

Woodville, Swadlincote

Flood Risk Assessment & Outline Drainage Strategy

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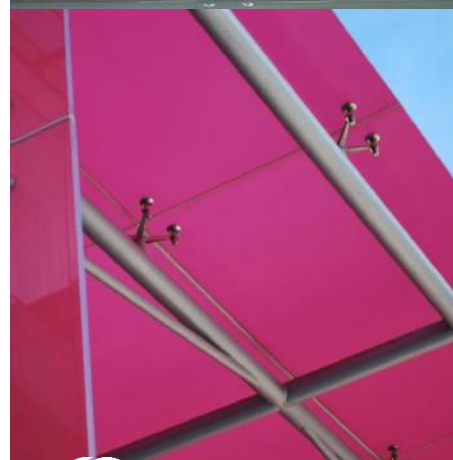
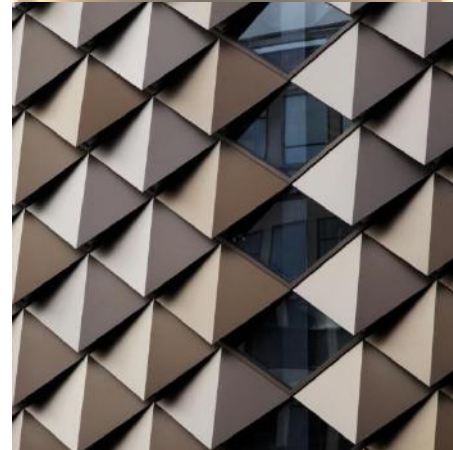
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Client Name: Harworth Group

Client Address: Advantage House, Poplar way, Catcliffe. Rotherham, South Yorkshire, S60 5TR

Site Address: Woodville, Swadlincote, DE11 8EX.

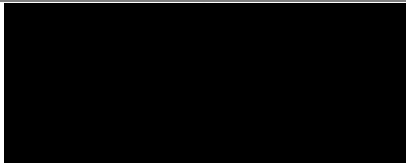


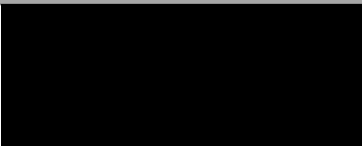
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Revisions

Revision	Date/ by	Description of Revision
V01	09/08/18 AMG	DRAFT ISSUE
V02	16/07/19 JDB	REVISED LAYOUTS
V03	19/07/19 JDB	DRAINAGE STRATEGY AMENDED
V04	24/07/19 JDB	LAYOUT UPDATED

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Appendix A

Proposed Site Layout

Appendix B

Public Sewer Records

Topographical Survey

British Geological Survey Infiltration SuDS GeoReport

Appendix C

Derbyshire County Council Correspondence

United Utilities Correspondence

Appendix D

Outline Drainage Strategy Plan

1.0 Introduction

1.1 Project Background

- 1.1.1 Curtins was appointed by Harworth Group to provide a Flood Risk Assessment and Drainage Strategy (DS) for the proposed development of land off Occupation Lane in Swadlincote. The nearest postcode to the site is DE11 8EX, and the site is centred around National Grid Ref: 431017,318760.
- 1.1.2 The report provides information on the nature of flood risk at the site and follows Government guidance with regards to development and flood risk.
- 1.1.3 The report is based on currently available information and preliminary discussions.
- 1.1.4 Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.
- 1.1.5 Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

1.2 Scope of Assessment

- 1.2.1 The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF).
- 1.2.2 The site lies within the Derbyshire County Council's and South Derbyshire District Council.
- 1.2.3 The total site area is approximately 21.4Ha hectares and following scrutiny of the Environment Agency flood zone maps it has been identified that the entirety of the site lies within an area classified as Flood Zone 1. There is a less than 1 in 1,000 annual probability of river or sea flooding. Following scrutiny of surface water flood maps, it has been identified that the existing site lies within an area which is generally not at risk of flooding from surface water. There are localised areas at high risk of flooding towards the southern boundary of the site. A drainage ditch runs through the middle of the site to a pond in the northwest corner of the site, which also appears to be at high risk of surface water flooding. The review of the reservoir flooding maps confirms that the site does not lie within the vicinity of the maximum extents of reservoir flooding risk. Since the site is larger than 1 hectare and in Flood Zone 1, a Flood Risk Assessment (FRA) is required to support a planning application which also takes into consideration the management of surface water run-off.

- 1.2.4 In April 2015, the Government made changes to the National Planning Policy Framework which made Sustainable Urban Drainage Systems (SuDS) a material consideration in the determination of planning applications for 'major' developments.
- 1.2.5 A Drainage Strategy will therefore be required as part of the Full Planning Application for the development, as the site is 'major' development as per the Town and Country Planning Order 2015.
- 1.2.6 The assessment will:
- Investigate all potential risks of flooding to the site,
 - Consider the impact the development may have elsewhere with regards to flooding; and
 - Consider detailed proposals to mitigate any potential risk of flooding determined to be present.
- 1.2.7 This FRA & Drainage Strategy reviews the following information:
- Environment Agency flood maps for rivers and sea flooding.
 - UK Government Long Term Flood Risk Information for surface water flooding and reservoir flooding.
 - Severn Trent Water Sewer Records (March 2018).
 - British Geological Survey (BGS) Infiltration SuDS GeoReport February 2018)
 - South Derbyshire District Council Level 1 Strategic Flood Risk Assessment (November 2008)
 - Derbyshire County Council Preliminary FRA for Derbyshire (May 2011)

1.3 Proposed Development

- 1.3.1 The masterplan for the proposed site covers approximately 21.4 hectares and is to comprise of up to 300 dwellings and employment space.
- 1.3.2 The current site is greenfield and is undeveloped.
- 1.3.3 The proposed plans for the site are included in Appendix A.

2.0 Existing Site Details

2.1 History and Current Use

The site is situated within a mixed residential and non-residential area of Woodville in Derbyshire. The site is adjacent to Occupation Lane to the south. The site is bordered by industrial estates to the north, east and west. There is a housing estate located to the south of the proposed site boundary. (See Figure 1). Swadlincote is located approximately 850m northwest from the site.



Figure 1: Aerial Photograph (© Google)

- 2.1.1 The area proposed for development is currently entirely greenfield. Within the identified redline boundary is an area to the south which is currently industrial. This area is to remain in its current configuration as part of the proposed masterplan.
- 2.1.2 The existing site consists of agricultural land, likely to have been farmed in recent years.
- 2.1.3 The site lies within the South Derbyshire District Council Level 1 Strategic Flood Risk Assessment.

Existing Watercourses and Other Waterbodies

2.1.4 A number of drainage ditches lie within the vicinity of the site. These are likely to convey the green field run-offs to the pond in the northwest corner of the site and the culverted drain along the northern boundary.

2.1.5 The following watercourses have been identified within the vicinity of the proposed site, refer to Figure 2:

- Watercourse 1 flows through the middle of the site to the pond in the northeast of the site. This most likely convey the greenfield run off from the site and flow in a northerly direction.
- Watercourse 2 is along the northern boundary of the site and appears to be partially culverted. It is assumed that this watercourse conveys run off from the industrial estates to the north of the site boundary.
- Further afield there are a number of ponds to the northern extent of the proposed site. Albert village lake is also located approximately 1km south west from the site boundary.



Figure 2 – Existing Watercourses

2.2 Existing Drainage

- 2.2.1 There are a number of surface water pipes which run around the boundary of the site, but specifically there is 600mm diameter sewer running adjacent to the south west corner of the site, and a 1800mm diameter sewer discharging at the northern boundary of the site. As stated in the STW predevelopment Enquiry this will required a 10m easement about the pipes centreline where no building or planting of trees shall be permitted. The closest surface water manhole is 8503 of Occupation Lane.
- 2.2.2 The closest gravitational foul water connection point would be to the 150mm foul water sewer south of at MH8501.
- 2.2.3 It is most likely that highway drainage and greenfield run-off is discharged to the existing brooks.

2.3 Topography

- 2.3.1 A topographical survey has been carried out on the proposed site, and is enclosed in Appendix B.
- 2.3.2 The site slightly undulates from south east corner to north west with a drain running through the middle of the proposed site.
- 2.3.3 The high point is approximately 138.870mAOD, whereas the low point is approximately 118.120mAOD.
- 2.3.4 A CPO is underway to develop a highway running through the centre of the site, this will result in a localised raised area where the road is set.

2.4 Geology

- 2.4.1 The British Geological Survey Infiltration SuDS GeoReport is included in Appendix B, and identifies the following geological succession underlying the site:
- Superficial deposits – No deposits recorded by BGS in the search area.
 - Bedrock – Pennine Middle Coal measure formation – Mudstone, Siltstone and sandstone.
- 2.4.2 There is made ground present at the surface. Infiltration may increase the possibility of remobilising pollutants.
- 2.4.3 The bedrock permeability is spatially variable, but likely to permit moderate infiltration.
- 2.4.4 Groundwater is likely to be more than 5m below the ground surface throughout the year.
- 2.4.5 The site is not within a source protection zone.
- 2.4.6 The BGS maps show that there are very significant constraints indicated for suitable infiltration SuDS. There is a very significant potential for one or more hazards associated with infiltration. The design will be influenced by the ground conditions following the site investigation report.

- 2.4.7 Ground instability problems are probably present, increased infiltration may result in ground instability.
A full site investigation should be carried out to confirm.

3.0 Development and Flood Risk

3.1 National Planning Policy Framework (NPPF) and Planning Practice Guidance

- 3.1.1 In March 2012 the Department of Communities and Local Government published the National Planning Policy framework document (NPPF) and the Planning Practice Guidance was published in March 2014 which provides guidance on how flood risk should be assessed during the planning and development process.

Table 1: (Extract from Planning Practice Guidance) Flood Zone Classifications

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's [Flood Map for Planning \(Rivers and Sea\)](#), available on the Environment Agency's web site, as indicated in the table below.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 2: (Extract from Planning Practice Guidance) Flood Risk Vulnerability Classification

Essential Infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable • Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').
More Vulnerable • Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less Vulnerable

- Police, ambulance and fire stations which are **not** required to be operational during flooding.
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill* and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.

Water-Compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 3: (Extract from Planning Practice Guidance) Flood Risk Vulnerability and Flood Zone Compatibility

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	x	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	x	x	x	✓*

Key:

✓ Development is appropriate

x Development should not be permitted.

Notes to table 3:

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

3.2 Site Specific NPPF Flood Risk Categorisation

- 3.2.1 To assess the NPPF flood risk classification for the site, the first step was to inspect the Environment Agency web based flood mapping data for flooding from rivers and seas, surface water and reservoirs. The rivers and sea flood map is used to inform planning of a sites Flood Zone(s), however the surface water and reservoir flood maps should also be used to identify other flood risks.
- 3.2.2 From the Environment Agency flooding from rivers and seas map, it can be seen that the site lies within an area classified as Flood Zone 1 (very low risk of flooding from rivers or sea).

3.3 Site Specific Flood Zone Compatibility

- 3.3.1 The proposals for the development site are likely to fall within the following categories:
- 'Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotel.'

This type of development shall be classed as 'More Vulnerable' development in the Flood Risk Vulnerability Classification (Table 2: (Extract from Planning Practice Guidance) Flood Risk Vulnerability Classification).

- 3.3.2 As the site is located within Flood Zone 1, 'More Vulnerable' development is deemed to be appropriate for all areas of the site and neither the sequential nor the exception test is required.

4.0 Hydrological Assessment

4.1 Sources of Flood Risk

4.1.1 This study assesses the risk from different types of flooding to the development and the risk of flooding from the development, taking into consideration climate change, as well as how flood risks should be managed. The approach to assessing flood risk at the development site was informed by the requirements of NPPF in conjunction with the client and Environment Agency requirements.

4.2 Fluvial Flooding (Rivers and Streams)

4.2.1 From the Environment Agency flooding from rivers and seas map:

- Where a site is located in a dark blue shaded zone, this indicates that the site is within Flood Zone 3b where there is a chance of flooding of greater than 1 in 30 (3.3%).
- Where a site is located in a blue shaded zone, this indicates that the site is within Flood Zone 3a where there is a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).
- Where a site is located in a turquoise shaded zone; this indicates that the site is within Flood Zone 2 where there is a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Where a site is located in a white (unshaded) area, it is generally deemed to be classified as Flood Zone 1 where there is a chance of flooding of less than 1 in 1000 (0.1%).

4.2.2 Flooding to the site from rivers and seas is indicated in Figure 3: Environment Agency Map – Flood Map For Planning (Rivers and Sea), there is no flooding from either source noted on the EA maps.

4.2.3 There are a number of drains around the site used for agricultural and land drainage purposes. These are not identified as having issues with fluvial flooding.

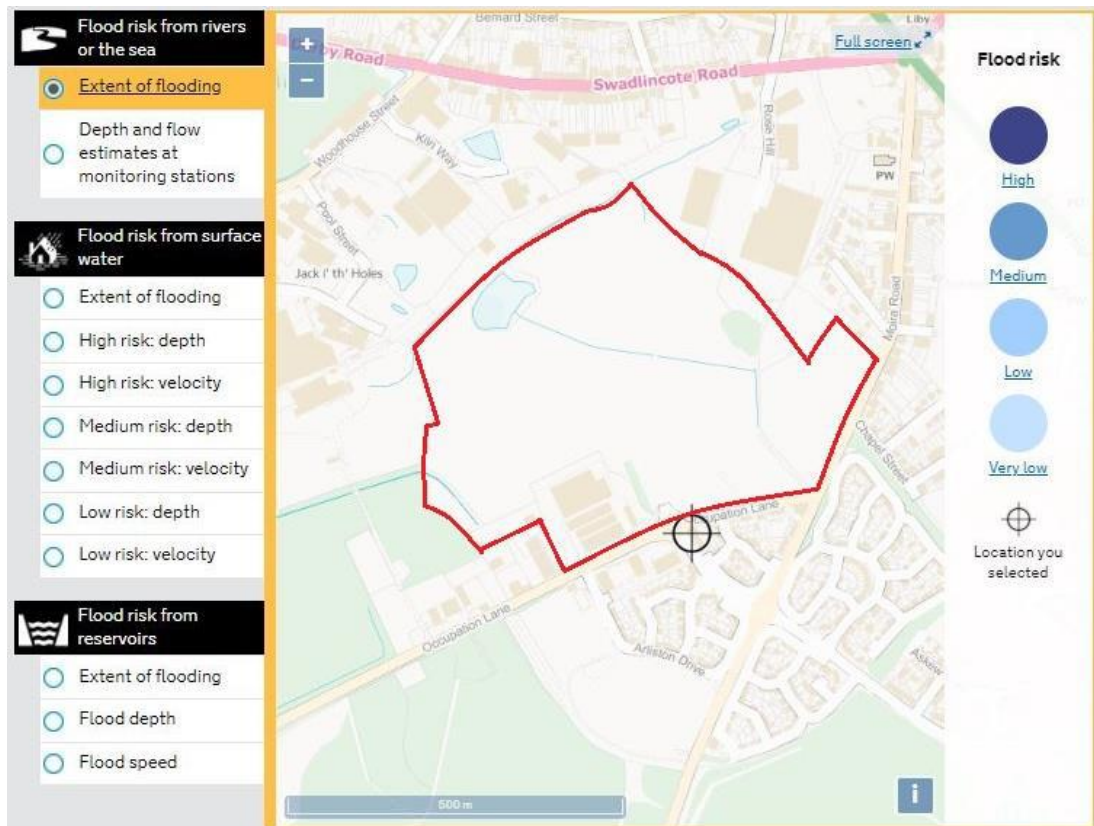


Figure 3: Environment Agency Map – Flood Map For Planning (Rivers and Sea)

4.3 Tidal Flooding (Coastal or Estuarine)

- 4.3.1 There is no evidence that the site is at risk from Tidal Flooding. The SFRA confirms that this area is not considered at risk.

4.4 Reservoir Flooding

- 4.4.1 Reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the enforcement authority and ensures that reservoirs are inspected regularly and essential safety work is carried out.
- 4.4.2 The Flood Warning Information Service Flood Risk from Reservoirs map shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. Since this is a prediction of a worst-case scenario, it is very low risk that a reservoir flood would be this large.
- 4.4.3 The site is not located within the vicinity of the extents of flooding due to reservoir breach. Therefore, the risk from reservoir flooding to the site is considered low.

4.5 Canal Flooding

- 4.5.1 The Trent- Mersey Canal is located approximately 11km south of the proposed development. This canal poses no flooding risk to the site.
- 4.5.2 The SFRA does not highlight any risk of canal flooding in this area. The only recorded breach in the area was in 2000 and was located east of Shardlow and therefore does not affect this site.

4.6 Groundwater Flooding

- 4.6.1 The BGS Infiltration SuDS GeoReport, included in Appendix B, identifies that groundwater is likely to be more than 5m below the ground surface for at least part of the year.
- 4.6.2 Assessment of the SFRA suggests that there are no records of groundwater flooding were found during the course of the study. The Defra Strategy and Coastal Erosion Risk Management Study (2004) did not show any recorded instances of groundwater flooding in the study area.
- 4.6.3 Site specific groundwater levels are not available; however, it is assumed based on the information available that the site area is not susceptible to groundwater flooding, the risk is not significant and therefore may be considered low. It is highly recommended that a detailed site investigation is carried out prior to commencement on site.

4.7 Public Sewers or Highway Drainage Flooding (Infrastructure Failure)

- 4.7.1 Severn Trent Water do not appear to have any infrastructure that would affect the site.
- 4.7.2 As there is no infrastructure in the area there is no risk of flooding from public sewers.
- 4.7.3 Providing Derbyshire County Council, South Derbyshire District Council and Severn Trent water maintain their drainage assets in the vicinity of the site, the risk of flooding to the proposed development site from public sewers or highway drainage is considered as low.

4.8 Surface Water Flooding to the site

- 4.8.1 Surface water flooding can be caused when rainwater during extreme rainfall events does not drain away through the normal drainage system or soak into the ground with flooding occurring, principally from manholes and gullies. Surcharging sewers can result in overland flows which if originating at a higher elevation than a development site can potentially pose a flood risk.
- 4.8.2 From the UK Government's Flood Risk from Surface Water (extent of flooding) map;
 - Where a site is located in a dark blue shaded zone, this indicates that the site is at high risk of flooding where there is a chance of flooding of greater than 1 in 30 (3.3%).

- Where a site is located in a mid-blue shaded zone, this indicates that the site is at medium risk of flooding where there is a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).
- Where a site is located in a light blue shaded zone; this indicates that the site is at low risk of flooding where there is a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Where a site is located in a white (unshaded) area; this indicates that the site is at very low risk of flooding where there is a chance of flooding of less than 1 in 1000 (0.1%).

4.8.3 The extent of flooding to the site from surface water is indicated in Figure 4: Risk of Flooding from Surface Water - Extent of Flooding and it can be seen that the majority of the site is located in an area classified as being at 'Very Low' risk of flooding from surface water, however there are localised areas of high risk of surface water flooding in areas where the pond and drain are located.

