



# Wykham Park Farm Remediation Method Statement

*L & Q Estates*

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# DOCUMENT CONTROL SHEET

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# CONTENTS

1.	INTRODUCTION.....	1
2.	BACKGROUND.....	3
3.	PROTECTION OF HUMAN HEALTH .....	8
4.	MATERIALS MANAGEMENT .....	13
5.	UNEXPECTED CONTAMINATION .....	16

## Appendices

Appendix A	Drawings
Appendix B	Soil Acceptance Criteria
Appendix C	Discovery Strategy
Appendix D	Contractor Requirements
Appendix E	Clean Cover System Calculation

## Tables

Table 2.1:	Ground Conditions Encountered.....	4
Table 2.2:	Final conceptual model and residual risks following risk evaluation. ....	5
Table 3.1:	Estimated Depth to Marlstone Rock Formation (based on WPF-HYD-XX-XX-DR-C-2410).....	8

## 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 (hereafter referred to as 'Stage 1') and the individual development parcels are to be subsequently developed by third parties (hereafter referred to as '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 over-arching RMS for the subsequent third-party developers 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, schools and public open space (POS), 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 review and revision (in agreement with the relevant regulatory bodies) during the development works, significantly by the parcel developers when detailed designs of the individual development 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 to the residential, allotment and school end users of the site (i.e., the concentrations were above the SSAC based on a residential with plant uptake end use). Therefore, a significant thickness of clean cover is required in all soft landscaping areas in residential private gardens, allotments, and both the schools (primary and secondary) to sever the pathway.

The site-specific risk assessment did not indicate a significant risk to POS users from the the natural occurring arsenic levels within the Marlstone Rock Formation (i.e., the concentrations were below the SSAC based on a POS end use). Therefore, no remedial measures are required in POS areas, including the Local Equipped Area for Play (LEAP) in the west of the site and the sports pitches (both A and B).

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 Hydrock 2017 ground investigation 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 and no remedial measures are required at these locations (as discussed above). The unexpected finds protocol, as per Section 5, should be followed in any instance, should contamination be found in this previously uninvestigated 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. 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 development of the individual parcels), 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, comprising:

- Ensuring 600mm of clean cover is present above the top of the Marlstone Rock Formation in private gardens, the allotments or in any soft landscaped areas of the proposed schools. This cover could include:
  - existing *in situ* cover of the Whitby Formation; or
  - increasing the cover thickness to 600mm above the Marlstone Rock Formation 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 summary

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 SSAC based on a residential with plant uptake land use scenario (based on bio accessibility). No significant risk indicated to POS end users.	Mitigation required to sever the pathway by ensuring a significant thickness of clean cover is present in all soft landscaping areas in residential private gardens, allotments, and both the schools (primary and secondary).
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, 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 areas in private gardens, allotments, and schools; 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.

As detailed in Section 2.2.1, remedial measures are not required in the POS areas, including the LEAP and sports pitches, since the site-specific risk assessment did not indicate a significant risk to POS end users. Therefore, there is no requirement to ensure a sufficient thickness of clean cover is present above the Marlstone Rock Formation within the POS areas.

### 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 areas during Stage 2 (in private gardens, allotments, and schools) 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 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. It is understood that all Marlstone Rock Formation arisings from the Stage 1 earthworks are to be placed in the LEAP at the west of the site or in the sports pitches (A and B), below topsoil.
- 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 individual development parcels

#### *Soft landscaping in private gardens, allotments, and schools*

The remedial concept for soft landscaping in private gardens, allotments, and schools at the site can be summarised as follows:

- Task 1: The parcel developers are to review this RMS against the detailed designs for the individual development parcels and, where required, update the RMS or prepare 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 private gardens, allotments, or schools. This will require segregation of Marlstone Rock Formation arisings for placement beneath clean cover system or for its use outside of the soft landscaping areas in private gardens, allotments, or schools, 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.**

As detailed in Section 2.2.1, remedial measures are not required in any POS areas. Therefore, any soft landscaping areas within the individual development parcels that are classified as POS (and not private gardens, allotments, or related to the schools), do not require remedial measures.

#### *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 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 of private gardens, allotments, and schools. The site-specific risk assessment confirmed that the naturally occurring arsenic did not present a significant risk to site users of the POS, including the LEAP and sports pitches.

Where required, the 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 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 in private gardens, allotments, and schools

Drawing WPF-HYD-XX-XX-DR-C-2410 in Appendix A shows the estimated thicknesses of existing cover (above the Marlstone Rock Formation) across the site. This is based on the data within 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 subsequent contractors/ developers of each parcel will be required to review the cover thicknesses based on their final design and levels, and update the this RMS (or prepare a standalone RMS), accordingly.

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 existing 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.

Parcel	Minimum depth to Marlstone Rock Formation in Area (mm below existing ground)	Note/ Additional Work
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' are likely to be required for the Stage 2 works in addition to this overarching RMS to demonstrate that parcel developers have reviewed the identified risks for each development parcel and ensure that the proposed remediation measures are suitable for the proposed end use.

The existing cover system across the development parcels can be divided in to the following scenarios.

### 3.2.1 Scenario 1 – existing cover is suitable (600mm or greater)

There is currently no requirement to provide a cover system in private gardens, allotments, and soft landscaping areas of schools, where the existing thickness of the topsoil and Whitby Mudstone overlying the Marlstone Rock Formation is 600mm or greater based on current levels (see the Marlstone Rock Depths drawing [Ref: WPF-HYD-XX-XX-DR-C-2410] in Appendix A),. In these instances, no additional works would be required to thicken the cover and a validation report stating that sufficient thickness is already present should be suitable to comply with planning conditions, both Outline and any Reserved Matters.

However, the above is subject to detailed design. Once the final design details of each individual development parcel are known (including finished levels), each parcel developer must reexamine the depth to the Marlstone Rock Formation from the finished levels to ensure a 600mm thickness of cover remains. If the depth to the underlying Marlstone Rock Formation from finished levels is reduced to less than 600mm, then 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 thickness of existing cover is less than 600mm there is a requirement to thicken this cover in private garden, allotments, and soft landscaping areas of schools. 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 schools:

- Shall comprise a minimum total thickness of 600 mm (combined subsoil and topsoil) above the Marlstone Rock Formation.
- May comprise soils from the wider site (but not Marlstone Rock Formation), which have been demonstrated as suitable for use in the Hydrock 2017GIR.
- May comprise soils 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.

- Shall 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), oversize material (>50mm) and anything which could be reasonably deemed to be of potential harm.

### 3.2.3 Verification of clean cover

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 at shallow depths across the development parcels (i.e., as part of the Stage 1 primary infrastructure or subsequent development of the individual parcels).

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 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 250m<sup>2</sup> of soft landscaped area in allotments and schools, to verify the thickness over the Marlstone Rock Formation.

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 250m<sup>3</sup> 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 m<sup>3</sup> of material, followed by 1 sample for each additional 250 m<sup>3</sup> (i.e. a 500 m<sup>3</sup> stockpile would require 3 samples, whereas a 1,200 m<sup>3</sup> 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.

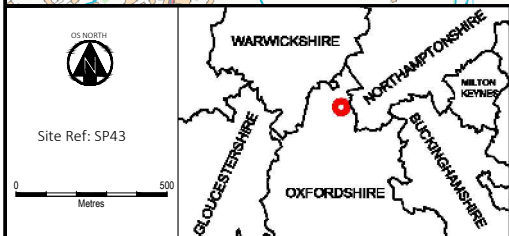
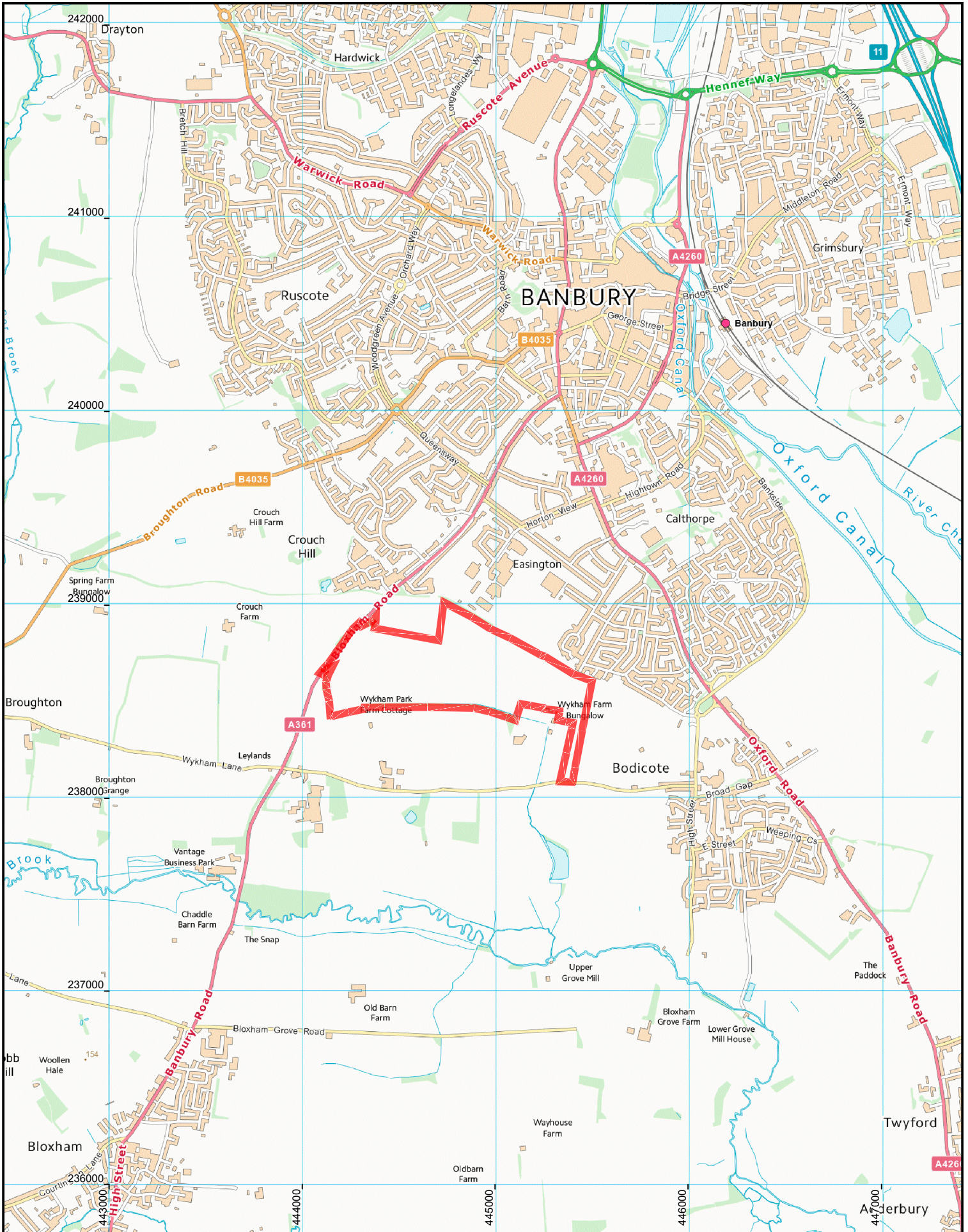
A report will be prepared by Hydrock and submitted to the regulatory parties, the Local Authority and the Environment Agency where groundwater may potentially have been impacted.



