



GLP LTD AND BARRATT HOMES

Cowm Top, Castleton

Soils and Agricultural Land Classification

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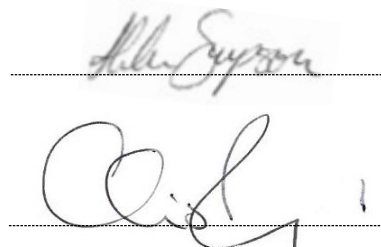
April 2021

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1 INTRODUCTION

1.1 Background

- 1.1.1 Wardell Armstrong LLP (WA) has been commissioned by GLP Ltd and Barratt Homes to undertake a detailed Soil and Agricultural Land Classification (ALC) survey on the agricultural land within a 22 ha site at Cowm Top, Castleton, Rochdale to support the Outline Planning Application for a proposed residential development.

1.2 Site description

- 1.2.1 Cowm Top, Castleton, Rochdale (thereafter referred to as the 'Site') is located within the administrative area of Rochdale Borough Council and lies to the south east of Castleton, at approximate central grid reference SD 891 102. The Site covers an area of approximately 22 ha. To the North it is bordered by Cripple Gate Lane with existing industrial development beyond; to the East by the A627(M); to the South by a number of small reservoirs, and industrial buildings with the M62 beyond; and to the West by existing residential development, see Drawing NT14720-002.
- 1.2.2 The buildings associated with Trows Farm, its access road and land used for vehicle storage to the Southwest; and a proposed access to the North, are included in the Site boundary and are classed as non-agricultural.
- 1.2.3 The agricultural land within the Site comprises a number of small fields and is characterised by an undulating topography with considerable differences in elevation occurring within relatively short distances (Photograph 1). The majority of the Site is in unimproved grassland, with an area to the Southwest being used for grazing horses at the time of the survey. Wet areas dominated by rush vegetation are located to the centre and centre east of the Site; and small streams were evident at the base of 'valley' features. Areas of scrub and gappy hedgerows are also present within the Site.
- 1.2.4 The soil profile across large areas of the Site is classified as 'disturbed' due to the presence of non-naturally occurring / anthropogenic materials such as brick, ceramics and glass; which are randomly distributed throughout the profile and do not occur in a distinct layer. These soils are denoted (d) on the soil resource plan presented as Drawing NT14720/003. There is anecdotal evidence from the current landowner (*pers. comm.*) regarding the presence of historic, capped landfill sites / tips to the West of the Site; however, it is noted that these disturbed soils are present across the whole Site.

- 1.2.5 Additionally, discrete areas of ‘surface tipping’ of wastes are present within the Site, as illustrated in Photograph 2 and Photograph 3 and shown on Drawing NT14720/002. These areas were clearly visible during the survey due to the poor vegetation cover and erosion features; and comprised a surface layer (approximately 20 to 30 cm thick) of organic material mixed with anthropogenic materials such as brick, concrete, metals and glass. The largest of these areas was recorded to the North of the Site, it is visible on aerial mapping and measures approximately 20 m by 20 m. The visible areas of surface tipping to the East of the Site were smaller, measuring approximately 1 m by 1m. Where these areas occur to the East of the Site the underlying soil profile appears to be undisturbed, however a disturbed soil profile was surveyed close to the Northern area.



Photograph 1: View across the Site looking West to East



Photographs 2 and 3: Areas of surface tipping of wastes (locations shown in Drawing NT14720-002)

1.3 Definitions

- 1.3.1 The **Agricultural Land Classification (ALC)** was devised by MAFF (1988)¹ and is the standard method for determining the quality of agricultural land in England and Wales according to its versatility, productivity and workability, based upon inter-related parameters including climate, relief, soil characteristics and drainage; i.e. ALC assesses land quality based upon the type and level of agricultural production the land can potentially support. The ALC places land into one of five grades: Grade 1 (excellent); Grade 2 (very good); Grade 3 (good to moderate) which is divided into Subgrades 3a (good) and 3b (moderate); Grade 4 (poor); and Grade 5 (very poor).
- 1.3.2 **Best and most versatile (BMV)** agricultural land is defined as land of excellent to good agricultural quality (ALC Grades 1, 2 and Subgrade 3a) and is afforded a degree of protection in the National Planning Policy Framework (NPPF), 2019².
- 1.3.3 **Soil series** are the lowest category in the soil classification system and are precisely defined based upon particle-size distribution, parent material (substrate) type, colour and mineralogical characteristics. **Soil Associations** are groupings of related soil series.

¹ MAFF (1988). The Agricultural Land Classification (ALC) of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land.

² Ministry of Housing, Communities and Local Government (2018). National Planning Policy Framework (NPPF). Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf

2 POLICY AND GUIDANCE

2.1 National Planning Policy

2.1.1 Under Section 15 of the NPPF: Conserving and enhancing the natural environment, Paragraph 170 states that planning policies and decisions should contribute to and enhance the natural and local environment by:

- a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);
- b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;
- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and
- f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

2.1.2 The footnote to Paragraph 171 also states that ‘Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality’.

2.1.3 The Planning Practice Guidance (PPG) which accompanies the NPPF is split into a number of guidance notes. Guidance on soils and agricultural land is found in the Planning Practice Guidance for the Natural Environment 2019 (PPGNE)³ under the heading Agricultural Land, Soil and Brownfield Land of Environmental Value. This advises that the Agricultural Land Classification (ALC) be used to assess the quality of farmland to enable informed choices to be made about its future use within the planning system; and explains that the ALC places agricultural land into five Grades with Grade 3 subdivided into 3a and 3b. The best and most versatile (BMV) land is

³ Planning Practice Guidance for the Natural Environment 2019 (PPGNE) Available at: <https://www.gov.uk/guidance/natural-environment>

defined as Grades 1, 2 and 3a. The PPGNE states that ‘Planning policies and decisions should take account of the economic and other benefits of the best and most versatile agricultural land’.

- 2.1.4 The PPGNE goes on to state that ‘In the circumstances set out in Schedule 4 paragraph (y) of the Development Management Procedure Order 2015, Natural England is a statutory consultee: a local planning authority must consult Natural England before granting planning permission for large-scale non-agricultural development on best and most versatile land that is not in accord with the development plan’ and refers to Natural England guidance to assessing development proposals on agricultural land, 2018.
- 2.1.5 Therefore, knowledge of the ALC grading of the Site, is necessary to be able to determine whether the requirements of planning policy are being met.
- 2.1.6 The PPGNE also recognises soil as an essential natural capital asset that provides important ecosystem services, for example as a growing medium for food, timber and other crops, as a store for carbon and water, as a reservoir of biodiversity and as a buffer against pollution. It also recommends Defra’s Code of Practice for the Sustainable Use of Soils on Construction Sites as a useful tool when setting planning conditions for development sites, as it provides advice on the use and protection of soil in construction projects, including the movement and management of soil resources.

2.2 Local Planning Policy

- 2.2.1 Policy E6 of the Rochdale Core Strategy⁴: ‘Supporting and diversifying the rural economy’, seeks to *“support development outside the urban area... where it is in accordance with national Green Belt and local protected land policy”* and it: *“does not result in the loss of agricultural land, particularly the best (Grade 3a and above), unless there is an overriding strategic need for development and no appropriate land exists elsewhere.”*

⁴ Rochdale Borough Council (2018) Rochdale Core Strategy Adopted October 2016 <http://www.rochdale.gov.uk/pdf/2018-04-05-rochdale-core-strategy-v1.pdf>. (Accessed: 24/02/2021).

2.3 Guidance

- 2.3.1 Natural England Technical Information Note 49 (TIN049)⁵, promotes the use of ALC for assessing the quality of agricultural land, to ensure informed choices are made about its future use within the planning system. It advocates the use of soil survey to inform environmental assessment. TIN049 states that where development is proposed on agricultural or other potential crop producing land, if that development is not for agricultural purposes and is not in accordance with the provisions of a development plan, and involves the direct or cumulative loss of more than 20 ha of BMV agricultural land, Natural England must be consulted in accordance with the Schedule 4, paragraph (y) of the Statutory Instrument 2015 No. 595⁶.

3 METHODOLOGY

3.1 Desk Study

- 3.1.1 Information about the soils and agricultural land present on the Site was obtained from the following published sources:

- MAFF (1993). 1:250,000 'Provisional Agricultural Land Classification Sheet, London and the South East'.
- Met Office (1989) Climatological Data for Agricultural Land Classification (ALC): Grid point datasets of climatic variables at 5 km intervals for England and Wales.
- Soil Survey of England and Wales (1984) Soils and their Use in Northern England, with accompanying 1: 250,000 map, Sheet 1.
- OS (2021) Terrain 5 Digital Terrain Modelling⁷

3.2 Site Survey

- 3.2.1 A detailed soil survey was undertaken on the 17th and 18th February 2021 by a competent soil surveyor using augered soil cores and soil profile pits. Auger cores were taken using a 70 mm diameter hand-held Edelman auger, capable of sampling to a maximum depth of 120 cm; the soil profile pits were excavated, using a spade, to a maximum depth of approximately 53 cm, sufficient to evaluate the full soil profile.

⁵ Natural England (2012). Technical Information Note 049, 'Agricultural Land Classification: protecting the Best and Most Versatile agricultural land'.

