Castle Cement Limited




Carbon Capture and Storage Project – Padeswood, North Wales

Soil Resource Assessment and Outline Soil Resource Management Plan

663575

ADAS

EXECUTIVE SUMMARY

The purpose of the Soil Resource Assessment and outline Soil Resource Management Plan (SRMP) for the land at Padeswood Cement works is:

- To ensure the protection and conservation of soil resources in the proposed lay down areas, car park areas and the area of the proposed Carbon Capture Plant;
- Identify best practice to maintain the physical properties of the soils on-site; and
- Provide on-site reference on the management of the soil resource for site operators.

The Survey work was undertaken in February 2023 and the report has been updated with additional information received from Castle Cement Limited (the 'Applicant') in April 2024.

Five blocks of land were surveyed and included the area of the proposed Post Combustion Carbon Capture Plant, covering approximately 4.62ha; two laydown areas covering approximately 3.28ha and two car parks covering approximately 1.29ha.

The field survey found one main soil type: heavy textured soils with either a heavy clay loam topsoil or organic heavy clay loam topsoil overlying heavy clay loam and clay. Two soil units have been identified which will require separate handling and storage where required of the topsoil and subsoil. A further soil unit has been identified for an area of woodland.

The topsoil and subsoil in the area of the Post Combustion Carbon Capture Plant will be taken off site due to lack of space for permanent storage bunds. Samples from two bunds in the area of the proposed Carbon Capture Plant failed to meet the BS3882:2015 specification[1] for topsoil. The coarse fragment content (>50mm) was not compliant with the standard. Separate removal and management of these bunds from the other soils in the area will be necessary.

The report covers on-site soil handling, the assessment of soil moisture content and storage of soil in bunds.

The Agricultural Land Classification (ALC) of the five blocks of land shows 3.42ha classified as Subgrade 3b land and 1.56ha as Grade 4 land. A further 4.21ha is classified as other land, being non agricultural land and woodland.

[1] https://knowledge.bsigroup.com/products/specification-for-topsoil?version=tracked

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1 INTRODUCTION

1.1.1 The survey included five blocks of land at the Padeswood Cement Works, Flintshire, North Wales (the 'Site'). The land is to be used for car parks, construction laydown areas and a new Carbon Capture Plant ('the Proposed Development').

1.1.2 The five blocks of land covered a total of approximately 9.19ha at the Cement Works. The land at the Proposed Development covers approximately 4.62ha, was under grass for grazing and included some woodland; the laydown area to the west of the Site access road covers 1.77ha and is identified in this report as the west laydown area and was under grass for grazing; the laydown area to the east of the Site access road and referred to in this report as the east laydown area covers 1.51ha and was a grassed sports pitch; the car park area to the west of the Site access road and identified in this report as the west car park covers approximately 0.3ha and was an amenity grass area; the car park area to the east of the Site access road and identified in this report as the east car park covers 0.99ha and was a grassed sports area.

1.1.3 An assessment of the soil resource was undertaken by RSK ADAS in February 2023. Details of the observations are included in the survey report at **Appendix 1**.

1.1.4 The purpose of the outline Soil Resource Management Plan (SRMP) is:

- To ensure the protection and conservation of soil resources on-site;
- Identify best practice to maintain the physical properties of the soils on-site; and
- Provide on-site reference on the management of the soil resource for site operators.

1.1.5 The SRMP follows the principles of best practice[2] [3] to maintain the physical properties of the soil and gives information for use with the Landscape and Biodiversity Strategic Mitigation Proposals.

[2] https://assets.publishing.service.gov.uk/media/5b2264ff40f0b634cfb50650/pb13298-code-of-practice-090910.pdf
[3] https://www.quarrying.org/soils-guidance

2 METHODOLOGY

1.1.6 A desk study of soils, climatic and geological information was undertaken using reference material held by ADAS, followed by detailed fieldwork to study soil and site limitations.

1.1.7 Fieldwork was undertaken with a 50mm diameter "Dutch", to a depth of up to 1.0m.

1.1.8 The soil survey covered five blocks of land close to the current cement works and was undertaken to determine the soil types and identify soil units which have similar characteristics for soil handling and management purposes. Soil profiles were examined by carrying out 19 soil auger borings to determine the soil profile texture, depth, stone content and drainage characteristics. Two soil pits were hand dug.

1.1.9 Samples of topsoil were also collected from several sampling locations and sent for laboratory analysis to create a baseline record of the nutrient status.

1.1.10 Composite soil samples were collected from two bunds in the south west corner of the Site and sent for BS3882:2015[4] (topsoil) testing.

1.1.11 A description of the soil units is provided in **Appendix 1**, with a description of the soil characteristics at each sample location (soil texture as determined by hand texturing, depth, stone content and drainage characteristics). A plan of the soil handling units is provided in **Appendix 2**.

1.1.12 The results of the BS3882:2015[5] topsoil analyses and other laboratory results are detailed at **Appendix 3**.

[4] https://knowledge.bsigroup.com/products/specification-for-topsoil?version=tracked
[5] https://knowledge.bsigroup.com/products/specification-for-topsoil?version=tracked

3 BACKGROUND INFORMATION

3.1 Site

1.1.13 Gradient: The land in the proposed parking areas and laydown areas was generally level. The block of land designated for the Proposed Development had a gradient of less than 7° and sloped towards the southern Site boundary. Gradient is not a limitation to the agricultural use of the land. The land rises from an altitude of 95m above sea level at the southern boundary of the Proposed Development block of land to about 110m above sea level close to the A5118 road.

1.1.14 Flooding: The blocks of land[6] generally have a low risk of flooding from surface water and small watercourses. At the southern boundary of the land for the Proposed Development there is a high risk of flooding from surface water and a watercourse draining towards Padeswood Pool. There is no risk of flooding from rivers in the cement works.

3.2 Geology

1.1.15 The Geology of Britain viewer map[7] shows the basal geology over much of the land as Pennine Lower Coal Measures, comprising mudstone, siltstone and sandstone laid down in the Carboniferous Period (319-318 million years ago). At the north western block of land (west laydown area) the basal geology is shown as Pennine Middle Coal Measures, comprising mudstone, siltstone and sandstone, laid down in the Carboniferous Period (318-309.5 million years ago). Part of the block of land for the Proposed Development the underlying geology is shown as Gwespyr Sandstone, comprising sandstone and argillaceous rocks of the Carboniferous Period (320 to 318 million years ago). All the land is covered by superficial deposits of Till (Devensian) of the Quaternary Period (116-11.8 thousand years ago).

3.3 Published Soil Information

1.1.16 The Soil Map of England and Wales[8], published at 1:250 000 scale, records the land in the vicinity of Padeswood as belonging to the Brickfield 3 Soil Association. Soils of the Brickfield 3 Soil Association are typically fine loamy over clayey subsoils, which are slowly permeable and seasonally waterlogged. A typical soil profile is described as having a topsoil texture of clay loam over a subsoil of clay loam.

3.4 Climatic Information

1.1.17 The agricultural climate calculated using the Climatological Data for Agricultural Land Classification[9] is a useful guide to planning soil handling operations at a broad scale, but not for decision making on day-to-day operations on the ground. The meteorological parameter - Field Capacity Days - estimates the duration of the period when the soil moisture deficit is zero. Soils typically return to field capacity (zero deficit) during the autumn (mid October) and the field capacity period ends in the spring (mid April) when evapotranspiration exceeds rainfall, the soil becomes drier and a moisture deficit starts. This commonly varies by 2-3 weeks either side of this period depending on the season.

1.1.18 The agro-climatic variables are provided in **Table 1**.

[6] https://naturalresources.wales/flooding/check-your-flood-risk-on-a-map-flood-risk-assessment-wales-map/?lang=en
[7] https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/
[8] https://www.nhbs.com/soils-of-england-and-wales-sheet-3-flat-midland-and-western-england
[9] https://publications.naturalengland.org.uk/publication/6493605842649088#:~:text=This%20document%2C%20published%20by%20the,interpolate%20data%20are%20also%20described

Table 1 Agro-climatic variables

Grid Reference	SJ290624
Altitude (m)	108 m
Average Annual Rainfall (AAR)	824 mm
January-June Accumulated Temperature (AT0)	1350 day °C
Field Capacity Days (FCD)	187 days
Moisture Deficit Wheat (MDW)	86 mm
Moisture Deficit Potatoes (MWP)	72 mm

4 SOIL RESOURCES

4.1 Soil Types

1.1.19 The main soil type found in the area of the Proposed Development, the west laydown area, the east car park and east laydown area typically has either a heavy clay loam topsoil or an organic heavy clay loam topsoil overlying an upper subsoil of heavy clay loam and a lower subsoil of clay.

1.1.20 For the main soil type the topsoil depth ranges from 280mm to 400mm and the upper subsoil depth is typically about 200mm. In places there is no distinct upper subsoil and the heavy clay loam overlies clay at a depth of 350mm. Occasionally a lower subsoil of sandy clay loam may be present. In the east laydown area there are occurrences of either a sandy clay loam, a medium sandy loam or a medium clay loam topsoil overlying a subsoil of heavy clay loam.

