PHASE I DESK STUDY

245 Barnsley Road,
Wombwell,
Barnsley,
S73 8DT

For

ADP Architects

May 2018

18/0770

Geo^2 Remediation Limited

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ADP Architects

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Report ref no. 18/0770

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ADP Architects

Phase I Desk Study

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1.0 Introduction

Geo^2 Remediation Limited was commissioned by ADP Architects to conduct a Phase 1 Desk Study of a site occupied at 245 Barnsley Road, Wombwell, Barnsley, S73 8DT. The site is 0.19 hectares in area and located at grid reference 439070, 403990. The study was undertaken prior to potential redevelopment of the site for continuing commercial use.

The Phase I Environmental Assessment, consisting of a desk study, was conducted to establish evidence of potential contamination, if any, resulting from the site's past and current landuse. The desk study was also undertaken to identify possible sensitive receptors that may be at risk within the locality of the site.

2.0. Site Reconnaissance

2.1 Site's Use and Location

The site is situated in a residential area of Wombwell, approximately 4 km to the south-east of the city centre of Barnsley. Figures 1 and 2 in Appendix A show the location of the site. The site was commercial property involving floor type sales (carpet, laminate, wood etc..) at the time this study was undertaken.

The area shown within the bold site boundary on Figure 2 in Appendix A, will be referred to throughout this document as 'the site'.

The site is accessed via two access points on Barnsley Road to the north of the site and a third access point located on Roy Kilner Road to the east of the site.

The site comprises a shop building with showroom in the north of the site with a canopy cover. To the south-east of the site is a two-storey building with roof which is adjoined to the main shop. To the south-west of the site there is a large brick building which appears to be a warehouse type building, this building is also adjoined to the main shop building.

A review of online mapping tools indicates that the surfacing of the site is a mix of concrete and tarmacadam which appears to be in poor to fair condition. Hardstanding is located in the north, east and south corners of the site.

2.2 Surrounding Land Uses

The surrounding landuses are summarised in Table 1.

Direction	Landuse
North	Directly to the north is Barnsley Road. Beyond this lay residential, commercial and industrial properties.
West	Directly west of the site are residential properties with agricultural land and more residential properties beyond.
East	Roy Kilner Road is directly to the east of the site. Beyond Roy Kilner Road are residential properties.
South	To the south are residential properties. Beyond this, Roy Kilner Road and more residential properties.

Table 1. Landuses in the Surrounding Area

The nearest residential properties are located directly west and south of the site.

2.3 Site Topography

Ordinance Survey maps of the area indicate that the site is generally flat, but slopes very gently from south-west to north-east, although there are likely to be local variations in topography.

2.4 Proposed Development

It is understood that the site will be redeveloped for a commercial end use as a petrol filling station. No proposed development plans made available at the time of writing this report.

3.0 Desk Study

Information regarding the environmental setting of the site was obtained from the Envirocheck report, which collated information from a variety of sources. A copy of the Envirocheck report is presented in Appendix B.

Where indicated in the following sections, the data from the Envirocheck report has been supplemented with additional information obtained from freely available on-line data.

3.1 Site Geology

The BGS online mapping indicates that there are no superficial deposit underlying the site.

Bedrock beneath the site has been identified as Oaks Rock, a sandstone, formed approximately 315 to 318 million years ago during the Carboniferous period.

The Envirocheck report indicates that the site ground stability hazards are indicated as having 'very low' or 'no hazard' potential.

The Envirocheck report indicates that there are two BGS Recorded Mineral Sites within 1,000m of the site. Both Recorded Mineral Sites are now ceased and involved underground mining of coal and are located 175m and 179m north east of the site.

The Envirocheck report indicates the site may be in an area affected by coal mining. A separate coal mining report has been obtained, and is included in Appendix E. The conclusions of this report are as follows:

- The area could be affected by underground mines in seven seams of coal, which were last worked in 1981 at depths between 110m to 600m depth. Any movement from this should have ceased.
- The property is not within an area that could be affected by present underground mining.
- The site is not in an area where there is a licence to remove coal, but reserves exist that could be worked at some point in the future.
- There are no known mine entries within 20m of the site.
- As such the risk from coal mining is considered low.

The Envirocheck report indicates that the site is in an intermediate probability radon affected area, as 1% to 3% of homes are estimated to be at or above the action level. However, no radon protective measures are necessary in the construction of new dwellings or extensions.

3.2 Site Hydrogeology

The bedrock deposits that directly underlie the site are classified as a Secondary A Aquifer, defined by the Environment Agency as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

The Envirocheck report indicates that there are no recorded groundwater abstractions within 1,000m of the site.

The Envirocheck report indicates that there is limited potential for groundwater flooding to occur onsite.

The Envirocheck report indicates that the east of the site is classified within a groundwater vulnerability zone of soils with high leaching potential.

The Envirocheck report indicates that the site is not situated in a Source Protection Zone.

3.3 Site Hydrology

The Envirocheck report records that the nearest surface water feature is located 134m north-east of the site. Mapping tools suggest that this may relate to an unnamed drain or stream with an orientation of north-west to south-east. It is unknown as to whether the drain or stream discharges to another surface water body from review of online maps.

The Envirocheck report indicates that there are no recorded surface water abstractions within 1,000m of the site.

The Envirocheck report indicates that there are eight recorded discharge consents within 1,000m of the site. The nearest is located 78m north of the site and relates to trade effluent discharge, however, the discharge consent was revoked in 1994. The nearest active discharge consent relates to sewage discharges located 539m north-west of the site into land or a soakaway.

There are five Local Authority Pollution Prevention and Controls within 1,000m of the site according to the Envirocheck report. The nearest concerns the coating of metal and plastic and is located 105m east of site.

