

JOHNSONS WELLFIELD LIMITED

AGRICULTURAL LAND CLASSIFICATION AND SOIL RESOURCE REPORT ON LAND AT MOOR END SOUTH

Report prepared by
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1. INTRODUCTION

- 1.1 Johnsons Wellfield Limited instructed Richard Stock to prepare an Agricultural Land Classification and Soil Resource report on approximately 22.45 ha of land at Moor End South, Crosland Moor, Huddersfield. The report is required as part of the baseline information for a planning application and EIA for stone extraction, and includes recommendations for soil storage and handling.
- 1.2 The report is based on a soil survey which was undertaken on 26th and 27th May 2016 by sampling soil at twenty five locations using a 1.2 m dutch auger and spade, and examining two soil profile pits. Further information has been obtained from the MAGIC website, (Multi-Agency Geographic Information for the Countryside defra.gov.uk), and the Soil Survey of England and Wales.
- 1.3 The survey area covers a single block of land comprising 8 field parcels. The survey area is centred on National Grid Reference SE 108 128 at an average altitude of approximately 245 m AOD.
- 1.4 The soil survey details have been interpreted to grade the site in accordance with the Ministry of Agriculture, Fisheries and Food Agricultural Land Classification of England and Wales (Revised Guidelines and Criteria for Grading the Quality of Agricultural Land) published in 1988. The system considers criteria relating to the **climate, site and soil**.

2. CLIMATE

- 2.1 Agroclimatic data for the site influences the agricultural land classification in respect of growing conditions for crops, and the soil reaction in terms of wetness and drought.
- 2.2 The meteorological office has published agroclimatic data for England and Wales on a five km grid basis, which can be interpolated to produce data for specific grid points. Data for the site is presented in the table below.

Grid Reference	SE 108 128
Altitude - ALT	235 m
Average Annual Rainfall - AAR	1264 mm
Accumulated Temperature - Jan to June - ATO	1165
Moisture Deficit Wheat - MDMWHT	41
Moisture Deficit Potatoes - MDMPOTS	15
Duration of Field Capacity - FCD	274
Climatic Limitation	Grade 4

- 2.3 The climatic criteria are considered first when classifying land as climate can be overriding irrespective of soil and site conditions. The main parameters used in the assessment of climatic limitation are Average Annual Rainfall (AAR), as a measure of overall wetness, and Accumulated Temperature (ATO, Jan to June), as a measure of the relative warmth of the area.
- 2.4 On the basis of Rainfall and Accumulated Temperature, there is a climatic limitation to Grade 4.

3 THE SITE

- 3.1 The land is bordered by Whitehead Road to the south, Turbid Lane to the east, Arborary Lane to the west and is set back approximately 100 m from Intake Lane to the north. All the external and internal boundaries are dry stone walling and all the fields are connected through access gates. At the time of survey all the land was in a grass for grazing and strip grazing by dairy cattle was being practiced with some extensive grazing by young stock.
- 3.2 The land is very gently undulating and falls from Arborary Lane at about 250 m AOD towards the Turbid Lane on the east boundary at 210 m AOD.
- 3.4 The topography does not present any significant gradients, which might affect farming practice.
- 3.5 There is no evidence that the site is at risk of flooding or that micro-relief influences land use through frost risk.
- 3.6 On the basis of **site** characteristics relating to gradient, microrelief and flooding there is no limitation to grade.

4 THE SOILS

- 4.1 The soils are described in Soil Survey of England and Wales Bulletin 10 (Soils and Their Use in Northern England), and identified on the 1:250,000 soil map of England and Wales Sheet 1. The information given in the Bulletin and maps is limited in several ways and is not a definitive soil description. Firstly, soil patterns in England and Wales are commonly complex and vary greatly in composition. Secondly, the minimum area that can be shown on the map is 0.5 km² and because of this many soil associations include small patches of soils which, at a larger scale, would be correlated with a different map unit. It is therefore noted that within the limitations of the map, the site is dominated by soils in the Rivington 1 Association.
- 4.2 The Rivington 1 Association is described in the Legend as '*Well drained coarse loamy soils over sandstone. Locally associated with similar soils affected by groundwater.*'
- 4.3 The Association includes soils in the Rivington and Melbourne soil series.
- 4.4 The Bulletin states that the soils in drier districts grow a wide range of crops but on higher ground because of greater rainfall and short growing season, only grass is grown.
- 4.5 The soils typically comprise sandy loam or sandy silt loam topsoil overlying similar textured slightly or moderately stony subsoil on hard or soft sandstone at about 50cm.
- 4.6 The detailed soil survey accords with the broad description of the Associations but records a topsoil texture of sandy clay loam. It is possible that a higher organic matter content in topsoil built up by long term grassland and grazing gives the textural characteristics of sandy clay loam. This does not affect the land quality or handling characteristics.
- 4.7 The soil survey details are attached at Appendix 1 and plan M19/1 shows the soil survey locations.