1.1.21 The soil profile is typically either imperfectly or poorly drained. Where the soil is described as imperfectly drained there is ochreous mottling present in the soil below a depth of 400mm and a slowly permeable layer starting between a depth of 350mm and 660mm. Where the soil is described as poorly drained there is ochreous mottling present in the soil between the surface and above 400mm with a slowly permeable layer starting at a depth of between 350mm and 500mm. There are very occasional soil profiles for example at sample locations 5 and 7, where no slowly permeable layer was noted within a depth of 700 mm and with ochreous mottling present below 400mm, placing the profile in Wetness Class I. There are occasional profiles where the topsoil has a medium textured topsoil of sandy clay loam or medium clay loam (e.g. sample location 14 and soil pit 2). The stone content of the topsoil is described as very slightly stony (1-5%) and the subsoil as slightly stony (6-15%). The stone lithology is hard and the stone shape is rounded, with is described as being small (6mm-2cm).

1.1.22 The wooded area within the Proposed Development area may have been subject to disturbance in the past as there was foreign material such as brick fragments and plastic present within the upper subsoil. It was not possible to establish the extent of the presence of foreign materials due to the density of woodland undergrowth. There is reported disturbance of the land in the area of bunds with the Proposed Development area. There were sandstone fragments present within the soil examined, but no evidence of contamination by foreign material.

1.1.23 At the west car park area the soil has a medium sandy loam texture overlying a stone layer at a depth of 150mm.

4.2 Soil Units

1.1.24 Soils can differ in their susceptibility to compaction depending on their textural class, degree of structural development and water retention properties. Light textured soils with a clay content of less than 18%, such as sandy loam, are significantly less susceptible to compaction than a heavy textured soil with a clay content of between 27% and 35% such as a heavy clay loam, which has a low resilience to structural damage.

1.1.25 Three soil units have been identified which will require separate handling. The soils have been grouped into one of three soil units based on soil the texture recorded in the field. A separate unit has been identified for the wooded area due to the presence of foreign material. The soil grouping reflects the resilience to structural damage during soil handling. A summary of the soil found on site is provided in **Table 2**.

Table 2 Summary of soils on-site – typical profiles

Bottom Depth of Horizon (mm)	Colour/Texture	Drainage	Stones
Unit 1 (brown)			
350 (range 280 to 400)	Brown or Dark brown heavy clay loam or Dark greyish brown or Very Dark greyish brown organic heavy clay loam		Very slightly stony (1-5%)
580 (range 280 to 800)	Brown or dark greyish brown heavy clay loam	Common ochreous mottles	Slightly stony (5-15%)
1000 (range 400 to 1000)	Brown or greyish brown clay	Common ochreous mottles	Slightly stony (5-15%)
Unit 2 (green) car park			
150	Dark brown fine sandy loam		
Impenetrable	Stone(road)		
Unit 3 (yellow) (wooded area in CHP block)			
280	Brown heavy clay loam		Very slightly stony (1-5%)
450	Brown heavy clay loam (brick fragments and plastic)		Slightly stony (5-15%)
600(impenetrable)	Brown clay		Slightly stony (5-15%)

5 BUNDS COMPLIANCE WITH BRITISH STANDARD (BS3882:2015[10])

1.1.26 Two composite samples from bunds in the area of the proposed Carbon Capture Plant were analysed. The NRM Laboratories Certificates of Analysis are given in **Appendix 4** (Lab ID:59375-613465 and 59375-613466 for topsoil). The laboratory results reported that the samples failed to meet the specification for topsoil (BS3882:2015). The material in the bunds was not compliant as the coarse fragment content >20mm content exceeded the maximum limit of 10% w/w for this size of coarse fragment content. The certificates of analysis report the content as 10.2% w/w and 13.3% w/w.

[10] https://knowledge.bsigroup.com/products/specification-for-topsoil?version=tracked

6 SOIL NUTRIENTS

1.1.27 A summary of the laboratory results is given in **Table 3** and laboratory reports are in provided in **Appendix 3**.

Table 3 Summary of laboratory results

Sample location	Soil Unit	Soil Texture	pH	Available Phosphorus (Index) mg/l	Available Potassium (Index) mg/l	Available Magnesium (Index) mg/l
10	2	SL	7.8	7.4 (0)	35.5 (0)	28.1 (1)
11	1	O-HCL	6.5	27.0 (3)	60.9 (1)	67.7 (2)
15	1	HCL	5.9	5.4 (0)	58.8 (0)	58.4 (2)
18	1	O-HCL	7.7	6.2 (0)	32.3 (2)	23.4 (0)
soil pit 1 (SU1)	1	HCL	N/A	N/A	N/A	N/A
soil pit 2 (SU2)	1	SCL	6.1	13.2 (1)	58.8 (0)	35.9 (1)

7 DRAINAGE AND UTILITIES

1.1.28 It is recommended that prior to commencement of any soil stripping the current drainage condition of the Site should be assessed to ensure water is drained off site as quickly as possible. A record of ground conditions during construction works will be kept and any unmarked utilities located during the work will be recorded and protected.

1.1.29 A track sheet should record any existing drainage features located during soil stripping, including their type, depth, size, angle and condition. This detail will then be available to aid a review of the requirements for water management.

1.1.30 Any existing field drains which are cut off/damaged by the works should be diverted into local drainage ditches through silt traps, to minimise sediment release.

8 SOIL STRIPPING

1.1.31 The Soil Units plan (**Appendix 2**) shows three soil units identified during the survey of February 2023. The soils in the area of the Carbon Capture Plant (permanent development) in the south west part of the Site are to go off site due to lack of space for permanent bunds on-site (updated information April 2024). There are two soil units identified in this area and it is recommended that the soils be stripped and stored separately. The topsoil should be stripped separately to a depth of 350mm. The subsoil can be stripped to a depth of 1000mm. The bunds referred to in **Section 5** should be managed separately. The topsoil should be put to a beneficial use off site to ensure its many soil functions such as a carbon and water storage are retained.

1.1.32 In parts of the Site identified for temporary use during construction (sports ground A and B, laydown, preconstruction & offices) the topsoil is to be stripped and stored. These parts cover the three blocks of land identified on the Soil Resource Units Plan (**Appendix 2**). **Table 4** has been updated with volume figures provided by the Applicant (April 2024). In the temporary areas the topsoil is stripped in suitable conditions and stored. A suitable geo textile membrane should be laid over the subsoil and suitable aggregate placed on top.

The following points should be in place prior to the stripping of soil:

- The Site layout should accommodate designated soil storage areas;
- The volume of soil for the land blocks and is shown in **Table 4;**
- Best practice is to use an excavator and dump truck to strip and move soil;
- All machinery should operate and travel on subsoil or defined routes;
- Matting may be required on defined routes to contain and reduce soil compaction;
- Vegetation on the areas to be disturbed should be cut short to less than 100mm as necessary, no more than 2 weeks before stripping;
- A record of any soil placed in storage including an asset tag and a plan of the storage bunds should be maintained;
- The topsoil should be stripped to a depth of approximately 350m for Unit 1, a depth of 150mm for Unit 2 and a depth of 280mm for Unit 3; and
- Soil in bunds should be removed prior to any works commencing in the area of the Proposed Development.

Table 4: Soil Volumes

Land Block[1]	Area (ha)	Topsoil volume (m^3)
West car park (4)	0.5	1786
East car park (5)	0.9	2970
West laydown area (1,2,3,7)	1.4	5578
East laydown area (6)	2.3	7012

[1] Reference numbers used on Topsoil Strip areas plan from Applicant

9 SOIL MOISTURE ASSESSMENT

1.1.33 To minimise the risk of structural damage to the soil the soil should only be handled when in a dry and friable condition.

1.1.34 The following points should be considered on each occasion that soil handling is proposed:

- Topsoil stripping will only occur when the soils are as dry as reasonably practicable (normally below the plastic limit and not normally within 24 hours of significant rainfall (i.e. >10mm in a 24 hour period);
- During light rainfall events local level decisions to proceed or stop should be based on the current wetness state of the soils being handled;
- There should be no surface water standing in the area to be stripped;
- The ground should be sufficiently dry for traffic to travel across without forming ruts; and
- Soil should not be moved when the ground is covered by snow or is frozen.

1.1.35 To determine the suitability of the soil for handling the following in-field soil moisture test should be undertaken to assess the moisture content of the soil prior to working.

1.1.36 The method involves rolling a ball of soil into intact threads (3mm diameter), which if possible, indicate the soils are in a plastic and wet condition[11] [12] [13] (refer to **Table 6**). A visual examination of the soil taken initially and then an assessment of the soil consistency (the cohesion and adhesion of the soil) as set out in **Tables 5, 6 and 7** should be undertaken.

