6.4 Obstructions

No concrete or brickwork obstructions were encountered in any of the exploratory holes. The made ground was however difficult to excavate. No voids were noted within the made ground.

6.5 Groundwater

Surface water ingressing into TP1 and TP2 in the scrubland caused pooling and significant collection at the base. Minor groundwater ingresses were noted within TP5 at 0.8 m bgl and in TP6 at 2.0 m bgl however did not cause significant groundwater collection.

6.6 Evidence of Contamination

No significant visual or olfactory of possible significant contamination was identified within the arisings of the exploratory holes. No obviously fibrous fragments were encountered.

7.0 GEOTECHNICAL APPRAISAL

7.1 Geotechnical Parameters

Ground conditions beneath the hardstanding or topsoil generally comprised reworked clay/colliery spoil. This material was found to depths of between 3.4 to 5.9 m bgl, occasionally overlying a layer of relic topsoil, found to be between 0.15 and at least 0.5 m thick. Perched water was encountered in a few of the trial pits from around 1 to 2 m bgl.

SPTs carried out in the made ground within the adjacent boreholes recorded N values of between 7 and 55, but typically around 15 to 20, indicating stiff ground is present. Hand penetrometer readings within the made ground were generally recorded at between 125 and 175 kN/m^2 with the occasional reading of 100 kN/m^2. Although the made ground appears to be well compacted, a conservative allowable bearing pressure of 75 kN/m^2 can be assumed for the made ground.

7.2 Mining

As detailed in Section 3.8, fireclay is expected at shallow depth beneath site and has possibly been worked. Six boreholes were drilled across the area where the extension is proposed.

Boreholes were drilled below the proposed development footprint to depths of between 18 and 20 m bgl. Beneath the made ground, intact ground was found, with no signs of disturbed or broken ground which could be indicative of workings. Precautions against the effects of shallow fireclay workings are not considered necessary.

7.3 Foundations

Pad foundations are considered to be appropriate for the proposed development, founding in the made ground at a minimum depth of 750 mm below finished ground level. The made ground, which is expected to have been in place for nearly 40 years, was found to be reasonably well compacted and the sides of the excavations relatively stable in the short term. Minor water ingresses were noted, but significant inundation settlement is not expected.

7.4 Ground Floors

It is understood that none of the equipment to be installed within the building is particularly sensitive to settlement. Therefore with some minor ground improvement, ground bearing floor slabs are considered appropriate for the proposed development.

7.5 Superstructure Precautions

Superstructure precautions will not be required.

7.6 Excavation Problems and Obstructions

No significant obstructions were encountered in the trial pits. The made ground was generally well consolidated and pit sides were found to be stable. Minor collapse was encountered near surface in the upper mixed granular layer of made ground beneath the car park to a maximum depth of 0.8 m bgl.

Support will be required in accordance with current Health & Safety Regulations wherever access is required to trenches deeper than 1.2 m or less where there is risk of collapse.

7.7 Surface Water Drainage

The ground conditions indicate that soakaways will not be suitable for surface water drainage due to the cohesive nature of backfill and natural deposits. Surface water will therefore have to be piped to an existing drainage system, subject to approval from the relevant regulatory bodies.

8.0 REFINEMENT OF OUTLINE CONCEPTUAL MODEL

8.1 Source Characterisation

An outline conceptual model, detailing possible sources and associated contaminants of concern, potential pathways and receptors identified in the Phase 1 report was detailed in Section 4.0. This section of the report documents the works undertaken to obtain information to test and refine this model enabling a risk assessment to be produced and, where significant risks are encountered, remediation recommendations given.

8.2 Ground Conditions

Made ground, between 4 to 6 m thick, was encountered beneath the surface hardstanding and topsoil materials. The made ground was generally described as colliery spoil backfill comprising clay and mudstone with coal and bands of burnt shale gravel. The made ground is expected to contain elevated concentrations of contaminants such as heavy metals, PAH compounds and sulphates. The natural ground would not be expected to contain elevated levels of contamination, however naturally occurring slightly elevated levels of heavy metals/metalloids may occur in natural ground. The chemical analysis undertaken for these materials is discussed below.

8.3 Gas Precautions

Basic radon precautions are required. Deep made ground was recorded and was noted to contain wood fragments. Four recorded landfills lie within 250 m of the site however the basic radon precautions required in the heated areas of the proposed building are expected to be sufficient in guarding against ingress of significant quantities of ground gas.

