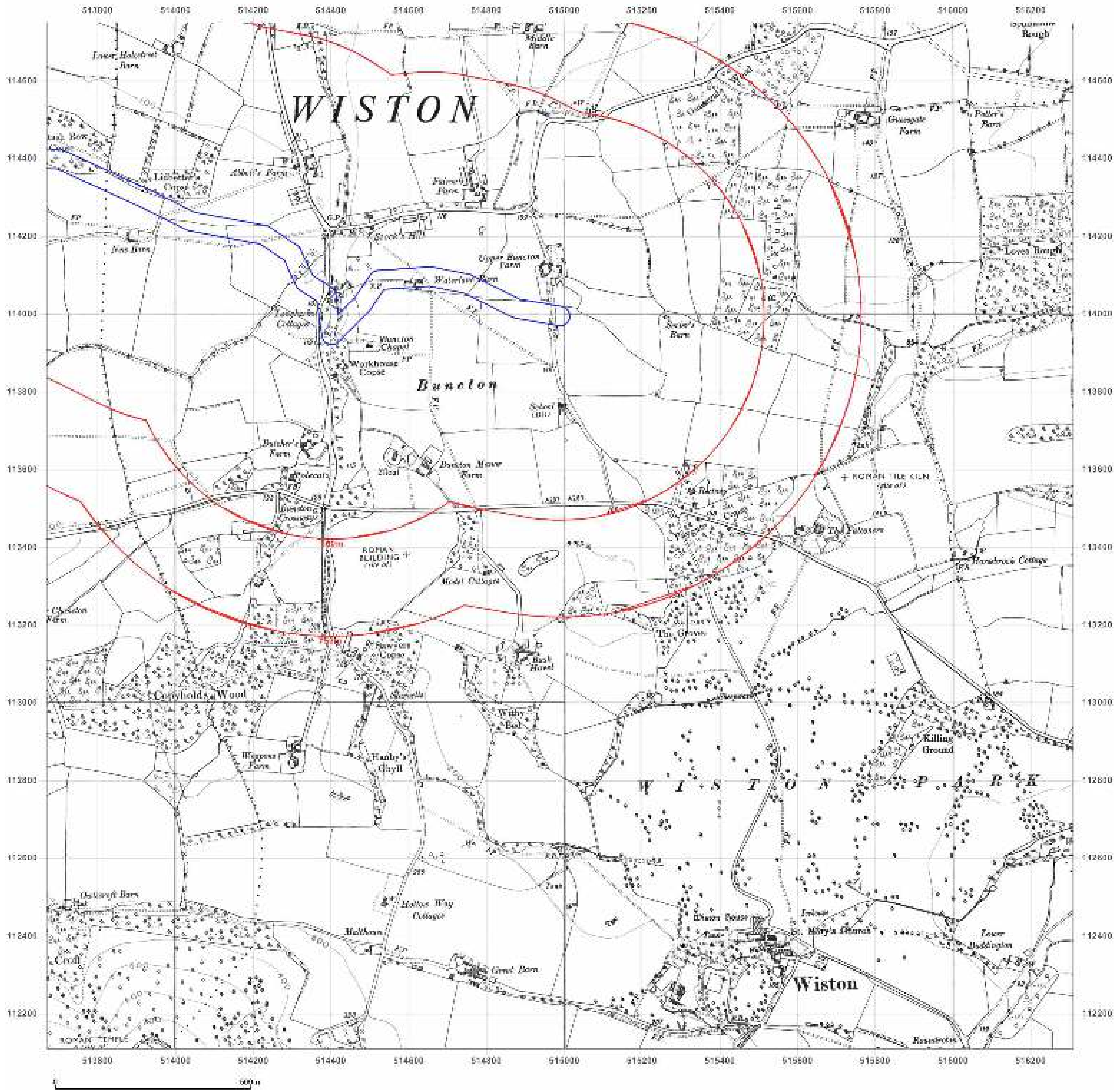

Site Details:

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113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_1
Grid Ref:	514988, 113429

Map Name:	Provisional
Map date:	**1957-1961**
Scale:	1:10,560
Printed at:	1:10,560

N
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Surveyed 1957
Revised 1961
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1957
Edition N/A
Copyright N/A
Levelled N/A

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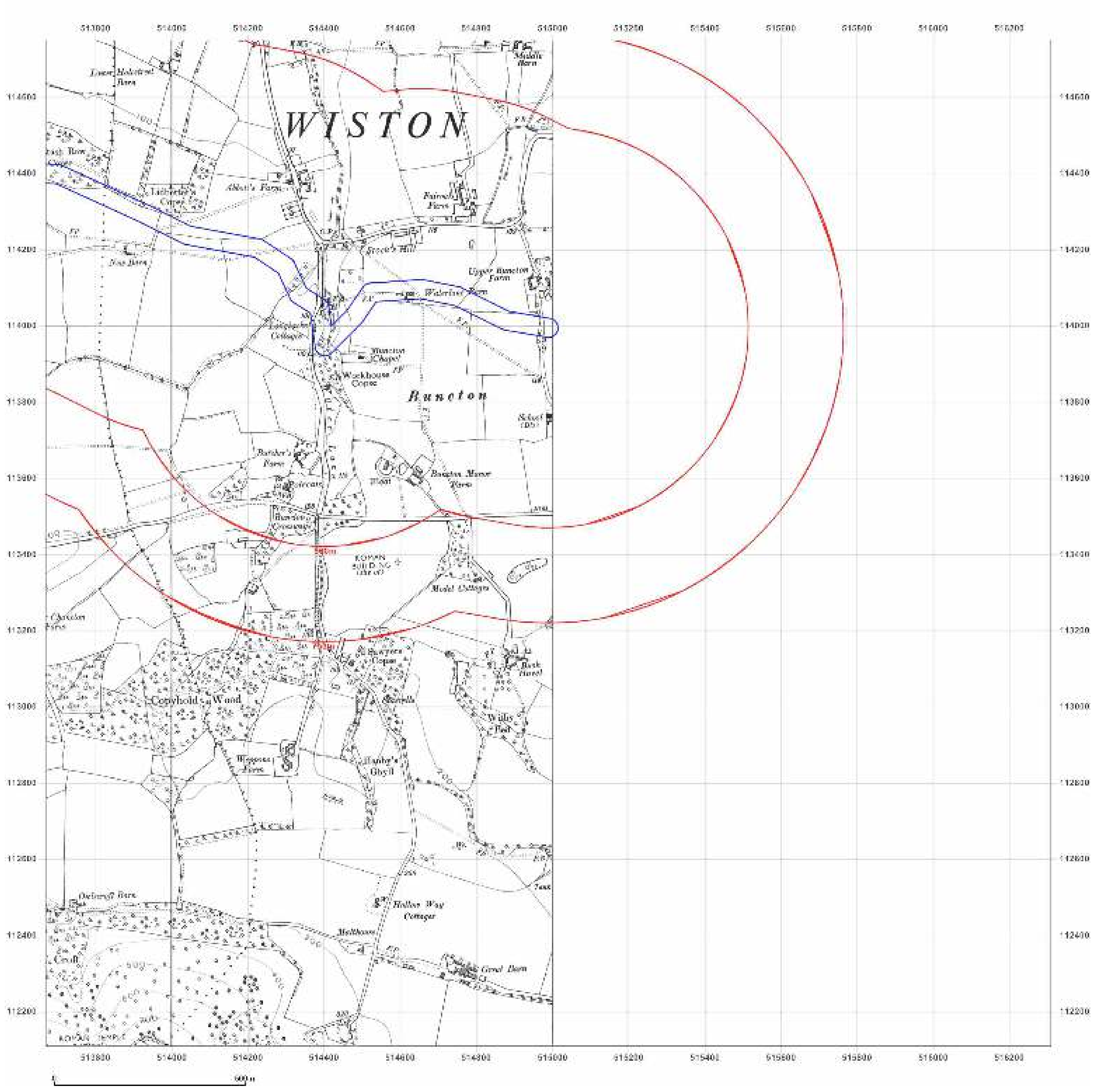

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Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_1
Grid Ref:	514988, 113429
Map Name:	Provisional
Map date:	1971
Scale:	1:10,560
Printed at:	1:10,560

N
W E
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Surveyed 1957
Revised 1971
Edition N/A
Copyright N/A
Levelled N/A

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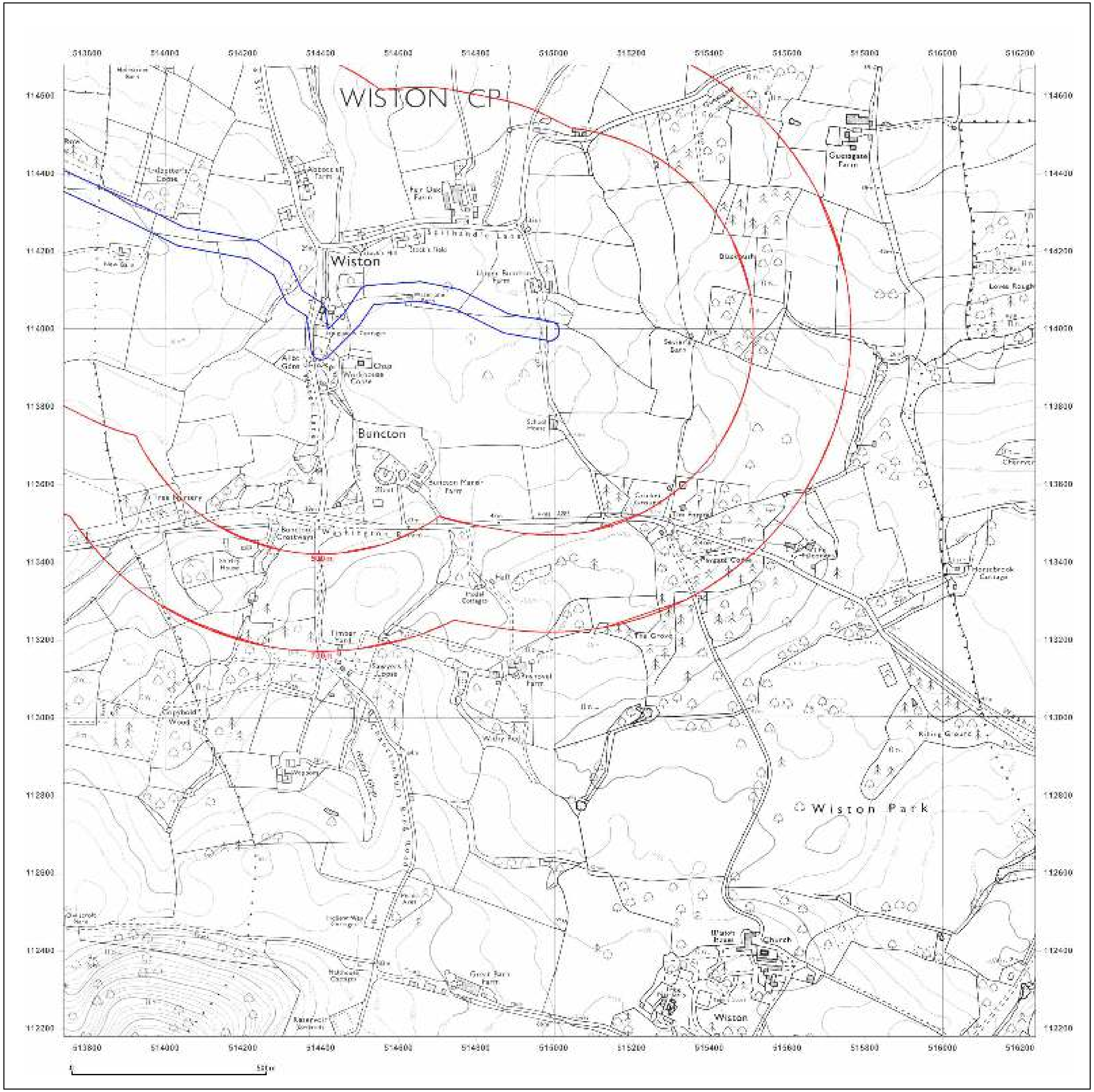

Site Details:

512613.3136663828,
113963.30244818775

Client Ref: RCGWM
Report Ref: GS-7180190_SS_2_1
Grid Ref: 514988, 113429

Map Name: National Grid

Map date: **1976-1980**

Scale: 1:10,000

Printed at: 1:10,000

N
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Surveyed 1971
Revised 1980
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1971
Revised 1976
Edition N/A
Copyright N/A
Levelled N/A

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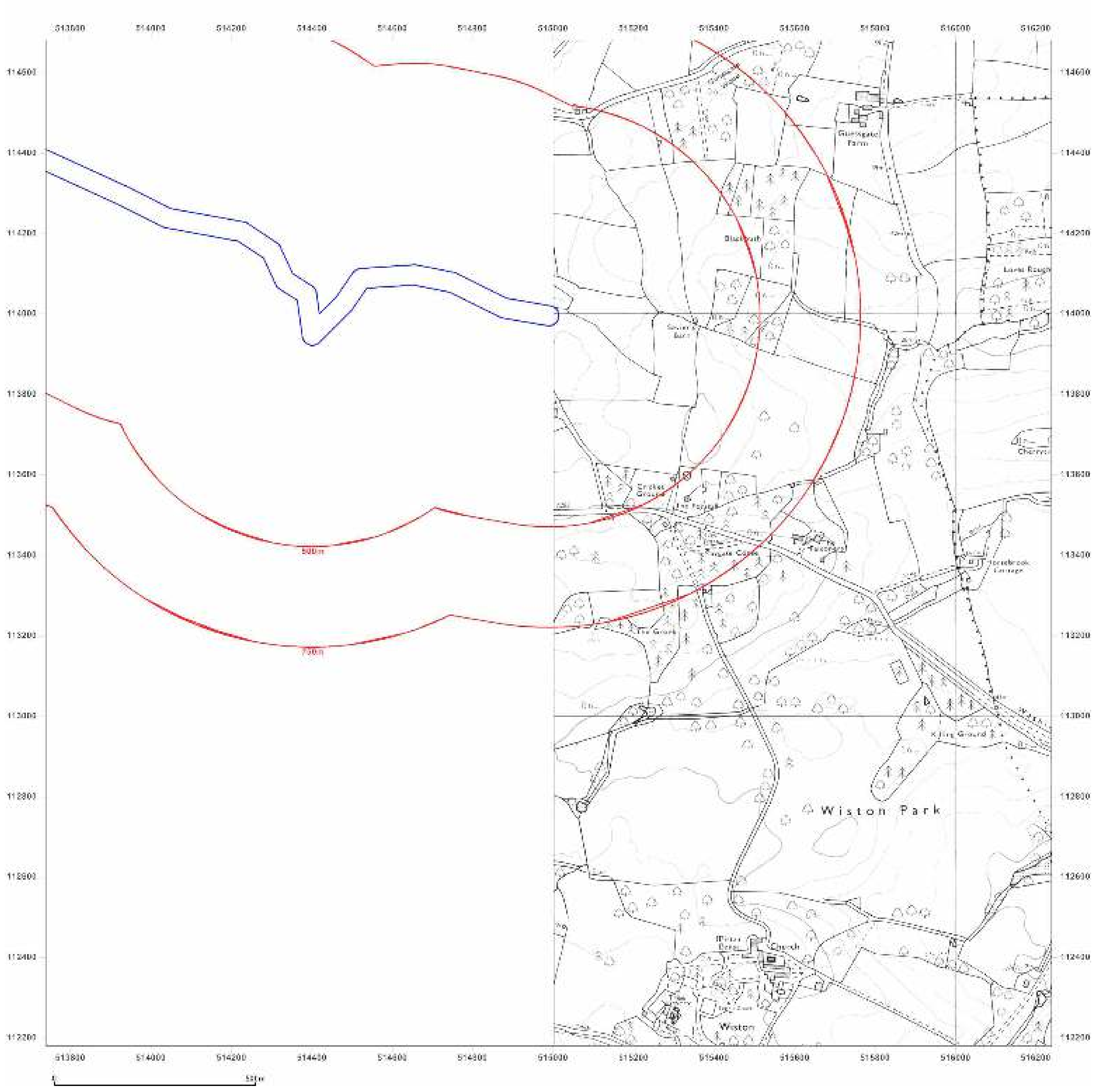

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_1
Grid Ref:	514988, 113429

Map Name:	National Grid
Map date:	1992
Scale:	1:10,000
Printed at:	1:10,000

N
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Surveyed 1971
Revised 1992
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 21 October 2020

Map legend available at:
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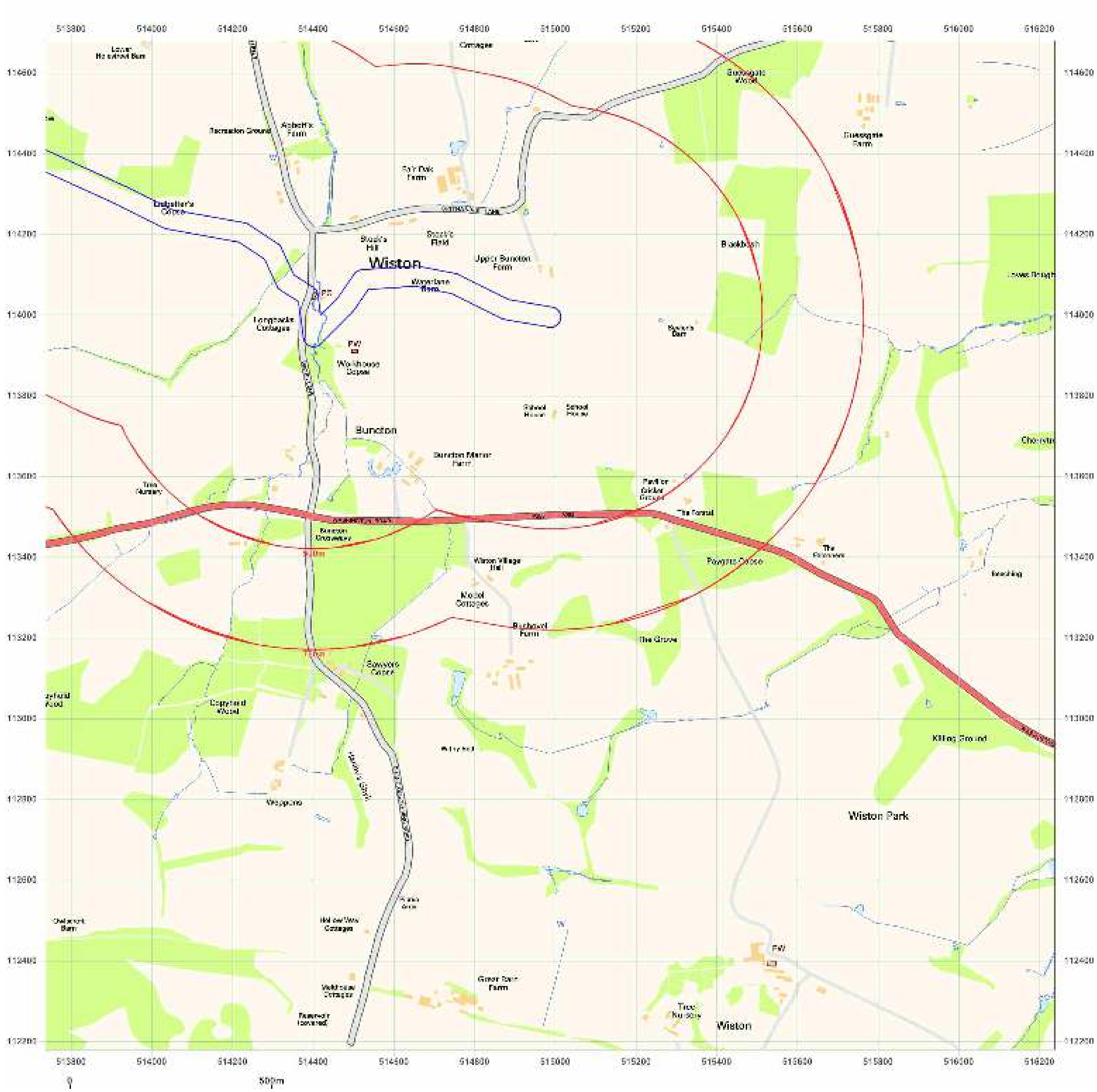

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INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_1
Grid Ref:	514988, 113429

Map Name:	National Grid
Map date:	**2001**
Scale:	1:10,000
Printed at:	1:10,000

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Production date: 21 October 2020

