



Wykham Park Farm Remediation Method Statement

L & Q Estates

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1. INTRODUCTION

1.1 Background and Terms of reference

Hydrock Consultants Limited (Hydrock) have been commissioned by L & Q Estates (the new owner of Gallagher Estates who commissioned the previous works) to prepare a Remediation Method Statement (RMS) for the redevelopment of their Wykham Park Farm site, south of Banbury as shown on Hydrock Drawing Ref: WPF-HYD-XX-GI-DR-G-1000 in Appendix A.

In 2017, Hydrock undertook a combined Phase 1 Desk Study and Phase 2 Ground Investigation for the proposed redevelopment of the site, and the findings were reported in the Hydrock Report Ref. WPF-HYD-XX-XX-RP-G-1001-P1-S2, dated April 2017 (herein referred to as the Hydrock 2017 GIR).

Hydrock understand that L & Q Estates are to develop the primary infrastructure (i.e. roads and drainage etc.) at the site (Stage 1) and the individual housing development parcels are to be sold onto third parties for later development (Stage 2). This RMS is intended to cover the works undertaken by L & Q Estates for the development of the primary site infrastructure in Stage 1, and; to provide an overarching RMS for the subsequent third-party buyers of the individual development parcels in Stage 2 to plan their remedial works.

1.2 Objectives

The objective of the RMS is to:

- Set out the primary objectives of the remediation;
- Outline the design of the remediation and how it will be implemented;
- Outline how the remediation will be verified; and
- Allow regulatory scrutiny and approval of the remediation concept.

It is anticipated that regulatory agreement of this document will enable partial discharge of Conditions 13 - 16 of the Draft Outline Planning Permission (Ref: 14/01932/OUT, dated 17 November 2014).

The remediation works are planned to ensure that upon completion, the ground conditions at the site can be shown to be appropriate for the intended mixed use, including residential, school and public open space, and that the site will not pose an unacceptable contamination risk to the identified receptors, particularly in a residential setting where risks were identified in the Hydrock 2017 GIR.

The RMS should be considered a working document and will require revision (in agreement with the relevant regulatory bodies) during the development works, when detailed designs of the housing parcels are finalised.

1.3 Available information

In preparing this RMS the following documents were consulted and should be read in conjunction with:

- Jubb. Development Site Boundary Line. Ref: B14129_A_003_Rev_A, dated 29 June 2016;
- Geomatic Surveys Limited. Topographical Survey - Proposed Development Whittingham Road, Longridge. Ref: 0908/Topo, 16 February 2011; and
- Wardell Armstrong. Wykham Park Farm, Banbury – Desk Study Report. Ref: CA10769, dated August 2014.

The following reports have been produced by Hydrock for this site:

- Hydrock. Wykham Park Farm, Site Investigation Report. Ref: WPF-HYD-XX-XX-RP-G-1001-P1-S2, April 2017; and
- Hydrock. Land at Wykham Park Farm, Soakaway Technical Note. Ref: C-04841-C, Land at Wykham Park Farm, Banbury, dated 10 October 2017.

1.4 Limitations

The report has been prepared by Hydrock on the basis of available information obtained during the study period. Although every reasonable effort has been made to gather all relevant information, all potential environmental constraints or liabilities associated with the site may not have been revealed.

The report has been prepared for the exclusive benefit of L & Q Estates and those parties designated by them for the purpose of providing information on the remediation and validation works to be undertaken during the enabling works and construction phases of the development. Third parties may require letters of reliance from Hydrock for the use of this report and clarification should be sought from Hydrock in this regard. The report contents should only be used in that context. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

Hydrock has used reasonable skill, care and diligence in the design of the remediation of the site. The inherent variation of ground conditions allows only definition of the actual conditions at the locations and depths of trial pits and boreholes at the time of the investigation. At intermediate locations, conditions can only be inferred. Information provided by third parties has been used in good faith and is taken at face value. However, Hydrock cannot guarantee the accuracy or completeness of any information provided by others.

The work has been carried out in general accordance with recognised best practice as detailed in guidance documents such as in the CLR 11 Model Procedures (Environment Agency 2004), BS5930:2015 and BS10175: 2011+A2:2017.

2. BACKGROUND

The site covers approximately 50 hectares (ha) and currently comprises five whole fields and a section of an additional sixth field. These fields are currently in use for arable farming. The field boundaries are lined with mature hedgerows. There is a small wooded area located in the north western corner of the site and trees are also present along the majority of the site boundary.

A Site Location Plan (Ref: WPF-HYD-XX-GI-DR-G-1000) and an Exploratory Hole Location Plan (Ref: WPF-HYD-XX-GI-DR-G-1001) are presented in Appendix A for reference.

2.1 Site history

Historical mapping shows the site to have been in agricultural use since the earliest Ordnance Survey maps available. No significant changes to the field boundaries were noted during the review of the available historic information. Further information on site history is available in the previous reports detailed in Section 1.3.

2.2 Hydrock 2017 Ground Investigation

In December 2017 Hydrock undertook ground investigation works comprising:

- 132 mechanically excavated trial pits;
- 3 dynamically sampled rotary cored boreholes
- nine infiltration tests and two falling head permeability tests; and
- ground gas monitoring on three occasions.

The findings are detailed within the Hydrock 2017 GIR and are also summarised below.