# Appendix A

## Drawings





Site Ref: SP43

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

Over Court Barns  
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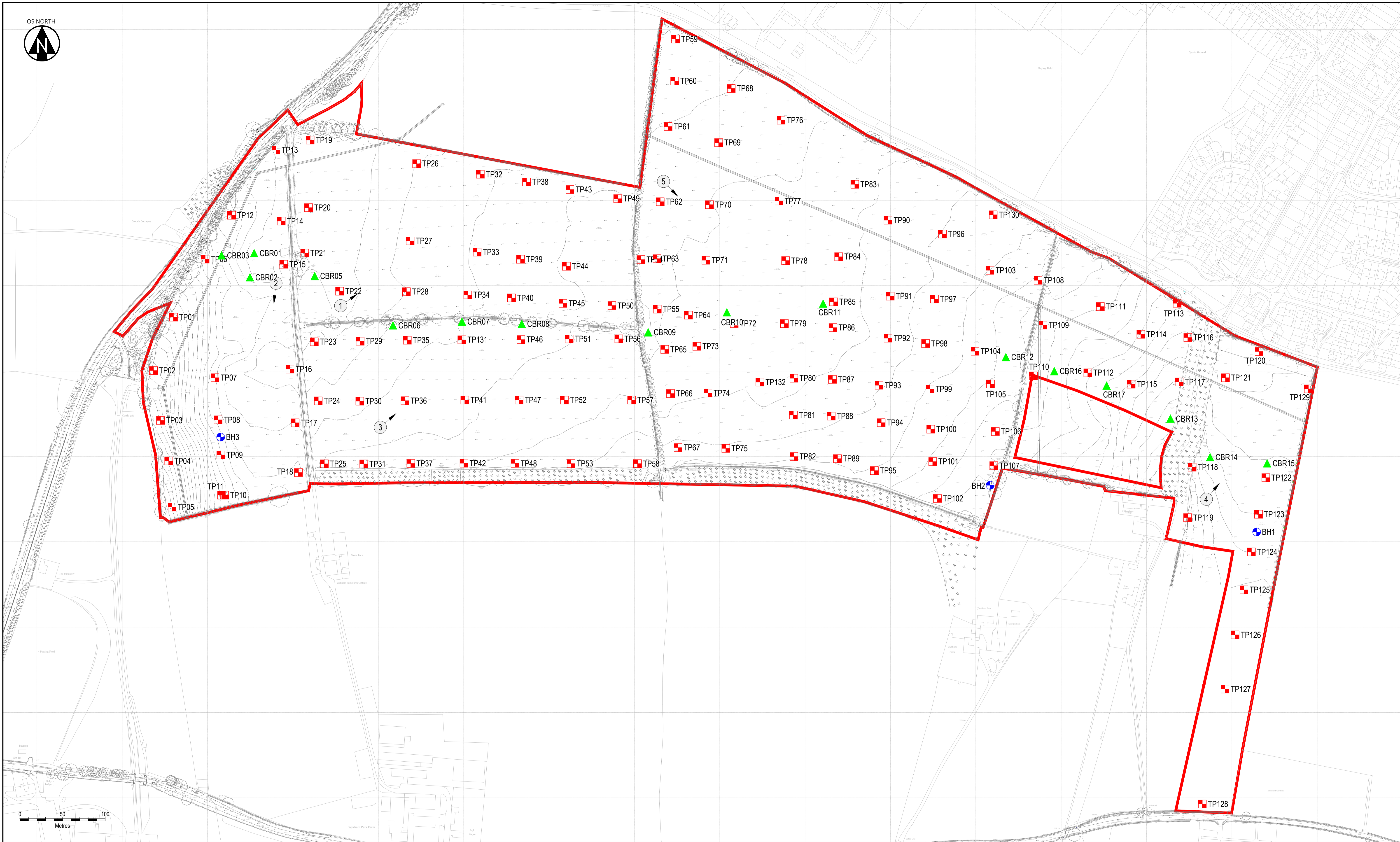
**Hydrock**

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


<b>FIRST ISSUE</b>	IB	15/02/17	RC	22/03/17	Ruh	22/03/17
<b>REVISION NOTES/COMMENTS</b>						
<b>REV.</b>	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

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or visit www.hydrock.com

**GALLAGHER**  
ESTATES

CLIENT

GALLAGHER

ESTATES

**PROJECT**

Wykham Park Farm

<b>TITLE</b>	
<b>EXPLORATORY HOLE LOCATION PLAN</b>	
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





**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
P1	IB	08/03/17	RC	08/03/17	Ruh	08/03/17

FIRST ISSUE		PROJECT	
IB	08/03/17	RC	08/03/17
REVISION NOTES/COMMENTS		Wykham Park Farm	
DRAWN BY	DATE	CHECKED BY	DATE

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CLIENT  
**GALLAGHER**  
 ESTATES

TITLE <b>GEOLOGICAL ZONATION PLAN</b>	
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



**TABLE 1/5: TESTING TO BE CARRIED OUT BY THE CONTRACTOR**  
ACCEPTABILITY TESTING OF SOURCE MATERIAL

CLAUDE	WORKS, GOODS OR MATERIAL			TEST	FREQUENCY	COMPLIANCE
	Class	General Description	Permitted Constituents			
Series 600		General Description	Permitted Constituents			
<b>Acceptable limits row</b>						
601, 631 to 637, 640	1	General granular fill	Any material, or combination of materials other than Chalk. Recycles aggregate.	MC	BS 1377-2	1 per 1,000m <sup>3</sup>
				Grading & Uniformity Coefficient	BS 1377-2	1 per 1,000m <sup>3</sup>
				OMC/MDD (Vib Hammer)	BS 1377-4	1 per 1,000m <sup>3</sup>
				Sulphate Suite Including WS, OS, TPS, OM	TRL 447	1 per 1,000m <sup>3</sup>
2	General cohesive fill	Any material, or combination of materials other than Chalk. Recycles aggregate.	MC	BS 1377-2	1 per 1,000m <sup>3</sup>	
			PL, LL, PI	BS 1377-2	1 per 1,000m <sup>3</sup>	
			Grading	BS 1377-2	1 per 1,000m <sup>3</sup>	
			OMC/MDD to include HSV at each compaction point & particle Density	BS 1377-4	1 per 1,000m <sup>3</sup>	
			Sulphate Suite including WS, OS, TPS, OM	TRL 447	1 per 2,000m <sup>3</sup>	
4	Fill to Landscape		Grading	BS 1377-2	1 per 2,000m <sup>3</sup>	
			MC / OMC	BS 1377-2	1 per 2,000m <sup>3</sup>	
5	Topsoil, or Turf Existing on site	Topsoil or turf designated as Class 5A in the contract	Grading	BS 1377-2	1 per 2,000m <sup>3</sup>	
			Imported Topsoil	Chemical Suite (Imported Materials)	Appendix 6/14	
640	Earthworks material beneath the surface of a road or external area with handstanding, if within 450mm of existing landscaping		Frost Heave		Source Approval	
630	Below slabs and handstanding		Dual Cycle Plate Load Test for equivalent CBR in accordance with Table 1/5-2.		1 per 40m x 40m Grid	
			Dual Cycle Plate Load Test for equivalent CBR in accordance with Table 1/5-2.		1 per 50m x 50m Grid	

**DUAL CYCLE PLATE LOAD TEST: CONFIRMATION OF MODULUS OF SUBGRADE REACTION K762 AND EQUIVALENT CBR**

This test should be undertaken with a minimum 0.60m diameter plate and whilst plates of smaller diameter may be used this should not be less than 0.30m. The method of analysis should follow DMRB IAN 73/06 Rev1 for an equivalent CBR. The modulus of subgrade reaction is an elastic modulus, and can only be proven if the test is done cyclically to ensure repeatable results. Therefore, the testing protocols to be followed are below:

- The initial seating stress is to be based upon the stress required to induce at least 1.5mm.
- The first load cycle is applied incrementally, to achieve cumulative settlement intervals of 0.25, 0.50, 0.75, 1.00, 1.25 and 1.50mm retrospectively. Each incremental stress is maintained until there is less than 0.05mm per minute before the next load is applied.
- Upon achieving the 1.50mm settlement and less than 0.05mm per minute requirement, the plate should be unloaded back to zero and the non-recoverable settlement at a stress of 0kpa is recorded.
- The dial gauges are re-set to zero and the test is repeated to achieve the same number of increments with the corresponding same level of deformation (e.g. stress applied to achieve 0.25mm increments, up to the maximum nominal deformation of 1.50mm).

The results are assessed by:

- Checking that the non-recoverable settlement after the first cycle is less than 50% of the total (e.g. if the total settlement was 1.50mm, then after unloading back to zero the gauges should return to less than 0.75mm). If this is not achieved, additional stress cycles can be undertaken until repeatable values are recorded as this is indicative of poor compaction and required re-engineering.
- Comparison of stiffness (E<sub>sp</sub>) of the final cycle divided by the stiffness of the previous cycle. The target ratio for shall be less than 2.0, an never above 2.2. Where the ratio of greater than 2.2, this indicated the fill has not been fully compacted.
- The modulus of subgrade reaction (k<sub>s</sub>) for the first cycle, shall be equal to or more than the design value for the subgrade and checked against the foundation design requirements. This can be converted to an equivalent CBR if required by the design, using the equation in DMRB IAN 73/06 Rev1.

**TABLE 6/1: COMPACTION REQUIREMENTS IN SHW CLAUSE 612 & ADDITIONAL NOTES**

Earthworks Class of expected materials on site	Typical Use envisaged	Compaction Control and Key Performance Requirements *
Class 1A General Granular Fill (Well Graded)	Site-won Earthworks fill to raise levels and preparation of formation level	SHW Table 6/4 Method 2, modified as required to ensure 95% MDD. *
Class 1B General Granular Fill (Uniformly Graded)	Site-won Earthworks fill to raise levels and preparation of formation level	SHW Table 6/4 Method 3, modified as required to ensure 95% MDD. *
Class 2A General Wet Cohesive Fill	Site-won Earthworks fill to external areas	SHW Table 6/4 Method 1, modified as required to ensure MC achieves between 95-105% MDD and 5% air voids and 95% MDD with min Cu of 50kN/m <sup>2</sup> . *
Class 2B General Dry Cohesive Fill	Site-won Earthworks fill to external areas	SHW Table 6/4 Method 2, modified as required to ensure MC achieves 95% MDD with min Cu of 50kN/m <sup>2</sup> . *
Class 2C General Stoney Cohesive Fill	Earthworks fill to external areas / raise levels and preparation of formation level	SHW Table 6/4 Method 2, modified as required to ensure MC achieves 95% MDD with min Cu of 50kN/m <sup>2</sup> . *
Class 4 Landscape Fill	Fill to Landscaping	SHW Table 6/4 Method 2, modified as required to ensure minimum bulk unit weight of 18kN/m <sup>3</sup> and Cu of 40kN/m <sup>2</sup> .

\* In-situ testing locations to be confirmed by Project Engineer and as agreed with a local authority Highways Representative / Validation of site material to be according to TABLE 1/5, 6/1, AND 6/2 to SHW S600

**Marlstone Rock Formation**

The Marlstone Rock Formation generally comprises of ferruginous limestone, interbedded ferruginous sandstone and subordinate ferruginous mudstone. Elevated concentrations of some metals and metalloids (including arsenic) are known to be present within the Marlstone Rock Formation at concentrations which are considered unacceptable in a residential, setting. Further details of the required remedial strategy are provided with the Hydrock Report WPF-HYD-XX-DR-G-1002.

Increased cut and/or fill in proposed garden areas where the Marlstone Rock Formation is present maybe required in order to archive the necessary 600mm clean cover below the proposed finished ground levels.

The reuse and placement of the Marlstone Rock Formation should only be placed in within the LEAP on the west of the site. Should this material be stockpiles 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.

**Reuse of site won Material**

The Whitby Mudstone comprises of a slightly sandy gravely residual clay with occasional limestone bands. The natural moisture content ranges between 26-40% with an average of 29%. The optimum moisture content ranges between 25-30% to ensure the best compaction and achieve the highest density. A total of four grading tests have been undertaken and indicate that the material is a Class 2. In areas of limestone the material the material contains higher gravel content and may be classified as a Class 2C or Class 1 material.

The Marlstone Rock Formation is encountered as strong yellow to brown distinctly weathered limestone. This classification of this material is variable depending on how weathered the material is but is generally classified as a Class 2C or Class 1 material.

Dryham Formation is a slightly sandy slightly gravely residual clays and silt with rare pockets of clayey sand. The natural moisture content of this material ranges between 13-40% but on average is 33%. The optimum moisture content is 42%. It is noted that this material may be dry of optimum in some areas of the site but is generally considered to be within the 95% range of the maximum dry density (MDD). This material is classed as Class 2.

The above assessment of site won material is based on the testing undertaken during the ground investigation on April 2017 (Hydrock Report: WPF-HYD-XX-DR-G-1001-P1-P2) and subject to change as a result of weather conditions. Therefore, the above classification are indicative and are subject to confirmatory testing as part of the testing specified within this earthworks specification.