Map legend available at:
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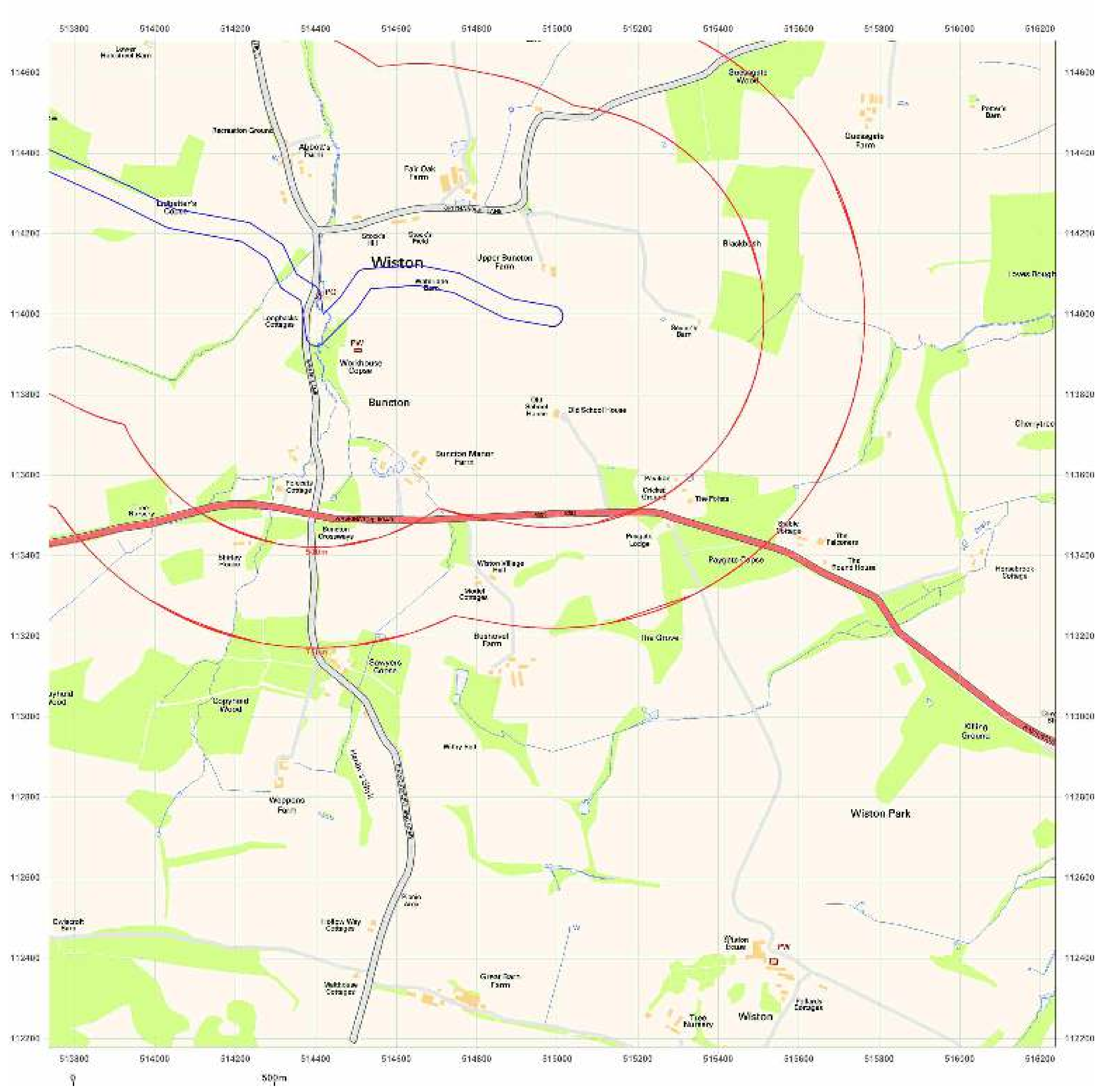

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INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_1
Grid Ref:	514988, 113429

Map Name:	National Grid
Map date:	**2010**
Scale:	1:10,000
Printed at:	1:10,000

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2010

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Production date: 21 October 2020

Map legend available at:
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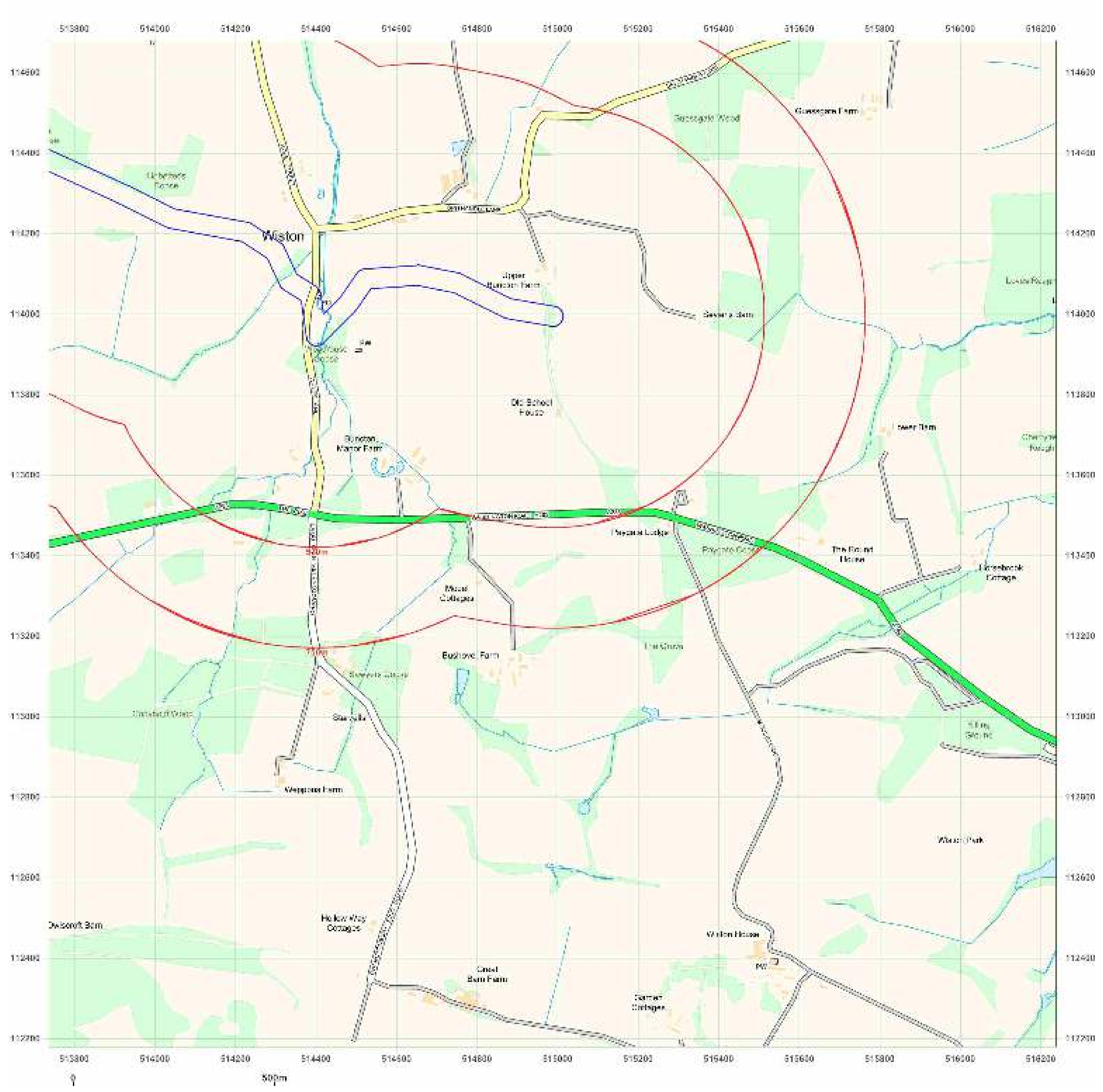

Groundsure
INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_1
Grid Ref:	514988, 113429

Map Name:	National Grid
Map date:	**2020**
Scale:	1:10,000
Printed at:	1:10,000

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2020

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Production date: 21 October 2020

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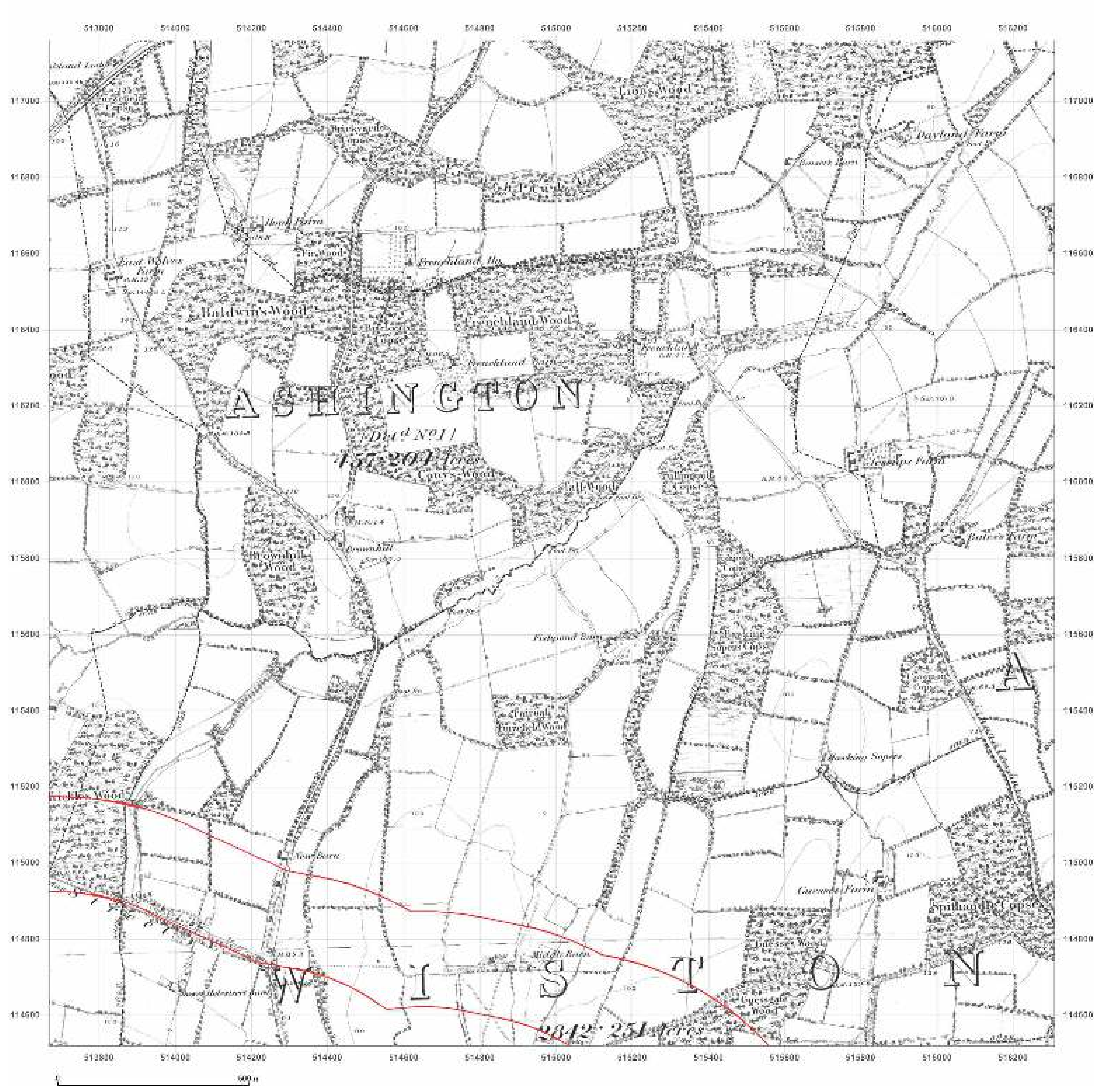

Groundsure
INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_2
Grid Ref:	514988, 115839

Map Name:	County Series
Map date:	**1875**
Scale:	1:10,560
Printed at:	1:10,560

N
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Surveyed 1875
Revised 1875
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
~~Revised 1875~~
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 21 October 2020

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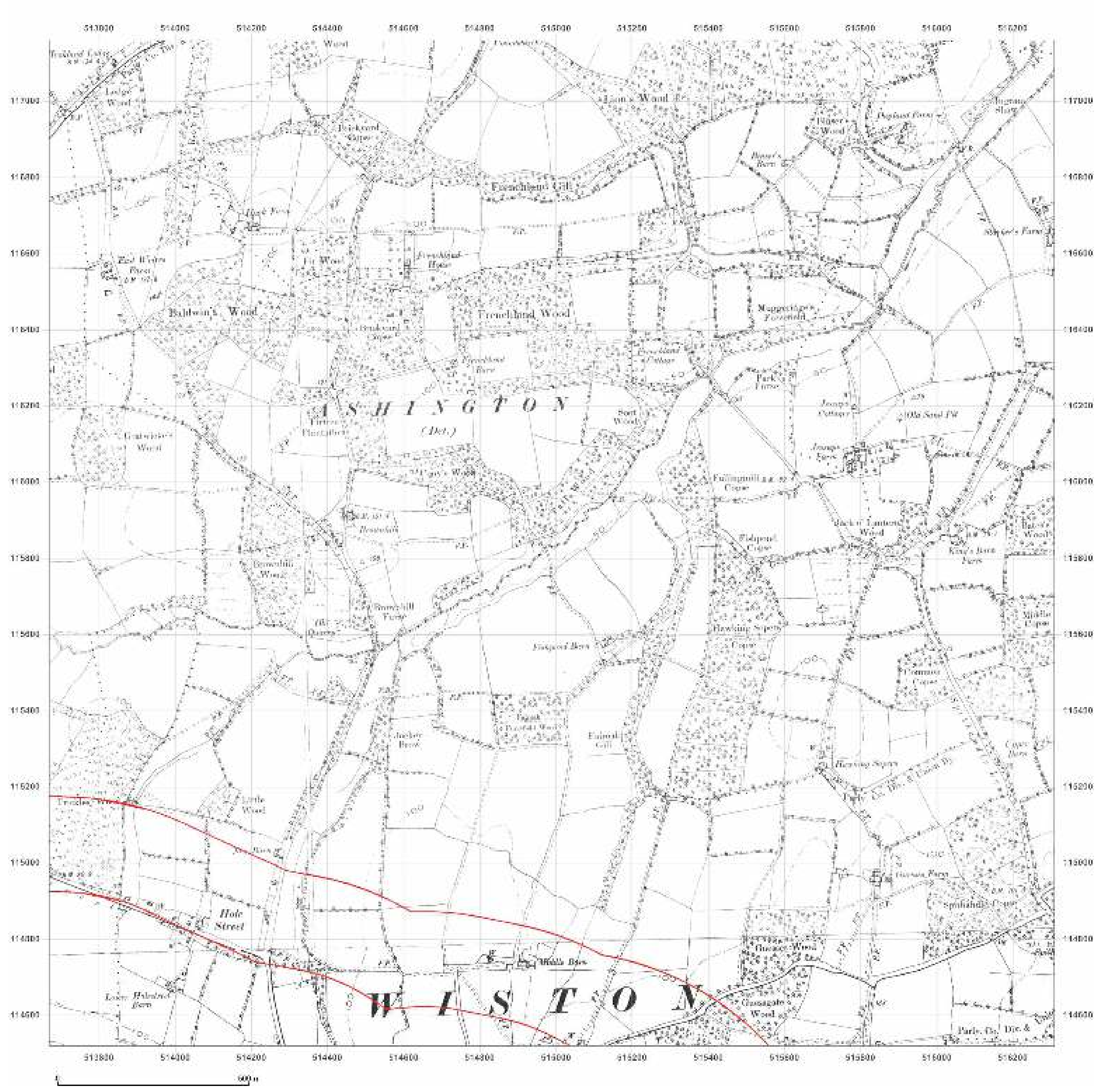

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INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref: RCGWM
Report Ref: GS-7180190_SS_2_2
Grid Ref: 514988, 115839

Map Name:	County Series
Map date:	**1895-1896**
Scale:	1:10,560
Printed at:	1:10,560

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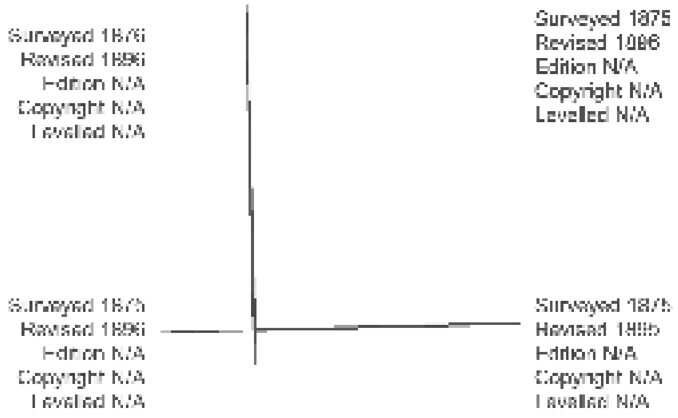

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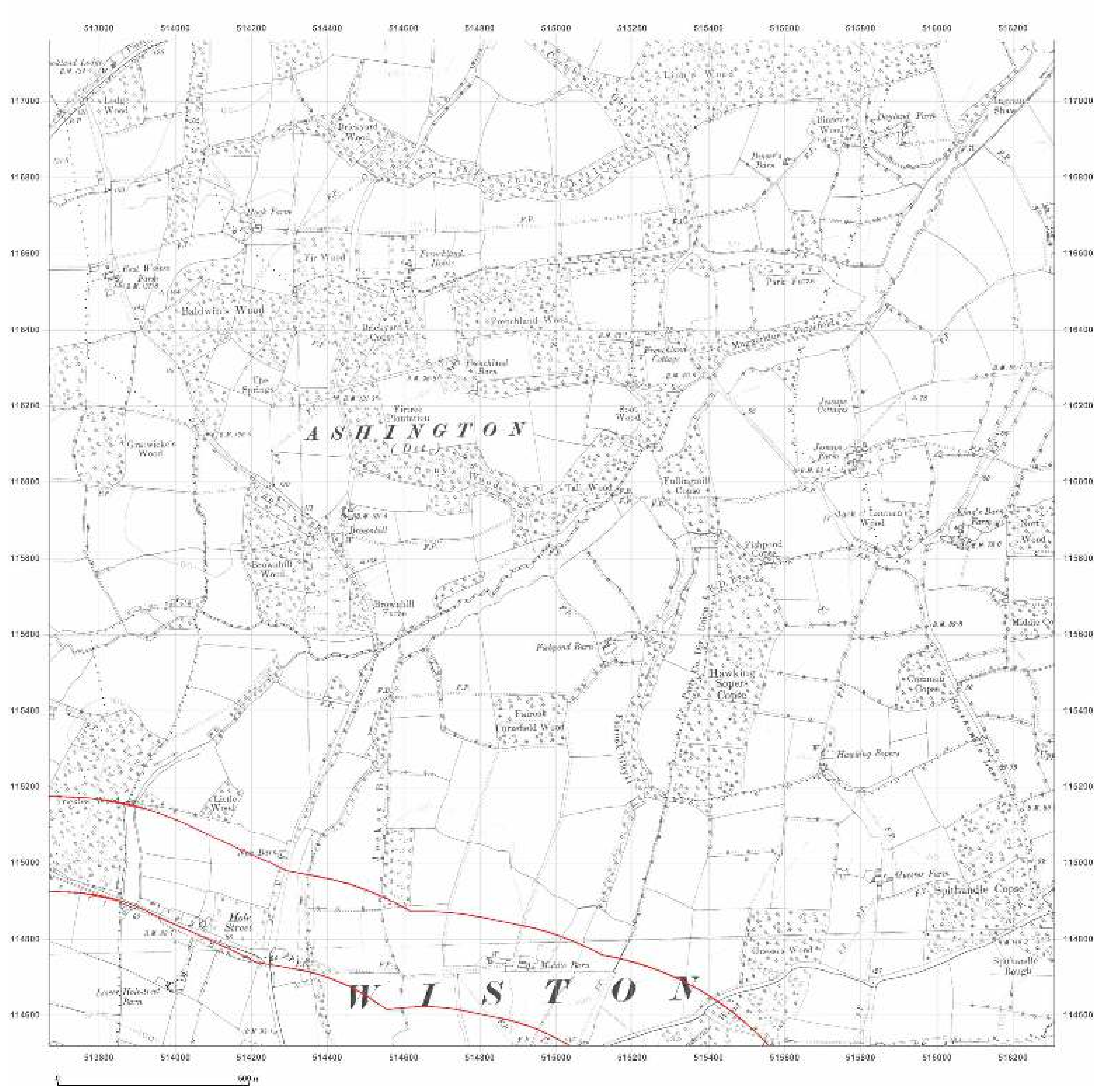

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_2
Grid Ref:	514988, 115839

Map Name:	County Series
Map date:	**1909-1914**
Scale:	1:10,560
Printed at:	1:10,560

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Surveyed 1875
Revised 1909
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1913
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1914
Edition 1914
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Levelled N/A