5. AGRICULTURAL LAND CLASSIFICATION

- 5.1 The site was graded by applying the survey details to the Ministry of Agriculture, Fisheries and Food Guidelines for Agricultural Land Classification (October 1988).
- 5.2 The current classification system was adopted in 1988 and was a refinement of the previous system. A series of Provisional ALC maps were produced at a scale of 1 inch to 1 mile between 1967 and 1974 based on the earlier classification system, and were intended to be

for guidance only for strategic planning purposes. A new series of soil maps at a scale of 1:250,000 based on the same information are available on MAGIC, an interactive, geographical information website. The 1:250,000 map of the area shows the site to be Provisional Grade 4.

- 5.3 The agricultural land classification system provides a framework for classifying land according to the extent to which it's physical or chemical characteristics impose long-term limitations on agricultural use. The limitations can affect the range of crops that can be grown, the level of yield, the consistency of yield and the cost of obtaining it. The principal factors considered are **Climate, Site and Soil**. These factors, together with interactions between them, form the basis for classifying land into one of five grades. Grade 1 is land of excellent quality and grade 5 is very poor. Grade 3 is divided into sub-grades 3a and 3b since this grade covers about half of England and Wales. The grade or sub-grade is determined by the most limiting factor present.
- 5.4 On this site there is a **Climate** limitation to Grade 4.
- 5.5 The assessment of **Site** factors considers the way the topography affects agricultural machinery use and crop production. This site comprises very gently graded land and fundamentally offers no restrictions to agricultural use and cropping potential.
- 5.6 The main **Soil** properties, which may affect cropping potential, are texture, structure, depth, stoniness and chemical fertility. The land has been actively farmed for generations and there are no overriding limitations caused by the individual soil factors.
- 5.7 The remaining consideration for ALC grading on this site relates to **Interactive** limitations, principally wetness and drought.
- 5.8 Regarding soil wetness the soil profiles are all free draining and classified as wetness class 1. With 277 Field Capacity Days and dominant topsoil texture of sandy clay loam, the site cannot be graded higher than 3a on wetness criteria.
- 5.9 Droughtiness calculations have been completed on the representative soil profiles. Both profiles are classified as drought grade 2 assuming no rooting into the underlying hard sandstone.
- 5.10 Therefore the whole site has been mapped as Grade 4, based on Climate, which is the most limiting factor. This is described as land of Poor quality.
- 5.11 The distribution of the grades is shown on Plan M19/2 and summarised in the table below.

Grade	Are (ha)	%
4	22.45	100
Total	22.45	100

6. SOIL RESOURCES

- 6.1 The soil survey recorded the soil profile to a depth on 1.2m or to an impenetrable layer. It identifies a broadly uniform soil profile comprising Topsoil, Subsoil and Sandstone, in which the main variation is the depth to sandstone.
- 6.2 The topsoil is predominantly very dark brown sandy clay loam, with the exception of the northern field where is recorded as very dark brown medium sandy loam. The topsoil depth varies between 20 and 32cm (commonly 25cm).
- 6.3 The subsoil is predominantly sandy clay loam. The colour is lighter than the topsoil being mainly brown, dark greyish brown and dark yellowish brown. It varies in depth between 10 and 70cm. The average depth of the subsoil layer is 25cm.