2.2.1 *Ground model and pertinent findings*

The published British Geological Survey (BGS) geological mapping for the area (Sheet 43) indicates that the site is mostly underlain by the Whitby Mudstone Formation of the Lias Group (Jurassic). The Whitby Mudstone Formation is recorded as comprising fossiliferous mudstone, siltstone, sandstone and occasional limestone bands.

The eastern section of the site and the south western corner of the site is recorded to be underlain by the Marlstone Rock Formation, also of the Lias Group. The Marlstone Rock Formation generally comprises ferruginous limestone, interbedded ferruginous sandstone and subordinate ferruginous mudstone. Elevated concentrations of some metals and metalloids (including arsenic) are known to be associated with soils derived from the Marlstone Rock Formation in the local area.

The western edge of the site is shown to be underlain by the Dyrham Formation of the Lias Group of Jurassic age. The Dyrham Formation generally comprises pale to dark grey and greenish grey, silty and sandy mudstone, with interbedded silt or very fine-grained sand (locally muddy or silty), with yellow weathering.

The physical ground conditions as encountered in the Hydrock 2017 GIR are summarised in Table 2.1.

Table 2.1: Ground Conditions Encountered

Stratum	Brief Description	Depth to top (m bgl)	Depth to base (m bgl)	Thickness (m) (range)
Topsoil	Slightly sandy clayey topsoil	GL	0.15 – 0.40	0.15 – 0.40
Whitby Mudstone Formation	Slightly sandy slightly gravelly residual clay with limestone bands in places	0.15 -0.70	0.60 – 1.80	0.30 – 1.50
Marlstone Rock Formation	Strong yellow brown distinctly weathered limestone	0.20 – 2.90	1.10 - >5.70	>5.45
Dyrham Formation	Slightly sandy slightly gravelly residual clays and silts with rare pockets of clayey sand.	0.20 – 1.45	1.70 - >5.1	>4.8

No visual and olfactory evidence of significant contamination was noted during the Hydrock 2017 GI, however, laboratory analysis detected significant elevated levels of naturally occurring arsenic, vanadium and zinc. These contaminants were reported within the natural soils on site.

The recorded arsenic levels were considered significant enough that bioavailability testing was undertaken to produce Site-Specific Assessment Criteria (SSAC) for each geological stratum at the site. The subsequent detailed site-specific risk assessment indicated that the natural occurring arsenic levels within the Marlstone Rock Formation soils posed a significant risk in a residential setting. Remedial actions are therefore required to ensure that the Stage 2 housing areas and the proposed primary school are suitable for use.

The radon risk was also assessed with reference to the Indicative Atlas of Radon in England and Wales (Miles et al 2007) and Annex A maps in BR 211 (Scivyer, 2015). This indicated that the site is in a Radon Affected Area where recorded radon levels in more than 10% of homes are above the action level and full radon protection measures are required for new buildings at this location in line with current guidance.

Ground gasses were monitored as part of the Hydrock 2017 GIR and it was determined that no risks from ground gasses, other than radon, were present and no additional works were required in this regard. Furthermore, no risks to groundwater were identified during the previous works.

It should be noted that Sports Pitch A was not investigated due to access during the GI works, however, based on the risk within the general site being low (other than the naturally occurring arsenic) the details within this report remain the same for both Sports Pitches A and B as they are being built up with cut from elsewhere and clean cover is still required as per the spec and as per the cut and fill plan WPF-HYD-XX-XX-DR-C-2400. The unexpected finds protocol, as per Section 5, should also be followed in any instance, should contamination be found in this area.

2.2.2 Recommended Remedial Measures

Stage 1 of the works (i.e. the development of primary site infrastructure) does not require remedial measures as no buildings, particularly residential properties, are being developed as part of this stage. However, the methodology of the proposed development does require detailing to ensure that the construction activities during Stage 1 do not increase the identified risks to the future receptors during Stage 2 of the project from poor handling of materials and cross contamination.

In regard to Stage 2 of the project (i.e. the housing and building developments), the Hydrock 2017 GIR concluded that the risks from the naturally occurring arsenic within the Marlstone Rock Formation were significant enough to require remediation during Stage 2 of the project (i.e. construction of the residential properties and primary school), comprising:

- 600mm of cover above the top of the Marlstone Rock Formation in any private garden in a residential property, the allotments or in any soft landscaped areas of the proposed primary school. This cover could include:
 - Existing *in situ* cover of the Whitby Formation; or
 - Increasing the cover thickness to 600mm above the Marlstone Rock Formation, within gardens with the use of site-won material (but not Marlstone Rock Formation), or; the importation of ‘clean’ material from off site.
 - In addition to the risks from the Marlstone Rock Formation, it was noted that the risks presented by radon gas at the site were elevated and Full Radon Protection Measures are required in all new buildings at the site (residential or otherwise).

2.3 Conceptual Site Model

Based on the findings of the historic investigation works and the ground model detailed above, the source-pathway-receptor (S-P-R) contaminant linkages for which the risks are unacceptable and require mitigation is shown in Table 2.2 below.

Table 2.2: Final conceptual model and residual risks following risk evaluation.

Contaminant Linkage				Comments	
Pollutant Linkage	Sources	Pathways	Receptors	General	Mitigation
PL 1.	Naturally Occurring Arsenic in Marlstone Rock Formation	Human ingestion, skin contact, inhalation of dust and outdoor air	Human end users	Naturally occurring arsenic above generic assessment criteria and SSAC for the site based on bio accessibility.	Mitigation required in the construction of residential gardens and soft landscaping in the primary school.
PL 2.	Radon Gas.	Inhalation	Human health.	Radon levels in 10% of houses within the area are above the action level.	Mitigation required in the form of full radon protection in all buildings.

