

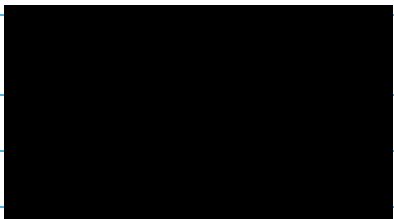
Structural | Civil | Geo-Environmental

Crescent Road, Crumpsall Phase 1 Desk Study

April 2013



Quality Management

Job No	SS/018883	Client	Plexus Consultants Ltd
Title	Phase 1 Desk Study		
Project	Crescent Road, Crumpsall		
Location	Crumpsall, Lancashire		
Document Ref	18883-DS01	Issue / Revision	1
File reference	P:\SS018883 Crescent Rd Crumpsall GEO\10 Reports\Phase 1\SS018883-DS01.docx		
Date	18 April 2013		
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Revision Status / History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked	Authorised
1	18/04/13	Original Issue	SCC	MSG	MSG

Contents

1. Introduction	1
1.1 Background	1
1.2 Proposed Development	1
1.3 Objective and Scope of Work	1
2. Site Location and Description	2
2.1 Site Location	2
2.2 Site Description	2
2.3 Surrounding Land-use	2
3. Environmental Setting	4
3.1 Geology	4
3.2 Coal Mining, Mineral Extraction and Subsidence	5
3.3 Hydrogeology	5
3.4 Hydrology	5
3.5 Potential Flood Risks	5
3.6 Landfill and Waste Management Activity	6
3.7 Industrial Land Use Information	6
3.8 Ecology	6
4. Site History	7
4.2 Summary	9
5. Conceptual Site Model	10
5.1 Introduction	10
5.2 Contamination Sources	10
5.3 Pathways	11
5.4 Receptors	12
5.5 Preliminary Risk Assessment	12
5.6 Discussion	13
6. Other Development Considerations	15
6.1 Preliminary Geotechnical Appraisal	15
6.2 Waste Soils Management	15
6.3 Potable Water Supplies	16
7. Conclusion & Recommendations	17
7.1 Overview	17
7.2 Conclusions	17
7.3 Recommendations	17
8. References	18

Appendices

Appendix A	Figures & Drawings
Appendix B	Environment Agency Website Extracts
Appendix C	GroundSure Historic Maps
Appendix D	BGS Borehole Information
Appendix E	Coal Authority Website Extracts

1. Introduction

1.1 Background

- 1.1.1 Capita Symonds (Structures) Ltd (“CSS”) was commissioned by Plexus Consultants Ltd to undertake a Phase 1 Geo-Environmental Desk Study for an area of land off Crescent Road in the Crumpsall district of Greater Manchester.
- 1.1.2 A site location and existing site layout plan is presented on Figure 1 in Appendix A.

1.2 Proposed Development

- 1.2.1 The current proposed development plan is presented on the drawing, reference 1039-01 Revision K, (dated January 2012) in Appendix A.
- 1.2.2 Current proposals are for the construction of approximately 22 low-rise residential structures with external areas to include a new access road, hardstanding for parking and servicing and private gardens.

1.3 Objective and Scope of Work

- 1.3.1 The objective of this assessment was to collate and review the available geo-environmental information to determine potential constraints on the development such as ground contamination risks and geotechnical hazards.
- 1.3.2 To achieve the objective, the following scope of work was defined:
 - Review the published and readily available information concerning the site:
 - Recent Ordnance Survey (OS) Map Archive;
 - British Geological Survey (BGS) published maps;
 - EA’s “what’s in your backyard?” website (extracts in Appendix B);
 - GroundSure Historic Map Archive (Appendix C);
 - www.oldmaps.co.uk - Ordnance Survey Map Archive;
 - BGS borehole records from the subject site/surrounding area (Appendix D);
 - The Coal Authority website (extracts in Appendix E).
 - Develop a preliminary Conceptual Site Model (CSM) that relates the anticipated ground conditions at the site to the proposed development.
 - Establish areas of potential concern based on identified risks and/or potential risks.
 - Identify any actions (e.g. intrusive site investigation) required to reduce risks and/or uncertainties.

2. Site Location and Description

2.1 Site Location

- 2.1.1 The subject site comprises an area of land situated to the south-west of the grounds of the North Manchester General Hospital, south-west of Ellis Drive and to the north of the residential properties off Pendale Avenue in Crumpsall, Lancashire.
- 2.1.2 The approximate centre of the subject site is located at Ordnance Survey National Grid Reference 384774E, 402046N; an indicative postcode for the current clubhouse is M8 5RL.
- 2.1.3 A site location and existing site layout plan is presented on Figure 1 in Appendix A.

2.2 Site Description

- 2.2.1 With reference to Figure 1, the subject site is irregular in plan and covers an area of approximately 0.55ha / 1.36 acres.
- 2.2.2 The site is almost entirely surfaced with hardstanding and there are no above ground structures remaining. The areas of hardstanding can be split by their type and former uses as follows:
 - The central and southern sections of the site are surfaced with concrete which is considered to represent the floor slab of a former single fairly large structure;
 - The northern and north-west areas are surfaced with asphalt locally in a poor state of repair; and
 - Several areas of concrete adjacent to the north-western boundary are considered to represent the locations of former small structures (possibly portable cabins).
- 2.2.3 Areas of landscaping are located along the eastern and western boundaries and comprise semi-mature and mature trees, with areas of smaller shrubs to the east.
- 2.2.4 Access to the subject site is along an existing hospital access track and through a metal gate in the east of the site leading from Crescent Drive to the east.
- 2.2.5 The topography of the site is ostensibly level due to the previous redevelopment (and the remaining floor slab). However, site levels in general reduce from west to east by less than 0.50m over the width of the site.
- 2.2.6 From anecdotal information provided by Plexus Consultants Ltd, the site is indicated to have formerly been used by Anglia Crown; a company which provided meals to the healthcare service.

2.3 Surrounding Land-use

- 2.3.1 To the **NORTH**, the subject site is bounded by the buildings and roads of the hospital complex.

- 2.3.2 To the **EAST**, the subject site is bounded by an access track, car-park and landscaping areas of the larger hospital complex. Beyond the hospital, the site is bounded by the northern most section of a cemetery with undeveloped open space beyond.
- 2.3.3 To the **SOUTH**, the subject site is bounded by residential areas of Charminster Drive, Pendale Avenue, Duchess Road and Whiston Road.
- 2.3.4 To the **WEST**, the site is bounded by Crumpsall Park beyond which is located further residential areas.

3. Environmental Setting

3.1 Geology

- 3.1.1 The regional geological information pertaining to the site was gained from a review of the BGS 1:50 000 Regional Sheet 85 (Manchester) Solid and Drift Editions and 1:10,000 scale Sheet SD80SW supplemented by the BGS Digital Geological Map of Great Britain (DiGMapGB-50; available as a Web Map Service).
- 3.1.2 Given the site history, deposits of Made Ground of unknown thickness are likely to exist and provenance of such is also unknown. Such deposits may attain substantial thicknesses in areas of the historical structures and such are likely to be heterogeneous in composition and may be relatively incompetent.
- 3.1.3 According to the geological plans, the site is underlain by Drift deposits, comprising cohesive Glacial Till which could be interbedded with granular horizons. Granular Glacial (Sand and Gravel) Deposits are indicated to exist to the east of the site and may extend beneath the southern section of the site, at least in parts.
- 3.1.4 The Drift deposits are inferred to be underlain by solid strata comprising sandstone of the Sherwood Sandstone Group of Triassic age. These are indicated to dip broadly to the south-west at an inferred angle of 25 degrees in the wider site area.
- 3.1.5 The BGS Lexicon of Named Rock Units provides the following lithological description of the Sherwood Sandstone Group:
- “Sandstone, red, yellow and brown, part pebbly; subordinate red mudstone and siltstone.”*
- 3.1.6 There are no readily available BGS borehole records at the site. The closest BGS borehole records (SD800SE27-29 and SD80SW941) located at Delauney Road and Waterloo Roads respectively have been obtained and are included in Appendix D for reference.
- 3.1.7 The exploratory hole log located near Delauney Road (immediately north-west of the hospital) indicated granular Glacial Deposits comprising sand and / or gravel with stiff clay recorded to depths in excess of 7.00m bgl. Granular strata described as ‘Quicksand’ on the records is considered to represent ‘running sand’ conditions. In addition, SD800SE28 encountered a horizon of Peat between 1.98m and 2.08m bgl.
- 3.1.8 Borehole SD80SW941 formed close to Waterloo Road approximately 500m east of the site encountered silty clayey sand beneath Made Ground to a depth of 8.50m bgl, where it was underlain by soft grey clay to a depth in excess 10.00m bgl.
- 3.1.9 According to the HPA Radon Atlas (2007), the property is in a lower probability radon area, as less than 1% of homes are above the action level. No radon protective measures are therefore considered necessary for new structures at this time.

3.2 Coal Mining, Mineral Extraction and Subsidence

- 3.2.1 The Coal Authority website has been consulted; relevant extracts are presented in Appendix F.
- 3.2.2 With regards to the Coal Authority website the subject site lies within the Coal Authority Reporting Area but does not lie within a past or current Surface Mining Area, in the vicinity of past or current Shallow Coal Mine Workings, within a Surface Coal Resource Area or within a Development High Risk Area.
- 3.2.3 Also, the subject site is not in an area known to be affected by mine gas and there are no known mine shafts / adits within 1km of the site.
- 3.2.4 Given the thickness of Glacial Till and underlying Sherwood Sandstone beneath the subject site as indicated within the BGS boreholes, the risk associated with shallow coal mining hazards or other extractable industries is considered to be negligible and can be discounted.

3.3 Hydrogeology

- 3.3.1 According to the Environment Agency 'What's in your backyard?' website, the site is shown to be underlain by a Principal Bedrock Aquifer assumed to comprise the Sherwood Sandstone. These are layers of rock that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale
- 3.3.2 The overlying Glacial Till deposits are classified as Unproductive Strata i.e. deposits that have negligible significance for water supply or river base flow.
- 3.3.3 The site does not lie within a Groundwater Source Protection Zone (SPZ).
- 3.3.4 Relevant extracts from the Environment Agency 'What's in your backyard?' website are presented in Appendix B.