The Envirocheck report indicates that there has been three recorded Pollution to Controlled Waters incident that has occurred within 1,000m of the site. The nearest is located 104m north-west of the site and relates to a Category 3 – Minor Incident involving oils/petrol.

The Envirocheck report indicates that there have been no recorded Substantiated Pollution Incidents within 1,000m of the site.

3.4 Waste

The Envirocheck report indicates that there are two recorded historical landfills located within 1,000m of the site. The closest of these is located 859m south-east of the site that accepted inert, household, commercial and industrial waste.

The Envirocheck report indicates that there are no BGS recorded landfills within 1,000m of the site.

There is one licensed waste management facility located 176m north-east of the site that is a physical treatment facility according to the Envirocheck report.

The Envirocheck report indicates that are no local authority recorded landfills within 1,000m of the site.

The Envirocheck report indicates that there are three areas of potentially infilled land (non-water) within 1,000m of the site. The nearest relates to an area of unknown filled ground located 139m north-east.

The Envirocheck report indicates that there are seven areas of potentially infilled land (water) within 1,000m of the site. The nearest relates to an area of unknown filled ground located 142m north-east of the site.

3.5 Other Receptors

The Envirocheck report indicates that the site is located in a Nitrate Vulnerable Zone.

3.6 Other Potential Sources

There are two Fuel Station Entries within 1,000m of the site with the closest being located 6m east of the site, however, this entry is now obsolete. This entry is likely to relate to the historic use of the site as a Petrol Filling Station (PFS).

4.0. Site History

Details regarding the development of the site, its immediate surroundings and potentially contaminative land uses were obtained from a review of historical maps.

Copies of the maps are provided as Appendix B and a summary is provided in Tables 2a and 2b. All distances are approximate and are relative to the site, unless otherwise stated.

Date	Onsite	Offsite
1854 - 1855	The site is situated in agricultural land.	The surrounding area is predominately agricultural land. The Dearne and Dove Canal is located approximately 200m north-east of the site. The South Yorkshire Railway is located 250m north-east of the site at its closest point.
1892 - 1894	No change.	Aldham Glass Bottle factory is located 100m north-east of the site. Mitchell Main Colliery is located approximately 150m north-east of the site.
1905 - 1907	No change.	Residential properties have been developed approximately 30m north and north-east of the site. A mill is located approximately 500m north east of the site.
1931	No change.	Surrounding land to the south-east is now more developed with residential and commercial properties. Within Mitchell Main Colliery numerous features associated with the mine are now shown on the map such as shafts, tanks and an engine shed. A pit is shown approximately 300m north of the site.
1938 - 1948	No change.	The pit located on historical maps 300m to the north has been extended to a larger size.
1955 - 1956	No change.	No significant changes.
1962	A garage is now present within the site boundary.	More residential properties have been developed in the surrounding area to the south-east with the nearest located 30m south of the site. Aldham Glass factory has now been demolished and a builder's yard is now shown on historical maps. A lot of infrastructure associated with the Mitchell Main Colliery has now been demolished including some of the rail infrastructure.
1970 - 1971	No change.	Mitchells Main Colliery appears to be fully demolished, however, shafts are still present on site. The immediate surrounding land has now been developed including residential and leisure areas. An engineering works approximately 110m east of the site is now present on historical maps. A textile works is also now present approximately 150m north-west of the site. The large pit located 300m north of site is now shown as disused spoil heap.
1978 - 1980	No change	Aldham industrial estate is now present on maps from 1978 – 1980 located 150m north of the site. More residential properties are located in the surrounding land 150m west of the site.

Table 2a. Summary of review of historical maps

Date	Onsite	Offsite
1980 - 1984	The site has been further developed into its current configuration but remains as a garage.	Part of Mitchells Main Colliery has been redeveloped.
1985 - 1989	No change.	The South Yorkshire Railway is now shown as dismantled.
1993 - 1994	No change.	No significant change.
1999 – 2000	No change.	More industrial properties have been developed 300m to the north of the site.
2006	No change.	No significant change.
2018	No change.	No significant change.

Table 2b. Summary of review of historical maps

The immediate vicinity shows a growth from agricultural land to residential and commercial/industrial land throughout available mapping. During the 1800's Mitchell Main Colliery and Aldham Glass Bottle factory were developed, a railway line is present in the earliest map publishing, which becomes dismantled from circa 1989. There is a successive build-up of residential properties in the area approximately 1km in all directions of the site. Towards the north from 1962 Mitchells Main Colliery has been demolished and replaced with industrial units which remain in the present day. Beyond the historic site of Mitchells Main Colliery is infilled land of unknown material. This was most likely infilled during the operational period of Mitchells Main Colliery pre-1962, however, there is no more information on this.

It is likely that the site has been used as a petrol filling station since the garage was developed in 1962, however, the current site is now a floor sales store (carpet, laminate, wood etc…). It is unknown when the garage was no longer in production and became a commercial property selling different types of flooring.

Potentially contaminative historical activities occurring onsite include the use of the site as a petrol filling station, which has remained in its present-day layout since 1980 - 1984.

In addition, the presence of the infilled land and water close to the property could act as a source of ground gas generation.

The adjacent residential properties and the drain/stream to the north-east are possible sensitive receptors.

5.0 Hazard Identification

UK legislation and guidance on assessing potentially contaminated land recommends the use of a risk assessment process based on a review of source/pathway/receptor relationships for various environmental media. The first stage of any risk assessment is to identify, using the desk study data and site information, the presence and extent of any hazard at the site, theoretical or demonstrable.

A key component of the overall risk assessment process is identification of "significant contamination linkages" between contaminants and receptors. This can be accomplished through development of a site-specific conceptual model in which the potential contaminants, pathways and receptors identified on-site are described.