2.4 Remedial requirements and concept

The Stage 1 works require no actual remediation to facilitate the process, however, the works should be carried out in accordance with this RMS to avoid increasing the identified risks with regard to Stage 2 of the works. The key constraint to the proposed development during Stage 1 comprises:

- Human health – Cross contamination.

For the site to be considered adequately remediated and thus suitable for Stage 2 (i.e. residential development), the identified geo-environmental constraints need to be addressed. The key constraints to the proposed development during Stage 2 can be grouped as follows:

- Human health – Soft landscaping (gardens in residential properties, the proposed schools and allotments); and
- Human health – Radon gas.

Remedial works that address all of these potential development constraints are required to render the site suitable for the proposed end use. Each of these specific areas are discussed in the following sections of this RMS, outlining the assessment of risk and how these are to be managed via remediation.

2.4.1 Stage 1 Remedial Concept for Primary Site Infrastructure Development

The works required to avoid cross contamination from the Stage 1 works and to facilitate the clean cover system required in the Soft landscaping (gardens in residential properties, the proposed schools and allotments) during Stage 2 can be summarised as follows:

- Task 1: Excavation to required formation Level, segregation of Marlstone Rock Formation*, stockpiling and disposal of excess soil to off-site facilities;
- Task 2: Reuse and placement of soils in accordance with Earthworks Specification (EWS) (Ref: WPF-HYD-XX-GI-M2-G-1004) for its intended use (with all Marlstone Rock Formation arisings placed in the LEAP at the west of the site or in the sports pitches (A and B), below topsoil) as detailed in the cut and fill plan (Ref: WPF-HYD-XX-XX-DR-C-2400) and the fill cross sections (Ref: WPF-HYD-XX-XX-DR-C-0210 to 1213) in Appendix A; and
- Task 3: Validation of placement in line with EWS.

***Note that if Marlstone Rock Formation is to be stockpiled prior to placement, within one of the housing parcels, the material should be underlain by a separator layer to avoid cross contamination in areas where gardens may be present at a later date. In addition to this, the contractor should undertake selective dig of topsoil directly over Marlstone Rock Formation with a sacrificial layer of topsoil (50 – 100mm) at the base excavated and stored separately for analysis for cross contamination with underlying material.**

2.4.2 Stage 2 Remedial Concept for the Housing and Industrial/ Retail Parcels

Soft landscaping (gardens in residential properties, the proposed schools and allotments)

The remedial concept for soft landscaping (gardens in residential properties, the proposed schools and allotments) at the site can be summarised as follows:

- Task 1: Review of this RMS against the proposed designs for the individual development parcels and where required update of this RMS or generation of a standalone RMS to cover the proposed works. Currently it is anticipated the following tasks (Task 2 to Task 4) will be suitable;
- Task 2: Excavation and/ or placement of fill as per the required cut and fill* for the individual development parcels;
- Task 3: Increased cut and/ or fill in proposed garden areas where the Marlstone Rock Formation is present at less than 600mm depth from final level in gardens or soft landscaping in the primary school. This will require segregation of Marlstone Rock Formation arisings for placement beneath clean cover system or for its use outside of garden areas, or; if required disposal off of site; and
- Task 4: Validation assessment and reporting of works in each parcel in line with this RMS.
- *Note that if Marlstone Rock Formation is to be stockpiled prior to placement, within one of the housing parcels, the material should be underlain by a separator layer to avoid cross contamination in areas where gardens may be present at a later date. In addition to this, the contractor should

undertake selective dig of topsoil directly over Marlstone Rock Formation with a sacrificial layer of topsoil (50 – 100mm) at the base excavated and stored separately for analysis for cross contamination with underlying material.

Radon Gas Resistant Membrane Installation for all Buildings

The remedial works for the radon protection membranes are not detailed herein. Installation by competent contractors will be required. Sign off by suitably qualified professionals will be required.

3. PROTECTION OF HUMAN HEALTH

3.1 Introduction

The pervasive arsenic contamination within the Marlstone Rock Formation was originally identified in the Hydrock 2017 GIR.

The conclusions regarding the risk from the naturally occurring arsenic within the Marlstone Rock Formation were initially based on exceedances of readily available generic assessment criteria (GAC). Due to the exceedances of the GAC it was determined that site specific assessment criteria (SSAC) should be generated and consideration of the bio-available fraction of the arsenic should be considered as a second-tier risk assessment.

This second-tier risk assessment confirmed that the arsenic in the Marlstone Rock Formation presented a risk to future site users. On this basis a clean cover system has been designed to provide the complete separation of the receptor from the hazard (i.e. to break the applicable S-P-R linkages discussed in Section 2.3). The thicknesses of the clean cover system for the private gardens and soft landscaping areas of the primary school are detailed below. The thickness of the system has been determined by the use of a cover thickness calculator in general accordance with BRE 465, which highlighted that the system could be simple, i.e. not engineered with separation fabric, the calculation sheet for this assessment is including in Appendix E.

Detailed guidance on this type of cover system is also given in CIRIA Special Publications 105, 106 and 124.