3.4 Hydrology

- 3.4.1 The nearest major watercourse is The River Irk which flows ~500m to the east of the site where Waterloo Street extends over the river.
- 3.4.2 The watercourse flows in a roughly south-westerly direction before draining into the River Irwell near Victoria (Train) Station in Central Manchester.
- 3.4.3 No Chemical Water Quality information is available for the stretch of River within the vicinity of the site.

3.5 Potential Flood Risks

- 3.5.1 According to the Environment Agency website the site is not located in an area at risk from flooding or extreme flooding from reservoirs, rivers or seas.

3.6 Landfill and Waste Management Activity

3.6.1 According to the Environment Agency's "What's in your backyard?" website there are four historical landfills within 1km of the site.

3.6.2 The nearest authorised landfill site, Abraham Moss Centre, is located approximately 250m south of the subject site to the south of Crescent Road. No further information is known regarding this landfill.

3.6.1 There are several other recorded / historic landfill sites within 1km of the subject site. The following table details the relevant information:

Distance and Direction	Landfill Name	Waste Accepted	Recorded Disposal Period
450m south-east	Harpurhey Road	Not Known	Not Known
750m east	Factory Lane	Not Known	Not Known
800m east	Bankfield Street	Not Known	Not Known

3.6.2 Given the underlying low permeability ground conditions and the distances from the aforementioned landfill sites, the risk to the subject site is considered negligible.

3.7 Industrial Land Use Information

3.7.1 The nearest open fuel station is an Esso Petrol Station on Cheetham Hill Road located approximately 700m southwest of the subject site. The distance and underlying low permeability geological conditions are likely to preclude any contaminant migration affecting the subject site.

3.8 Ecology

3.8.1 With respect to the DEFRA Rural Designation interactive map resource (2012), the site does not lie within 500m of one of the following *sensitive* sites: Site of Special Scientific Interest (SSSI), National Nature Reserve, Ramsar Site, Special Area of Conservation, Special Protection Area or World Heritage Site.

4. Site History

- 4.1.1 The following summary of the site's history is based on a review of available historical Ordnance Survey maps provided by GroundSure (presented in Appendix C) supplemented with records presented on *oldmaps.co.uk*.

Table 4.1. Summary of the Historical Development of the Site.

Map Dates	Description	Comments
1893 - 1909	Undeveloped	The site comprised sections of larger fields primarily within an undeveloped rural / agricultural area.
1909 – 1949	Change of Field Boundaries	The former field boundaries are no longer apparent. The site was entirely enclosed within a larger field.
1949 - 1987	Sports Fields	The site was described as being a sports field with a small pavilion to the north-east.
1987 – 1992	Car Park	The central and eastern sections of the site appeared to have been developed and formed an open-air car-park for the adjacent hospital. Possible earthworks could have been undertaken in the north-eastern section of the site.
1992 – 2012	Single Structure	The former car-park had been redeveloped and included a single structure, a modified access road along the northern boundary and areas of car-parking. The north-western tip of the site appeared to have been modified with an irregular shaped enclosure, although it is not indicated to be a structure.
2012 – present	Site Cleared	At some time in the early 21 st Century the site was cleared of structures from ground level. However, the surface hardstanding was still evident during the site inspection in April 2013.

NOTE: All locations are approximate; measured from the nearest site boundary.

Table 4.2. Summary of the Historical Development of the Surrounding Area.

Map Dates	Description	Comments
1893 – present	Springfield Hospital (North Manchester General Hospital)	By this time the hospital complex had been constructed within 100m of the north-eastern boundary. By 1922 the hospital complex had expanded both eastwards and southwards. The existing buildings appeared to have undergone modifications.
1893 – present	Cemetery and Mortuary Chapel	A mortuary chapel and cemetery were depicted 100m south-east of the site boundary beyond the hospital access road.
1893 –present	Brick Works (later Crumpsall Park)	A brick works was located ~125m west / north-west of the site. However, no clay pits / quarries were depicted on the historical records. By 1909 the brickworks had been cleared and the area landscaped as Crumpsall Park.
1893 – present	Pond	A pond associated with Clarkes Villa located ~250m south-east. The pond was still depicted on the most recent site plans.
1909 – present	Residential Development	During the early 20th century the area immediately south-west of the site boundary was developed for residential use. The residential area was located beyond a small track and an area which appeared to have undergone localised earthworks. By 1922 the residential areas to the south-west had expanded northwards to the boundary with Crumpsall Park. By 1992 the residential redevelopment had extended to the south of the site: accessed from Crescent Drive.
1949 - 1983	Sports Ground	The land between the hospital and the subject site was described as a sports ground with a bowling green, tennis courts and a small pavilion. By 1968 the pavilion had been relocated approximately 50m north of the subject site with in an area which appeared to have undergone significant earthworks to the north-west. By 1983 the hospital had been further modified with a rectangular shaped building extending to ~25m of the northern site boundary within the area of the former sports ground.

4.2 Summary

- 4.2.1 With reference to the available historical maps, the site remained mainly undeveloped grass/amenity land, until the 1980's when it was developed with a single large structure indicated to provide catering services to the nearby hospital. However, by the early 2000's the site was indicated to be disused with the above ground structures later demolished. The site has since remained disused and surfaced with concrete / asphalt.
- 4.2.2 The surrounding area largely comprised undeveloped agricultural land / fields with the Springfield Hospital (North Manchester General) to the north-east and several localised urban areas to the south-west and north-west. The earliest plans indicate a brick-works to the west which was later redeveloped as Crumpsall Park.
- 4.2.3 During the 20th Century a residential area steadily expanded to encompass the southern site boundary. The historical plans also indicate a cemetery and a pond within 250m of the site.
- 4.2.4 On the basis of the above there are few apparent historic potential sources of contamination at or within very close proximity to the site. However, materials are likely to have been imported to the site in support of the previous phase of development. Such Made Ground materials are of unknown provenance and could be contaminated.
- 4.2.5 The adjacent cemetery could provide a theoretical source of potentially hazardous ground gas, however, the risks are considered to be low and a viable pathway would have to be established for a risk to be realised.

5. Conceptual Site Model

5.1 Introduction

5.1.1 This section summarises the findings of the desk study and site reconnaissance in the form of a geo-environmental conceptual site model (CSM).

5.1.2 The CSM provides a qualitative evaluation of potentially active “*pollutant linkages*” at the site; these being plausible scenarios whereby a contamination source is connected to a possible receptor by one or more pathways:

- i) Potential sources of contamination: these include any actual or potentially contaminating materials and activities, located either on or in the vicinity of the site;
- ii) Potential pathways for contamination migration: these comprise the routes or mechanisms by which contaminants may migrate from the source to the receptor including environmental migration pathways and human health exposure pathways; and
- iii) Potential receptors of contamination: these include present and/or future land users, ecological systems, water resources and property.

5.1.3 For reference, a schematic cross-section of the conceptual site model is presented on Figure 2 in Appendix A.

5.2 Contamination Sources

5.2.1 From the information reviewed in this report, no significant potential contamination sources associated with the site’s historic or current usage have been identified, and no significant sources of potential ground gas generation have been identified at the subject site either.

5.2.2 Made Ground is likely to be present beneath historical structures; such deposits could contain ash-related contaminants (e.g. toxic/phytotoxic elements), but could also include hydrocarbon impacts (e.g. Poly Aromatic Hydrocarbons (PAHs)) and other potentially harmful inorganic determinants (e.g. sulphates). The ground gas generation potential with regards to Made Ground deposits is considered “low”.

5.2.3 Given the proposed residential end-use of part of the site, it will likely be a requirement to confirm the absence of contamination at the site. No significant volumes of Topsoil are thought to exist at the site, such as could be utilised within the development.

5.3 Pathways

5.3.1 Potential migration pathways are discussed below.

Airborne Migration Pathways

- In areas of hardstanding such as pavements, highways and floor slabs the potential for particulate generation will be negligible and therefore the particulate inhalation pathway is considered inactive.
- In areas of soft standing such as private gardens where the ground surface is exposed there is the potential for dust generation and therefore (without consideration of any mitigation) the particulate inhalation pathway is considered active.
- During development works, sub-surface soils could be exposed at the surface and therefore dust has the potential to be generated. Notwithstanding, typical dust suppression techniques would almost certainly be employed so that exposures would be minimised.
- Ground gas/vapour migration and inhalation pathways from soil or groundwater sources are potentially active irrespective of site status.

Aqueous Migration Pathways

- The site is recorded as being directly underlain by Unproductive Strata comprising the Glacial Drift Deposits; this would afford suitable protection to the underlying Principal Aquifer; on this basis groundwater migration is considered to be inactive.
- Leaching of contaminants in the shallow soils is likely to be negligible in areas of hardstanding (buildings, pavement, etc.) where infiltration of rainfall is minimal however could potentially occur in uncovered areas.

Direct Contact Exposure Pathways

- In areas of hardstanding such as pavements, highways and floor slabs the potential for direct contact will be negligible and therefore direct contact exposure pathways are considered inactive.
- In areas of soft standing such as private gardens and public open space where the ground surface is exposed there is the potential for direct contact and therefore (without consideration of any mitigation) direct contact exposure pathways are considered active.
- Direct contact pathways would be active throughout the construction phase; however typical mitigation measures such as personal protective equipment (PPE; overalls, gloves etc) could be used to mitigate this risk.
- As domestic gardens are to be included in the development, the consumption of home-grown produce is also likely to occur and therefore exposure pathways associated with this practice are considered active for residential end-users.