**TABLE 6/2: Grading Requirements for Acceptable Earthwork Materials**

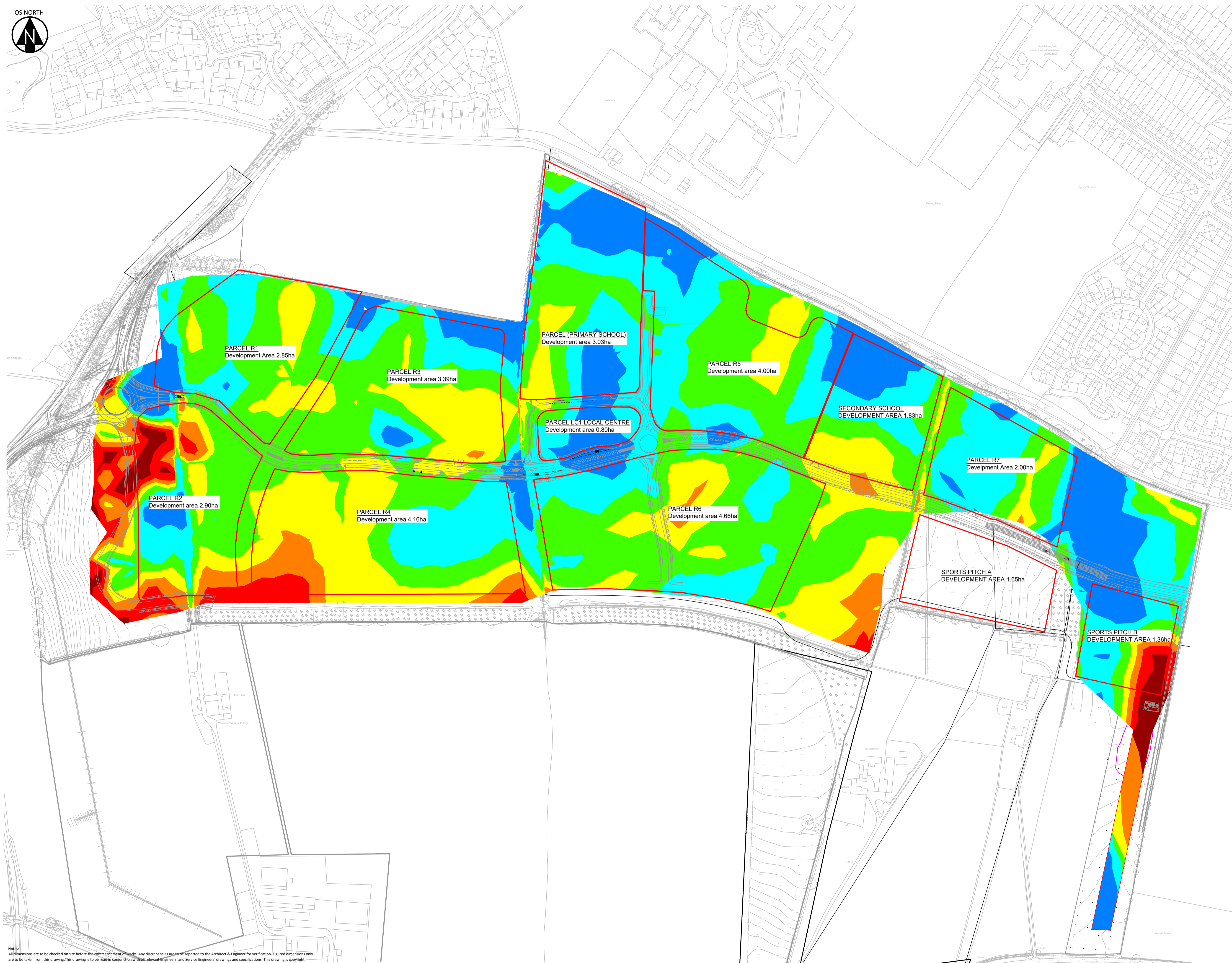
Class	Size (mm) BS Series												Size (microns) BS Series				Size (microns)					
	500	300	125	90	75	37.5	28	20	14	10	6.3	5	3.35	2	1.18	600		300	150	63	2	
1A		100	95																		<15	
1B			100																			<15
1C	100		10-95																0-25			15
2A & 2B			100																80-100			15-100
2C			100																15-80			15-80
2D			100																			80-100 0-20

**TABLE 6/4: Method Compaction for Earthworks Materials: Plant and Methods (Method 1 to Method 6)**  
(This Table is to be read in conjunction with sub-Clause 612.10)

Type of Compaction Plant	Ref No.	Category	Method 1			Method 2			Method 3			Method 4			Method 5			Method 6				
			D		N	D		N	D		N	D		N	D		N	N for D = 110 mm		N for D = 150 mm		
			mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
Smoothed wheeled roller (or vibratory roller operating without vibration)	1	Mass per metre width of roll:	125	8	125	10	125	10*	175	4	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	2	over 2700 kg up to 5400 kg	125	6	125	8	125	8*	200	4	unsuitable	16	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	3	over 5400 kg	150	4	150	8	150	8	300	4	unsuitable	8	16	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	4	over 5400 kg	150	4	150	12	150	12	400	4	unsuitable	12	20	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
Grid roller	1	Mass per metre width of roll:	150	10	unsuitable	150	10	250	4	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	2	over 2700 kg up to 5400 kg	150	8	125	12	150	12	325	4	unsuitable	20	20	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	3	over 5400 kg up to 8000 kg	150	4	150	12	150	12	400	4	unsuitable	12	20	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	4	over 8000 kg	150	4	150	12	150	12	400	4	unsuitable	12	20	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
Deadweight tamping roller	1	Mass per metre width of roll:	225	4	150	12	250	4	350	4	unsuitable	12	20	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	2	over 6000 kg	300	5	200	12	300	3	400	4	unsuitable	8	12	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
Pneumatic-tyred roller	1	Mass per wheel:	125	6	unsuitable	150	10*	240	4	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	2	over 1000 kg up to 1500 kg	150	5	unsuitable	150	10	300	4	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	3	over 1500 kg up to 2000 kg	175	4	125	12	350	4	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	4	over 2000 kg up to 2500 kg	225	4	125	10	400	4	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	5	over 2500 kg up to 4000 kg	300	4	125	10	400	4	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	6	over 4000 kg up to 6000 kg	350	4	150	8	400	4	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	7	over 6000 kg up to 8000 kg	400	4	150	8	400	4	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	8	over 8000 kg up to 12000 kg	450	4	175	6	400	4	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
Vibratory tamping roller	1	Mass per metre width of a vibrating roll:	100	12	100	12	150	12	100	10	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	2	over 700 kg up to 1300 kg	125	12	125	12	175	12*	175	8	unsuitable	12	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	3	over 1300 kg up to 1800 kg	150	12	150	12	200	12*	200	12*	unsuitable	8	12	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	4	over 1800 kg up to 2300 kg	150	9	150	9	250	12*	400	5	6	6	10	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	5	over 2300 kg up to 2900 kg	200	9	200	9	275	12*	500	6	6	10	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	6	over 2900 kg up to 3600 kg	225	9	225	9	300	12*	600	6	4	8	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	7	over 3600 kg up to 4300 kg	250	9	250	9	300	9*	700	6	3	7	12	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	8	over 4300 kg up to 5000 kg	275	9	275	9	300	7*	800	6	3	6	10	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
Vibratory plate compactor	1	Mass per m <sup>2</sup> of base plate:	unsuitable	unsuitable	75	16	150	16	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	2	over 880 kg up to 1100 kg	unsuitable	unsuitable	75	10	150	12	150	12	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	3	over 1100 kg up to 1200 kg	100	12	125	10	150	10	175	10	unsuitable	16	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	4	over 1200 kg up to 1400 kg	125	8	150	8	200	10*	200	10*	unsuitable	16	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	5	over 1400 kg up to 1800 kg	150	6	150	6	150	6	150	6	unsuitable	6	16	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	6	over 1800 kg up to 2100 kg	150	6	150	5	200	4	unsuitable	unsuitable	unsuitable	6	6	12	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
Vibro-tamper	1	Mass:	100	3	100	3	150	3	125	3	unsuitable	4	8	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	2	over 50 kg up to 65 kg	125	3	125	3	200	3	150	3	unsuitable	3	6	12	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	3	over 65 kg up to 75 kg	150	3	150	3	225	3	175	3	unsuitable	2	4	10	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
	4	over 75 kg up to 100 kg	225	3	200	3	225	3	250	3	unsuitable	2	4	10	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable	unsuitable
Power rammer	1	Mass:	150	4	150	6	unsuitable	200</														



OS NORTH



**NOTES:**

It is assumed that any cut material can be reused on site as an engineered fill material. It is likely that material from site will need to be conditioned in terms of their moisture content to ensure they can be adequately compacted within proposed earthworks.

Topsoil strip is as advised by the geotechnical investigation report. (hydrock ref: WPF-HYD-XX-XX-RP-G-1001-P1.4-S2). this suggests topsoil thickness ranging from 0.15m to 0.4m so an average of 0.3m has been assumed.

Depths displayed are taken from existing ground level to top of Marlstone Rock formation

**CUT Depth Bands**

Band 1	-0.00 - -0.25
Band 2	-0.25 - -0.50
Band 3	-0.50 - -0.75
Band 4	-0.75 - -1.00
Band 5	-1.00 - -1.25
Band 6	-1.25 - -1.50
Band 7	-1.50 >

— PARCEL BOUNDARY

P1	25/11/19	First Issue	SM	BS
Rev	Date	Description	By	Ckd

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Client: **L & Q ESTATES**

Project: **WYKHAM PARK FARM**

Hydrock Project No: **C-04841**

Drawing Title: **MARLSTONE ROCK DEPTHS**

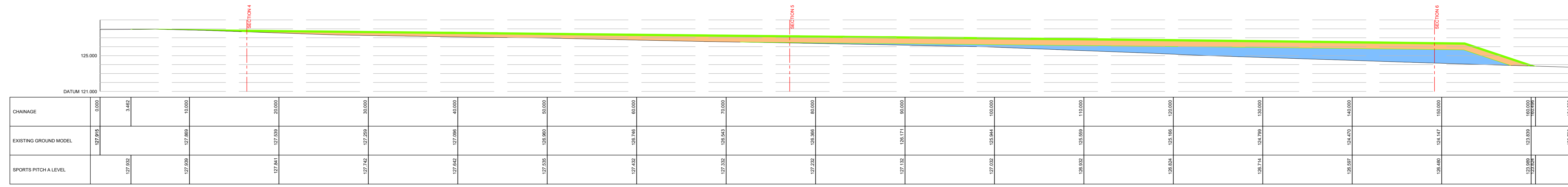
Status: **SO** Purpose of Issue: **INFORMATION**

Drawn:	Checked:	Scale @ A1:	Drawn Date:	First Issue:
SM	BS	1:2000	16/08/2017	16/08/2017

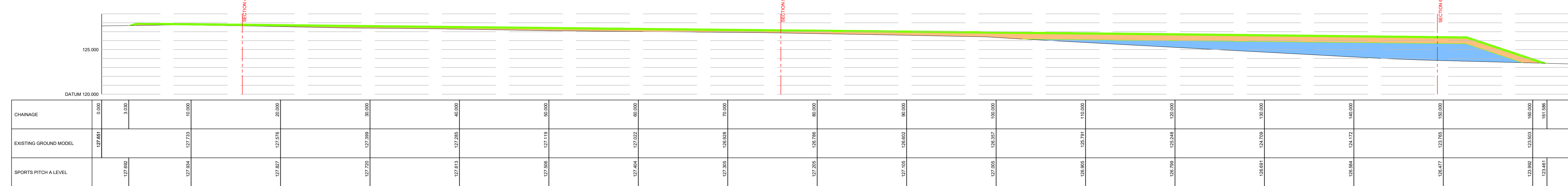
Drawing No.	Revision
WPF-HYD-XX-XX-DR-C-2410	P1

Notes:  
 All dimensions are to be checked on site before the commencement of works. Any discrepancies should be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing. This drawing is to be read in conjunction with the Client's brief and 'Service Engineers' drawings and specifications. This drawing is copyright.