Each element can be defined as follows:

- **Contaminant source:** A substance either on or under the land and which has the potential to cause harm or pollution to human or environmental receptors.
- **Pathway:** A route or means by which a receptor can be exposed to or affected by a source.
- **Receptor:** A living organism or an ecological system or, controlled water, or property including buildings, crops and livestock.

The presence of all three of the above elements identifies a contamination linkage and a potentially unacceptable risk.

5.1 Contaminant Source

The desk study identified the historic use of the site as a PFS and maintenance garage to be the main potential contaminant source at the property. Contamination may have occurred through leaks and spills from the fuel storage, distribution infrastructure and site drainage. The site has been used as a PFS since circa 1962. It is unknown when the PFS closed and whether underground infrastructure associated with the PFS was removed or made safe. In addition, it is unknown as to whether infilling of ground associated with underground infrastructure removal was used.

In addition, the presence of infilled land approximately 139m and 142m north-east of the site could act as a possible source of ground gas generation. The infilled material is likely to be associated with Mitchells Main Colliery.

There are no other offsite sources of contamination that are considered to pose a significant potential threat to the site.

There is a potential for asbestos to have been used in the fabric of the building. As no asbestos assessment has been made on the building, its presence cannot be ruled out.

5.2 Receptors or Point of Exposure

Potential receptors both on and offsite that could be affected by contamination hazards at the site are listed below:

- **Surface waters**

The nearest surface water is indicated to be an unnamed drain or a stream that is located 134m north-east of the site. This water body (and the receiving watercourses, to which it drains) may act as a receptor to any contamination from the site. Migration of on-site contamination could occur via site drainage, made ground or through the underlying aquifer (in superficial deposits or bedrock). Any impact may affect the amenity of this resource, water quality or aquatic life and contravene the water framework directive.

- **Groundwater as a resource**

The bedrock is listed as a Secondary A Aquifer. There are no superficial deposits above the bedrock that could protect the aquifer from potential significant contamination.

Any impact to groundwater may affect the quality of the resource, impact future users and contravene the water framework directive.

- **Current site users**

This will include exposure of current users on the site, including within buildings. The current hardcover use of the site will effectively sever many pathways. There is no proposed residential use of the site, only a development for continued commercial purposes. Site users in any future landscaped areas could potentially be exposed to any contamination present within the soil.

- **Neighbouring site users**

The surrounding land use is residential to the north, east, west and south of the site. This receptor is considered significant as any contamination associated with the historical site use as a PFS could potentially migrate into neighbouring properties, placing residents at risk to exposure.

- **Construction workers**

Any construction workers involved in works in impacted areas may become directly exposed to contaminants. Any potential harm may easily be mitigated to this receptor through the use of appropriate Personal Protective Equipment (PPE). This represents an easy and low cost solution to any such hazard and as such it is not considered necessary to consider construction workers any further in this assessment.

5.3 Contamination Pathways

Potential pathways by which any identified contamination may manifest itself in the environment are as follows:

- **Groundwater migration**

Records suggest that the site is not underlain by any superficial deposits, therefore, there is limited protection to the Secondary A Aquifer. Any vertical migration associated from the site will directly be in contact with the aquifer and further migration horizontally to surface waters may occur.

- **Accumulation of volatile vapours and tainting of potable water**

Volatile compounds and ground gas may generate potentially harmful vapours which may accumulate within buildings onsite or offsite.

Shallow contamination or ground gases may migrate along, or within, water pipes or ducting, potentially providing a preferential pathway and permitting tainting of buried water pipes. Exposure to contaminated material may lead to tainting of potable water supplies.

- **Direct contact, inhalation and ingestion**

This may occur during redevelopment works at the site or in the event of a future change of landuse. This pathway is not considered to be currently active due to the predominantly hardcover landuse of the site but may become active during any redevelopment or in future landscaped areas.

5.4 Initial Contaminant Linkages

All contamination linkages arising as a result of the interconnection of the contaminant source, contamination pathways and potential receptors detailed above are summarised in Table 3, below.

Linkage No.	Source	Pathway	Receptor
1	Potential releases, leaks and spills associated with historical use of the site as a PFS and maintenance garage.	Leaching to groundwater followed by migration within the aquifer.	Surface waters.
2			The Secondary A Aquifer as a resource.
3		Exposure to harmful vapours, hazardous ground gas and tainting of water supply.	Current and future site users, principally within buildings onsite.
4			Neighbouring residents on adjacent properties.
5		Direct contact, inhalation and ingestion.	Site users in landscaped areas.
6	Off-site infilled land 139m and 142m north-east of the site.	Exposure to harmful vapours and ground gas	Site users

Table 3. Identified contamination linkages

6.0 Qualitative Risk Assessment

Each of the identified plausible contamination linkages in the preliminary conceptual site model is reviewed based upon the findings of the site investigation which allows a greater understanding of the ground conditions at the site, site observations, soil and groundwater quality and chemical analysis. This review, discussed for each contamination linkage in Tables 4 a-c, allows a qualitative risk assessment to be undertaken.

A qualitative risk assessment is undertaken in line with guidance provided in *Guidance for the Safe Development of Housing on Land Affected by Contamination* (EA / NHBC, 2008). The purpose of this assessment is to determine the relative significance of the identified contamination linkages by assessing the probability of an impact occurring and by assessing the perceived severity of an impact to a receptor. The classification of these two factors is detailed in Appendix C.

Those linkages considered of low risk or less on the basis of the additional site data will not be considered any further in this assessment. Linkages considered to be more significant are identified as presenting a potentially significant hazard (PSH), which may present a potentially unacceptable risk to the identified receptor. In these instances further works may be considered necessary.