Table 5: Visual Assessment of Soil Moisture

Soil Condition	Procedure
If the soil is wet, films of water are visible on the surface of the soil particles or aggregates and/or when a soil sample is squeezed by hand and readily deforms into a 'cohesive' ball	NO HANDLING
Soil peds readily break up or crumble when squeezed in the hand	HANDLING OK
If the sample is moist (a slight dampness when squeezed by hand) but the soil colour does not change upon further wetting	HANDLING OK IF UNDERTAKEN BY TRACKED EXCAVATOR AND CONSISTENCY TEST IS PASSED
If the sample is dry and darkens if water is added the soil is brittle	HANDLING OK IF CONSISTENCY TEST IS PASSED

[11] HM Stationery Office (1982). MAFF Reference Book 441 Techniques for measuring soil physical properties.
[12] https://www.gov.uk/government/publications/reclaim-minerals-extraction-and-landfill-sites-to-agriculture/planning-and-aftercare-advice-for-reclaiming-land-to-agricultural-use
[13] https://www.quarrying.org/soils-guidance

Table 6: Consistency Test (1)

Attempt to mould a soil sample into a ball by hand:

Soil Condition	Procedure
Impossible because the soil is too hard or dry	HANDLING OK
Impossible because the soil is too loose (dry)	HANDLING OK
Impossible because the soil is too loose and wet	HANDLING NOT OK
Possible	GO to **Table 6**

Table 7: Consistency Test (2)

Attempt to roll the ball by hand into a thread of 3mm diameter on a flat non-adhesive surface

Soil Condition	Procedure
Impossible the soil crumbles or disintegrates	HANDLING OK
Possible	NO HANDLING

10 SOIL STORAGE

1.1.37 Topsoil from different soil units should be stored in separate soil bunds and placed on soil in a similar soil unit.

1.1.38 The following points should be considered when planning soil storage to keep soil aerated, reduce erosion, runoff and ponding:

- The soil bund should ideally be no higher than 3m for topsoil, but may be raised to 3.5m in order to retain on-site during construction the soil resources from the temporary areas;
- The side slopes should be between 25° and 45°;
- The bund should be shaped to shed water;
- Be located on dry level ground;
- Not disrupt any natural surface drainage;
- The bund should be seeded with a suitable grass mix;
- The bund should be treated for weeds; and
- Grass on the bund should be cut at least twice a year.

1.1.39 A record should be kept of soil placed into storage. Each bund should be identified by asset tag and include details of the soil volume and soil unit.

Soil Storage

- Topsoil and subsoil of different soil units should be stored in separate soil stores;
- Topsoil should be stored in bunds, where possible up to 3m high and no higher than 3.5m. The bunds should be lightly formed to consolidate the surface, to shed water;
- Topsoil should be stored on topsoil and subsoil should be stored on subsoil;
- It is recommended that soil stores be placed close to the original location of the soil to be stored, in defined areas for screening and final restoration of land to be restored to agricultural use or non agricultural use;
- Soil stores should be set back by more than 0.5m from any excavation to prevent soils slumping into the cut;
- A record should be kept of any soils which are placed in store. All bunds should be labelled with their land use at the time of stripping, volume and soil type (e.g. pasture, ***m^3; Unit 1 topsoil);
- All bunds which will be in place for more than 6 months should be sown with a low maintenance grass seed mix at a rate of 5g/m^2; and
- All soil bunds should be inspected in spring to ensure that the grass cover is intact and to decide if an herbicide is required to control invasive weeds. The species present will determine the most appropriate herbicide.

11 RESTORATION OF LAND

11.1 Restoration Phase

1.1.40 During restoration of the land the following points should be taken into account when planning the works:

- Wherever possible, soil reinstatement should only be undertaken between mid-April and mid-October when soils are likely to be at their driest;
- The Site should be free of litter, waste, construction materials roadstone and protective covers such as geosynthetics prior to work commencement;
- Ten days prior to soil reinstatement soil bunds should be sprayed off if vegetated;
- To minimise compaction of subsoils during restoration works, potentially resulting in soil structural damage that could be impossible to resolve in the short term, soil replacement should only take place when the soils are below their plastic limit and not within 24hrs of significant rainfall (i.e. >10mm in 24hrs). This will allow a full day of drying before work recommences;
- The cleared surface should be soil sampled in areas most at risk of having been contaminated (such as from under fuel stores and from any areas of imported material which could have contained potentially toxic substances), to ensure the soils are suitable for use. Samples should be collected and submitted to UKAS and MCERTS accredited laboratories for a range of commonly occurring pollutants such as metals, oils and polycyclic aromatic hydrocarbons (PAHs);
- Any excavations in the subsoil should be backfilled and the subsoil surface reformed and very lightly consolidated to reduce settlement. Any surplus subsoils should be spread evenly over the area, ensuring that the natural contours are maintained to allow surface water flow over the restored profile;
- If required due to damage to an existing old drainage system, new drains should be installed into the subsoil;
- Subsoil compaction should be removed prior to replacing the topsoil. Subsoiling should be carried out in a sinuous line, at an angle to the line of the haul road and any drains; where possible extending into the undisturbed soil on the lower side of the temporary working area. The depth of working and the type of equipment used will be determined by the depth of compaction;
- Soils should be replaced with the minimum number of vehicular movements necessary, to avoid re-compacting the loosened surface. Restoration should start at the furthest point from each site exit to ensure that soils once deposited are not trafficked by earth moving machinery;
- Particular care should be taken to minimise re-compaction of the subsoil by carefully controlling traffic movement along defined routes and working only in dry conditions. The defined route will have to be loosened again prior to topsoil placement; and
- Topsoil should be reinstated to their full depth, maintaining and tying into the original contours on either side of the strip to allow surface water flow.

11.2 Aftercare

1.1.41 After hand back of reinstated land, any aftercare responsibility will be as agreed by the contractors and landowners. On completion of the restoration works the soils will be in a fragile condition and all work should be geared towards stabilising the soil structure. Where there is to be an agricultural use (e.g. West laydown area) establishing a strongly growing crop will help to ensure the best chance of a successful and sustainable restoration. Timing of cultivation operations will be critical to the success of the restoration with the soils only being worked when in a dry and friable condition.

12 TRAFFICKING

1.1.42 For any construction on site there exists the risk of soil compaction from the use of heavy machinery and traversing land in unsuitable ground conditions. The aim should be to minimise the risk through appropriate site management during the construction phase. Much of the Site is classified as having a low resilience to structural soil damage and hence there exists the risk of soil compaction of the Site.

1.1.43 The management of trafficking on-site and traversing the land when the soil is in a suitable dry condition is key to managing the risk of soil compaction. Where land is to be returned to an agricultural use it is important that the risk of soil compaction and its management is considered as part of the pre-construction planning.

1.1.44 As a guide to planning operations it should be noted that the Field Capacity Day figure for the Site is about 187 days. The term Field Capacity is a measure of the duration of climatic wetness when soils hold the maximum amount of water. In a normal year the soils are likely to return to Field Capacity in mid October and remain at Field Capacity until mid April. However this could vary by a month either end depending on the rainfall during the year. As a general guide planning of the construction works should take this into consideration and either avoid or undertake minimal traversing across the Site and soil handling during the period mid October to mid April. An on-site inspection of the soil condition prior to any soil handling or trafficking is essential.

1.1.45 Using machinery such as dump trucks fitted with tracks or low ground pressure tyres to spread the weight of the machinery should be used.

1.1.46 All traffic should keep to defined routes across the Site to contain the risk of soil compaction. All operations for stripping soil should be undertaken on subsoil.

13 REFERENCES

British Geological Society. *BGS Geology Viewer*. Available at: https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/ (Accessed 07/03/2024)

British Standards Institution (2015). *BS3882:2015 Specification for topsoil*. Available at: https://knowledge.bsigroup.com/products/specification-for-topsoil?version=tracked

Department for Environment Food & Rural Affairs (2009). *Construction Code of Practice for the Sustainable Use of Soils on Construction-sites*. Available at: https://assets.publishing.service.gov.uk/media/5b2264ff40f0b634cfb50650/pb13298-code-of-practice-090910.pdf

HM Stationery Office (1982). *MAFF Reference Book 441 Techniques for measuring soil physical properties*.