5.4 Receptors

- 5.4.1 With reference to Part 2a of the Environmental Protection Act (1990), the applicability of potential receptors which should be considered in any contaminated land scenario can be summarised as follows:

Human Health

- The proposed redevelopment is for residential housing and as such future occupants would be the primary receptors for consideration in any contamination risk.
- Construction workers/contractors could also potentially be exposed to contaminants during any construction processes (i.e. during any development) as would any maintenance workers (working in the ground) following completion of any development.
- Users of the adjacent buildings could also be at risk; though for exposure to occur, active cross-boundary migration pathways would be required.

Eco-systems

- The site is not located within or close to a statutory protected site.

Property (buildings, etc)

- The proposed development will include new structures and associated infrastructure; these will be designed on the basis of a site specific geotechnical investigation which will include an appraisal of relevant risks including the potential for sulphate attack on buried concrete and ground gas risks.

Controlled Water

- All groundwater is Controlled Water; therefore the groundwater beneath the site requires consideration and protection. Notwithstanding, on the basis of the immediate underlying geology being classed as Unproductive Strata, the resource value of groundwater in the Drift is negligible. The drift will also afford protection to the underlying Principal Aquifer.
- Surface water courses are also considered Controlled Water receptors. The River Irk runs ~500m east of the subject site; however given its distance and the intervening permeability geology, potential off-site migration in groundwater is considered negligible.

5.5 Preliminary Risk Assessment

- 5.5.1 Based on the CSM the following table presents the plausible pollutant linkages that apply to this site. An indicative qualitative assessment of the likelihood that a risk could be realised is provided within Table 5.1 constituting the Preliminary Risk Assessment (PRA) as outlined in CLR 11 (DEFRA & EA, 2004).

Table 5.1. Summary of the preliminary risks associated with Potential Pollutant Linkages

Potential Receptor	Potential Source	Potential Pathway	Preliminary Risk*
Future Residents	Made Ground/Fill potentially contaminated with inorganic and organic substances and potentially asbestos	Particulate inhalation / dermal contact / ingestion / consumption of homegrown produce	Low - Moderate
		Vapour inhalation (indoor and outdoor)	Low
	Ground Gas	Migration through structures	Low
Construction Workers/ Maintenance Workers	Made Ground/Fill potentially contaminated with inorganic and organic substances and (potentially) asbestos.	Particulate inhalation / dermal contact / ingestion/vapour inhalation (outdoor)	Low
Property (future buildings)	Sulphate impacted soil and groundwater	Chemical Attack	Low
	Ground Gas – site derived	Structural damage due to explosion of combustible gas	Low
	Ground Gas – offsite source	Structural damage due to explosion of combustible gas	Low
Controlled Water: Principal Aquifer	Contaminated soil and perched groundwater	Leaching and migration of contaminants	Low
Controlled Water: River Irk	Contaminated Soil and perched groundwater	Leaching and migration of contaminants	Low

* assuming no mitigation or remedial measures are implemented.

5.6 Discussion

- 5.6.1 In view of the site history and the sensitive nature of the proposed residential redevelopment, the contamination potential for the site is generally LOW.
- 5.6.2 The only aspect of the PRA to attract a “Moderate” rating is due to the likely presence of Made Ground/Fill materials associated with historic development at the site and the unknown quality and provenance of this.
- 5.6.3 Therefore, the characteristics of the site in this regard should be confirmed prior to development, particularly in the context of the residential modifications and the sensitivity associated with this.

- 5.6.4 A geotechnical investigation is required for the design of foundations and the characterisation of the aggressivity of the ground (potential risk of chemical attack) on buried concrete. It would be prudent to use the opportunity to chemically assess Made Ground deposits at the site (for example beneath former structures and areas of hardstanding), both in terms of contamination risk (future use and/or disposal as waste) and in terms of geotechnical suitability.

6. Other Development Considerations

6.1 Preliminary Geotechnical Appraisal

- 6.1.1 Current proposals are for the construction of approximately 22 low-rise residential structures. External areas include a new access road, hardstanding for parking and servicing and private gardens.
- 6.1.2 The majority of the site is surfaced with hardstanding which included asphalt and a former concrete floor slab which will need to be broken and could be, crushed and stockpiled for re-use.
- 6.1.3 It is anticipated that underground obstruction (i.e. former foundations and services etc.) will be encountered at the site which will also need to be broken out and removed.
- 6.1.4 Ground conditions beneath the surface horizon of hardstanding are anticipated to include Made Ground, underlain by cohesive Glacial deposits underlain by weathered sandstone, of the Sherwood Sandstone Formation, at depth.
- 6.1.5 It is therefore likely that new structures could be founded on shallow spread foundations with due regard to mitigation for tree roots especially along the western and western boundaries.
- 6.1.6 Notwithstanding the above, the foundation design for the proposed structure should be based on a development specific intrusive ground investigation to allow geotechnical design parameters to be quantified.
- 6.1.7 There is the potential, albeit considered low at this stage that 'running sand' deposits could exist beneath the site. A suitable scale of site investigation would establish the relevance of this potential constraint.

6.2 Waste Soils Management

- 6.2.1 Careful management of soils during the excavation works will ensure optimum utilisation of soil resources. For example Topsoil (where present along the eastern and western boundaries) should be stripped and tested, and where suitable stockpiled for use in the development.
- 6.2.2 In addition hardstanding should be broken out, crushed and stockpiled for re-use.
- 6.2.3 Excavated soils which require off-site disposal are anticipated to be classified in accordance with the following document: Guidance on the Disposal of "Contaminated Soils" Version 3 (April 2001); produced by the Environment Agency. On this basis it is considered likely that soils from the majority of the site would classify as "Inert" for disposal. However, Made Ground where encountered will likely classify as Non-Hazardous and possibly Hazardous.
- 6.2.4 Nevertheless, the opportunity should be taken to assess the potential characterisation of materials for possible future off-site disposal.

- 6.2.5 The re-use of soil during development will require the contractor to obtain an Environmental Permit, Permit Exemption or develop a “Materials Management Plan”/“Design Statement” in line with CL:AIRE (2011).

6.3 Potable Water Supplies

- 6.3.1 There are currently no (fully adopted) national standards for the protection of potable water supply pipes in potentially contaminated ground. However the UKWIR has published guidance in this respect and site testing should be undertaken with due recognition of this guidance.
- 6.3.2 On the basis of the current information, no special precautions are likely to be required.

7. Conclusion & Recommendations

7.1 Overview

- 7.1.1 This Phase 1 Desk Study Report presents an assessment of the geo-environmental information pertaining to the site based on readily available desktop/published sources.
- 7.1.2 The objective of this assessment was to collate and review the available geo-environmental information to determine any potential geo-environmental risks associated with the site in its current condition and evaluate any potential geo-environmental constraints with regards to the proposed future development of the site.

7.2 Conclusions

- 7.2.1 In view of the site history and the sensitive nature of the proposed residential redevelopment, the contamination potential for the site is considered LOW. The only aspect of the PRA to attract a "Moderate" rating is the likely presence of Made Ground/Fill materials associated with historic development at the site; the quality and provenance of which is unknown.
- 7.2.2 Ground conditions beneath the site will likely include Made Ground deposits overlying cohesive Glacial Till and underlain by weathered Sandstone of the Sherwood Sandstone Formation. Although the BGS record proved granular Glacial Deposits to depths of at least 10.00m within the wider site area, depths within the subject site are unknown.
- 7.2.3 A geotechnical investigation will be required to confirm the above and as such the opportunity should be taken to quantify the contaminant concentrations with specific focus on Topsoil and Made Ground characterisation for future re-use.
- 7.2.4 Such investigations should also characterise any mitigation measures for aggressive ground and characterise 'Waste' for future disposal.

7.3 Recommendations

- 7.3.1 In recognition of the proposed development, Phase II Intrusive site investigation is recommended to establish the nature of the ground conditions and to obtain geotechnical design parameters.
- 7.3.2 The investigation should be undertaken in line with BS5930 (1999) and ISO10175 (2011) with the aim of determining the ground conditions, allowing sampling of soils for geotechnical and environmental testing and the installation of monitoring wells for rudimentary gas and groundwater assessments. Such investigations will also allow mitigation of any aggressive ground and characterise 'Waste' for future disposal.
- 7.3.3 In particular the investigation will be required to establish the depth to competent bearing strata across the site for future foundation design.

8. References

British Standards Institution (BSI), 1999. Code of Practice for Site Investigations – BS5930:1999.

British Standards Institution (BSI), 2011. Investigation of Potentially Contaminated Sites – Code of Practice. BS 10175 – 2011.

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Appendix A Figures & Drawings