- 6.4 The hard sandstone is encountered at depths of between 30 and 98cm (average 50 cm). There is commonly a thin layer of pale coloured medium sand or loamy medium sand just above the sandstone, which is included as part of the sandstone.
- 6.5 It is recommended that the medium sandy loam topsoil in the northern field (augers 2, 3 and 4) is lifted and stored as a single topsoil unit, separate from the sandy clay loam topsoil covering the remaining fields. All the topsoil can be stored to a maximum height of 3m in a continuous bund providing there is a separation layer of straw or a geomembrane between the two textures. The topsoil should be lifted to its full depth (average 25cm) where there is a change to the lighter coloured subsoil.
- 6.6 It is recommended that the subsoil is treated as a single soil unit across the whole site and separately stored to a maximum height of 5m. It is predominantly sandy clay loam texture but there are occasional inclusions of medium sandy loam. It is considered that sandy clay loam and medium sandy loam subsoil textures are not strongly contrasting in physical or chemical characteristics and some minor mixing will not detract from the restored quality. The subsoil should be lifted to its full depth down to the hard sandstone. It is estimated that the average depth of subsoil is 25cm. Minor mixing of the sandy clay loam subsoil with sand at the interface with the sandstone will not be detrimental to the restoration.
- 6.7 The remaining sandstone overburden overlying the commercial stone should be lifted and stored separately from the topsoil and subsoil. The attached plan M19/3 shows the recorded depth to the top of the hard sandstone in cm.

7. SOIL STORAGE

- 7.1 Topsoil and subsoil should be stored separately to maximum heights of 3m and 5m respectively. It is recommended that the maximum inner and outer side batters are 1 in 2 and 1 in 3 respectively.
- 7.2 If screen bunds are required higher than 5 m they can be constructed either using a basal layer of sandstone to achieve the required height, or constructed with a core of sandstone dressed with topsoil and/or subsoil subject to the long term use of the store.
- 7.3 Store footprints should be prepared so that the soils and sandstone are stored 'like on like'.
- 7.4 Stores should be grass seeded with a low maintenance mix and regularly cut unless they are managed for grazing by young stock. Stores should be maintained tidy and free of weeds by regular cutting or spraying as required and should only be travelled on by agricultural equipment.

8. SOIL HANDLING

- 8.1 Soils will be handled using hydraulic excavators, articulated dump trucks and low ground pressure bulldozers.
- 8.2 This equipment will be used in accordance with MAFF (2000), Good Practice Guide For Handling Soils (version 04/00), FRCA Cambridge, quoting sheets 1, 2, 3, 4, 14 and 19 as follows:-
- Sheet 1- Soil stripping with excavators and dump trucks.
 - Sheet 2- Building soil storage mounds with excavators and dump trucks.
 - Sheet 3- Excavation of soil storage mounds with excavators and dump trucks.
 - Sheet 4- Soil replacement with excavators and dump trucks.
 - Sheet 14- Building soil storage mounds with bulldozers and dump trucks.
 - Sheet 19- Soil decompaction with bulldozer drawn tines.

Sheet 19 is included to allow for decompaction of the soil bund footprints if required and loosening the sandstone restoration platform before soil reinstatement. Sheet 14 is included to allow the grading of soil stores before seeding for agricultural use.

- 8.3 Soils will be transported on specific haul routes, travelling only on the mineral surface or the restoration platform. It is recommended that where practicable, after the initial site development, the land should be worked and restored progressively by direct placement of the soils. The target restored soil profile, based on the survey findings, should be 25cm of topsoil over 25cm of subsoil, but this target should be reviewed following the initial development and exposure of a section of the in-situ soil profile across the site.
- 8.4 The restoration platform will be constructed by spreading sandstone in layers and tracking with a dozer to ensure that the substrate is permeable and stable without leaving voids in order to eliminate future differential settlement. The surface will be scarified before soil placement to ensure drainage continuity between the restored soil profile and the underlying sandstone platform.
- 8.5 It is recommended that the soils are only handled when they are in a dry and friable condition. The objective is that all soils shall be handled when they are in a reasonably dry and friable state, which is when they will be least susceptible to lasting damage by compaction and smearing.