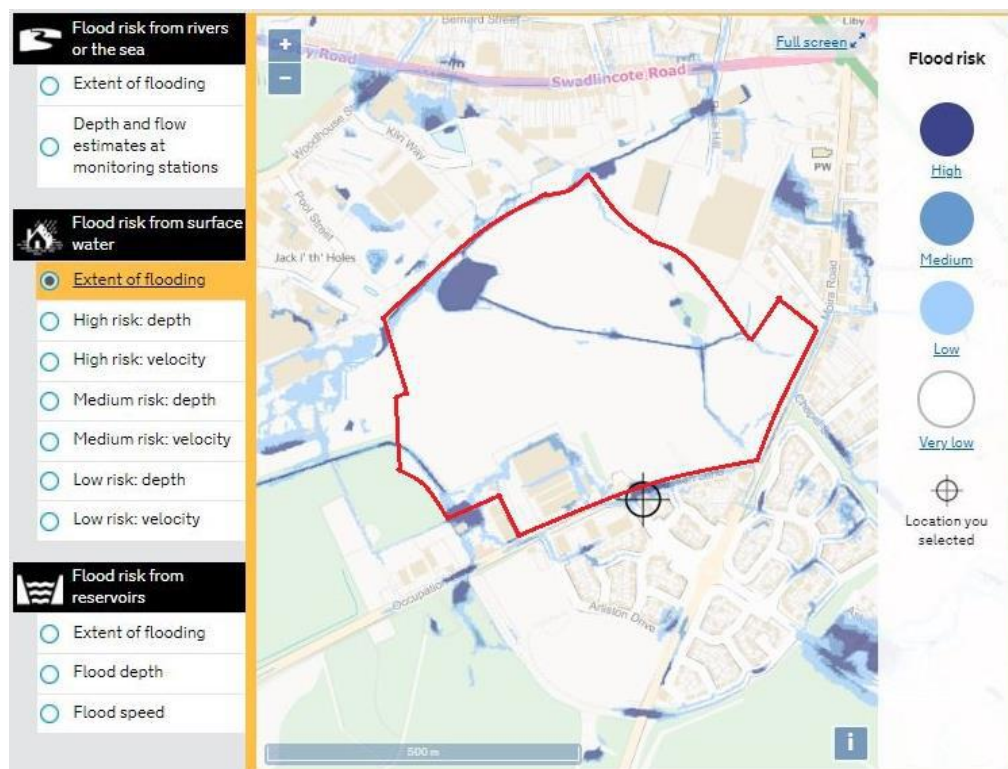


Figure 4: Risk of Flooding from Surface Water - Extent of Flooding

- 4.8.4 There is a localised areas at risk of flooding on site. It is located around the existing land drains. The main land drain passes through the middle of the site to a pond in the north west of the site.
- 4.8.5 Considering the above information, the general risk of surface water flooding to the site is considered low. However, there are areas of higher risk surrounding the existing land drains and pond, assuming the these are maintained, and discharge rates managed; the risk can be controlled. Mitigation measures are proposed in Section 5.

4.9 Surface Water Flooding from the site

- 4.9.1 Developers are responsible for ensuring that new development does not increase the flood risk elsewhere. The proposed surface water drainage network shall be designed to not flood for the critical 1 in 30-year storm event and flood water generated up to the critical 1 in 100-year plus climate change storm event shall be constrained within areas on site so as not to cause damage to buildings, essential services or adjoining developments and services.
- 4.9.2 The development has the potential to increase flood risk where any increase in impermeable areas results in additional run-off from proposed roads, car parks and building roofs being discharged freely into the existing watercourse. It is therefore encouraged to propose permeable areas, landscaping areas and incorporate sustainable drainage features utilising infiltration or attenuation where possible.
- 4.9.3 Having reviewed the SFRA there is no reference to Critical Drainage Areas (CDA's), areas defined as CDA's suggest that the sewer network is operating above capacity and is therefore a potential flood risk. As this is not the case in this location we assume that the system is operating within its defined performance limits and as such the risk of flooding is low.
- 4.9.4 An assessment of the proposed surface flows is carried out within the drainage strategy within section 6 of this report.

4.10 Historical Flooding

- 4.10.1 EA confirmed they hold no record of historical flooding within the area.
- 4.10.2 The SFRA confirms that there are no historical flooding issues within the site vicinity
- 4.10.3 According to the LLFA held datasets, there is 1 incidence of flooding from an unknown source approximately 100m from the south of the site. Additionally, 130m to the north of the site, there is an incidence of sewer flooding reported to the LLFA. There are 7 records of highway flooding held by the LLFA along the southern boundary of the site, on Occupation Lane, attributed to the ponding of surface water within the highway.

4.11 Summary of Flood Risk

- 4.11.1 From the evidence collated and subsequent negotiations the main types of flooding that may apply to the proposed development site are as follows:
- Surface water flooding to the site; and
 - Surface water flooding from the site.

5.0 Mitigation

5.1 Surface Water Flooding to the Site Mitigation

- 5.1.1 The UK Government surface water flood maps indicate that the site is generally at low risk of surface water flooding, with a localised area of higher risk areas surrounding the existing brook and highway embankment.
- 5.1.2 The majority of the flood risk is located around the existing land drain. The site owner should ensure that this is maintained and kept clear of any blockage. The proposed site levels in this area should not be any lower than what is currently constructed.
- 5.1.3 There is also a region along the northern boundary of the site which is at high risk from surface water flooding, it is assumed this is where the current highway drainage from the site and the industrial estate to the north of the site discharges to. Works to this area of the site should not involve lowering the ground surface below the existing ground level.
- 5.1.4 It is recommended that proposed external ground levels across the site should fall away from the proposed buildings in a manner which does not create low points where water might collect unintentionally. The current site appears to drain into the existing brook, this fall should be maintained to ensure sufficient run off.
- 5.1.5 Providing the above measures are implemented the flooding risk to the development site from surface water is therefore considered low post development.

5.2 Surface Water Flooding from the Site Mitigation

- 5.2.1 Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated from up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments & services.
- 5.2.2 In February 2016, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Table 4 demonstrates the climate change allowances with central and upper end allowances being considered.

Based on the nature of the development, a lifespan in excess of 100 years is anticipated, exceeding the 2115 upper limit. The potential climate change allowance for 2070-2115 ranges between 20% for the central allowance and 40% for the upper end allowance. Table 4 shows anticipated changes in extreme rainfall intensity in small and urban catchments.

Table 4: (Extract Environment Agency Guidance) Peak Rainfall Intensity Allowance in small and urban catchments

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

- 5.2.3 The minimum allowance to be applied is the 'Central' allowance provided it can be demonstrated, through evidence, that the flood risk is no worse at the 'Upper End' scenario than it is during the 'Central' scenario, and that flood water can be managed safely for the range of scenarios between 'Central' and 'Upper End' for the development's lifetime. If this cannot be demonstrated, then the 'Upper End' allowance must be applied.
- 5.2.4 In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration.
- 5.2.5 The BGS SuDS report as contained within appendix B states that there is very significant constraints indicated for infiltration SuDs. There is a very significant potential for one or more hazards associated with infiltration. The viability of infiltration will be assessed further in the ground investigation report.
- 5.2.6 Section 6 reviews the surface water discharge options, and it is proposed that the surface water will be directed towards the 3 surface water ponds located within the proposed site boundary. Attenuation will be provided where required on site.
- 5.2.7 To minimise localised flooding within the site, the drainage design should ensure that gullies, drainage channels and drains are all suitably sized to accommodate peak storm flows. Also, all inlet features should have suitably sized sumps to catch silts and should be subject to a documented routine maintenance and cleansing regime.
- 5.2.8 Any surface water should be constrained within the site and sustainable techniques such as water reuse by rainwater harvesting/rainwater butts, permeable paving or enhanced landscaping features should be considered.
- 5.2.9 Flood water exceedance routes should be identified, both on and off site.
- 5.2.10 For any sustainable drainage systems employed in the development, an appropriate management and maintenance plan for the sustainable drainage system for the lifetime of the development should be submitted which should include:

- Any arrangements for adoption by an appropriate public body or statutory undertaker, management and maintenance by a Residents' Management Company
- Arrangements concerning appropriate funding mechanisms for its on-going maintenance of all elements of the sustainable drainage system (i.e. inspections, regular maintenance)
- Means of access for maintenance and easements where applicable

5.2.11 Assuming that the proposed drainage system is designed to provide adequate capacity, and that the private and adopted sewers will be maintained by their adopted authority (where applicable), it can be assumed risk of flood from blockage or overloading is minimal.

5.2.12 The final design of the drainage networks shall be in accordance with the legislation set by the Environment Agency, Derbyshire County Council and Severn Trent Water.

6.0 Outline Drainage Strategy

6.1 Existing Drainage

- 6.1.1 The public sewer records have been obtained for the development site. The records indicate that there are no public sewers recorded within the site therefore sewer diversion works are not required.
- 6.1.2 The proposed site has agricultural use, and as such is unlikely to contain existing private drainage features within the site.
- 6.1.3 Any existing drainage connections to the public sewer should be assessed for their potential to serve the development proposals for the site. The following proposals assume that no existing drainage exists on site.

6.2 Proposed Foul Water Drainage

- 6.2.1 A separate foul and surface water system is proposed. Assessment of the Environment Agency's Annex 6 has determined that the foul discharge can be treated as "Domestic Sewage".
- 6.2.2 A pumping station is proposed for foul network. The system will be pumped to an existing Severn Trent pumping station located to the south west of the proposed boundary. Proposed Flows and pumping requirements to be confirmed and Severn Trent Approval required for connection. Connection to the system would be via a section 106 (S106) agreement. The final connection location and type of connection would be agreed as part of this agreement process.
- 6.2.3 The preliminary drainage assessment is enclosed in Appendix D.

6.3 Proposed Surface Water Drainage

- 6.3.1 Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated for up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments and services.

In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration. The discharge options are summarised below in Table 5.

Table 5: Summary of Surface Water Disposal

Surface Water Disposal Method	Potential	Description
Infiltration	X	Whilst the BGS report acknowledges the potential for infiltration, the ground water level is likely to be within 3m and 5m of the surface for at least part of the year. The available ground information suggests the Mudstone, Siltstones and sandstone will support infiltration. Further investigation is required to confirm the potential for infiltration. Further SI information shows that this site was previously a quarry and made up of “made ground”.
Watercourse	✓	The nearest watercourse (existing drain is located within the site boundary running from south to north through the middle of the site.) It is proposed that all surface water is discharged into this existing rain.
Surface Water Sewer	X	There are no public surface water sewers within the vicinity of the site.
Combined Water Sewer	X	There are no public combined sewers within the vicinity of the site, and in any case discharge to a surface water sewer is preferred.

- 6.3.2 For the outline application of this development, it shall be assumed that infiltration is not suitable at the site due to the existence of a brook and availability of ponds. Soakaway testing is recommended to assess the potential for incorporating infiltration into the drainage design.
- 6.3.3 Any consideration of infiltration should assess groundwater depths, and the potential of remobilising contaminants in addition to the ground conditions identified during site investigation works.
- 6.3.4 There are no opportunities present in the area for discharging into existing surface water sewers. The closest STW connection would require either a pumped sewer or various third-party agreements. The existing site drains into the existing brook.
- 6.3.5 The existing drainage is greenfield run-off, therefore, calculations have been created to simulate the current site discharge and storage requirements. The results are summarised below, and the calculations are available in appendix C.
- 6.3.6 The estimated 1 in 1, 30 and 100-year return periods for the entirety of the site have been simulated for the greenfield run-off and the flow rates are as follows:
- 6.3.7 QBAR = 97.41 l/s
1 year = 80.85 l/s

30 year = 194.82 l/s

100 year = 250.34 l/s

6.3.8 The current site is 100% permeable.

6.3.9 The LLFA has been contacted to confirm a suitable reduction in flow, the LLFA will not allow any increase in the existing greenfield run-off rates.

6.3.10 The impermeable areas on the developed residential site are likely to be approximately 50% of each of the 4 parcels of land. Refer to the below table for the breakdown on the required attenuation volumes.

6.3.11 A Microdrainage model has been created to analyse the proposed drainage network, using two pipe simulations the attenuation volumes have been determined. The site is split into four parcels as per Figure 6.1. The allowable discharge rates and approximate storage requirements are as follows:

	Area	Impermeable Area	Allowable Discharge	Approximate Storage Required
Parcel 1	2.9 ha	1.45 ha	13.2 l/s	800m ³
Parcel 2	5.7 ha	2.85 ha	25.8 l/s	2000 m ³
Parcel 3	3.1 ha	1.55 ha	14.1 l/s	850 m ³
Parcel 4	2.3 ha	1.15 ha	10.2 l/s	600 m ³

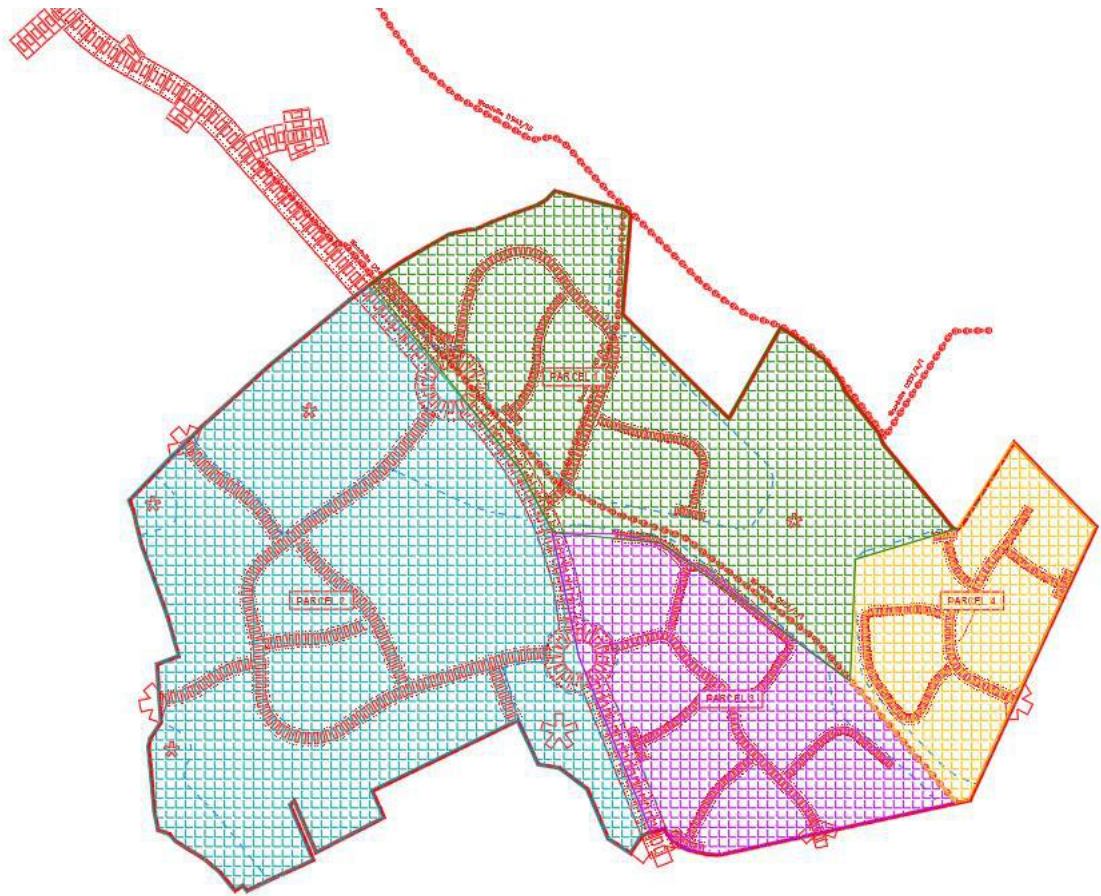


Figure 6: Proposed Drainage Zones

Attenuation Requirements

- 6.3.12 It is recommended that sustainable methods of attenuation are implemented where possible; this can be achieved using a combination of ponds, swales, permeable paving with high voids sub-base and percolation pipes. Use of ponds, swales and permeable paved areas would also be considered as methods of filtration to improve water run-off quality.
- 6.3.13 Other methods of sustainability could be provided by use of rainwater harvesting tanks, rainwater butts or green roofs for the Building elements.
- 6.3.14 Where attenuation ponds and permeable construction is proposed, lining barriers should be installed to prevent any potential pathway for pollution where contaminants may be present.
- 6.3.15 In this circumstance it is likely that the attenuation can be implemented through a series of open attenuation basins.

Contamination

- 6.3.16 Surface water run-off from hard paved areas at risk of contamination should receive water quality treatment. Low traffic access roads and car parking is considered low hazard in terms of contamination.

Figure 7 illustrates the pollution hazard indices for different land use classifications from The CIRIA SuDS Manual C753 (2015).

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

Figure 7: Pollution Hazard indices for land use classification (Table 26.2 the CIRIA SuDS manual 2015)

6.3.17 Treatment could be provided using sustainable methods such as: filter strips, filter drains, swales, bio-retention systems, and/or permeable paving. Figure 8 illustrates the SuDS Component mitigation indices from The CIRIA SuDS Manual C753 (2015).

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.6
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ³	0.7 ⁴	0.7	0.5
Wetland	0.8 ⁴	0.8	0.6
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

- 1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.
- 2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.
- 3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.
- 4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.
- 5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: <http://tinyurl.com/igt7yuj7>
- 6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

Figure 8: Indicative SuDS mitigation indices (Table 26.3 the CIRIA SuDS manual 2015)

- 6.3.18 It is recommended that sustainable features are implemented where possible, however other options for treatment could be provided by oil interceptors, trapped gullies or smart sponge/filter gullies.
- 6.3.19 The selection of treatment should ensure that the SuDS mitigation component index (Figure 8: Indicative SuDS mitigation indices (Table 26.3 the CIRIA SuDS manual 2015)) exceeds the pollution hazard index (Figure 7). Where two stages of treatment are required, the second stage of treatment should account for reduced performance due to lower inflows; therefore 0.5 (mitigation index) should be used.
- 6.3.20 Treatment could be provided using a combination of sustainable methods such as permeable paving with high voids sub-base/percolation pipes, swales, and filter strips. Other methods of treatment include the use of Oil Interceptors, Trapped Gullies, Smart Sponge gullies and chambers.
- 6.3.21 The proposals for pollution protection should be agreed with the local authority.
- 6.3.22 The proposed outline drainage strategy is enclosed in Appendix D.

7.0 Maintenance

7.1 General

- 7.1.1 This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.
- 7.1.2 The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

7.2 Components

- 7.2.1 The following components have been included within the drainage design for the proposed development:
- Manhole Chambers
 - Pipes
 - Drainage Channels and Gullies
 - Permeable Pavements
- 7.2.2 A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.
- 7.2.3 It is assumed that the maintenance of the drainage network will be the responsibility of an on-site facilities management team.
- 7.2.4 A copy of the final construction drainage layout should be provided in the final Operations and Maintenance Manual.
- 7.2.5 It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event.
- 7.2.6 Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.
- 7.2.7 Long-term management practices include monthly sweeping of external paved areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during storm events and transported to the drainage system.

- 7.2.8 During the winter months, drainage features such as gullies and channels should be cleared of ice, snow, debris or litter
- 7.2.9 Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the filter drains and the upstream/downstream chambers.

7.3 Manhole Chambers

- 7.3.1 The indicative locations of the Inspection Chambers and Manholes are indicated on Curtins drainage drawing.
- 7.3.2 Access points have been located at the head of each run, at a change in direction and at a change of pipe size in accordance with Building Regulations Part H.
- 7.3.3 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access.