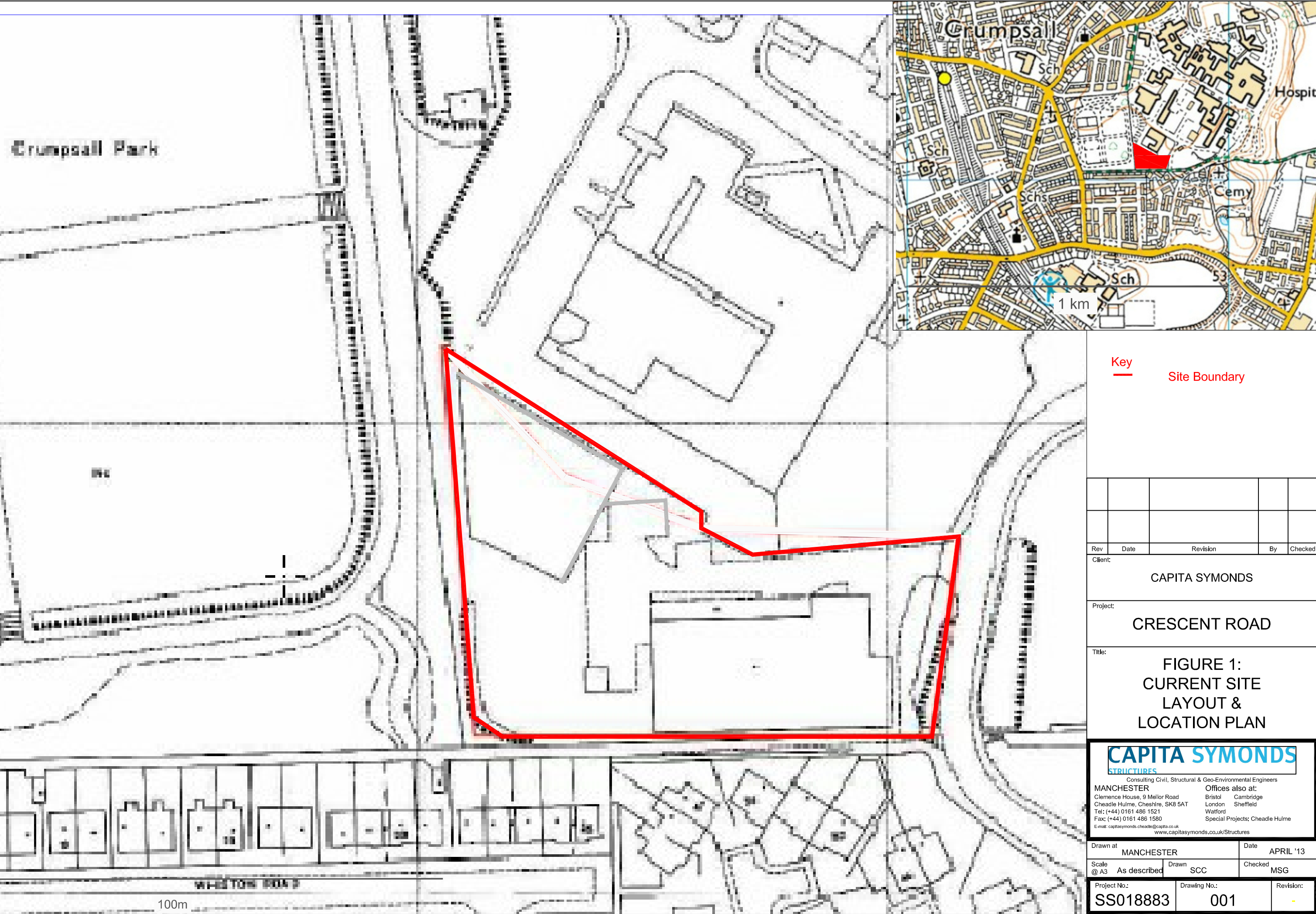


FIGURE 2

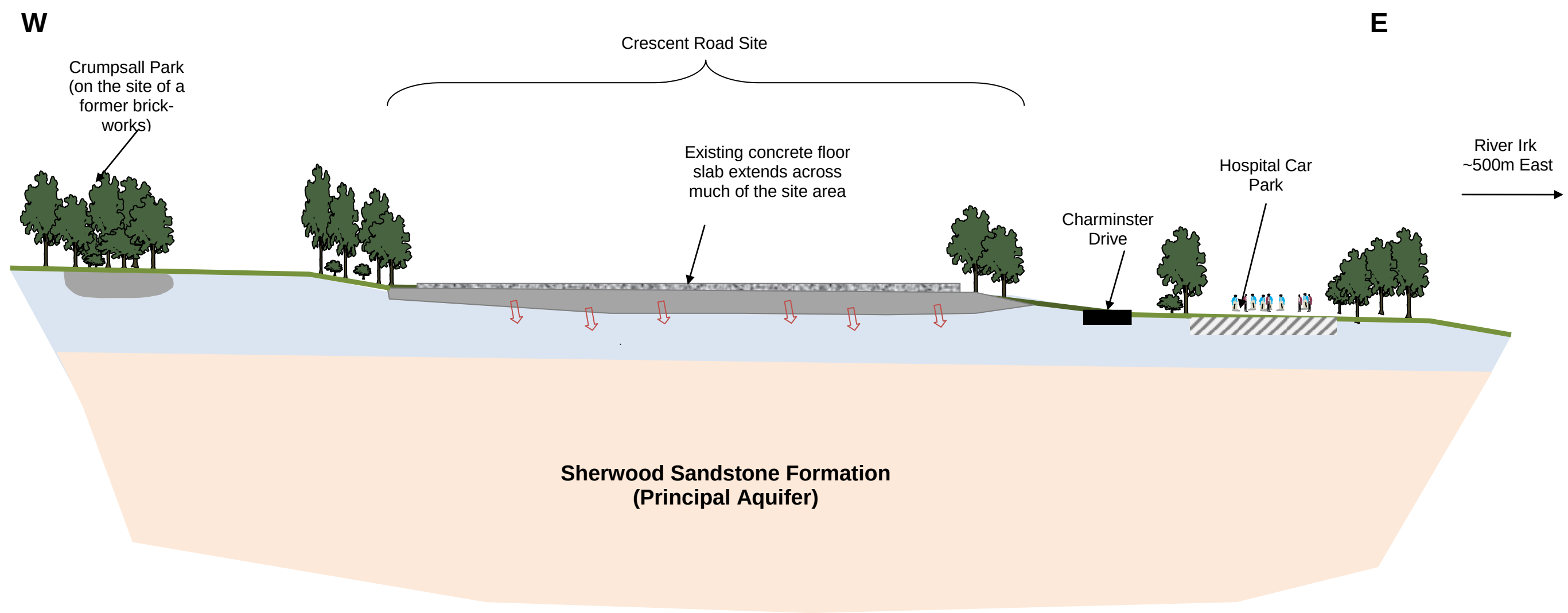


FIGURE 2

CONCEPTUAL SITE MODEL
Schematic Cross Section
for Crescent Road, Crumpsall

Job Number: SS/018883

Scale: NTS Date: 14/04/13

Key:

- Made Ground
- Glacial Till (Non Aquifer)
- Sherwood Sandstone Formation (Principal Aquifer)
- ⇓ Migration of contaminants in groundwater / leachate

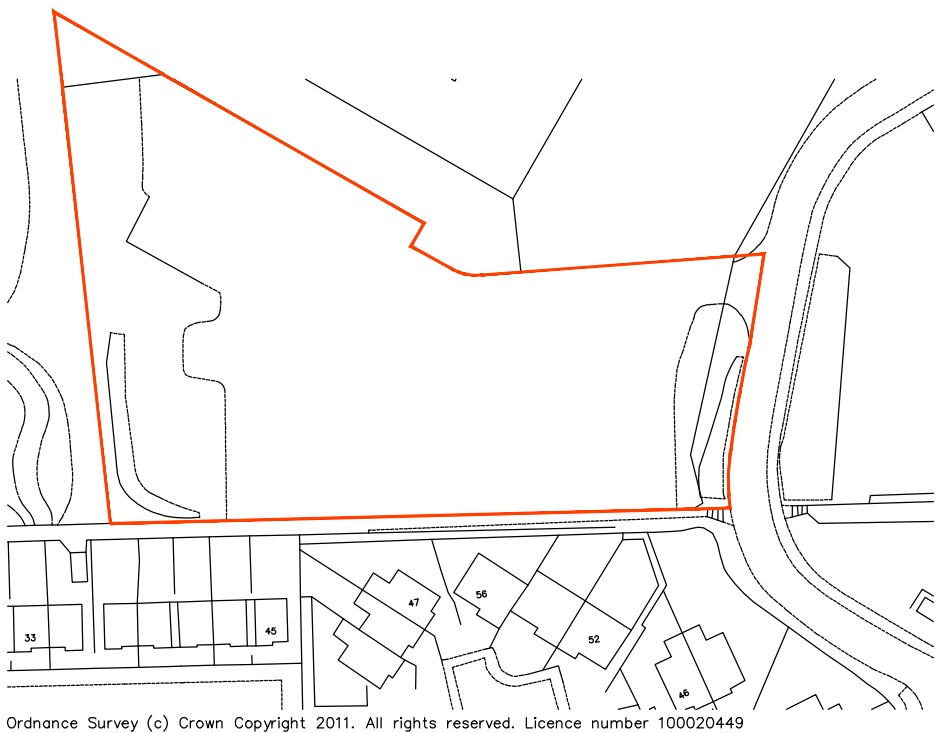
CAPITA SYMONDS
STRUCTURES
Consulting Civil, Structural & Geo-Environmental Engineers

MANCHESTER
Clemence House, 9 Mellor Road
Cheadle Hulme, Cheshire. SK8 5AT
Tel: (+44) 0161 486 1521
Fax: (+44) 0161 486 1580
E-mail: capitasymonds.cheadle@capita.co.uk