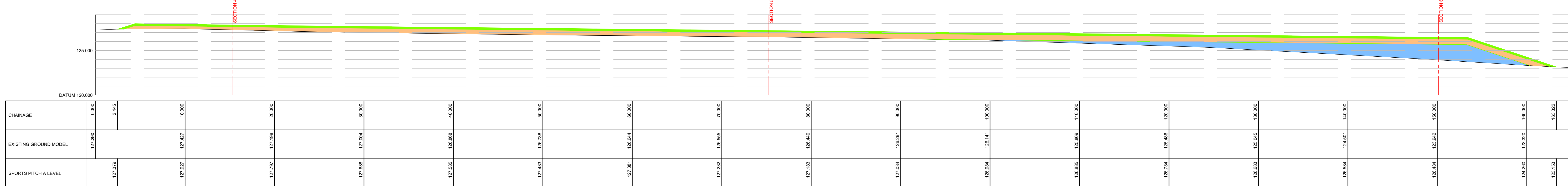




SPORTS PITCH A CROSS SECTION 1  
SCALE 1:200



SPORTS PITCH A CROSS SECTION 2  
SCALE 1:200



SPORTS PITCH A CROSS SECTION 3  
SCALE 1:200



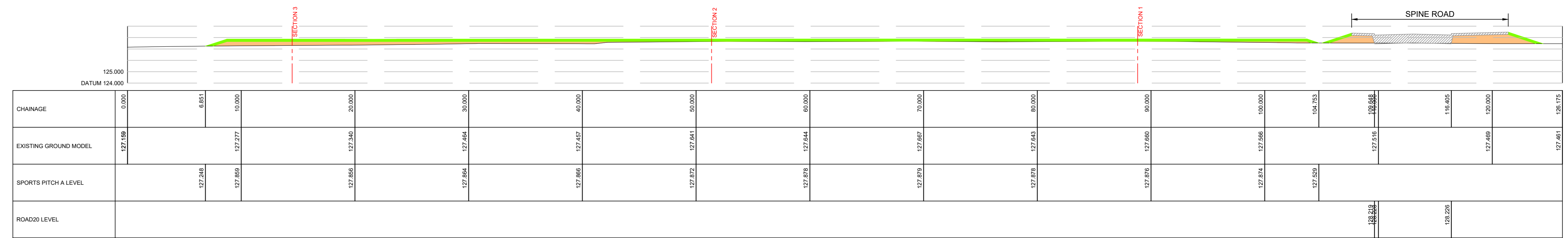
NOTES

**Sports pitch A**  
 Total fill required = 12280m<sup>3</sup>  
 Fill volume consists of - 4125m<sup>3</sup> of Marlstone Rock deposits.  
 2474m<sup>3</sup> Topsoil  
 5681m<sup>3</sup> Sustainable Fill  
 Topsoil reuse volume = 2315m<sup>3</sup> assuming 0.2m thickness  
 No topsoil strip has been assumed beneath the extent of Sports Pitch A  
 For Sports Pitch B sections refer to drawing: WPF-HYD-XX-XX-DR-C-0211  
 For LEAP sections refer to drawing: WPF-HYD-XX-XX-DR-C-0212  
 For site wide Cut & Fill Analysis refer to drawing: WPF-HYD-XX-XX-DR-C-2400

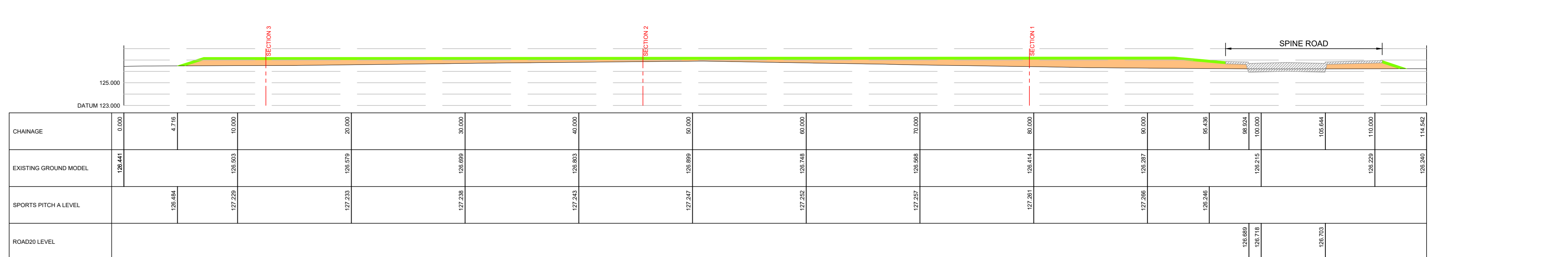
**LEGEND**

<span style="color: green;">█</span>	TOPSOIL PLACEMENT (200mm thickness where reused)
<span style="color: orange;">█</span>	FILL MATERIAL (Min 600mm cover over marlstone rock volumes)
<span style="color: red;">█</span>	CUT MATERIAL
<span style="color: blue;">█</span>	MARLSTONE ROCK (Placed in leap & sports pitch A)
<span style="color: grey;">█</span>	EXISTING GROUND
<span style="color: green;">█</span>	TOPSOIL STRIP

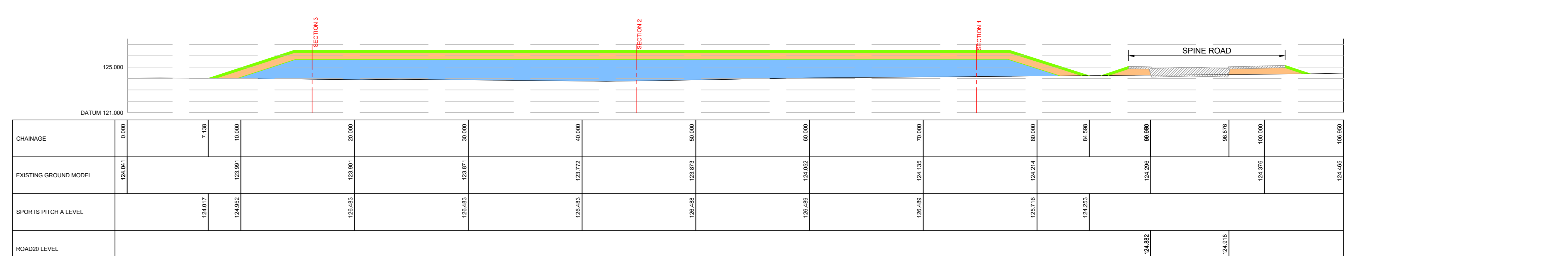
NOTES (CONTINUED)



SPORTS PITCH A CROSS SECTION 4  
SCALE 1:200



SPORTS PITCH A CROSS SECTION 5  
SCALE 1:200



SPORTS PITCH A CROSS SECTION 6  
SCALE 1:200

REVISIONS (CONTINUED)

REVISIONS

Rev	Date	Description	By	Ckd	App
P01	21/10/19	First Issue			

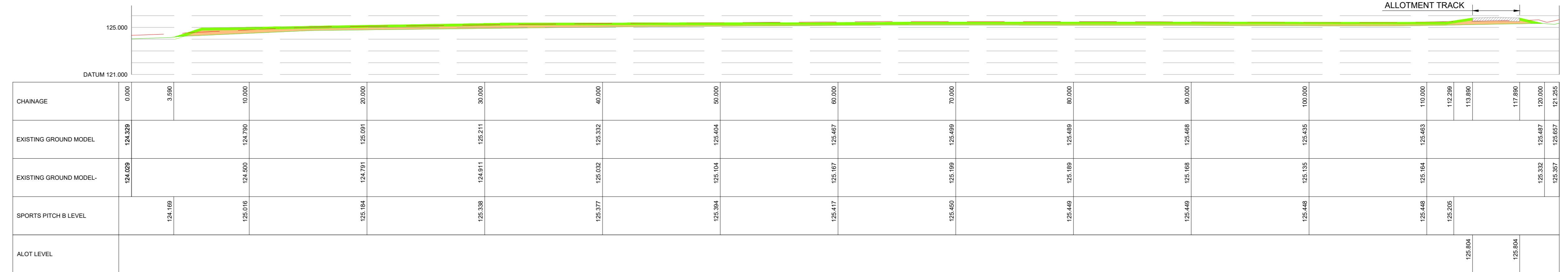
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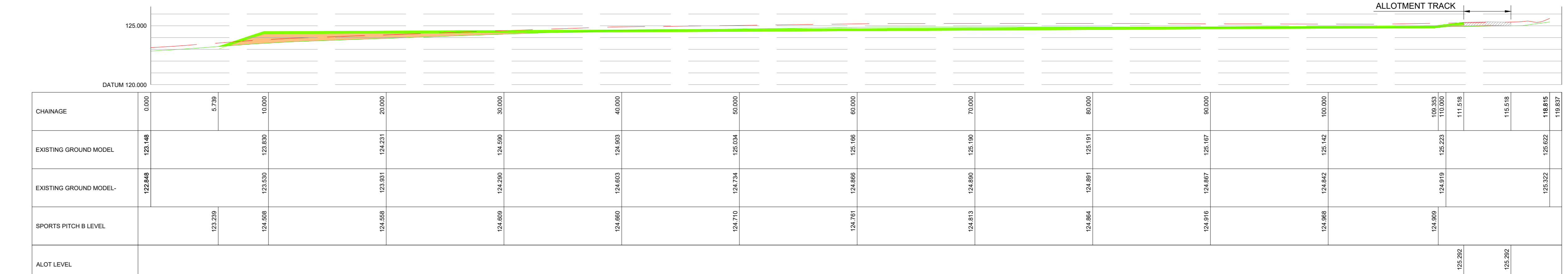
PROJECT  
**WYKHAM PARK FARM**

TITLE <b>CUT AND FILL ANALYSIS - SPORTS PITCH A SECTIONS</b>	
HYDROCK PROJECT NO. <b>C-04841-C</b>	SCALE @ A/D <b>AS SHOWN</b>
STATUS DESCRIPTION <b>INFORMATION</b>	STATUS <b>S2</b>
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE LEVEL-TYPE-ROLE-NUMBER) <b>WPF-HYD-XX-XX-DR-C-0210</b>	REVISION <b>P01</b>

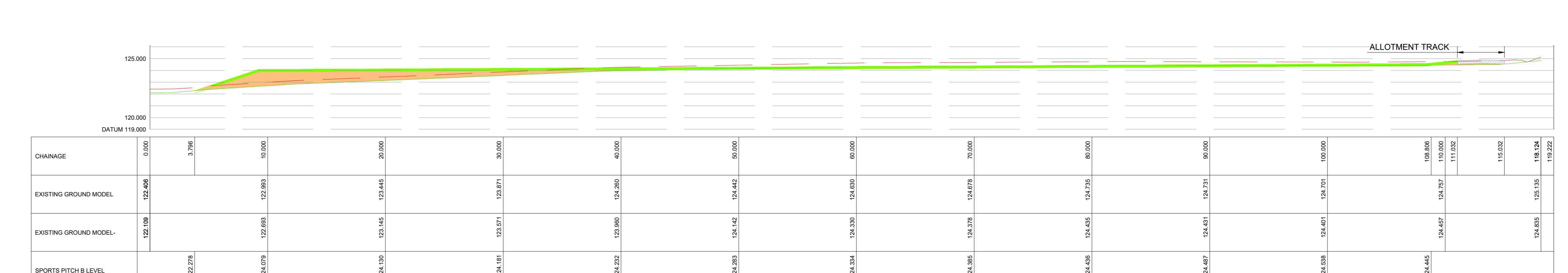




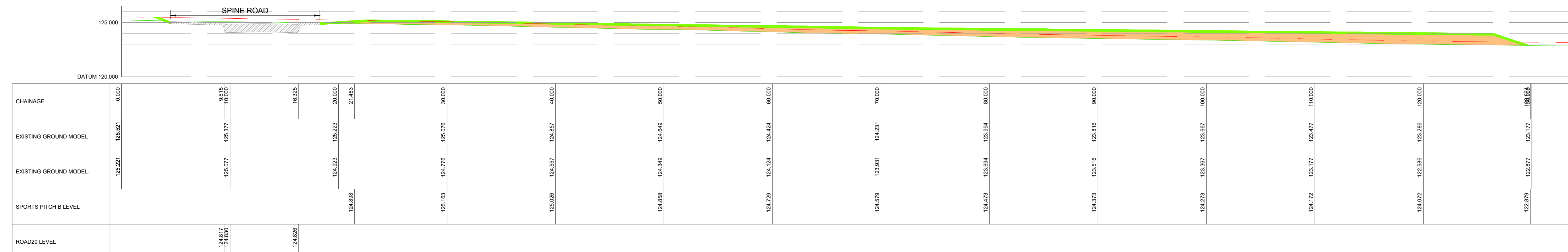
SPORTS PITCH B CROSS SECTION 1  
SCALE 1:200