3.2 Clean Cover Specification - Soft landscaping (gardens in residential properties, the proposed schools and allotments)

Drawing WPF-HYD-XX-XX-DR-C-2410 in Appendix A shows the estimated thicknesses of cover (above the Marlstone Rock Formation) across the site. This is based on the data with the Hydrock 2017 GIR and modelling of the depths to the top of this formation. The assessment is based on current ground levels and the contractors/ developers of each parcel will be required to review the cover thicknesses based on their final design and levels. Table 2.1 shows the current minimum thickness of cover based on the assessment to date and provides relevant notes.

Table 3.1: Estimated Depth to Marlstone Rock Formation (based on WPF-HYD-XX-XX-DR-C-2410)

Parcel	Minimum depth to Marlstone Rock Formation in Area (mm below ground)	Note/ Additional Work
R1	600mm	Cut and fill in the area is likely to affect the 600mm cover present and additional consideration required post design in standalone RMS.
R2	200mm	Detailed design of cut and fill required once garden areas known. Site specific RMS required to identify the cut and fill requirement in each area and validation requirements.
R3	600mm	Cut and fill in the area is likely to affect the 600mm cover present and additional consideration required post design in standalone RMS.

R4	200mm	Detailed design of cut and fill required once garden areas known. Site specific RMS required to identify the cut and fill requirement in each area and validation requirements.
R5	600mm	Cut and fill in the area is likely to affect the 600mm cover present and additional consideration required post design in standalone RMS.
R6	600mm	Cut and fill in the area is likely to affect the 600mm cover present and additional consideration required post design in standalone RMS.
R7	600mm	Cut and fill in the area is likely to affect the 600mm cover present and additional consideration required post design in standalone RMS.
Primary School	800mm	Whilst cover thickness is currently sufficient, due to the sensitivity of the receptor an additional plot specific RMS is required as part of detailed design to ensure the cover thickness is appropriate following design
Secondary School	600mm	Whilst cover thickness is currently sufficient, due to the sensitivity of the receptor an additional plot specific RMS is required as part of detailed design to ensure the cover thickness is appropriate following design
Community Centre	800mm	No cover system required but avoidance of cross contamination with other parcels still required when handling material.
Sports Pitches (A and B)	Various	Land raise as per the cross sections in Appendix A shows the cover to be added to these areas during the Stage 1 (infrastructure) works negate any residual risk to future users.
Allotments	200mm	Natural material (not Marlstone Rock Formation) and topsoil from Stage 1 (infrastructure) works being placed here to assist growth and thicken cover to 600mm.
LEAP Areas	0mm	No cover system required but avoidance of cross contamination with other parcels still required when handling material. Filling from cut areas is to be completed as per the cross sections in Appendix A.

Additional parcel specific RMS's are likely to be required for Stage 2 works in addition to this over-arching RMS to demonstrate that an updated review of the identified risks is completed in each development parcel to ensure the proposed remediation measures are suitable for the proposed end use.

The clean cover system designed for the soft landscaping areas in the residential properties and schools can be divided in to the following scenarios.

3.2.1 Scenario 1 – Existing Cover is Suitable (600mm or greater)

In certain areas of the site, as shown on the Marlstone Rock Depths drawing (Ref: WPF-HYD-XX-XX-DR-C-2410) in Appendix A there is no requirement to provide a cover system where the existing thickness of the topsoil and Whitby Mudstone overlying the Marlstone Rock Formation is 600mm or greater based on current levels. In these instances, no works would be required to thicken the cover and a validation report stating this should be suitable to comply with planning conditions, both Outline and any Reserved Matters. The final design of the development parcel (post this over-arching RMS) may, however, indicate that the approximate thicknesses shown on the Marlstone Rock Depths drawing and in Table 3.1 may change and therefore consideration of Scenario 2, which is detailed below, may be required.

3.2.2 Scenario 2 – Existing Cover is Partial (less than 600mm)

Where the Marlstone Rock Depths drawing (Ref: WPF-HYD-XX-XX-DR-C-2410) in Appendix A shows existing cover thickness of less than 600mm in the private garden areas of residential properties or other sensitive sites (schools/ allotments etc.) the developer will be required to thicken this cover. All site-won materials currently identified, other than the Marlstone Rock Formation, will be suitable for use to increase cover. The topsoil in the area of required thickening should be removed and stockpiled to allow filling to occur beneath the topsoil, unless the additional cover is supplementary topsoil. The clean cover system is also to include a minimum thickness of 150 mm topsoil. For the purposes of this RMS, topsoil is defined as the upper layer of an *in-situ* soil profile, usually darker in colour and more fertile than the layer below (subsoil), which is a product of natural chemical, physical, biological and environmental processes, but does not imply compliance with BS 3882:2015.

To achieve proposed levels, it is possible to place additional Marlstone beneath subsequent clean cover in lower lying areas. The requirement for 600mm of clean cover above must still be met. Furthermore, if the volume of soil at the site is insufficient to meet the 600mm required, material can be imported. The imported material will be required to meet the chemical criteria set in Appendix B and be transferred to site under the CL:AIRE Definition of Waste Code of Practice (DoWCoP) in the form of a Materials Management Plan (MMP) declared with CL:AIRE by a Qualified Person (QP).

Should additional topsoil be placed above existing topsoil to meet the required 600mm cover, the overall thickness of topsoil should be considered in regard to increased settlement and/ or potential gassing. Furthermore, any grass and/ or organic material should be scraped off the surface prior to additional topsoil being placed above.