APPENDIX 1

Schedule of Auger Borings and Soil Pit Descriptions

KEY

Colour		Munsell Colour
vdb	very dark brown	10yr2/2
vdgb	very dark greyish brown	10yr3/2
dgb	dark greyish brown	10yr4/2
gb	greyish brown	10yr5/2
vpb	very pale brown	10yr7/3 and 8/4
lbg	light brownish grey	10yr6/2
b	brown	10yr4/3 and 5/3
by	brownish yellow	10yr6/6 and 6/8
yb	yellowish brown	10yr5/6
dyb	dark yellowish brown	10yr4/4 and 4/6
gb	greyish brown	10yr5/2
pb	pale brown	10yr6/3
lyb	light yellowish brown	2.5y6/4

Mottling and Gleying

0	none
x	few and faint
xx	common
xxx	many

Texture

msl	medium sandy loam
scl	sandy clay loam
ms	medium sand
lms	loamy medium sand
cls	coarse loamy sand

Observations

nc	non calcareous
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ALC

4	Grade 4
cl	climatic limitation

SCHEDULE OF AUGER BORINGS AND PROFILE PITS

LAND AT MOOR END SOUTH

Auger No	Grid Ref SE	Depth cm	Colour	Texture	gley	Observations	ALC Grade
1	10655 12928	0-20 20-40 40	vdb b	scl cls	0 0	ns. nc nc impenetrable	4 cl
2	10795 13052	0-22 22-40 40	vdb b	msl/scl msl	0 0	nc ns. occasional sandstone impenetrable. see pit A	4 cl
3	10870 13030	0-25 25-35 35-40 40	vdb b vpb	msl msl ms	0 0 0	nc nc. occasional sandstone weathered sandstone impenetrable	4 cl
4	10937 13015	0-30 30-35 35-60 60	vdb vdgb b	msl msl scl	0 0 x	nc nc nc impenetrable	4 cl
5	10942 12894	0-30 30-35 35-70 70-75 75	vdb b lbg lbg	scl scl lms ms	0 0 0 0	nc nc occasional sandstone impenetrable	4 cl
6	11065 12877	0-25 25-40 40	vdb b	scl msl	0 0	nc inclusions of pb ms impenetrable	4 cl
7	11087 12790	0-20 20-30 30-50 50-65 65-75 75	vdb vdgb dgb gb by	scl scl scl scl ms	0 0 x x 0	nc inclusions of ms impenetrable	4 cl
8	11155 12800	0-25 25-40 40-65 65	vdb vdgb dyb	scl scl scl	0 0 0	nc impenetrable	4 cl
9	11195 12726	0-25 25-40 40-60 60	vdb vdgb dyb	scl scl scl	0 0 0	nc impenetrable	4 cl
10	11112 12697	0-25 25-95 95-98 98	vdb vdgb vpb	scl scl ms	0 0 0	nc impenetrable	4 cl

Auger No	Grid Ref SE	Depth cm	Colour	Texture	gley	Observations	ALC Grade
11	10919 12876	0-32 32-60 60-70 70	vdb dyb by	scl scl lms	0 x 0	nc impenetrable	4 cl
12	10921 12788	0-25 25-50 50-70 70	vdb b yb	scl scl cs	0 0 0	nc impenetrable	4 cl
13	10995 12704	0-30 30-50 50	vdb b	scl scl	0 0	nc inclusions of vpb ms impenetrable	4 cl
14	10879 12763	0-25 25-40 40	vdb lyb	scl ms	0 0	nc weathered sandstone impenetrable	4 cl
15	10841 12686	0-25 25-40 40-50 50-75 75	vdb vdgb dyb by	scl msl msl lms	0 0 0 0	nc impenetrable	4 cl
16	10759 12699	0-25 25-32 32	vdb b	scl scl	0 0	nc impenetrable	4 cl
17	10714 12612	0-23 23-30 30	vdb dgb	scl msl	0 0	nc impenetrable. see pit B	4 cl
18	10677 12667	0-20 20-40 40-50 50	vdb lyb by	scl scl ms	0 0 0	nc inclusions of yb ms impenetrable	4 cl
19	10625 12627	0-22 22-30 30	vdb pb	scl ms	0 0	nc impenetrable. cf pit B	4 cl
20	10630 12759	0-23 23-40 40-62 62	vdb b yb	scl scl ms	0 0 0	nc inclusions of pyb ms impenetrable	4 cl
21	10697 12771	0-22 22-30 30-32 32	vdb dyb vpb	scl scl ms	0 0 0	nc impenetrable	4 cl