<table>
<tr><td>Source</td><td colspan="3">Potential releases, leaks and spills associated with use of the site as a PFS/maintenance garage.</td><td rowspan="2">Probability</td><td rowspan="2">Severity</td></tr>
<tr><td>Pathway- 1</td><td>Leaching to groundwater followed by migration within the aquifer.</td><td>Receptor-</td><td>Surface waters.</td></tr>
<tr><td colspan="4" rowspan="3">Releases of fuel may have occurred from fuel storage and distribution infrastructure. This has the potential to migrate into the groundwater, which may be in connectivity with the local unnamed surface water course, that passes 134m to the north-east of the site. Site drainage may eventually discharge into the nearest watercourse and could potentially be a migration pathway for any contamination from the site.

However, given the distance to the drain / stream it is considered unlikely that any impact beneath the site will be significant to surface waters.</td><td>Low Likelihood</td><td>Mild</td></tr>
<tr><td colspan="2">Classification</td></tr>
<tr><td colspan="2">Low risk</td></tr>
</table>

<table>
<tr><td>Source</td><td colspan="3">Potential releases, leaks and spills associated with use of the site as a PFS/maintenance garage.</td><td rowspan="2">Probability</td><td rowspan="2">Severity</td></tr>
<tr><td>Pathway- 2</td><td>Leaching to groundwater followed by migration within the aquifer.</td><td>Receptor-</td><td>The Secondary A Aquifer as a resource.</td></tr>
<tr><td colspan="4" rowspan="3">Releases of fuel may have occurred from fuel storage and distribution infrastructure and as there are no superficial deposits beneath the site there is limited protection to the aquifer. The nature of the subsurface could provide the potential for migration. Any impact to the underlying aquifer may damage the quality of the protected water resource and groundwater abstraction points.

In addition, it is unknown as to whether underground infrastructure has been removed or made safe following the closure of the site as a PFS and therefore the risk to the aquifer cannot be discounted.</td><td>Likely</td><td>Medium</td></tr>
<tr><td colspan="2">Classification</td></tr>
<tr><td colspan="2">Moderate risk</td></tr>
</table>

Table 4a. Qualitative Risk Assessment

Source	Potential releases, leaks and spills associated with use of the site as a PFS/maintenance garage.			Probability	Severity
Pathway- 3	Exposure to harmful vapours, hazardous ground gas and tainting of water supply.	Receptor-	Current and future site users, principally within buildings onsite.		
It is possible that vapours and gases may gain entrance through cracks or service ducts and potentially may lead to the tainting of water supply pipes. Any such impact may be capable of causing harm to human health. The presence of contamination beneath the main site building cannot be ruled out. Use of the onsite buildings for commercial purposes will reduce exposure duration, and increase dilution, which reduce the perceived risk to site staff.				Likely	Medium
				Classification	
				Moderate risk	

Source	Potential releases, leaks and spills associated with use of the site as a PFS/maintenance garage.			Probability	Severity
Pathway- 4	Exposure to harmful vapours, hazardous ground gas and tainting of water supply.	Receptor-	Neighbouring residents on adjacent properties.		
Site neighbours are at risk from any migrating contamination from the PFS. The presence of adjacent residential properties surrounding the site are a potential receptor to any contamination. Theoretically it is possible that contaminants and their vapours may gain entrance through cracks or service ducts and potentially may lead to the tainting of water supply pipes. Any such impact may be capable of causing harm to human health.				Low likelihood	Medium
				Classification	
				Moderate / low risk	

Source	Potential releases, leaks and spills associated with use of the site as a PFS/maintenance garage.			Probability	Severity
Pathway- 5	Direct contact, inhalation and ingestion.	Receptor-	Future site users in landscaped areas.		
There is currently no active pathway, however, future landscaping at the site means that site users could be exposed to any shallow subsurface contamination. It is understood that the site is proposed to continue operating as hardcover commercial premise, and as such, direct contact with contamination in the sub surface is unlikely to take place and as such, this linkage is not currently considered active.				Unlikely	Mild
				Classification	
				Low risk	

Table 4b. Qualitative Risk Assessment

Source	Ground gas generation from off-site infilled land.			Probability	Severity
Pathway- 6	Direct contact, inhalation and ingestion.	Receptor-	Current and future site users		
Infilled land 139m and 142m north-east of the site may potentially generate ground gas that may pose a significant risk to human health. The material is likely to be associated with Mitchells Main Colliery was last mined in 1981. There is the potential for ground gas generation within the infilled land which could migrate to the site and cause exposure to current and future site users. The use of hardstanding at the site will reduce the risk of exposure, however, the poor condition of hardstanding identified during a review of online maps will increase the risk of exposure to site users.				Low	Medium
				Classification	
				Moderate risk	

Table 4c. Qualitative Risk Assessment

Table 5, summarises the relative significance of each contaminant linkage and which are deemed to present a potentially significant hazard (PSH). These linkages should be considered for further assessment or remedial works in order to mitigate these identified risks. Those without the potential to cause significant harm will not be considered any further.

Linkage No.	Source	Pathway	Receptor	PSH?
1	Potential releases, leaks and spills associated with historical and current use of the site as a garage and PFS.	Leaching to groundwater followed by migration within the aquifer.	Surface waters.	×
2			The Secondary A Aquifer as a resource.	✓
3		Exposure to harmful vapours, hazardous ground gas and tainting of water supply.	Current and future site users, principally within buildings onsite. Site neighbours on adjacent properties.	✓
4			Neighbouring residents on adjacent properties.	✓
5		Direct contact, inhalation and ingestion.	Site users in landscaped areas.	×
6	Ground gas generation from off-site infilled land.	Exposure to harmful vapours, hazardous ground gas and tainting of water supply.	Current and future site users, principally within buildings onsite.	✓

Table 5. Summary of Qualitative Risk Assessment

7.0 Conclusions

7.1 Summary

A desk study was conducted on the site occupied by at 245 Barnsley Road, Wombwell, Barnsley, S73 8DT. The purpose of the assessment was to assess the potential for a risk to be posed to human health and sensitive environmental receptors from potential historical and current land uses of the site and surrounding land.