7.4 Pipes

- 7.4.1 The indicative locations of the drainage pipes are indicated on Curtins drainage drawing.
- 7.4.2 Pipes are proprietary products and the materials can vary across the site and as such where used the manufacture's recommendations should be followed. Regardless of the product used the pipes will be fully compliant with the Curtins drainage specification.
- 7.4.3 Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. Pipes which are proposed simply to convey water around the site have been designed such that they are considered to be self-cleansing. Where the primary function of the pipe/tank is to provide attenuation and the pipes are therefore oversized the velocity of water in the pipe may drop below 0.75m/s, which is considered to be self-cleansing, however for larger diameters the risk is reduced due to the overall pipe size.
- 7.4.4 Access for maintenance is provided through access chambers and manholes.
- 7.4.5 Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection should be provided as post construction CCTV survey.	N/A
Regular maintenance\ inspection	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
Remedial Action	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

7.5 Drainage Channels and Gullies

7.5.1 The indicative locations of the drainage channels and gullies are indicated on Curtins drainage drawing.

7.5.2 Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details. Channel units can be cleaned using a high-pressure hose; this can be fed into the channel system through access units strategically placed along the channel run. The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface water into the drainage channel and any debris within the throat should be removed.

- 7.5.3 Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers can move within their frame, this may cause damage to the frame or seating.
- 7.5.4 Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the car park channels.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection including channel outlet boxes.	Half yearly and after large storms.
Regular maintenance\ inspection	Litter and debris removal	Monthly or as required.
	Check and remove large vegetation growth near channel runs.	Monthly or as required
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	3-monthly, 48 hours after large storms.
Remedial Action	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required.

7.6 Permeable Pavements

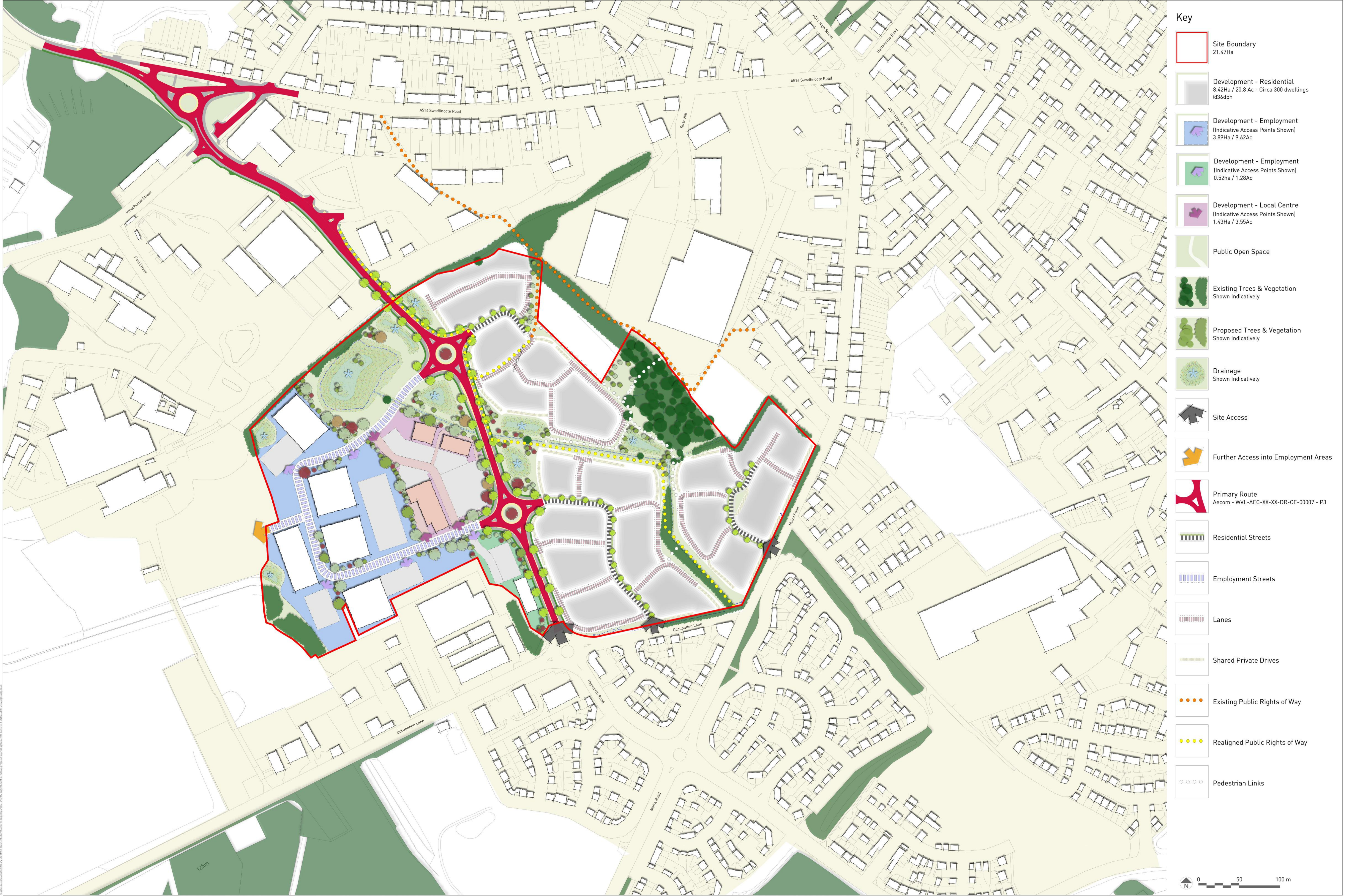
- 7.6.1 The indicative locations of the permeable paving areas are not currently indicated on Curtins drainage drawing, however there is the potential that this type of drainage structure could be used within specific areas of car parking situated around the proposed development site.
- 7.6.2 Should permeable paving be proposed as part of the wider surface water drainage strategy for the development the following should be considered as part of the maintenance strategy.
- 7.6.3 Permeable pavements contain proprietary products and as such where used the manufacturer's recommendations should be followed.
- 7.6.4 The permeable pavements are intended to be water quality and attenuation storage features. These features are intended to be dry except during rainfall events.
- 7.6.5 The surface has been designed to contain gaps where rain can flow through the upper construction layers in to the voided stone which makes up the subbase. Where these features are intended to be used as infiltration devices or soakaways any capping also needs to be permeable to permit the flows to the formation.
- 7.6.6 Access for maintenance is provided by inspection/access pipes, although access will be limited as this is a surface feature only.
- 7.6.7 Regular inspection and maintenance is important for the effective operation of the pervious pavement.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	3-monthly, 48 hours after large storms.
Regular maintenance\ inspection	Brushing and Vacuuming	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required and as per landscape architect's specification.
	Removal of weeds	As required.
Remedial Action	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required.

Maintenance Schedule	Required Action	Frequency
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.
	Rehabilitation of surface and upper sub-structure. This could include replacement of the jointing and bedding material. The upper geotextiles layer may also need replacing if clogged and Terram 1000 has a life span of 25 years.	As required (if infiltration performance is reduced as a result of significant clogging).

Appendix A

Illustrative Site Layout



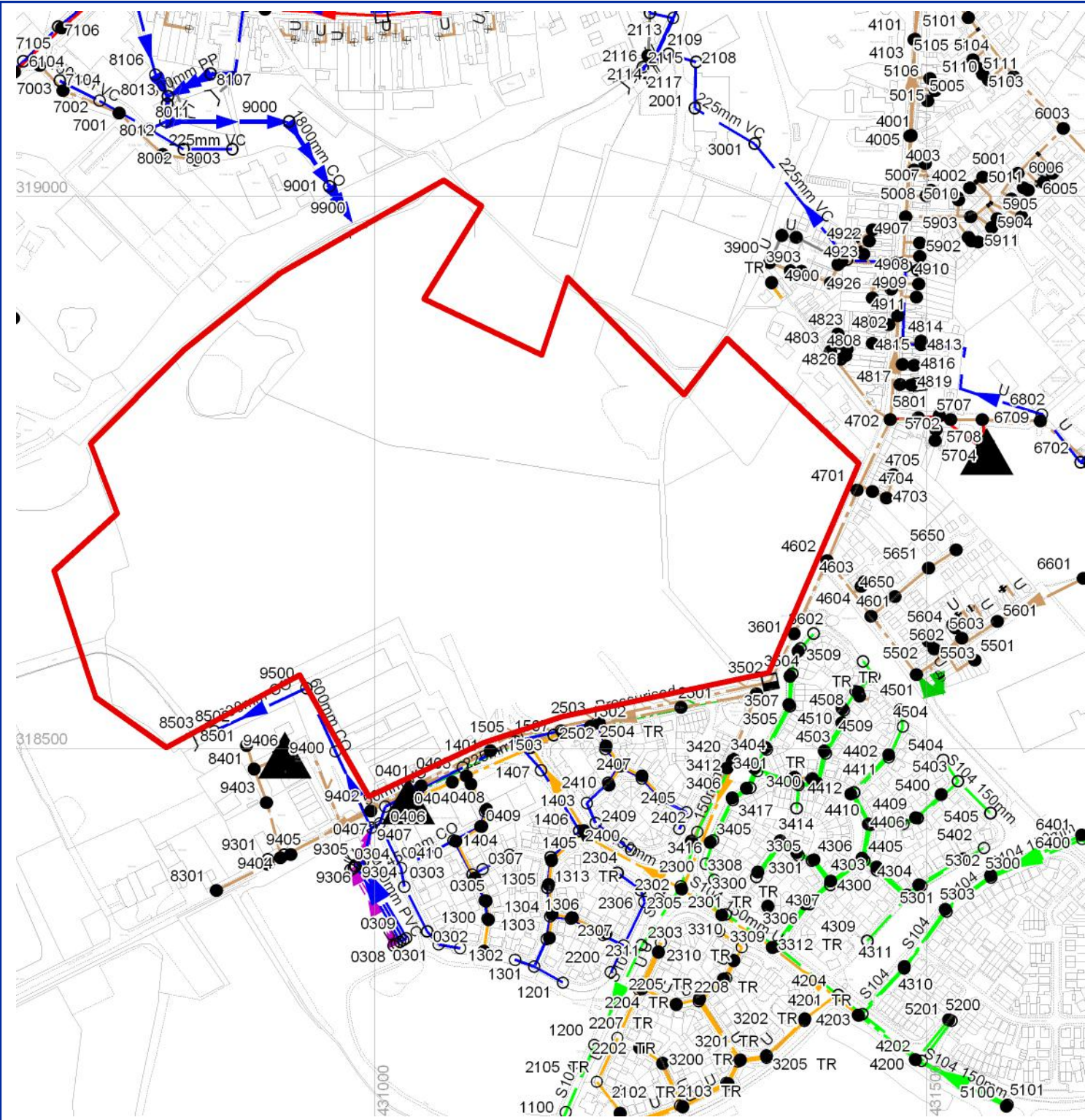
- Key**
- Site Boundary
21.47Ha
 - Development - Residential
8.42Ha / 20.8 Ac - Circa 300 dwellings
@36dph
 - Development - Employment
(Indicative Access Points Shown)
3.89Ha / 9.62Ac
 - Development - Employment
(Indicative Access Points Shown)
0.52ha / 1.28Ac
 - Development - Local Centre
(Indicative Access Points Shown)
1.43Ha / 3.55Ac
 - Public Open Space
 - Existing Trees & Vegetation
Shown Indicatively
 - Proposed Trees & Vegetation
Shown Indicatively
 - Drainage
Shown Indicatively
 - Site Access
 - Further Access into Employment Areas
 - Primary Route
Aecom - WVL-AEC-XX-XX-DR-CE-00007 - P3
 - Residential Streets
 - Employment Streets
 - Lanes
 - Shared Private Drives
 - Existing Public Rights of Way
 - Realigned Public Rights of Way
 - Pedestrian Links

Appendix B

STW Public Sewer Records

Topographical Survey

British Geological Survey Infiltration SuDS GeoReport



Sewer Node		Sewer Pipe Data								
REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SK30188301	nil	nil	118.76	F	VC	C	150	nil	0.00	nil
SK30188401	nil	nil	nil	F	nil	nil	nil	nil	0.00	nil
SK30188501	nil	nil	nil	F	nil	nil	nil	nil	0.00	nil
SK30188502	126.34	122.88	122.51	S	CO	C	600	nil	35.75	2006
SK30189300	132.53	nil	nil	S	U	U	nil	nil	0.00	2006
SK30189303	132.53	nil	nil	S	VC	C	150	nil	0.00	2006
SK30189304	132.53	nil	nil	S	U	U	nil	nil	0.00	2006
SK30189305	132.53	nil	nil	S	U	U	nil	nil	0.00	2006
SK30189306	132.53	nil	nil	S	XXX	C	600	nil	0.00	2006
SK30189307	nil	nil	nil	S	VC	C	150	nil	0.00	2006
SK30189400	131.68	128.62	128.03	S	CO	C	600	nil	108.34	2006
SK30189401	120.76	118.73	nil	F	VC	C	150	nil	0.00	nil
SK30189402	124.35	122.15	118.77	F	VC	C	150	nil	26.99	nil
SK30189403	nil	nil	nil	F	nil	nil	nil	nil	0.00	nil
SK30189404	120.75	119.08	117.85	S	VC	C	225	nil	12.62	nil
SK30189407	132.33	128.96	nil	S	CO	C	600	nil	0.00	2006
SK30189500	131.44	128.03	122.88	S	CO	C	600	nil	17.81	2006
SK30196102	124.80	123.30	nil	F	VC	C	225	nil	0.00	nil
SK30196104	nil	nil	nil	S	nil	nil	nil	nil	0.00	nil
SK30197001	126.07	124.05	123.59	F	VC	C	225	nil	119.09	nil
SK30197002	126.65	124.10	123.02	S	VC	C	150	nil	48.12	nil
SK30197003	125.03	123.59	123.30	F	VC	C	225	nil	107.38	nil
SK30197004	125.20	122.95	nil	S	VC	C	225	nil	0.00	nil
SK30197104	125.07	124.18	124.10	S	VC	C	150	nil	503.13	nil
SK30197105	123.79	121.80	121.76	C	VC	C	225	nil	1559.25	nil
SK30197106	nil	nil	nil	S	nil	nil	nil	nil	0.00	nil
SK30198001	126.99	124.49	124.24	F	VC	C	225	nil	125.60	nil
SK30198002	126.83	124.50	122.95	S	VC	C	225	nil	23.13	nil
SK30198003	127.02	125.69	124.50	S	VC	C	225	nil	36.97	nil
SK30198005	126.78	124.24	124.05	F	VC	C	225	nil	286.58	nil
SK30198011	124.06	122.11	122.05	S	CO	C	450	nil	117.74	2010
SK30198012	126.49	121.85	121.81	S	CO	C	1800	nil	3098.06	2010
SK30198013	126.35	122.05	121.85	S	CO	C	450	nil	79.35	2010
SK30198105	126.00	122.93	122.80	S	PP	C	300	nil	168.91	2010
SK30198106	nil	122.98	122.27	S	PP	C	300	nil	30.35	2010
SK30198107	124.60	122.80	122.26	S	PP	C	300	nil	81.67	2010
SK30199000	126.38	121.81	121.80	S	CO	C	1800	nil	6315.45	2010
SK30199001	125.63	121.80	121.69	S	PP	C	225	nil	363.73	2010
SK31180300	137.32	135.15	133.87	S	CO	C	450	nil	15.28	2006
SK31180301	135.97	133.87	132.92	S	CO	C	450	nil	16.96	2006
SK31180302	134.99	132.92	131.68	S	CO	C	450	nil	36.82	2006
SK31180303	133.74	131.68	131.26	S	CO	C	450	nil	39.73	2006
SK31180304	133.46	131.20	129.22	S	CO	C	525	nil	22.56	2006
SK31180305	nil	134.35	132.35	S	VC	C	225	nil	13.03	2006

Abandoned Gravity Sewer

Private Combined Gravity Sewer

Private Foul Gravity Sewer

Private Surface Water Gravity Sewer

Public Combined Gravity Sewer

Public Foul Gravity Sewer

Public Surface Water Gravity Sewer

Trunk Combined Gravity Sewer

Trunk Foul Use Gravity Sewer

Trunk Surface Water Gravity Sewer

Combined Use Pressurised Sewer

Foul Use Pressurised Sewer

Surface Water Pressurised Sewer

Highway Drain

Combined Lateral Drain (SS)

Foul Lateral Drain (SS)

Surface Water Lateral Drain (SS)

Culverted Watercourse

Cable, Earthing

Cable Junction

Cable, Optical Fibre/Instrumentation

Cable, Low Voltage

Cable, High Voltage

Cable, Other

Housing, Building

Housing, Kiosk

Disposal Site

Sewage Treatment Works

Housing, Other

Pipe Support Structure

Sewage Pumping Facility

Sewer Facility Connection Inlet / Outlet

Blind Shaft

Combined Use Manhole

Flushing Chamber

Foul Use Manhole

Grease Trap

Head Node

Hydrobrake

Lamphole

Outfall

Overflow

Penstock

Petrol Interceptor

Sewer Chemical Injection Point

Sewer Junction

Sewerage Air Valve

Sewerage Hatch Box Point

Sewerage Isolation Valve

Soakaway

Surface Water Manhole

Vent Column

Waste Water Storage

Pre-1937 Properties

MATERIALS

- NONE
AC - ASBESTOS CEMENT
BR - BRICK
CC - CONCRETE BOX CULVERT
CI - CAST IRON
CO - CONCRETE
CSB - CONCRETE SEGMENTS (BOLTED)
CSU - CONCRETE SEGMENTS (UNBOLTED)
DI - DUCTILE IRON
GRC - GLASS REINFORCED CONCRETE
GRP - GLASS REINFORCED PLASTIC
MAC - MASONRY IN REGULAR COURSES
MAR - MASONRY RANDOMLY COURSED
PE - POLYETHYLENE
PF - PITCH
PP - POLYPROPYLENE
PSC - PLASTIC STEEL COMPOSITE
PVC - POLYVINYL CHLORIDE
RPM - REINFORCED PLASTIC MATRIX
SI - SPUN (GREY) IRON
ST - STEEL
U - UNKNOWN
VC - VITRIFIED CLAY
XXX - OTHER

CATEGORIES

W - WEIR
C - CASCADE
DB - DAMBOARD
SE - SIDE ENTRY
FV - FLAP VALVE
BD - BACK DROP
SD - SIPHON
HD - HIGHWAY DRAIN
S104 - SECTION 104

SHAPE

C - COMBINED
E - EGG SHAPED
O - OTHER
R - RECTANGLE
S - SQUARE
T - TRAPEZOIDAL
U - UNKNOWN

PURPOSE

C - COMBINED
E - FINAL EFFLUENT
F - FOUL
L - SLUDGE
S - SURFACE WATER

TABULAR KEY

Sewer pipe data refers to downstream sewer pipe.

Where the node bifurcates (splits) X and Y indicates downstream sewer pipe.

Gradient is stated a 1 in...

All Private Sewers are shown in magenta
All section 104 sewers are shown in green
All Sewers that have been transferred to Severn Trent Water after the 1st October 2011, but have not been surveyed and confirmed by Severn Trent Water are shown in orange

SEVERN
TRENT
WATER

Severn Trent Water Limited

Asset Data Management

PO Box 5344

Coventry

CV3 9FT

Telephone: 0845 601 6616

SEWER RECORD (Tabular)

O/S Map scale:

1:5000

Date of issue:

15.03.18

Sheet No.