Any material placed should be placed in line with the EWS drawing (Ref: WPF-HYD-XX-GI-M2-G-1004) in Appendix A and this RMS.

It is anticipated that all areas will have a suitable thickness of topsoil as the minimum thickness encountered was 200mm during ground investigation.

Any additional clean cover materials added to an area shall give consideration to their permeability and the consequential impact upon the surface runoff. This principally relates to their composition (granular, cohesive or composite). The clean cover material will satisfy the requirements of NHBC Standards Chapter 4.1 and 10.2.

For clarity, the clean cover in the private gardens, allotments and soft landscaping areas of the school shall:

- Be placed in all soft landscaping areas as shown on the Marlstone Rock Depths drawing (Ref: WPF-HYD-XX-XX-DR-C-2410) included as part of Appendix A, however, any subsequent changes in design levels for the individual development parcels may result in changes to this.
- The clean cover will comprise the following minimum thicknesses:
 - A total of 600 mm (combined subsoil and topsoil) thickness above the Marlstone Rock Formation in all soft landscaping areas (residential gardens, school play areas etc.).
- Comprise soils from the wider site (but not Marlstone Rock Formation), which have been demonstrated as suitable for use in the Hydrock 2017GIR.
- If material is required to be imported from off site, this material should be demonstrated as suitable for use (i.e. comprise soils which are both physically* and chemically suitable with contaminant

concentrations below those set out within Appendix B. Furthermore, import from off of site will also require a MMP in line with CL:AIRE DoWCoP.

- Include a minimum thickness of 150 mm topsoil to provide a suitable growing medium.

*i.e. free from anthropogenic materials (particularly glass and other sharp materials), oversized material (>50mm) and anything which could be reasonably deemed to be of potential harm.

3.2.3 Verification of Residential Gardens and School Areas

The verification required on site will vary dependent on the scenario as detailed below.

Scenario 1 – Existing Cover is Suitable (600mm or greater)

In instances where the existing cover is suitably thick, minimal physical verification works will be suitable assuming levels are not altered (i.e. reduced) and the Marlstone Rock Formation is not brought to the surface and placed elsewhere beneath a clean cover system.

In these instances, the review of survey levels pre and post development is considered sufficient to provide an indicative result of the cover across these areas. In addition to this indicative review, it is recommended a low frequency of confirmatory trial holes are completed to verify the cover thickness as follows:

- At a minimum rate of 1 verification trial pit for every 4 residential plots to verify the thickness over the Marlstone Rock Formation. This rate may reduce pending final designs for each parcel and a parcel specific RMS if the risks are anticipated to be suitably controlled.

Scenario 2 – Existing Cover is Partial (less than 600mm) or not Present

In instances where the existing cover requires thickening to meet the 600mm clean cover requirement, the following physical verification works are required.

In these instances, the review of survey levels pre and post development is considered sufficient to provide an indicative result of the cover at site, however, a higher rate of confirmatory trial holes is also recommended to verify the cover system due to the additional works required to achieve the cover 600mm thickness. The verification works are to be undertaken as follows:

- At a minimum rate of 1 verification trial pit for every 4 residential plots, or per 250m² of soft landscaped area in schools, to verify the thickness over the Marlstone Rock Formation. In the allotments this rate of test pitting should be at 1 verification trial pit for every 250m²

Furthermore, in instances where material is required to be imported from off site, sampling of the imported material will be required. The required rate of testing would be:

- One sample per 250m³ of imported natural material (three tests minimum per source). These samples are to be analysed for the contaminants outlined in Appendix B. It is recommended that sampling is completed prior to import to avoid issues with unsuitable materials being placed; and
- Additional testing once placed at a rate of 1 sample per strata (possibly including topsoil, subsoil and residual soils) verification pit (one per four properties).

It should be noted that topsoil sampling and analysis is completed to ensure compliance with the contaminant concentrations set out within Appendix B and will not imply compliance with BS 3882:2015.

Verification Reports

Verification reports by a suitably qualified independent geo-environmental specialist will be required following completion of any remedial works (placement of a cover system) to allow sign off by the relevant Statutory Authority (usually EHO/NHBC).

3.3 Monitoring of Works

The Stage 1 infrastructure works have an estimated programme duration of eight weeks. Hydrock have determined that a schedule of visits to monitor the works, on an approximate fortnightly basis, will be sufficient to review the working practices at site. Furthermore, these visits can include ad-hoc review of work areas, stockpile arrangement, thickness of cover and where required offer advice into improving practices on site.

The Stage 2 works will also need a level of monitoring equal to the owner, or their contractors, risk assessment. To the west of the site, where cover is thinner it is anticipated that the frequency may be higher than fortnightly but this will need to be detailed in the plot specific RMS.

4. MATERIALS MANAGEMENT

The contractor undertaking the works shall comply with the requirements as outlined in Appendix D, which comprise best practice.

4.1 Re-use of existing material at site within the clean cover system

There will be a requirement to transfer clean material across the wider site for use in the clean cover system. Furthermore, movement of material will also be required to achieve the proposed levels across the site during the infrastructure works in Stage 1.

Whilst there is no requirement for a clean cover system in areas relating to the Stage 1 works, it is recommended that good material management hygiene and tracking procedures are maintained to avoid cross contamination of materials which may be used in a clean cover system elsewhere during subsequent works.