Meteorological Office (1989). *Climatological Data for Agricultural Land Classification*. Available at:https://publications.naturalengland.org.uk/publication/6493605842649088#:~:text=This%20document%2C%20published%20by%20the,interpolate%20data%20are%20also%20described

Natural England (1988). *Agricultural Land Classification of England and Wales: Revised criteria for grading the quality of agricultural land (ALC011)*. Available at: https://publications.naturalengland.org.uk/publication/6257050620264448

Natural England (2021). *Planning and aftercare advice for reclaiming land to agricultural use*. Available at: https://www.gov.uk/government/publications/reclaim-minerals-extraction-and-landfill-sites-to-agriculture/planning-and-aftercare-advice-for-reclaiming-land-to-agricultural-use

Natural Resources Wales. *Flood Risk Map*. Available at: https://naturalresources.wales/flooding/check-your-flood-risk-on-a-map-flood-risk-assessment-wales-map/?lang=en

Soil Survey of England and Wales. *Soil Map of England and Wales Sheet 3 Midlands and Western England scale 1:250 000*. Available at: https://www.nhbs.com/soils-of-england-and-wales-sheet-3-flat-midland-and-western-england

The Institute of Quarrying (2021). *Good Practice Guide for Handling Soils in Mineral Workings*. Available at: https://www.quarrying.org/soils-guidance

The Institute of Quarrying (2021). *Good Practice Guide for Handling Soils Supplementary Note 4 Soil Wetness*. Available at: https://www.quarrying.org/soils-guidance

Welsh Government (2023). *Predictive Agricultural Land Classification Map*. Available at: https://datamap.gov.wales/maps/new?layer=inspire-wg:wg_predictive_alc2#/

2 APPENDIX 1: SOIL UNIT DESCRIPTIONS

Soil Handling Unit 1 (brown)

These soils typically have either a heavy loam or organic heavy clay loam topsoil overlying an imperfectly or poorly drained upper subsoil of heavy clay loam and a lower subsoil of clay. The topsoil is described as very slightly stony (1-5%) and the subsoil as slightly stony (5-15%). The heavy textured soils have a low resilience to structural damage during soil handling. There are a few soil profiles of medium textured topsoils, but they cannot be practically placed in a separate soil unit.

1) example soil profile (soil pit 1 near sample location 5) is described below:

0-380mm brown (7.5YR4/3) heavy clay loam; very slightly stony (1-5%) with a few small, rounded stones; weakly developed fine subangular blocky structure; friable; many roots.

380-400mm brown (7.5YR4/3) heavy clay loam; few faint ochreous mottles; slightly stony (5-15%) with a few small, rounded stones; weakly developed fine subangular blocky structure; friable; common roots; more than 0.5% biopores greater than 0.5mm diameter.

400-550mm brown (10YR5/3) heavy clay loam; very firm; common ochreous mottles; slightly stony (5-15%) with occasional stone >6 cm and small rounded stones; weakly developed coarse angular blocky structure; less than 0.5% biopores greater than 0.5mm diameter; fine roots.

550-700mm augered brown (10YR5/3) heavy clay loam

2) example soil profile (soil pit 2 near sample location 14) is described below and is included within Soil Unit 1 as too small a unit to separate:

0-300mm dark brown (10YR3/3) sandy clay loam; very slightly stony (1-5%) with a few small, rounded stones; weakly developed fine subangular blocky structure; friable; many roots.

300-400mm dark brown (10YR3/3) sandy clay loam; very slightly stony (1-5%) with a few small, rounded stones; weakly developed fine subangular blocky structure; friable; many roots; more than 0.5% biopores greater than 0.5mm diameter.

400-500mm brown (10YR5/3) heavy clay loam; firm; common ochreous mottles; slightly stony (5- 15%) with occasional stone >6 cm and small rounded stones; weakly developed coarse angular blocky structure; more than 0.5% biopores greater than 0.5mm diameter; fine roots.

500-600mm augered brown (10YR5/3) heavy clay loam with small, rounded pebble present at 550 mm

These soils are either imperfectly drained and placed in Wetness Class III or are poorly drained and placed in Wetness Class IV. A summary of Unit 1 is provided in **Table 8**.

Table 8 Unit 1 Summary

Unit 1 (brown)			
350 (range 280 to 400)	Brown or Dark brown heavy clay loam or Dark greyish brown or Very Dark greyish4/3)) brown organic heavy clay loam		Very slightly stony (1-5%)
580 (range 280 to 800)	Brown or dark greyish brown heavy clay loam	Common ochreous mottles	Slightly stony (5-15%)
1000 (range 400 to 1000)	Brown or greyish brown clay	Common ochreous mottles	Slightly stony (5-15%)

Soil Handling Unit 2 (green)

This soil unit covers the amenity grassland of the proposed west car park block, where there is a shallow depth of a light textured topsoil (150 mm) overlying stone which was impenetrable with a handheld auger . A summary of soil handling unit 2 is provided in Table 9.

Table 9 Soil Handling Unit 2 Summary

Unit 2 (green) car park	
150	Dark brown fine sandy loam
Impenetrable	Stone(road)

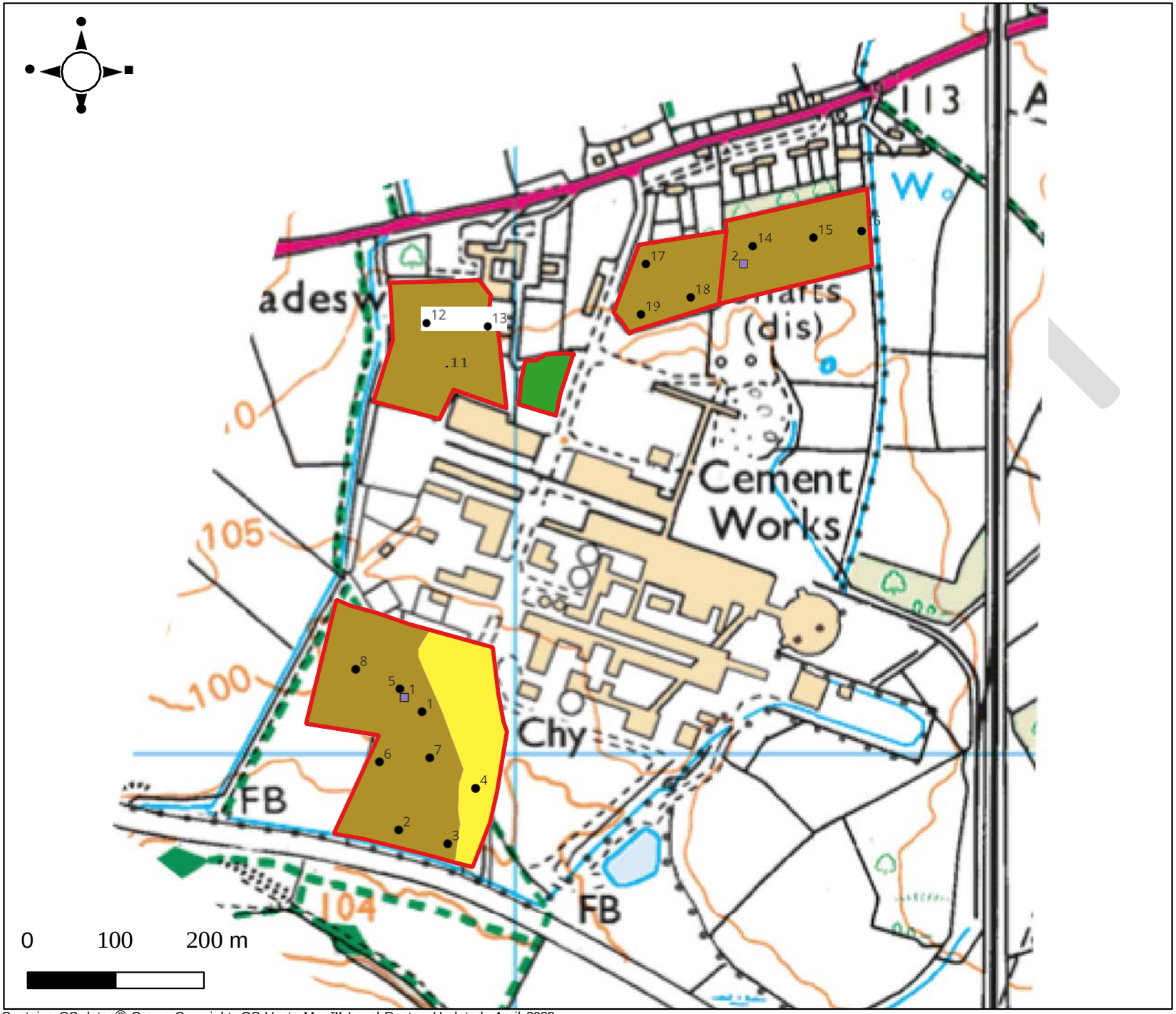
Soil Handling Unit 3 (yellow)

This soil unit covers the woodland area in the Proposed Development block. Much of the woodland was impenetrable due to undergrowth. At the sample location within the woodland brick fragments and plastic was present. The extent of the presence of foreign materials is unknown. A summary of soil handling unit 3 is provided in Table 10.