1 of 9

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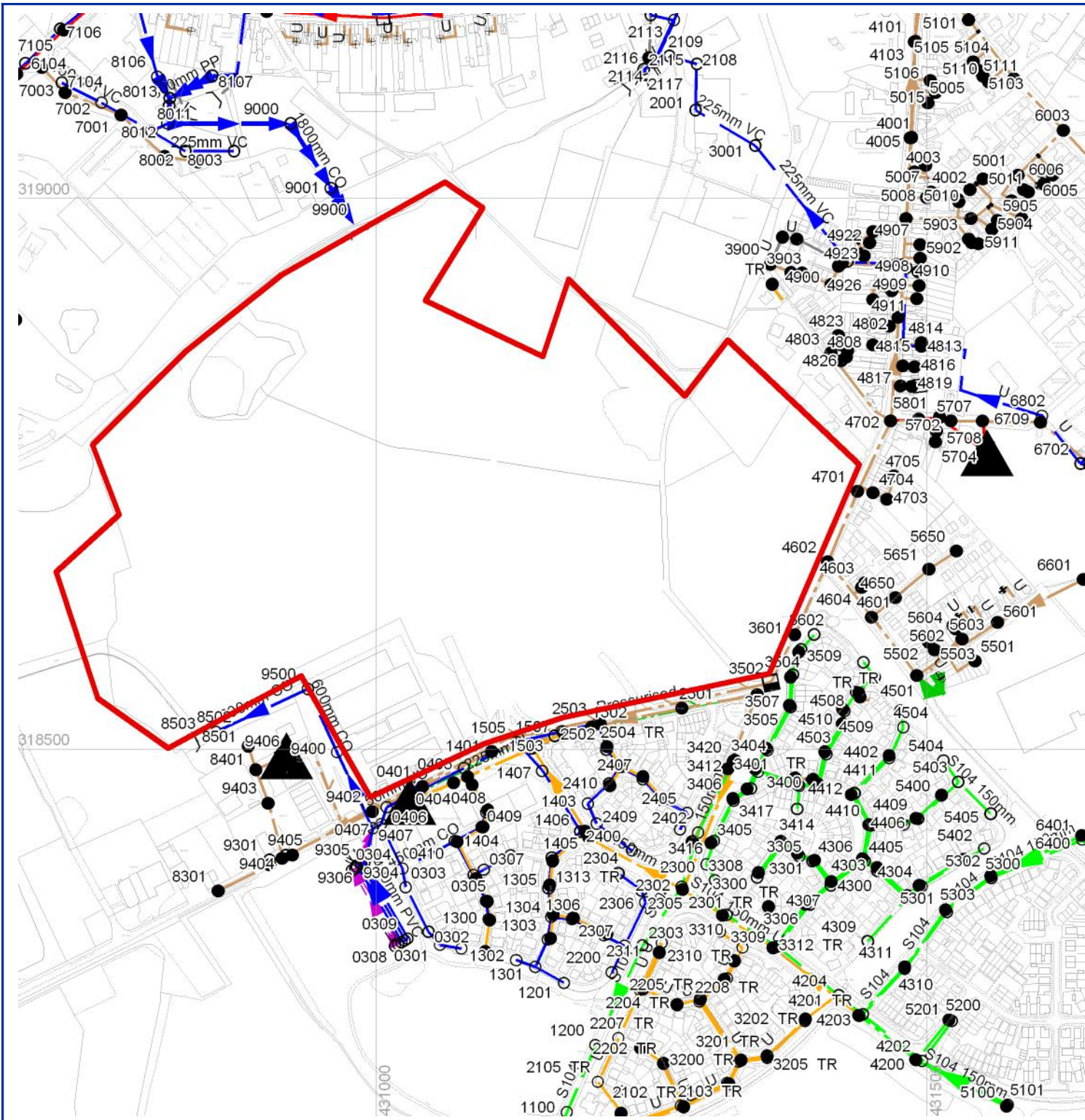
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y : 318667

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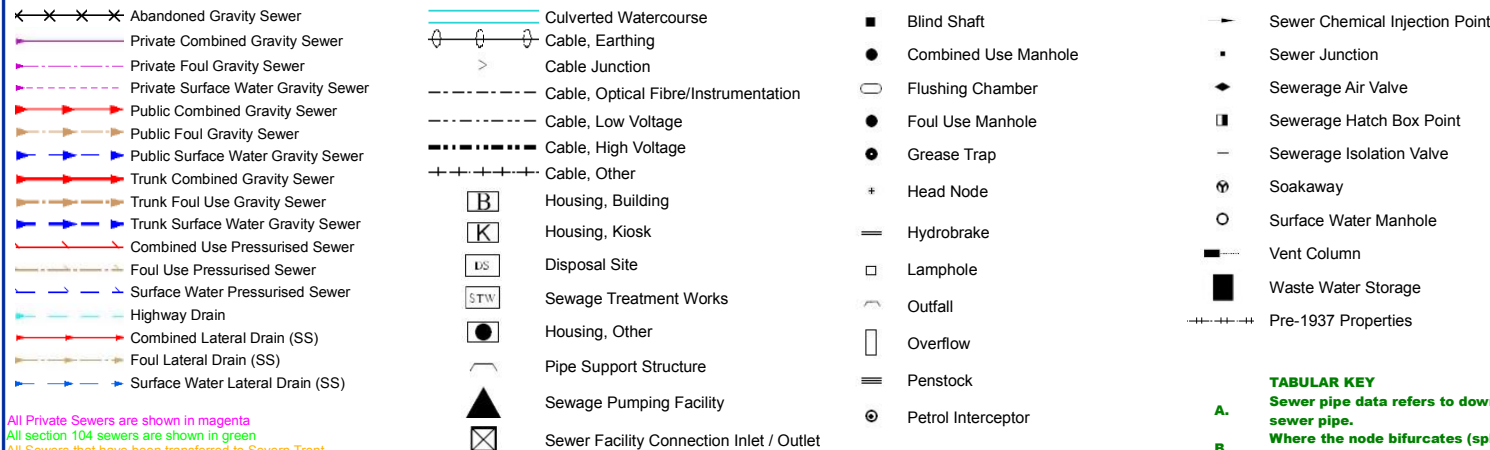
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Sewer Node

Sewer Pipe Data

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SK31180306	134.50	132.35	131.84	S	VC	C	225	nil	68.99	2006
SK31180307	134.62	132.55	132.35	S	VC	C	225	nil	54.61	2006
SK31180308	132.80	129.49	129.28	S	PVC	C	2400	nil	377.88	2006
SK31180309	132.93	129.53	129.22	S	PVC	C	2400	nil	256.53	2006
SK31180309	132.93	nil	nil	S	U	U	nil	nil	0.00	2006
SK31180310	132.93	129.53	129.22	S	PVC	C	2400	nil	256.18	2006
SK31180310	132.93	nil	nil	S	U	U	nil	nil	0.00	2006
SK31180311	132.93	129.53	129.22	S	PVC	C	2400	nil	255.25	2006
SK31180312	nil	129.50	129.09	F	U	C	150	nil	70.45	nill
SK31180313	nil	126.02	125.15	F	U	C	150	nil	43.24	nill
SK31180314	132.80	129.49	129.28	S	PVC	C	2400	nil	377.88	2006
SK31180314	132.80	nil	nil	S	U	U	nil	nil	0.00	2006
SK31180401	125.73	123.02	122.17	F	VC	C	150	nil	60.51	nill
SK31180402	nil	nil	nil	F	U	U	nil	nil	0.00	nill
SK31180405	133.78	130.63	129.51	S	CO	C	450	nil	70.30	2006
SK31180406	132.41	129.45	129.27	S	CO	C	525	nil	92.85	2006
SK31180407	132.39	129.20	128.96	S	CO	C	600	nil	33.48	2006
SK31180408	134.22	132.12	131.95	S	CO	C	300	nil	82.31	2006
SK31180409	134.02	131.95	131.74	S	CO	C	300	nil	127.51	2006
SK31180410	137.32	131.68	131.25	S	CO	C	450	nil	126.41	2006
SK31180411	nil	125.15	124.95	F	U	C	150	nil	131.19	nill
SK31180412	nil	124.95	124.84	F	U	C	150	nil	153.40	nill
SK31180413	nil	nil	nil	F	U	C	225	nil	0.00	nill
SK31180414	nil	124.45	124.38	F	U	C	150	nil	134.59	nill
SK31181100	nil	nil	nil	S	nil	nil	nil	nil	0.00	nill
SK31181200	nil	nil	nil	S	nil	nil	nil	nil	0.00	nill
SK31181201	140.79	138.61	138.40	S	VC	C	225	nil	142.34	2006
SK31181300	nil	135.64	134.35	S	VC	C	225	nil	13.04	2006
SK31181301	141.28	138.40	138.20	S	VC	C	225	nil	134.98	2006
SK31181302	140.26	139.18	138.40	S	VC	C	225	nil	24.15	2006
SK31181303	140.51	138.20	136.96	S	VC	C	225	nil	16.64	2006
SK31181304	139.26	136.89	135.42	S	CO	C	300	nil	18.08	2006
SK31181305	137.72	135.42	135.27	S	CO	C	300	nil	181.98	2006
SK31181306	139.97	136.96	136.89	S	CO	C	300	nil	271.30	2006
SK31181307	nil	129.09	127.80	F	U	C	150	nil	12.67	nill
SK31181308	nil	127.80	126.02	F	U	C	150	nil	13.01	nill
SK31181309	nil	131.71	130.32	F	U	C	100	nil	15.14	nill
SK31181310	nil	130.32	129.17	F	U	C	150	nil	23.73	nill
SK31181312	nil	130.44	130.32	F	U	C	150	nil	151.98	nill
SK31181313	nil	129.17	129.03	F	U	C	150	nil	151.43	nill
SK31181314	nil	129.03	128.76	F	U	C	150	nil	151.03	nill
SK31181401	126.05	124.09	123.03	F	VC	C	150	nil	66.66	nill
SK31181402	nil	nil	nil	F	nil	nil	150	nil	0.00	nill
SK31181403	136.14	134.55	134.01	S	VC	C	225	nil	49.14	2006



MATERIALS

- NONE
- AC - ASBESTOS CEMENT
- BR - BRICK
- CC - CONCRETE BOX CULVERT
- CI - CAST IRON
- CO - CONCRETE
- CSB - CONCRETE SEGMENTS (BOLTED)
- CSU - CONCRETE SEGMENTS (UNBOLTED)
- DI - DUCTILE IRON
- GRC - GLASS REINFORCED CONCRETE
- GRP - GLASS REINFORCED PLASTIC
- MAC - MASONRY IN REGULAR COURSES
- MAR - MASONRY RANDOMLY COURSED
- PE - POLYETHYLENE
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- PVC - POLYVINYL CHLORIDE
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- XXX - OTHER

SHAPE

- C - CIRCULAR
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PURPOSE

- C - COMBINED
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- S - SIPHON
- HD - HIGHWAY DRAIN
- S104 - SECTION 104

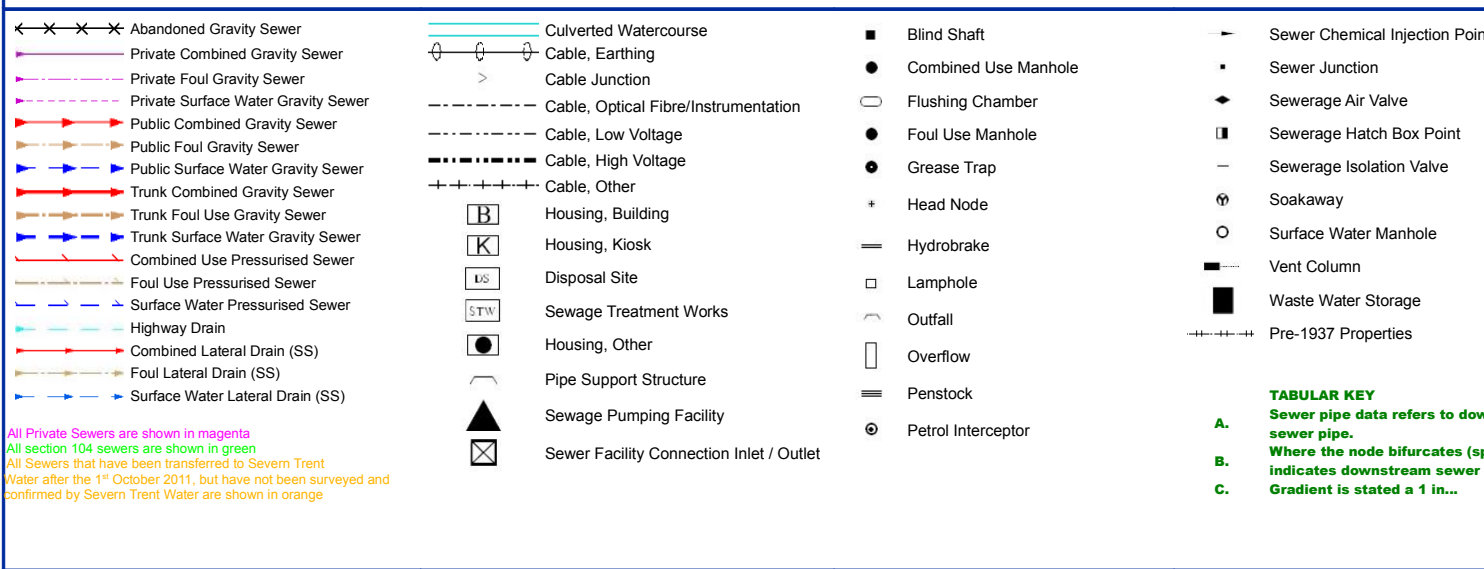


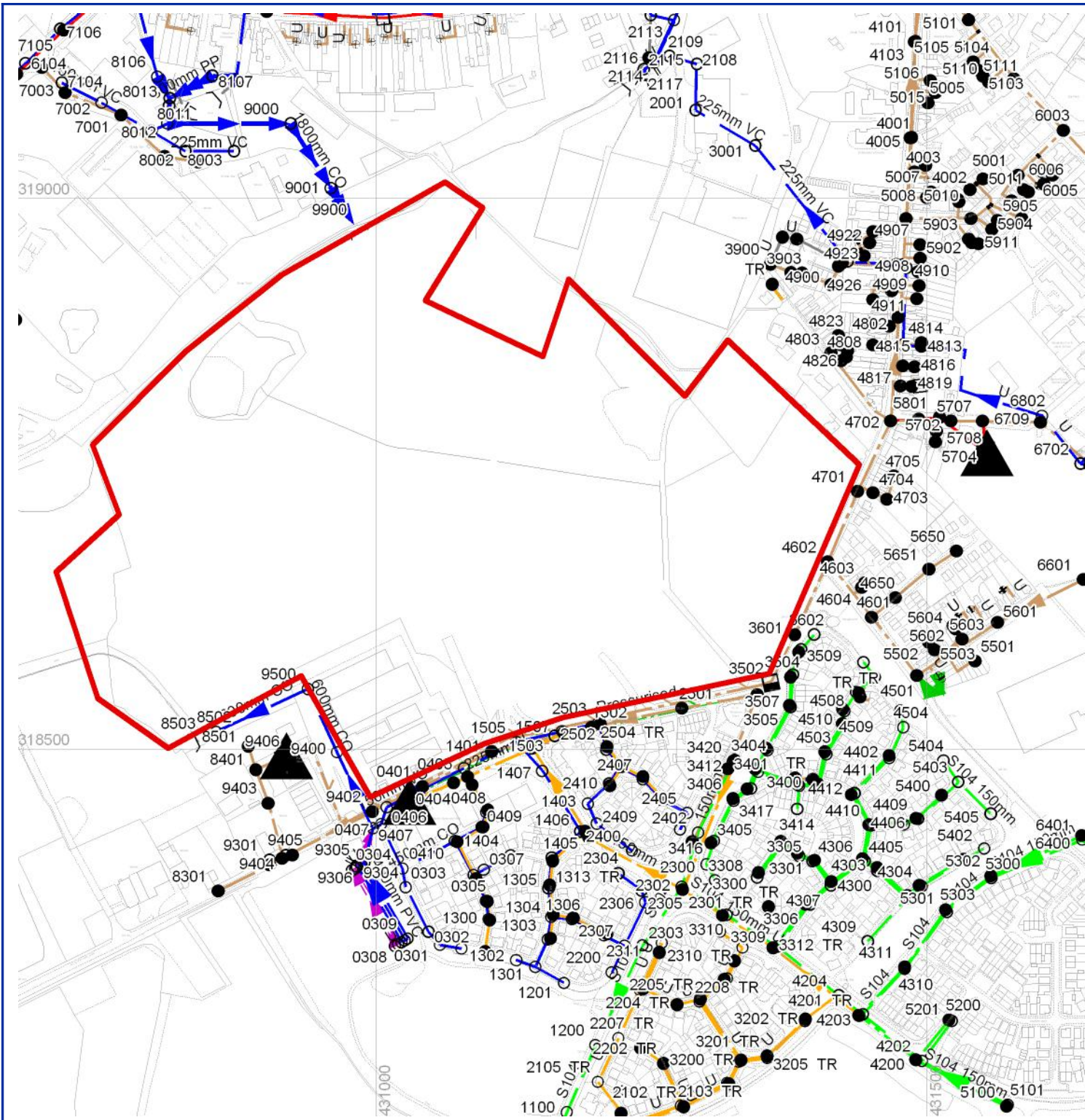
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Coventry
CV3 9FT
Telephone: 0845 601 6616

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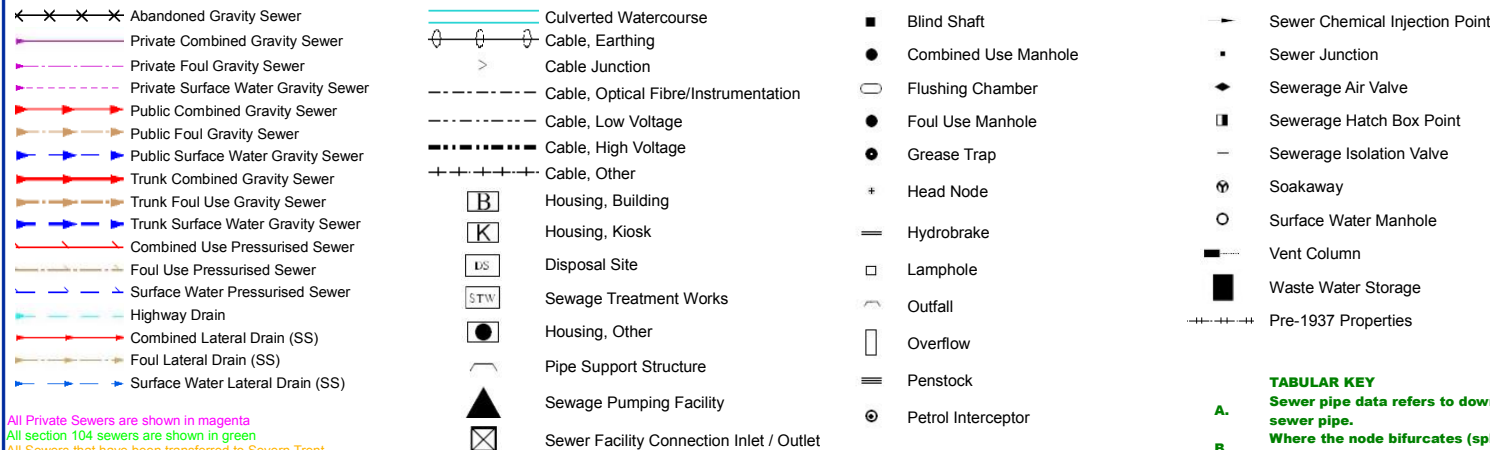
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Sewer Node