The historical maps indicate that the site has operated as a PFS/maintenance garage since circa 1962. By 1993, the site had been developed into its current day layout. However, the site is not currently operating as a PFS and it is unknown when the site stopped operating as PFS.

Historical use of the site as a PFS presents a possible source of contamination, with potential contamination associated with current and historic storage of oils, fuels and wastes at the site. It is possible that any contamination may have impacted upon the Secondary A Aquifer directly beneath the site. It is also possible that any sub-surface leaks of hydrocarbons could volatilise and infiltrate the shop or neighbouring properties where it could potentially impact upon site users or residents.

Current and future site could potentially be exposed to ground gas generated from infilled land located 139m and 142m north-east of the site. Migration could occur through the ground and underground infrastructure such as ducts and drains.

7.2 Recommendations

On the basis of the Phase I Desk Study, Geo^2 recommend the following:

- Geo^2 would recommend that a Phase II Environmental Site Investigation should be undertaken at the site, to include sampling of both soils and groundwater and to locate and characterise any potential contamination at the site.

- Ground gas monitoring should be undertaken to locate and characterise any potentially harmful ground gasses at the site in line with Ciria C665 guidance.

- Whilst undertaking any redevelopment work, it is also recommended that the relevant personal protective equipment (PPE) is deployed to ensure that any risks to site workers are removed.

- It should be noted that in line with The Environment Agency's Approach to Groundwater Protection - regarding the installation of subsurface fuel storage infrastructure above a Secondary A Aquifer, a further risk assessment may be required if new UST's are to be installed at the site.

8.0 Limitations

Geo^{2}s' conclusions, recommendations and opinions are based on information gathered at the time of the study from a variety of third party sources.

A portion of this report is based solely upon information provided by third parties. The information has not been independently verified by Geo^2. Whilst this report and the opinions given in it are accurate to the best knowledge of Geo^2, Geo^2 cannot guarantee the completeness or accuracy of any descriptions, opinions or conclusions based solely upon information that has not been independently verified.

The recommendations contained within this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices and hydrological and engineering practices at this time. As such they are not a guarantee that the site is free of hazardous materials or conditions.

Geo^2 prepared this report for our Client; any third parties using this report do so entirely at their risk. Geo^2 makes no warranty or representation whatsoever, express or implied, with respect to the use by a third party of any information contained in this report or its suitability for any purpose. Geo^2 assumes no responsibility for any costs, claims, damages or expenses (including any consequential damages) resulting from the use of this report or any information contained in this report by a third party.

This report was prepared by

Ben Wilson — 01st May 2018 (Date)

This report was reviewed by

Adam Wilson — 01st May 2018 (Date)

9.0 References

British Standards Institute

BS10175:2011 “Investigation of potentially contaminated land sites – code of practice”

British Geological Society

Geology of Britain Viewer

Environment Agency

CLR 8 - Potential Contaminants for the Assessment of Land, 2002
What’s in your backyard – online