⁶ Statutory Instrument 2015 No. 595, The Town and Country Planning (Development Management Procedure) (England) Order 2015, Schedule 4, Part (y).

⁷ OS Terrain 5 Available at: <https://www.ordnancesurvey.co.uk/business-government/products/terrain-5>

3.2.2 A total of 23 cores and two pits were inspected. As shown on Drawing NT14720-001, the survey points were distributed evenly across the Site giving a survey density of approximately one point per hectare, as per recommendations set out in standard survey and ALC guidance and methodology⁸. The purpose of the survey was to provide details of soil profile characteristics and to inform the ALC assessment.

3.2.3 To confirm the soil texture across the Site, four soil samples were sent for analysis of particle size distribution by NRM Laboratories, accredited by UKAS to the internationally recognised standard for competence; ISO/IEC 17025.

4 DESK STUDY

4.1 Soils

4.1.1 The scale of the Soil Survey of England and Wales (1984) mapping is such that it is not accurate to the field level and does not pick up small-scale local variations in soil type. It does however provide a general indication of the soil types within the Site and the wider Borough.

4.1.2 The Soil Survey of England and Wales (1984) indicates there are two soil types present within the Site. The deep well drained sandy and coarse loamy soils of the Newport 1 (551d) soil association are mapped as covering approximately 75% of the Site; with soils to the West of the Site being classified as unsurveyed (U), which typically denotes soils believed to be urban or industrial in nature. This 'unsurveyed' classification fits with the anecdotal evidence of former landfill to the West of the Site.

4.1.3 A summary of the characteristics of these soils are provided in Table 4.1.

Table 4.1: The Soil Associations based on the Soil Survey of England and Wales (1984)*.	
Soil Association	Newport 1 (551d)
Soil Series	Newport, Wick, Blackwood, Rudge
Soil characteristic	Deep well drained sandy and coarse loamy soils. Some sandy soils affected by groundwater. Risk of wind and water erosion.
Soil Water Regime	Free drainage and summer droughtiness are the outstanding features of most of this land. Only the wettest areas are free of drought in most summers. Drainage is not necessary except in low-lying areas where the Blackwood series dominates. Newport soils are well drained (Wetness Class I). Waterlogging in the Blackwood series depends on drainage and climate. Where drained they are usually Wetness Class I, but in Lancashire, where agriculture is less intensive and there is no underdrainage, these soils remain seasonally waterlogged (Wetness Class III or IV).
Erodibility*	Very high risk from water and wind

⁸ Natural England (2012) Agricultural Land Classification; protecting the Best and Most Versatile agricultural land. Available at <http://publications.naturalengland.org.uk/file/4424325> (Accessed: 19/02/2021)

Table 4.1: The Soil Associations based on the Soil Survey of England and Wales (1984)*.

Soil Association	Unsurveyed (U)
Soil Series	NA
Soil characteristic	Not surveyed, typically urban or industrial areas.
Soil Water Regime	Unknown
Erodibility*	NA
*Soil Survey of England and Wales (1984) Soils and their Use in South East England, with accompanying 1: 250,000 map, Sheet 1. *Taken from Knox <i>et al.</i> (2015)⁹ NA – Not Applicable	

4.2 Agricultural Land Classification

4.2.1 The Provisional 1:250,000 ALC mapping indicates that agricultural land within the Site is ALC Grade 4 (poor quality). However, as with the soils data, the scale of the mapping is not accurate at the field level as it does not pick up variations in ALC grade for areas less than approximately 80 ha. However, it does provide an indication of the predominant ALC grading in the wider area.

4.2.2 No detailed published survey data are available for the Site or within close proximity to it.

4.3 Aerial Imagery and Ordnance Survey Mapping

4.3.1 The most recent aerial images display some visual clues to soil constraints to agricultural practice or development, including waterlogging, signs of poor vegetation growth and indications of disturbed areas, including the areas of surface tipping described previously.

4.3.2 The Ordnance Survey mapping indicates that the Site has a varying elevation, ranging from 141m to 184m AOD; with large changes in elevation occurring over relatively short distances resulting in steep slopes.

4.3.3 LiDAR mapping (Plate 1) further identifies the spatial distribution of the elevation across the Site, with the lowest elevation detected in the centre of the Site where a stream and marshy area were identified.

4.3.4 OS Terrain 5⁷ digital terrain modelling was used to quantify the slope across the Site. Slope gradient was identified to vary from 0° to >18° The ALC grading of the Site is

⁹ Knox et al., (2015). Research to Develop the Evidence Base on Soil Erosion and Water Use in Agriculture: Final Technical Report

therefore considered to be impacted by micro-topography, with gradient posing limitations to the use of agricultural machinery.

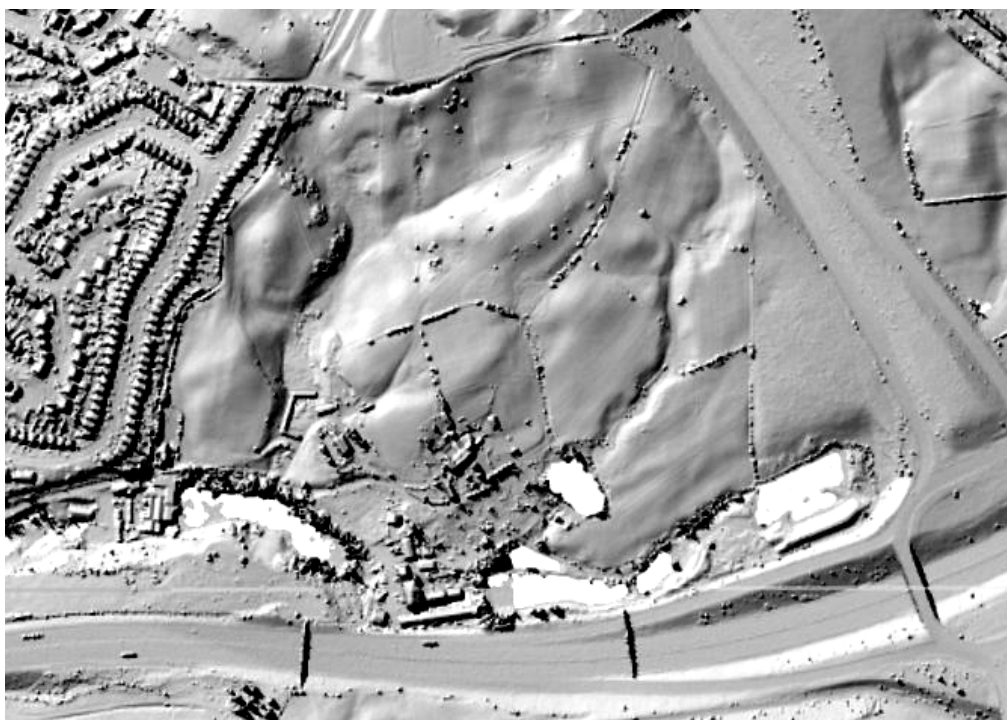


Plate 1: LiDAR mapping of the Site (Lidar Finder, 2021¹⁰)

5 SITE SURVEY

5.1 Soils

5.1.1 The soil profiles observed across the Site varied from granular to cohesive, with some areas of disturbed soils identified, as described above in paragraph 1.2.4. Four main soil types were identified across the Site, as listed in Table 5.1. The full soil survey record is presented as Appendix 1 and the geographical distribution of soil types is presented in Drawing NT14720/003.

Table 5.1: Soil types and locations on the Site			
Soil Type	General Topsoil Description	General Subsoil Description	Sample Locations
Type 1	Black to very dark greyish brown (10YR 2/1 to 10YR 3/2), stoneless medium sandy loam. Weak fine subangular blocky structure, with a loose consistency.	Brown to reddish yellow (10YR 4/3 to 7.5YR 6/6), stoneless medium sand. Occasional ochreous and pale mottles (10YR 6/6 to 7.5YR 7/4 and 7.5YR 8/3). Weak fine subangular blocky structure, with a firm consistency. Some variation was noted.	Cores 6, 12, 14, 15, 16, 17, 20. Pit 1 and 2

¹⁰ LiDAR Finder (2021) Available at: <https://www.lidarfinder.com/>. Accessed: 25/02/2021.