8.4 Unexpected Contamination

No visual or olfactory observations of unexpected contamination were noted in the exploratory holes. No obviously fibrous material was encountered.

8.5 Chemical Testing

Three samples of topsoil, six samples of made ground and two samples of natural ground were sent for testing, as detailed below.

Contaminant Type	Actual Contaminants
Metals/Metalloids	Arsenic, cadmium, chromium, lead, mercury, nickel, copper and zinc
pH	pH
Organics	Speciated PAH
Sulphates*	Water soluble sulphate, total sulphur, acid soluble sulphate

* Excluding topsoil samples

Testing was undertaken by Chemtest, using MCERTs accredited methodologies, where available.

8.6 Assessment Criteria

The proposed development of the site is commercial/ industrial. Tables detailing the relevant assessment concentrations used are included in Appendix 4.

8.7 Chemical Test Results

Topsoil

None of the tested determinands exceeded their respective generic industrial assessment values.

Made Ground

None of the tested determinands exceeded their respective generic industrial assessment values.

Natural Ground

None of the tested determinands exceeded their respective generic industrial assessment values.

Sulphates

The results of the made ground recorded total potential sulphate concentrations of between 0.03 and 4.15%, with a maximum recorded water soluble sulphate concentration of 0.7 g/l. The pH varied between 6.4 and 9.5.

The results of the natural ground recorded a maximum sulphate concentration of <0.03%. The highest water soluble sulphate concentration was 0.7 g/l. The pH was recorded at 6.7 and 7.0.

8.8 Significant Pollutant Linkages

Source	Pathway	Receptor
Sulphates	Direct contact	Below ground concrete
Radon	Inhalation	Future site users and visitors

9.0 RISK ASSESSMENT

9.1 Human Health – Future Site Users and Construction Workers

The development is to comprise predominantly hardstanding surrounding the proposed factory unit with minor soft landscaping indicated on the periphery, assumed to comprise a low-shrub vegetated border. No significantly elevated concentrations of the tested determinands were found within the topsoil, made ground or natural materials. There is therefore no significant risk considered to be posed to construction workers or site end users from the materials encountered on site.

Normal site precautions such as wearing gloves and washing hands prior to eating should be sufficient to mitigate against any potential unexpected contamination. There is the possibility that, as with any site, areas of unexpected contamination may be encountered during construction works. If any unusual, brightly coloured, ashy or particularly odorous material are encountered it should be brought to the attention of the site staff and investigated.

9.2 Construction Materials – Sulphates

In accordance with BRE Special Digest 1, the site comes under the classification of 'Brownfield'. The results from the made ground record a maximum total potential sulphate of 4.15% equating to a minimum Design Sulphate classification of DS5. Three types of made ground have been identified: shallow granular material encountered below the hardstanding, well compacted clay/colliery spoil and relic topsoil. The two samples of shallow granular made ground recorded relatively low total potential sulphate concentrations of 0.03 and 0.08%, which equate to DS1. The two samples of the reworked clay recorded total potential sulphate concentrations of 0.43 (DS2) and 3.09% (DS5). The sample of relic topsoil recorded the highest total potential sulphate concentration of 4.15% (DS5).

Generally, the water soluble concentrations are quite low and equivalent to DS1, except for the sample of relic topsoil and the samples of natural ground where 0.6 to 0.7 g/l was recorded, equivalent to DS2. The range of total potential sulphate results indicates the clay/colliery spoil has the potential to require a high level of sulphate precautions. However, in accordance with BRE Special Digest 1, where the sulphate class is initially found to be DS5 (as is the case here) but the water soluble results are less than DS3, the overall classification could be reduced to DS4. The classification could be reduced further with the incorporation of additional protective measures.

9.3 Controlled Waters

No significant risk is considered to be posed to controlled waters from the made ground or natural materials on site. Given the relatively impermeable nature of the materials encountered, the risk of unexpected migrating contamination to the underlying aquifer is considered to be negligible.

9.4 Ground Gas

Basic radon precautions are required.