Sewer Pipe Data

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SK31182409	137.44	135.89	134.55	S	VC	C	225	nil	14.89	2006
SK31182410	135.55	133.95	133.57	S	CO	C	300	nil	47.47	2006
SK31182411	nil	129.90	128.06	F	U	C	100	nil	14.99	nil
SK31182412	nil	128.01	126.44	F	U	C	150	nil	13.72	nil
SK31182413	nil	126.44	125.34	F	U	C	150	nil	20.34	nil
SK31182414	nil	126.83	126.49	F	U	C	100	nil	59.76	nil
SK31182501	128.19	nil	124.61	F	VC	C	150	nil	0.00	nil
SK31182502	134.63	132.78	132.68	S	CO	C	300	nil	247.68	2006
SK31182503	134.07	132.63	131.84	S	CO	C	450	nil	42.80	2006
SK31182504	nil	125.34	125.11	F	U	C	150	nil	93.18	nil
SK31182505	nil	125.11	124.89	F	U	C	150	nil	154.49	nil
SK31183100	nil	nil	nil	F	U	U	nil	nil	0.00	nil
SK31183101	nil	nil	nil	S	U	U	nil	nil	0.00	nil
SK31183200	nil	nil	nil	F	U	U	nil	nil	0.00	nil
SK31183201	nil	nil	nil	F	U	U	nil	nil	0.00	nil
SK31183203	nil	nil	nil	F	U	U	nil	nil	0.00	nil
SK31183204	nil	nil	nil	S	U	U	nil	nil	0.00	nil
SK31183205	nil	nil	nil	S	U	U	nil	nil	0.00	nil
SK31183206	nil	nil	nil	S	U	U	nil	nil	0.00	nil
SK31183207	nil	nil	nil	S	U	U	nil	nil	0.00	nil
SK31183300	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183301	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183302	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183303	nil	nil	nil	F	U	U	nil	nil	0.00	nil
SK31183304	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31183305	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31183306	nil	nil	nil	S	nil	nil	450	nil	0.00	nil
SK31183307	nil	nil	nil	S	U	U	nil	nil	0.00	nil
SK31183308	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31183309	nil	nil	nil	S	nil	nil	nil	nil	0.00	nil
SK31183310	nil	nil	nil	S	nil	nil	nil	nil	0.00	nil
SK31183311	nil	nil	nil	F	U	nil	150	nil	0.00	nil
SK31183312	nil	nil	nil	F	U	nil	150	nil	0.00	nil
SK31183313	nil	nil	nil	S	U	U	nil	nil	0.00	nil
SK31183400	nil	nil	nil	F	U	U	100	nil	0.00	nil
SK31183401	132.16	nil	128.23	F	nil	nil	nil	nil	0.00	nil
SK31183402	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183403	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183405	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183406	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183407	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183408	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183409	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183410	nil	nil	nil	S	nil	nil	225	nil	0.00	nil



MATERIALS

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SHAPE

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PURPOSE

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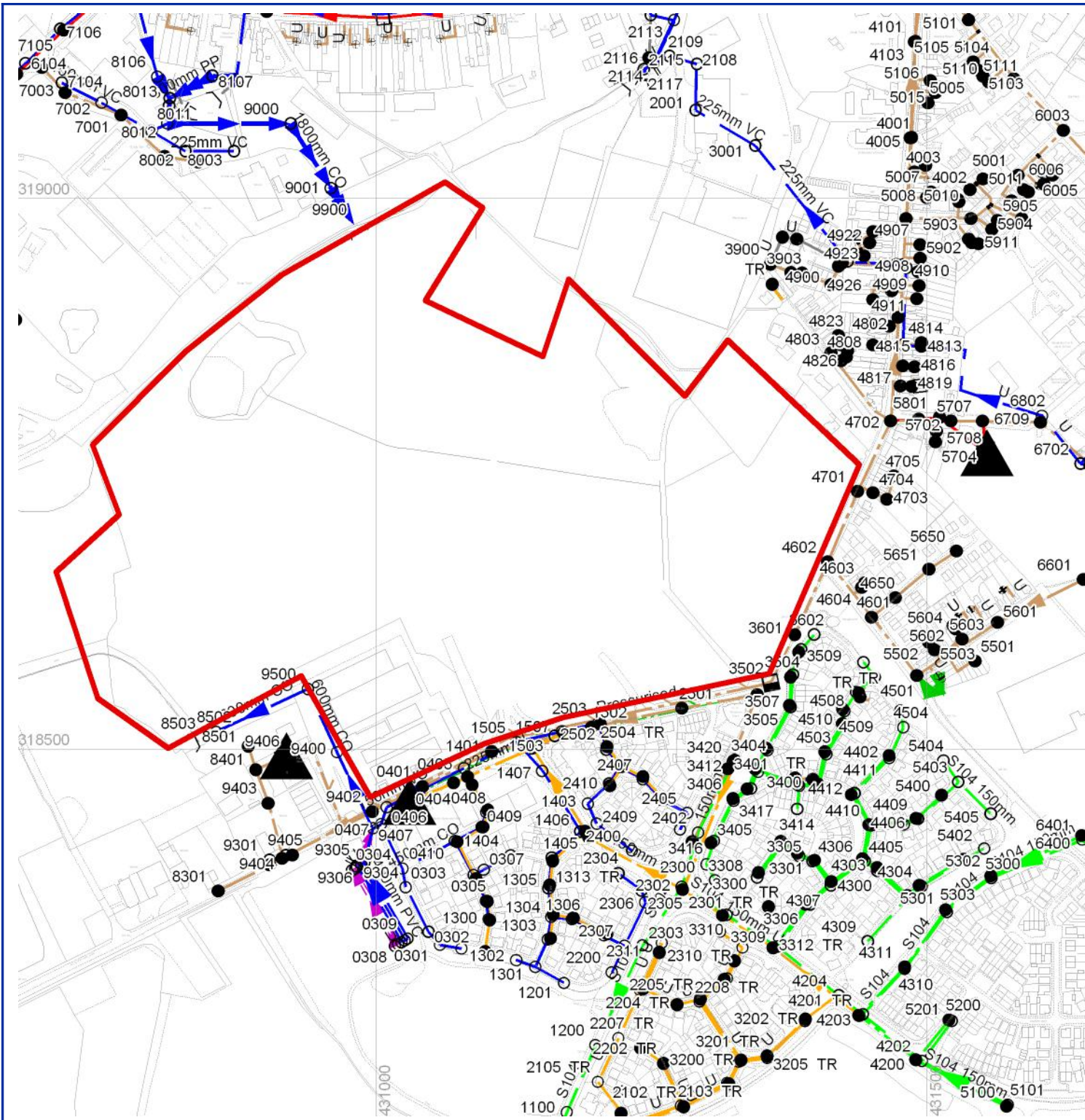


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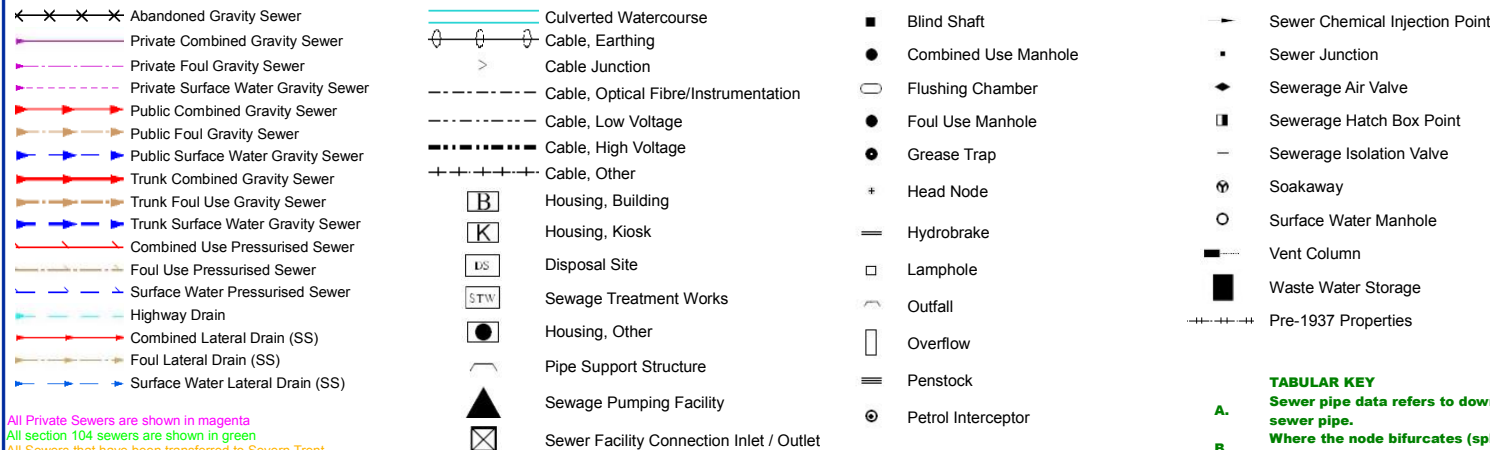
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Sewer Node

Sewer Pipe Data

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SK31183411	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31183413	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31183414	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31183415	nil	nil	nil	S	nil	nil	300	nil	0.00	nil
SK31183416	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31183417	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31183418	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31183419	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31183420	nil	nil	nil	S	nil	nil	nil	nil	0.00	nil
SK31183421	nil	nil	nil	F	nil	C	150	nil	0.00	nil
SK31183501	130.05	128.03	nil	F	VC	C	150	nil	0.00	1979
SK31183503	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183504	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183505	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183506	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31183507	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31183508	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31183509	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31183601	nil	nil	nil	F	nil	nil	nil	nil	0.00	nil
SK31183602	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31183900	138.30	137.42	136.84	F	U	C	150	nil	34.41	2014
SK31183902	137.90	136.84	136.54	F	U	C	150	nil	34.72	2014
SK31183903	137.80	136.54	135.73	F	U	C	150	nil	34.70	2014
SK31184200	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184201	nil	nil	nil	F	U	nil	150	nil	0.00	nil
SK31184202	nil	nil	nil	S	nil	nil	nil	nil	0.00	nil
SK31184203	nil	nil	nil	S	nil	nil	nil	nil	0.00	nil
SK31184204	nil	nil	nil	S	nil	nil	nil	nil	0.00	nil
SK31184300	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184301	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184302	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184303	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184304	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31184305	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31184306	nil	nil	nil	S	nil	nil	375	nil	0.00	nil
SK31184307	nil	nil	nil	S	nil	nil	450	nil	0.00	nil
SK31184308	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31184309	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31184310	nil	nil	nil	S	nil	nil	nil	nil	0.00	nil
SK31184311	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184400	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184401	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184402	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184403	nil	nil	nil	F	nil	nil	150	nil	0.00	nil



MATERIALS

- NONE
- AC - ASBESTOS CEMENT
- BR - BRICK
- CC - CONCRETE BOX CULVERT
- CI - CAST IRON
- CO - CONCRETE
- CSB - CONCRETE SEGMENTS (BOLTED)
- CSU - CONCRETE SEGMENTS (UNBOLTED)
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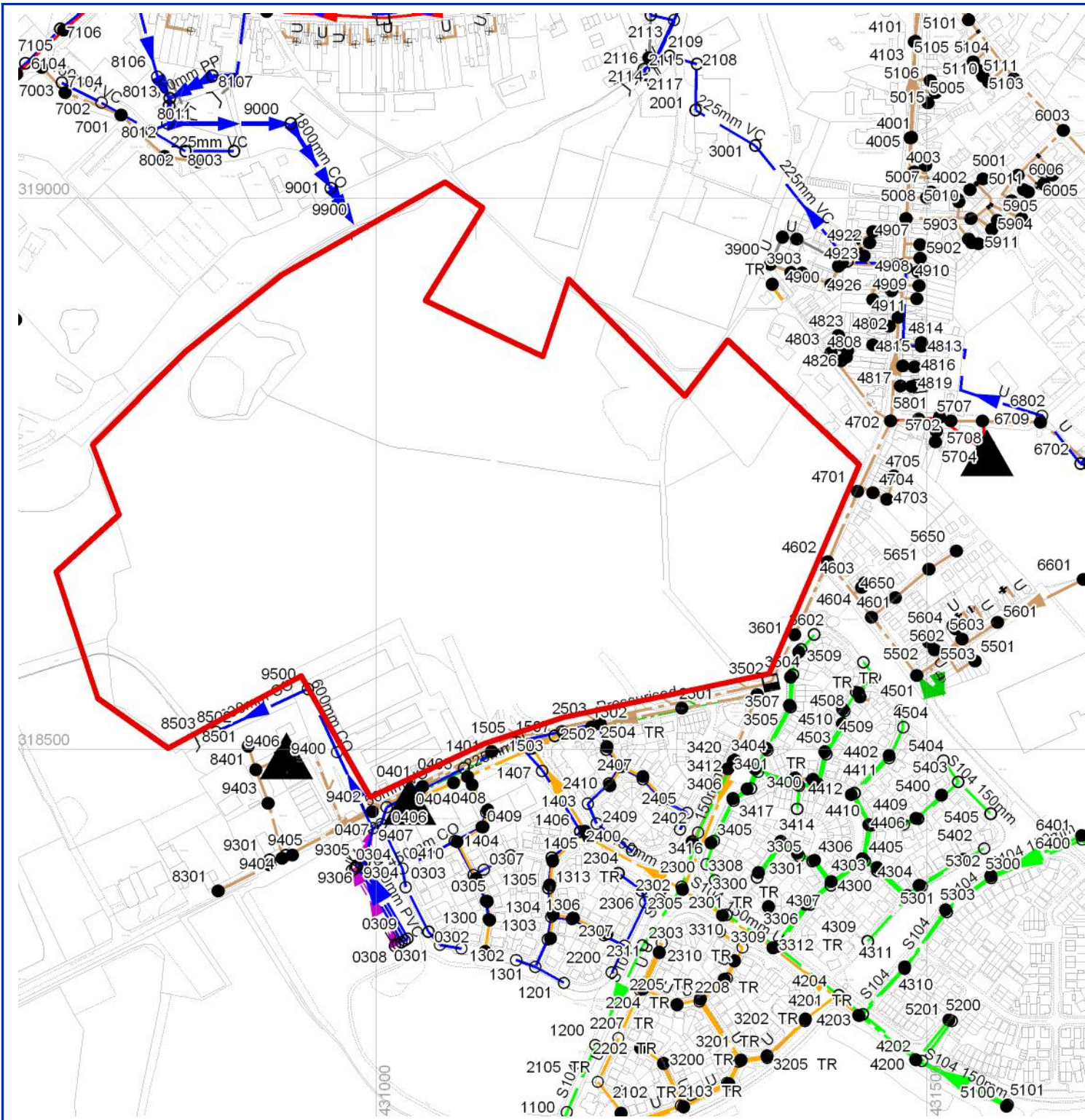


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Coventry
CV3 9FT
Telephone: 0845 601 6616

SEWER RECORD (Tabular)

O/S Map scale:	1:5000	This map is centred upon:	
Date of issue:	15.03.18	O / S Grid reference:	
Sheet No.	5 of 9	x :	431159
		y :	318667

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3. On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012 (date to be confirmed). Private pumping stations, which form part of these sewers or lateral drains, will transfer to the ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on this Map.
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Sewer Node

Sewer Pipe Data

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SK31184404	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184405	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184406	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184407	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184408	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31184409	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31184410	nil	nil	nil	S	nil	nil	375	nil	0.00	nil
SK31184411	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31184412	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31184413	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31184414	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31184501	139.83	137.94	46.86	F	VC	C	225	nil	0.74	nil
SK31184502	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184503	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31184504	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31184505	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31184506	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31184507	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31184508	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31184509	nil	nil	nil	S	nil	nil	150	nil	0.00	nil
SK31184510	nil	nil	nil	S	nil	nil	225	nil	0.00	nil
SK31184601	50.03	46.85	nil	F	VC	C	225	nil	0.00	nil
SK31184602	136.86	nil	135.90	F	nil	nil	nil	nil	0.00	nil
SK31184603	139.43	138.86	138.82	F	VC	C	225	nil	125.00	nil
SK31184604	139.42	138.81	nil	F	VC	C	225	nil	0.00	nil
SK31184650	50.51	47.93	46.95	F	nil	C	nil	nil	28.37	nil
SK31184701	138.74	135.89	nil	F	VC	C	375	nil	0.00	nil
SK31184702	139.99	135.14	134.87	C	PF	C	450	nil	96.38	2007
SK31184702	139.99	nil	135.24	F	nil	nil	nil	nil	0.00	nil
SK31184703	139.56	138.66	138.43	F	VC	C	225	nil	62.26	nil
SK31184704	139.24	138.40	nil	F	VC	C	150	nil	0.00	nil
SK31184705	139.53	139.07	138.68	F	VC	C	100	nil	56.00	nil
SK31184707	140.21	134.87	134.74	C	PF	C	450	nil	140.90	2007
SK31184801	139.58	138.55	136.85	S	VC	C	150	nil	41.21	nil
SK31184802	138.83	135.23	135.00	F	CO	C	450	nil	209.87	nil
SK31184803	141.73	140.75	nil	F	VC	C	150	nil	0.00	nil
SK31184804	141.73	140.59	nil	F	nil	nil	nil	nil	0.00	nil
SK31184807	139.72	139.10	nil	F	VC	C	150	nil	0.00	nil
SK31184808	140.01	139.53	139.11	F	VC	C	150	nil	33.43	nil
SK31184809	139.12	138.08	nil	F	VC	C	150	nil	0.00	nil
SK31184810	139.58	138.87	138.11	F	VC	C	150	nil	23.83	nil
SK31184813	139.26	138.39	137.99	F	VC	C	100	nil	40.08	nil
SK31184814	139.17	138.46	138.42	F	VC	C	100	nil	50.00	nil
SK31184815	139.49	138.65	137.99	F	VC	C	100	nil	24.42	nil

Abandoned Gravity Sewer

Private Combined Gravity Sewer

Private Foul Gravity Sewer

Private Surface Water Gravity Sewer

Public Combined Gravity Sewer

Public Foul Gravity Sewer

Public Surface Water Gravity Sewer

Trunk Combined Gravity Sewer

Trunk Foul Use Gravity Sewer

Trunk Surface Water Gravity Sewer

Combined Use Pressurised Sewer

Foul Use Pressurised Sewer

Surface Water Pressurised Sewer

Highway Drain

Combined Lateral Drain (SS)

Foul Lateral Drain (SS)

Surface Water Lateral Drain (SS)

Culverted Watercourse

Cable, Earthing

Cable Junction

Cable, Optical Fibre/Instrumentation

Cable, Low Voltage

Cable, High Voltage

Cable, Other

Housing, Building

Housing, Kiosk

Disposal Site

Sewage Treatment Works

Housing, Other

Pipe Support Structure

Sewage Pumping Facility

Sewer Facility Connection Inlet / Outlet

Blind Shaft

Combined Use Manhole

Flushing Chamber

Foul Use Manhole

Grease Trap

Head Node

Hydrobrake

Lamphole

Outfall

Overflow

Penstock

Petrol Interceptor

Sewer Chemical Injection Point

Sewer Junction

Sewerage Air Valve

Sewerage Hatch Box Point

Sewerage Isolation Valve

Soakaway

Surface Water Manhole

Vent Column

Waste Water Storage

Pre-1937 Properties

TABULAR KEY

Sewer pipe data refers to downstream sewer pipe.

Where the node bifurcates (splits) X and Y indicates downstream sewer pipe.

Gradient is stated a 1 in...