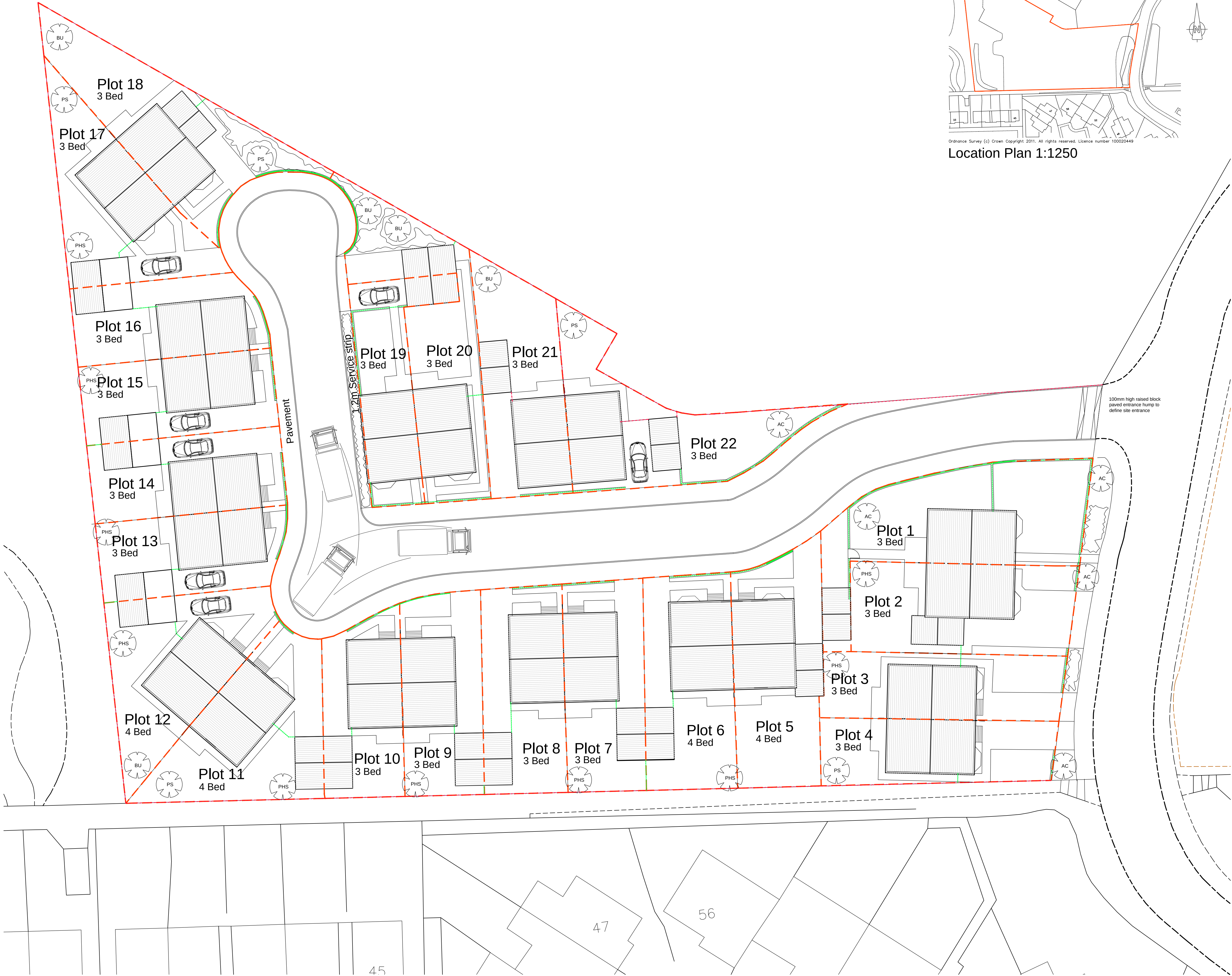
Offices also at:
Bristol
Cambridge
London
Watford
Cheadle Hulme (Special Projects)

www.capitasymonds.co.uk/structures

NOTE
This drawing is to read in conjunction with all other Architects drawings and all Structural Engineers drawings details and calculations.
It is the contractors responsibility to check all dimensions prior to fabrication or construction, any discrepancies to be reported to the Architect.



Location Plan 1:1250



- Revisions
- A: Updated following comments received during pre-application advise meeting with planning department. 01/02/12 - ADL
 - B: 3 storey units added to plots 1&2 and 11&12. 07/02/12 - ADL
 - C: Site layout updated to reflect highways comments. 10/04/12 - ADL
 - D: Site edged red amended. 18/04/12 - ADL
 - E: Site edged red amended. 20/04/12 - ADL
 - F: Plots 1 - 4 amended to gain additional off road parking . 20/04/12 - ADL
 - G: 2m wide footpath added to front of plots 19 to 22 . 10/05/12 - ADL
 - H: general update, 2 bed type added and numbers increased to 23 . 23/10/12 - ADL
 - J: Minor updates to general layout for planning submission. 19/11/12 - ADL
 - K: Site layout revised back to 22 units. 14/02/13 - ADL

Project
Proposed Residential Development
Former Anglian Crown Site,
Crescent Road, Crumpsall

Drawing
Proposed Site Layout

Date	Jan 12	Drawn By	ADL	Scale	1:200
Drawing Status	Planning	Drawing No.	1039-01	Rev No.	K

Appendix B Environment Agency Website Extracts



Enter a postcode or place name:

Other topics for this area...

Groundwater

Groundwater

Map legend

Click on a catchment to see more details

☐ ☒ Groundwater source protection zones

-  Inner zone (Zone 1)
-  Outer zone (Zone 2)
-  Total catchment (Zone 3)
-  Special interest (Zone 4)

  Aquifer Maps -
Superficial Deposits
Designation 

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes and landslip)

☒ Aquifer Maps - Bedrock Designation 

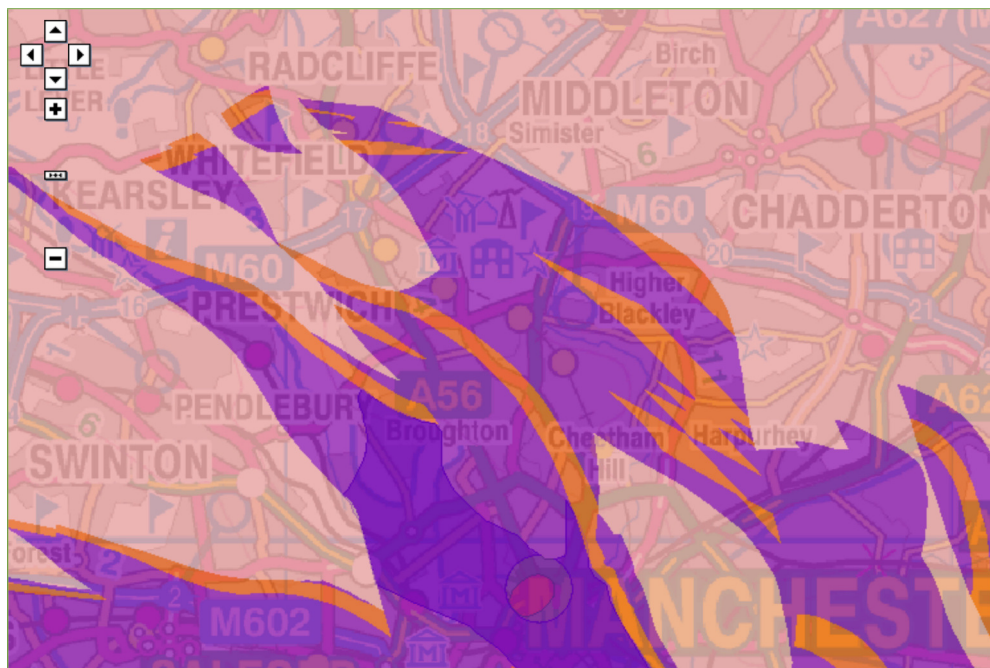
- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)

  Groundwater Vulnerability Zones 

-  Major Aquifer High
-  Major Aquifer Intermediate
-  Major Aquifer Low
-  Minor Aquifer High
-  Minor Aquifer Intermediate
-  Minor Aquifer Low

X: 383,306;Y: 402,981 at scale 1:75,000

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More about Groundwater

British Geological Survey Aquifer data:

The Aquifer Extents are not displayed at scales greater than 1:75,000 (Ordnance Survey 1:250,000 scale) as the data was only modelled to this level and is not accurate past this.

New BGS Aquifer Designation Maps

From 1st April 2010 new aquifer designations replace the old system of classifying aquifers as Major, Minor and Non-Aquifer. This new system is in line with our Groundwater Protection Policy (GP3) and the Water Framework Directive (WFD) and is based on British Geological Survey mapping.

Groundwater Source Protection Zones data:

The Source Protection Zones are not displayed at scales greater than 1:20,000 (Ordnance Survey 1:50,000 scale) as the data was only modelled to this level and is not accurate pass this. They should not be compared against field boundaries.

Groundwater Source Protection Zones

Groundwater provides a third of our drinking water. We ensure that your water is safe to drink defining Source Protection Zones. These zones help to monitor the risk of contamination from any activities that might cause pollution in the area.

Facts and figures of our groundwater resources

Find out more about groundwater and groundwater levels.



Enter a postcode or place name:

[Go](#)

Other topics for this area...

Risk of Flooding from Rivers and Sea

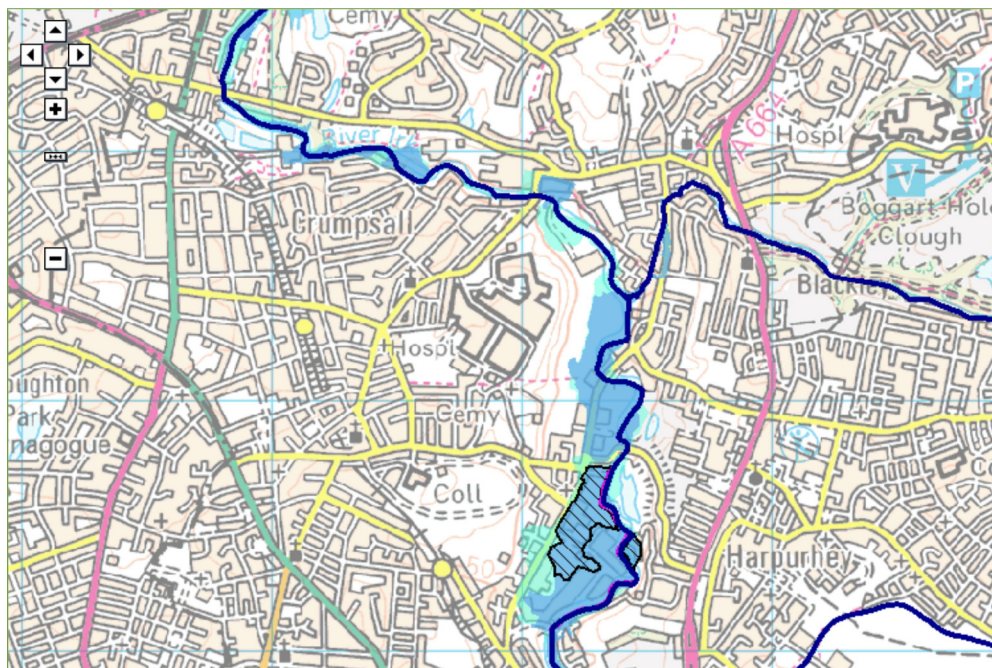
Map legend

Click on the map to see what is the Risk of Flooding at a particular location.