Auger No	Grid Ref SE	Depth cm	Colour	Texture	gley	Observations	ALC Grade
22	10831 12816	0-25 25-40 40	vdb b	scl scl	0 0	nc inclusions of vpb ms impenetrable	4 cl
23	10849 12915	0-25 25-40 40-58 58-60 60	vdb dgb by vpb	scl scl scl ms	0 0 x 0	nc impenetrable	4 cl
24	10727 12924	0-25 25-30 30-40 40-43 43-50 50	vdb dgb vpb vpb yb	scl scl ms ms scl	0 0 0 0 0	nc band of sandstone impenetrable	4 cl
25	10644 12854	0-25 25-50 50-55 55-70 70	vdb dyb yb yb	scl scl ms ms	0 0 0 0	nc impenetrable	4 cl

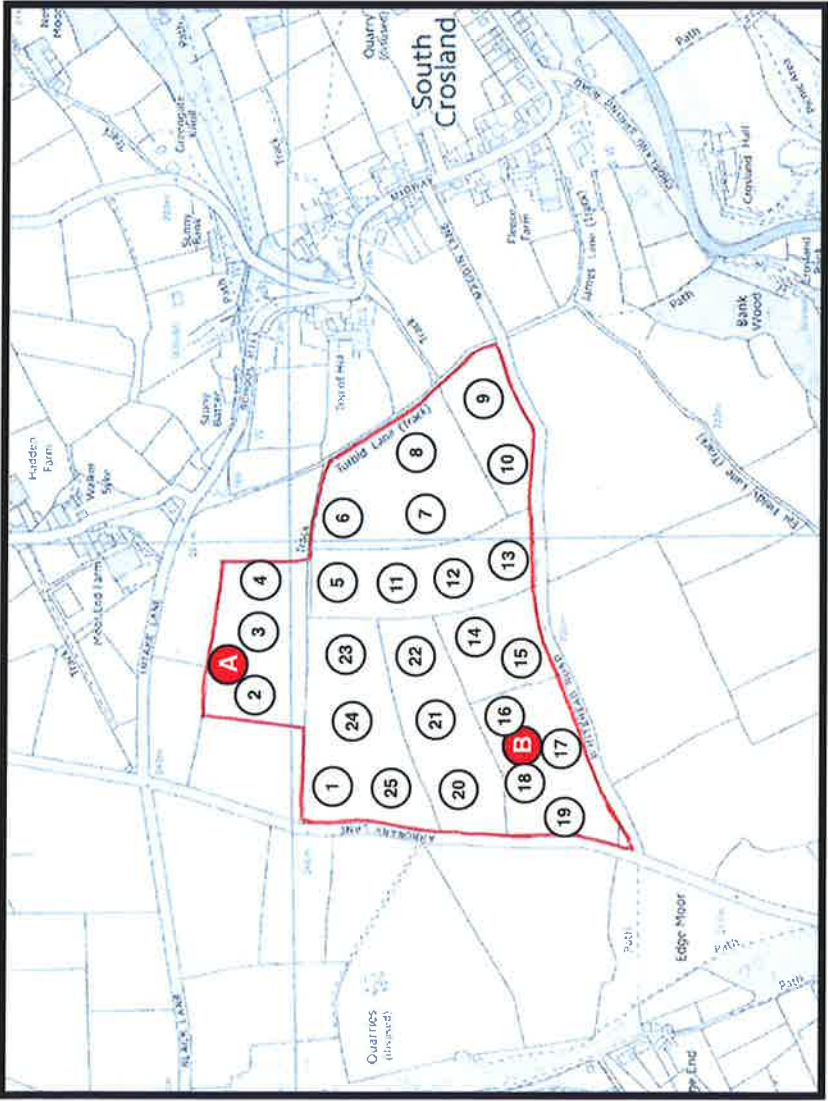
PROFILE PIT DESCRIPTIONS

Pit A Auger 2	0-20	very dark brown (10yr2/2) medium sandy loam. Non calcareous. Occasional stone. Few earthworms. Moderate medium subangular blocky. Good rooting.
	20-40	brown (10yr5/3) medium sandy loam. Very firm to dig. Moderate medium subangular blocky. Good rooting.
	40	Pit ends. Hard sandstone lateral plates.
	wetness	<i>Free draining. Wetness class 1. No wetness limitation</i>
	drought	<i>mb wht – +24 mb pots – +51 drought grade calculated to 40cm is grade 2</i>
	climate	<i>Grade 4</i>
	overall grade	<i>Grade 4</i>