Surveyed 1874
Revised 1914
Edition N/A
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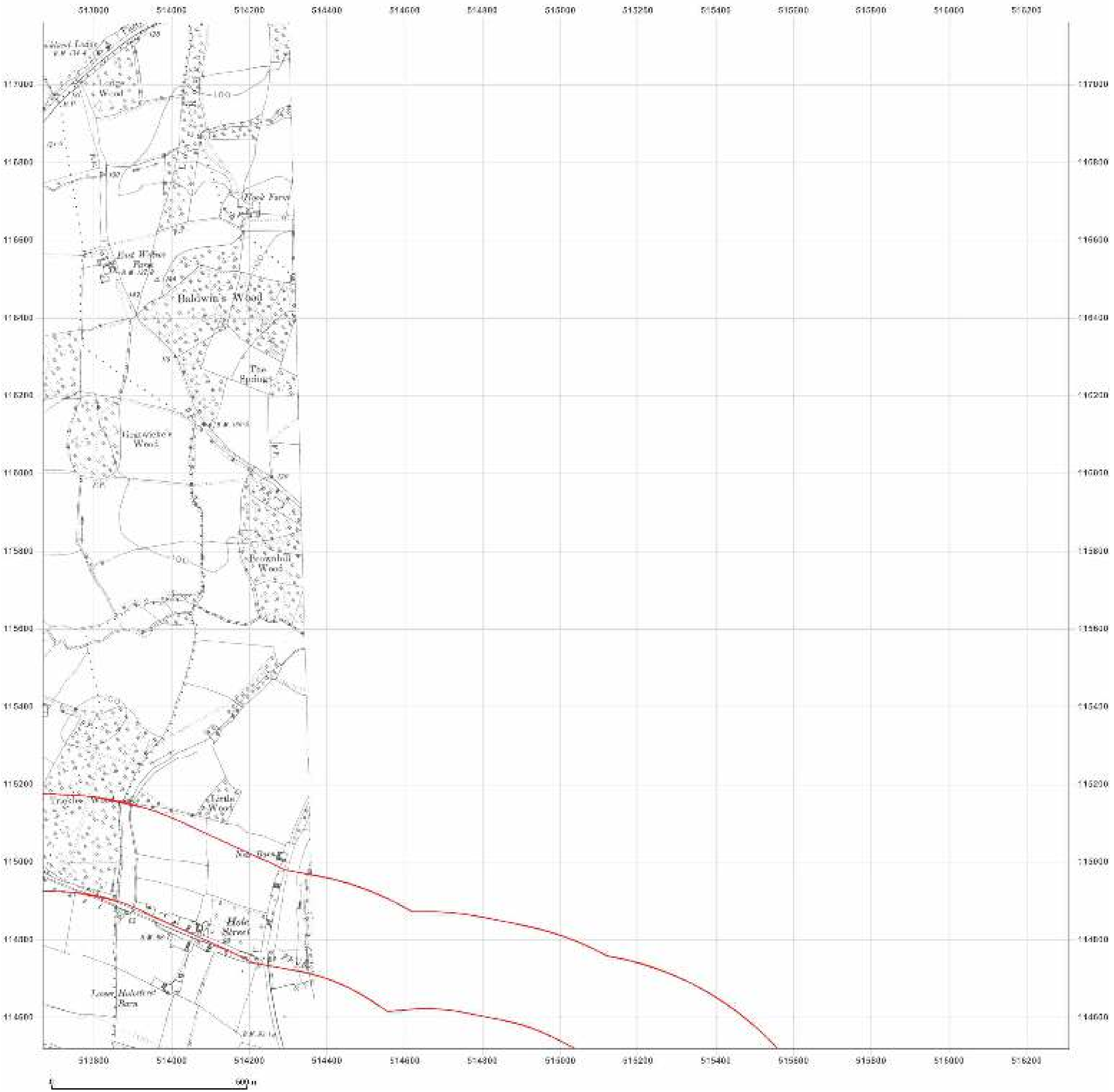

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113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_2
Grid Ref:	514988, 115839
Map Name:	County Series
Map date:	**1909-1914**
Scale:	1:10,560
Printed at:	1:10,560

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Surveyed 1875
Revised 1909
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1914
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 21 October 2020

Map legend available at:
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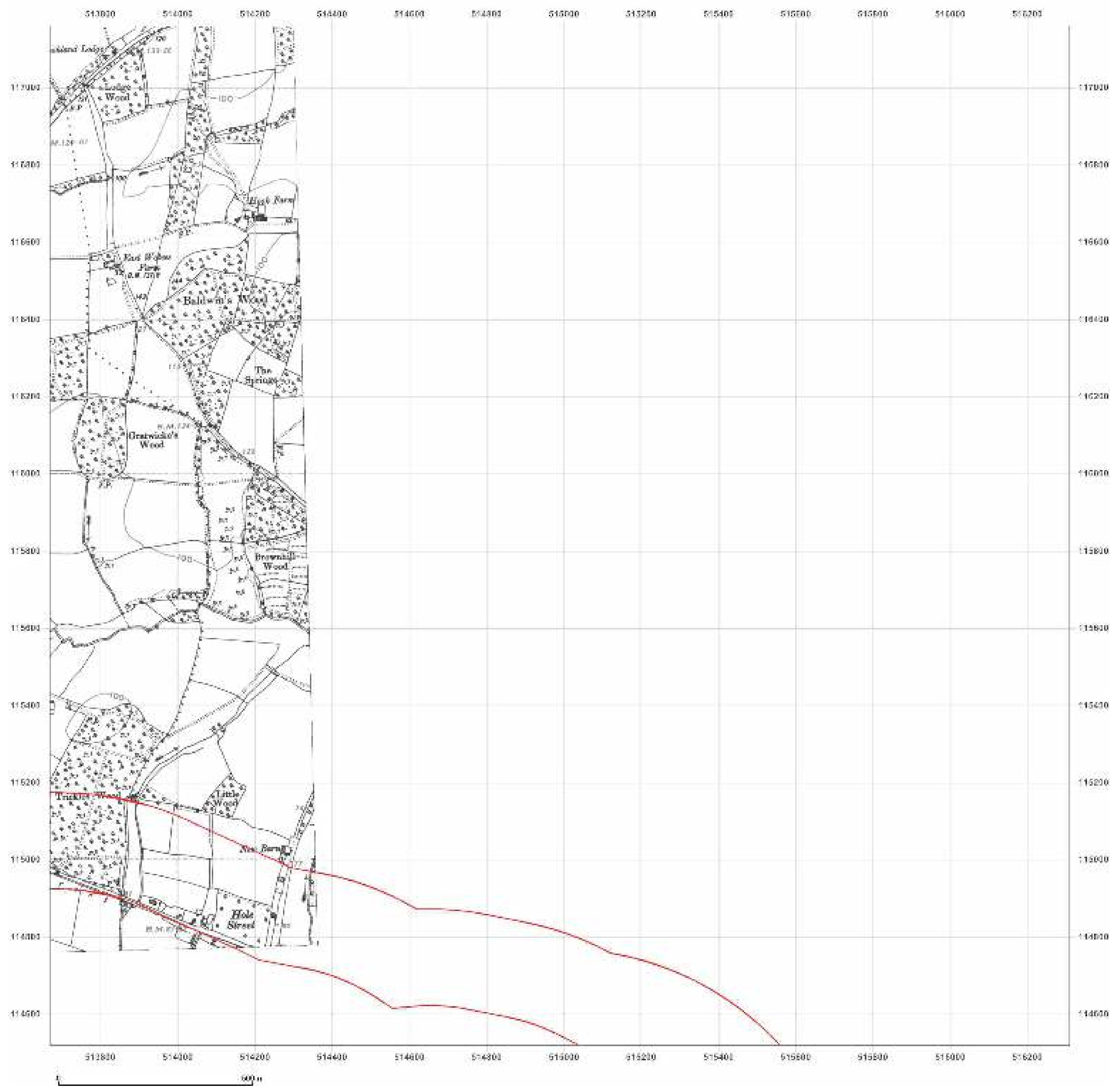

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_2
Grid Ref:	514988, 115839
Map Name:	County Series
Map date:	**1946**
Scale:	1:10,560
Printed at:	1:10,560

Surveyed 1875
Revised 1946
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 21 October 2020

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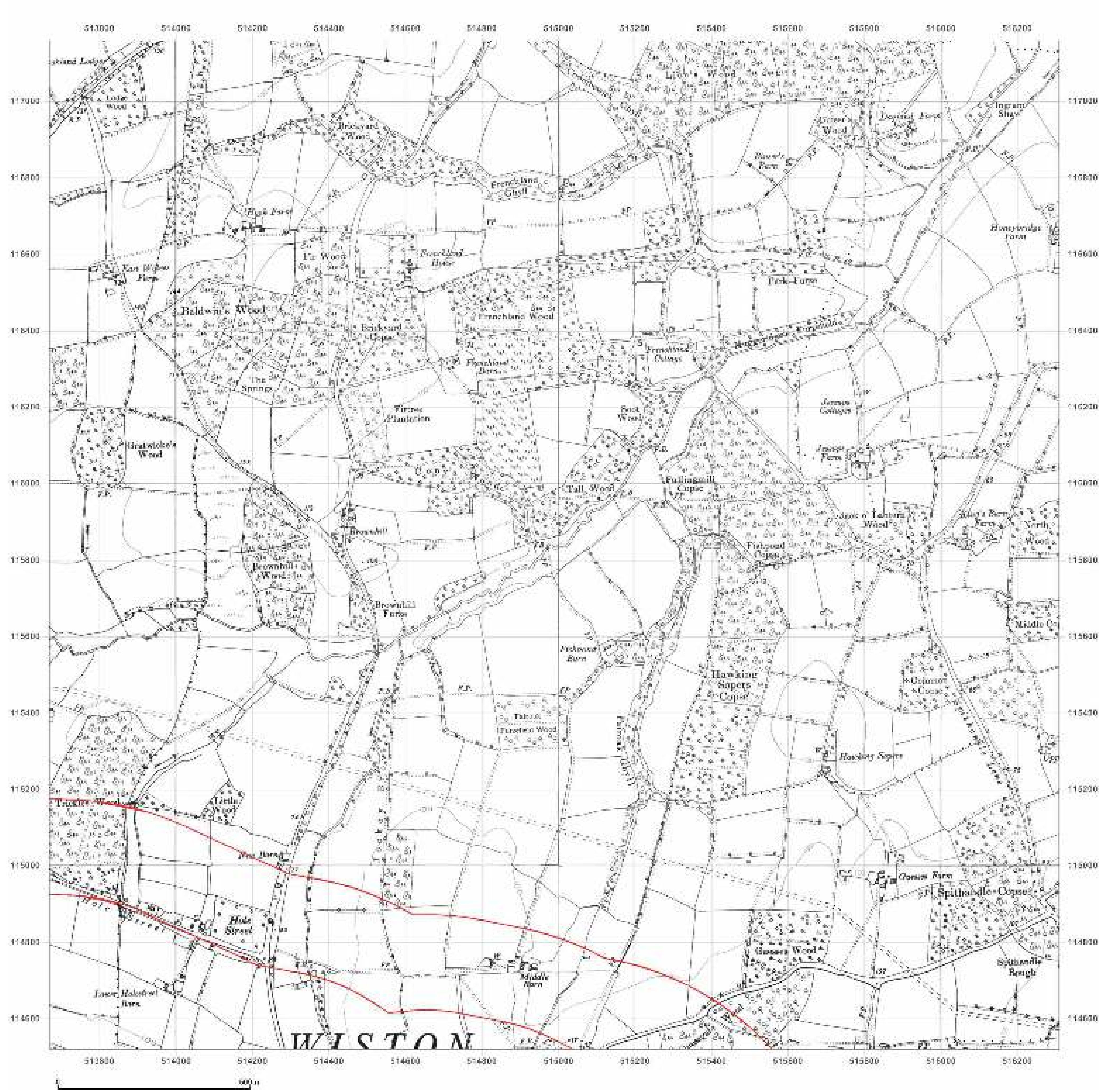

Groundsure
INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref: RCGWM
Report Ref: GS-7180190_SS_2_2
Grid Ref: 514988, 115839

Map Name: Provisional

Map date: **1957-1961**

Scale: 1:10,560

Printed at: 1:10,560

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Surveyed 1957
Revised 1957
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1957
Revised 1957
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1957
Revised 1961
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised 1957
Edition N/A
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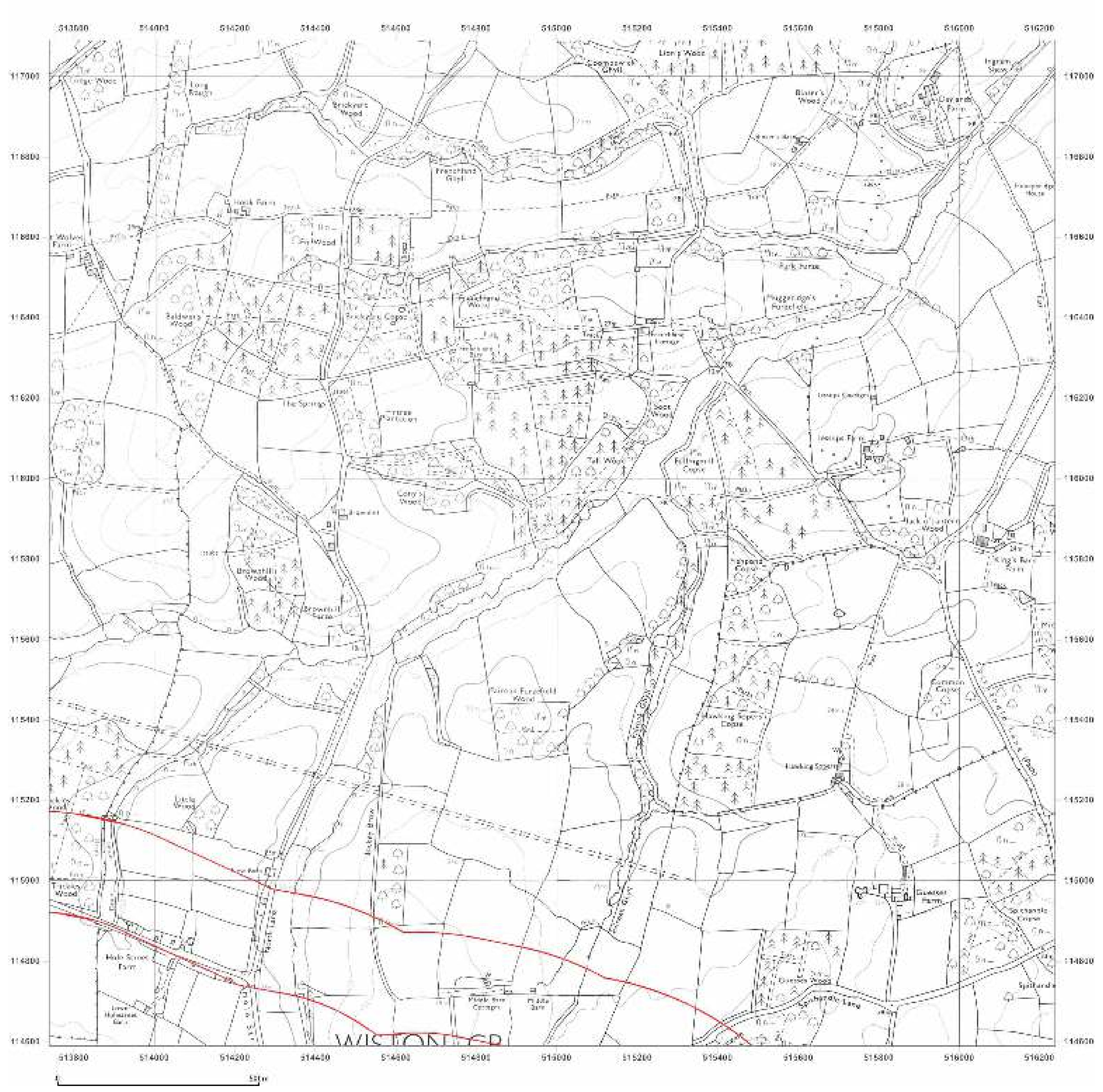

Groundsure INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_2
Grid Ref:	514988, 115839

Map Name:	National Grid
Map date:	**1976-1980**
Scale:	1:10,000
Printed at:	1:10,000

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Surveyed 1973
Revised 1980
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1973
Revised 1980
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1971
Revised 1980
Edition N/A
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Levelled N/A

Surveyed 1971
Revised 1976
Edition N/A
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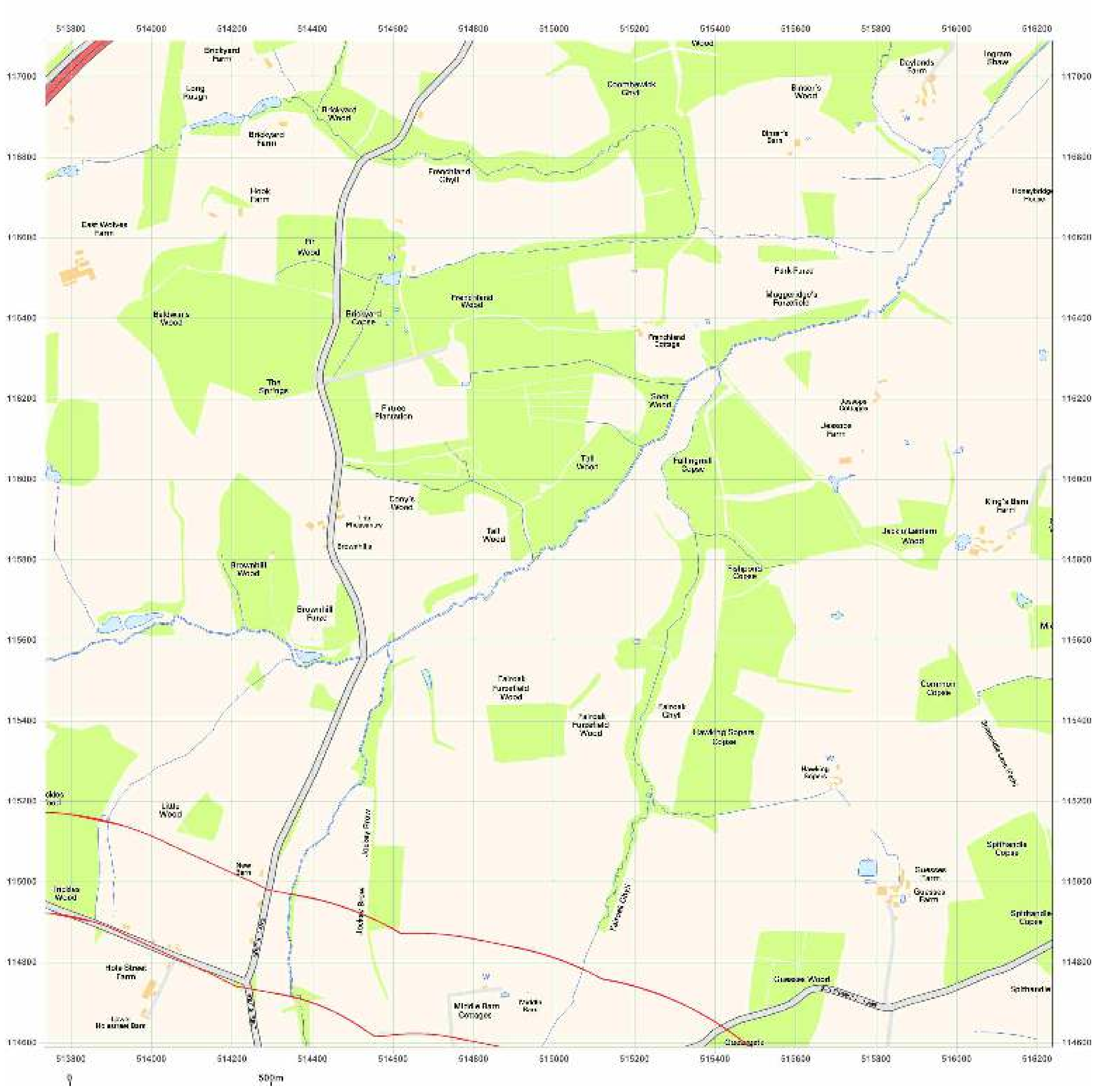

Site Details:

512613.3136663828,
113963.30244818775

Client Ref: RCGWM
Report Ref: GS-7180190_SS_2_2
Grid Ref: 514988, 115839

Map Name: National Grid

Map date: 2001

Scale: 1:10,000

Printed at: 1:10,000

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Map legend available at:
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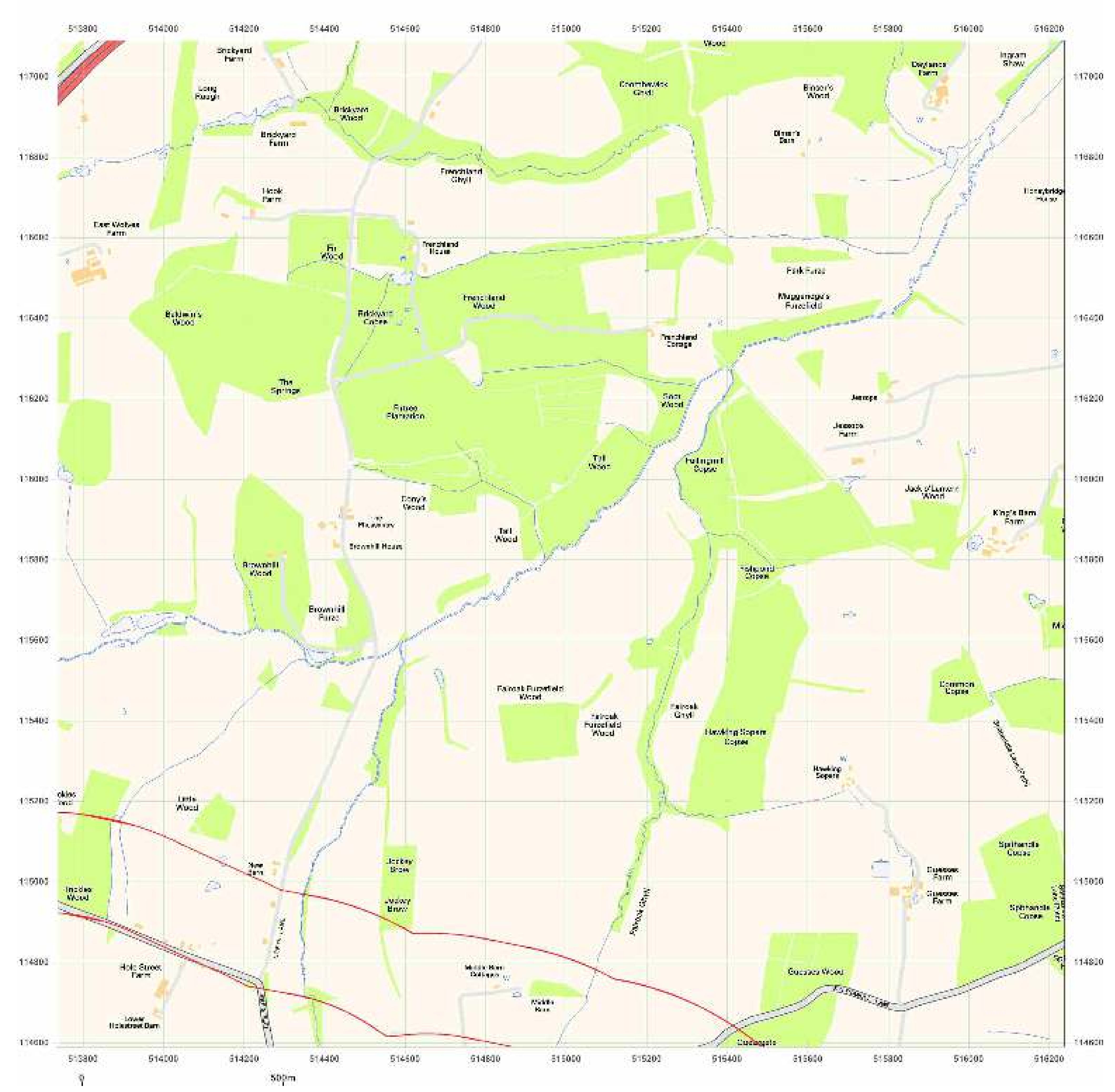