MATERIALS

- NONE

AC - ASBESTOS CEMENT

BR - BRICK

CC - CONCRETE BOX CULVERT

CI - CAST IRON

CO - CONCRETE

CSB - CONCRETE SEGMENTS (BOLTED)

CSU - CONCRETE SEGMENTS (UNBOLTED)

DI - DUCTILE IRON

GRC - GLASS REINFORCED CONCRETE

GRP - GLASS REINFORCED PLASTIC

MAC - MASONRY IN REGULAR COURSES

MAR - MASONRY RANDOMLY COURSED

PE - POLYETHYLENE

PF - PITCH

PP - POLYPROPYLENE

PSC - PLASTIC STEEL COMPOSITE

PVC - POLYVINYL CHLORIDE

RPM - REINFORCED PLASTIC MATRIX

SI - SPUN (GREY) IRON

ST - STEEL

U - UNKNOWN

VC - VITRIFIED CLAY

XXX - OTHER

CATEGORIES

W - WEIR

C - CASCADE

DB - DAMBOARD

SE - SIDE ENTRY

FV - FLAP VALVE

BD - BACK DROP

SD - SIPHON

HD - HIGHWAY DRAIN

S104 - SECTION 104

PURPOSE

C - COMBINED

E - FINAL EFFLUENT

F - FOUL

L - SLUDGE

S - SQUARE

T - SURFACE WATER

MATERIALS

- NONE
- AC - ASBESTOS CEMENT
- BR - BRICK
- CC - CONCRETE BOX CULVERT
- CI - CAST IRON
- CO - CONCRETE
- CSB - CONCRETE SEGMENTS (BOLTED)
- CSU - CONCRETE SEGMENTS (UNBOLTED)
- DI - DUCTILE IRON
- GRC - GLASS REINFORCED CONCRETE
- GRP - GLASS REINFORCED PLASTIC
- MAC - MASONRY IN REGULAR COURSES
- MAR - MASONRY RANDOMLY COURSED
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- PF - PITCH
- PP - POLYPROPYLENE
- PSC - PLASTIC STEEL COMPOSITE
- PVC - POLYVINYL CHLORIDE
- RPM - REINFORCED PLASTIC MATRIX
- SI - SPUN (GREY) IRON
- ST - STEEL
- U - UNKNOWN
- VC - VITRIFIED CLAY
- XXX - OTHER

SHAPE

- C - CIRCULAR
- E - EGG SHAPED
- O - OTHER
- R - RECTANGLE
- S - SQUARE
- T - TRAPEZOIDAL
- U - UNKNOWN

PURPOSE

- C - COMBINED
- E - FINAL EFFLUENT
- F - FOUL
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- C - CASCADE
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- HD - HIGHWAY DRAIN
- S104 - SECTION 104

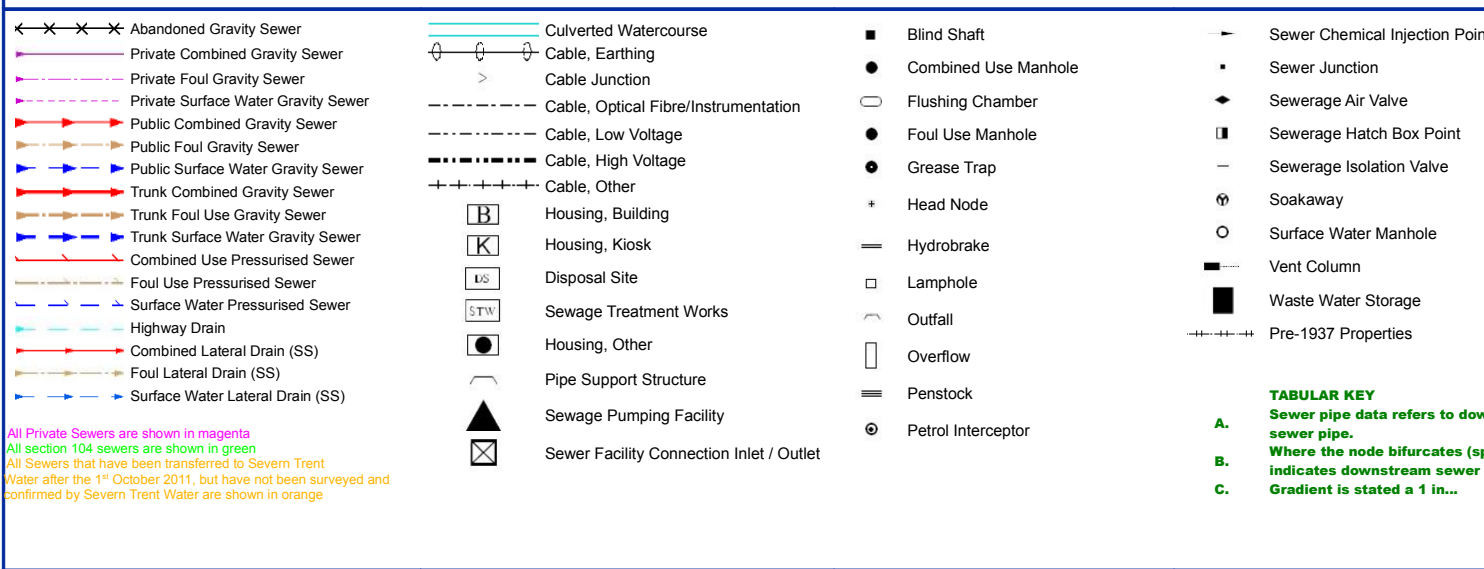


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LS

OS CEMENT

TE BOX CULVERT

TE

TE SEGMENTS (BOLTED)

TE SEGMENTS (UNBOLTED)

IRON

EINFORCED CONCRETE

EINFORCED PLASTIC

EY IN REGULAR COURSES

EY RANDOMLY COURSED

ELENE

OPYLENE

STEEL COMPOSITE

YL CHLORIDE

ANCED PLASTIC MATRIX

REY) IRON

IN

D CLAY

W

N

E

S

- WEIR

- CASCADE

- DAMBOARD

- SIDE ENTRY

- FLAP VALVE

- BACK DROP

- SIPHON

- HIGHWAY DRAIN

- SECTION 104

PURPOSE

C - COMBINED

E - FINAL EFFLUENT

F - FOUL

L - SLUDGE

S - SURFACE WATER

CATEGORIES

SEVERN

TRENT

WATER

Severn Trent Water Limited

Asset Data Management

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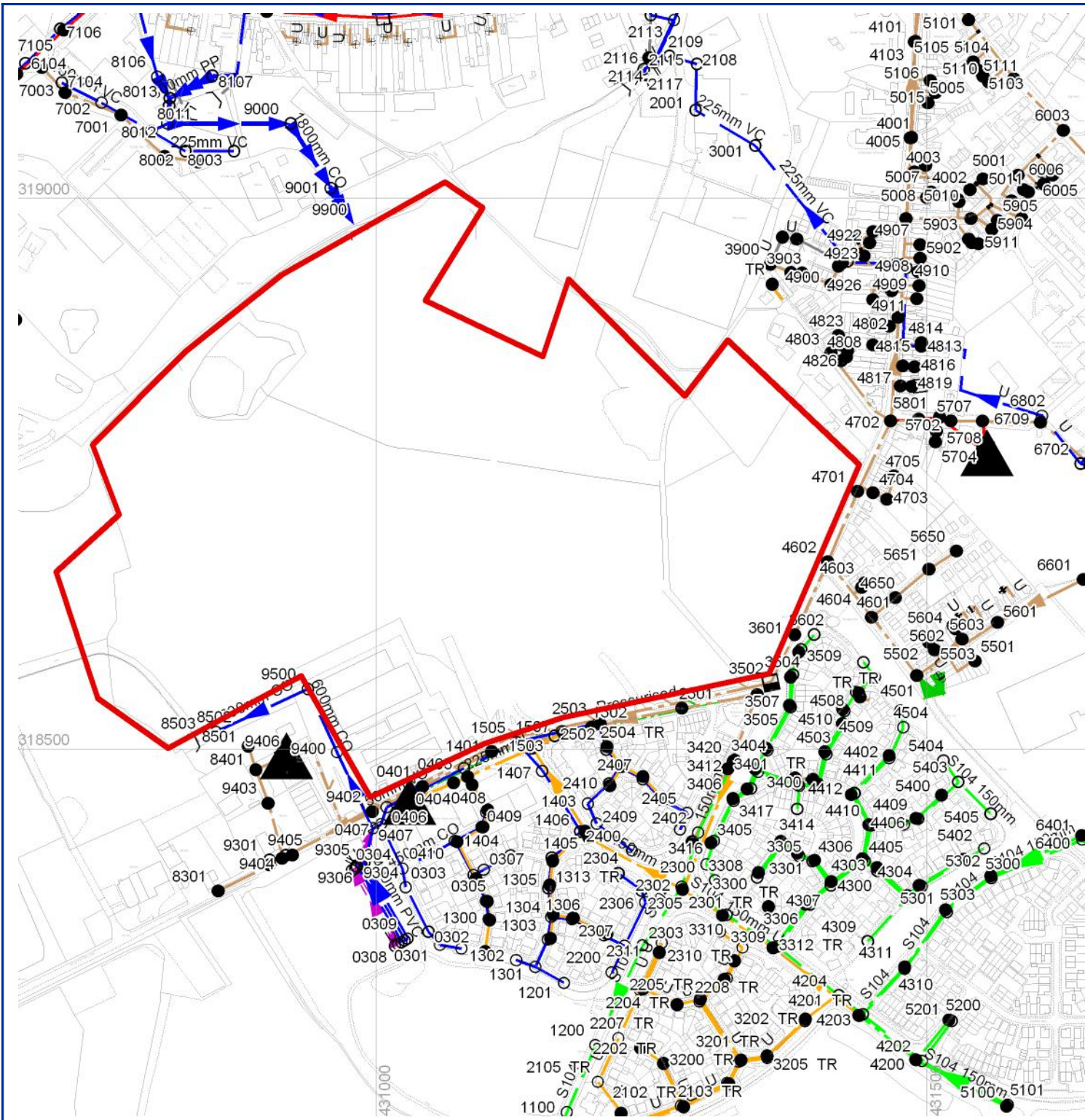
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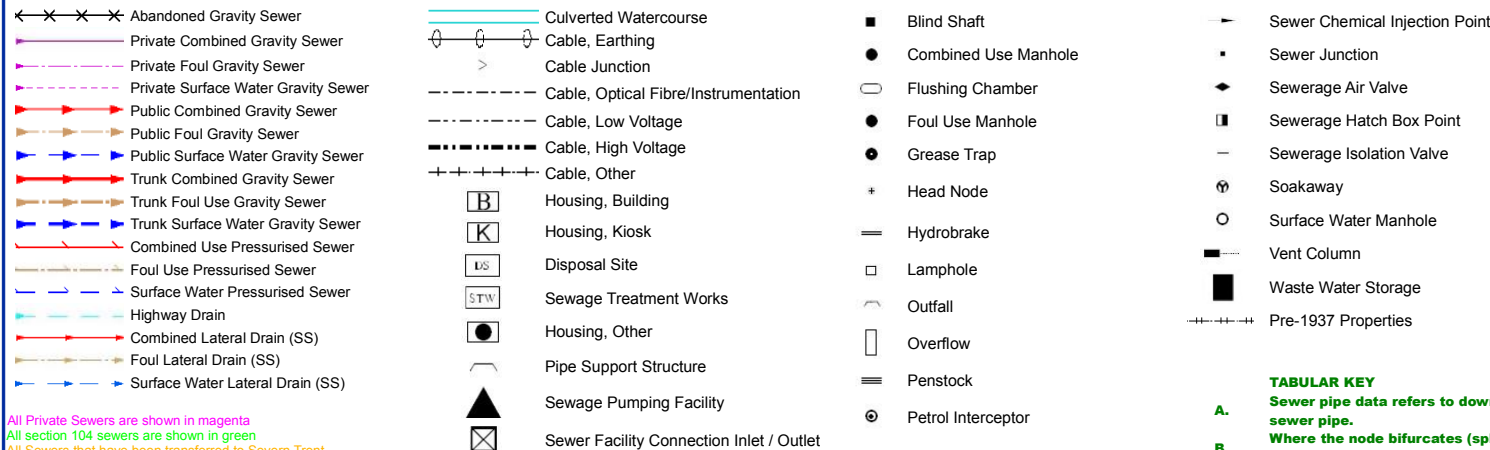
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Sewer Node

Sewer Pipe Data

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SK31185603	142.85	142.15	nil	F	VC	C	150	nil	0.00	nil
SK31185604	142.94	142.57	142.49	F	VC	C	100	nil	45.13	nil
SK31185650	54.81	52.37	50.42	F	nil	C	150	nil	15.23	nil
SK31185651	52.97	50.44	47.94	F	nil	C	150	nil	16.00	nil
SK31185702	140.77	137.37	nil	F	VC	C	225	nil	0.00	nil
SK31185703	140.81	140.05	nil	F	VC	C	150	nil	0.00	nil
SK31185704	140.88	nil	140.05	F	nil	nil	nil	nil	0.00	nil
SK31185707	140.80	138.07	137.42	F	VC	C	225	nil	44.01	nil
SK31185801	140.52	134.74	134.40	C	PF	C	450	nil	153.15	2007
SK31185901	142.29	140.13	136.75	F	VC	C	150	nil	17.46	nil
SK31185902	141.85	141.27	141.02	F	VC	C	100	nil	16.96	nil
SK31185903	141.77	140.99	nil	F	VC	C	150	nil	0.00	nil
SK31185904	143.26	142.17	nil	F	VC	C	150	nil	0.00	nil
SK31185905	142.99	142.29	nil	F	VC	C	100	nil	0.00	nil
SK31185906	143.21	142.49	nil	F	VC	C	100	nil	0.00	nil
SK31185907	142.47	141.69	nil	F	VC	C	150	nil	0.00	nil
SK31185908	142.53	142.00	141.69	F	VC	C	100	nil	16.13	nil
SK31185909	142.20	141.32	nil	F	VC	C	150	nil	0.00	nil
SK31185910	142.11	nil	nil	F	nil	nil	nil	nil	0.00	nil
SK31185911	142.82	142.48	141.32	F	VC	C	100	nil	5.24	nil
SK31186400	nil	nil	nil	F	nil	nil	150	nil	0.00	nil
SK31186401	nil	nil	nil	S	nil	nil	nil	nil	0.00	nil
SK31186601	147.80	141.63	141.15	F	VC	C	225	nil	181.69	nil
SK31186702	144.30	nil	nil	S	U	U	nil	nil	0.00	nil
SK31186709	142.09	139.26	138.07	F	VC	C	225	nil	44.04	nil
SK31186802	nil	nil	nil	S	U	U	nil	nil	0.00	nil
SK31192001	133.90	131.53	131.23	S	VC	C	225	nil	140.03	nil
SK31192105	nil	nil	131.68	S	VC	C	225	nil	0.00	nil
SK31192108	133.33	131.20	nil	S	VC	C	225	nil	0.00	nil
SK31192109	nil	nil	nil	S	U	U	nil	nil	0.00	nil
SK31192113	133.80	131.00	130.91	S	CO	C	1200	nil	488.51	2003
SK31192113	133.80	131.00	130.91	S	CO	C	1200	nil	488.51	2003
SK31192114	132.86	131.82	131.78	S	VC	C	150	nil	400.00	2003
SK31192114	132.86	130.91	130.85	S	CO	C	450	nil	183.33	2003
SK31192115	133.00	130.85	130.80	S	CO	C	450	nil	60.00	2003
SK31193001	134.67	133.09	131.52	S	VC	C	225	nil	39.98	nil
SK31194001	139.72	133.57	133.35	F	CO	C	450	nil	397.14	nil
SK31194002	140.13	139.57	138.55	F	VC	C	100	nil	16.61	nil
SK31194003	139.21	138.53	nil	F	VC	C	150	nil	0.00	nil
SK31194005	139.72	137.12	136.47	F	VC	C	225	nil	112.72	nil
SK31194101	140.65	133.25	132.91	F	CO	C	450	nil	202.47	nil
SK31194103	140.65	138.30	137.12	F	VC	C	225	nil	74.00	nil
SK31195001	142.40	nil	139.13	F	nil	nil	nil	nil	0.00	nil
SK31195002	142.60	141.91	nil	F	VC	C	150	nil	0.00	nil



MATERIALS

- NONE
- AC - ASBESTOS CEMENT
- BR - BRICK
- CC - CONCRETE BOX CULVERT
- CI - CAST IRON
- CO - CONCRETE
- CSB - CONCRETE SEGMENTS (BOLTED)
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- PSC - PLASTIC STEEL COMPOSITE
- PVC - POLYVINYL CHLORIDE
- RPM - REINFORCED PLASTIC MATRIX
- SI - SPUN (GREY) IRON
- ST - STEEL
- U - UNKNOWN
- VC - VITRIFIED CLAY
- XXX - OTHER

SHAPE

- C - CIRCULAR
- E - EGG SHAPED
- O - OTHER
- R - RECTANGLE
- S - SQUARE
- T - TRAPEZOIDAL
- U - UNKNOWN

PURPOSE

- C - COMBINED
- E - FINAL EFFLUENT
- F - FOUL
- L - SLUDGE
- S - SURFACE WATER

CATEGORIES

- W - WEIR
- C - CASCADE
- DB - DAMBOARD
- SE - SIDE ENTRY
- FV - FLAP VALVE
- BD - BACK DROP
- S - SIPHON
- HD - HIGHWAY DRAIN
- S104 - SECTION 104