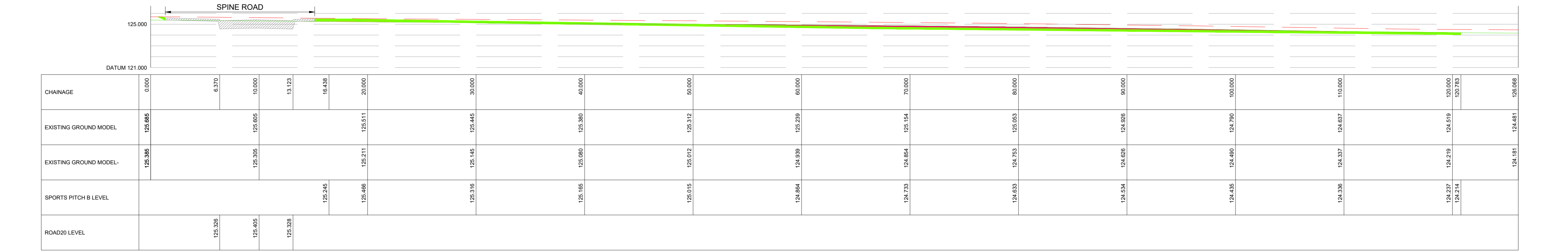
SPORTS PITCH B CROSS SECTION 2  
SCALE 1:200



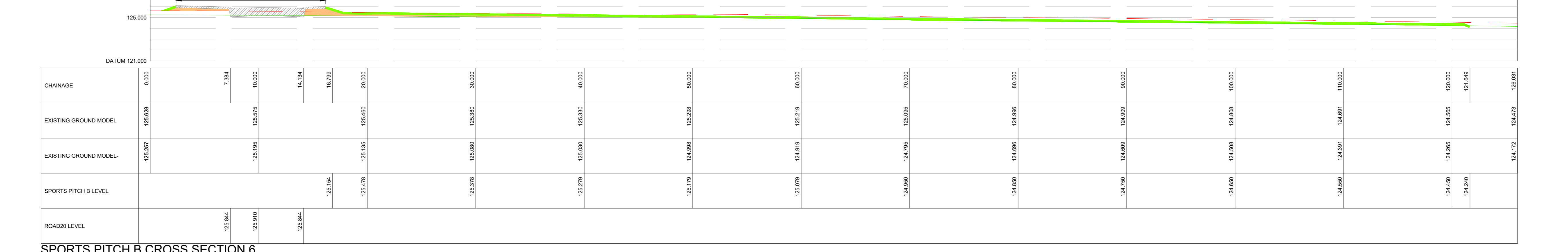
SPORTS PITCH B CROSS SECTION 3  
SCALE 1:200



SPORTS PITCH B CROSS SECTION 4  
SCALE 1:200



SPORTS PITCH B CROSS SECTION 5  
SCALE 1:200



SPORTS PITCH B CROSS SECTION 6  
SCALE 1:200

**LEGEND**

- TOPSOIL PLACEMENT (200mm thickness where reused)
- FILL MATERIAL (Min 600mm cover over marlstone rock volumes)
- CUT MATERIAL
- MARLSTONE ROCK (Placed in leap & sports pitch A)
- EXISTING GROUND
- TOPSOIL STRIP

**NOTES**

Sports pitch B

Total fill required = 2936m<sup>3</sup>  
Fill volume consists of -  
2474m<sup>3</sup> Topsoil  
5681m<sup>3</sup> Suitable Fill

Topsoil reuse volume = 2315m<sup>3</sup> assuming 0.2m thickness

No topsoil strip has been assumed beneath the extent of Sports Pitch A

For Sports Pitch B sections refer to drawing:  
WPF-HYD-XX-XX-DR-C-0211  
For LEAP sections refer to drawing:  
WPF-HYD-XX-XX-DR-C-0212

For site wide Cut & Fill Analysis refer to drawing:  
WPF-HYD-XX-XX-DR-C-2400

REVISIONS

P01 01/10/19 First Issue MF MF SM

Rev	Date	Description	By	Ckd	App

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CLIENT  
L & Q ESTATES

PROJECT  
WYKHAM PARK FARM

TITLE  
CUT AND FILL ANALYSIS - SPORTS PITCH B SECTIONS

HYDROCK PROJECT NO. C-04841-C	SCALE @ A0 1:AS SHOWN
STATUS DESCRIPTION INFORMATION	STATUS S2
DRAWING NO. (PROJECT CODE ORIGINATOR.ZONE-LEVEL-TYPE-SCALE-NUMBER) WPF-HYD-XX-XX-DR-C-0211	REVISION P01





LEGEND	
	TOPSOIL PLACEMENT (200mm where reused)
	FILL MATERIAL (Min 600mm cover over marlstone rock volumes)
	CUT MATERIAL
	MARLSTONE ROCK (Placed in leap & sports pitch A)
	EXISTING GROUND
	TOPSOIL STRIP

**NOTES**

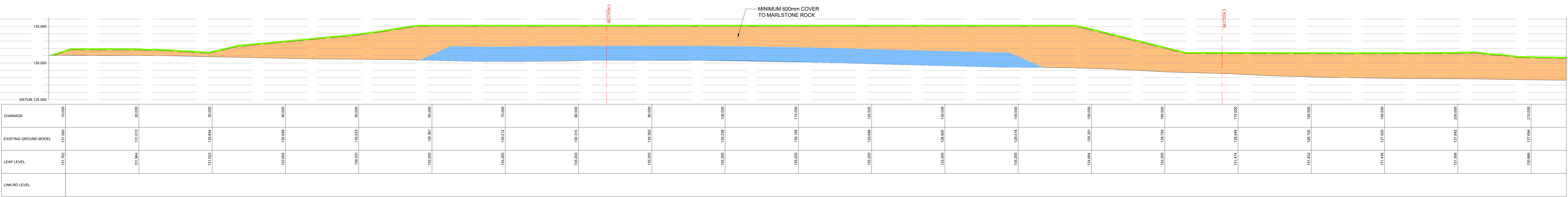
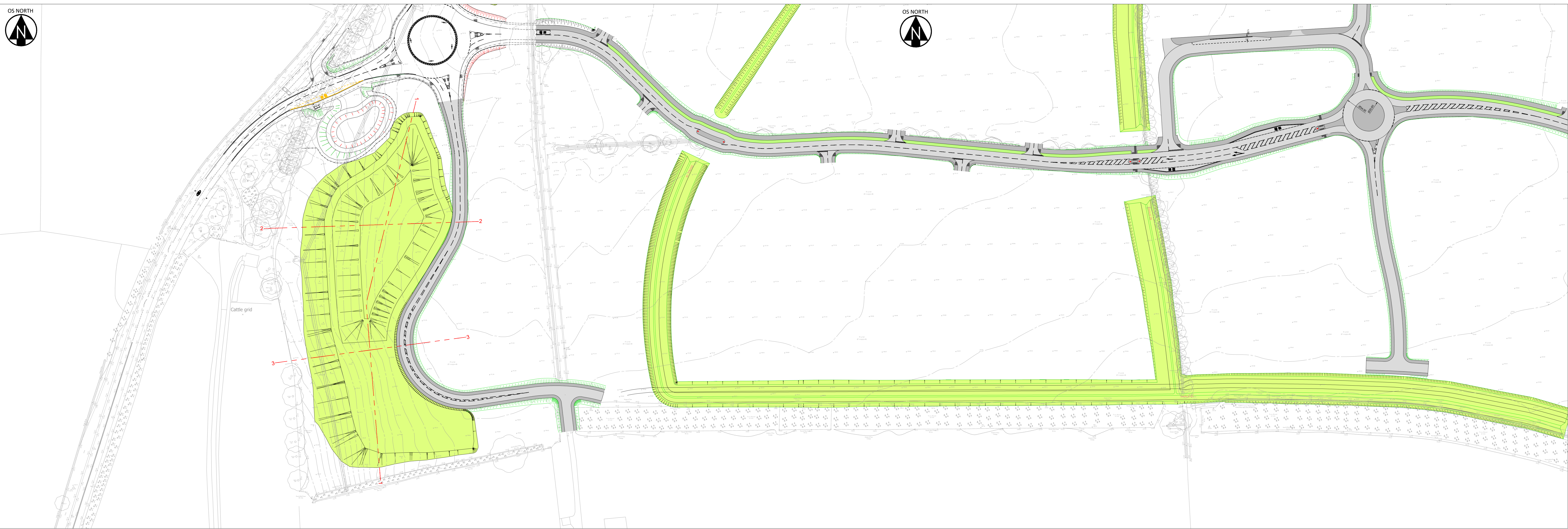
**LEAP**

Total fill available = 51084m<sup>3</sup>  
 Fill volume consists of:  
 2388m<sup>3</sup> Topsoil  
 3870m<sup>3</sup> Marlstone Rock deposits  
 44826m<sup>3</sup> Suitable Material

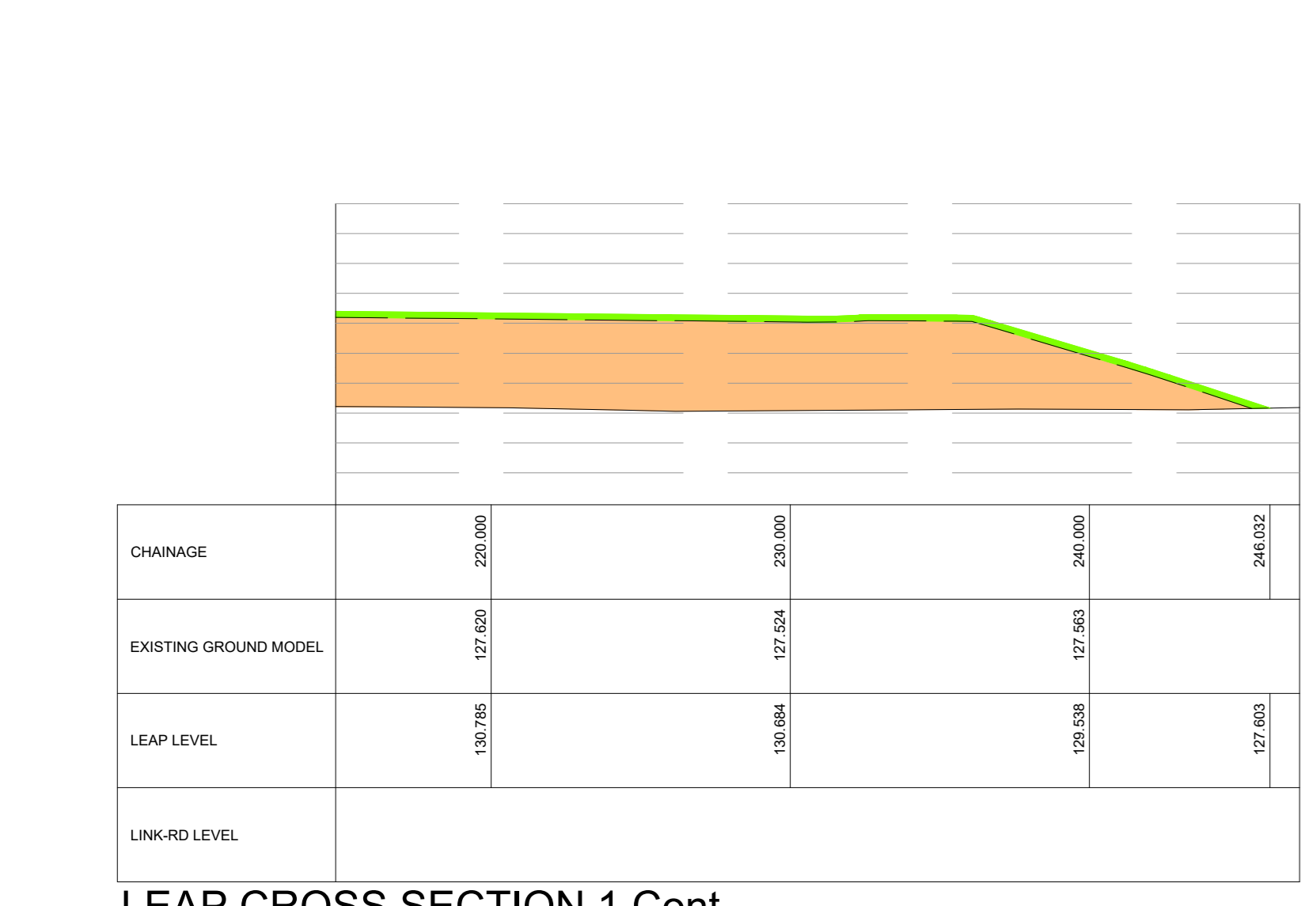
Topsoil reuse volume = 2388m<sup>3</sup> assuming 0.2m thickness

For Sports Pitch A sections refer to drawing:  
 WPF-HYD-XX-DR-C-0210  
 For Sports Pitch B sections refer to drawing:  
 WPF-HYD-XX-DR-C-0211