Groundsure
INSIGHTS

Site Details:

512613.3136663828,
113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_2
Grid Ref:	514988, 115839

Map Name:	National Grid
Map date:	**2010**
Scale:	1:10,000
Printed at:	1:10,000

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2010

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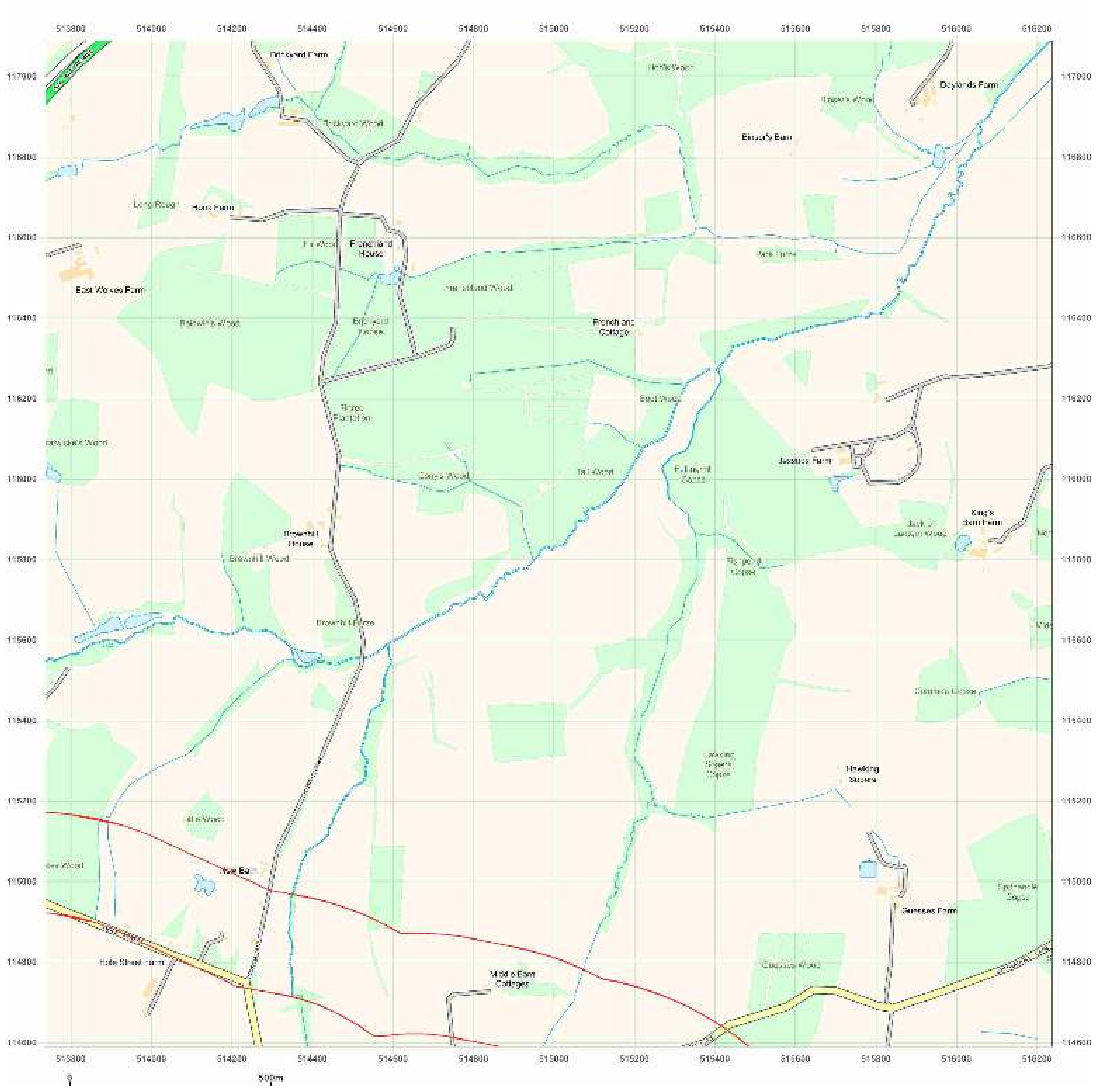
W: www.groundsure.com

Production date: 21 October 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure
INSIGHTS

Site Details:

512613.3136663828, 113963.30244818775

Client Ref:	RCGWM
Report Ref:	GS-7180190_SS_2_2
Grid Ref:	514988, 115839

Map Name:	National Grid
Map date:	2020
Scale:	1:10,000
Printed at:	1:10,000

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2020

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W: www.groundsure.com

Production date: 21 October 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf

Annex C – Chain of Custody

SAMPLE RECEIPT

i2's job no: 20-33480

H2Ogeo
The Annex Faygate Place
Wimlands Lane
Faygate
RH12 4SP

Tel: 07787231455
Fax:
E-mail: david.walker@h2ogeo.co.uk

Contact: David Walker
Your job no: RC
Your order no:
Turnaround: 7

Site: RC
Sample Type(s): 4 water samples

Received on: 02/10/2020
Booked in: 02/10/2020
Due date: 13/10/2020

i2 Analytical
7 Woodshots Meadows
Croxley Green Business Park
Watford
Herts
WD18 8YS

Tel: 01923 225404
Fax: 01923 237404
www.i2analytical.com

SAMPLES	SAMPLE ID	*AGS TYPE	DEPTH	Metals in water by ICP-MS (dissolved)	Metals in water by ICP-OES (dissolved)	Alkalinity in Water (by titration)	Boron in water	Hexavalent chromium in water	Sulphate in water	TPH1 (Waters)	Ammoniacal Nitrogen as N in water	Nitrate as N in water	Chloride in water
1638618	HB1			X	X	X	X	X	X	X	X	X	X
1638619	D1			X	X	X	X	X	X	X	X	X	X
1638620	HB2			X	X	X	X	X	X	X	X	X	X
1638621	GW1			X	X	X	X	X	X	X	X	X	X

The above information indicates the analysis scheduled in the laboratory for the given site. Should any of the information displayed be incorrect then please contact the customer services team to discuss your requirements.

*Where AGS is required and an AGS type is not specified by the client, the laboratory default AGS types are used; ES for all soil chemical testing samples, EW for all water chemical testing samples, B for bulk samples received in bags, U for core samples and D for samples received in any other container (eg. Tub).

Annex D – Laboratory Results

David Walker
H2Ogeo
The Annex Faygate Place
Wimlands Lane
Faygate
RH12 4SP

t: 07787231455

e: david.walker@h2ogeo.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 20-33480

Project / Site name: RC

Samples received on: 02/10/2020

Your job number: RC

Samples instructed on/ Analysis started on: 02/10/2020

Your order number:

Analysis completed by: 13/10/2020

Report Issue Number: 1

Report issued on: 13/10/2020

Samples Analysed: 4 water samples

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-33480
Project / Site name: RC

Lab Sample Number				1638618	1638619	1638620	1638621
Sample Reference				HB1	D1	HB2	GW1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				01/10/2020	01/10/2020	01/10/2020	01/10/2020
Time Taken				1100	1115	1135	1214
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				

General Inorganics

Sulphate as SO4	µg/l	45	ISO 17025	33500	47900	47500	50700
Sulphate as SO4	mg/l	0.045	ISO 17025	33.5	47.9	47.5	50.7
Chloride	mg/l	0.15	ISO 17025	37	34	36	37
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	< 15	230	190	230
Nitrate as N	mg/l	0.01	ISO 17025	2.99	4.92	4.97	4.61
Alkalinity (titration)	mgCaCO3/l	3	NONE	170	100	140	100

Bicarbonate	mgHCO3/l	10	NONE	32	< 10	< 10	< 10

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	39	40	40	39
Calcium (dissolved)	mg/l	0.012	ISO 17025	84	50	55	57
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Magnesium (dissolved)	mg/l	0.005	ISO 17025	4.2	7.5	7.3	7.8
Potassium (dissolved)	mg/l	0.025	ISO 17025	5.8	3.8	4	3.7
Sodium (dissolved)	mg/l	0.01	ISO 17025	22	19	20	20

Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.06	0.44	0.46	0.44
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	0.04	0.03	0.03
Chromium (dissolved)	µg/l	0.2	ISO 17025	2.1	1.5	1.4	1.7
Copper (dissolved)	µg/l	0.5	ISO 17025	5	1.6	2.5	2.1
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	2.6	18	17	20
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	0.8	1.2	0.8
Zinc (dissolved)	µg/l	0.5	ISO 17025	1.4	9.4	11	11

Petroleum Hydrocarbons

TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample   I/S = Insufficient Sample

Analytical Report Number : 20-33480
Project / Site name: RC

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Alkalinity in Water (by titration)	Determination of Alkalinity by titration (colorimetry).	In house method based on MEWAM & USEPA Method 310.2.	L025-PL	W	NONE
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

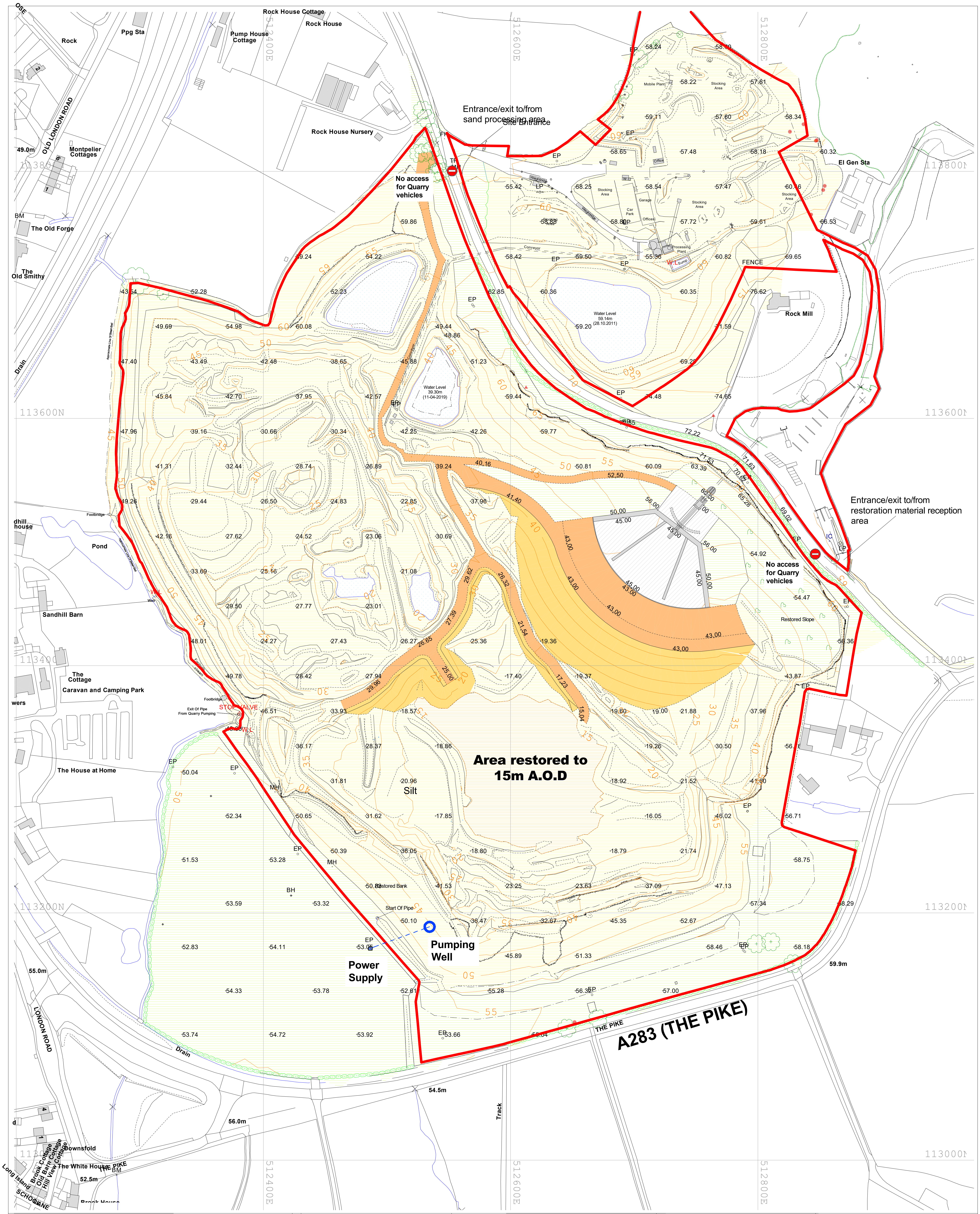
Sample Deviation Report

Analytical Report Number : 20-33480
Project / Site name: RC

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
D1	None Supplied	W	1638619	c	Ammoniacal Nitrogen as N in water	L082-PL	c
GW1	None Supplied	W	1638621	c	Ammoniacal Nitrogen as N in water	L082-PL	c
HB1	None Supplied	W	1638618	c	Ammoniacal Nitrogen as N in water	L082-PL	c
HB2	None Supplied	W	1638620	c	Ammoniacal Nitrogen as N in water	L082-PL	c

Key: **a** - No sampling date **b** - Incorrect container
c - Holding time **d** - Headspace **e** - Temperature

Annex E – Phasing Drawings



Legend:

🟥 Application Area

REVISIONS

	Date	Description	By
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//	//	//	//
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//	//	//	//

TERRESTRIA LIMITED

TERRESTRIA LIMITED
T/A MgM Consulting
6 Engine Mews,
Hampton-in-Arden,
Solihull
B92 0AZ

Mob - 07712779525
e-mail - mick@terrestria.co.uk

Client

DUDMAN ROCK COMMON LIMITED

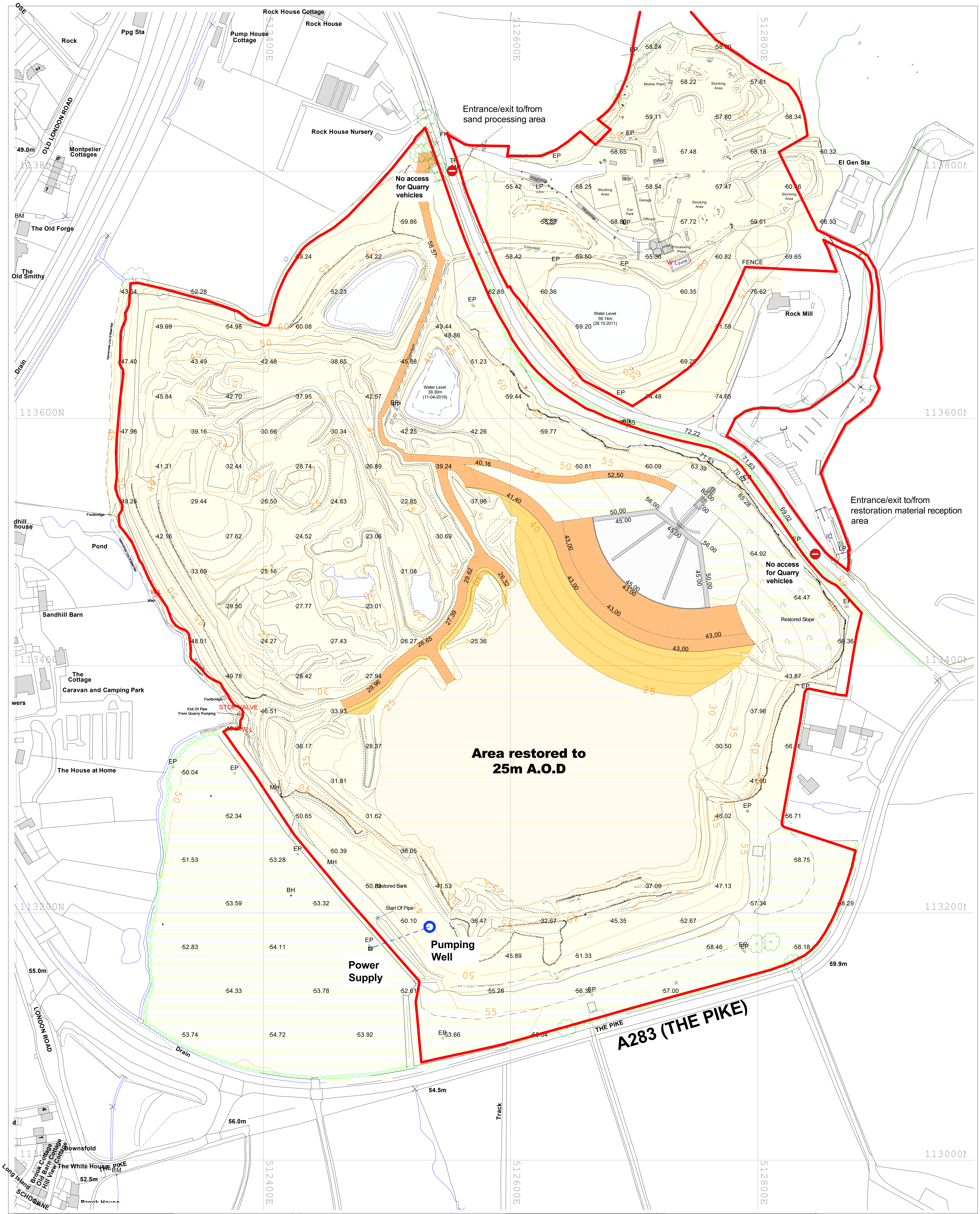
Job Title
Rock Common Quarry

Project Title
Planning application to vary approved restoration

Scale	Date	Drawn by	Checked
1:2000	SEP 20 (v4)	SW	MM

Dwg. title
Phase 1 - Restoring to 15 metres AOD

DWG No.
DRCL/RCRA/WP-04



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REVISIONS

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TERRESTRIA LIMITED
T/A MgM Consulting
6 Engine Mews,
Hampton-in-Arden,
Solihull
B92 0AZ

Mob - 07712779525
e-mail - mick@terrestria.co.uk

Client

DUDMAN ROCK COMMON LIMITED

Job Title
Rock Common Quarry

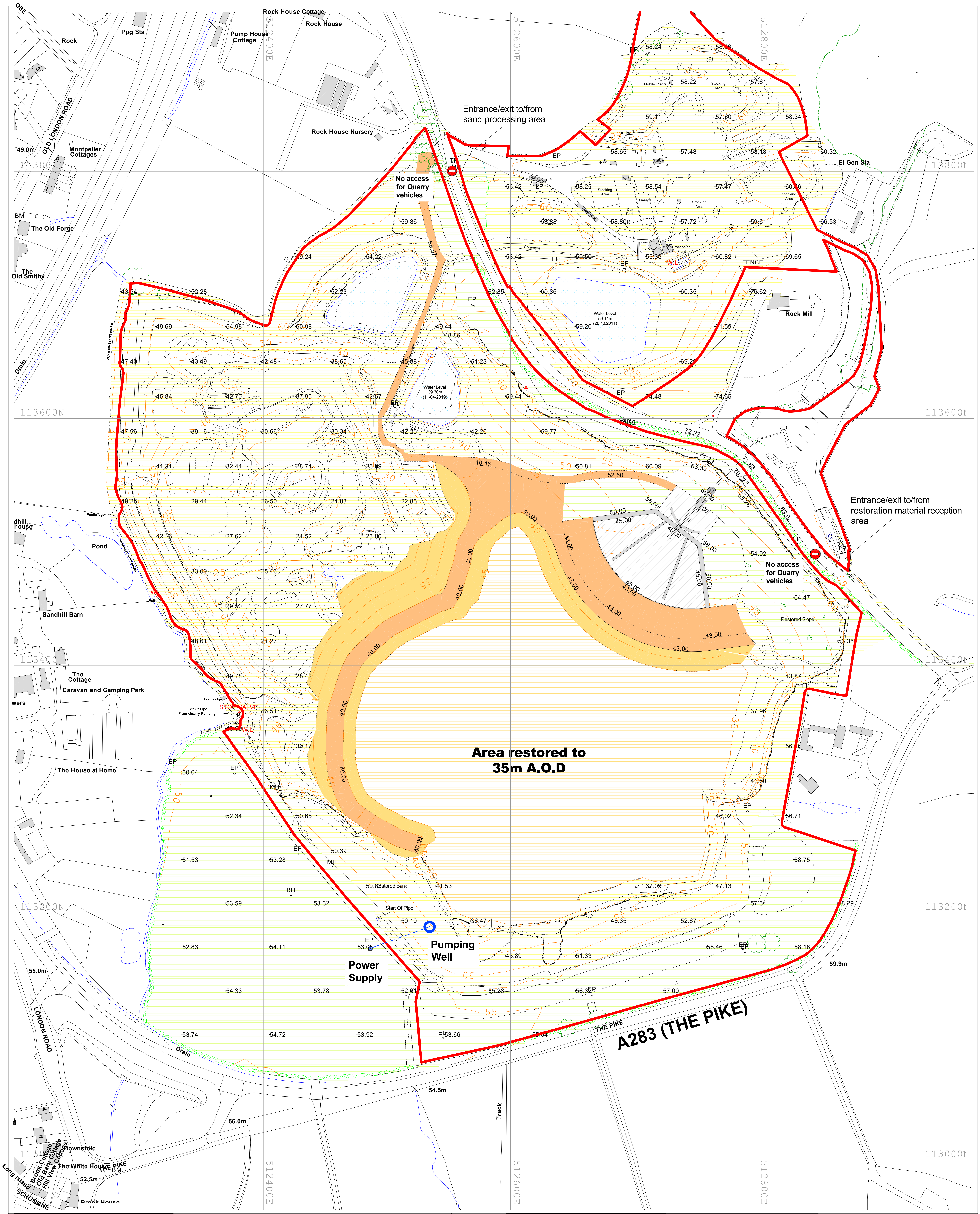
Project Title
Planning application to vary approved restoration