☒ Flood Maps [i](#)

- Flooding from rivers or sea without defences
- Extent of extreme flood
- Flood defences (Not all may be shown*)
- Areas benefiting from flood defences (Not all may be shown*)
- Main rivers

Map of M8 5RL at scale 1:20,000

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Flood Map – Information Warnings

Manchester Ship Canal

Flood Mapping of the Manchester Ship Canal in Trafford, Salford and Warrington was updated 9 August 2012 as a result of a judgment of the High Court. The judgment concluded that the Ship Canal sluice gates should not be regarded as 'formal' flood defences and that our decision to map the Ship Canal flood zones as if the sluice gates were closed was unlawful. We have applied to the Court of Appeal to appeal against this judgment, and we will keep this caveat updated. For further information please contact the Environment Agency on 03708 506 506.

* **Legend Information:** Flood defences and the areas benefiting from them are gradually being added through updates. Please contact your [local environment agency office](#) for further details.

More about flooding:

Understanding the flood map

A more detailed explanation to help you understand the flood map shown above.

Current flood warnings

We provide flood warnings online 24 hours a day. Find out the current flood warning status in your local area.

Flood map - your questions answered

Answers to commonly asked questions about the flood map.



Interactive Maps

Historic landfill (Grid reference: X: 384,696.88; Y: 401,596.42)

Page 1 of 1 (1 result for selected location)

Site name	Site address	First waste received	Last waste received	
Abraham Moss Centre	Crescent Road, Crumpsall, Manchester, Greater Manchester	-	-	

Tell me more about waste and landfill:

Waste regulation

We regulate waste management through a system of licences. Find out how to get the correct licence here, get data on waste and find out if there are any rules applying to household waste.

Waste facts and figures

The UK produces about 220 million tonnes of controlled wastes per year. Find out about waste incineration, hazardous waste, recycling and landfill.

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Author: The Environment Agency | WIYBYSUPPORT@environment-agency.gov.uk
Last updated: 8th November 2012

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Enter a postcode or place name:

Other topics for this area...

Waste

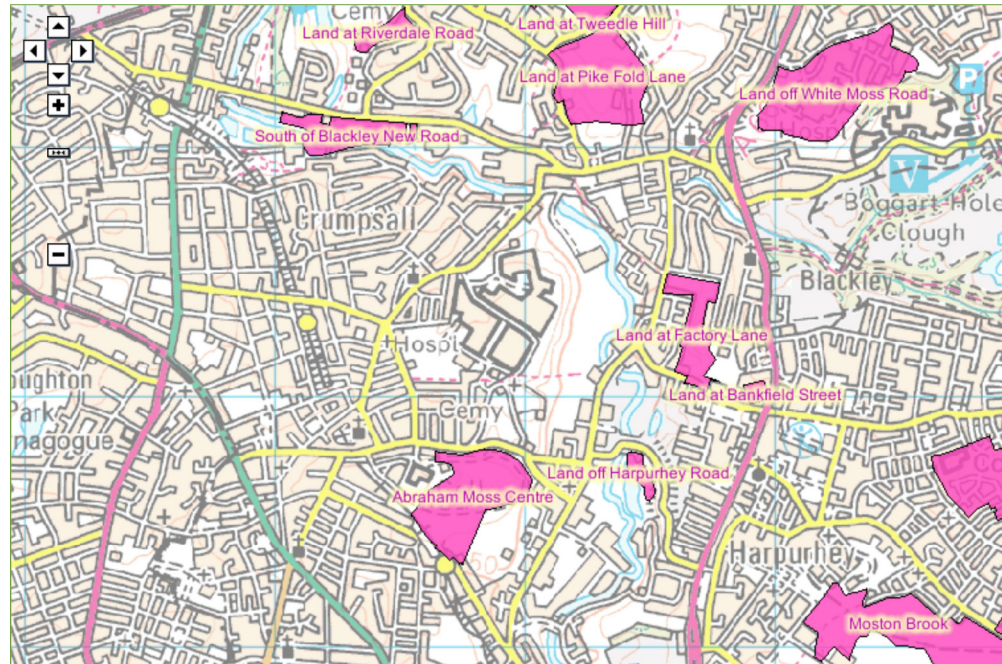
[Go](#)

Map legend

Click on a feature for details of that site	
☒	Authorised Landfill i
	Site boundary
☒	Historic landfill i
	Site boundary

Map of X: 384,935; Y: 402,242 at scale 1:20,000

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Enter a postcode or place name:

Other topics for this area...

Pollution

 [Go](#) [Go](#)

Map legend

Click on a feature for details of that site

☒ [Pollution Incidents](#) [i](#)

- Major
- Significant

☒ [Industrial Pollution](#) [i](#)

- Fuel & Power
- Metal
- Mineral
- Chemical
- Waste
- Water
- Radioactive
- Associated
- Other
- Not Classified

☒ [Industrial Operator Scores \(OPRA\) 2011](#) [i](#)

- Band A
- Band B
- Band C
- Band D
- Band E
- Band F

☒ [Compliance Rating Scores](#) [i](#)

- Very Good
- Good
- Moderate
- Fair
- Poor
- Bad

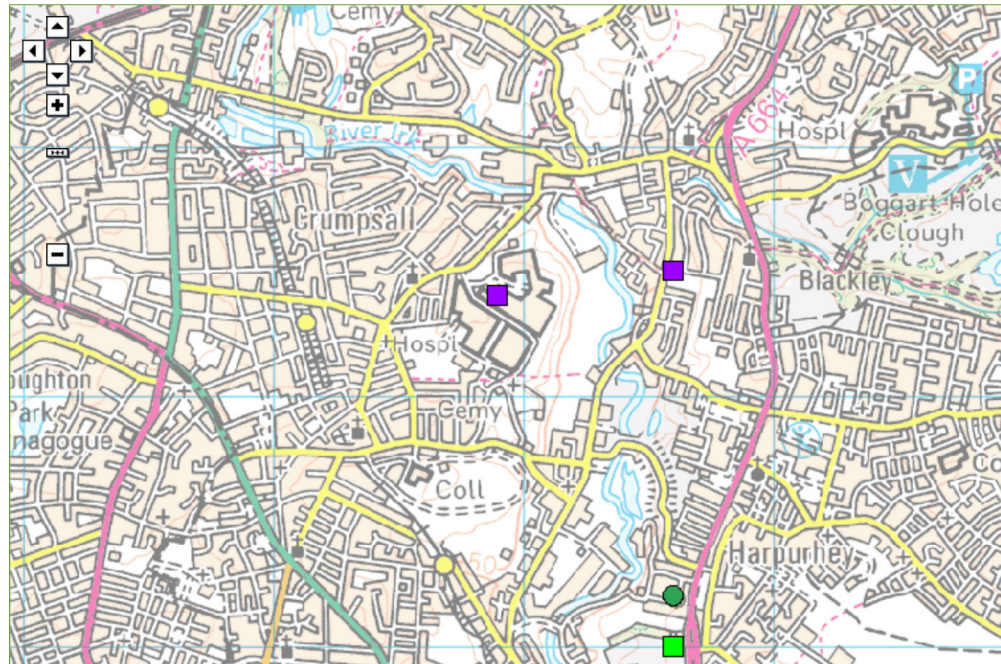
☒ [Mining Waste](#) [i](#)

Closed Mining Waste Sites

☒ [Historic Industrial Operator Scores \(OPRA\)](#) [i](#)

Permitted Sites

Map of X: 384,935; Y: 402,242 at scale 1:20,000

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Tell me more about Pollution:

Pollution Incidents

Find out how we categorise incidents and their possible effects on health and the environment

Industrial Pollution

Every industrial process could theoretically pose a risk to human health and the environment. Find out how we measure this risk and how we score operators on their potential to impact the environment.

Industrial Operator Scores (OPRA)

Industrial Operator Scores reflect two of the five attributes that make a site's Operational risk appraisal (Opra) profile. The Compliance Rating band reflects the number of non-compliances with permit conditions we have recorded at the site over the course of a year. The Operator Performance band is influenced by the type of management system the operator has in place and any formal enforcement action we have taken at the site.

[More information about OPRA](#)

Compliance Rating Scores

Compliance Rating Scores is our report of the level of permit breaches we've recorded at sites during the year. We include both the number of breaches and also our assessment of the severity of these breaches, as determined by our Compliance Classification Scheme (CCS).

[More information about Compliance Classification Scheme](#)

Mining Waste

Closed mining waste facilities pose serious environmental impacts. The map states the cause of the impact: either water pollution, harm to human health, instability or fire hazard.



Enter a postcode or place name:

Other topics for this area...