Deep made ground is present beneath the site, and wood fragments were noted within the material. As the proposed development is to be a factory warehouse it is anticipated the warehouse doors will be opened for prolonged periods, further reducing the likelihood of any potential ground gases from accumulating within the building. Additionally, the correct installation of basic radon precautions should provide sufficient cover against low levels of ground gases. It is therefore considered ground gas precautions beneath the majority of the warehouse spaces will not be required.

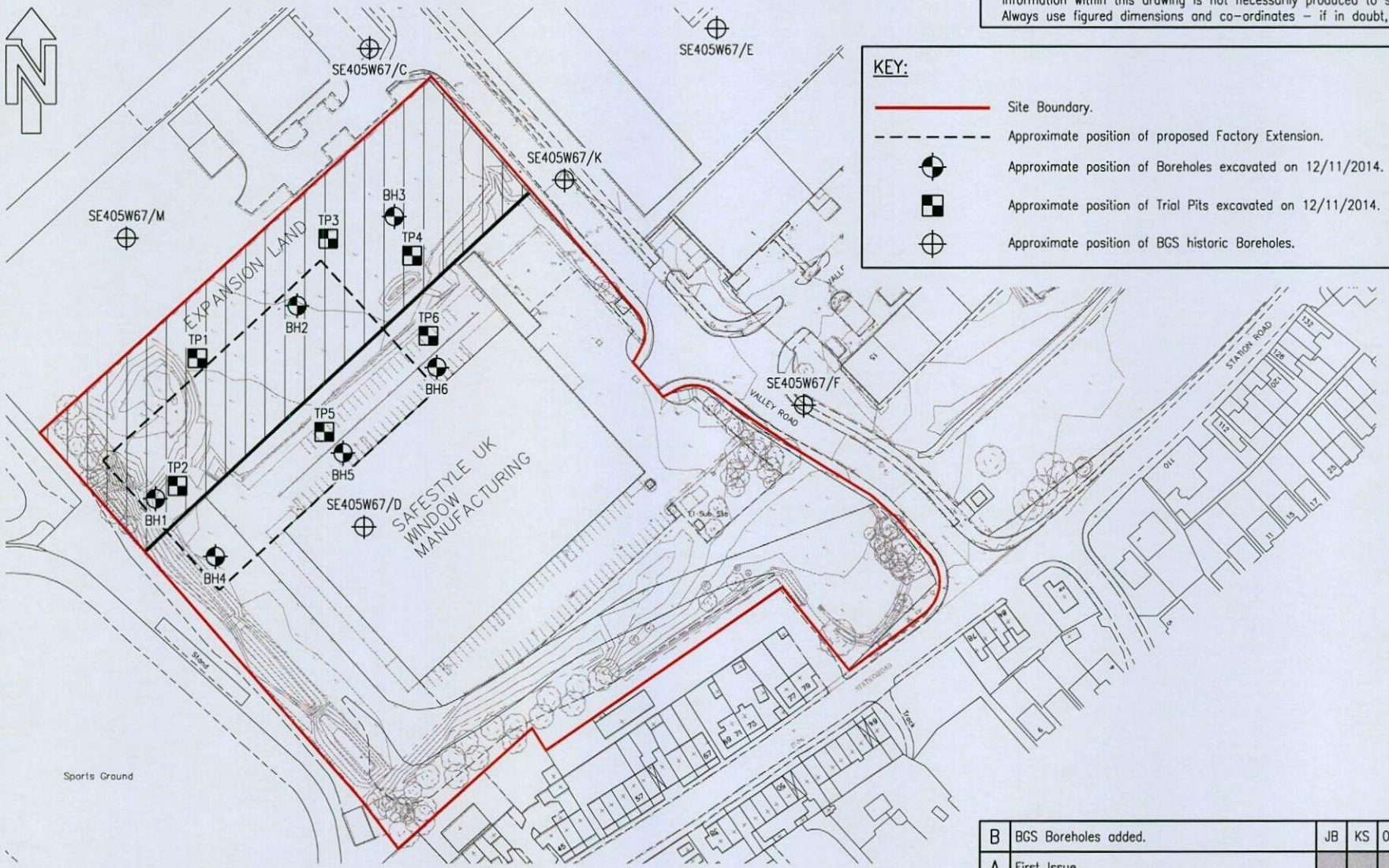
9.5 Waste Classification

We understand a proportion of the made ground material will be taken offsite. Although the chemical test results show the material could generally be classed as potentially inert, the elevated sulphates will need to be assessed by the tip manager. The receiving tip manager may request Waste Acceptance Criteria testing to confirm the classification of the material.