Scale	Date	Drawn by	Checked
1:2000	SEP 20 (v4)	SW	MM

Dwg. title
Phase 2 - Restoring to 25 metres AOD

DWG No.
DRCL/RCRA/WP-05

PLOT SIZE: A2 PLOT SCALE: 1: TYPE SCALE HERE



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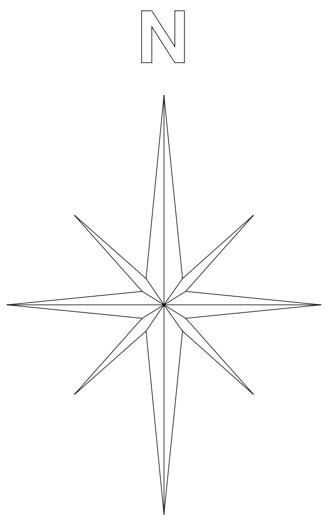

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6 Engine Mews,
Hampton-in-Arden,
Solihull
B92 0AZ

Mob - 07712779525
e-mail - mick@terrestria.co.uk

Client

DUDMAN ROCK COMMON LIMITED

Job Title
Rock Common Quarry

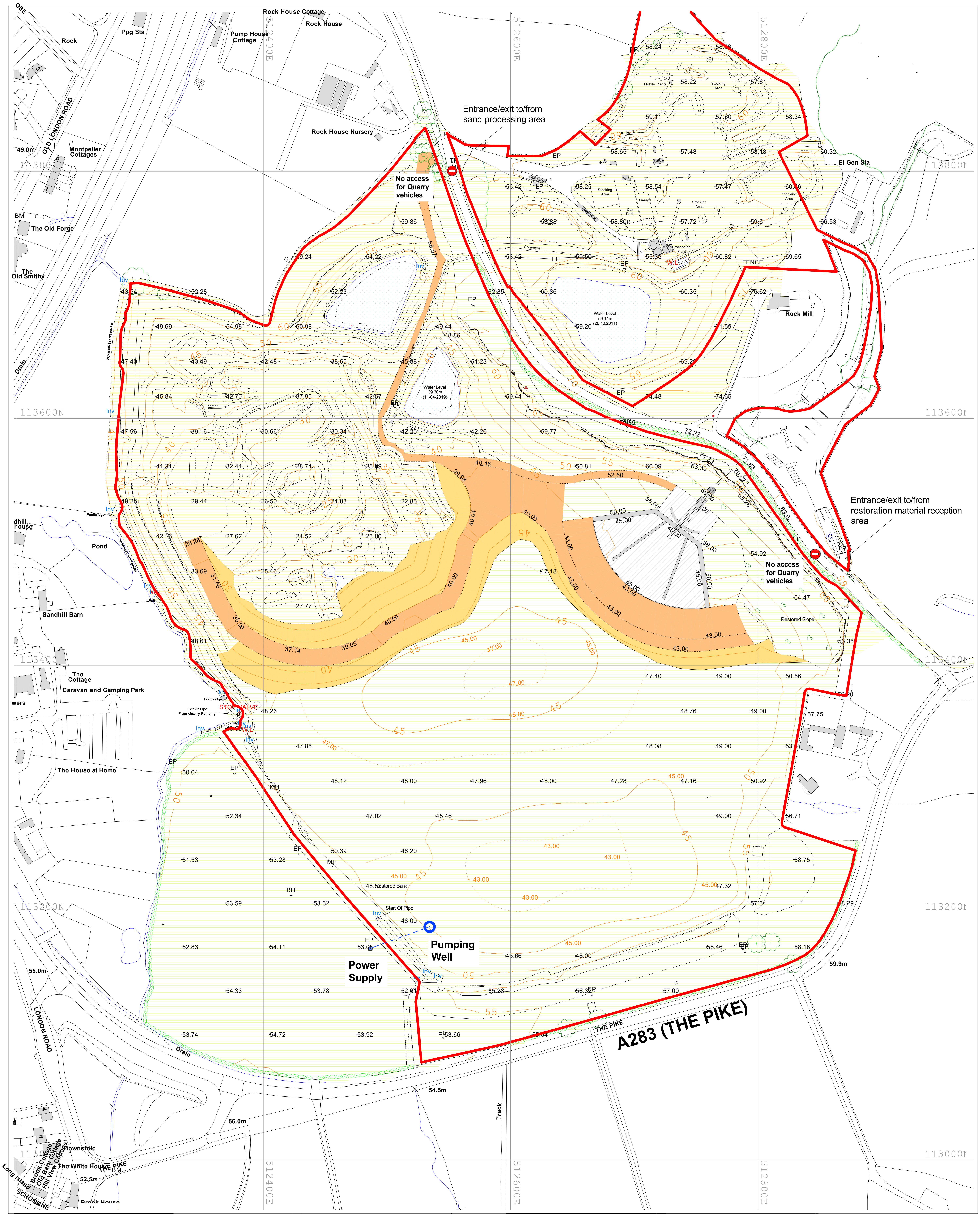
Project Title
Planning application to vary approved restoration

Scale	Date	Drawn by	Checked
1:2000	SEP 20 (v4)	SW	MM

Dwg. title
Phase 3 - Restoring to 35 metres AOD

DWG No.
DRCL/RCRA/WP-06

PLOT SIZE: A2 PLOT SCALE: 1:TYPE SCALE HERE



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6 Engine Mews,
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Solihull
B92 0AZ

Mob - 07712779525
e-mail - mick@terrestria.co.uk

Client

DUDMAN ROCK COMMON LIMITED

N

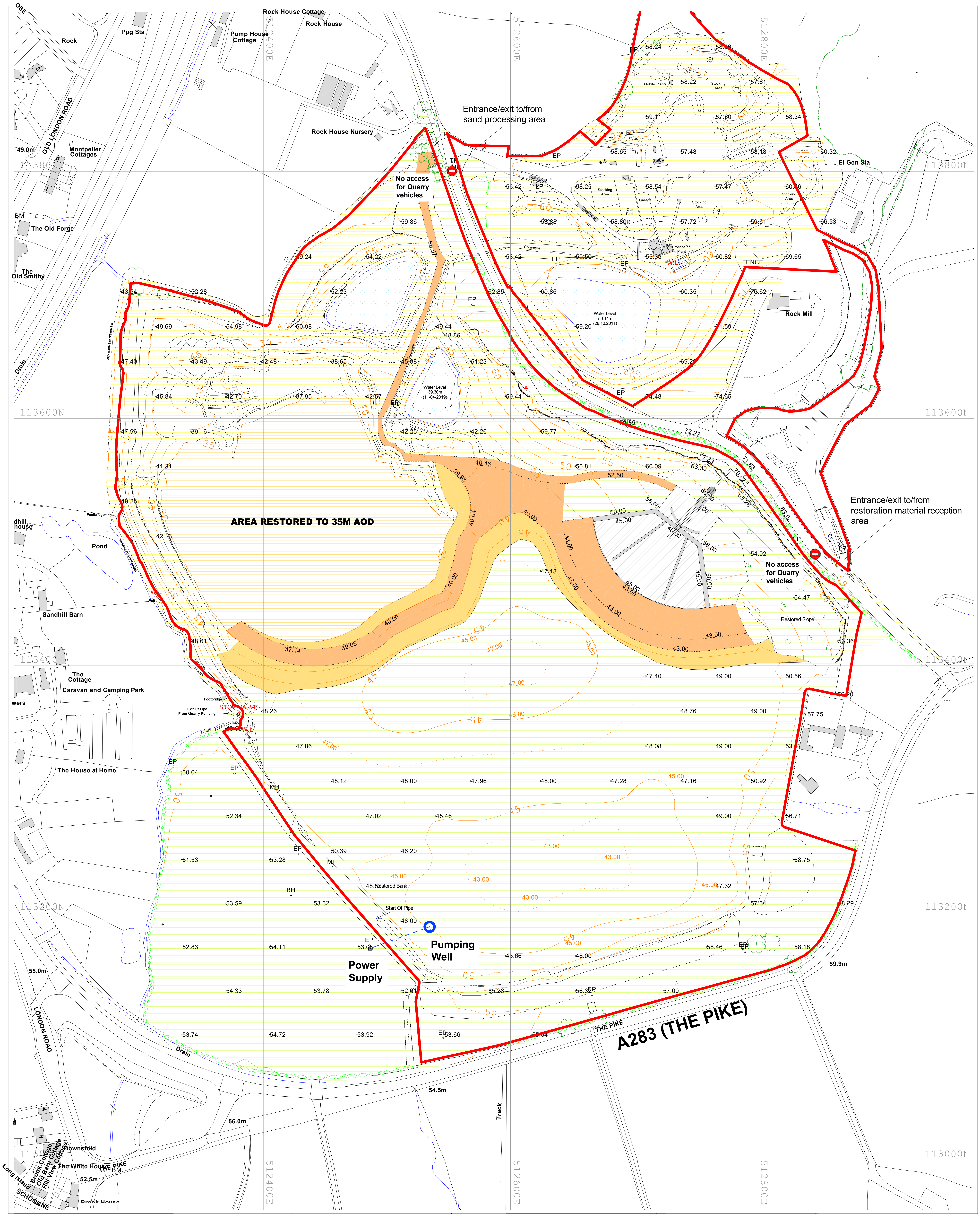
Job Title
Rock Common Quarry

Project Title
Planning application to vary approved restoration

Scale	Date	Drawn by	Checked
1:2000	SEP 20 (v4)	SW	MM

Dwg. title
Phase 4 - Restoring to final levels

DWG No.
DRCL/RCRA/WP-07



Legend:

🟥 Application Area

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e-mail - mick@terrestria.co.uk

Client

DUDMAN ROCK COMMON LIMITED

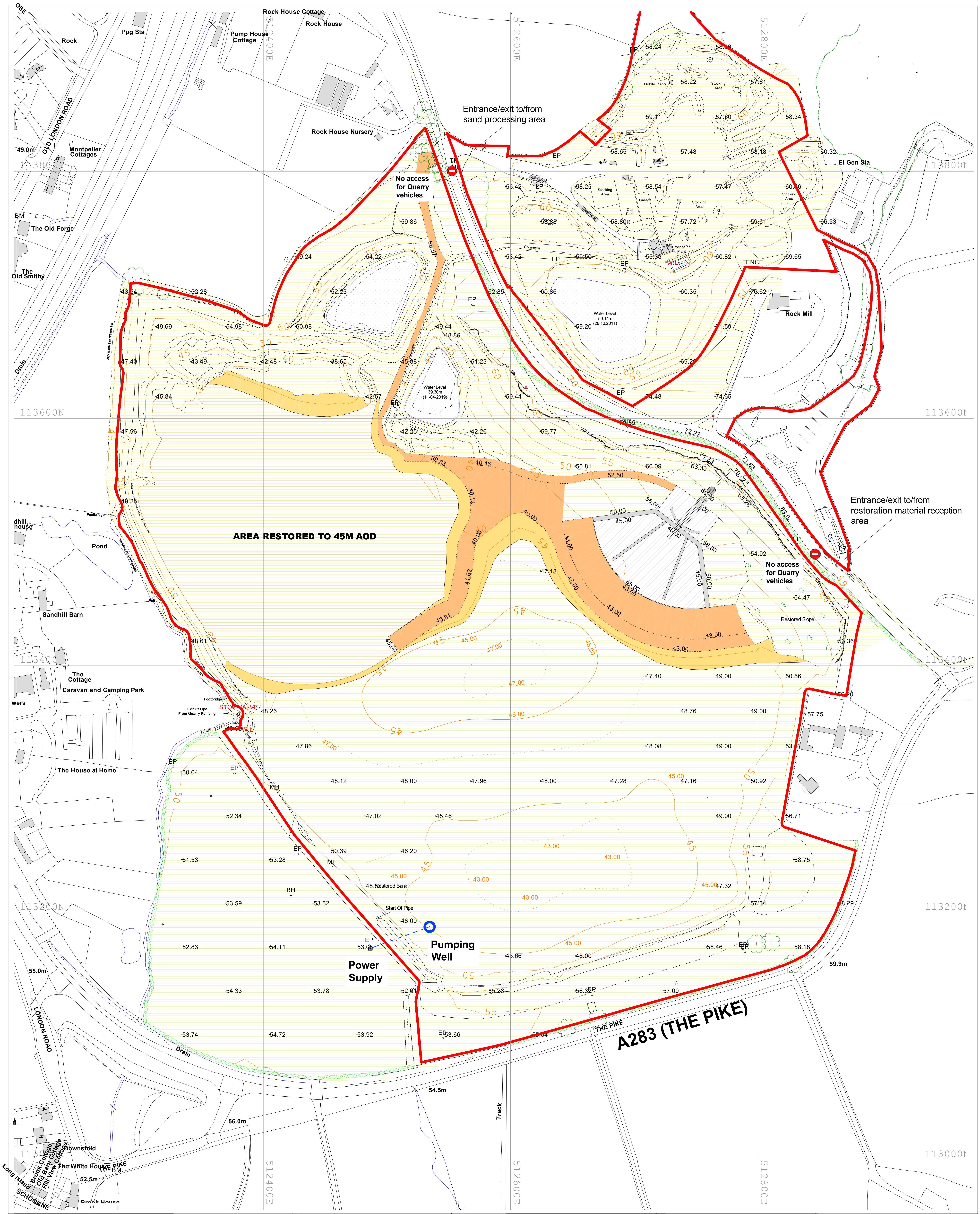
Job Title
Rock Common Quarry

Project Title
Planning application to vary approved restoration

Scale	Date	Drawn by	Checked
1:2000	SEP 20 (v4)	SW	MM

Dwg. title
Phase 5 - Restoring to 35m AOD

DWG No.
DRCL/RCRA/WP-08



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Client

DUDMAN ROCK COMMON LIMITED

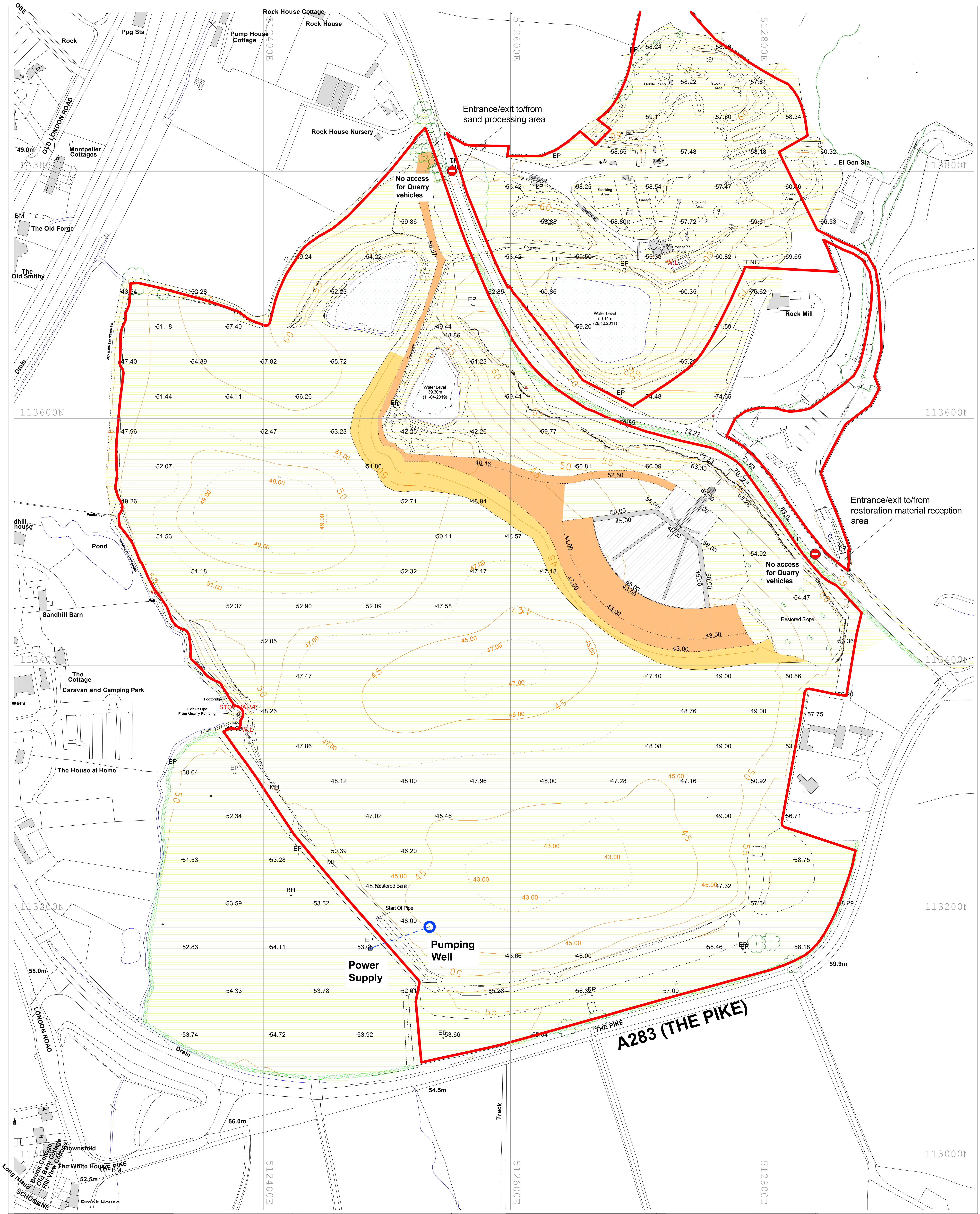
Job Title
Rock Common Quarry

Project Title
Planning application to vary approved restoration

Scale	Date	Drawn by	Checked
1:2000	SEP 20 (v4)	SW	MM

Dwg. title
Phase 6 - Restoring to 45m AOD

DWG No.
DRCL/RCRA/WP-09



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Project Title
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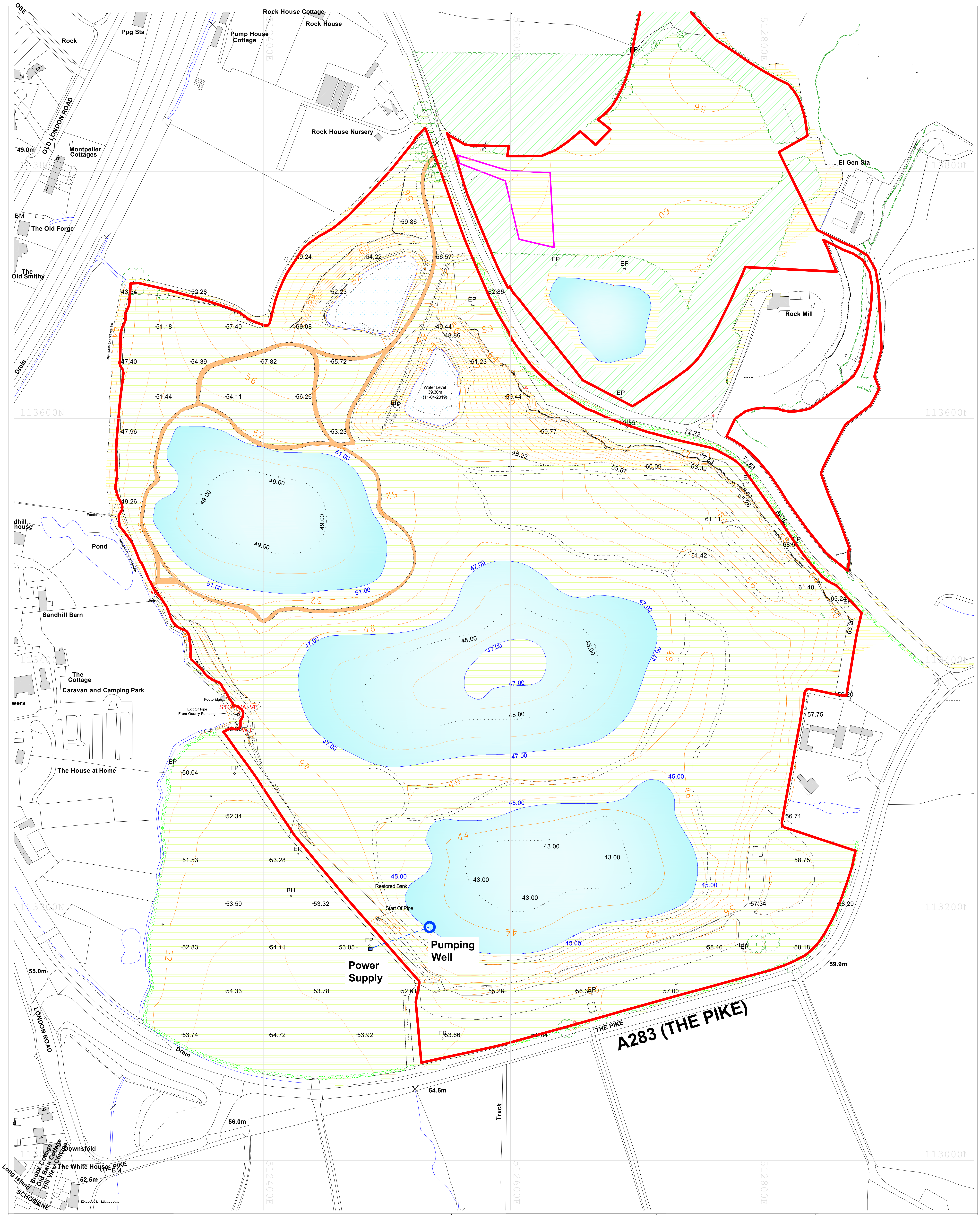
Scale	Date	Drawn by	Checked
1:2000	SEP 20 (v4)	SW	MM