The Envionment Agency’s Guide to Groundwater Protection, February 2018

Desk Study Data

Envirocheck Report- for Environmental Data

Envirocheck Historical Maps

Appendix A

Figures

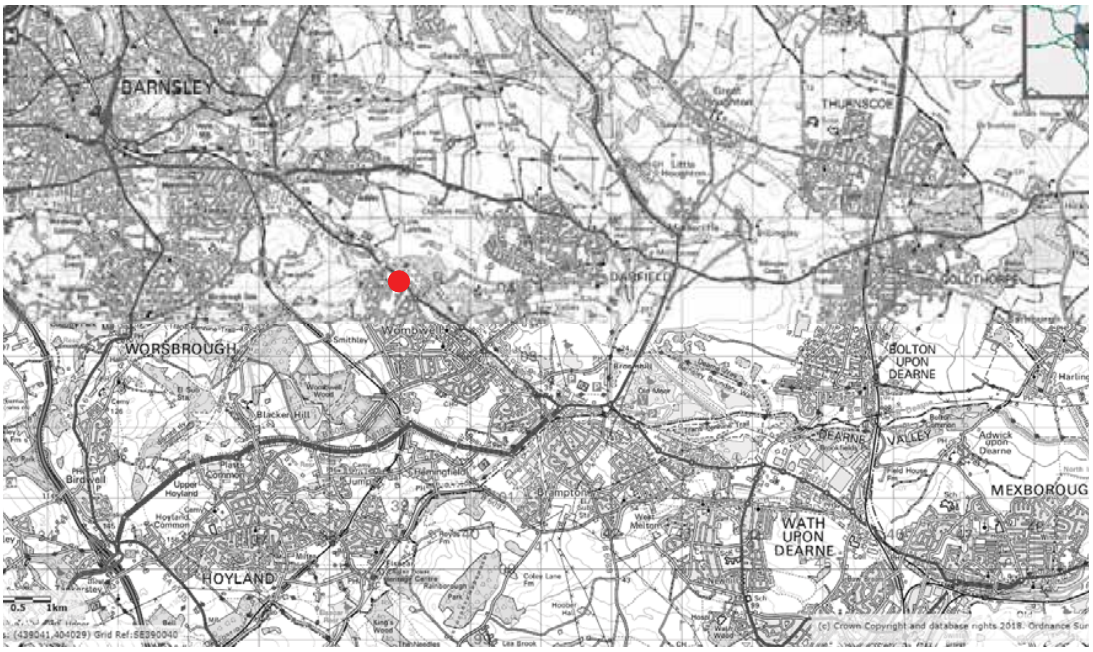

Figure 1 - Site Location

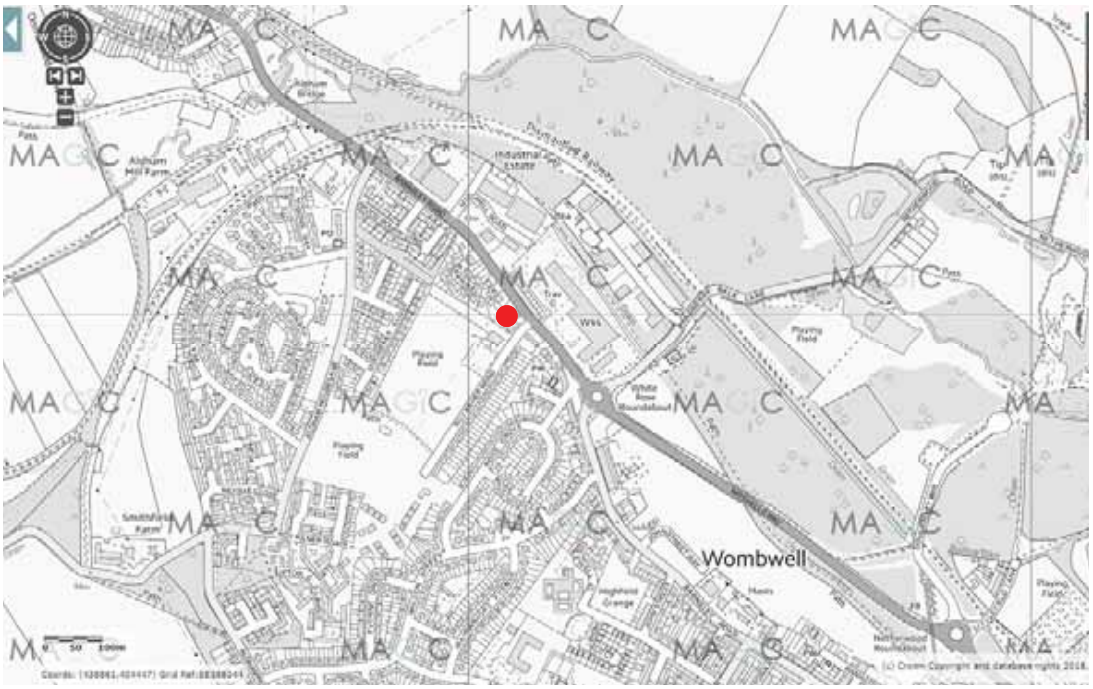

Figure 2 - Site Location

Ref: http://
www.natureonthemap.naturalengland.org.uk

Figures 1 & 2 Site Location - 245 Barnsley Road, Wombwell, Barnsley, S73 8DT

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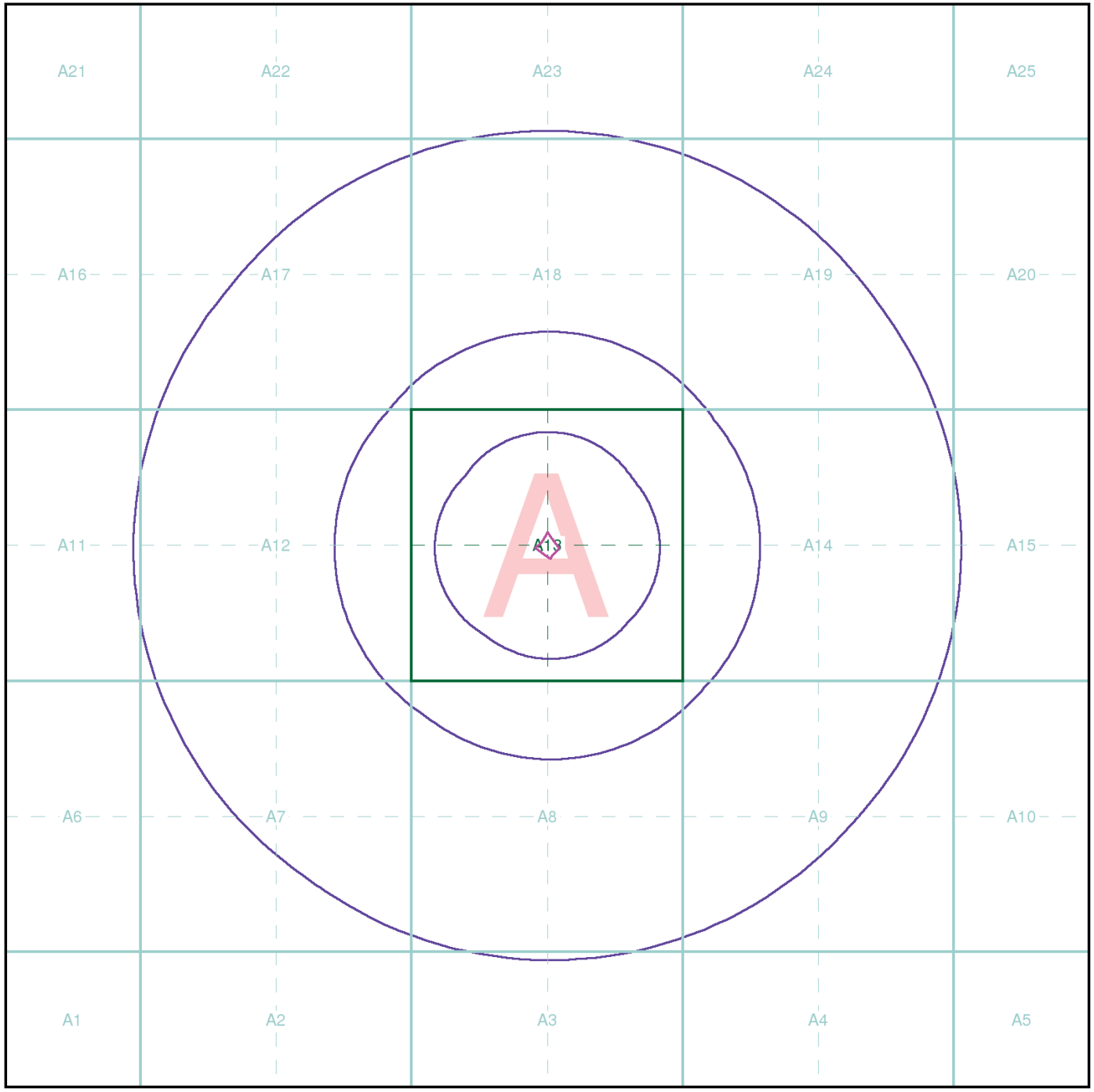
Appendix B