Appendix 1

Exploratory Hole Location Plan 37688/001/B

Information within this drawing is not necessarily produced to scale.
Always use figured dimensions and co-ordinates – if in doubt, ask.



KEY:

- Site Boundary.
- Approximate position of proposed Factory Extension.
- Approximate position of Boreholes excavated on 12/11/2014.
- Approximate position of Trial Pits excavated on 12/11/2014.
- Approximate position of BGS historic Boreholes.

REV	DESCRIPTION	SIG	CHK	DATE
B	BGS Boreholes added.	JB	KS	04.12.14
A	First Issue.			

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SAFESTYLE UK LTD
PROPOSED FACTORY EXTENSION, VALLEY ROAD, WOMBWELL
EXPLORATORY HOLE LOCATION PLAN

SCALE WHEN PLOTTED AT A3	DRAWING STATUS
1:1250	INFORMATION

DRAWN	CHECKED	DATE	DRAWING NUMBER	REV
JL	KS	14.10.14	37688/001	B

Appendix 2

Envirocheck Report

Coal Authority Report

BGS Borehole Logs

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Envirocheck® Report:

Datasheet

Order Details:

Order Number:
22837981_1_1

Customer Reference:
30423/MJY/KE

National Grid Reference:
440360, 403440

Slice:
A

Site Area (Ha):
5.68

Search Buffer (m):
1000

Site Details:

Site at 440340, 403480

Client Details:

Mr J Wood
Eastwood & Partners Ltd
St Andrews House
23 Kingfield Road
Sheffield
S11 9AS

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Summary	-
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Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1			28	24
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 14		1	3	1
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 14		Yes		
Pollution Incidents to Controlled Waters	pg 14		9	7	5
Prosecutions Relating to Authorised Processes					
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances					
River Quality	pg 18		2		1
River Quality Biology Sampling Points	pg 18		1		1
River Quality Chemistry Sampling Points	pg 19			1	
Substantiated Pollution Incident Register	pg 19		1		
Water Abstractions	pg 20			1	(*5)
Water Industry Act Referrals	pg 21		1		
Groundwater Vulnerability	pg 21	Yes	n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences	pg 21	Yes		n/a	n/a
Flooding from Rivers or Sea without Defences	pg 21	Yes		n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas	pg 21	Yes		n/a	n/a
Flood Defences				n/a	n/a
Waste					
BGS Recorded Landfill Sites	pg 22			1	
Historical Landfill Sites	pg 22	1	3	5	1
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)	pg 24			1	
Licensed Waste Management Facilities (Locations)	pg 24			1	1
Local Authority Recorded Landfill Sites	pg 24	1	2	2	1
Registered Landfill Sites	pg 26		3		7
Registered Waste Transfer Sites	pg 30			2	
Registered Waste Treatment or Disposal Sites					

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
Geological					
BGS Recorded Mineral Sites	pg 31			2	
BGS 1:625,000 Solid Geology	pg 31	Yes	n/a	n/a	n/a
Brine Compensation Areas			n/a	n/a	n/a
Coal Mining Affected Areas	pg 31	Yes	n/a	n/a	n/a
Mining Instability	pg 31	Yes	n/a	n/a	n/a
Natural and Mining Cavities					
Potential for Collapsible Ground Stability Hazards				n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 31	Yes	Yes	n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards		Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 32	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 32	Yes	Yes	n/a	n/a
Radon Affected Areas				n/a	n/a
Radon Protection Measures	pg 32	Yes	Yes	n/a	n/a
Shallow Mining Hazards	pg 32	Yes	Yes	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 33	11	6	25	26
Fuel Station Entries	pg 39				1