Table 10 Soil Handling Unit 3 Summary

Unit 3 (yellow) (wooded area in CHP block)		
280	Brown heavy clay loam	Very slightly stony (1-5%)
450	Brown heavy clay loam (brick fragments and plastic)	Slightly stony (5-15%)
600(impenetrable)	Brown clay	Slightly stony (5-15%)

3 APPENDIX 2: SOIL HANDLING UNITS PLAN



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Title

Soil Resource Units Plan

Project

SRA - Padeswood Cement Works (rsk9002 - 17)

- Augers
- Pits
- Survey Area
- Unit 1 (Heavy)
- Unit 2 (Shallow Light)
- Unit 3 (Woodland - Heavy)

Date: 12 / 04 / 2023

ADAS

www.adas.uk

4 APPENDIX 3: LABORATORY RESULTS

4.1 Certificate of Analysis

Client: DARREN INGRAM
(K740) RSK ADAS LTD
PRESTON WYNNE
HEREFORD
HR1 3PG

Originator: 1010626
PADESWOOD
R METCALFE
SOIL 16-02-2023
1010626

Lab ID: 59375 - 612465
Sample ID: M1

Date Received: 23/02/2023
Date Reported: 13/03/2023

Sample Weight: 998g

BS 3882 : 2015 SPECIFICATION FOR TOPSOIL
Fails BS 3882

		Unit	Result		Compliant with range (Y/N) Multi-P	Acid	Calc	Low-F	Low-F Acid	Low-F Calc
Texture:	Clay	% w/w	24							
	Silt	% w/w	25			*See area of permitted soil textural classes in Fig. 1.*				
	Sand	% w/w	51							
	Textural Class		Sandy Clay Loam		Y	Y	Y	Y	Y	Y
Organic Matter:		% w/w	3.8		N	N	N	Y	Y	Y
Coarse	>2 mm	% w/w	18.9		Y	Y	Y	Y	Y	Y
Fragment	>20 mm	% w/w	13.3		N	N	N	N	N	N
Content:	>50 mm	% w/w	0.0		Y	Y	Y	Y	Y	Y
Soil pH:			7.8		Y	N	Y	Y	N	Y
Carbonate:		% w/w	3.3				Y			Y
Available	Nitrogen	% w/w	0.153		Y	Y	Y			
Plant	Phosphorus	mg/l	4.4	(0)*	N	N	N	Y	Y	Y
Nutrients:	Potassium	mg/l	49.2	(0)*	N	N	N			
	Magnesium	mg/l	122.8	(3)*	Y	Y	Y			
Carbon:Nitrogen Ratio:		:1	24.4		Y	Y	Y	Y	Y	Y
Exchangeable Sodium Percentage:		%	2.5		Y	Y	Y	Y	Y	Y
Visible	>2mm	% w/w	0.00		Y	Y	Y	Y	Y	Y
Contaminants:	Plastics	% w/w	0.00		Y	Y	Y	Y	Y	Y
	Number of Sharps		0		Y	Y	Y	Y	Y	Y
Additional	Available Sodium	mg/l	12.1							
Analysis:	Available Calcium	mg/l	1816.0							
	Conductivity	uS/cm	2095		Y					
Compliancy:					**N**	**N**	**N**	**N**	**N**	**N**
Phytotoxic	Total Copper	mg/kg	21.5		Y	Y	Y	Y	Y	Y
Contaminants:	Total Nickel	mg/kg	27.2		Y	Y	Y	Y	Y	Y
	Total Zinc	mg/kg	81.5		Y	Y	Y	Y	Y	Y

Results are expressed on a dry matter basis.
* Soil indices from RB209

Released by: *Myles Nicholson* **Date: 13/03/2023**

DECLARATION: I certify that this sample has been analysed by NRM in accordance with BS 3882 Specification for Topsoil (2015).

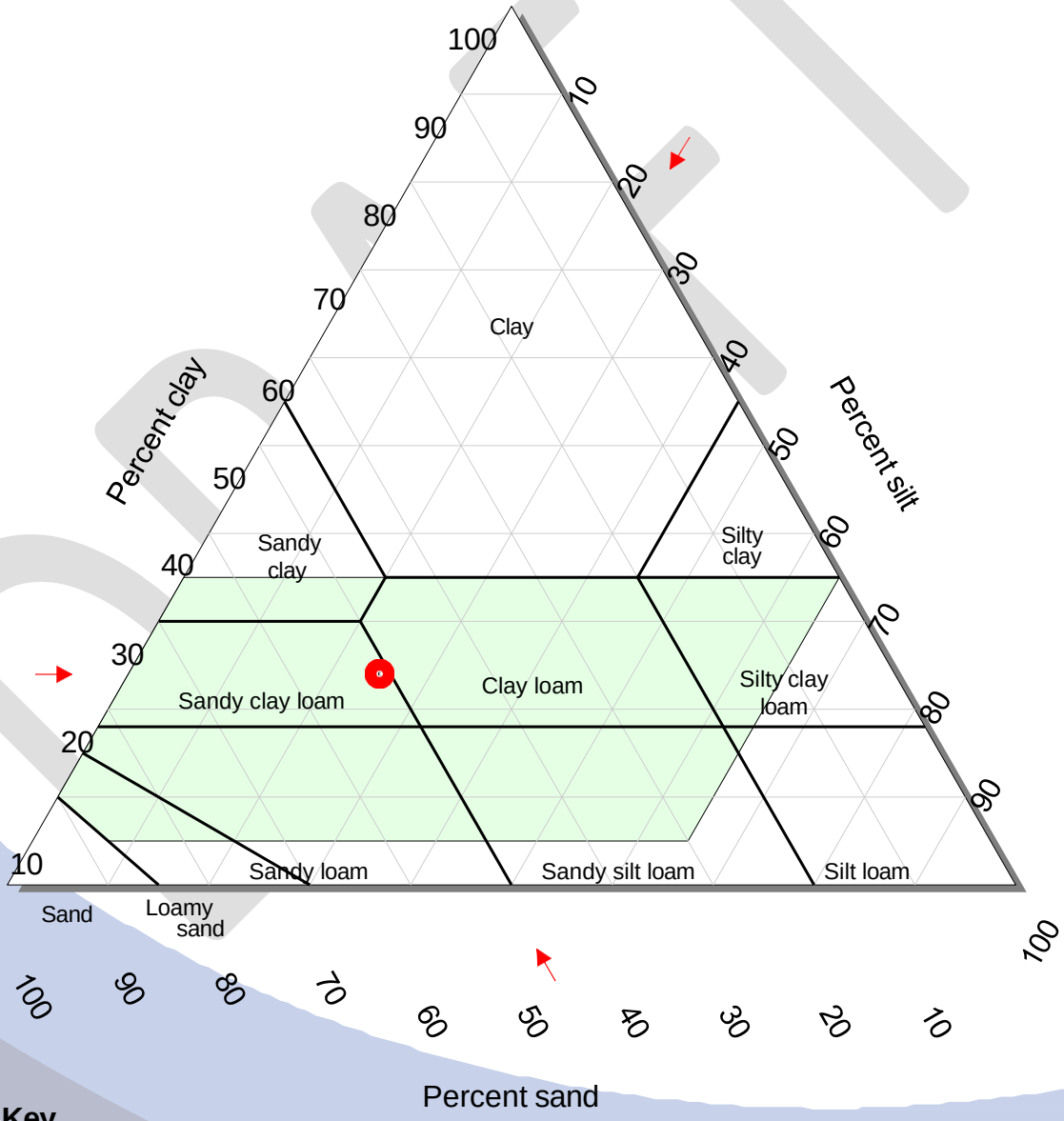
NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 Fax: +44 (0) 1344 890972 Email: enquiries@nrm.uk.com www.nrm.uk.com

4.2 Analytical Report

Client:	DARREN INGRAM	**Originator:**	1010626
(K740)	RSK ADAS LTD		PADESWOOD
	PRESTON WYNNE		R METCALFE
	HEREFORD		SOIL 16-02-2023
	HR1 3PG		1010626

Lab ID:	59375 - 612465	**Date Received:**	23/02/2023
Sample ID:	M1	**Date Reported:**	13/03/2023
Sample Weight:	998g		

Fig. 1. Textural Class: Sandy Clay Loam (compliant)



Key

Area within which texture of topsoil is required to fall.