Table 5.1: Soil types and locations on the Site			
Soil Type	General Topsoil Description	General Subsoil Description	Sample Locations
Type 1 (d)	Disturbed black (10YR 2/1), medium sandy loam with coal fragments. Weak medium subangular blocky structure with very friable consistency.	Red (7.5YR 5/6), stoneless medium sand with a few greyish (7.5YR 4/2) mottles. Single grain structure with loose consistency. Some variation was noted.	Cores 1, 7, 10, 13, 18, 21
Type 2	Black to dark greyish brown (10YR 2/1 to 10YR 4/2), medium sandy loam. Weak medium subangular blocky structure with very friable consistency.	Light red to weak red (7.5YR 6/6 to 7.5YR 4/4), stoneless sandy clay loam with occasional ochreous and pale mottles (10YR 6/6 and 7.5YR 6/8). Moderate medium to coarse subangular blocky structure with friable to firm consistency. Some variation was noted.	Cores 2, 3, 5, 8, 11, 22
Type 3 (d)	Disturbed very dark greyish brown to dark greyish brown (10YR 3/2 to 10YR 4/2) stoneless heavy silty clay loam or medium clay loam. Weak medium subangular blocky structure, with firm consistency.	Disturbed light yellowish brown, brownish yellow to weak red (10YR 6/2, 10YR 6/4 to 7.5YR 4/2) slightly stony sandy clay with coal fragments. Moderate medium prismatic to massive structure, with friable to firm consistency. Some variation was noted.	Cores 4, 19, 23

- 5.1.2 The majority of soils within the Site comprise medium sandy loam topsoil over sand (Type 1). Approximately two thirds of the Site is recorded as either Type 1 or the disturbed version of this soil type (Type 1(d)) (Drawing NT14720/003). Approximately one third of the Site is the undisturbed version and a further third is the disturbed version (Table 5.1). As described previously (paragraph 1.2.4) the disturbed soils contain anthropogenic materials such as brick, ceramics and glass; which are randomly distributed throughout the profile and do not occur in a distinct layer.
- 5.1.3 Areas of lower elevation, identified to have higher groundwater (often coinciding with rush-dominated vegetation cover) were mainly recorded as Type 2, medium sandy loam topsoil over a cohesive, sandy clay loam subsoil (Table 5.1 and Photograph 6).
- 5.1.4 Type 3(d) soils comprised heavy silty clay loam or medium clay loam topsoils over sandy clay subsoils. These soils were classified as 'disturbed' due to the presence of coal fragments at an approximate depth of 50 to 60 cm (Photograph 7); other materials such as brick were also present to a depth of approximately 80 cm in some cores. The coal / anthropogenic materials were unevenly distributed within the profile and not in distinct layers or bands. These soils were recorded to the North and

Southeast of the Site; with the Northern sample point being in close proximity to an area of surface tipped wastes.

5.1.5 The NRM laboratory results for soil texture are presented in Appendix 3, the laboratory data confirmed the soil textures determined in the field.



Photograph 4: Showing soil profile for Type 1 soils (Auger Core 6). (Scale in decimeters).



Photograph 5: Showing soil profile for Type 1(d) soils (Auger Core 1). (Scale in decimeters).



Photograph 6: Showing soil profile for Type 2 soils (Auger Core 11). (Scale in decimeters).



Photograph 7: Showing soil profile for Type 3(d) soils (Auger Core 4). (Scale in decimeters).

5.2 Agroclimatic data

5.2.1 Agroclimatic data was taken from the nearest meteorological stations and interpolated to obtain site-specific values (Table 5.2). This was then used to establish

whether the agricultural land quality of the Site is limited by climate and, in conjunction with soil profile characteristics, wetness and droughtiness. It was found that the climate poses a limitation to the ALC on Site, restricting the Site to Grade 3a.

Table 5.2: Interpolated agroclimatic data for the Site	
Average annual rainfall (mm)	1083
Accumulated Temperature (°C)	1253
Field Capacity Duration (FCD) (days)	249
Moisture Deficit Wheat (mm)	58.6
Moisture Deficit Potatoes (mm)	36.6

5.3 Direct ALC limitations

5.3.1 This section summarises the limitations present at the Site (for the assessment of each survey point refer to Appendix 1).

5.3.2 Across the Site there are areas of land which are identified as being limited to Grade 5 due to slope gradients greater than 18° (Drawing NT15201-004; identified using OS Terrain 5⁷ data modelling).

5.3.3 There is no further limitation to land quality due to topsoil texture, soil stone content, soil depth or flood risk (summer and winter).

5.4 Interactive ALC limitations

5.4.1 Droughtiness poses a limitation to the agricultural land quality for a number of the Type 1 soil survey points, limiting the ALC to Grade 2, in these areas of the Site (Appendix 2).

5.4.2 Wetness poses a limitation to the agricultural land quality, with the combination of 249 Field Capacity Days, varying topsoil textures (including medium sandy loam and medium clay loam) and Wetness Class I through to IV resulting in Grade 2, Subgrade 3b and isolated points of Grade 4 limitations across the Site.

5.4.3 Pattern effect

5.4.4 Overall, the Site is recorded as exhibiting changes in soil properties, elevation and depth to groundwater table over short distances within the Site boundary.

5.4.5 During the soil survey, a mosaic of soils with different textures and wetness classes were noted, with some areas impacted by anthropogenic sources (Drawing NT14720-002).

5.4.6 The micro-relief across the Site restricts the use of machinery, with streams noted in the base of the valleys and slopes measured between 0° and >18°.

5.4.7 In addition, areas with a high groundwater table were noted across the Site, mainly within the low-lying areas, where rush vegetation dominated.

5.4.8 Therefore, due to the high variability of direct and indirect limitations across the Site, it is considered there is a 'pattern' limitation on the Site, limiting the overall Site ALC Grade to **Grade 4**; with **Grade 5** recorded in discrete areas where slope gradients are greater than 18° (Drawing NT14720/04).

5.5 Overall ALC

5.5.1 The majority of the agricultural land within the Site is Grade 4, with small discrete areas of Grade 5, limited by slope also identified. Therefore, all agricultural land within the Site is classified as non-BMV agricultural land; comprising the two lowest Grades in the ALC classification system. A summary of the ALC characteristics is provided in Table 5.3 and the geographical distribution of ALC grading within the Site is shown in Drawing NT14720-004.

Table 5.3: Summary of ALC at the Site		
ALC or other land category	Area (ha)	Percentage (%)
Grade 1 (excellent)	0.0	0
Grade 2 (very good)	0.0	0
Subgrade 3a (good)	0.0	0
Subgrade 3b (moderate)	0.0	0
Grade 4 (poor)	20.24	92
Grade 5 (very poor)	0.65	3
Non-agricultural	1.11	5
Total	22.0	100%

6 SUMMARY AND CONCLUSIONS

6.1.1 The majority of the soils on Site are stoneless medium sandy loam over medium sand soils (Type 1 Soils and disturbed Type 1 (d) Soils). Other soils recorded on Site include Type 2 Soils; stoneless medium sandy loam over sandy clay loam soils and Type 3(d) Soils; disturbed stoneless heavy silty clay loam or medium clay loam over disturbed sandy clay with coal fragments.

6.1.2 The sandy nature of the soils present within the Site means that they are highly vulnerable to erosion from water and wind. Therefore, site-appropriate standard soil handling and management measures, such as those described in Defra's Code of

practice for the sustainable use of soils on construction sites¹¹ (as referenced in the PPGNE) are vital in ensuring that these soils are protected from damage and loss. Application of such measures will ensure that the soils within the Site remain at an appropriate quality to allow their reuse either on Site (in gardens and areas of landscaping and public open space) or elsewhere; promoting the sustainable reuse of this important finite resource as prescribed in planning policy. Such measures may include, but are not limited to:

- the handling of soil resources only when sufficiently dry to prevent compaction and damage to soil structure;
- the stripping, handling, storage and transportation of topsoil separately from subsoil;
- appropriate seeding of soil storage mounds if required for a period longer than six months, to prevent erosion and to maintain soil structure, nutrient content and biological activity;
- the wetting down of soil storage mounds on dry windy days if erosion is noted or, in more severe cases, the ‘capping’ of mounds with a protective erosion control fabric;
- de-compacting of the subsoil before topsoil re-instatement; and
- minimising the number of machine movements across topsoil to reduce compaction and retain soil structure.

6.1.3 It is noted that although vulnerable to erosion, the permeable nature of sandy soils means that their drainage characteristics relatively easily maintained upon reinstatement.

6.1.4 The disturbed soils may require screening to remove inclusions such as brick and glass in order to make them suitable for reuse.

6.1.5 The surfaced tipped materials are not soils and are not suitable for reuse within the Site.

6.1.6 The Provisional ALC data identifies all land within the Site as Grade 4, however as explained in paragraph 4.2.1, this mapping is not accurate at the field level.

¹¹ Defra (2009). Code of practice for the sustainable use of soils on construction sites. Available at: <https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites> (Accessed 20/03/2021)

- 6.1.7 The detailed (field scale) survey showed ALC grading across the Site to primarily be Grade 4 (poor quality); with the limitation to agricultural land quality being 'pattern' due to high variability within soil textures, micro-relief and groundwater table height across the Site. Small areas of Grade 5 (very poor quality) were also identified across the Site, with slope limitations to agricultural land quality in these areas. Consequently, all c. 20.89 ha of agricultural land within the Site is of non-BMV quality comprising the two lowest gradings in the ALC classification system. Development of the Site therefore fits the requirements of planning policy in relation to development on agricultural land. Furthermore, there is also opportunity to focus some development onto areas of non-agricultural land (1.1 ha).
- 6.1.8 The Site is also considered to be a logical extension of the existing commercial and residential development in the area. Development at the Site would therefore maximise the use of existing infrastructure and potentially prevent the development of more isolated and potentially higher quality agricultural land elsewhere in the Borough.

Appendix 1 Soil Survey Record

APPENDIX 1: Soil Survey Record and Overall ALC

Legend of non-self-explanatory terms used within the Soil Profile Descriptions and ALC tables below:

Horizons - number of different horizons identified within the profile

Type - type of sample, auger core or hand dug soil profile pit (dug using a spade)

Depth - depth to the bottom of the (horizon number) horizon in cm

Texture – Soil Texture is denoted by standard nomenclature and describes the proportion of sand, silt and clay sized particles that make up the mineral fraction of the soil.