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Areas of Adopted Green Belt	pg 40		1		
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 40	1			
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Discharge Consents** Operator: Yorkshire Water Services Ltd Property Type: Sewage Disposal Works - Water Company Location: Wombwell Wwtw Ings Road, Barnsley, South Yorkshire Authority: Environment Agency, North East Region Catchment Area: Don Tributaries Reference: Wa 6273 Permit Version: 16 Effective Date: 31st March 2008 Issued Date: 25th February 2005 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: River Dove And Bulling Dyke **Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A14SW (E)	335	1	440880 403360
1	**Discharge Consents** Operator: Yorkshire Water Services Ltd Property Type: Sewage Disposal Works - Water Company Location: Wombwell Wwtw Ings Road, Barnsley, South Yorkshire Authority: Environment Agency, North East Region Catchment Area: Don Tributaries Reference: Wa 6273 Permit Version: 14 Effective Date: 9th September 1998 Issued Date: 9th September 1998 Revocation Date: 30th December 2000 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: River Dove And Bulling Dyke **Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A14SW (E)	335	1	440880 403360
1	**Discharge Consents** Operator: Yorkshire Water Services Ltd Property Type: Sewage Disposal Works - Water Company Location: Wombwell Wwtw Ings Road, Barnsley, South Yorkshire Authority: Environment Agency, North East Region Catchment Area: Don Tributaries Reference: Wa 6273 Permit Version: 15 Effective Date: 31st December 2000 Issued Date: 9th September 1998 Revocation Date: 30th March 2008 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: River Dove And Bulling Dyke **Status: Modified (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A14SW (E)	335	1	440880 403360
1	**Discharge Consents** Operator: Yorkshire Water Services Ltd Property Type: Sewage Disposal Works - Water Company Location: Wombwell Wwtw Ings Road, Barnsley, South Yorkshire Authority: Environment Agency, North East Region Catchment Area: Don Tributaries Reference: Wa 6273 Permit Version: 13 Effective Date: 8th April 1998 Issued Date: 8th April 1998 Revocation Date: 8th September 1998 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: River Dove And Bulling Dyke **Status: Varied by Application - (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A14SW (E)	335	1	440880 403360

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Discharge Consents** Operator: Yorkshire Water Services Ltd Property Type: Sewage Disposal Works - Water Company Location: Wombwell Wwtw Ings Road, Barnsley, South Yorkshire Authority: Environment Agency, North East Region Catchment Area: Don Tributaries Reference: Wa 6273 Permit Version: 9 Effective Date: 31st May 1996 Issued Date: 22nd May 1996 Revocation Date: 30th June 1996 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: River Dove And Bulling Dyke **Status: Revised Consent, by Notice (Section 37(1))** Positional Accuracy: Located by supplier to within 10m	A14SW (E)	335	1	440880 403360
1	**Discharge Consents** Operator: Yorkshire Water Services Ltd Property Type: Sewage Disposal Works - Water Company Location: Wombwell Wwtw Ings Road, Barnsley, South Yorkshire Authority: Environment Agency, North East Region Catchment Area: Don Tributaries Reference: Wa 6273 Permit Version: 10 Effective Date: 1st July 1996 Issued Date: 22nd May 1996 Revocation Date: 7th April 1998 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: River Dove And Bulling Dyke **Status: Revised Consent, by Notice (Section 37(1))** Positional Accuracy: Located by supplier to within 10m	A14SW (E)	335	1	440880 403360
1	**Discharge Consents** Operator: Yorkshire Water Services Ltd Property Type: Sewage Disposal Works - Water Company Location: Wombwell Wwtw Ings Road, Barnsley, South Yorkshire Authority: Environment Agency, North East Region Catchment Area: Don Tributaries Reference: Wa 6273 Permit Version: 8 Effective Date: 31st March 1996 Issued Date: 18th March 1996 Revocation Date: 30th May 1996 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: River Dove And Bulling Dyke **Status: Revised Consent, by Notice (Section 37(1))** Positional Accuracy: Located by supplier to within 10m	A14SW (E)	335	1	440880 403360
1	**Discharge Consents** Operator: Yorkshire Water Services Ltd Property Type: Sewage Disposal Works - Water Company Location: Wombwell Wwtw Ings Road, Barnsley, South Yorkshire Authority: Environment Agency, North East Region Catchment Area: Don Tributaries Reference: Wa 6273 Permit Version: 7 Effective Date: 6th March 1995 Issued Date: 6th March 1995 Revocation Date: 30th March 1996 Discharge Type: Sewage Discharges - Stw Storm Overflow/Storm Tank - Water Company Discharge Environment: Freshwater Stream/River Receiving Water: River Dove And Bulling Dyke **Status: Revised Consent, by Application (Water Resources Act 1991, Section 34(2))** Positional Accuracy: Located by supplier to within 10m	A14SW (E)	335	1	440880 403360