Pit B Auger 17	0-23	very dark brown (10yr2/2) sandy clay loam. Non calcareous. Occasional stone. Few earthworms. Moderate fine and medium subangular blocky.
	23-30	dark greyish brown (10yr4/2) sandy clay loam (marginal medium sandy loam). Non calcareous moderate medium subangular blocky . Fine fibrous roots. Evidence of dark worm channels.
	30-60	matrix of horizontal sandstone plates and brownish yellow (10yr6/6) medium sandy loam subsoil. Rooting in soil between sandstone. Estimate 70% stone.
	60	Pit ends on hard sandstone
	wetness	<i>Free draining. Wetness class 1. No wetness limitation</i>
	drought	<i>mb wht – +25 mb pots – +53 drought grade calculated to 60cm is grade 2</i>
	climate	Grade 4
	overall grade	Grade 4

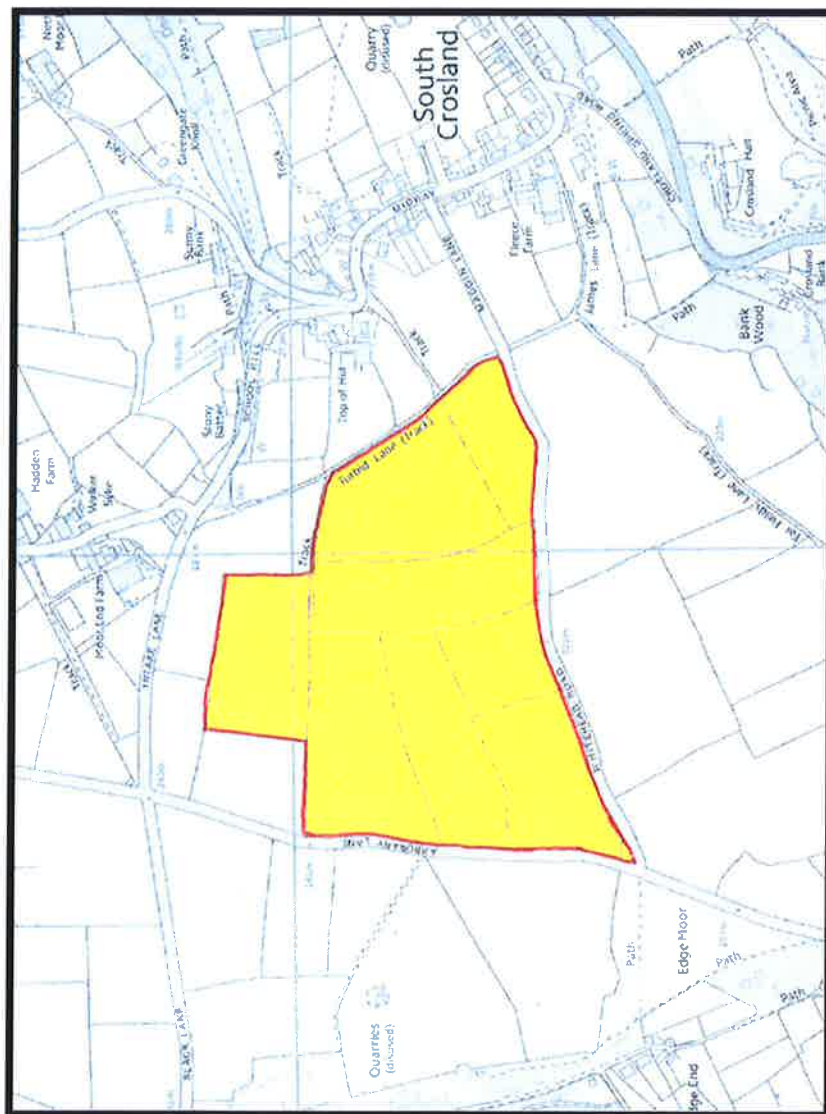
PLANS

1. Soil Survey Locations (M19/1)
2. Agricultural Land Classification (M19/2)
3. Depth to Sandstone (M19/3)



CLIENT	Johnsons Wellfield Ltd		
SITE	Moor End South, Crosland Moor		
TITLE	Soil Survey Locations		
SCALE	NTS		N
REF	M19/1		
DATE	May 2016		