Groundwater

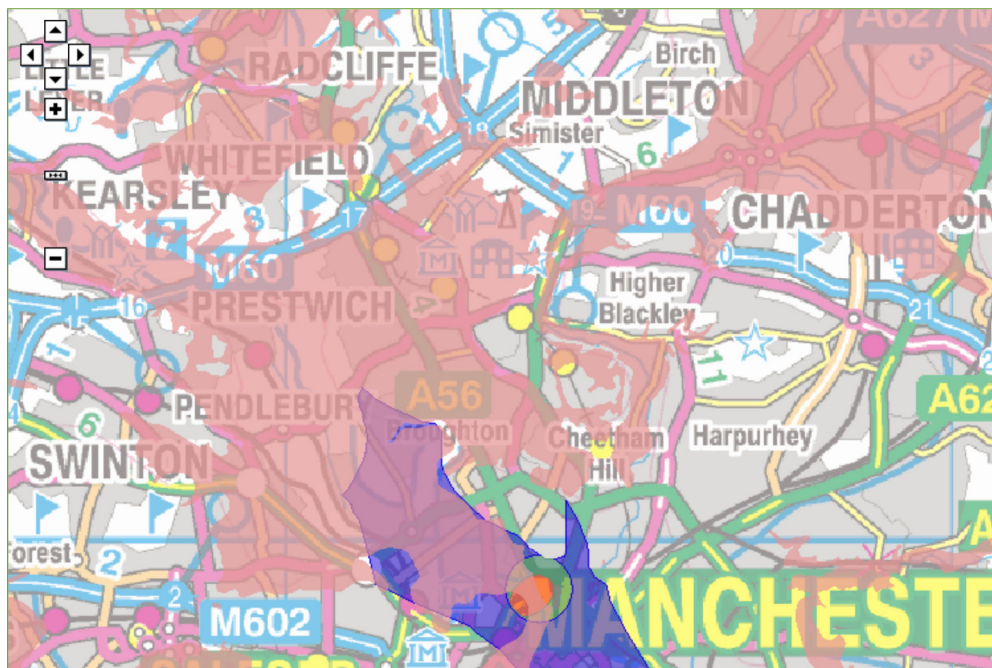
[Go](#)

Map legend

Click on a catchment to see more details

☒ Groundwater source protection zones [i](#)☒ Inner zone (Zone 1)☒ Outer zone (Zone 2)☒ Total catchment (Zone 3)☒ Special interest (Zone 4)☒ Aquifer Maps - Superficial Deposits Designation [i](#)☒ Principal☒ Secondary A☒ Secondary B☒ Secondary (undifferentiated)☒ Unknown (lakes and landslip)☐ Aquifer Maps - Bedrock Designation [i](#)☐ Principal☐ Secondary A☐ Secondary B☐ Secondary (undifferentiated)☐ Groundwater Vulnerability Zones [i](#)☐ Major Aquifer High☐ Major Aquifer Intermediate☐ Major Aquifer Low☐ Minor Aquifer High☐ Minor Aquifer Intermediate☐ Minor Aquifer Low

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Facts and figures of our groundwater resources

Find out more about groundwater and groundwater levels.

Appendix C GroundSure Historic Maps

Site Details:

Land Off Crescent Drive
Crumpsall , M8 5RL

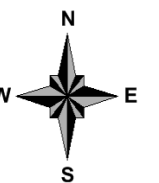
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Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: MasterMap

Map date: 2012

Scale: 1:1,250

Printed at: 1:2,500



2012



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To view map legend click here [Legend](#)



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Crumpsall, M8 5RL

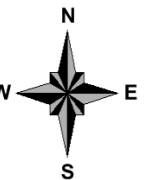
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Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: National Grid

Map date: 1994-1995

Scale: 1:1,250

Printed at: 1:2,500



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Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A	



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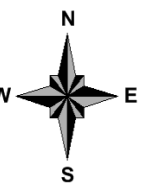
Client Ref: SS018883-ZMCR
Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: National Grid

Map date: 1992-1994

Scale: 1:1,250

Printed at: 1:2,500



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Site Details:

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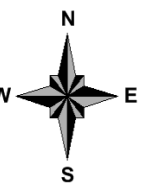
Client Ref: SS018883-ZMCR
Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: National Grid

Map date: 1992

Scale: 1:1,250

Printed at: 1:2,500



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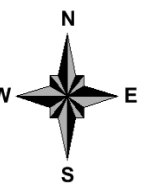
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Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: National Grid

Map date: 1983-1987

Scale: 1:1,250

Printed at: 1:2,500



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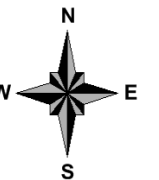
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Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: National Grid

Map date: 1968-1973

Scale: 1:1,250

Printed at: 1:2,500



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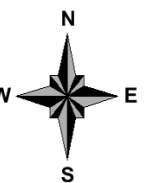
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Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: National Grid

Map date: 1967-1968

Scale: 1:2,500

Printed at: 1:2,500



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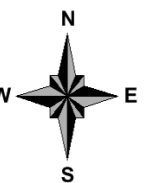
Client Ref: SS018883-ZMCR
Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: National Grid

Map date: 1949-1951

Scale: 1:1,250

Printed at: 1:2,500



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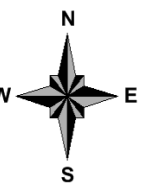
Client Ref: SS018883-ZMCR
Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: National Grid

Map date: 1949-1951

Scale: 1:2,500

Printed at: 1:2,500



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Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled 1948

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Revised 1950
Edition N/A
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Client Ref: SS018883-ZMCR
Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: County Series

Map date: 1932

Scale: 1:2,500

Printed at: 1:2,500



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Surveyed 1932
Revised 1932
Edition N/A
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Site Details:

Land Off Crescent Drive
Crumpsall, M8 5RL

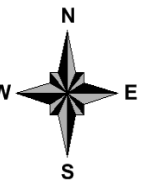
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Report Ref: HMD-191-703953
Grid Ref: 384765, 402058

Map Name: County Series

Map date: 1922

Scale: 1:2,500

Printed at: 1:2,500



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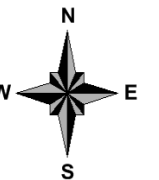
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Grid Ref: 384765, 402058

Map Name: County Series

Map date: 1909

Scale: 1:2,500

Printed at: 1:2,500



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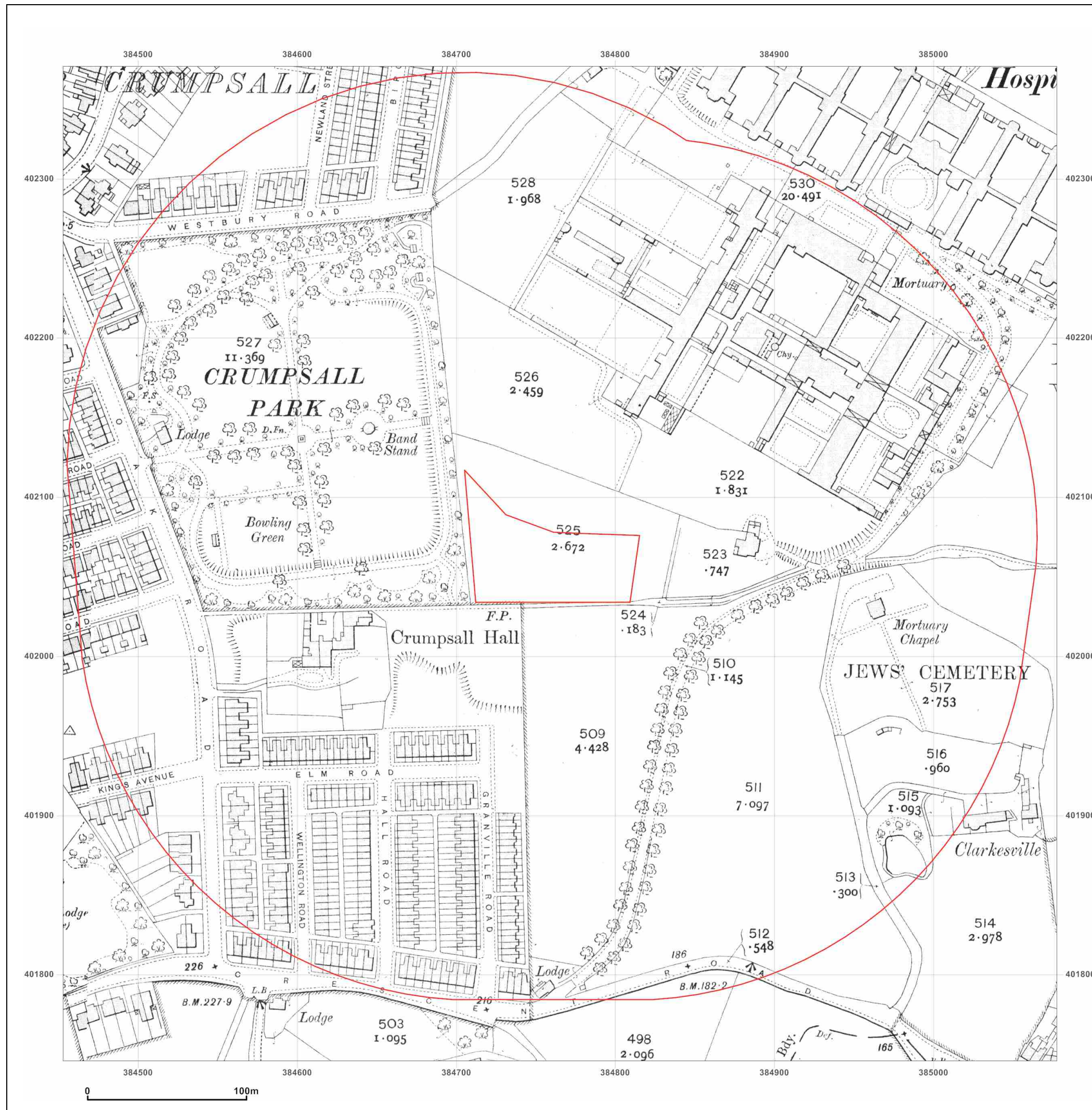


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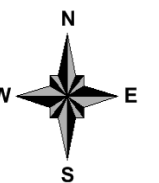
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Grid Ref: 384765, 402058