- C - clay,
- ZC - silty clay,
- SC - sandy clay,
- CL - clay loam,
- SCL - sandy clay loam,
- ZCL - silty clay loam,
- SL - sandy loam,
- LS - loamy sand,
- S – sand,
- O - organic,
- P - peat or peaty,
- HP - humified (highly decomposed peat),
- FP - fibrous peat,
- SFP - semi-fibrous peat and
- MZ - marine light silts

CL and ZCL textures are subdivided into medium (M) and heavy (H) classes according to clay content, as follows: M medium (less than 27 % clay), H heavy (27-35 % clay);

S, LS, SL, and SZL textures are subdivided into fine (F), medium (M) and coarse (C) classes

Matrix (main) colour - dominant colour of the soil. This is determined using the Munsell colour chart and has three components

- **Hue** - Munsell colour hue
- **Value** - Munsell colour value
- **Chroma** - Munsell colour chroma

Mottling - spots and blotches of different colour than the dominant matrix colour, caused by periodic waterlogging (anaerobic soil conditions). Abundance and colour (using Munsell colour chart) recorded.

Ped faces - surfaces of the primary soil fragments into which the soil naturally breaks up upon excavating. Colour of face recorded if different from matrix (main) soil colour.

FeMn - ferri-manganiferous concentrations

Biopores - voids in the soil which were formed by the activity of soil life. Recorded as 'yes' if >0.5 % biopores greater than 0.5 mm diameter are present (by area)

Stones: the following are recorded

- **Stones > 2 cm up to %** - maximum percentage of 2 - 6 cm diameter stones;
- **Stones > 6 cm up to %** - maximum percentage of > 6 cm diameter stones
- **Type** of stone
 - o H - All hard rocks or stones (those which cannot be scratched with a finger nail);
 - o SS - Soft, medium or coarse grained sandstones;
 - o SIM - Soft 'weathered' igneous or metamorphic rocks or stones;
 - o SL - Soft oolitic or dolomitic limestones;
 - o SFS - Soft fine-grained sandstones;
 - o SAZ - Soft, argillaceous or silty rocks or stones;
 - o CH - Chalk or chalk stones;
 - o GRH - Gravel¹ with non-porous (hard) stones;
 - o GRS - Gravel¹ with porous stones (mainly soft stone types listed);

¹ - Gravel with at least 70% rounded stones by volume

Soil Structure: the following are recorded

- **Type** - Soil structure describes the arrangement of the solid parts of the soil and of the pore space located between them. It is determined by how individual soil granules clump, bind together, and aggregate, resulting in the arrangement of soil pores between them
 - o SG - single grain;
 - o GR - granular;
 - o SAB - subangular blocky;
 - o AB - angular blocky;
 - o PR - prismatic;
 - o PL - platy;
 - o MAS - massive
- **Development (Dev)** - how well the structure is developed
 - o W - weak;
 - o M - moderate;
 - o S – strong

Consistence - Soil consistence (strength);

- L - loose;
- VFR - very friable;
- FR - friable;
- FIR - firm;
- VFIR - very firm;
- EXFIR - extremely firm;
- EXHD - extremely hard

Gleying - Gleying occurs in areas devoid of oxygen when the soil is waterlogged. The resulting mottling (spots or blotches of colour) can be used to identify occurrence of temporary excessive soil wetness. Presence and depth to gleying is recorded

SPL - depth to any slowly permeable layer within the soil

Wetness Class - classification of the soil according to the depth and duration of waterlogging in the soil profile, the higher the class, the longer and at the shallower depth the soil is wet

Overall ALC - *this part of the table combines results of the classification for each of the limitations*

Soil profile descriptions				Soil profile descriptions continued																						ALC for areas represented by individual survey points																	
Survey point	Type	Grad-ient	Soil distur-bed or resto-red	Horizon	Depth	Texture	Matrix (main) colour			Mottling			Ped faces			FeMn up to %	Biopo-res	Stones and rocks		Structure				Consistence	Calca-reous	Gley-ing	SPL	Notes	Wetness class	Climate	Gradient	Summer flood risk	Winter flood risk	Topsoil texture	Soil Depth	Topsoil stoniness	Wetness	Droughti-ness	Other (see "Limited by" column)	ALC Grade	Limited by		
							Hue	Value	Chroma	Abundan-ce up to %	Hue	Value	Chroma	Colour different to matrix	Hue			Value	Chroma	> 2 cm up to %	> 6 cm up to %	Type	Type																			Deve-lop-ment	Ped size
1	Core	4	YES	1 2 3 4 5	35 120	MSL MS	10YR 7.5YR	2 5	1 6	0 2	0 7.5YR	0 4	0 2	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SG	W 0	M 0	VFR L	YES YES	NO NO	NO NO	Coal and brick in surface.	4	3a	1	1	1	1	1	1	3b	1	4	4	Pattern
2	Core	4	NO	1 2 3 4 5	12 50 100 120	MSL MSZL SCL SCL	10YR 10YR 10YR 7.5YR	2 4 4 4	1 3 4 6	0 0 20 20	0 0 10YR 7.5YR	0 0 6 6	0 0 6 8	NO NO NO NO	n/a n/a n/a n/a	n/a n/a n/a n/a	n/a n/a n/a n/a	0 YES NO NO	NO 0 NO 0	0 0 0 0	0 0 0 0	n/a n/a n/a n/a	SAB SAB SAB SAB	W M M M	F M M C	VFR FR FR FIR	YES YES YES YES	NO NO NO NO	NO NO NO NO	Some organic topsoil at depth within the profile picture from augering. Sandy throughout, damp from 60cm+	1	3a	1	1	1	1	1	1	2	1	4	4	Pattern
3	Core	1	NO	1 2 3 4 5	25 57 100	MSL SCL C	10YR 7.5YR	2 5	1 6	0 40	0 10YR 7.5YR	0 6 7	0 6 4	NO NO YES	n/a 7.5YR	n/a 6	n/a 4	0 0 0	NO NO NO	0 0 0	0 0 0	n/a n/a n/a	SAB SAB MAS	W W 0	F M 0	L FR FIR	YES NO 0	NO NO NO	NO NO YES	On the edge of an area with rushes and looks to be a wetter stream area.	3	3a	1	1	1	1	1	1	3b	1	4	4	Pattern
4	Core	2	YES	1 2 3 4	36 80 120	MCL FSZL SC	10YR 7.5YR 10YR	3 6	2 4	0 40	0 7.5YR	0 6 6	0 8 8	NO NO NO	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	0 0 0	NO NO NO	0 5 0	0 0 0	n/a SIM n/a	SAB SAB MAS	W M 0	M M 0	FR FR FIR	YES NO NO	NO YES YES	NO NO NO	In SS2 mottles of 7.5YR 7/2 also noted. Borehole wet from 60cm+. Seam of weathered coal identified at 57cm depth.	4	3a	1	1	1	1	1	1	3b	1	4	4	Pattern
5	Core	4	NO	1 2 3 4 5	35 60	MSZL SCL	10YR 7.5YR	2 5	1 6	0 20	0 10YR	0 7	0 6	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SAB	W M	M M	VFR FIR	YES 0	NO NO	NO NO	Refused at 60cm.	1	3a	1	1	1	1	1	1	2	1	4	4	Pattern
6	Core	1	NO	1 2 3 4 5	40 75 120	MSL SCL MS	10YR 7.5YR 7.5YR	2 6	1 8	0 0 0	0 0 0	0 0 0	0 0 0	NO NO NO	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	0 0 0	NO NO NO	0 0 0	0 0 0	n/a n/a n/a	SAB SAB SG	M S 0	M C 0	FR VFR L	YES NO YES	NO NO NO	NO NO NO	Moved due to OHL. On downward slop towards stream on South of site	1	3a	1	1	1	1	1	1	2	1	4	4	Pattern
7	Core	3	YES	1 2 3 4 5	35 120	MSL MS	10YR 7.5YR	2 5	1 6	0 2	0 7.5YR	0 4	0 2	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SG	W 0	M 0	VFR L	YES YES	NO NO	NO NO	Coal and brick in surface.	4	3a	1	1	1	1	1	1	3b	1	4	4	Pattern
8	Core	1	NO	1 2 3 4 5	30 80	MSL SCL	10YR 7.5YR	4 5	2 6	0 40	0 7.5YR	0 7	0 6	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SAB	W M	M C	VFR FIR	YES 0	NO NO	NO NO	Wet at 70cm+. At base of valley next to rushes	1	3a	1	1	1	1	1	1	2	1	4	4	Pattern
9	Core	5	YES	1 2 3 4 5	36 80 120	MCL FSZL SC	10YR 7.5YR 10YR	3 6	2 4	0 40	0 7.5YR	0 6 6	0 8 8	NO NO NO	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	0 0 0	NO NO NO	0 5 0	0 0 0	n/a SIM n/a	SAB SAB MAS	W M 0	M M 0	FR FR FIR	YES NO NO	NO YES YES	NO NO NO	In SS2 mottles of 7.5YR 7/2 also noted. Borehole wet from 60cm+. Seam of weathered coal identified at 57cm depth.	4	3a	1	1	1	1	1	1	3b	1	4	4	Pattern
10	Core	3	YES	1 2 3 4 5	35 120	MSL MS	10YR 7.5YR	2 5	1 6	0 2	0 7.5YR	0 4	0 2	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SG	W 0	M 0	VFR L	YES YES	NO NO	NO NO	Coal and brick in surface.	4	3a	1	1	1	1	1	1	3b	1	4	4	Pattern
11	Core	2	NO	1 2 3 4 5	20 80	MSL SCL	10YR 7.5YR	2 6	1 6	0 20	0 7.5YR	0 8	0 6	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SAB	M M	M M	VFR FIR	YES 0	NO NO	NO NO	On downhill slope (east facing) towards standing water and reed area	1	3a	1	1	1	1	1	1	2	1	4	4	Pattern
12	Core	1	NO	1 2 3 4 5	43 72 82	MSL MSZL MSZL	10YR 10YR 10YR	3 7 5	2 3 4	0 20 20	0 10YR 7.5YR	0 5 6	0 6 6	NO NO NO	n/a n/a n/a	n/a n/a n/a	n/a n/a n/a	0 0 0	NO NO NO	0 0 0	0 0 0	n/a n/a n/a	SAB AB SAB	M M M	M M M	FR FR FR	YES YES YES	NO YES NO	NO NO NO	Moved due to OHL. In rough grassland with reeds prior to all reed area next to motorway	1	3a	1	1	1	1	1	1	2	1	4	4	Pattern
13	Core	1	YES	1 2 3 4 5	35 120	MSL MS	10YR 7.5YR	2 5	1 6	0 2	0 7.5YR	0 4	0 2	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SG	W 0	M 0	VFR L	YES YES	NO NO	NO NO	Coal and brick in surface.	4	3a	1	1	1	1	1	1	3b	1	4	4	Pattern
14	Core	1	NO	1 2 3 4 5	25 57 100	MSL MS C	10YR 10YR 7.5YR	2 4 5	1 3 6	0 20 40	0 10YR 7.5YR	0 6 7	0 6 4	NO YES YES	n/a n/a 7.5YR	n/a n/a 6	n/a n/a 4	0 0 0	NO NO NO	0 0 0	0 0 0	n/a n/a n/a	SAB SAB MAS	W W 0	F F 0	L FR FIR	YES 0 0	NO NO NO	NO NO YES	-	3	3a	1	1	1	1	1	1	3b	1	4	4	Pattern
15	Core	2	NO	1 2 3 4 5	20 80	MSL MS	10YR 7.5YR	2 6	1 6	0 20	0 7.5YR	0 8	0 6	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SAB	M M	M F	VFR FIR	YES 0	NO NO	NO NO	-	1	3a	1	1	1	1	1	1	2	2	4	4	Pattern
16	Core	1	NO	1 2 3 4 5	20 80	MSL MS	10YR 7.5YR	2 6	1 6	0 20	0 7.5YR	0 8	0 6	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SAB	M M	M F	VFR FIR	YES 0	NO NO	NO NO	-	1	3a	1	1	1	1	1	1	2	2	4	4	Pattern
17	Core	2	NO	1 2 3 4 5	20 80	MSL MS	10YR 7.5YR	2 6	1 6	0 20	0 7.5YR	0 8	0 6	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SAB	M M	M F	VFR FIR	YES 0	NO NO	NO NO	-	1	3a	1	1	1	1	1	1	2	2	4	4	Pattern
18	Core	1	YES	1 2 3 4 5	35 120	MSL MS	10YR 7.5YR	2 5	1 6	0 2	0 7.5YR	0 4	0 2	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SG	W 0	M 0	VFR L	YES YES	NO NO	NO NO	-	4	3a	1	1	1	1	1	1	3b	1	4	4	Pattern
19	Core	1	YES	1 2 3 4 5	25 80	HZCL SC	10YR 7.5YR	4 4	2 2	0 0	0 0	0 0	0 0	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 5	0 0	n/a H	SAB PR	M M	M M	FR FIR	YES 0	NO NO	NO NO	Disturbed with brick at 80cm depth. To hard to auger at 80cm. Soil surface water ponding.	4	3a	1	1	1	1	1	1	4	1	4	4	Wetness Pattern
20	Core	3	NO	1 2 3 4 5	20 80	MSL MS	10YR 7.5YR	2 6	1 6	0 20	0 7.5YR	0 8	0 6	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SAB	M M	M M	VFR FIR	YES 0	NO NO	NO NO	-	1	3a	1	1	1	1	1	1	2	2	4	4	Pattern
21	Core	2	YES	1 2 3 4 5	35 120	MSL MS	10YR 7.5YR	2 5	1 6	0 2	0 7.5YR	0 4	0 2	NO NO	n/a n/a	n/a n/a	n/a n/a	0 0	NO NO	0 0	0 0	n/a n/a	SAB SG	W 0	M 0	VFR L	YES YES	NO NO	NO NO	Coal and brick in surface.	4	3a	1	1	1	1	1	1	3b	1	4	4	Pattern
22	Core	1	NO	1 2 3 4 5	20 80	MSL SCL	10YR 7.5YR	2 6	1 6	0 20	0 7.5YR																																