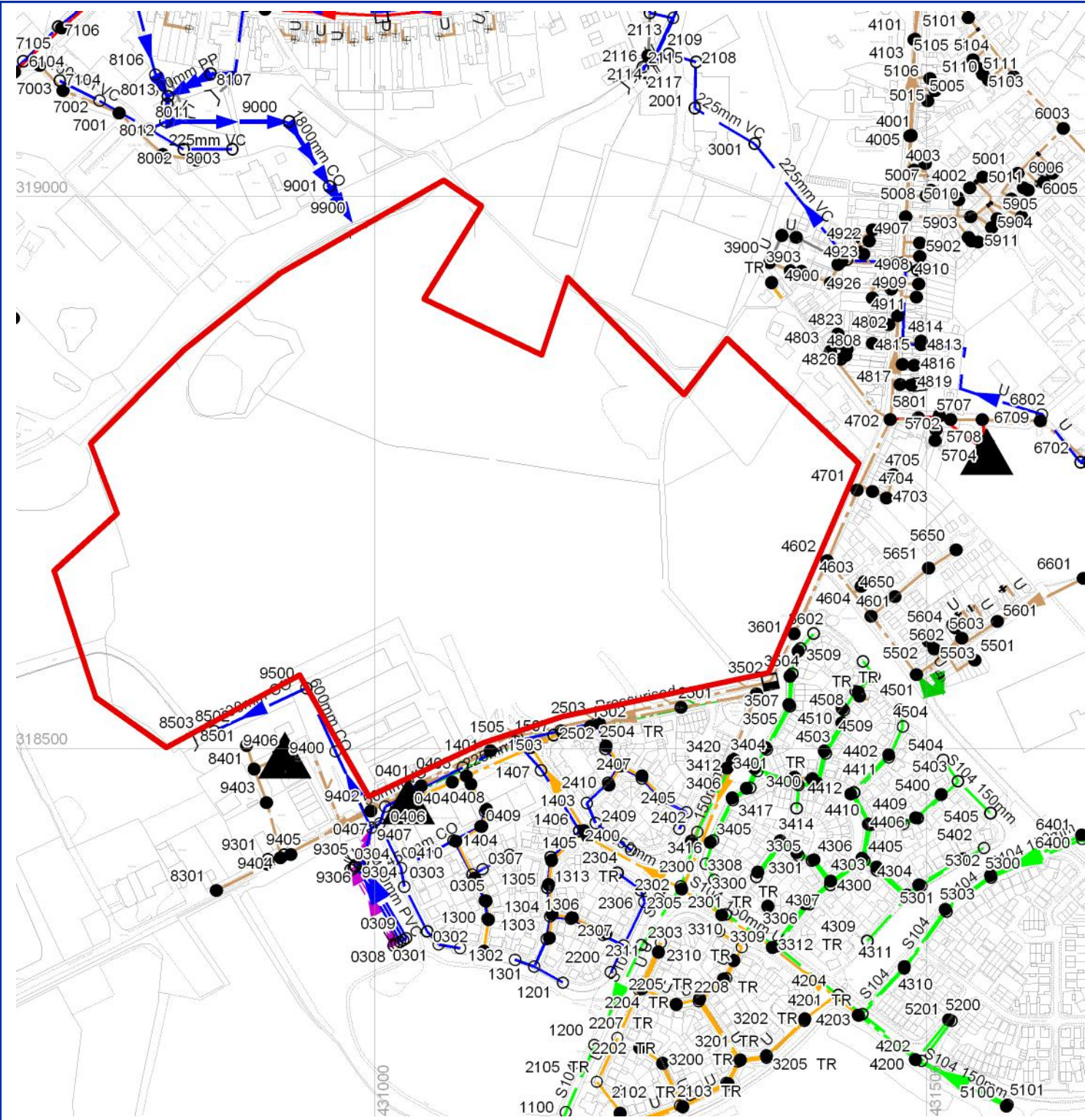


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Sewer Node		Sewer Pipe Data								
REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SK31195005	140.24	139.64	nil	F	VC	C	150	nil	0.00	nill
SK31195007	139.69	139.12	138.95	F	VC	C	150	nil	48.12	nill
SK31195008	139.51	138.91	nil	F	VC	C	150	nil	0.00	nill
SK31195010	142.06	141.50	141.19	F	VC	C	100	nil	25.19	nill
SK31195011	141.99	141.49	141.19	F	VC	C	100	nil	31.53	nill
SK31195012	142.66	142.10	141.92	F	VC	C	150	nil	24.83	nill
SK31195015	140.34	139.40	nil	F	VC	C	150	nil	0.00	nill
SK31195101	140.49	137.89	136.26	F	VC	C	225	nil	40.82	nill
SK31195102	140.36	138.38	137.94	F	VC	C	225	nil	152.30	nill
SK31195103	138.16	137.84	137.02	F	VC	C	100	nil	8.62	nill
SK31195104	138.11	137.78	nil	F	VC	C	100	nil	0.00	nill
SK31195105	138.27	137.74	nil	F	VC	C	150	nil	0.00	nill
SK31195106	140.45	139.32	nil	F	VC	C	150	nil	0.00	nill
SK31195110	138.14	137.00	nil	F	VC	C	150	nil	0.00	nill
SK31195111	138.25	137.91	137.79	F	VC	C	100	nil	67.17	nill
SK31196003	140.80	138.94	138.35	F	VC	C	225	nil	110.29	nill
SK31196005	142.45	nil	nil	F	VC	C	150	nil	0.00	nill
SK31196006	142.74	142.27	141.83	F	VC	C	150	nil	25.70	nill
nil	nil	nil	nil	C	VC	nil	nil	nil	0.00	nill
nil	nil	nil	nil	C	VC	nil	nil	nil	0.00	nill
nil	nil	nil	nil	F	nil	nil	nil	nil	0.00	nill
nil	nil	nil	nil	F	nil	nil	nil	nil	0.00	nill

Abandoned Gravity Sewer

Private Combined Gravity Sewer

Private Foul Gravity Sewer

Private Surface Water Gravity Sewer

Public Combined Gravity Sewer

Public Foul Gravity Sewer

Public Surface Water Gravity Sewer

Trunk Combined Gravity Sewer

Trunk Foul Use Gravity Sewer

Trunk Surface Water Gravity Sewer

Combined Use Pressurised Sewer

Foul Use Pressurised Sewer

Surface Water Pressurised Sewer

Highway Drain

Combined Lateral Drain (SS)

Foul Lateral Drain (SS)

Surface Water Lateral Drain (SS)

Culverted Watercourse

Cable, Earthing

Cable Junction

Cable, Optical Fibre/Instrumentation

Cable, Low Voltage

Cable, High Voltage

Cable, Other

Housing, Building

Housing, Kiosk

Disposal Site

Sewage Treatment Works

Housing, Other

Pipe Support Structure

Sewage Pumping Facility

Sewer Facility Connection Inlet / Outlet

Blind Shaft

Combined Use Manhole

Flushing Chamber

Foul Use Manhole

Grease Trap

Head Node

Hydrobrake

Lamphole

Outfall

Overflow

Penstock

Petrol Interceptor

Sewer Chemical Injection Point

Sewer Junction

Sewerage Air Valve

Sewerage Hatch Box Point

Sewerage Isolation Valve

Soakaway

Surface Water Manhole

Vent Column

Waste Water Storage

Pre-1937 Properties

MATERIALS

- NONE
AC - ASBESTOS CEMENT
BR - BRICK
CC - CONCRETE BOX CULVERT
CI - CAST IRON
CO - CONCRETE
CSB - CONCRETE SEGMENTS (BOLTED)
CSU - CONCRETE SEGMENTS (UNBOLTED)
DI - DUCTILE IRON
GRC - GLASS REINFORCED CONCRETE
GRP - GLASS REINFORCED PLASTIC
MAC - MASONRY IN REGULAR COURSES
MAR - MASONRY RANDOMLY COURSED
PE - POLYETHYLENE
PF - PITCH
PP - POLYPROPYLENE
PSC - PLASTIC STEEL COMPOSITE
PVC - POLYVINYL CHLORIDE
RPM - REINFORCED PLASTIC MATRIX
SI - SPUN (GREY) IRON
ST - STEEL
U - UNKNOWN
VC - VITRIFIED CLAY
XXX - OTHER

SHAPE
C - CIRCULAR
E - EGG SHAPED
O - OTHER
R - RECTANGLE
S - SQUARE
T - TRAPEZOIDAL
U - UNKNOWN

PURPOSE
C - COMBINED
E - FINAL EFFLUENT
F - FOUL
L - SLUDGE
S - SURFACE WATER

CATEGORIES

W - WEIR
C - CASCADE
DB - DAMBOARD
SE - SIDE ENTRY
FV - FLAP VALVE
BD - BACK DROP
S - SIPHON
HD - HIGHWAY DRAIN
S104 - SECTION 104

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0845 601 6616

SEWER RECORD (Tabular)

O/S Map scale:	1:5000	This map is centred upon:	
Date of issue:	15.03.18	O / S Grid reference:	
Sheet No.	9 of 9	x :	431159
		y :	318667

Disclaimer Statement:
1. Do not scale off this Map.
2. This map and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this Map and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of Severn Trent Water's assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems.
3. On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012 (date to be confirmed). Private pumping stations, which form part of these sewers or lateral drains, will transfer to the ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on this Map.
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Note:

Some services may have been omitted due to parked vehicle.

The Ordinance Survey file is to be used as a guide only.

OS Buildings Surveyed Buildings 

This survey has been orientated to the Ordinance Survey (OS) National Grid (OSGB36) via a Global Position System (GPS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre. A transformation using the OSTN02 & OSGM12 transformation models.

The survey has been correlated to this point and a further on-site OSTN02 points established to create a true OS bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true to OS. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid.

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Little Eaton
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DE21 5DR
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admin@greenhatch-group.co.uk

CLIENT

**St Modwen
Properties Ltd**

PROJE

Dyson
Woodville

TITLE Topographical
Survey

Level datum	OS (GPS Verified)
Grid orientation	OS (GPS Verified)

Job number	16867
Drawing No.	Rev

Comments
This plan should only be used for its original purpose. GreenHatch Ltd accepts no responsibility for this plan if supplied to any party other than the original client.
All dimensions should be checked on site prior to design and construction.
Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

DO NOT SCALE



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

GeoReports

**Andrea McGee
Curtins Consulting Ltd
17-19 Whitworth Street West
Manchester
Lancashire
M1 5WG**

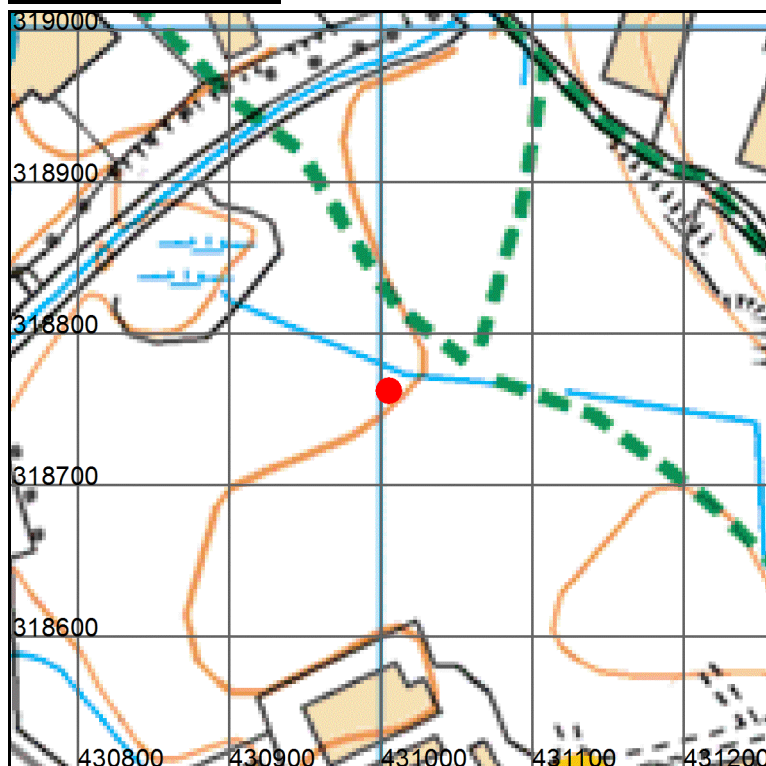
Infiltration SuDS GeoReport:

This report provides information on the suitability of the subsurface for the installation of infiltration sustainable drainage systems (SuDS). It provides information on the properties of the subsurface with respect to significant constraints, drainage, ground stability and groundwater quality protection.

Report Id: GR_217892/1

Client reference:

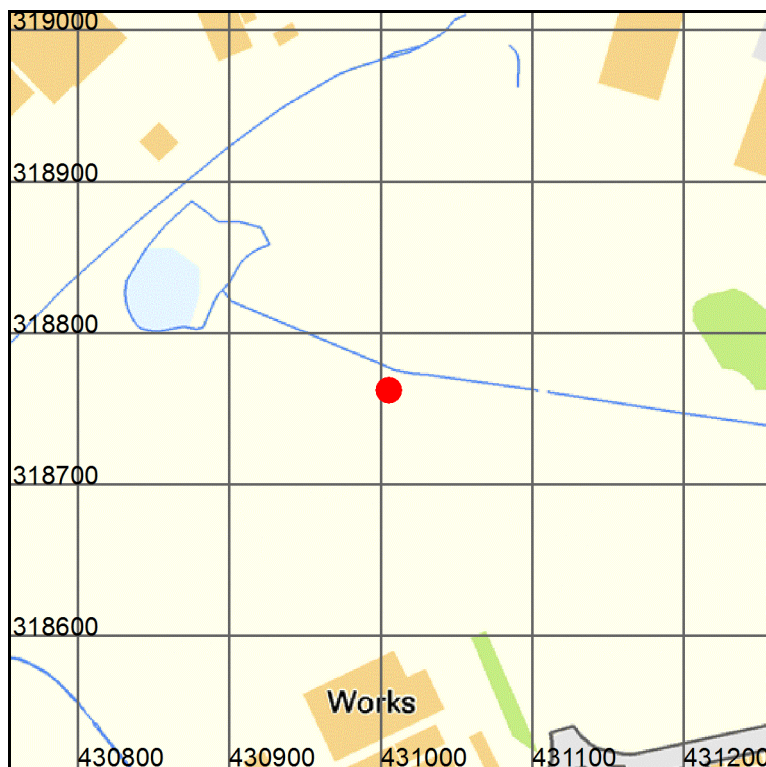
Search location



Point centred at:
431005,318762

Search location indicated in
red

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© Crown Copyright and/or database right 2018. Licence number 100021290 EUL
Scale: 1:5 000 (1cm = 50 m)



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OS Street View: Scale: 1:5 000 (1cm = 50 m)

Assessment for an infiltration sustainable drainage system

Introduction

Sustainable drainage systems (SuDS) are drainage solutions that manage the volume and quality of surface water close to where it falls as rain. They aim to reduce flow rates to rivers, increase local water storage capacity and reduce the transport of pollutants to the water environment. There are four main types of SuDS, which are often designed to be used in sequence. They comprise:

- **source control:** systems that control the rate of runoff
- **pre-treatment:** systems that remove sediments and pollutants
- **retention:** systems that delay the discharge of water by providing surface storage
- **infiltration:** systems that mimic natural recharge to the ground.

This report focuses on infiltration SuDS. It provides subsurface information on the properties of the ground with respect to drainage, ground stability and groundwater quality protection. It is intended principally for those involved in the preliminary assessment of the suitability of the ground for infiltration SuDS, and those involved in assessing proposals from others for sustainable drainage, but it may also be useful to help house-holders judge whether or not further professional advice should be sought. If in doubt, users should consult a suitably-qualified professional about the results in this report before making any decisions based upon it.

This GeoReport is structured in two parts:

- **Part 1. Summary data.**

Comprises three maps that summarise the data contained within Part 2.

- **Part 2. Detailed data.**

Comprises a further 24 maps in four thematic sections:

- **Very significant constraints.** Maps highlight areas where infiltration may result in adverse impacts due to factors including: ground instability (soluble rocks, non-coal shallow mining and landslide hazards); persistent shallow groundwater, or the presence of made ground, which may represent a ground stability or contamination hazard.
- **Drainage potential.** Maps indicate the drainage potential of the ground, by considering subsurface permeability, depth to groundwater and the presence of floodplain deposits.
- **Ground stability.** Maps indicate the presence of hazards that have the potential to cause ground instability resulting in damage to some buildings and structures, if water is infiltrated to the ground.
- **Groundwater protection.** Maps provide key indicators to help determine whether the groundwater may be susceptible to deterioration in quality as a result of infiltration.

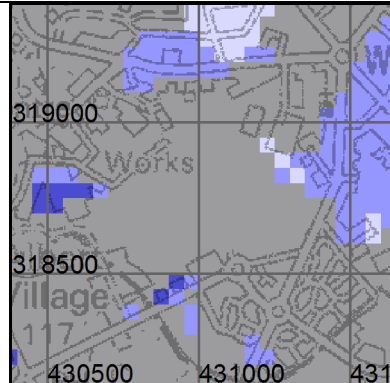
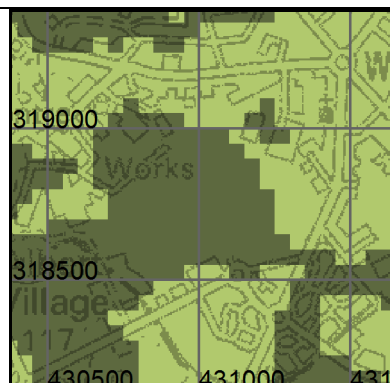
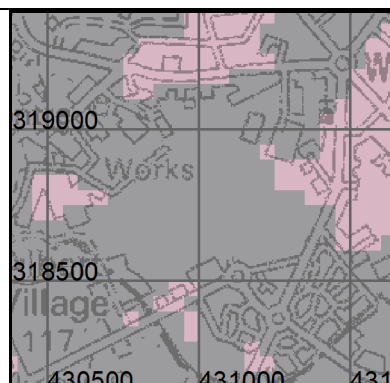


This report considers the suitability of the subsurface for the installation of infiltration SuDS, such as soakaways, infiltration basins or permeable pavements. It provides subsurface data to indicate whether, and which type of infiltration system may be appropriate. It does not state that infiltration SuDS are, or are not, appropriate as this is highly dependent on the design of the individual system. This report therefore describes the subsurface conditions at the site, allowing the reader to determine the suitability of the site for infiltration SuDS.

The map and text data in this report is similar to that provided in the '*Infiltration SuDS Map: Detailed*' national map product. For further information about the data, consult the '*User Guide for the Infiltration SuDS Map: Detailed*', available from <http://nora.nerc.ac.uk/16618/>.

PART 1: SUMMARY DATA

This section provides a summary of the data on the following pages.

In terms of the drainage potential, is the ground suitable for infiltration SuDS?	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL	 Highly compatible for infiltration SuDS. The subsurface is likely to be suitable for free-draining infiltration SuDS.
	 Probably compatible for infiltration SuDS. The subsurface is probably suitable although the design may be influenced by the ground conditions.
	 Opportunities for bespoke infiltration SuDS. The subsurface is potentially suitable although the design will be influenced by the ground conditions.
	 Very significant constraints are indicated. There is a very significant potential for one or more hazards associated with infiltration.
Is ground instability likely to be a problem?	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL	 Increased infiltration is very unlikely to result in ground instability.
	 Ground instability problems may be present or anticipated, but increased infiltration is unlikely to result in ground instability
	 Ground instability problems are probably present. Increased infiltration may result in ground instability.
	 There is a very significant potential for one or more geohazards associated with infiltration.
Is the groundwater susceptible to deterioration in quality?	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL	 The groundwater is not expected to be especially vulnerable to contamination.
	 The groundwater may be vulnerable to contamination.
	 The groundwater is likely to be vulnerable to contaminants.
	 Made ground is present at the surface. Infiltration may increase the possibility of remobilising pollutants.

PART 2: DETAILED DATA

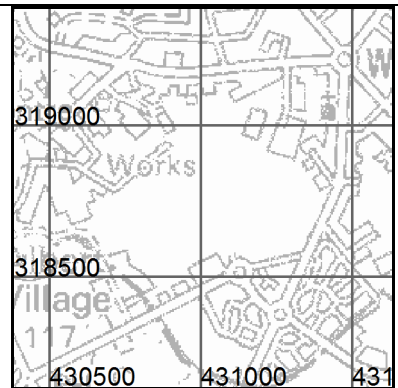
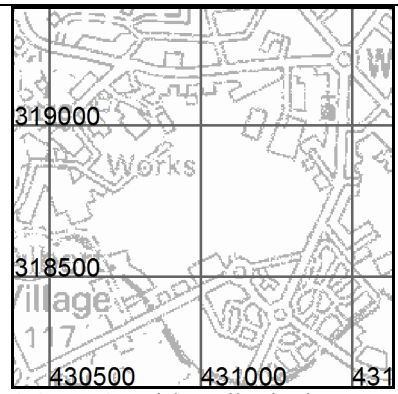
This section provides further information about the properties of the ground and will help assess the suitability of the ground for infiltration SuDS.