Tel: +44 (0) 1344 886338 Fax: +44 (0) 1344 890972 Email: enquiries@nrm.uk.com www.nrm.uk.com

NRM Laboratories is a division of Cawood Scientific Ltd, Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS Registered Number: 05655711

4.3 Certificate of Analysis

Client: (K740)
DARREN INGRAM
RSK ADAS LTD
PRESTON WYNNE
HEREFORD
HR1 3PG

Originator:
1010626
PADESWOOD
R METCALFE
SOIL 16-02-2023
1010626

Lab ID: 59375 - 612466
Sample ID: M2

Date Received: 23/02/2023
Date Reported: 13/03/2023

Sample Weight: 771g

BS 3882 : 2015 SPECIFICATION FOR TOPSOIL
Fails BS 3882

		Unit	Result		Compliant with range (Y/N) Multi-P	Acid	Calc	Low-F	Low-F Acid	Low-F Calc
Texture:	Clay	% w/w	25							
	Silt	% w/w	29			*See area of permitted soil textural classes in Fig. 1.*				
	Sand	% w/w	46							
	Textural Class		Clay Loam		Y	Y	Y	Y	Y	Y
Organic Matter:		% w/w	7.7		Y	Y	Y	Y	Y	Y
Coarse	>2 mm	% w/w	11.4		Y	Y	Y	Y	Y	Y
Fragment	>20 mm	% w/w	10.2		N	N	N	N	N	N
Content:	>50 mm	% w/w	0.0		Y	Y	Y	Y	Y	Y
Soil pH:			5.5		Y	Y	N	Y	Y	N
Carbonate:		% w/w	<1				N			N
Available	Nitrogen	% w/w	0.368		Y	Y	Y			
Plant	Phosphorus	mg/l	18.0	(2)*	Y	Y	Y	Y	Y	Y
Nutrients:	Potassium	mg/l	261.0	(3)*	Y	Y	Y			
	Magnesium	mg/l	89.9	(2)*	Y	Y	Y			
Carbon:Nitrogen Ratio:		:1	12.1		Y	Y	Y	Y	Y	Y
Exchangeable Sodium Percentage:		%	2.9		Y	Y	Y	Y	Y	Y
Visible	>2mm	% w/w	0.00		Y	Y	Y	Y	Y	Y
Contaminants:	Plastics	% w/w	0.00		Y	Y	Y	Y	Y	Y
	Number of Sharps		0		Y	Y	Y	Y	Y	Y
Phytotoxic	Total Copper	mg/kg	17.9		Y	Y	Y	Y	Y	Y
Contaminants:	Total Nickel	mg/kg	22.1		Y	Y	Y	Y	Y	Y
	Total Zinc	mg/kg	80.6		Y	Y	Y	Y	Y	Y
Additional	Available Sodium	mg/l	11.1							
Analysis:	Available Calcium	mg/l	807.5							
	Conductivity	uS/cm	2128		Y					
Compliancy:					**N**	**N**	**N**	**N**	**N**	**N**

Results are expressed on a dry matter basis.
* Soil indices from RB209

Released by: *Myles Nicholson* **Date: 13/03/2023**

DECLARATION: I certify that this sample has been analysed by NRM in accordance with BS 3882 Specification for Topsoil (2015).

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 Fax: +44 (0) 1344 890972 Email: enquiries@nrm.uk.com www.nrm.uk.com

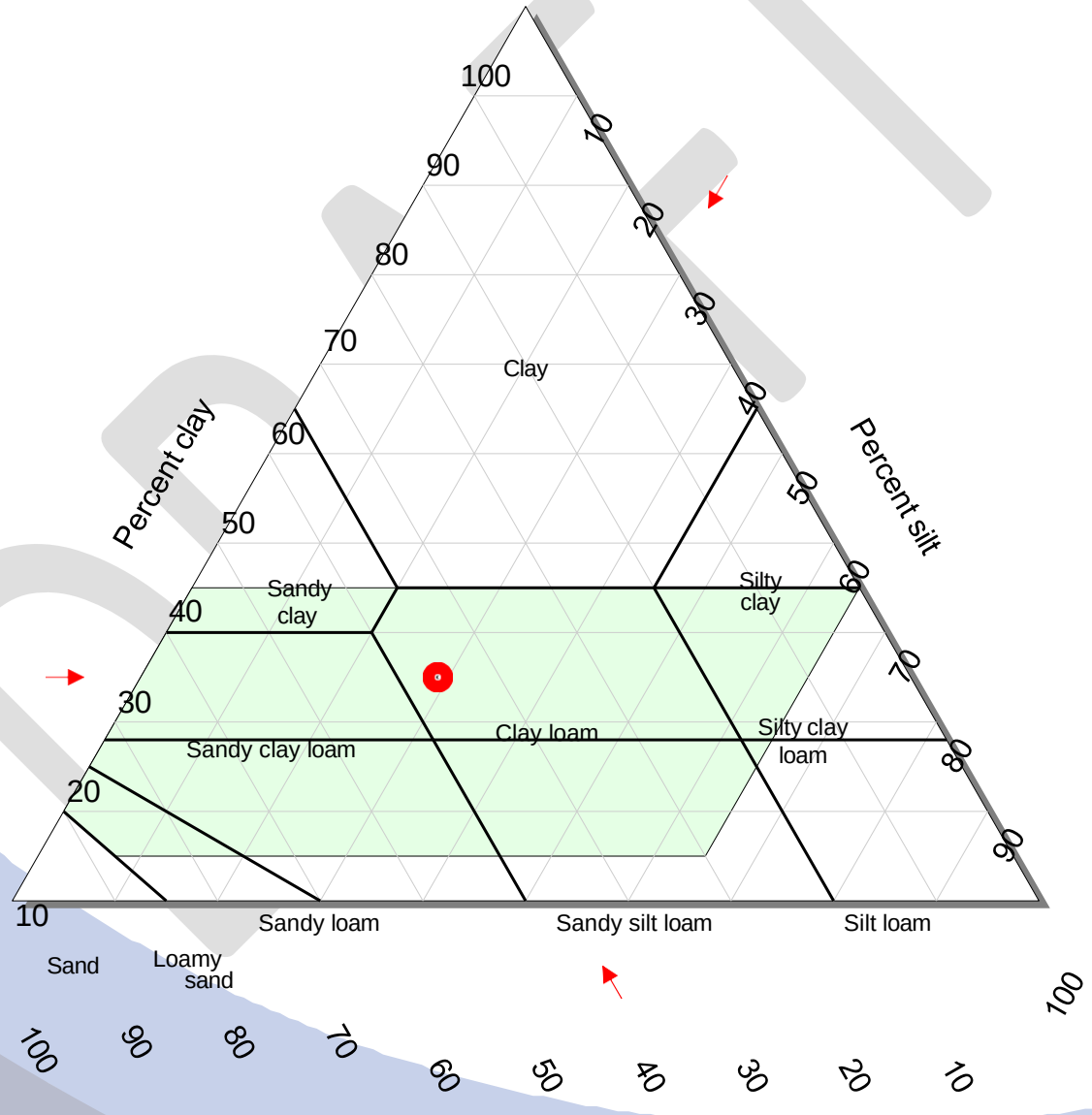
4.4 Analytical Report

Client:	DARREN INGRAM	**Originator:**	1010626
(K740)	RSK ADAS LTD		PADESWOOD
	PRESTON WYNNE		R METCALFE
	HEREFORD		SOIL 16-02-2023
	HR1 3PG		1010626

Lab ID:	59375 - 612466	**Date Received:**	23/02/2023
Sample ID:	M2	**Date Reported:**	13/03/2023

Sample Weight: 771g

Fig. 1. Textural Class: Clay Loam (compliant)



Key

Area within which texture of topsoil is required to fall.

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 Fax: +44 (0) 1344 890972 Email: enquiries@nrm.uk.com www.nrm.uk.com

ANALYTICAL REPORT

Report Number	**59374-23**	**K740**	**DARREN INGRAM**	**Client**	**PADESWOOD**
Date Received	**23-FEB-2023**		**RSK ADAS LTD**		**R METCALFE**
Date Reported	**27-MAR-2023**		**PRESTON WYNNE**		**SOIL 16-02-2023**
Project	**1010626**		**HEREFORD**		
Reference	**PADESWOOD R METCALFE**		**HR1 3PG**		
Order Number					

Laboratory Reference		**SOIL612461**	**SOIL612462**	**SOIL612463**	**SOIL612464**
Sample Reference		**10**	**11**	**15**	**18**
Determinand	**Unit**	**SOIL**	**SOIL**	**SOIL**	**SOIL**
pH water [1:2.5]		7.8	6.5	5.9	7.7
Available Phosphorus (Index)	mg/l	7.4 (0)	27.0 (3)	5.4 (0)	6.2 (0)
Available Potassium (Index)	mg/l	35.5 (0)	60.9 (1)	58.8 (0)	32.3 (0)
Available Magnesium (Index)	mg/l	28.1 (1)	67.7 (2)	58.4 (2)	23.4 (0)
Sand 2.00-0.063mm	% w/w	72	39	39	40
Silt 0.063-0.002mm	% w/w	15	32	30	32
Clay <0.002mm	% w/w	13	29	31	28
Available Sodium	mg/l	6.5	15.9	14.0	20.9
Available Calcium	mg/l	1270	2022	1552	1776
Organic Matter LOI	% w/w	3.6	10.7	7.9	10.4
Total Nitrogen	% w/w	0.172	0.475	0.393	0.465
Textural Class **		SL	O-HCL	HCL	HCL
Estimated CEC	meq/100g	10.7	16.0	14.9	12.0

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.