LEGEND			
Auger location		Pit location	
			Survey boundary
			



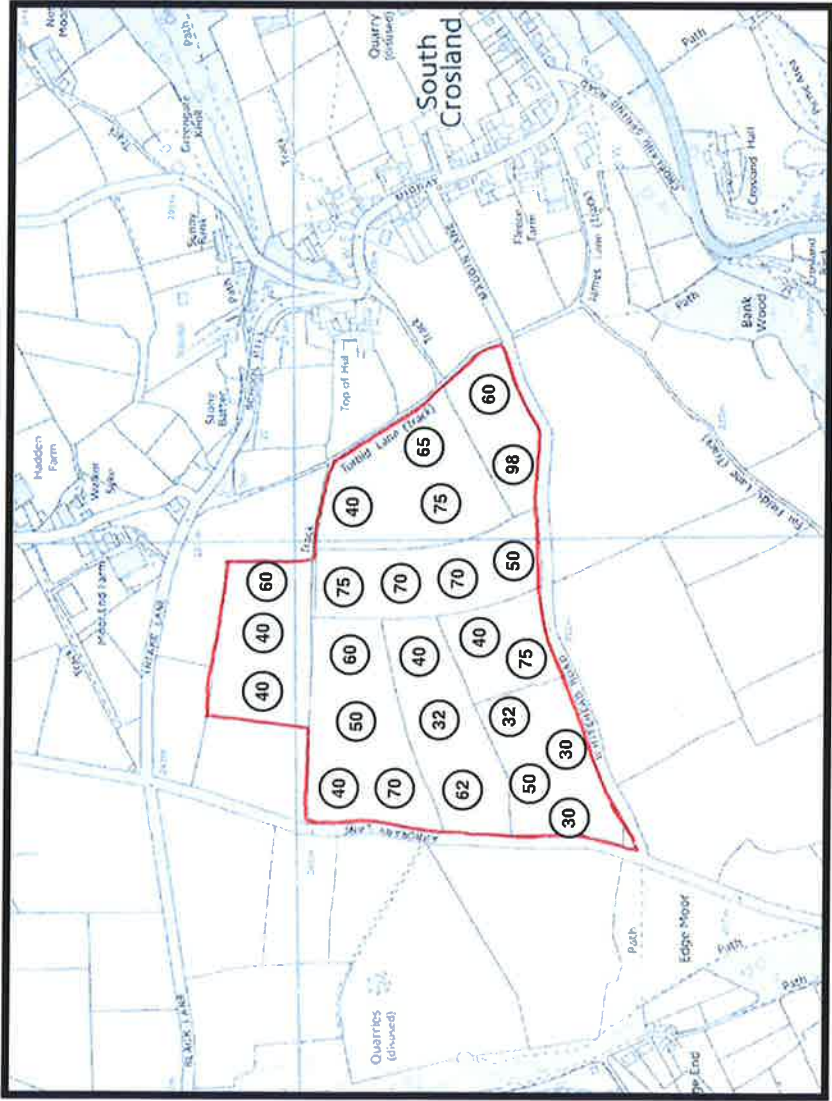
CLIENT	Johnsons Wellfield Ltd
SITE	Moor End South, Crosland Moor
TITLE	Agricultural Land Classification
SCALE	NTS
REF	M19/2
DATE	May 2016

LEGEND

Grade 4 

Survey boundary 

CLIENT	Johnsons Wellfield Ltd
SITE	Moor End South, Crosland Moor
TITLE	Depth to Sandstone
SCALE	NTS
REF	M19/3
DATE	May 2016



LEGEND

Depth to sandstone in cms



Survey boundary