Dwg. title
Phase 7 - Restoring to final landform

DWG No.
DRCL/RCRA/WP-10



Legend:

- 🟥 Application Area
- ▨ Footpath for informal public access
- ┄ Private use access for maintenance and habitat management
- ▭ Retained hardstanding/site maintenance area

The final routing of footpaths both for informal public access and for private use may change subject to consultation during the application process

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Job Title
Rock Common Quarry

Project Title
Planning application to vary approved restoration

Scale	Date	Drawn by	Checked
1:2000	DEC 20 (v4)	SW	MM

Dwg. title
Final restoration

DWG No.
DRCL/RCRA/WP-11

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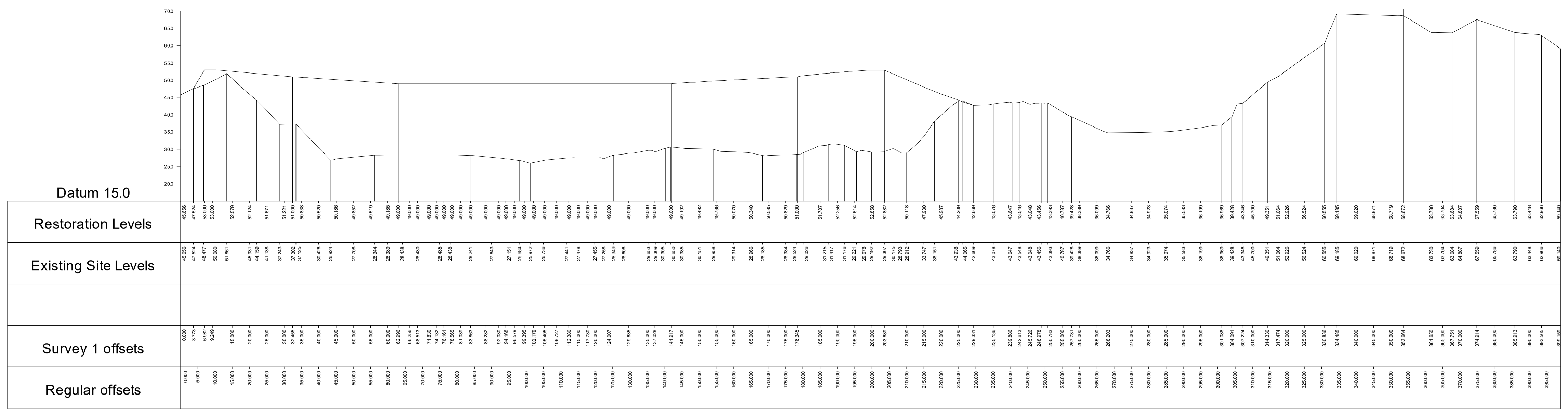

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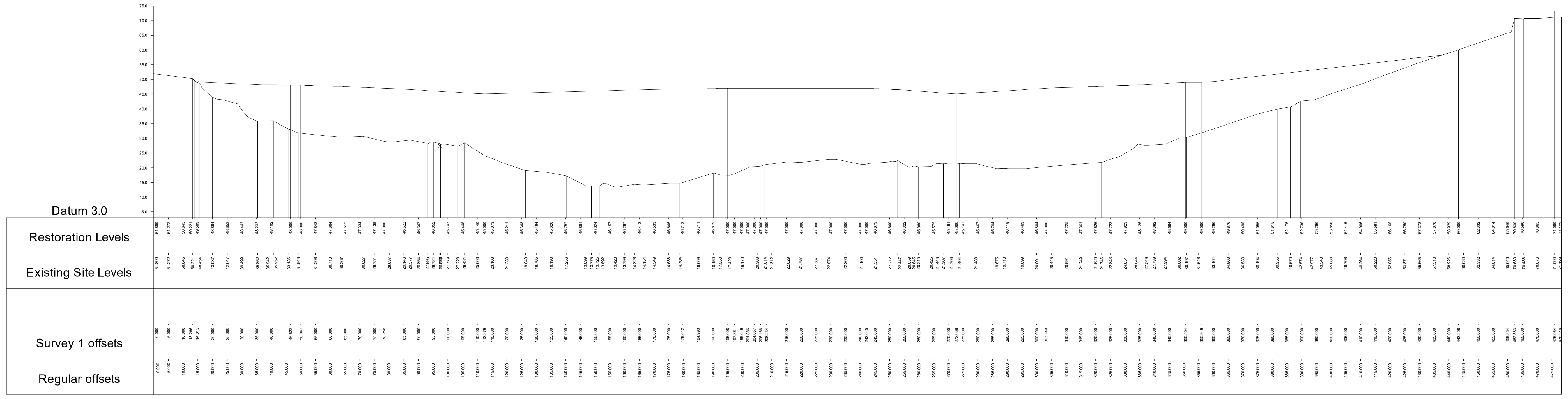

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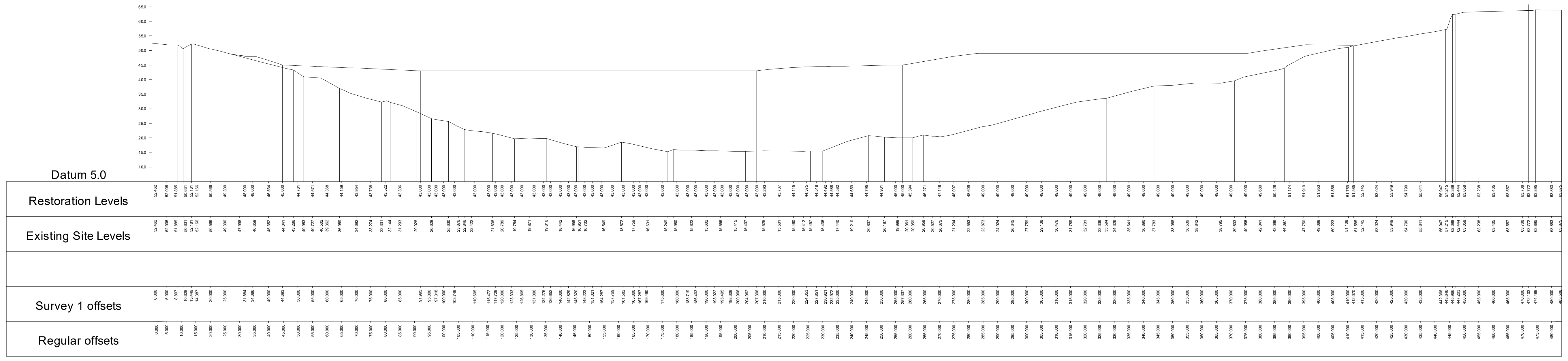

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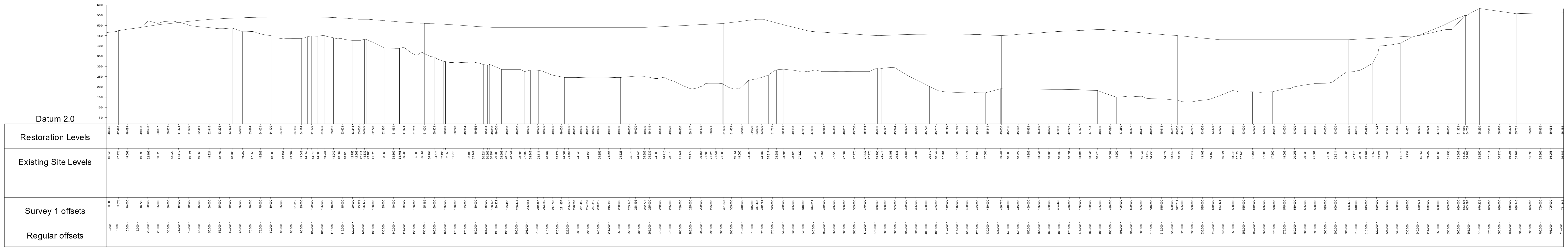

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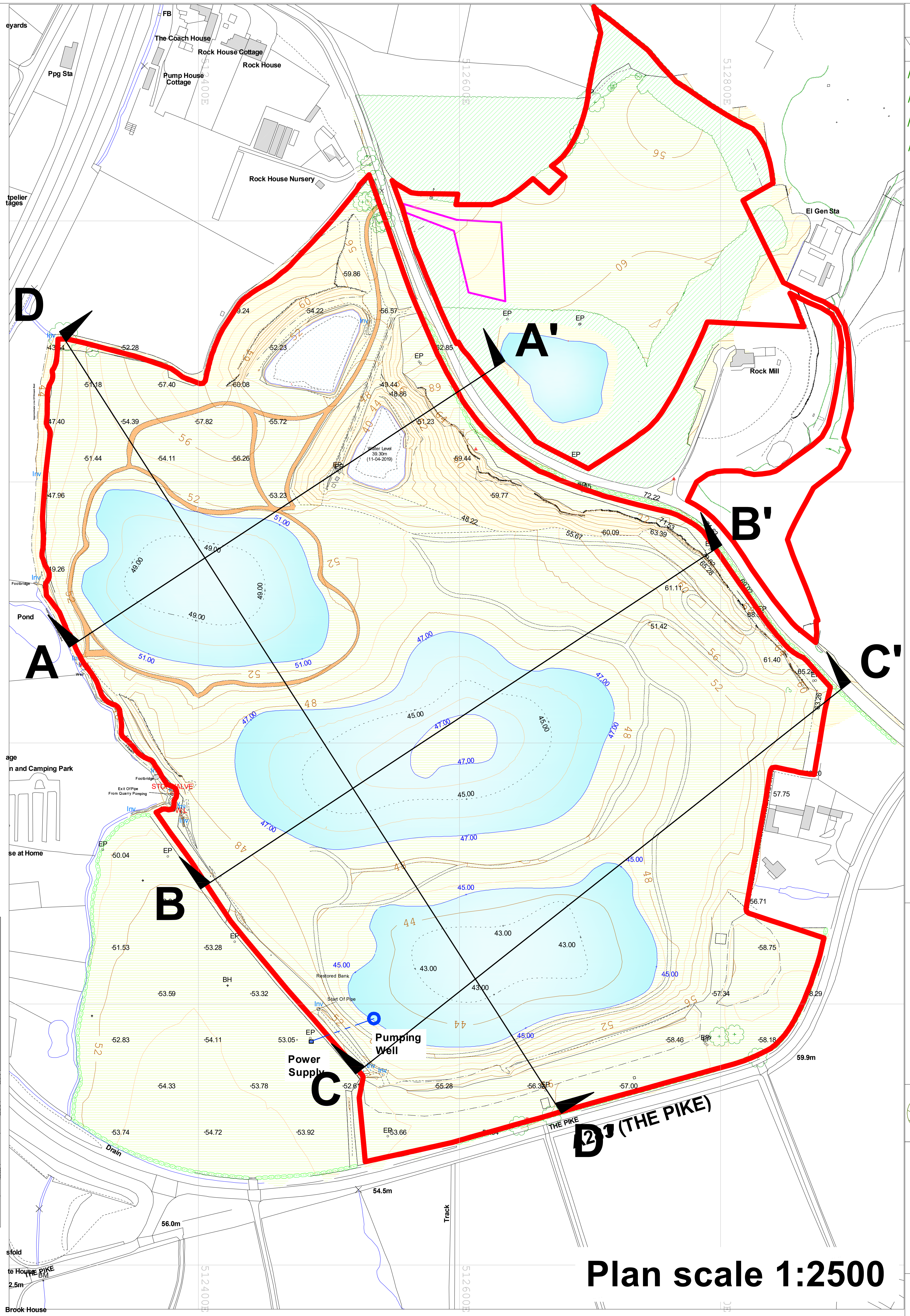

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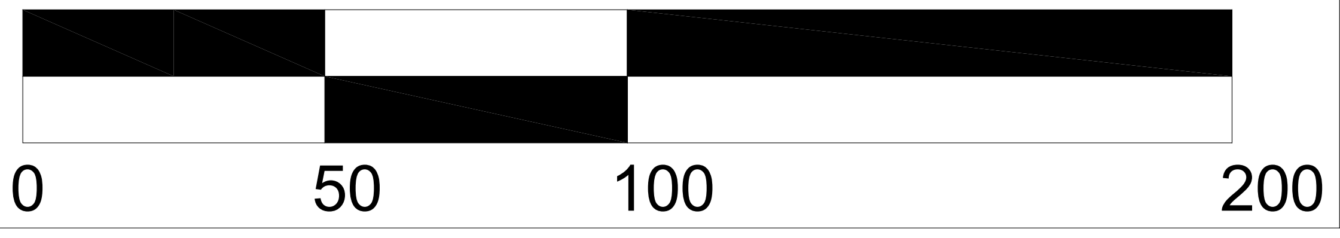

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Legend:

▭	Application Area

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Job Title
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Project Title
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1:1250	DEC 20 (v4)	SW	MM

Dwg. title
Cross sections

DWG No.
DRCL/RCRA/WP-12

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Rock Common
Flood Risk Assessment
ISSUED Version 1.3

For: Dudman Rock Common Ltd
Date: 22 December 2020

Issued v1.3: 22/12/2020

H2Ogeo
Hydrogeology & Environmental Consultancy

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Statement of Limitations

This report was prepared in accordance with the scope of work outlined within this report and is subject to the applicable cost, time and other constraints.

H2Ogeo performed the services on behalf of the Client in a manner consistent with the normal level of care and expertise exercised by members of the environmental profession. No warranties, expressed or implied, are made.

Except as otherwise stated, H2Ogeo's assessment is limited strictly to the scope of work outlined in the Scope of Work section and does not evaluate structural or geotechnical conditions of any part of the Site (including any buildings, equipment or infrastructure) or outside the Site boundary.

All conclusions and recommendations made in the report are the professional opinions of H2Ogeo personnel involved with the project and, while normal checking of the accuracy of data has been conducted, H2Ogeo assumes no responsibility or liability for errors in data obtained from external sources, regulatory agencies or any other external sources, nor from occurrences outside the scope of this project.

H2Ogeo is not engaged in environmental consulting and reporting for the purpose of advertising, sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity or investment purposes.

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Any use of this report by a third party is deemed to constitute acceptance of this limitation.

This report does not constitute legal advice.

Executive Summary

This Flood Risk Assessment has been prepared to accompany a planning application for an alternative restoration scheme at Rock Common Quarry in West Sussex. As the proposed *development* is greater than 1 Hectare a Flood Risk Assessment is required in accordance with the National Planning Policy Framework and Planning Policy Guidance to support the application.

The proposal is to permit the importation of suitable, inert classified engineering and restoration materials which will be used to restore the quarry void to a level which would be above the recovery level of the natural ground water and so provide a "dry" restoration landform.

The National Planning Policy Framework states that the flood risk assessment should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

The types of flood risk that have been considered in this report are:

- Risk of flooding from Rivers and the Sea (RoFRaS);
- Surface Water Flooding; and
- Groundwater Flooding.

Parts of the site are in a designated Flood Zone 3 with a summary of the estimated percentage % area of site impacted by the theoretically worst-case scenarios:

Flood Risk Summary

Type of Flood Risk	***Highest/Most Significant Potential Risk***	***Probability of Occurrence (%)/Impact***	***Modelled Area of Site Impacted (%)***[1]
RoFRaS	Medium	<3.3% and	2.15%
Surface Water Flooding	Significant	>3.3%	9.41%
Groundwater Flooding	High	In the event of a 1 in 100 year groundwater flood event levels could rise up to 25cm above ground level with basements becoming inundated	9.35%

In conclusion, due to the proposed restoration and increase in land form elevation, the most likely potential risk of flooding from Groundwater is not considered significant as the finished restoration is not considered Vulnerable with parts of it, lakes, considered Water Compatible.

In line with Horsham District Council's Strategic Flood Risk Assessment, Scott Wilson, April 2010, the proposed development will result in either Water Compatible land use or informal open space within the currently designated Flood Zone 3. As a result the risk posed by flooding from the Rivers and Surface Water are not considered significant.

The proposed restoration is not considered to exacerbate the potential for flooding down-stream as perimeter elevations are not changing therefore potential storage capacity is not being used up by the development and will remain on site for flood waters.

Based on the information presented in this report the estimated Flood Risk posed to and by this development and restoration project is deemed acceptable.

---

[1] Based on area (Ha) of most significant potential risk

1 Introduction

1.1 Background

The currently approved restoration scheme (WS/15/97) for Rock Common Quarry is no longer considered appropriate in terms of the final, very deep body of water and the potential for leachate pollution to pass into the lake from the now closed Windmill, Rough and The Rock Landfill sites.

An alternative restoration scheme is being considered whereby clean material would be imported to infill the void, to agreed levels, thereby cutting off the potential pollution linkage. As the proposed *development* is greater than 1 Hectare a Flood Risk Assessment (FRA) is required in accordance with the National Planning Policy Framework (NPPF) and Planning Policy Guidance (PPG) to support the application.

Terrestria Ltd contacted H2Ogeo and requested a FRA be prepared to accompany the application, the following report presents the findings of this FRA.

1.2 Scope of Work

The following scope of work has been undertaken:

- Obtain public and commercially available data sets on historic flooding (if any), flood risk considering surface, river and groundwater;
- Carry out a site visit and walkover;
- Review of the LLFA Strategic Flood Risk Assessment (SFRA), Policies and mitigation measures;
- If necessary, liaise with LLFA and Environment Agency (EA); and
- Prepare and issue a Flood Risk Assessment report for submission.

A Statement of Limitations is presented at the start of this report.

To prepare this report consideration has been given to the following legislation and documents:

1.3 Policy and Legislation

1.3.1 National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG)

The FRA has been undertaken in accordance with the statutory requirements of the NPPF and PPG with regard to development and flood risk, to ensure that flood risk is taken into account at all stages of the planning process and to avoid inappropriate development in areas potentially at risk of flooding.

The PPG classifies the flood risk vulnerability of sites used for minerals working and processing as ‘less vulnerable’ development.

1.3.2 Local Policy

West Sussex County Council (WSCC), is the Lead Local Flood Authority (LLFA) responsible for local flood risk defined as flooding from surface water, groundwater and ordinary watercourses.

The LLFA is required to provide consultation responses on the surface water drainage provisions associated with major development. The principles of West Sussex’s policy & drainage strategy have been considered in the preparation of this FRA along with Horsham District Council’s Strategic Flood Risk Assessment, 2010.

2 The Site

2.1 Location

The Site is situated within the District of Horsham, West Sussex (NGR TQ12460 13520) approximately 350 metres to the north-east of the village of Washington. At its nearest point the boundary of the South Downs National Park lies approximately 50 metres to the south of the Site following the line of the A283 road.

The Site location is shown in Figure 1.

The A24 (Worthing to Dorking Road) runs within 100 metres of the western boundary. A narrow, unclassified road (which connects the A283 and A24 and known as "The Hollow") runs along the north-east boundary of the Quarry. Access to the site is via the Hollow road off the A24/A283.

The application site has a total area of 33.64Ha consisting of:

- The Quarry = 27.19Ha;
- The Processing Area = 5.52Ha; and
- The Reception Area = 0.93Ha.

2.2 Land Use

The site, west of the Hollow, is currently used for the extraction of sand.

The area east of the Hollow is known as the Processing Area and consists of a weighbridge, offices, stocking areas, mobile plant, garages a processing plant and car parking.

Figure 1 shows the red line boundary and layout of the Site, the surrounding land uses are summarised in Table 1 below:

Table 1 Surrounding Land Use

Direction	***Land Use Description***
North	The Hollow Road, former landfill sites – The Rough, The Rock and the Windmill, Rock Farm and the Rock Business Park.
East	Butchers and residential premises, The Pyke (A283), woodlands and agricultural land.
South	Woodland, A283, agricultural land and the South Downs National Park.
West	The Honeybridge Stream, Woodlands, fields, the Washington Caravan and Camping Park, the A283 and A24.

2.3 Proposed Development

The proposal is to permit the importation of suitable, inert classified engineering and restoration materials which will be used to restore the quarry void to a level which would be above the recovery level of the natural ground water (Approximately 40mAOD[2]) and so provide a "dry" restoration landform.

The finished landform will consist of water compatible land use and informal open space ranging from 43m Above Ordnance Datum (mAOD) to existing ground levels around the extremities of the site.