REPORT FOR SAMPLE LOCATIONS 10,11,15 AND 19

ANALYTICAL REPORT

Report Number	**59373-23**	**K740**	**DARREN INGRAM**	**Client PADESWOOD-R METCALFE**
Date Received	**23-FEB-2023**		**RSK ADAS LTD**	**SOIL 16-02-2023**
Date Reported	**08-MAR-2023**		**PRESTON WYNNE**	
Project	**1010626**		**HEREFORD**	
Reference	**PADESWOOD R METCALFE**		**HR1 3PG**	
Order Number				

Laboratory Reference		**SOIL612460**
Sample Reference		**SU1**
Determinand	**Unit**	**SOIL**
Sand 2.00-0.063mm	% w/w	42
Silt 0.063-0.002mm	% w/w	28
Clay <0.002mm	% w/w	30
Textural Class **		HCL

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

** Please see the attached document for the definition of textural classes.

Reported by

Myles Nicholson

Natural Resource Management, a trading division of Cawood Scientific Ltd.
Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS
Tel: 01344 886338
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REPORT OF PSD FOR SOIL PIT (1) NEAR SAMPLE LOCATION 5

ANALYTICAL REPORT

Report Number	**59635-23**	**K740**	**DARREN INGRAM**	**Client**	**PADESWOOD**
Date Received	**24-FEB-2023**		**RSK ADAS LTD**		**R METCALFE**
Date Reported	**27-MAR-2023**		**PRESTON WYNNE**		**SOIL 16-02-2023**
Project	**1010626**		**HEREFORD**		
Reference	**PADESWOOD R METCALFE**		**HR1 3PG**		
Order Number					

Laboratory Reference		**SOIL612556**
Sample Reference		**SU2**
Determinand	**Unit**	**SOIL**
pH water [1:2.5]		6.1
Available Phosphorus (Index)	mg/l	13.2 (1)
Available Potassium (Index)	mg/l	58.8 (0)
Available Magnesium (Index)	mg/l	35.9 (1)
Sand 2.00-0.063mm	% w/w	51
Silt 0.063-0.002mm	% w/w	26
Clay <0.002mm	% w/w	23
Organic Matter LOI	% w/w	6.5
Total Nitrogen	% w/w	0.362
Textural Class **		SCL

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.

** Please see the attached document for the definition of textural classes.

Reported by

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

REPORT FOR SOIL PIT (2) NEAR SAMPLE LOCATION 14 (psd)

ANALYTICAL REPORT

Report Number	**59635-23**	**K740**	**DARREN INGRAM**	**Client**	**PADESWOOD**
Date Received	**24-FEB-2023**		**RSK ADAS LTD**		**R METCALFE**
Date Reported	**13-MAR-2023**		**PRESTON WYNNE**		**SOIL 16-02-2023**
Project	**1010626**		**HEREFORD**		
Reference	**PADESWOOD R METCALFE**		**HR1 3PG**		
Order Number					

Laboratory Reference		**SOIL612556**
Sample Reference		**SU2**
Determinand	**Unit**	**SOIL**
pH water [1:2.5]		6.1
Available Phosphorus (Index)	mg/l	13.2 (1)
Available Potassium (Index)	mg/l	58.8 (0)
Available Magnesium (Index)	mg/l	35.9 (1)
Organic Matter LOI	% w/w	6.5
Total Nitrogen	% w/w	0.362

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

Reported by

Myles Nicholson

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REPORT FOR SOIL PIT (2) NEAR SAMPLE LOCATION 14

5 APPENDIX 4: AGRICULTURAL LAND CLASSIFICATION

Introduction

A survey to prepare a soil resource assessment and management plan was undertaken by ADAS in February 2023. Following a client request after this survey an Agricultural Land Classification (ALC) summary report of the blocks of land has been prepared.

The MAFF Agricultural Land Classification Revised Guidelines[14] provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. A description of the grades is provided below.

The Welsh Government Predictive Agricultural Land Classification Map[15] shows the survey areas as Subgrade 3b, non agricultural land and urban.

The land in the proposed parking areas and laydown areas was generally level. The Proposed Development block of land had a gradient of less than 7° and sloped towards the southern Site boundary. Gradient is not a limitation to the agricultural use of the land. The land rises from an altitude of 95m above sea level at the southern boundary of the CHP block of land to about 110m above sea level close to the A5118 road.

The blocks of land[16] generally have a low risk of flooding from surface water and small watercourses. At the southern boundary of theProposed Development there is a high risk of flooding from surface water and a watercourse draining towards Padeswood Pool. There is no risk of flooding from rivers in the area of the Cement works.

The Geology of Britain viewer map[17] shows the basal geology over much of the land as Pennine Lower Coal Measures, comprising mudstone, siltstone and sandstone laid down in the Carboniferous Period (319-318 million years ago). At the north western block of land (west laydown area) the basal geology is shown as Pennine Middle Coal Measures, comprising mudstone, siltstone and sandstone, laid down in the Carboniferous Period (318-309.5 million years ago). Part of the block of land for the proposed CHP the underlying geology is shown as Gwespyr Sandstone, comprising sandstone and argillaceous rocks of the Carboniferous Period (320 to 318 million years ago). All the land is covered by superficial deposits of till (Devensian) of the Quaternary Period (116-11.8 thousand years ago).

The Soil Map of England and Wales[18], published at 1:250 000 scale, records the land in the vicinity of Padeswood as belonging to the Brickfield 3 Soil Association. Soils of the Brickfield 3 Soil Association are typically fine loamy and loamy over clayey and clayey subsoils, which are slowly permeable and seasonally waterlogged. A typical soil profile is described as having a topsoil texture of clay loam over a subsoil of clay loam.

A summary of the findings by grade is provided below:

[14] https://publications.naturalengland.org.uk/publication/6257050620264448
[15] https://datamap.gov.wales/maps/new?layer=inspire-wg%3Awg_predictive_alc2&/
[16] https://naturalresources.wales/flooding/check-your-flood-risk-on-a-map-flood-risk-assessment-wales-map/?lang=en
[17] http://www.bgs.ac.uk/data/mapViewers/
[18] https://www.nhbs.com/soils-of-england-and-wales-sheet-3-flat-midland-and-western-england

Subgrade 3b land includes soils with either a heavy clay loam or an organic heavy clay loam (organic matter content more than 10%) topsoil overlying heavy clay loam upper subsoil at depths of between 28cm and 8cm from the surface and a lower subsoil of clay. There is evidence of gleying within 40cm of the surface and a slowly permeable layer starting within a depth of 68cm from the surface. These soils are placed in Wetness Class III and the main limitation to the agricultural use of the land is soil wetness.

There are occasional soil profiles (e.g. sample locations 5 and 7 (CHP block)) where there is gleying present below a depth of 40cm from the surface and the lower subsoil has a sandy clay loam texture. These soils are placed in Wetness Class I and Subgrade 3a. These soils cannot be mapped as a separate unit and are mapped within the Subgrade 3b land.

Grade 4 land includes soils with either a heavy clay loam or an organic heavy clay loam topsoil overlying clay subsoil at depths of between 35cm and 45cm. There is evidence of gleying above a depth of 40cm from the surface and a slowly permeable layer starting within a depth of 51cm from the surface.

These soils (e.g. sample locations 4, 11 and 13) are placed in Wetness Class IV and the main limitation to the agricultural use of the land is soil wetness.

Other land includes non agricultural land in the west car park, the east car park and the east laydown area. These areas include an area of amenity grass and sports field. An area of woodland in the Proposed Development block is mapped separately.

The survey classified the land within the Site boundary is presented in Table 11 and Table 12. A summary of the augers taken is provided in Table 13.

Table 11 Agricultural Land Classification Grade

Agricultural Land Classification Grade	Total Area (ha)	% of Site
1	0	0
2	0	0
3a	0	0
3b	3.42	37.4
4	1.56	16.9
5	0	0
Other land: non agricultural land	2.80	30.4
Other land: woodland	1.41	15.3
Total	9.19	100

Table 12 Agricultural land classification grade

Agricultural Land Classification Grade (ha)	CHP Block	West Car Park Block	West Laydown Block	East Car Park Block	East Laydown Block
1	0	0	0	0	0
2	0	0	0	0	0
3a	0	0	0	0	0
3b	2.51	0	0.91	0	0
4	0.70	0	0.86	0	0
5	0	0	0	0	0
Other land: non agricultural land	0	0.3	0	0.99	1.51
Other land: woodland	1.41	0	0	0	0
Total	4.62	0.3	1.77	0.99	1.51