The materials should be excavated and segregated according to their material type, as outlined in Table 2.1. These segregated materials should be stockpiled separately in clearly marked locations to differentiate between the materials during the works. When Marlstone Rock Formation material is stockpiled, this should be on top of a separation layer to avoid cross contamination with the material below.

4.2 Sourcing of imported materials for use within clean cover

Based on the ground investigation works undertaken to date and the knowledge of the site, it is considered unlikely that material import will be required to meet proposed design levels. However, should there be a requirement to import clean materials to the site for use in the clean cover system, any material to be imported should be from a natural source must comply with the following:

- Be accompanied with provenance to demonstrate that there is no potential for the soils to have been contaminated as a result of past land uses. Wherever possible, this information should be obtained in advance of import and chemical testing (see below).
- Comprise soils approved as suitable for use by an appropriately qualified Geo-environmental Engineer i.e. comprise soils which are both physically* and chemically suitable with concentrations of the contaminants of concern below those set out within Appendix B.

*i.e. free from anthropogenic materials, oversize material (>50mm) and anything which could be reasonably deemed to be of potential harm.

It should be noted that imported topsoil will be sampled to ensure compliance with the contaminant concentrations set out within Appendix B but will not imply compliance with BS 3882:2015.

Furthermore, any such imports will require an MMP in accordance with the CL:AIRE DoWCoP to comply with the regulations. A verification report to demonstrate that the MMP has been implemented correctly will also be required.

4.2.1 Characterisation of imported material

Where provenance of an imported material cannot clearly be demonstrated, the stockpile should be characterised on the following basis:

- 3 samples for the initial 500 m³ of material, followed by 1 sample for each additional 250 m³ (i.e. a 500 m³ stockpile would require 3 samples, whereas a 1,200 m³ stockpile would require 5 samples)*.

*it is recommended that stockpile sizes are managed to avoid sample non-compliance resulting in larger volumes being deemed unsuitable for use and resultant double handling/ disposal costs.

Once a stockpile has been sampled and is awaiting the results, no further material is to be added to or removed from the stockpile, or should the stockpile be moved to a new location. In the event of the stockpile being disturbed the chemical results will become invalid and new samples will be required.

If the material is assessed as both physically and chemically suitable (by a Geo-Environmental Engineer), then the material can be reused as part of the clean cover system. However, if the material is assessed as either physically or chemically unsuitable for reuse as part of a clean cover system, then it will require disposing of off of site in line with waste regulations.

Once a stockpile has been characterised and is assessed as suitable for use as part of the clean cover system, then the materials may be considered 'pre-verified' and can be placed as part of the clean cover system without further testing in situ. This is provided the stockpile is not cross contaminated, disturbed or moved in the interim period until it is required as this would invalidate the results. If the stockpile is disturbed the chemical results will become invalid and additional samples should be collected or in situ testing following placement in the clean cover will be required.

4.3 Soil quality import criteria for use within clean cover

As detailed above, soils to be imported for use within the clean cover system (subsoil and topsoil) must comply with the contaminant concentrations set out presented in Appendix B. These criteria are based on standard current United Kingdom guidance, as indicated, and will form the basis for material import, unless otherwise agreed with the Cherwell District Council - North Oxfordshire.

4.4 Stockpiling of materials

Any material to be stockpiled shall be segregated by material type (i.e. Made Ground, natural material, topsoil etc.). Similarly, any materials being imported to site, for example for use in the clean cover system, or construction aggregates, shall likewise be stockpiled separately.

The stockpile locations shall be clearly marked and documented on working drawings maintained in the site office. All stockpiles should be identified with clear signs and each stockpile should be given a clear reference number and designated sheet recording the following:

- identification reference (e.g. Stockpile A, B, C etc.);
- material type (e.g. topsoil);
- source site;
- the carrier's Consignment Note reference numbers;
- the approximate volume (number of loads); and
- which parcels and/ or plots the material is to be used on and where (i.e. plot number or landscape area).

The contractor to take appropriate mitigation measures and environmental precautions as considered necessary at storage locations. However, as a minimum, stockpiles should be mechanically sealed and compacted to prevent dust and they should be kept wet in periods of dry weather.

Stockpile management shall be undertaken in accordance with the following protocol:

- Separate stockpiles shall be created for each material type, whether site-won materials or imported materials and shall be appropriately labelled and clearly identifiable on site.

- Stockpiles shall not be cross contaminated, double handing should be avoided and stockpiles shall remain quarantined until ready for use.
- For imported materials, copies of the carrier's Consignment Notes shall be retained on site and made available for inspection by the Geo-Environmental Engineer and for inclusion within the Verification Report.
- A record of all imported materials (i.e., deliveries) shall be maintained by the Site Manager, recording details of material type, source of the imported material, and Consignment Note reference numbers. In addition, the Site Manager shall record the status of each stockpile, in terms of material type, source site, volume and intended use on site.
- Topsoil shall not be placed during or after heavy or prolonged periods of rainfall.

5. UNEXPECTED CONTAMINATION

Whilst unlikely, based on the ground investigation data, there is potential for areas of unexpected contamination to be present. Any significant quantities of suspected oily or odorous material, significant ashy soils and unusual brightly coloured or potentially asbestos containing materials should be considered as possibly contaminated.