Desk Study Data



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Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:

Map data

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Environment Agency

NATURAL ENGLAND

Envirocheck reports are compiled from 136 different sources of data.

Client Details

Mr M Swindells, Geo2 Remediation Ltd, 11 The Mending Rooms, Sunny Bank Mills, Town Street, Farsley, Leeds, West Yorkshire, LS28 5UJ

Order Details

Order Number:	164345359_1_1
Customer Ref:	0770
National Grid Reference:	439070, 403990
Site Area (Ha):	0.19
Search Buffer (m):	1000

Site Details

245, Barnsley Road, Wombwell, BARNSLEY, S73 8DT

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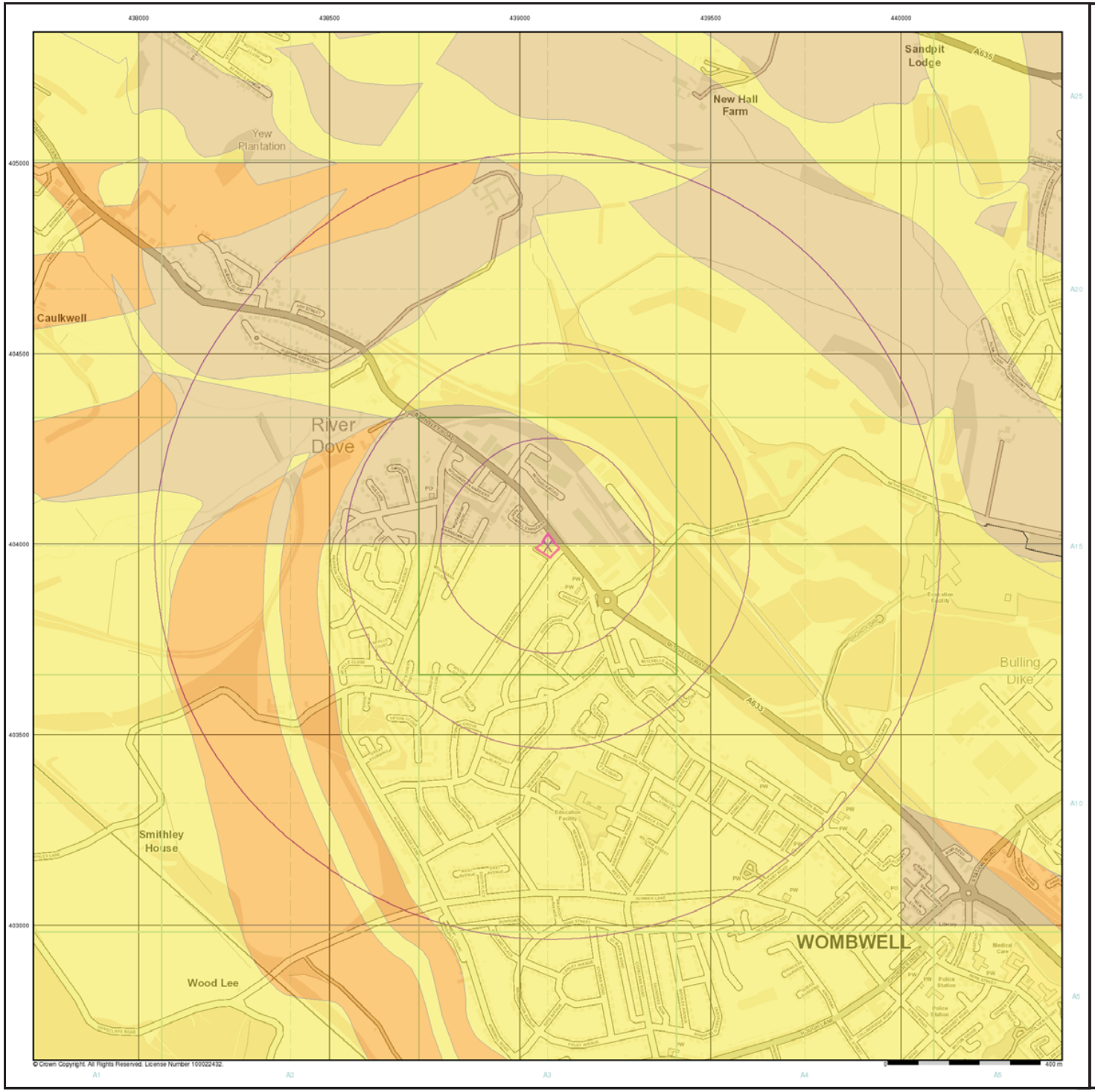

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General

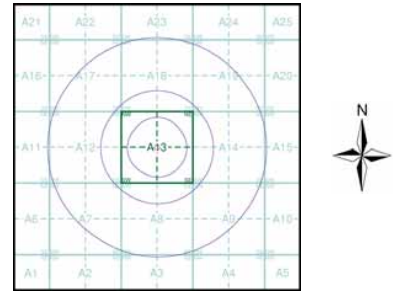
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Arsenic