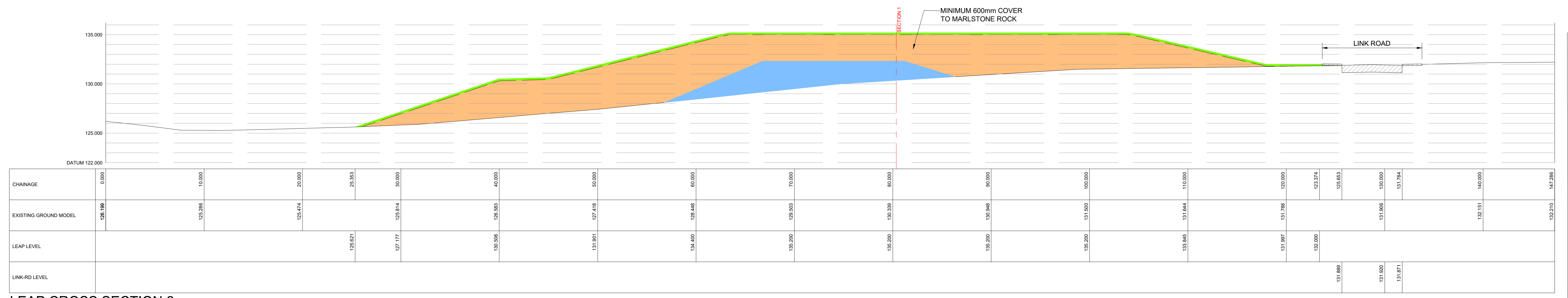
For site wide Cut & Fill Analysis refer to drawing:  
 WPF-HYD-XX-DR-C-2400



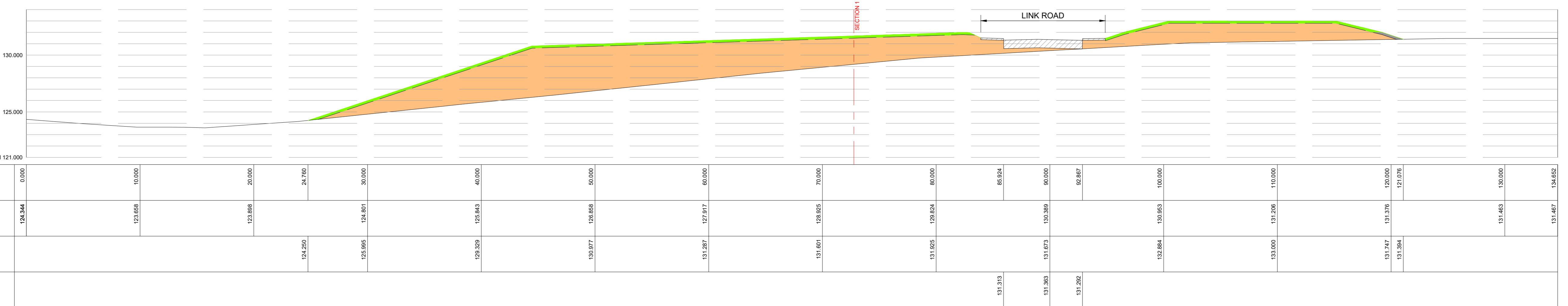
**LEAP CROSS SECTION 1**  
SCALE 1:200



**LEAP CROSS SECTION 1 Cont.,**  
SCALE 1:200



**LEAP CROSS SECTION 2**  
SCALE 1:200



**LEAP CROSS SECTION 3**  
SCALE 1:200

**NOTES**

REV	DATE	DESCRIPTION	BY	CHKD	APPD
P3	17/10/19	Amended LEAP shape and updated sections	SM	SM	BS
P2	04/07/19	Amended LEAP shape and updated sections	SM	SM	BS
P01	02/07/18	First issue	MF	SM	SM



**CLIENT**  
L & Q ESTATES

**PROJECT**  
WYKHAM PARK FARM  
BANBURY

**TITLE**  
CUT AND FILL ANALYSIS LEAP  
SECTIONS

HYDROCK PROJECT NO. C-04841-C	SCALE @ A0 1:1000	STATUS S2
STATUS DESCRIPTION INFORMATION	DRAWING NO. / PROJECT CODE ORIGINATOR.ZONE.LEVEL.TYPICALE NUMBER WPF-HYD-XX-DR-C-0212	REVISION P03





LEGEND	
<span style="display:inline-block; width:15px; height:10px; background-color:lightgreen; border:1px solid black;"></span>	TOPSOIL PLACEMENT (200mm where reused)
<span style="display:inline-block; width:15px; height:10px; background-color:orange; border:1px solid black;"></span>	FILL MATERIAL (Min 600mm cover over marlstone rock volumes)
<span style="display:inline-block; width:15px; height:10px; background-color:blue; border:1px solid black;"></span>	CUT MATERIAL
<span style="display:inline-block; width:15px; height:10px; background-color:lightblue; border:1px solid black;"></span>	MARLSTONE ROCK (Placed in leap & sports pitch A)
<span style="display:inline-block; width:15px; height:10px; background-color:grey; border:1px solid black;"></span>	EXISTING GROUND
<span style="display:inline-block; width:15px; height:10px; background-color:lightgrey; border:1px solid black;"></span>	TOPSOIL STRIP

NOTES

REVISIONS

Rev	Date	Description	By	Chk	App
P2	04/07/19	Amended LEAP shape and updated sections	SM	SM	BS
P01	02/07/18	First Issue	MF	SM	SM

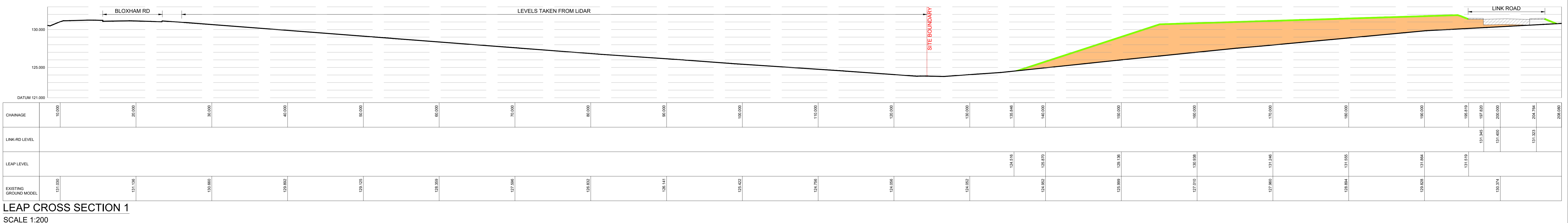
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PROJECT  
**WYKHAM PARK FARM  
BANBURY**

TITLE  
**CUT AND FILL ANALYSIS LEAP  
SECTIONS 2**

HYDROCK PROJECT NO. <b>C-04841-C</b>	SCALE @ A0 <b>1:1000</b>
STATUS DESCRIPTION <b>INFORMATION</b>	STATUS <b>S2</b>
DRAWING NO. (PROJECT CODE ORIGINATOR_ZONE-LEVEL-TYPE-SCALE-NUMBER) <b>WPF-HYD-XX-XX-DR-C-0213</b>	REVISION <b>P02</b>



**LEAP CROSS SECTION 1**  
SCALE 1:200



# Appendix B

## Soil Acceptance Criteria

**Appendix B. Wykham Park Farm - Proposed Soil Acceptance Criteria for Clean Cover Soils in Private Gardens,  
Allotments, and Soft Landscaping Areas of Schools**

Contaminant	Generic Assessment Criteria (GAC)			Source
<b>Inorganics</b>				
Arsenic	37			SGV report + CLEA 1.07
Beryllium	73			LQM/CIEH + CLEA 1.07
Boron	300			LQM/CIEH + CLEA 1.07
Cadmium	14			SGV report + CLEA 1.07
Chromium (III)	890			LQM/CIEH + CLEA 1.07
Chromium (VI)	6.1			LQM/CIEH + CLEA 1.07
Copper	2500			LQM/CIEH + CLEA 1.07
Lead	200			C4SL
Mercury, inorganic	170			SGV report + CLEA 1.07
Nickel	130			Hydrock + CLEA 1.07
Selenium	360			SGV report + CLEA 1.07
Vanadium	410			LQM/CIEH + CLEA 1.07
Zinc	3900			LQM/CIEH + CLEA 1.07
Cyanide (free)	790			Hydrock + CLEA 1.07
<b>Organics</b>				
	<b>Soil Organic Matter (SOM)</b>			
	<b>1%</b>	<b>2.5%</b>	<b>6%</b>	
Phenol (total)	290	560	1100	SGV report + CLEA 1.07
Acenaphthene	220	520	1100	LQM/CIEH + CLEA 1.07
Acenaphthylene	180	430	940	
Anthracene	2400	5500	11000	
Benz(a)anthracene	4.2	6.7	8.6	
Benzo(a)pyrene	1.5	1.5	1.5	
Benzo(b)fluoranthene	7.6	9.4	10	
Benzo(ghi)perylene	64	69	71	
Benzo(k)fluoranthene	12	14	15	
Chrysene	7.7	11	13	
Dibenz(a,h)anthracene	1.1	1.3	1.4	
Fluoranthene	290	560	900	
Fluorene	170	410	880	
Indeno(1,2,3,cd)pyrene	4.3	5.5	6.2	
Naphthalene	2.2	5.2	12	
Phenanthrene	97	220	440	
Pyrene	620	1200	2000	
<b>Other</b>				
pH	>5 - <9			-
Asbestos	Not present			-

**Notes:**

Criteria suitable for residential with plant uptake land use. This list of contaminants is not exhaustive, should the source of soils suggest additional risks are present suitable criteria should be sought.



# Appendix C

## Discovery Strategy

## DISCOVERY STRATEGY

### DISPLAY AND AWARENESS

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 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 this Discovery Strategy.

### HOW TO IDENTIFY POTENTIAL CONTAMINATED MATERIAL

- Looks oily and has an oily odour.
- Solvent type of odour.
- Man-made materials in fill such as paint cans, car parts, glass fragments.
- Contains fragments of white asbestos sheeting, coal/coke clinker.
- Sand bags, and or/subsurface concrete structures.
- Unusual colour e.g. Blue, red or green.
- Asbestos cement/lagging.

(Examples only – This list is not exhaustive. If in any doubt ask the Site Manager)

### PROCEDURE

If unexpected evidence of contamination is found the following procedures shall be adhered, including:

All site works at the position of the suspected contamination should stop.

Site Personnel to inform the Site Manager/Agent.

Visual and olfactory observations of the condition of the ground and the extent of contamination should be made and notification shall be given to Hydrock Consultants, who will inform the Local Authority within circa 24 hours after discovery. Should the contamination be likely to affect controlled waters the Environment Agency shall also be informed.

In the presence of a suitably qualified geo-environmental engineer on behalf of the Consultant, investigation works shall commence to recover samples for testing and, using visual and olfactory observations of the condition of the ground, delineate the area over which contaminated materials are present.

Should Hydrock deem it appropriate, the affected material may be excavated and placed in a stockpile on a suitable impermeable surface. This should be suitably quarantined with no addition to, or removal of, the stockpile while chemical analysis is being undertaken. Alternatively, the material should remain in situ until laboratory test results have been obtained.

A photographic recorded should also be made of relevant observations.

Hydrock will determine an appropriate testing suite based on visual and olfactory observations.

Test results will be compared against current assessment criteria suitable for the future use of the area of the site affected.

If after testing the ground is found to be contaminated, the Local Authority and NHBC shall be informed. After consultation with the Local Authority, NHBC and if necessary the Environment Agency, materials should either be removed for disposal to a licensed waste management facility or remediated to agreed clean-up criteria.

If the evidence for contamination is severe, as if it leads to pollution of water courses, the Environment Agency shall be informed immediately as an environmental incident (see EA website).

## **UNEXPECTED TANKS**

It is possible that underground tanks, which have not been identified by the investigations to date, may be present. The following procedures are to be adhered to if tanks are identified:

All site works at the position of the tanks should stop.

A description of the tank should be made by Hydrock including; condition and surround, along with visual and olfactory observations should any contents in the tank be apparent. A photographic record should also be made of relevant observations.

The tank's position and depth should be determined and marked on a plan of the site.

Notification shall be given to Hydrock Consultants who will inform the Local Authority within 24 hours.

During the presence of a suitably qualified geo-environmental engineer on behalf of the Consultant, investigation works should be undertaken to obtain samples of any liquid or sludge contents and to establish dimensions of the tank.