Map Name: County Series

Map date: 1893

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1893
Revised 1893
Edition N/A
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Revised 1893
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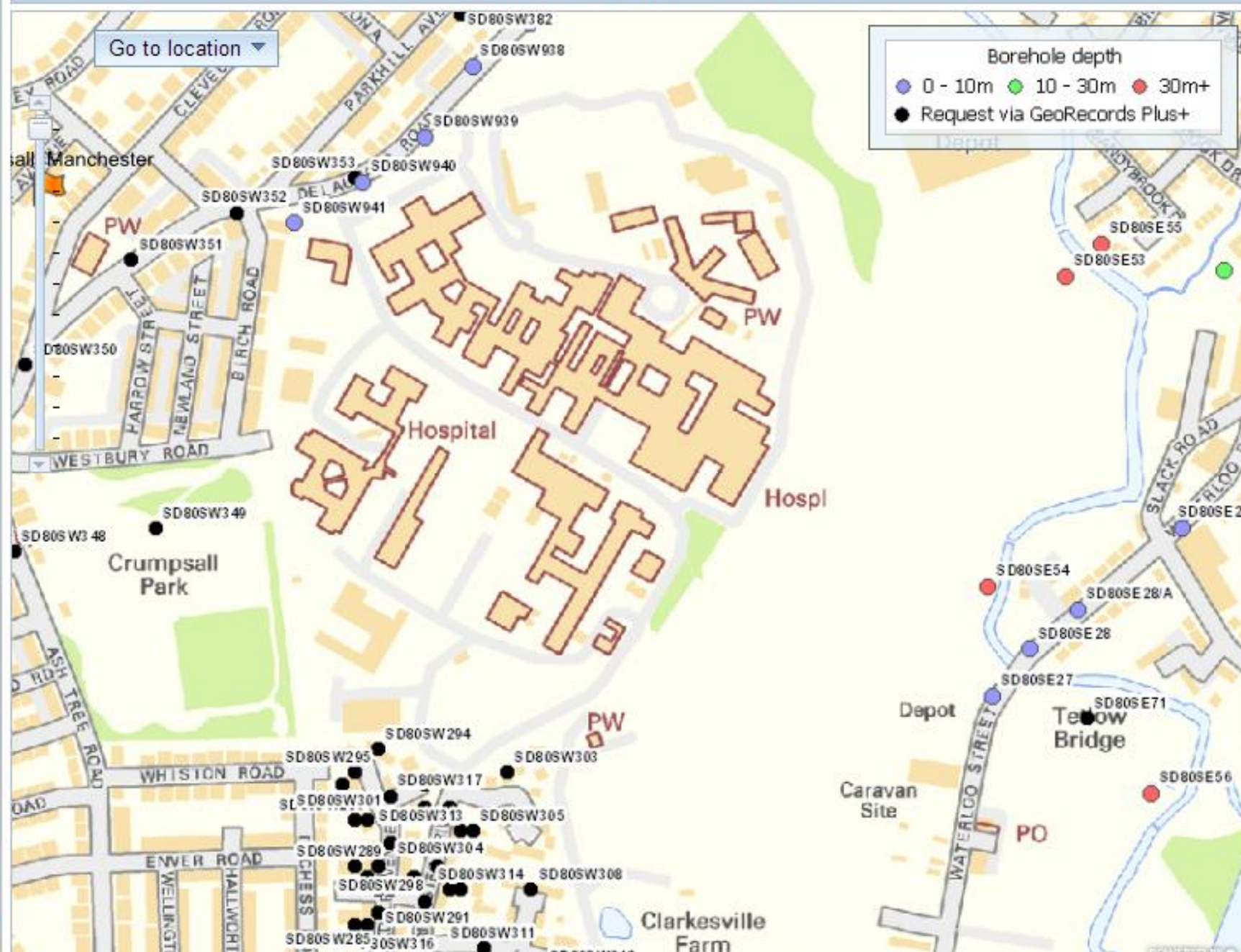
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Appendix D BGS Borehole Information



Search or **pan** and **zoom** to an area of interest.
Click on a **borehole** to open record.



384708
402471

Sampling		Properties			Strata						
Depth	Type	Cu kPa	w %	SPT N	Description	Depth	Level	Legend			
					MADE GROUND: Tarmacadam over stone sets over concrete.	GL					
1.00-1.45	CB			26	MADE GROUND: Comprising soft grey brown silty sandy clay with some fine gravel.	0.70					
1.00-1.50	B					0.90					
2.00-2.45	CB			39	MADE GROUND: Comprising brown and black very clayey coarse SAND with much angular fine to medium gravel of predominantly ash.						
2.00-2.50	B										
3.00-3.45	SD			7	Loose brown and grey very silty very clayey fine to medium SAND with traces of sub-rounded fine to medium gravel above 3.50m.	2.90					
3.00-3.50	B										
4.00-4.50	SD			9							
4.00-4.50	B										
5.00-5.45	SD			6							
5.00-5.50	B										
5.80-6.25	SD			8	Loose light brown silty clayey fine medium to coarse SAND with occasional thin bands of grey silt.	5.80					
5.80-6.30	B										
6.80-7.25	SD			7							
6.80-7.30	B										
7.80-8.25	SD			9							
7.80-8.30	B										
8.50-8.95	CB			26	Soft grey silty sandy CLAY with some sub-rounded fine medium to coarse gravel.	8.50					
8.50-9.00	B										
9.50-9.95	CB			44							
9.50-10.00	B										
End of Borehole						10.00					
Drilling					Groundwater						
Type	From	To	Size	Fluid	Struck	Behaviour	Sealed	Date	Hole	Cased	Water
Shell and Auger	GL	10.00	0.15	-	2.10	Rose to 2.80m	-	21.3.88	10.00	8.50	2.80
Remarks											
Service Location Plan excavated to 1.00m.											
Borehole Record					Project			Contract			
exploration associates					Manchester City Council Delanays Road Sewer Renewal Road			E6531/16			
								Borehole 9 (1 of 1)			

(621) Wt. 599—S.33 2000 6/22 Gp. 147 M.R.C. Ltd.

SECTION OF

SD 80 SEV 279 29

Manchester Corporation, Lower Crumpsall

Maps: One-inch..... Six-inch..... County.....

Height above O.D..... Latitude..... Longitude.....

Communicated by Manchester City Engineer &..... Date of sinking.....

Made by..... Dip of Strata.....

		Thickness.		Depth from Surface.	
				metres	
No. 6. Exact Position uncertain. Corner of Factory Lane Waterloo St., LOWER CRUMPSALL.					
No. 12. Setts & cinders.					
[96 S.E.W. 29			1 -	0.30	1 -
Ballast			8 6	2.89	9 6
Stiff brown clay.			13 6	7.01	23 -
No. 7. Exact position uncertain. Opposite Crumpsall Mills, Waterloo Street, LOWER CRUMPSALL.					
No. 11. Road formation, cinders, etc. (Water level at 7 ft.)					
[96 S.E.W. 28			7 -	2.13	7 -
Large ballast			4 -	3.35	11 -
Gravel.			2 -	3.96	13 -
Quicksand			4 -	5.18	17 -
No. 8. Exact position uncertain. 10 yds. of bridge over R. Lx, Waterloo Street, LOWER CRUMPSALL.					
No. 10. Setts, cinders, etc.					
[96 S.E.W. 28			3 -	0.91	3 -
Brown sand			3 6	1.98	6 6
Pest. (Water level at 6 ft. 6 ins.)			- 4	2.08	6 10
Loamy sand.			4 2	3.35	11 -
Gravel, large stones			7 -	5.49	18 -
Quicksand.			5 -	7.01	23 -
No. 9. Exact Position uncertain. Opposite Crumpsall Mills, Waterloo Street, LOWER CRUMPSALL.					
No. 13. Macadam, cinders, etc.					
[96 S.E.W. 27			1 -	0.30	1 -
Loamy soil			3 3	1.29	4 3
Sand, large stones. (Water level at 7 ft.)			3 3	2.28	7 6
Large rough ballast.			10 -	5.33	17 6
Quicksand.			6 6	7.31	24 -

Appendix E Coal Authority Website Extracts

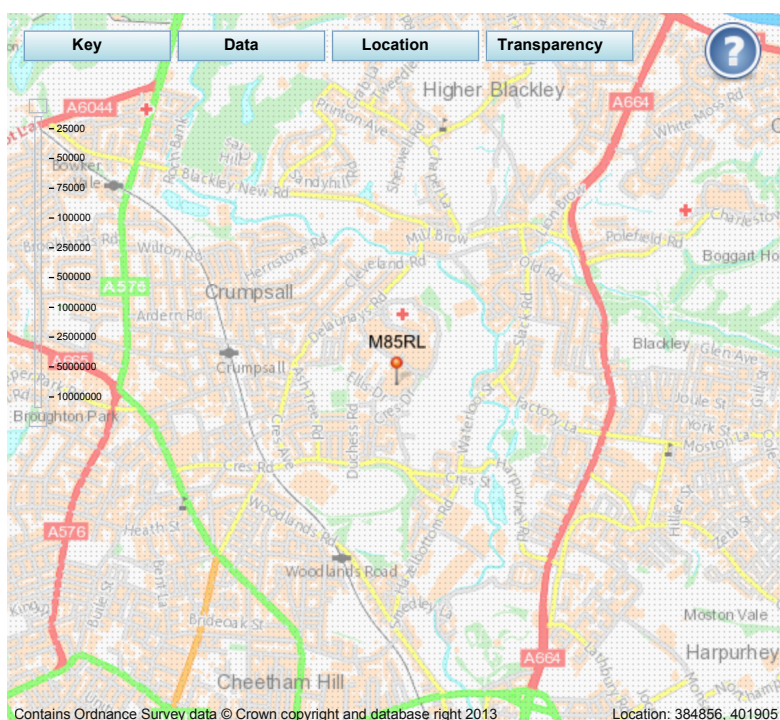


Department
of Energy &
Climate Change

[Publications and Information](#) [Mining Information and Datasets](#) [Interactive Map Viewer](#)

INTERACTIVE MAP VIEWER

This map viewer has been produced to enable selected coal mining information to be viewed around your area of interest. This information has been extracted from the national coal mining database, held and maintained by the Coal Authority.



- To start using the map, click on **Location** to perform a search of your area of interest, or navigate the map using your left mouse button and/or mousewheel to zoom.



Click on the help icon above to find out how to use the map.

TERMS AND CONDITIONS OF USE.

The [Interactive Map Viewer](#) and the [Web Mapping Services](#) are provided free of charge under the terms and conditions of the [Open Government Licence](#) and subject to a [specific re-use condition](#).

Please be aware that this data represents a snap shot in time taken from our dynamic information systems.

OTHER WAYS TO USE AND VIEW THE COAL MINING INFORMATION.

- Connect to our coal mining data through your own GIS via [Web Mapping Services \(WMS\)](#).
- Download coal mining data in GIS format.
- Download coal mining information as a PDF file (specific to your Local Authority).

DATE OF THE DATA EXTRACT.

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