---

[2] Rock Common Hydrogeological Assessment, H2Ogeo, 2020

This proposal equates to approximately 2.7 Million cubic metres of material imported over 8 years[3]. The imported material, once processed, will be placed in 5 metre thick, engineered layers. Material will be placed in the lowest part of the void first, at the southern end of the Quarry.
As levels are raised and as they begin to merge with adjoining, existing quarry floor levels then the "footprint" of the area of fill will increase (spread out). In this way, infilling will generally proceed south to north across the site. The void will be progressively restored similarly in a south to north direction.

Drawings showing the phasing of the proposed restoration are presented in Appendix 4 of Volume 1 in the Environmental Statement and the proposed final restoration is shown in Annex A.

2.4 Topography

2.4.1 Existing

Regional topography is dominated by the Chalk escarpment of the South Downs that runs east west at over 200mAOD (Chanctonbury Hill c240mAOD) 1km south of the Site.

The regional topography presented in Figure 2 is based on the Ordnance Survey OS Terrain 50 data set.

The existing topography on Site is presented in Figure 2. Ground levels surrounding the Site range from 72mAOD on the Hollow Road in the north east of the Site to 52mAOD south of the Site. There are steep, near vertical sides, on the southern and western boundary with falls of 20m+ over less than 50m.

The north and north eastern boundaries have gentler slopes into the Quarry and the maximum base level is approximately 12mAOD in the central southern portion of the pit.

2.4.2 Proposed

The proposed topography is presented in Annex A Final Restoration Drawing.

Surface elevations fall east of the Hollow in the processing area from around 60mAOD to 56mAOD in the very north of the site. Elevations in the quarry range from 60mAOD in the north to a low of 43mAOD in the south.

The three main lakes proposed as part of the development show water levels at 51, 47 and 45mAOD with lake beds at 49, 45 and 43mAOD respectively.

The existing topography and elevations around the perimeter of the site will not change as part of the proposed development.

---

[3] Section 3 - Terrestria Limited Application Document

3 Environmental Setting

3.1 Geology and Hydrogeology

The Site is located within the Lower Greensand Bedrock positioned on the southern limb of the Pyecombe Anticline.

To the south the Chalk forms the South Downs that overlie the Upper Greensand and Gault Clay. The Gault Clay confines the top section of the Lower Greensand in the south leaving only around 1km to the north unconfined. Further north, approximately 1km the Weald Clay Outcrops.

Structurally the beds dip between 5° and 10° to the south.

The Lower Greensand can be subdivided into Folkestone Formation in the south and the Sandgate and Hythe Beds in the north of the Site. These sediments are interpreted as having been deposited in shallow marine environments with strong tidal currents.

The Folkestone Formation is present on Site with faces up to 30m high overlain by Gault Clay. The Folkestone Formation is a yellow and red fine to medium grained cross-bedded sand with sets ranging from 1 to 3m. The Sandgate and Hythe Beds are grey green, fine grained sandstones and siltstones. The Folkestone Formation and Sandgate Beds are divided in this region by the Marehill Clay.

The geology is presented in Figure 3 and consists of the following sequence:

- Gault Clay;
- Folkestone Formation;
- Marehill Clay;
- Hythe Beds; and
- Weald Clay.

There are Superficial Deposits to the west of the Site that run north along a valley feature, which have been classified as Head Deposits. Head Deposits consist of poorly sorted and poorly stratified, angular rock debris and/or clayey hillwash and soil creep, mantling a hillslope and deposited by solifluction and gelifluction processes[4].

The table below indicates the aquifer designation for each of the geological sequences in the vicinity:

Table 2 Aquifer Designations

Group	***Geology***	***Aquifer Designation***	***Definition***
Superficial	Head Deposits	Secondary Undifferentiated	Assigned in cases where it has not been possible to attribute either category Secondary A or B to a rock type
NA	Gault Clay	Unproductive Strata	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.
Lower Greensand Group	Folkestone Formation	Principal	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.
	Marehill Clay	Unproductive Strata	When in situ these deposits have low permeability that have negligible significance for water supply or river base flow.

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[4] https://www.bgs.ac.uk/lexicon/lexicon.cfm?pub=HEAD

Group	Geology	Aquifer Designation	Definition
	Hythe Beds	Principal	Consisting of permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
	Weald Clay	Unproductive Strata	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

There are no Source Protection Zones within 1000 metres of the site with the closest being 1.5km south of the Site.

3.2 Hydrology

The site lies in the River Adur Catchment, presented in Figure 4, it covers an area of 600 square kilometres and is home to around 550,000 people. The main urban centres are located along the coast, including Worthing, Shoreham, Brighton and Hove. Inland towns include Burgess Hill, Steyning and Upper Beeding, as well as smaller settlements such as Hassocks, Henfield, and Partridge Green.

The watercourses within the catchment include the main River Adur and its tributaries that drain the Low Weald area through the South Downs, flowing out to sea at Shoreham[5]. The Site lies in the sub-catchment of the Honeybridge Stream, a tributary to the River Adur. The Honeybridge Stream flows from the south and passes the western boundary of the site before joining the Buncton Stream approximately 3km north east of the Site.

Limited flow data for the Honeybridge Stream has been obtained from the Environment Agency for the period between 1963 and 1991 (Annex B). It shows a peak flow of 0.329m^3/second in January 1965 and a mean average flow rate of approximately 0.09m^3/second during this incomplete 28-year period.

---

[5] River Adur Catchment Flood Management Plan Summary Report, Environment Agency, December 2009

4 Flood Risk

4.1 Flood Zones

The western boundary and base of Rock Common Quarry is located in a Flood Zone 2 and 3, the processing area and proposed reception area are not in Flood Zones.

Flood Zones are presented in Figure 5 and defined in Table 3.

Table 3 Flood Zone Definitions[6]

Flood Zone	***Definition***
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

The National Planning Policy Framework (NPPF) states that the flood risk assessment should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

The types of flood risk that have been considered in this report are:

- Risk of flooding from Rivers and the Sea (RoFRaS);
- Surface Water Flooding; and
- Groundwater Flooding.

4.2 Risk of Flooding from Rivers and the Sea

Figure 6 presents the Risk of Flooding from Rivers and the Sea (RoFRaS), the majority of the site does not fall into any flood risk classification.

The modelled data indicates that there is a Medium Risk of flooding occurring from rivers along the western boundary of the Quarry and into its base, i.e. The chance of flooding from rivers is considered to be less than 1 in 30 (3.3%) but greater than 1 in 100 (1%) in any given year.

The flood risk is assessed using local data and expertise and shows the chance of flooding from rivers or the sea, taking account of flood defences and the condition those defences are in.

The RoFRaS model uses local water levels and flood defence data to model flood risk.

---

[6] Flood risk and coastal change - GOV.UK (www.gov.uk)

4.3 Surface Water Flooding

Surface water flooding considers precipitation and runoff from the site.

A small area in the Processing Area is considered to have a Significant Risk of surface water flooding, Figure 7. This area is considered to have a 1 in 30 probability of surface water flooding due to rainfall in a given year to a depth of between 0.3m and 1.0m.

Within the Quarry the risk of surface water flooding ranges from Low to Highly Significant at the low points within the excavation.

Anecdotal evidence, based on the Client's recollection, suggests the site has not flooded from water derived from the Honeybridge Stream.

4.4 Groundwater Flooding

Groundwater flooding is flooding caused by unusually high groundwater levels. It occurs as excess water emerging at the ground surface or within underground structures such as basements.

The flood risk posed by groundwater is presented in Figure 8 and indicates a Negligible Risk in the Processing Area and Moderate-High to High Risk in the low points of Rock Common Quarry.

A High classification means that should a 1 in 100-year groundwater flood event occur, groundwater levels could rise above ground level to depth of up to 25cm with basement areas becoming inundated.

There are no basements on site or below ground structures vulnerable to flooding.

4.5 Historic Flooding

The Environment Agency's Historic Flood Map GIS Layer has been assessed to understand the presence of any historic flooding in the area. Figure 9 presents the data and indicates that no historic flooding has been recorded on site.

The closest historic flooding record is over 1700m north of the site close to Hole Street and the A24.

The only flooding on site has been due to groundwater rebound during outages of the active dewatering system.

5 Summary

A summary of the current flood risks identified have been presented in Table 4 along with the estimated percentage % area of site impacted by the theoretically worst-case scenarios:

Table 4 Flood Risk Summary

Type of Flood Risk	***Highest/Most Significant Potential Risk***	***Probability of Occurrence (%)/Impact***	***Modelled Area of Site Impacted (%)***[7]
RoFRaS	Medium	<3.3% and	2.15%
Surface Water Flooding	Significant	>3.3%	9.41%
Groundwater Flooding	High	In the event of a 1 in 100 year groundwater flood event levels could rise up to 25cm above ground level with basements becoming inundated	9.35%

The hierarchy of Flood Risk is used to assess the vulnerability of development types within different Flood Risk Zones and is shown in Table 5:

Table 5 Flood Risk Vulnerability Classification

Flood Risk Vulnerability Classification	***Essential Infrastructure***	***Water Compatible***	***Highly Vulnerable***	***More Vulnerable***	***Less Vulnerable***
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test Required	✓	✓
Zone 3a	Exception Test Required	✓	×	Exception Test Required	✓
Zone 3b	Exception Test Required	✓	×	×	×

✓ Acceptable, × Unacceptable

The proposal is to restore the Quarry floor to a low level of 43mAOD and a high of 60mAOD therefore the most likely potential risk of flooding from Groundwater is not considered significant.

The finished restoration is not considered Vulnerable with parts of it, lakes, considered Water Compatible. In line with Horsham District Council's Strategic Flood Risk Assessment, Scott Wilson, April 2010, the proposed development will result in either Water Compatible land use or informal open space within the currently designated Flood Zone 3.

In line with the National Planning Policy Framework the proposed restoration is not considered to exacerbate the potential for flooding down-stream. This is because the western boundary will remain in Flood Zone 2 and Flood Zone 3 as perimeter elevations are not changing. This means potential storage capacity is not being used up by the development and will remain on site for flood waters.

Based on the information presented in this report the estimated Flood Risk posed to and by this development and restoration project is deemed acceptable.

5.1 Recommendations

Emergency access and egress zones are not within the Flood Zones identified and must be kept well maintained during the course of the proposed development.

---

[7] Based on area (Ha) of most significant potential risk

6 References

- ⇨ National Planning Policy Framework – Flood Risk and Coastal Change Guidance, March 2014;
- ⇨ Planning Policy Statement 25: Development and Flood Risk Practice Guide; DCLG, December 2009;
- ⇨ Flood and Water Management Act 2010;
- ⇨ River Adur Catchment Flood Management Plan, Summary Report, Environment Agency, December 2009;
- ⇨ Horsham District Council's Strategic Flood Risk Assessment, Scott Wilson, April 2010;
- ⇨ Local Flood Risk Management Strategy, West Sussex County Council, 2013.

7 Figures

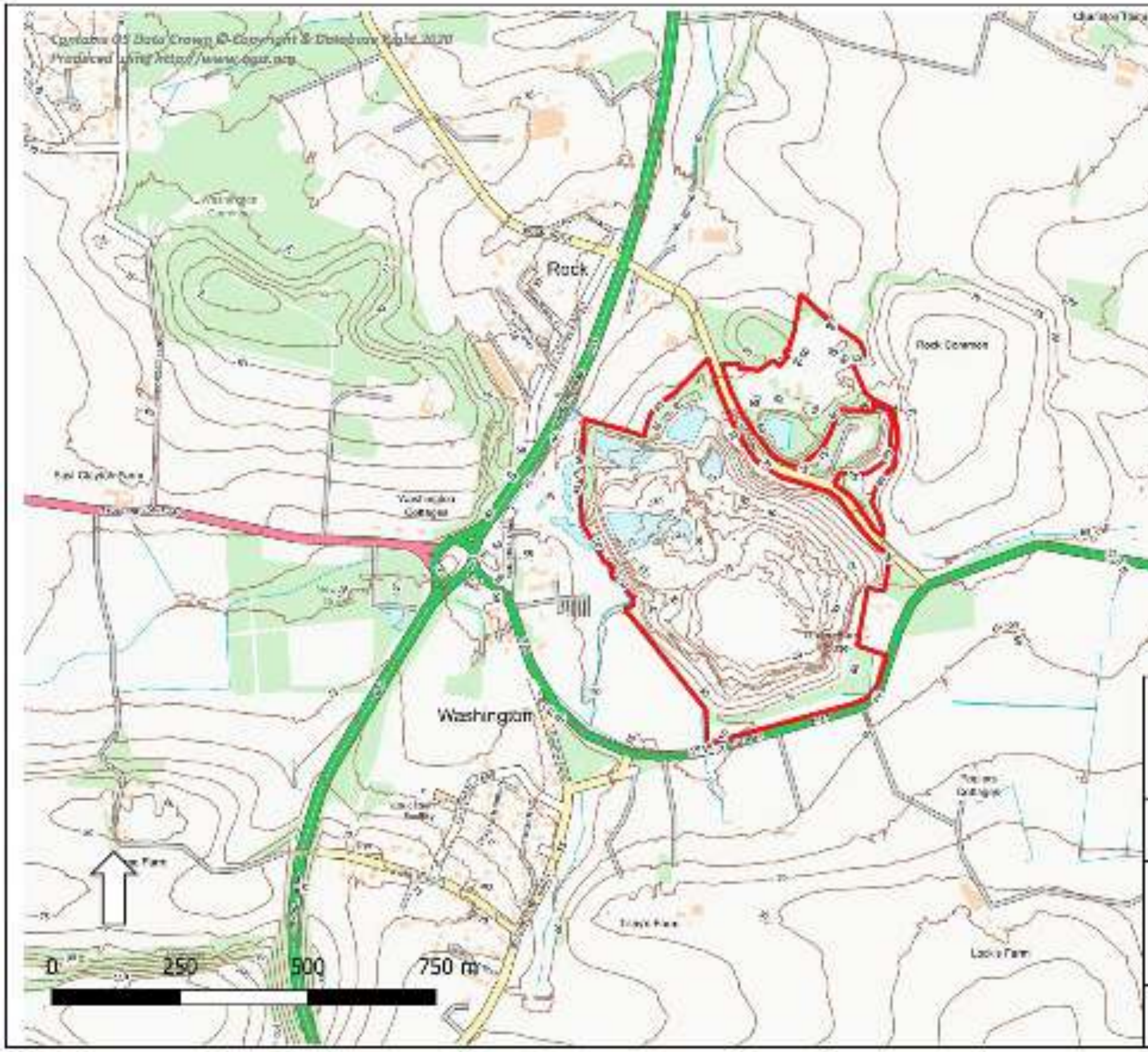
H2Ogeo

Hydrogeology & Environmental Consultancy

Dudman Rock Common Limited

Figure 1: Site Location

Reference: RC FRA



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Dudman Rock Common Ltd

Figure 2: Topography

Reference: RC FRA

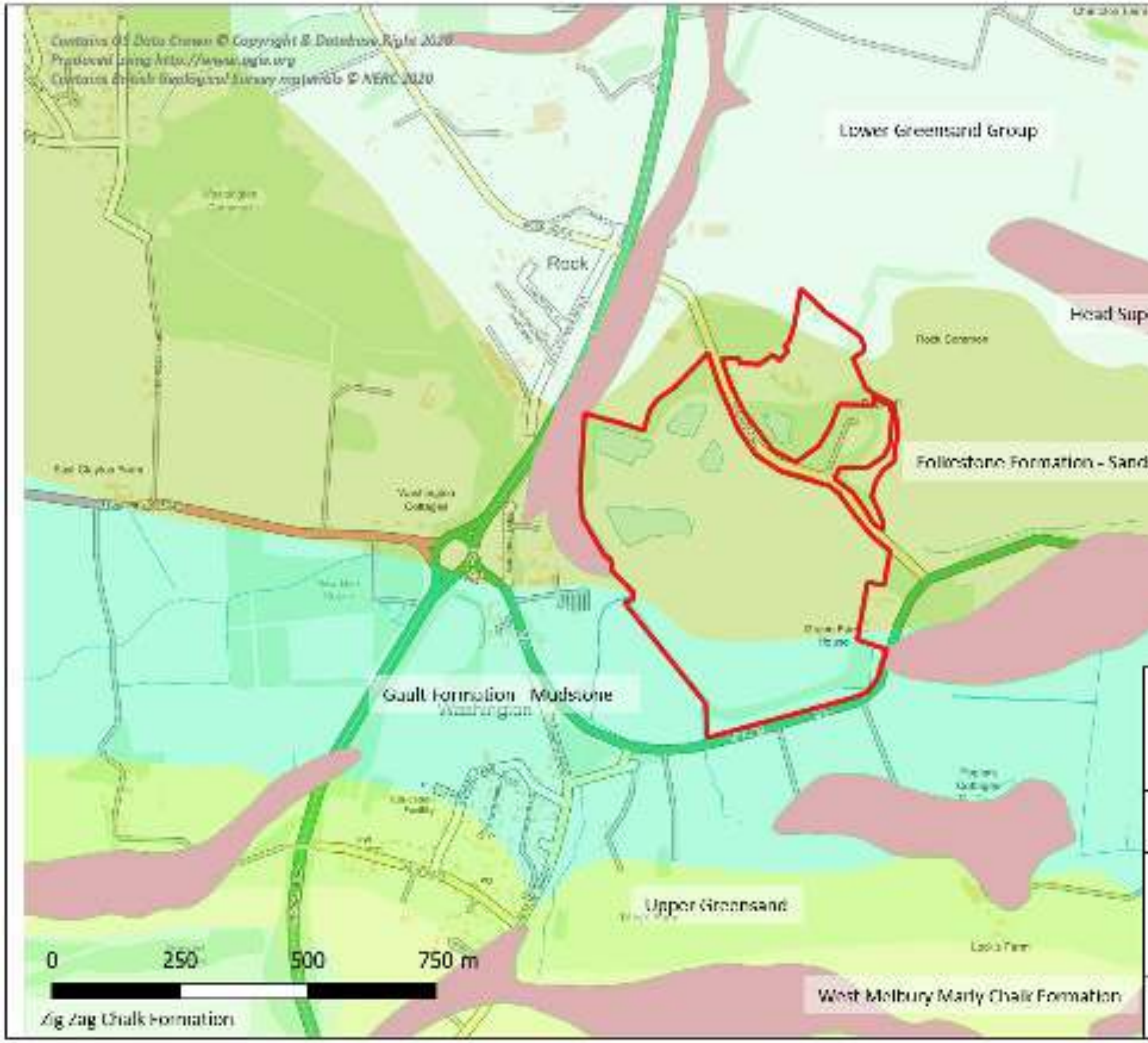

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Figure 3: Geology

Reference: RC FRA

Figure 4 Catchments

Adur Upper Operational Catchment

Source: Environment Agency - Catchment Data Explorer

Honeybridge Stream Catchment

Source: Environment Agency - CDE - Honeybridge Stream (data.gov.uk)

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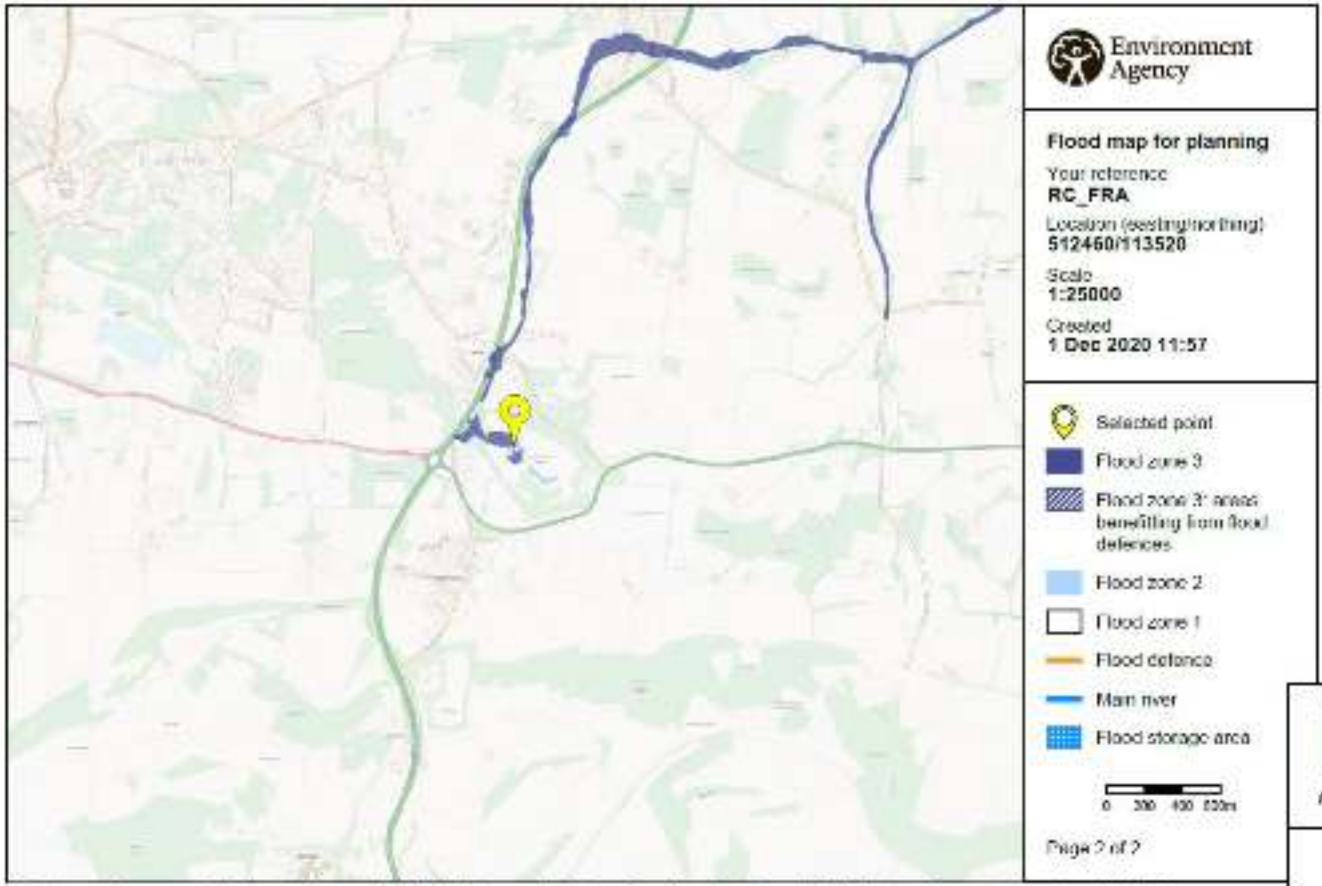
Dudman Rock Common Ltd