Appendix 2 Droughtiness Calculations

Data inputs										Droughtiness calculations																				Limited to ALC grade	
Survey Point	Horizon	Horizon thickness	Texture	Stones %	Structural condition	Av. water (soil)		Av. water (stones)		AP wheat										AP potatoes											
						TAv %	EAv %	TAv %	EAv %	TAv/EAv	Start depth	End depth	Horiz. thickn.	TAv/EAv soil	% non stone	TAv/EAv stones	Stones %	AP wheat	AP(wheat) -MD(wheat)	Start depth	End depth	Horiz. thickn.	TAv top/sub soil	non-stone %	TAv stones	Stone %	AP potatoes	AP(potato) -MD(potato)			
1	1	35	MSL	0	GOOD	17				TAv	0	35	35	17	100	0	0	595	105	46	0	35	35	17	100	0	0	595	84	47	1
									EAv	0	35	0	0	100	0	0	0														
	2	85	MS	0	MODERATE	7	5			TAv	35	120	15	7	100	0	0	105			35	120	35	7	100	0	0	245			
									EAv	35	120	70	5	100	0	0	350														
	3								TAv	120	120	0	0	100	0	0	0	120			120	0	0	100	0	0	0				
									EAv	120	120	0	0	100	0	0	0														
	4								TAv	120	120	0	0	100	0	0	0	120			120	0	0	100	0	0	0				
2	1	12	MSL	0	GOOD	17				TAv	0	12	12	17	100	0	0	204	183	124	0	12	12	17	100	0	0	204	131	94	1
									EAv	0	12	0	0	100	0	0	0														
	2	38	MSZL	0	GOOD	19	13			TAv	12	50	38	19	100	0	0	722			12	50	38	19	100	0	0	722			
									EAv	12	50	0	13	100	0	0	0														
	3	50	SCL	0	GOOD	19	14			TAv	50	100	0	19	100	0	0	0			50	100	20	19	100	0	0	380			
									EAv	50	100	50	14	100	0	0	700	100			120	0	15	100	0	0	0				
	4	20	SCL	0	MODERATE	15	10			TAv	100	120	0	15	100	0	0	0			100	120	0	15	100	0	0	0			
3	1	25	MSL	0	GOOD	17				TAv	0	25	25	17	100	0	0	425	130	71	0	25	25	17	100	0	0	425	120	84	1
									EAv	0	25	0	0	100	0	0	0														
	2	32	SCL	0	GOOD	19	14			TAv	25	57	25	19	100	0	0	475			25	57	32	19	100	0	0	608			
									EAv	25	57	7	14	100	0	0	98														
	3	43	C	0	POOR	13	7			TAv	57	100	0	13	100	0	0	0			57	100	13	13	100	0	0	169			
									EAv	57	100	43	7	100	0	0	301														
	4								TAv	100	100	0	0	100	0	0	0	100			100	0	0	100	0	0	0				
4	1	36	MCL	0	GOOD	18				TAv	0	36	36	18	100	0	0	648	172	114	0	36	36	18	100	0	0	648	137	100	1
									EAv	0	36	0	0	100	0	0	0														
	2	44	FSZL	5	GOOD	22	16	4.0	2.0	TAv	36	80	14	22	95	4	5	295			36	80	34	22	95	4	5	717			
									EAv	36	80	30	16	95	2	5	459														
	3	40	SC	0	POOR	13	8			TAv	80	120	0	13	100	0	0	0			80	120	0	13	100	0	0	0			
									EAv	80	120	40	8	100	0	0	320														
	4								TAv	120	120	0	0	100	0	0	0	120			120	0	0	100	0	0	0				
5	1	35	MSZL	0	GOOD	19				TAv	0	35	35	19	100	0	0	665	109	50	0	35	35	19	100	0	0	665	114	77	1
									EAv	0	35	0	0	100	0	0	0														
	2	25	SCL	0	GOOD	19	14			TAv	35	60	15	19	100	0	0	285			35	60	25	19	100	0	0	475			
									EAv	35	60	10	14	100	0	0	140	60			60	0	0	100	0	0	0				
	3								TAv	60	60	0	0	100	0	0	0	60			60	0	0	100	0	0	0				
									EAv	60	60	0	0	100	0	0	0														
	4								TAv	60	60	0	0	100	0	0	0	60			60	10	0	100	0	0	0				
6	1	40	MSL	0	GOOD	17				TAv	0	40	40	17	100	0	0	680	131	72	0	40	40	17	100	0	0	680	113	76	1
									EAv	0	40	0	0	100	0	0	0														
	2	35	SCL	0	MODERATE	15	10			TAv	40	75	10	15	100	0	0	150			40	75	30	15	100	0	0	450			
									EAv	40	75	25	10	100	0	0	250														
	3	45	MS	0	MODERATE	7	5			TAv	75	120	0	7	100	0	0	0			75	120	0	7	100	0	0	0			
									EAv	75	120	45	5	100	0	0	225														
	4								TAv	120	120	0	0	100	0	0	0	120			120	0	0	100	0	0	0				
7	1	35	MSL	0	GOOD	17				TAv	0	35	35	17	100	0	0	595	105	46	0	35	35	17	100	0	0	595	84	47	1
									EAv	0	35	0	0	100	0	0	0														
	2	85	MS	0	MODERATE	7	5			TAv	35	120	15	7	100	0	0	105			35	120	35	7	100	0	0	245			
									EAv	35	120	70	5	100	0	0	350														
	3								TAv	120	120	0	0	100	0	0	0	120			120	0	0	100	0	0	0				
									EAv	120	120	0	0	100	0	0	0														
	4								TAv	120	120	0	0	100	0	0	0	120			120	0	0	100	0	0	0				