Laboratory testing will be determined by Hydrock Consultants based on visual and olfactory observations of the material.

Test results will be compared against current assessment criteria and proposals for disposal of any contents determined in agreement with the appropriate Regulatory Parties.

Emptying the tank and disposal of contents to a suitable licenced disposal facility.

Once the tank has been emptied in accordance with the above proposals, it is to be removed for disposal to a licensed waste management facility. Copies of the relevant waste consignment notes are to be forwarded to Hydrock Consultants.

Excavation and remediation of any contaminated soils in accordance with Section 5.2.

Samples of the base and sides of the resultant hole will be sampled as per the Consultant's instructions and an assessment as to whether this may have been a source for groundwater contamination made.

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 D

# Contractor Requirements

### *Compliance with Legislation and Standards*

The works are to be undertaken in compliance with all relevant British Standards, codes of practice, regulations, guidance and legislation.

Whilst not an exhaustive list, works shall be in compliance with the latest revision of all relevant legislation, HSE Guidelines and good working practice including, but not be limited to, the following:

- The Health and Safety at Work etc. Act 1974;
- Construction Health Safety and Welfare Regulations 1996;
- Health and Safety Executive ‘Protection of Workers and the General Public during Redevelopment of Contaminated Land’ HS (G) 66, HMSO 1991;
- The Construction, Design and Management Regulations 2015;
- The Control of Substances Hazardous to Health Regulations 2002 (COSHH Regulations);
- The Control of Asbestos Regulations, 2012; and
- BS6187:2011 ‘Code of Practice for Full and Partial Demolition’.

The Contractor is responsible for obtaining all necessary approvals, licences, consents and permits from regulatory bodies and third parties prior to commencement.

### *Licences, Permits and Consents*

Any conditions associated planning permission should be addressed prior to carrying out the works.

It will be a requirement of the Contractor to obtain any of the necessary permits and undertake the appropriate notifications and assessments. The Contractor should only expect approvals have been sought by others where explicitly provided to the Contractor or advised in writing by the Client or Hydrock.

If treatment of the soils is to be undertaken (e.g. bioremediation of unexpected contamination), it will need to be undertaken in accordance with an appropriate Environmental Permit.

Any reuse of soils will need to be undertaken in accordance with the “Definition of Waste: Development Industry Code of Practice - Definition of Waste. Development Industry Code of Practice”, Version 2 2011 i.e. in accordance with an approved Materials Management Plan (MMP) and Qualified Person Declaration. The Contractor is responsible for the MMP.

### *Health and Safety Requirements*

The Contractors must manage the risks in accordance with their legal requirements and all works are to be undertaken in compliance with all relevant regulations, guidance and legislation.

A Construction Phase Plan (CPP) will be required to be submitted to the Principal Designer, the Client and the LPA in advance of mobilisation to site.

The CPP will be passed to the Site Manager who will implement all Health and Safety measures on site. The Site Manager will fully induct the Site Operatives prior to commencement of any works. The CPP will be kept as an open document and will be adapted as required to during the project. This will (as a minimum) include:

- welfare arrangements, storage and security;
- air monitoring requirements (and action levels);
- traffic management plan;

- segregation of working areas and site welfare (and decontamination units if required);
- site inductions, daily safety briefings and toolbox talks;
- activity specific risk assessments;
- method statement briefings;
- daily inspection records; and
- permits to work.

During the works it will be necessary to protect the health and safety of the site personnel. General guidance on these matters is given in the Health and Safety Executive (HSE) document 'Protection of Workers and the General Public during the Redevelopment of Contaminated Land' HS (G) 66. In summary, the following measures are suggested to provide a minimum level of protection:

- all ground workers should be issued with protective clothing (including high visibility clothing), hard hats, footwear and gloves, personnel instructed as to how it should be used;
- all personnel shall wear hard hats, high visibility clothing and protective footwear at all times;
- ensure that everyone on site complies with the health and safety plan;
- take reasonable steps to ensure that only authorised persons are allowed on site (or part thereof as the case may be);
- display, where they can be easily read, any notification that has been sent to the Health and Safety Executive;
- hand washing and boot cleaning facilities shall be provided;
- no smoking except in designated areas;
- good practices relating to personal hygiene shall be adopted;
- prepare method statements for construction operations as required by the CDM Co-ordinator; and
- provide the Principal Designer with any other relevant information.

Before site operations are commenced, the necessary COSHH Assessments, Method Statements and Health and Safety Plans should be completed, approved to the Principal Designer's satisfaction and issued in accordance with the CDM Regulations.

The Health and Safety Plan should pay particular attention to the following hazards which may be encountered:

- potentially hazardous or contaminated materials used or encountered on site;
- deep excavations;
- the potential for ground gases and risks on confined spaced entry;
- working in the vicinity of existing underground or overhead services;
- working in confined spaces;
- working on, or in the vicinity of highways;
- working with materials which have the potential to contain asbestos and the risk of inhalation of asbestos fibres;
- manual handling;
- the potential for fire;
- working with electrical apparatus in the vicinity of mobile plant and the potential presence of water;



- poor lighting;
- the potential for falling/slipping/tripping and sustaining injury;
- the possibility for biological agents to be present, including, but not limited to: psittacosis, leptospirosis (Weill's disease), tetanus, legionella, human waste; and
- working in the vicinity of voids and openings.

The Contractor shall take all necessary safety precautions throughout the ground treatment operations and shall comply with the Health and Safety at Work Act 1974 or any subsequent re-enactment thereof.

The Contractor shall submit for approval all necessary method statements to the Client and the Consultant prior to commencing the works.

The Contractor shall provide details of emergency procedures. Emergency services shall be informed of the site operations prior to commencement.

All statutory records to be kept in the site manager's office and these may include (not an exhaustive list and note not all may be required):

- ASB NNLW1 – Notification of non-licensed asbestos work if the work is deemed not be requiring a licence;
- appropriate licence with regards to CAR 1012 if the work is deemed to require a licence;
- HSE Notification F10;
- Pre-construction Information Pack;
- Construction Phase Health and Safety Plan;
- Method Statements and Risk Assessments;
- Environmental Permit deployment form and associated paperwork;
- Discharge Consents for disposal of groundwater;
- competence records (including asbestos awareness training and face-fit test records
- service records;
- plant and machinery maintenance records;
- Duty of Care paperwork.

In addition, if asbestos is found during the demolition works/enablement works, it is recommended that:

- Asbestos Awareness training / briefing to be given to all staff;
- background and ongoing air dust monitoring (to include asbestos) to be undertaken to check for presence of asbestos fibres during the works; and
- licensed asbestos contractors are employed to manage the licensed asbestos controlled areas, all other operatives involved in the operations must have appropriate training to satisfy the requirements of the Control of Asbestos Regulations 2012.

### *Site Establishment and Security*

Prior to the commencement of any works, the Contractor, in conjunction with the Client, shall establish the boundaries of the site and working areas.

The Contractor shall make adequate provision to secure the site boundary and prevent unauthorised access onto the site during the course of the works.

Prior to the commencement of any works, the Contractor, shall undertake a dilapidation survey of all adjacent features/construction including but not limited to boundary walls/ fences, adjacent footpath and road constructions etc. The survey is to be agreed with the Client or their representative prior to commencing any work on site.

The Contractor shall be responsible for all costs associated with rectification of damage to adjacent features/construction including but not limited to boundary walls/ fences, adjacent footpath and road constructions etc. resulting from the demolition works. If damage is not noted on the dilapidation survey (or the dilapidation survey is not undertaken) and damage is later reported, it is the responsibility of the Contractor to rectify.

The Contractor is to provide surveying capability as set out in this document facilitate the above.

Prior to the completion of the works the Contractor is to discuss the continuation of the site security, including the fences, with the client and acceptable arrangements for continued security are to be agreed prior to the removal of the Contractor's security provision.

### *Traffic Safety and Management*

The Contractor shall comply in all respects with Chapter 8 of the Traffic Signs Manual for works on or affected the public highway and/or private roads forming the highway access to/from the site. The Enabling Works Contractor shall obtain all necessary consents from the Local Highway Authority for works on the public highway.

On-site access and haul routes should be provided and maintained by the Contractor in such a manner so as not to endanger either the user, those working in the vicinity of such accesses/haul routes and or the Works.

Access to the site will be agreed with the Client prior to commencement.

Suitable precautions shall be taken to prevent the spread of mud and debris on the public highways. Regular inspections of the public highway adjacent to the site shall be carried out. If deemed necessary by the Contractor, the Client or the Consultant, the highway shall be swept regularly to remove any mud, slurry or dust deposited by vehicles entering or departing the site. If the Consultant considers that significant amounts of any detritus have been deposited on the public highway then operations shall be temporarily suspended until appropriate cleaning operations have been undertaken.

The Contractor is to co-operate with other contractors if they are present during the works.

The proposed works will generate a number of vehicle movements associated with the removal of soils and delivery to site of materials. Consideration should be given to the route and the timing of these vehicle movements, to minimise risk and disturbance to sensitive locations (such as schools, residential areas).

Risks associated with the transport of soils that are potentially containing contaminated, such as dust emission, should be appropriately managed by the Contractor.

### *Welfare Facilities*

Site cabins and welfare facilities will be established at a location to be agreed with the Client.

The Contractor is deemed to have made provision and arrangements for all temporary services associated with the welfare facilities.

### *Working Hours*

Noisy operations i.e. the use of hydraulic breakers shall be restricted to operating times as specified by the Client and by the planning permission.

Prior to commencement the Contractor is to make contact with the Local Authority to establish if any further restrictions apply.

### *Mobile Plant*

Mobiles plant shall be operated by suitably trained and qualified operators experienced for each item of plant. When not in use all plant shall be locked to prevent all plant shall be locked to prevent unauthorised operation.

All traffic entering or working on site shall obey a maximum 10 mph speed limit.

Fuelling of any plant shall be undertaken in a designated area and all above ground fuel storage tanks shall comply with the requirements of the Pollution Prevention Guidelines PPG2.

Specifically, any storage tanks used should:

- be sited within an oil-tight secondary containment system such as an impermeable bund;
- the secondary containment must provide storage for at least 110% of the tanks maximum capacity;
- be located within a secure area; and
- all taps and valves should be fitted with a lock and kept locked shut when not in use.

Maintenance of mobile plant should be undertaken in a designated area, unless absolutely necessary.

Waste oil, hydraulic fluid etc. should not be tipped directly or discharged on to site. Such materials shall be stored separately, in a secure bunded area, for off-site disposal. Waste oil may be a special waste and disposal shall be undertaken by a registered carrier in accordance with the Duty of Care Regulations.

A spill kit shall be kept on site in an accessible place adjacent to the designated refuelling area and used in the event of a spillage or leak.

### *Surveying*

The Contractor shall provide full time surveying personnel and equipment to undertake the following activities and any other requirement for topographical information relating to the project that arises through the duration of the enabling works contract. The survey personnel and equipment should be capable of providing accurate levels and co-ordinates in relation to the national grid and topographical survey provided within 1 day of request.

The following key activities are covered by the requirements for surveying:

- confirmation of topographical survey on possession of the site, and setting out of the site boundary;
- confirmation of positions of existing services and site features;
- surveying the base and extent of all excavations and remaining obstructions (to be undertaken prior to backfilling);
- all setting out and levelling relating to delivery of the enabling works;
- the location of sub-structures removed;

- interim surveys to be undertaken during the infilling works to provide information on issues such as depth of excavation, progress of earthwork, quantities of materials etc.;
- the location and elevation of test samples and locations; and
- as built survey information.

A topographical survey of the site is provided in the Site Information. The Contractor is required to undertake all necessary topographical survey works to verify these levels before the commencement of the contract. Should the Contractor find any discrepancies on the drawings they are to refer the matter to the Client for verification before proceeding with the part of the works affected.

The Contractor shall undertake a topographical survey following completion of the enablement works.

All topographical surveys shall include levels at maximum 10m spacing and details of any features, changes in slope, structures, services and any other features of interest.

All of the above features shall be surveyed for line and level at the site boundary and marked on a plan. Levels shall be to Ordnance Datum and locations to National Grid. The survey shall be calibrated against existing site surveys and benchmarks in the vicinity of the site.

### *Testing*

The Contractor shall be responsible for undertaking all testing necessary to satisfy the Consultant that the works have been carried out in accordance with and comply with the specification.