Figure 4: Catchments

Reference: RC FRA



Flood map for planning

Your reference
RC_FRA

Location (easting/northing)
512460/113520

Scale
1:25000

Created
1 Dec 2020 11:57

Page 2 of 2

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Figure 5: Flood Zones

Reference: RC FRA

Figure 6: Risk of Flooding From Rivers and Sea

Figure 7: Surface Water Flooding (Low 1 in 30)

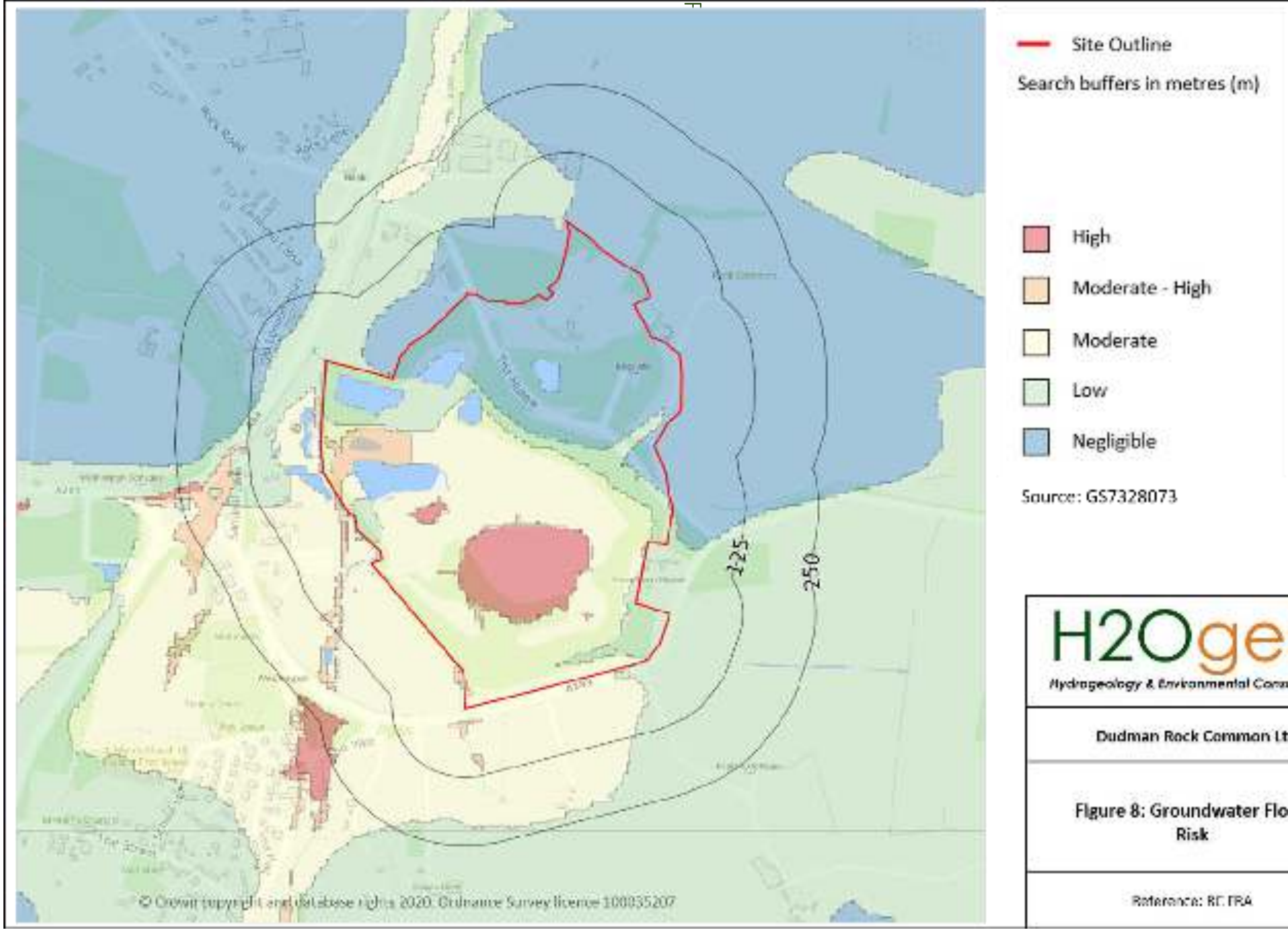

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Figure 8: Groundwater Flood Risk

Reference: RC FRA

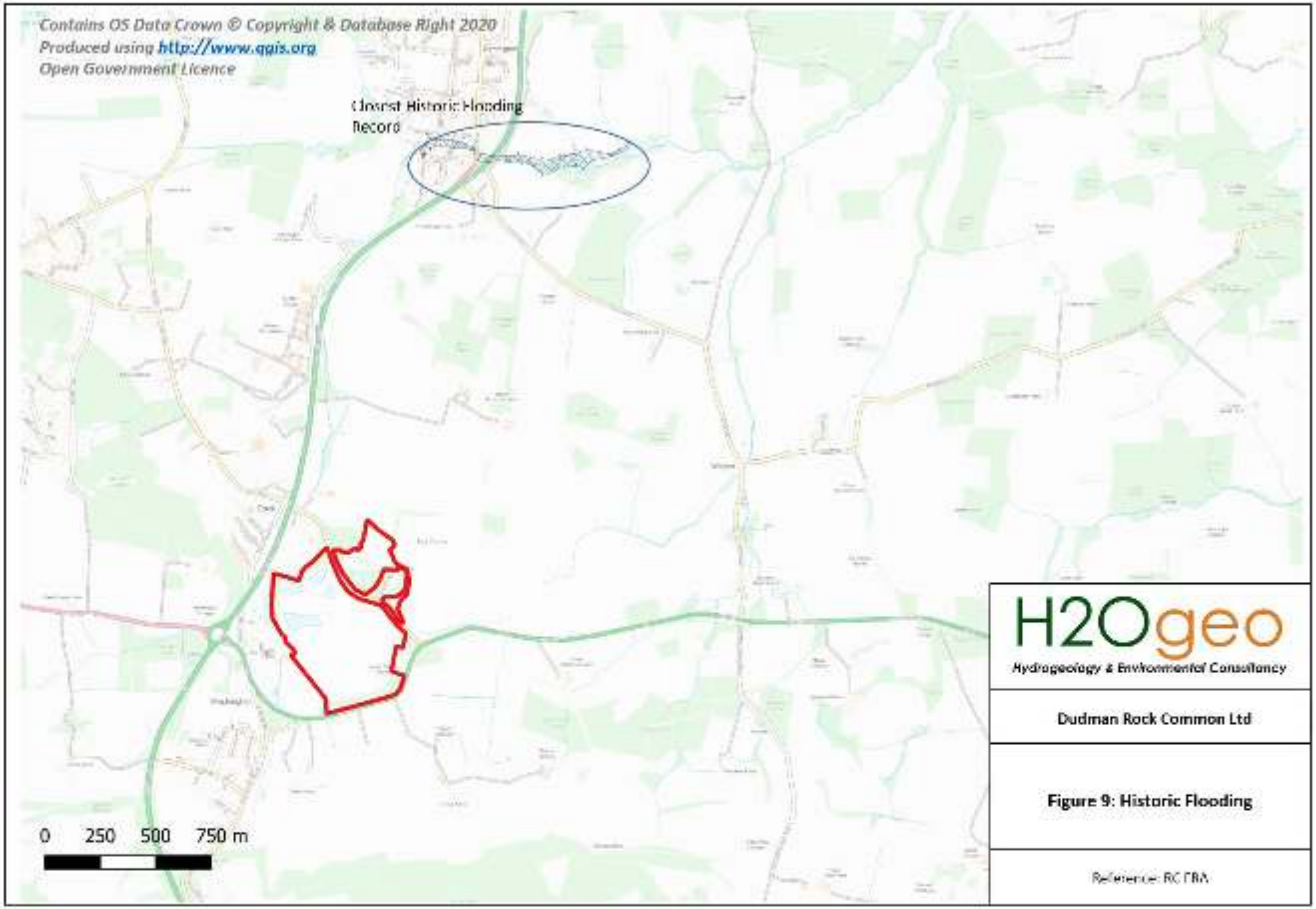

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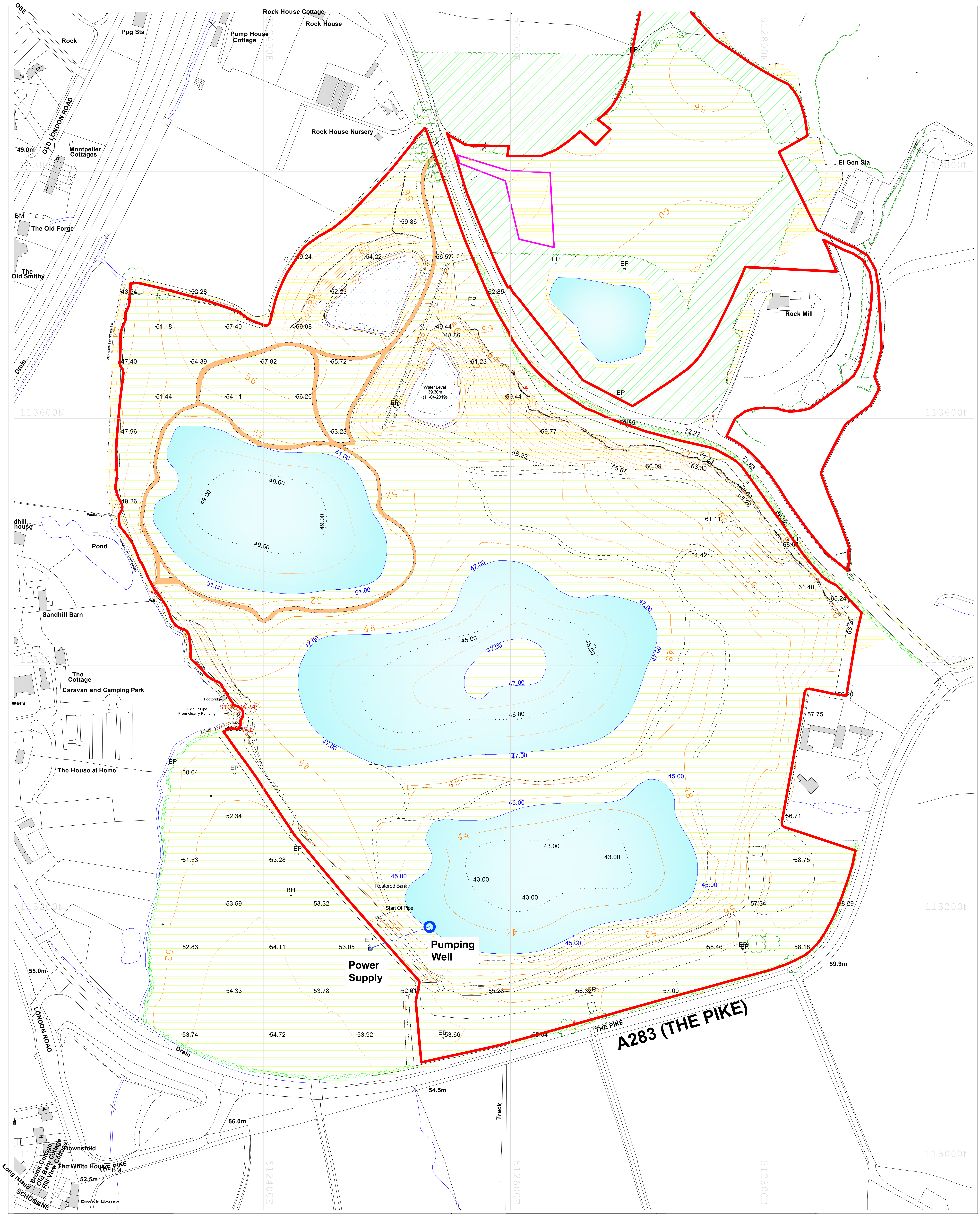
Figure 9: Historic Flooding

Reference: RC FRA

8 Annexes

Annex A Drawings
Annex B Environment Agency Data

Annex A Drawings



Legend:

🟥 Application Area

▨ Footpath for informal public access

☐ Private use access for maintenance and habitat management

🟪 Retained hardstanding/site maintenance area

The final routing of footpaths both for informal public access and for private use may change subject to consultation during the application process

SCALE BAR

0 50 100 200

REVISIONS

Date	Description	By
//	//	//
//	//	//
//	//	//
//	//	//

N

TERRESTRIA LIMITED

TERRESTRIA LIMITED
T/A MgM Consulting
6 Engine Mews,
Hampton-in-Arden,
Solihull
B92 0AZ

Mob - 07712779525
e-mail - mick@terrestria.co.uk

Client

DUDMAN ROCK COMMON LIMITED

Job Title
Rock Common Quarry

Project Title
Planning application to vary approved restoration

Scale	Date	Drawn by	Checked
1:2000	DEC 20 (v4)	SW	MM

Dwg. title
Final restoration

DWG No.
DRCL/RCRA/WP-11

Annex B Environment Agency Data

Date	*Time*	*Flow (m3/S)*
28/02/1963	00:04:00	0.131
28/02/1963	00:06:00	0.131
21/10/1963	00:03:00	0.129
21/10/1963	00:07:00	0.129
08/01/1964	00:01:00	0.13
08/01/1964	00:08:00	0.13
04/03/1964	00:02:00	0.107
04/03/1964	00:06:00	0.107
05/05/1964	00:03:00	0.193
05/05/1964	00:09:00	0.193
29/05/1964	00:08:00	0.2
29/05/1964	00:17:00	0.2
12/06/1964	00:04:00	0.146
12/06/1964	00:15:00	0.146
23/06/1964	00:05:00	0.128
23/06/1964	00:09:00	0.128
07/07/1964	00:02:00	0.076
07/07/1964	00:09:00	0.076
22/07/1964	00:03:00	0.056
22/07/1964	00:09:00	0.056
07/08/1964	00:05:00	0.058
07/08/1964	00:26:00	0.058
19/08/1964	00:05:00	0.069
19/08/1964	00:07:00	0.069
02/09/1964	00:03:00	0.042
02/09/1964	00:09:00	0.042
16/09/1964	00:03:00	0.045
16/09/1964	00:08:00	0.045
30/09/1964	00:04:00	0.038
30/09/1964	00:08:00	0.038
13/10/1964	00:06:00	0.031
13/10/1964	00:09:00	0.031
28/10/1964	00:02:00	0.02
28/10/1964	00:09:00	0.02
11/11/1964	00:04:00	0.021
11/11/1964	00:09:00	0.021
25/11/1964	00:05:00	0.033
25/11/1964	00:07:00	0.033
10/12/1964	00:03:00	0.15
10/12/1964	00:06:00	0.15
21/12/1964	00:03:00	0.079
21/12/1964	00:09:00	0.079
06/01/1965	00:01:00	0.075
06/01/1965	00:09:00	0.075
18/01/1965	00:04:00	0.329
18/01/1965	00:12:00	0.329
02/02/1965	00:01:00	0.094
02/02/1965	00:02:00	0.094
17/02/1965	00:05:00	0.093
17/02/1965	00:11:00	0.093
03/03/1965	00:03:00	0.072
03/03/1965	00:11:00	0.072
31/03/1965	00:04:00	0.092
31/03/1965	00:11:00	0.092
13/04/1965	00:03:00	0.082
13/04/1965	00:09:00	0.082
27/04/1965	00:04:00	0.057
27/04/1965	00:10:00	0.057
11/05/1965	00:01:00	0.061
11/05/1965	00:07:00	0.061
25/05/1965	00:01:00	0.055
25/05/1965	00:07:00	0.055
08/06/1965	00:05:00	0.037
08/06/1965	00:09:00	0.037
22/06/1965	00:06:00	0.079
22/06/1965	00:11:00	0.079
03/08/1965	00:03:00	0.171
03/08/1965	00:06:00	0.171
14/09/1965	00:03:00	0.131
14/09/1965	00:05:00	0.131
13/09/1966	00:03:00	0.023
13/09/1966	00:07:00	0.023
08/10/1971	00:04:00	0.054
08/10/1971	00:06:00	0.054
14/03/1989	10:31:00	0.113
14/03/1989	10:33:00	0.105
14/03/1989	10:34:00	0.113
14/03/1989	10:35:00	0.105
12/04/1991	12:31:00	0.149
12/04/1991	12:32:00	0.149

Environment Agency Data

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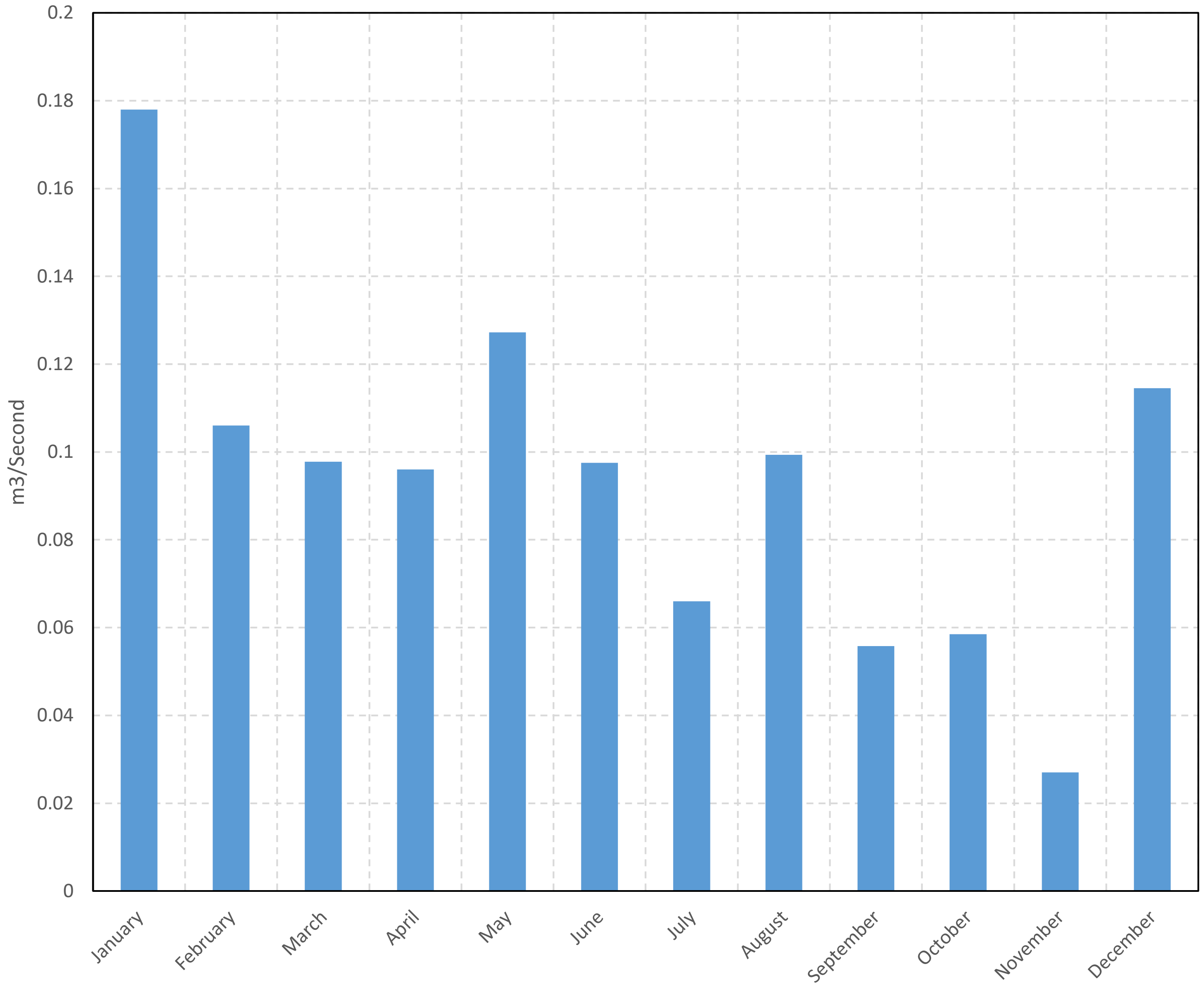
Annex B: Honeybridge Stream Historic Gauging Data

Reference: RC FRA

Environment Agency Data - Long-Term Average Monthly Flow
Honeybridge Stream
(7 Years over a 28 Year Period)



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Annex B: Honeybridge Stream Historic Gauging

Reference: RC FRA