Data inputs										Droughtiness calculations																							
						Av. water (soil)		Av. water (stones)		AP wheat										AP potatoes												Limited to ALC grade	
Survey Point	Horizon	Horizon thickness	Texture	Stones %	Structural condition	TAv %	EAv %	TAv %	EAv %	TAv/EAv	Start depth	End depth	Horiz. thickn.	TAv/EAv soil	% non stone	TAv/EAv stones	Stones %	AP wheat	AP(wheat) -MD(wheat)	Start depth	End depth	Horiz. thickn.	TAv top/sub soil	non-stone %	TAv stones	Stone %	AP potatoes	AP(potato) -MD(potato)					
8	1	30	MSL	0	GOOD	17				TAv	0	30	30	17	100	0	0	510	111	52	0	30	30	17	100	0	0	510	111	74	1		
									EAv	0	30	0	0	100	0	0	0																
	2	50	SCL	0	MODERATE	15	10			TAv	30	80	20	15	100	0	0	300			30	80	40	15	100	0	0	600					
									EAv	30	80	30	10	100	0	0	300																
	3									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0					
									EAv	80	80	0	0	100	0	0	0																
	4									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0					
9	1	36	MCL	0	GOOD	18				TAv	0	36	36	18	100	0	0	648	172	114	0	36	36	18	100	0	0	648	137	100	1		
									EAv	0	36	0	0	100	0	0	0																
	2	44	FSZL	5	GOOD	22	16	4.0	2.0	TAv	36	80	14	22	95	4	5	295			36	80	34	22	95	4	5	717					
									EAv	36	80	30	16	95	2	5	459																
	3	40	SC	0	POOR	13	8			TAv	80	120	0	13	100	0	0	0			80	120	0	13	100	0	0	0					
									EAv	80	120	40	8	100	0	0	320																
	4									TAv	120	120	0	0	100	0	0	0			120	120	0	0	100	0	0	0					
10	1	35	MSL	0	GOOD	17				TAv	0	35	35	17	100	0	0	595	105	46	0	35	35	17	100	0	0	595	84	47	1		
									EAv	0	35	0	0	100	0	0	0																
	2	85	MS	0	MODERATE	7	5			TAv	35	120	15	7	100	0	0	105			35	120	35	7	100	0	0	245					
									EAv	35	120	70	5	100	0	0	350																
	3									TAv	120	120	0	0	100	0	0	0			120	120	0	0	100	0	0	0					
									EAv	120	120	0	0	100	0	0	0																
	4									TAv	120	120	0	0	100	0	0	0			120	120	0	0	100	0	0	0					
11	1	20	MSL	0	GOOD	17				TAv	0	20	20	17	100	0	0	340	133	74	0	20	20	17	100	0	0	340	129	92	1		
									EAv	0	20	0	0	100	0	0	0																
	2	60	SCL	0	GOOD	19	14			TAv	20	80	30	19	100	0	0	570			20	80	50	19	100	0	0	950					
									EAv	20	80	30	14	100	0	0	420																
	3									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0					
									EAv	80	80	0	0	100	0	0	0																
	4									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0					
12	1	43	MSL	0	GOOD	17				TAv	0	43	43	17	100	0	0	731	122	64	0	43	43	17	100	0	0	731	119	82	1		
									EAv	0	43	0	0	100	0	0	0																
	2	29	MSZL	0	MODERATE	17	11			TAv	43	72	7	17	100	0	0	119			43	72	27	17	100	0	0	459					
									EAv	43	72	22	11	100	0	0	242																
	3	10	MSZL	0	GOOD	19	13			TAv	72	82	0	19	100	0	0	0			72	82	0	19	100	0	0	0					
									EAv	72	82	10	13	100	0	0	130																
	4									TAv	82	82	0	0	100	0	0	0			82	82	0	0	100	0	0	0					
13	1	35	MSL	0	GOOD	17				TAv	0	35	35	17	100	0	0	595	105	46	0	35	35	17	100	0	0	595	84	47	1		
									EAv	0	35	0	0	100	0	0	0																
	2	85	MS	0	MODERATE	7	5			TAv	35	120	15	7	100	0	0	105			35	120	35	7	100	0	0	245					
									EAv	35	120	70	5	100	0	0	350																
	3									TAv	120	120	0	0	100	0	0	0			120	120	0	0	100	0	0	0					
									EAv	120	120	0	0	100	0	0	0																
	4									TAv	120	120	0	0	100	0	0	0			120	120	0	0	100	0	0	0					
14	1	25	MSL	0	GOOD	17				TAv	0	25	25	17	100	0	0	425	94	35	0	25	25	17	100	0	0	425	82	45	1		
									EAv	0	25	0	0	100	0	0	0																
	2	32	MS	0	GOOD	7	5			TAv	25	57	25	7	100	0	0	175			25	57	32	7	100	0	0	224					
									EAv	25	57	7	5	100	0	0	35																
	3	43	C	0	POOR	13	7			TAv	57	100	0	13	100	0	0	0			57	100	13	13	100	0	0	169					
									EAv	57	100	43	7	100	0	0	301																
	4									TAv	100	100	0	0	100	0	0	0			100	100	0	0	100	0	0	0					

Data inputs										Droughtiness calculations																	Limited to ALC grade				
Survey Point	Horizon	Horizon thickness	Texture	Stones %	Structural condition	Av. water (soil)		Av. water (stones)		AP wheat										AP potatoes											
						TAv %	EAv %	TAv %	EAv %	TAv/EAv	Start depth	End depth	Horiz. thickn.	TAv/EAv soil	% non stone	TAv/EAv stones	Stones %	AP wheat	AP(wheat) -MD(wheat)	Start depth	End depth	Horiz. thickn.	TAv top/sub soil	non-stone %	TAv stones	Stone %	AP potatoes	AP(potato) -MD(potato)			
15	1	20	MSL	0	GOOD	17				TAv	0	20	20	17	100	0	0	340	70	11	0	20	20	17	100	0	0	340	69	32	2
									EAv	0	20	0	0	100	0	0	0														
	2	60	MS	0	MODERATE	7	5			TAv	20	80	30	7	100	0	0	210			20	80	50	7	100	0	0	350			
										EAv	20	80	30	5	100	0	0	150													
	3									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0			
										EAv	80	80	0	0	100	0	0	0													
	4									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0			
16										EAv	80	80	0	0	100	0	0	0	70	11									69	32	2
	1	20	MSL	0	GOOD	17				TAv	0	20	20	17	100	0	0	340			0	20	20	17	100	0	0	340			
										EAv	0	20	0	0	100	0	0	0													
	2	60	MS	0	MODERATE	7	5			TAv	20	80	30	7	100	0	0	210			20	80	50	7	100	0	0	350			
										EAv	20	80	30	5	100	0	0	150													
	3									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0			
										EAv	80	80	0	0	100	0	0	0													
17	4									TAv	80	80	0	0	100	0	0	0	80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0													
	5									TAv	80	80	0	0	100	0	0	0	80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0													
	1	20	MSL	0	GOOD	17				TAv	0	20	20	17	100	0	0	340	0	20	20	17	100	0	0	340					
										EAv	0	20	0	0	100	0	0	0													
	2	60	MS	0	MODERATE	7	5			TAv	20	80	30	7	100	0	0	210	20	80	50	7	100	0	0	350					
18										EAv	20	80	30	5	100	0	0	150													
	3									TAv	80	80	0	0	100	0	0	0	80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0													
	4									TAv	80	80	0	0	100	0	0	0	80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0													
	5									TAv	80	80	0	0	100	0	0	0	80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0													
19	1	35	MSL	0	GOOD	17				TAv	0	35	35	17	100	0	0	595	105	46	0	35	35	17	100	0	0	595	84	47	1
										EAv	0	35	0	0	100	0	0	0													
	2	85	MS	0	MODERATE	7	5			TAv	35	120	15	7	100	0	0	105			35	120	35	7	100	0	0	245			
										EAv	35	120	70	5	100	0	0	350													
	3									TAv	120	120	0	0	100	0	0	0			120	120	0	0	100	0	0	0			
										EAv	120	120	0	0	100	0	0	0													
	4									TAv	120	120	0	0	100	0	0	0			120	120	0	0	100	0	0	0			
20										EAv	120	120	0	0	100	0	0	0	120	120	0	0	100	0	0	0					
	1	25	HZCL	0	GOOD	19				TAv	0	25	25	19	100	0	0	475	112	53	0	25	25	19	100	0	0	475	112	75	1
										EAv	0	25	0	0	100	0	0	0													
	2	55	SC	5	MODERATE	15	10	1.0	0.5	TAv	25	80	25	15	95	1	5	358			25	80	45	15	95	1	5	644			
										EAv	25	80	30	10	95	1	5	286													
	3									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0			
										EAv	80	80	0	0	100	0	0	0													
4									TAv	80	80	0	0	100	0	0	0	80			80	0	0	100	0	0	0				
21										EAv	80	80	0	0	100	0	0	0	80	80	0	0	100	0	0	0					
	5									TAv	80	80	0	0	100	0	0	0	80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0													
	1	35	MSL	0	GOOD	17				TAv	0	35	35	17	100	0	0	595	105	46	0	35	35	17	100	0	0	595	84	47	1
										EAv	0	35	0	0	100	0	0	0													
	2	85	MS	0	MODERATE	7	5			TAv	35	120	15	7	100	0	0	105			35	120	35	7	100	0	0	245			
										EAv	35	120	70	5	100	0	0	350													
3									TAv	120	120	0	0	100	0	0	0	120			120	0	0	100	0	0	0				
									EAv	120	120	0	0	100	0	0	0														
4									TAv	120	120	0	0	100	0	0	0	120			120	0	0	100	0	0	0				