All soils and chemical testing shall be carried out by a UKAS and MCERTS accredited laboratory, with accreditation for the specific analysis, to the approval of the Consultant. The lowest level of detection shall be used for all testing. The Contractor is to submit to the Consultant the proposed levels of detection for all proposed testing.

The Contractor is to make available on site at all times a file containing all test data received for inspection by the Client or Consultant or Named Representative (NR). The Contractor is to prepare a summary table for presentation with the contractors report detailing test results and associated status.

This summary table will be in Excel format and be updated and sent to the Consultant by 10:00am every Monday. This summary will include an up to date location plan, all samples taken, tests scheduled, laboratory results received and outstanding testing.

### *Offsite Disposal*

Materials for offsite disposal shall be sampled and analysed, by the Contractor, at rates sufficient to allow the material to be adequately categorised.

Material exported from site to landfill, or other appropriately licensed facility, shall be hauled by a registered waste carrier in accordance with the requirements of the Duty of Care Regulations, 1991 and where appropriate the Special Waste Regulations, 1996.

A transfer note shall be completed, signed and retained by all parties involved. The transfer note shall state the volume of waste, the nature of the material and statement to the chemical composition.

The waste transfer notes shall be kept by the Contractor for a period of at least 2 years.

### *Contamination*

Contractors should be made aware of the possibility of encountering contaminants within soils or groundwater at the site (including asbestos) through 'toolbox' talks.

Safe working procedures should be implemented in accordance with CIRIA132 and good standards of personal hygiene should be observed and appropriate levels of PPE provided and utilised.

Eating, drinking and smoking should be strictly prohibited in the development site other than in designated mess areas.

### *The Control of Noise, Vibration and Dust Nuisance*

The Contractor shall comply with the recommendations for practical measures to reduce noise and vibration set out in BS5228-1:2009 and BS5228-2:2009 and with any specific Principal Contractor requirements.

The Contractor shall take all reasonable measures to prevent dust nuisance from being generated by construction traffic, etc.

If necessary, working methods will be altered in order to ensure that the level of noise generated from the works is within published tolerable limits.

The requirements of the LPA are to be sought and undertaken.

### *General*

No fires shall be permitted on site.

### *Dust Mitigation*

Appropriate measures shall be implemented at all times during the demolition and enabling works to minimise any dust emissions.

Any main temporary haul roads shall, where practical to do so, be constructed of crushed hardcore products. The haul roads shall be maintained for the duration of their use to minimise any build-up of loose spoil etc.

Traffic both entering and working on site shall obey a maximum speed limit of 10 mph (unless otherwise agreed).

Mobile water bowsers and sprayers shall be available on site at all times to water unpaved haul roads and working areas. The water spray may include chemical dust suppressants or wetting agents to improve dust control.

Wagons that are to be used for the haulage of any contaminated material from site shall be appropriately sealed or sheeted to prevent the release of fugitive dust.

An adequate supply of water shall be maintained on site at all times to allow for dust suppression activities to be carried out at short notice.

Where mobile water bowsers are not effective in suppressing dust then vapour masts shall be used. Such vapour masts shall be deployed at 20m centres on the downwind side of haul roads or excavations giving rise to significant dust or emissions of odour.

Air quality and dust monitoring stations will be set up and monitored by the Contractor to record the dust concentrations during the works.

With regards to stockpiles:

- stockpiles should be kept to a minimum to reduce ‘wind whip’ causing potentially hazardous material to be blown from the pile;
- stockpiles should be placed on a suitable polythene membrane to prevent any cross contamination and care should be taken not to pierce the sheeting when placing the bulky elements of the material;
- stockpiles should be dampened down or covered to prevent dust, whilst the final choice should be made by the Contractor based on site constraints, but the options include covering with plastic/polythene membrane, or by a layer of clean soil material; and
- the drop distance from excavator bucket to stockpile will be kept as short as reasonably practicable to reduce dust.

### *Odour*

In general terms the excavation works are not considered likely to give rise to any significant odour problems.

If highly odorous materials are encountered, which may give rise to nuisance to neighbouring properties, appropriate vapour masts shall be deployed to provide suitable odour control. Any odorous materials shall be covered at the end of each working day and any stockpiles will be located away from any sensitive areas.

Plant and machinery shall be serviced regularly to ensure that exhaust fumes are compliant with best practice and relevant regulations.

### *Noise*

The requirements of the Local Planning Authority and BS 5228: 1997 ‘Noise and vibration control on construction sites’ shall be adhered to at all times.

All machinery shall be fitted with effective silencers and shall be serviced at regular intervals. No items of plant shall be operated with engine covers raised.

The location of any crushing plant shall take into consideration the location of neighbouring properties and other noise sensitive receptors and shall be located away from these areas and located adjacent to proposed stockpile locations where possible.

### *Asbestos in Soils*

The Contractor for each stage of works must manage the risks in accordance with their legal requirements and will need to prepare appropriate health and safety documentation and obtain appropriate approvals, licences, consents and permits prior to commencement.

The remediation works are designed to break the source-pathway-receptor linkage with regards to contaminants within the soil. Whilst appropriate measures are required for all contaminants present, the Contractor should note the additional details provided below with regards to asbestos in the soils:

- Asbestos is a hazard to Human Health when airborne fibres are inhaled. Asbestos containing material (ACM) that is in a bound form (such as asbestos cement tiles) is a low risk where the asbestos fibres cannot become airborne. However, if lagging is present or the ACM is broken or crumbled in a dry condition the asbestos fibres could become airborne and could then be inhaled. When soil with asbestos is covered by hardstanding, buildings or a cover of clean soil or when the

soil is kept damp, the asbestos fibres are less likely to become airborne and the risk is greatly reduced.

- The Health and Safety at Work Act 1974 forms the basis of health and safety legislation in the UK. In addition, the Control of Asbestos Regulations 2012 (CAR 2012) applies throughout the UK. CAR 2012 applies if land has significant asbestos content and is relevant to any work conducted on asbestos contaminated land.
- CAR 2012 defines a 'control limit' of 0.1 fibres per cubic centimetre of air averaged over a continuous period of 4 hours. This limit is not risk based and may be much higher than the levels for control of environmental pollution.
- CAR 2012 applies even where exposure to asbestos of employees is sporadic and of low intensity and where exposure to asbestos of any employee will not exceed the control limit. In addition, the work must be of short non-continuous activities where non-friable materials are handled, or removal without deterioration of non-degraded materials in which asbestos fibres are firmly linked in a matrix.
- Lagging, broken fragments of asbestos and loose fibres have the potential to release airborne fibres in dry conditions. In addition, as the ACM and asbestos fibres have been contained in the soil for many years, the likelihood is that they would be degraded to some extent. However, if the asbestos fibres detected at the site are within a soil matrix and if this is kept damp, this should assist in minimising the risk of the release of airborne fibres.
- Given the above factors, it is possible that the works being undertaken would not be exempt from CAR 2012 licensing requirements and it is the Contractors responsibility to assess the licencing position.
- It should be noted that information presented in this document is provided to assist in managing the soil at the site which contains asbestos. Hydrock cannot be held responsible for how the control measures associated with these risks are implemented and recommend that an appropriate asbestos specialist assist with both the preparation of documents and licences and site supervision.

Task specific risk assessments and method statements should be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate PPE and if required RPE should be provided and utilised.

Visible fragments of suspected asbestos containing materials on the site surface should be handpicked. If hand picking is being undertaken it needs to be undertaken in accordance with and Environmental Permit and ACM shall be placed in a dedicated covered and lockable skip pending off-site disposal to a suitably licensed facility. Such remediation measures will be undertaken by suitably qualified contractors and in accordance with CAR 2012.

### *Water Quality Controls*

The Contractor shall provide for such measures as may be necessary to ensure that water, whether ground water, from precipitation or any other source does not accumulate in excavations or on sub-grades.

Adequate drainage sumps will be installed during works and cut off trenches/dewatering measures will be used as required to manage surface water run-off, to prevent any water from entering watercourses, either directly as surface water run-off, or indirectly via the surface water drainage systems.

If materials escape, appropriate the Contractor is to undertake (at their cost) appropriate remedial action as soon as possible.

### *Services*

Service records are to be provided by the Client for information purposes within the enabling works documentation. However, the Contractor shall be responsible for liaison with the statutory service providers to ensure all service records are current and correct. The Contractor is also responsible for the safe disconnection of existing services entering the site, except those which are to remain operational.

Prior to site work commencing, the position of all services indicated as on site or offsite but close to the site boundary shall be determined and clearly identified where on site. The locations should be confirmed on site by appropriate investigation, observations and survey. Any discrepancies between the anticipated positions and confirmed locations are to be reported to the Client.

All retained manholes should be located and clearly identified on site to prevent damage. The location, depth, diameter and invert level of each manhole and the size and depth of all stream connections shall be recorded. Where drains or sewers are to be grubbed up the downstream ends should be plugged prior to commencement to prevent offsite systems becoming blocked or contaminated.

Where existing drains or sewers are to remain, CCTV surveys are to be provided by the contractor. These surveys must be undertaken on commencement prior to any physical work and on completion to demonstrate no damage has occurred.

Where damage has occurred, any remedial work must be agreed with the Client and relevant authority/owner prior to repairs commencing. The repair costs will be borne by the contractor.

All services on site that are to be retained through the works are to be positively located on site, reliance shall not be placed on existing records. Services are to be visibly marked and protected for the duration of the works. Appropriate methods are to be put in place to ensure all site staff working in the vicinity of retained services are fully briefed.

The Contractor is responsible for ensuring that all hydrant covers, stop tap boxes manhole covers and the like are raised or lowered to suit the finished levels associated with the proposed enabling works plateaus and future construction thicknesses.

Following the completion of the works, a survey plan of the location of terminated services is to be provided.

### *Damage to Property*

All works are to be undertaken in accordance with the Party Wall etc. Act 1996.

The Contractor shall ensure that all precautions are taken in order to avoid any damage to existing property arising from the Works and shall be responsible for same in the event that any damage should arise from his failure to exercise due care.

Any adjacent structures, services and the like shall be inspected prior to commencement of the Works for evidence of existing defects and, if necessary, a dilapidation survey shall be carried out by the contractor, with the agreement of the Client, prior to works commencing on site. A re-inspection shall take place on completion of the Contract to verify that no damage or deterioration of the said structure, service or apparatus has occurred as a result of the Works. A schedule of the findings of this re-inspection shall be circulated to all parties concerned for their records.

The Contractor shall execute the works with care so as to avoid damage to existing structures and drains or other services to be retained.



All fences, trees, paths, shrubs, grassed areas and other surfaces required to be retained shall be protected by the Contractor from spillage and damage caused by site operations and upon completion of the works they shall be handed over in an undamaged and proper state to the satisfaction of the Client.

Refer to landscape architect drawings and specifications that define the areas that require protection. The Contractor shall not raise or lower the ground level beneath the spread of the branches of any tree to be retained without the approval of the Client.

#### *Drawings and Supplied Information*

Whilst efforts have been made to ensure that the information provided to the Contractor is correct and current, the Contractor is responsible for corroborating the existing information with the benefit of their site presence and to report any discrepancies encountered or anticipated to the Client immediately.

Where cutting and filling operations are to be carried out the Contractor is to undertake comparative assessments with the benefit of existing information, additional survey and their anticipated sequence of work to ensure sufficient and suitable material is available to undertake the works as proposed. Any anticipated shortfall or surplus is to be report immediately.

#### *Photographs*

A detailed dilapidation survey shall be undertaken of the site and adjacent properties including joint site boundaries, in conjunction with adjacent land owners.

Such survey shall include (but not be limited to) roads, footpaths, street lighting and road signs. A copy of the survey, including record photographs shall be provided to the Client within seven days of commencement of site works.

The Contractor is to provide on-site a digital camera and e-mail facilities to enable electronic transfer of site photographs and other information for the full duration of the contract.

Progress photographs are to be taken at least weekly across all parts of the site for inclusion within the contractor's report. Photographs are to be made available to the Consultant and the Client in electronic format should they be requested during the contract. Record photographs should be provided as part of the validation information.

## Appendix E

# Clean Cover System Calculation

# Design Chart

- $C_c = 0.00 - 0.25 \times$  Trigger levels
  - $C_c = 0.25 - 0.50 \times$  Trigger levels
  - $C_c = 0.50 - 0.75 \times$  Trigger levels
  - $C_c = 0.75 - 1.00 \times$  Trigger levels
  - ▲ Target Guideline Value 2
  - ▲ Target Guideline Value 1
- If site specific data falls in shaded area consideration should be given to the applicability of using a cover system