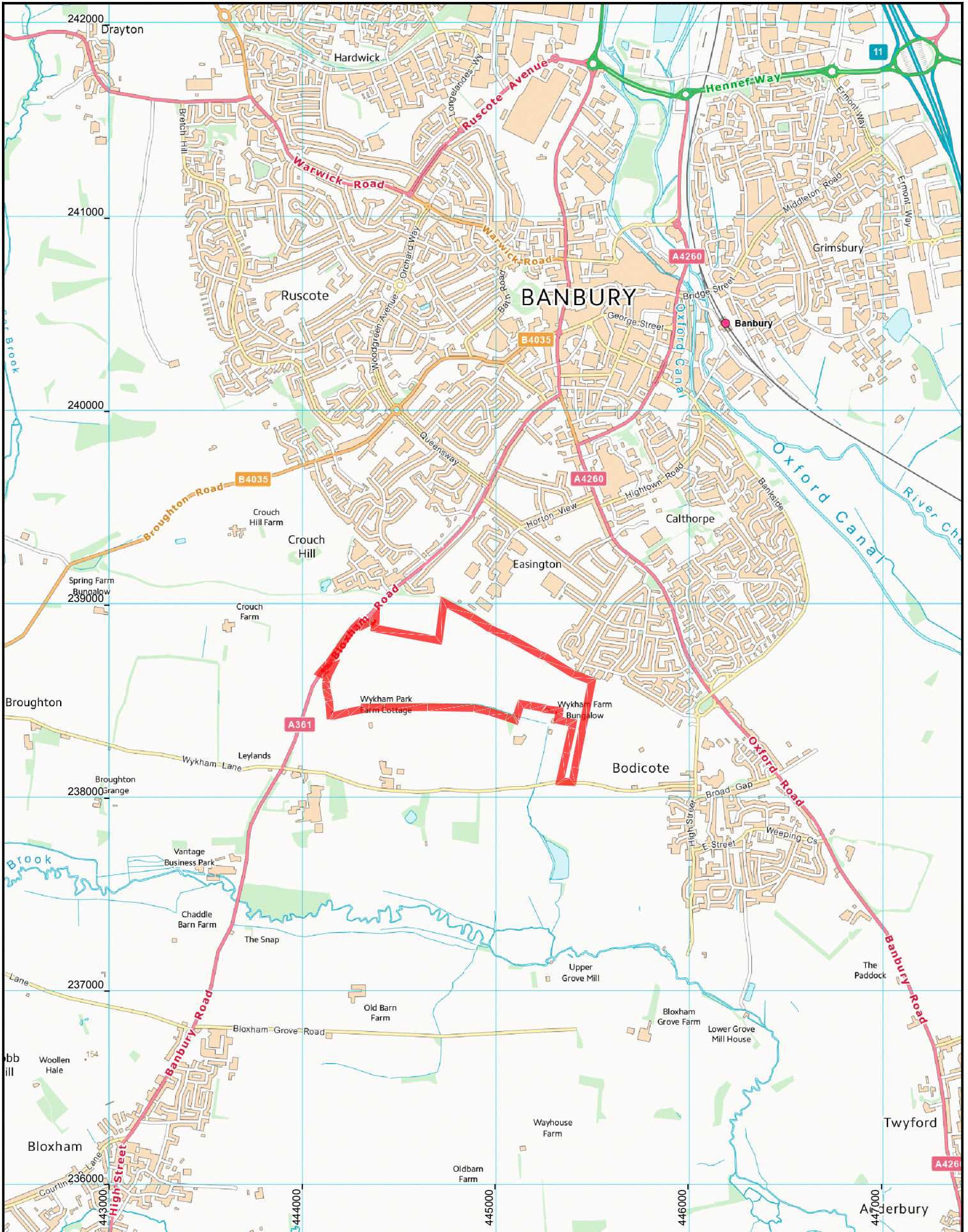
The Discovery Strategy is detailed in Appendix C and must remain on site at all times during the different stages of works. This demonstrates a clear allocation of responsibility for reporting and dealing with contamination.

A copy of the Discovery Strategy must be placed on the Health & Safety Notice Board and/or displayed in a prominent area where all site staff are able to take note of and consult the document at any time. Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination and the requirement to follow the Discovery Strategy.

A report will be prepared by Hydrock and submitted to the regulatory parties, the Local Authority and the Environment Agency where groundwater may potentially have been impacted.

Appendix A

Drawings



OS NORTH

Site Ref: SP43

0 500 Metres

P1	FIRST ISSUE	15/02/17	RC	15/02/17	ROH	15/02/17
REV.	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