Data inputs										Droughtiness calculations																				Limited to ALC grade			
						Av. water (soil)		Av. water (stones)		AP wheat										AP potatoes													
Survey Point	Horizon	Horizon thickness	Texture	Stones %	Structural condition	TAv %	EAv %	TAv %	EAv %	TAv/EAv	Start depth	End depth	Horiz. thickn.	TAv/EAv soil	% non stone	TAv/EAv stones	Stones %	AP wheat	AP(wheat) -MD(wheat)	Start depth	End depth	Horiz. thickn.	TAv top/sub soil	non-stone %	TAv stones	Stone %	AP potatoes	AP(potato) -MD(potato)					
22	1	20	MSL	0	GOOD	17				TAv	0	20	20	17	100	0	0	340	133	74	0	20	20	17	100	0	0	340	129	92	1		
										EAv	0	20	0	0	100	0	0	0															
	2	60	SCL	0	GOOD	19	14			TAv	20	80	30	19	100	0	0	570			20	80	50	19	100	0	0	950					
										EAv	20	80	30	14	100	0	0	420															
	3									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0															
	4									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0															
	5									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0															
23	1	25	HZCL	0	GOOD	19				TAv	0	25	25	19	100	0	0	475	112	53	0	25	25	19	100	0	0	475	112	75	1		
										EAv	0	25	0	0	100	0	0	0															
	2	55	SC	5	MODERATE	15	10	1.0	0.5	TAv	25	80	25	15	95	1	5	358			25	80	45	15	95	1	5	644					
										EAv	25	80	30	10	95	1	5	286															
	3									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0															
	4									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0															
	5									TAv	80	80	0	0	100	0	0	0			80	80	0	0	100	0	0	0					
										EAv	80	80	0	0	100	0	0	0															
P1	1	35	MSL	0	GOOD	17				TAv	0	35	35	17	100	0	0	595	79	21	0	35	35	17	100	0	0	595	83	46	2		
										EAv	0	35	0	0	100	0	0	0															
	2	35	MS	5	MODERATE	7	5	1.0	0.5	TAv	35	70	15	7	95	1	5	101			35	70	35	7	95	1	5	235					
										EAv	35	70	20	5	95	1	5	96															
	3									TAv	70	70	0	0	100	0	0	0			70	70	0	0	100	0	0	0					
										EAv	70	70	0	0	100	0	0	0															
	4									TAv	70	70	0	0	100	0	0	0			70	70	0	0	100	0	0	0					
										EAv	70	70	0	0	100	0	0	0															
	5									TAv	70	70	0	0	100	0	0	0			70	70	0	0	100	0	0	0					
										EAv	70	70	0	0	100	0	0	0															
P2	1	35	MSL	0	GOOD	17				TAv	0	35	35	17	100	0	0	595	79	21	0	35	35	17	100	0	0	595	83	46	2		
										EAv	0	35	0	0	100	0	0	0															
	2	35	MS	5	MODERATE	7	5	1.0	0.5	TAv	35	70	15	7	95	1	5	101			35	70	35	7	95	1	5	235					
										EAv	35	70	20	5	95	1	5	96															
	3									TAv	70	70	0	0	100	0	0	0			70	70	0	0	100	0	0	0					
										EAv	70	70	0	0	100	0	0	0															
	4									TAv	70	70	0	0	100	0	0	0			70	70	0	0	100	0	0	0					
										EAv	70	70	0	0	100	0	0	0															
	5									TAv	70	70	0	0	100	0	0	0			70	70	0	0	100	0	0	0					
										EAv	70	70	0	0	100	0	0	0															

Appendix 3 Laboratory Results



ANALYTICAL REPORT

Report Number	42001-21	H448	WARDELL ARMSTRONG LLP
Date Received	23-FEB-2021		CITY QUADRANT
Date Reported	03-MAR-2021		11 WATERLOO SQUARE
Project	NT14720NTEM		NEWCASTLE UPON TYNE
Reference	CHRIS ROGERS		NE1 4DP
Order Number	NT13748		

Laboratory Reference		SOIL505331	SOIL505332	SOIL505333	SOIL505334						
Sample Reference		BH1	BH8	BH20	PIT1						
Determinand	Unit	SOIL	SOIL	SOIL	SOIL						
Sand 2.00-0.063mm	% w/w	61	59	63	63						
Silt 0.063-0.002mm	% w/w	23	24	20	22						
Clay <0.002mm	% w/w	16	17	17	15						
Textural Class **		SL	SL	SL	SL						

Notes	
Analysis Notes	The sample submitted was of adequate size to complete all analysis requested. The results as reported relate only to the item(s) submitted for testing. The results are presented on a dry matter basis unless otherwise stipulated.
Document Control	This test report shall not be reproduced, except in full, without the written approval of the laboratory.

Reported by	** Please see the attached document for the definition of textural classes. Myles Nicholson Natural Resource Management, a trading division of Cawood Scientific Ltd. Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS Tel: 01344 886338 Fax: 01344 890972 email: enquiries@nrm.uk.com
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ADAS (UK) Textural Class Abbreviations

The texture classes are denoted by the following abbreviations:

Class	Code
Sand	S
Loamy sand	LS
Sandy loam	SL
Sandy Silt loam	SZL
Silt loam	ZL
Sandy clay loam	SCL
Clay loam	CL
Silt clay loam	ZCL
Clay	C
Silty clay	ZC
Sandy clay	SC

For the *sand*, *loamy sand*, *sandy loam* and *sandy silt loam* classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

vf	Very Fine (more than 2/3's of sand less than 0.106 mm)
f	Fine (more than 2/3's of sand less than 0.212 mm)
c	Coarse (more than 1/3 of sand greater than 0.6 mm)
m	Medium (less than 2/3's fine sand and less than 1/3 coarse sand).

The subdivisions of *clay loam* and *silty clay loam* classes according to clay content are indicated as follows:

M	medium (less than 27% clay)
H	heavy (27-35% clay)

Organic soils i.e. those with an organic matter greater than 10% will be preceded with a letter O.

Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter P.

DRAWINGS



KEY

- Site Boundary
- Location of Visible Surface Tipping

Notes:

Boundaries are indicative.

Aerial imagery shown for context purposes only.