Table 13 Summary of augers

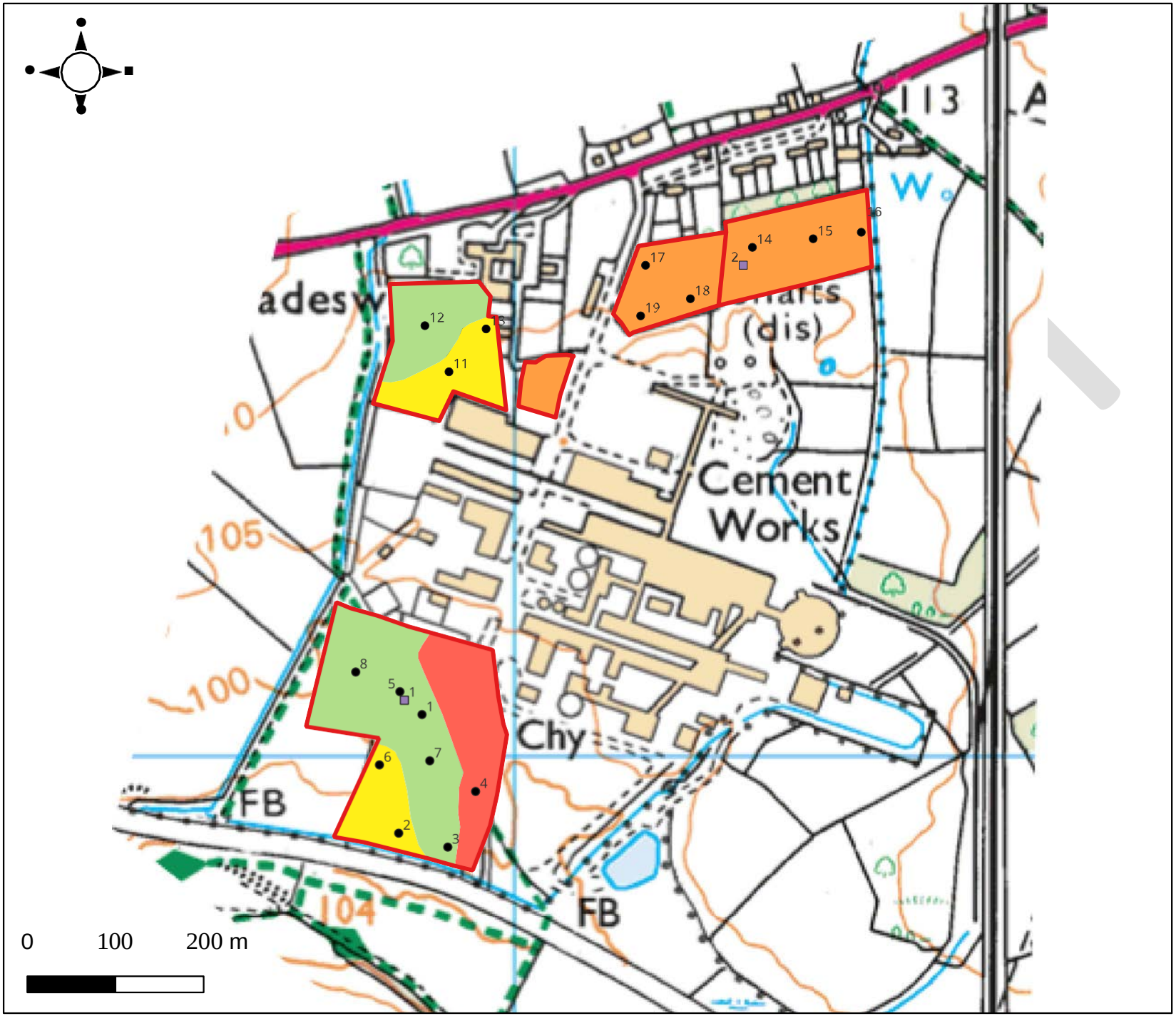
Auger	Depth (cm)	Texture	Munsell soil colour	soil colour	Mottling abundance	Colour	Stones		Soil wetness		Grid Reference	Notes
							Total	Type	WC	DRAINAGE		
1	38 40 58 100	hcl hcl hcl c	10YR3/2 10YR4/2 10YR3/2 10YR5/3	very dark greyish brown dark greyish brown very dark greyish brown brown	 common many	ochreous			III	imperfect	SJ28900 62000	ALC- Grade 3b
2	28 90	org hcl hcl	10YR3/2 7.5YR5/2	very dark greyish brown brown	many	ochreous			IV	poor	SJ28895 61893	ALC- Grade 4 assume spl 50cm as pit lower part of field
3	40 45 60	org hcl hcl c	10YR3/3 10YR5/3 10YR5/3	dark brown brown brown	 many many	ochreous			III	imperfect		stone stopped auger ALC- Grade 3b
4	28 45 60	hcl hcl c	7.5YR4/2 7.5YR4/2 7.5YR4/4	brown brown brown					IV	poor	SJ 28933 61944	wood brick fragments and plastic in soil ALC- non agricultural land
5	40 60 90	hcl hcl fscl	10YR4/2 10YR5/3 10YR5/4	dark greyish brown brown yellowish brown	 common	ochreous			III	imperfect	SJ28867 62013	ALC- Grade 3a gleyed below 40cm spl 40cm assume (pit 1)
6	30 50 80	org hcl hcl/c hcl	10YR3/2 10YR5/3 10YR5/3	very dark greyish brown brown brown	many many	ochreous			IV	poor	SJ28662 61933	root mottles wet part of field ALC- Grade 4
7	38 40 65 70	hcl hcl hcl scl	10YR4/3 10YR4/3 10YR5/3 10YR5/3	brown brown brown brown	 few many	ochreous			III	imperfect	SJ28882 61943	ALC- Grade 3a gleyed below 40cm spl 40cm assume (pit 1) stone
8	30 40 70 90	hcl hcl hcl c	10YR4/2 10YR4/2 10YR4/2 10YR5/2	dark greyish brown dark greyish brown dark greyish brown greyish brown	 many many	ochreous			III	imperfect	SJ28882 61943	ALC- Grade 3b sandstone fragments
9	15	scl	10YR3/3	brown					not assessed		SJ28882 61943	stone at 15cm (former car park?) ALC- non agricultural land

10	15	msl	10YR3/3	brown					not assessed	SJ28882 61943	stone at 15cm (former car park?) ALC- non agricultural land

Auger	Depth (cm)	Texture	Munsell soil colour	soil colour	Mottling abundance	Colour	Stones		Soil wetness		Grid Reference	Notes
							Total	Type	WC	DRAINAGE		
11	35 70	org hcl c	10YR4/2 10YR5/3	dark greyish brown brown	common	ochreous			IV	poor	SJ28920 62436	lab result o-hcl ALC- Grade 4
12	40 50 80	hc l hc l c	10YR4/3 10YR4/2 10YR5/3	brown brown brown	commo n commo n	ochreous			III	imperfect	SJ28899 62492	ALC - Grade 3b
13	30 43 80	hcl hcl c	10YR4/2 10YR4/2 10YR5/3	brown brown brown	common many	ochreous			IV	poor	SJ29052 62452	ALC-Grade 4 sl stony at 80cm
14	38 40 60 70	m/hcl m/hcl hcl c	10YR3/2 10YR3/2 10YR5/3 10YR5/3	very dark greyish brown very dark greyish brown brown brown	few many many	ochreous			III	imperfect	SJ29278 62584	football pitch ALC- non agricultural land
15	40 45 55 80	hcl mc l hcl c	10YR3/3 10YR3/3 10YR5/3 10YR5/3	dark brown dark brown brown brown	few many commo n	ochreous			III	imperfect	SJ 29336 62588	football pitch ALC- non agricultural land
16	43 70	mcl c	10YR4/3 10YR5/3	brown brown	few many	ochreous			III	imperfect		stone at 70cm ALC- non agricultural land
17	40 58 70	mcl hcl c	10YR3/3 10YR3/2 10YR5/3	dark brown very dark greyish brown brown	many	ochreous			III	imperfect	SJ29162 62574	sports field ALC- non agricultural land
18	30 40 60	org hcl hcl hcl	10YR3/2 10YR3/2 10YR5/3	very dark greyish brown very dark greyish brown brown	many	ochreous			III	imperfect	SJ29207 62524	sports field sl stony at 30cm+ lab psd org hcl ALC- non agricultural land

19	35 50	mzcl c	10YR3/2 10YR5/3	very dark greyish brown brown	many	ochreous			IV	poor	SJ29161 62524	sports field ALC- non agricultural land

6 APPENDIX 5: AGRICULTURAL LAND CLASSIFICATION PLAN



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Title

Agricultural Land Classification Plan

Project

SRA - Padeswood Cement Works (rsk9002 - 17)

Date: 12 / 04 / 2023

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7 APPENDIX 6: DESCRIPTION OF AGRICULTURAL LAND **CLASSIFICATION GRADES**

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. The *'best and most versatile agricultural land'* falls into grades 1, 2 and subgrade 3a – which collectively comprises about one-third of the agricultural land in England and Wales. About half the land in England and Wales is either of moderate quality (subgrade 3b) or poor quality (grade 4). Although less significant on a national scale, such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in grade 5, which mostly occurs in the uplands.

Grade 1 – excellent quality agricultural land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2 – very good quality agricultural land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

Grade 3 – good to moderate quality land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a – good quality agricultural land

Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b – moderate quality agricultural land

Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4 – poor quality agricultural land

Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 – very poor quality agricultural land

Land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

Other land

Non agricultural land includes 'soft' uses, where most of the land could be returned relatively easily to agriculture including sports fields and private parkland.

Woodland includes commercial and non-commercial woodland.