Arsenic Concentrations mg/kg

- < 15
- 15 - 25
- 25 - 35
- 35 - 45
- 45 - 60
- 60 - 120
- > 120

Estimated Soil Chemistry Arsenic - Slice A



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General

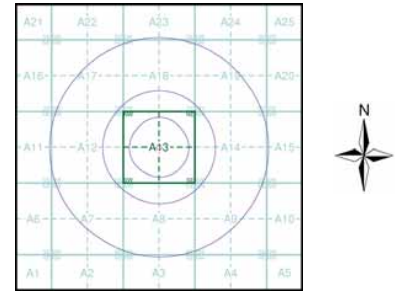
Specified Site | Specified Buffer(s) | Bearing Reference Point

Estimated Soil Chemistry Cadmium

Cadmium Concentrations mg/kg

- < 1.8
- 1.8 - 2.2
- 2.2 - 3.0
- > 3.0

Estimated Soil Chemistry Cadmium - Slice A



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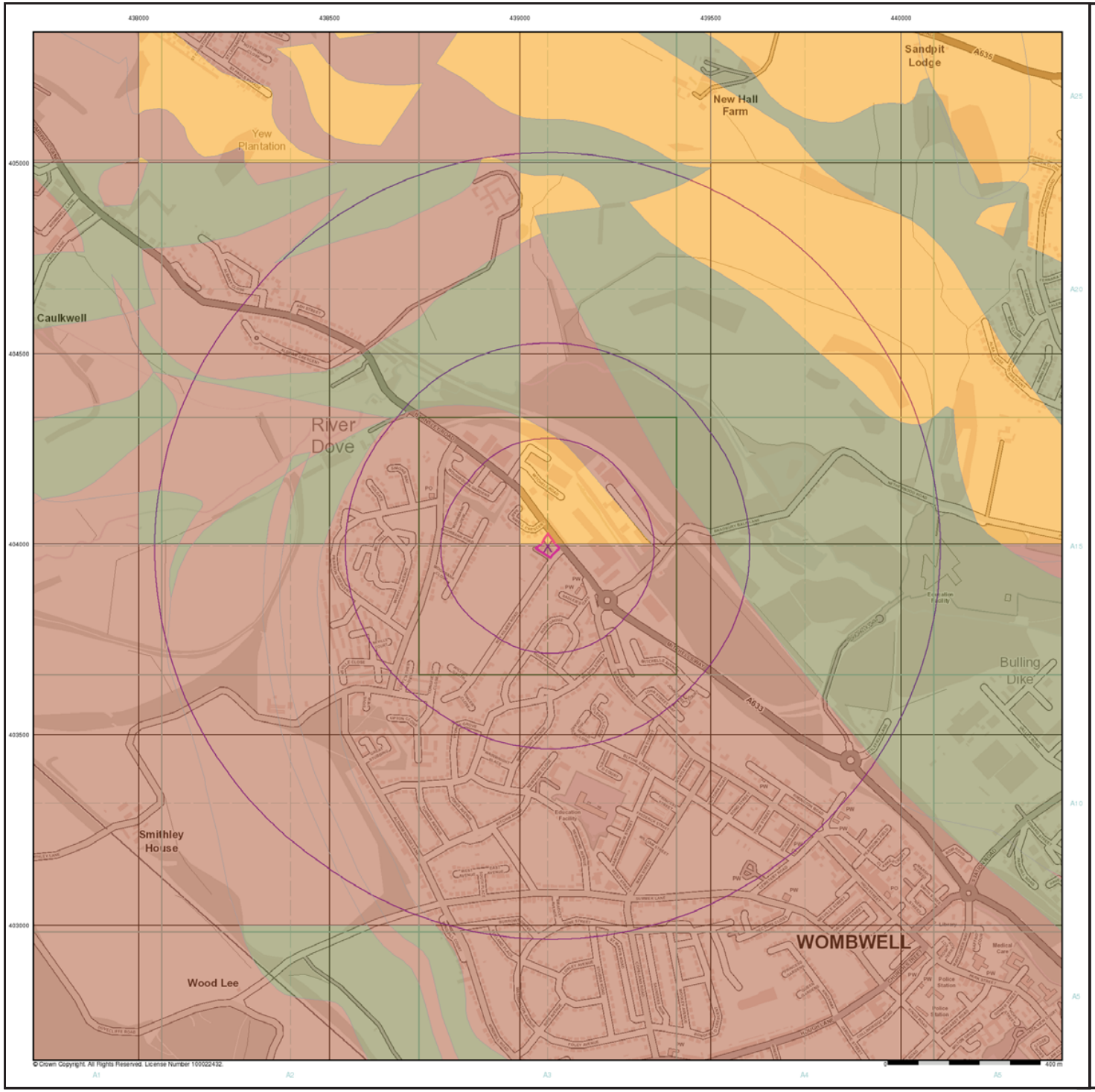

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General

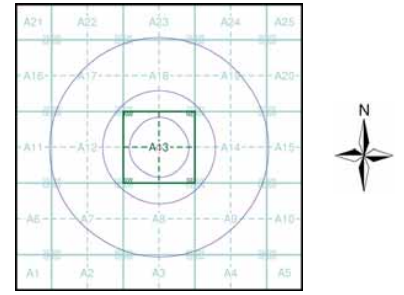
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Chromium

Chromium Concentrations mg/kg

- < 20
- 20 - 40
- 40 - 60
- 60 - 90
- 90 - 120
- 120 - 180
- > 180

Estimated Soil Chemistry Chromium - Slice A



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