REVISION	DETAILS	DATE	DRAWN	CHKD

CLIENT	GLP LTD AND BARRATT HOMES
--------	---------------------------

PROJECT	COWN TOP, CASTLETON
---------	---------------------

DRAWING TITLE	LOCATIONS OF VISIBLE SURFACE TIPPING
---------------	--------------------------------------

DRG No.	NT14720/002	REV	A
DRG SIZE	A3	SCALE	1:2,500
DRAWN BY	SW	CHECKED BY	RJ
		APPROVED BY	HS



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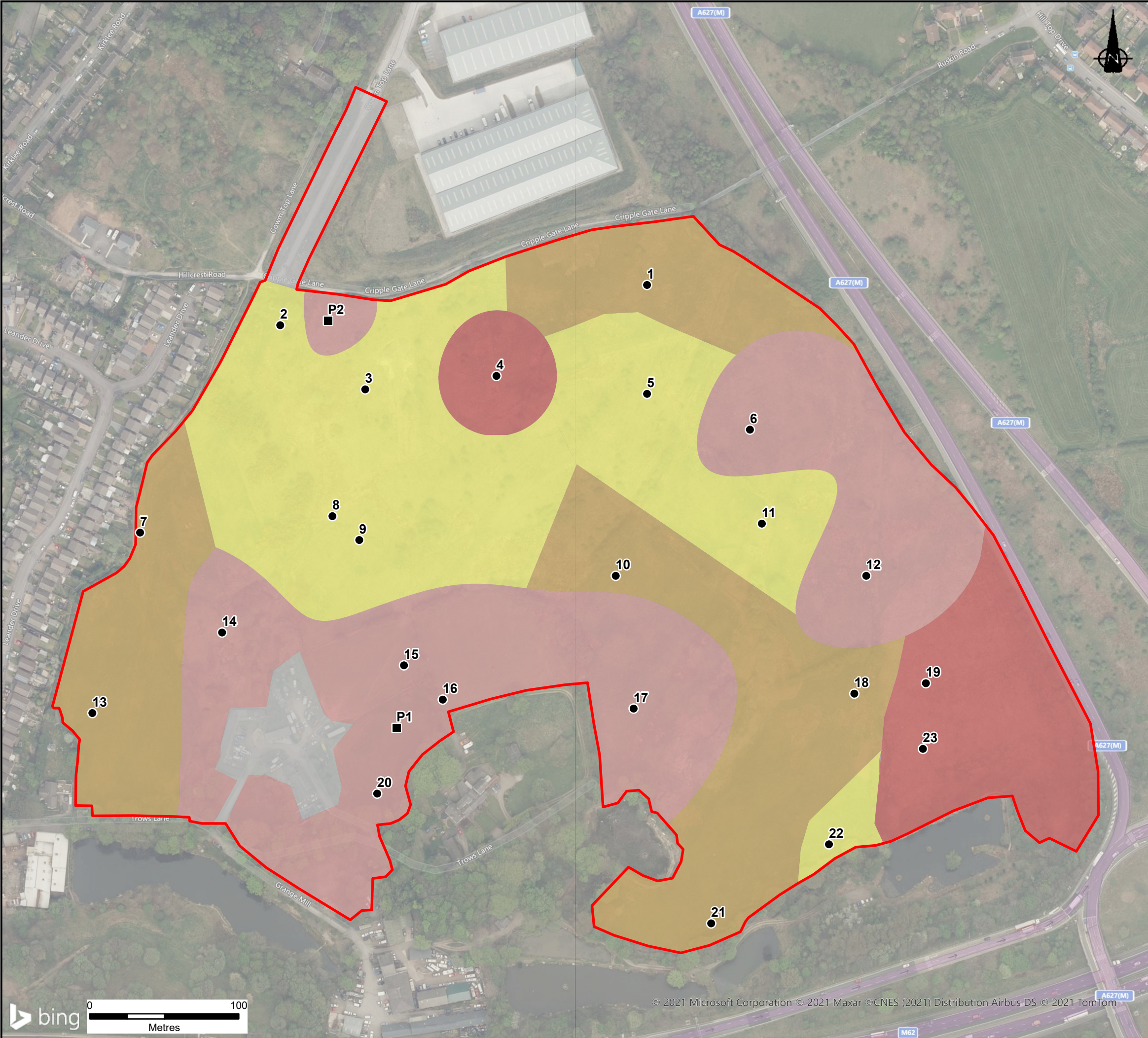
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KEY

Site Boundary

Auger Core

Profile Pit

Type 1

Type 1(d)

Type 2

Type 3(d)

Non-Agricultural

Notes:

Boundaries are indicative.

Aerial imagery shown for context purposes only.

Data taken from Wardell Armstrong Survey (February 2021)

REVISION	DETAILS	DATE	DRAWN	CHKD	APPD
CLIENT					
GLP LTD AND BARRATT HOMES					
PROJECT					
COWN TOP, CASTLETON					
DRAWING TITLE					
SOIL TYPES					
DRG No.		NT14720/003		REV	
				A	
DRG SIZE		SCALE		DATE	
A3		1:2,500		23/03/2021	
DRAWN BY		CHECKED BY		APPROVED BY	
SW		RJ		HS	

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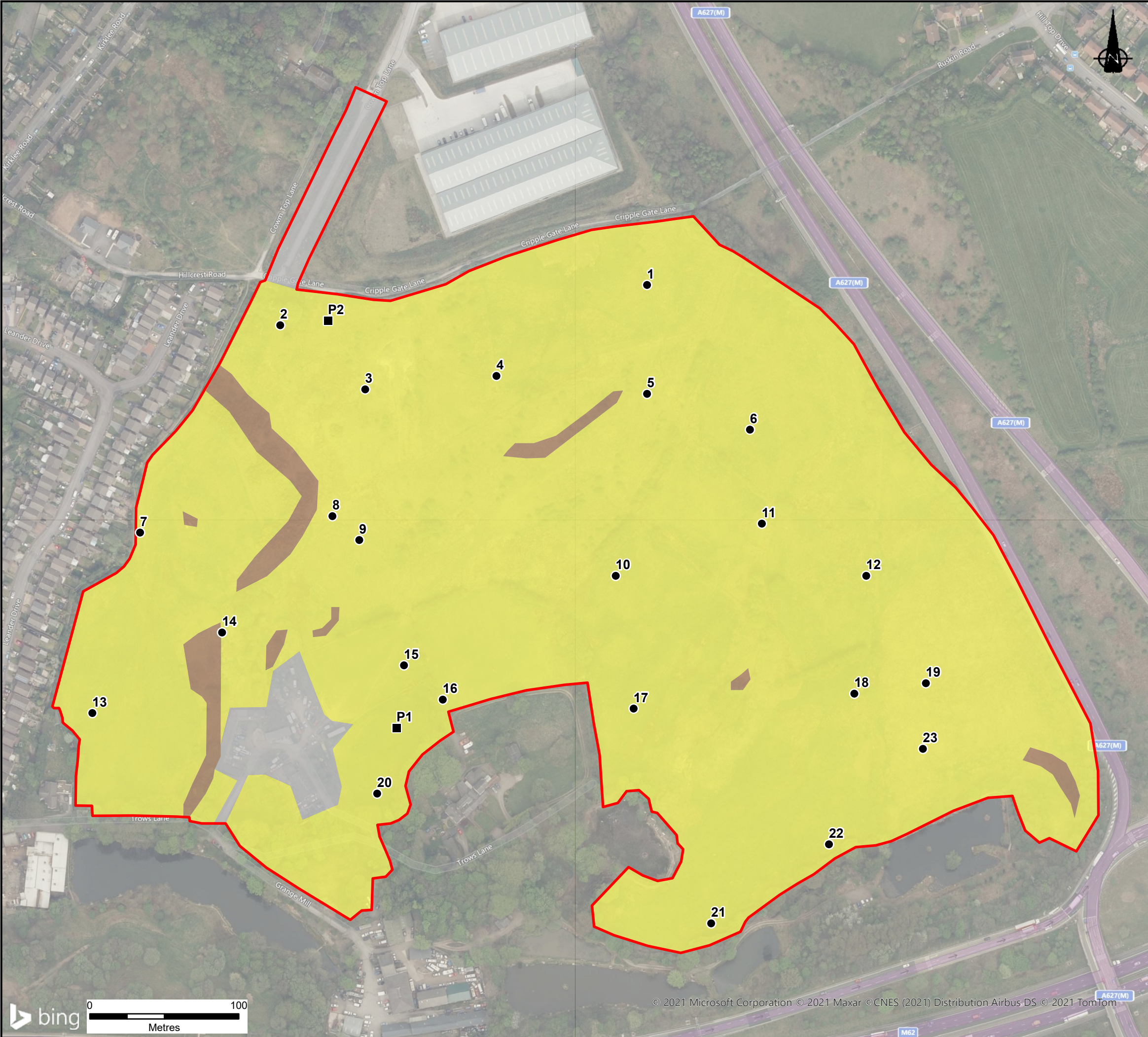
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KEY

Site Boundary

●

Auger Core

■

Profile Pit

Agricultural Land Classification

Grade 4

Grade 5

Non-agricultural

Agricultural Land Classification	Area (ha)
Grade 4	20.24 ha
Grade 5	0.65 ha
Non-agricultural	0.85 ha

Notes:

Boundaries are indicative.

Aerial imagery shown for context purposes only.

Grade 5 areas are interpolated from OS Terrain 5 data.
Contains Ordnance Survey data. © Crown Copyright and database right 2021.

REVISION	DETAILS	DATE	DRAWN	CHKD	APPD
CLIENT					
GLP LTD AND BARRATT HOMES					
PROJECT					
COWN TOP, CASTLETON					
DRAWING TITLE					
AGRICULTURAL LAND CLASSIFICATION					
DRG No.		NT14720/004		REV	
				A	
DRG SIZE		SCALE		DATE	
A3		1:2,500		23/03/2021	
DRAWN BY		CHECKED BY		APPROVED BY	
SW		RJ		HS	

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