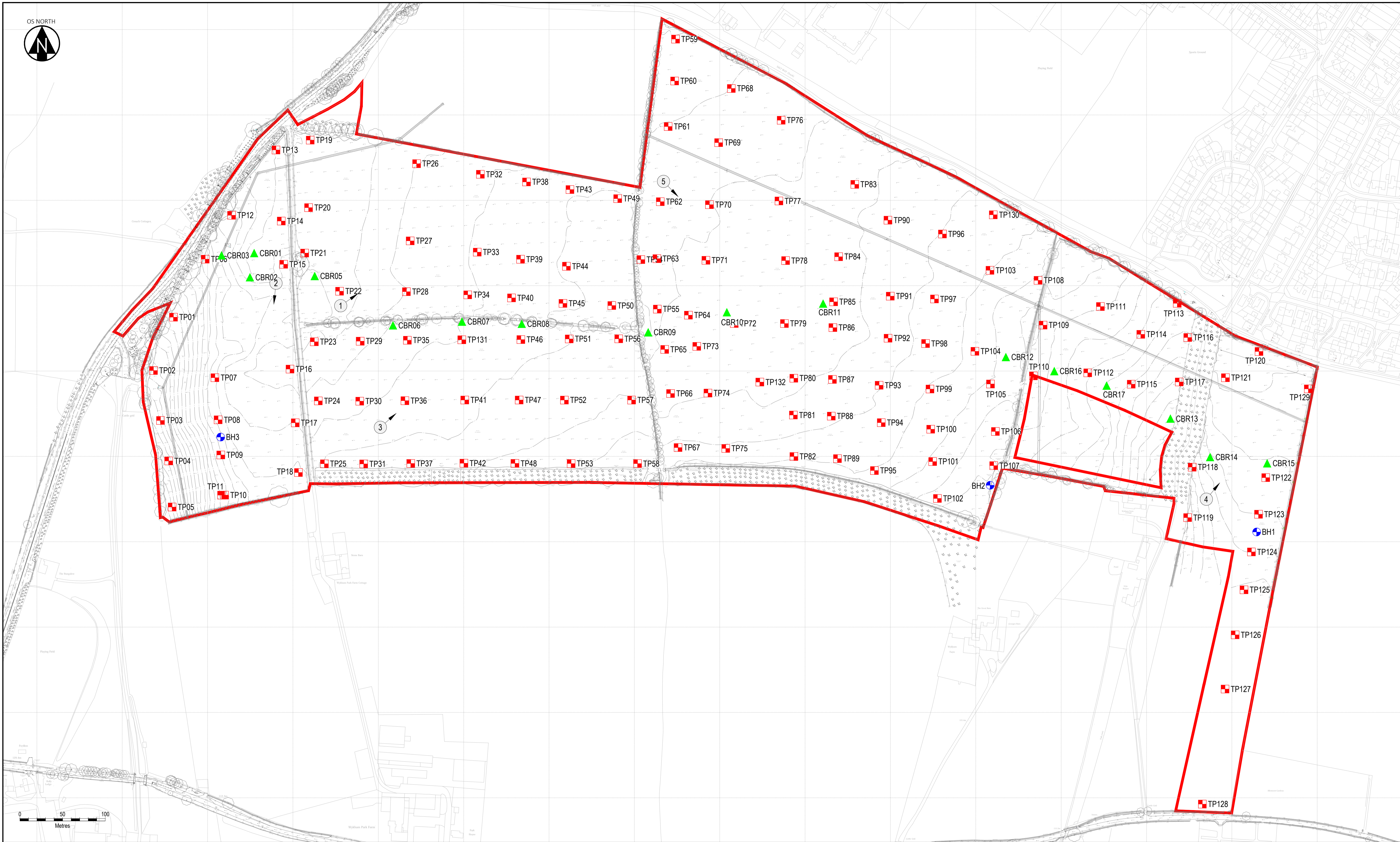
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CLIENT
GALLAGHER
ESTATES

PROJECT
Wykham Park Farm

TITLE SITE LOCATION PLAN	
HYDROCK PROJECT NO. C-04841-C	SCALE @ A4 1:25,000
PURPOSE OF ISSUE SUITABLE FOR INFORMATION	STATUS S2
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) NWPf-HYD-XX-GI-DR-G-1000	REVISION P1



KEY PLAN

- Site Boundary
- Trial Pit
- ⊕ Borehole
- ▲ CBR in-situ tests
- 01 Photograph location and reference number

NOTES

1. This drawing has been based on the following drawings and information:
 - Greenhatch Group topographical survey drawing no 17711 OGL - Rev.1,
 Date Nov2012

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P1	FIRST ISSUE	15/02/17	RC	22/03/17	Ruh	22/03/17
REV.	REVISION NOTES/COMMENTS	DATE	CHECKED BY	DATE	APPROVED BY	DATE

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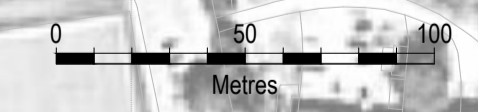
CLIENT

GALLAGHER

ESTATES

TITLE	
EXPLORATORY HOLE LOCATION PLAN	
HYDROCK PROJECT NO. C-04841-C	SCALE @ A1 1:1000
PURPOSE OF ISSUE SUITABLE FOR INFORMATION	STATUS S2
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) WPF-HYD-XX-GI-DR-G-1001	REVISION P1

PROJECT
Wykham Park Farm



KEY PLAN

- Site Boundary
- Trial Pit
- Borehole
- ▲ CBR in-situ tests
- Line dividing geology formations
- Whitby Mudstone Formation
- Marlstone Rock Formation
- Dryham Formation

NOTES

1. This drawing has been based on the following drawings and information:
 - Greenhatch Group topographical survey drawing no 17711 OGL - Rev.1, Date Nov2012
 - Proposed development: Illustrative Master Plan

REV.	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

FIRST ISSUE	IB	08/03/17	RC	08/03/17	Ruh	08/03/17

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TITLE	
GEOLOGICAL ZONATION PLAN	
HYDROCK PROJECT NO. C-04841-C	SCALE @ A1 1:1000
PURPOSE OF ISSUE SUITABLE FOR INFORMATION	STATUS S2
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) WPF-HYD-XX-GI-DR-G-1003	REVISION P1

PROJECT
Wykham Park Farm