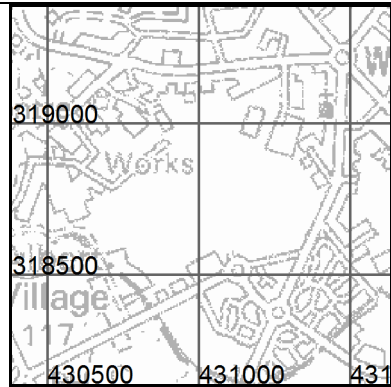
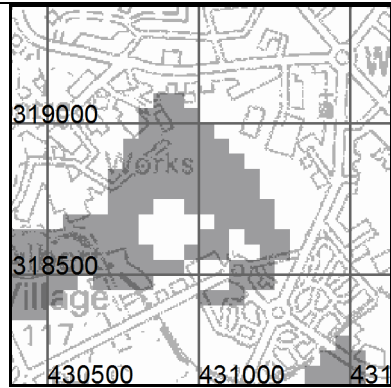
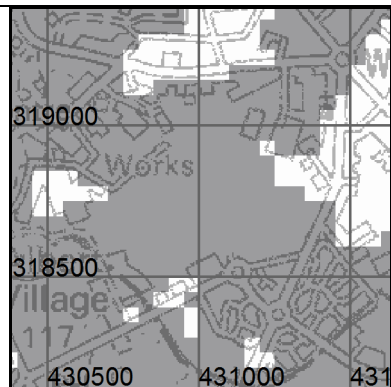
Section 1. Very significant constraints

Where maps are overlain by grey polygons, geological or hydrogeological hazards may exist that could be made worse by infiltration. The following hazards are considered:

- soluble rocks
- landslides
- shallow mining
- shallow groundwater
- made ground

For more information read 'Explanation of terms' at the end of this report.

Soluble rock hazard	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL	 Very significant soluble rock hazard. Soluble rocks are present with a very significant possibility of localised subsidence that could be initiated or made worse by infiltration. The site investigation should consider whether the potential for or the consequences of subsidence as a result of infiltration are significant.  Very significant soluble rock hazards are not present; however this hazard may still need to be considered. See Part 3.
Landslide hazard	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL	 Very significant landslide hazard. Slope instability problems are almost certainly present and may be active. An increase in moisture content as a result of infiltration may cause the slope to fail. The site investigation should consider whether the potential for or the consequences of landslide as a result of infiltration are significant.  Very significant landslide hazards are not present; however this hazard may still need to be considered. See Part 3.

Shallow mining hazard	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL	☒ Very significant mining hazard. Shallow mining is likely to be present with a very significant possibility of localised subsidence that could be initiated or made worse by increased infiltration. Also, infiltration may increase the possibility of remobilising pollutants. The site investigation should consider whether the potential for or consequences of subsidence and/or remobilisation of pollutants as a result of infiltration are significant. ☐ Very significant mining hazards are not present; however this hazard may still need to be considered. See Part 3.
Persistent shallow groundwater	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL	☒ Very high likelihood of persistent or seasonally shallow groundwater. Persistent or seasonally shallow groundwater is likely to be present. Infiltration may increase the likelihood of soakaway inundation, or groundwater emergence at the surface. The site investigation should consider whether the potential for or the consequences of groundwater level rise as a result of infiltration are significant. ☐ See Part 2 for the likely depth to water table.
Made ground	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL	☒ Made ground present. Made ground is present at the surface. Infiltration may affect ground stability or increase the possibility of remobilising pollutants. The site investigation should consider whether the potential for or consequences of ground instability and/or pollutant leaching as a result of infiltration are significant. ☐ None recorded

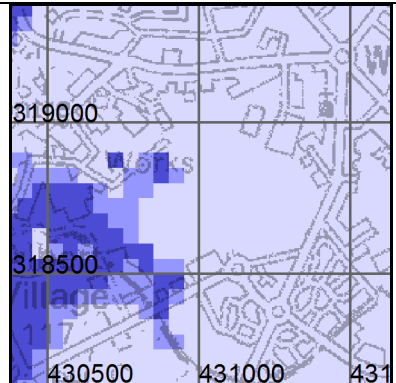
Section 2. Drainage potential

The following pages contain maps that will help you assess the drainage potential of the ground by considering the:

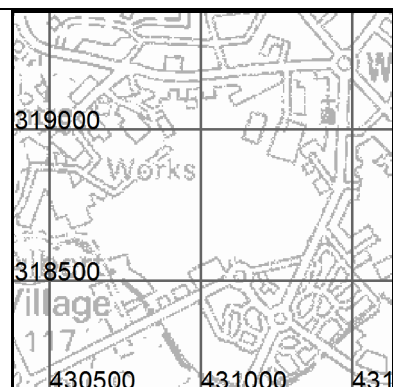
- depth to water table
- permeability of the superficial deposits
- thickness of the superficial deposits
- permeability of the bedrock
- presence of floodplains

Superficial deposits are not present everywhere and therefore some areas of the *superficial deposit permeability* map may not be coloured. Where this is the case, the *bedrock permeability* map shows the likely permeability of the ground. Superficial deposits in some places are very thin and hence in these places you may wish to consider both the permeability of the superficial deposits and the permeability of the bedrock. The *superficial thickness* map will tell you whether the superficial deposits are thin (< 3 m thick) or thick (>3 m). Where they are over 3 m thick, the permeability of the bedrock may not be relevant.

For more information read 'Explanation of terms' at the end of this report.

Depth to groundwater table	
	 Groundwater is likely to be more than 5 m below the ground surface throughout the year.
	 Groundwater is likely to be between 3 and 5 m below the ground surface for at least part of the year.
	 Groundwater is likely to be less than 3 m below the ground surface for at least part of the year.

Superficial deposit permeability



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Superficial deposits are likely to be **free-draining**.



The superficial deposit permeability is **spatially variable**, but likely to permit moderate infiltration.

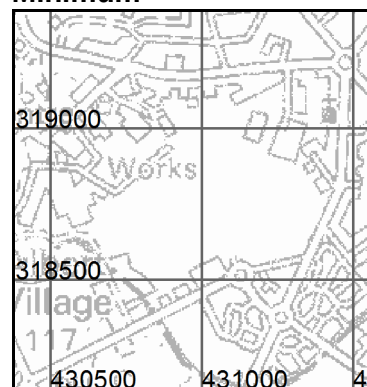


Superficial deposits are likely to be **poorly draining**.

These maps show the permeability range that is summarised above.

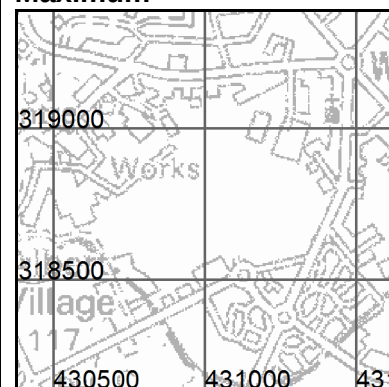
-  Very Low
-  Low
-  Moderate
-  High
-  Very High

Minimum



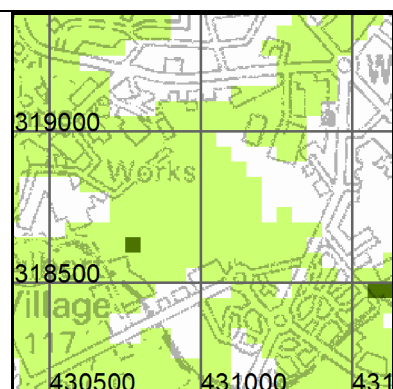
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Maximum



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Superficial deposit thickness



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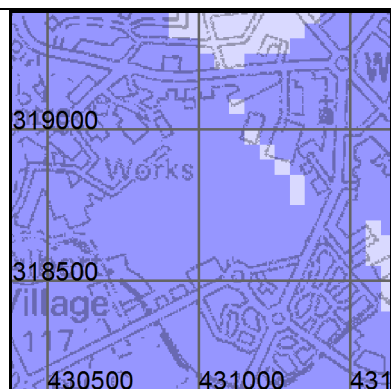


The thickness of superficial deposits is **< 3 m** and hence the permeability of the ground may be dependent on both the superficial deposits (where present) and underlying bedrock (see below).



The thickness of superficial deposits is **> 3 m** and hence the permeability of the superficial deposits is likely to determine the permeability of the ground.

Bedrock permeability



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Bedrock deposits are likely to be **free-draining**.



The bedrock permeability is **spatially variable**, but likely to permit moderate infiltration.



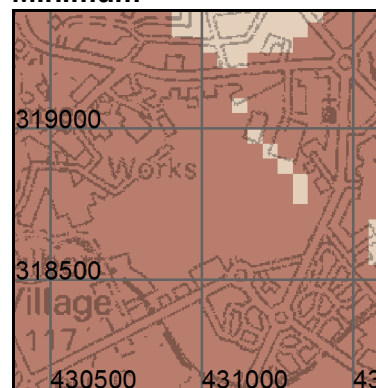
Bedrock deposits are likely to be **poorly draining**.

These maps show the permeability range that is summarised above.

Key

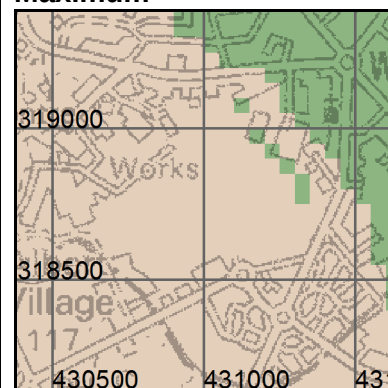
-  Very Low
-  Low
-  Moderate
-  High
-  Very High

Minimum



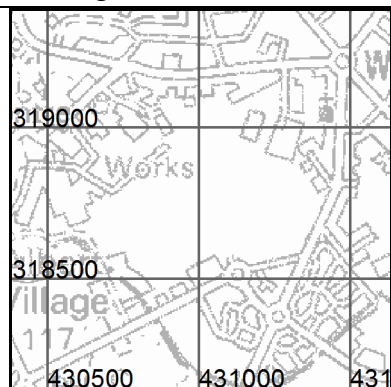
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Maximum



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Geological indicators of flooding



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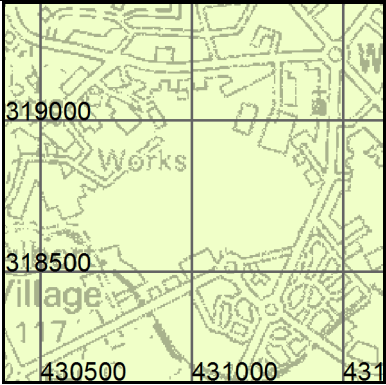
Superficial floodplain deposits or low-lying coastal areas have been identified. Groundwater levels may rise in response to high river or tide levels, potentially causing inundation of subsurface infiltration SuDS.

Section 3. Ground stability

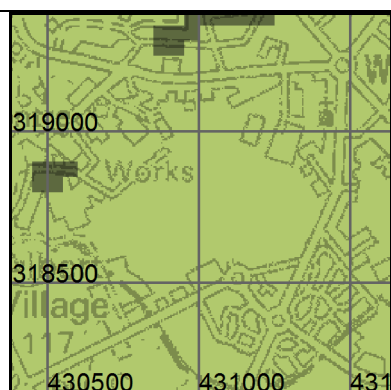
The following pages contain maps that will help you assess whether infiltration may impact the stability of the ground. They consider hazards associated with:

- soluble rocks
- landslides
- shallow mining
- running sands
- swelling clays
- compressible ground, and
- collapsible ground

In the following maps, geohazards that are identified in green are unlikely to prevent infiltration SuDS from being installed, but they should be considered during design. For more information read 'Explanation of terms' at the end of this report.

Soluble rocks	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL	 Increased infiltration is unlikely to result in subsidence.
	 Increased infiltration is unlikely to cause localised subsidence, but potential impacts should be considered.
	 Increased infiltration may result in localised subsidence. The potential for or the consequences of subsidence associated with soluble rocks should be considered.
	 Very significant possibility of localised subsidence that could be initiated or made worse by infiltration.

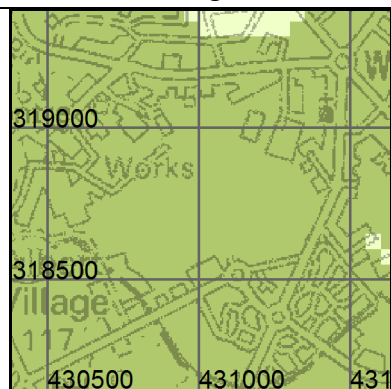
Landslides



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-  Increased infiltration is unlikely to lead to slope instability.
-  Slope instability problems may be present or anticipated, but increased infiltration is unlikely to cause instability
-  Slope instability problems are probably present or have occurred in the past, and increased infiltration may result in slope instability.
-  Slope instability problems are almost certainly present and may be active. An increase in moisture content as a result of infiltration may cause the slope to fail.

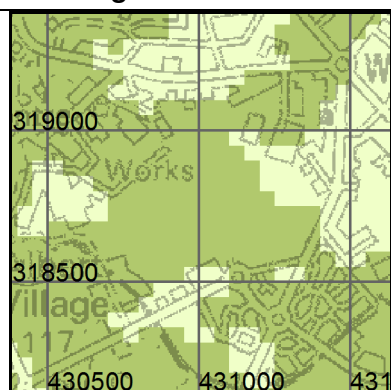
Shallow mining



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-  Increased infiltration is unlikely to lead to subsidence.
-  Shallow mining is possibly present. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
-  Shallow mining could be present with a significant possibility that localised subsidence could be initiated or made worse by increased infiltration.
-  Shallow mining is likely to be present, with a very significant possibility that localised subsidence may be initiated or made worse by increased infiltration.

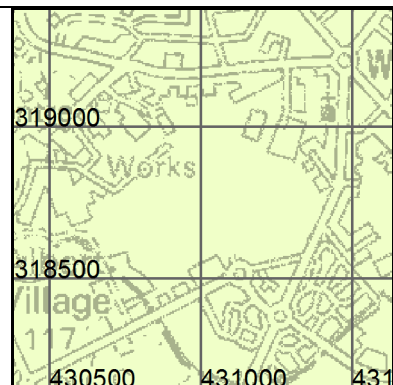
Running sand



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-  Increased infiltration is unlikely to cause ground collapse associated with running sands.
-  Running sand is possibly present. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
-  Significant possibility for running sand problems. Increased infiltration may result in a geohazard.

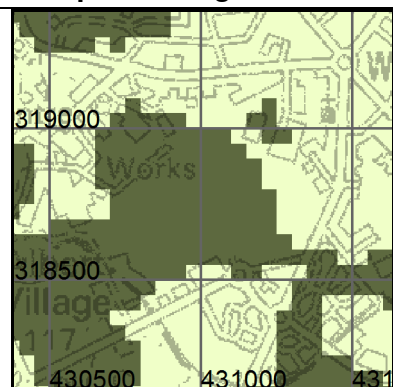
Swelling clays



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-  Increased infiltration is unlikely to cause shrink-swell ground movement.
-  Ground is susceptible to shrink-swell ground movement. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
-  Ground is susceptible to shrink-swell ground movement. Increased infiltration may result in a geohazard.

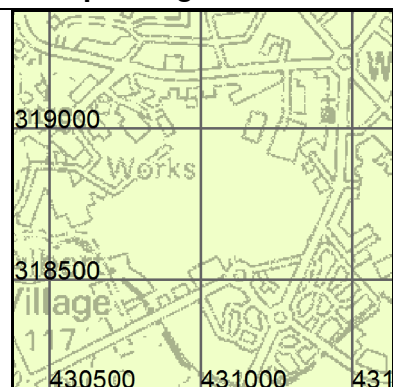
Compressible ground



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-  Increased infiltration is unlikely to lead to ground compression.
-  Compressibility and uneven settlement hazards are probably present. Increased infiltration may result in a geohazard.

Collapsible ground



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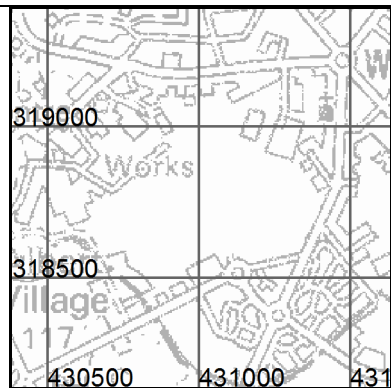
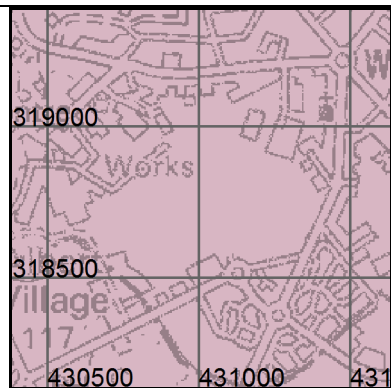
-  Increased infiltration is unlikely to result in subsidence.
-  Deposits with potential to collapse when loaded and saturated are possibly present in places. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
-  Deposits with potential to collapse when loaded and saturated are probably present in places. Increased infiltration may result in a geohazard.

Section 4. Groundwater quality protection

The following pages contain maps showing some of the information required to ensure the protection of groundwater quality. Data presented includes:

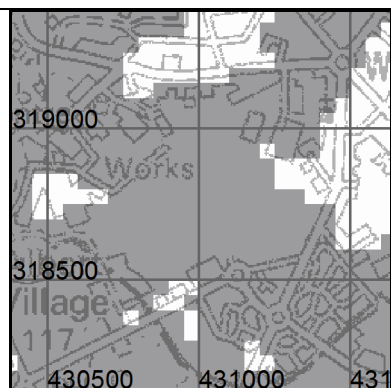
- groundwater source protection zones (Environment Agency data)
- predominant flow mechanism
- made ground

For more information read 'Explanation of terms' at the end of this report.

Groundwater source protection zones	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL Derived in part from Source Protection Zone data provided under licence from the Environment Agency © Environment Agency 2018.	Groundwater is not within a source protection zone.
	Source protection zone IV
	Source protection zone III
	Source protection zone II
	Source protection zone I.
Predominant flow mechanism	
 © Crown Copyright and/or database right 2018. All rights reserved. Licence number 100021290 EUL	Water is likely to percolate through the unsaturated zone to the groundwater through either the pore space in granular media or through porespace and fractures; these processes have some potential for contaminant removal and breakdown.
	Water is likely to percolate through the unsaturated zone to the groundwater through fractures, a process which has little potential for contaminant removal and breakdown.



Made ground



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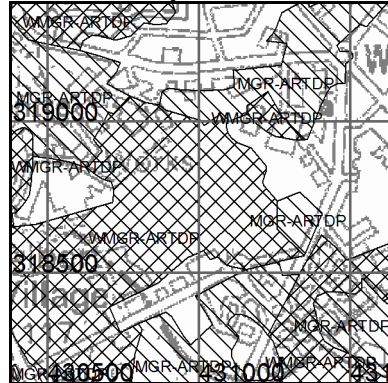


Made ground is present at the surface. Infiltration may increase the possibility of remobilising pollutants.

Section 5. Geological Maps

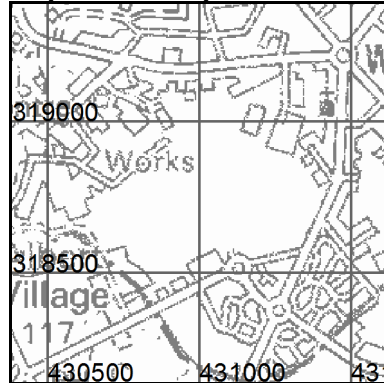
The following maps show the artificial, superficial and bedrock geology within the area of interest.

Artificial deposits



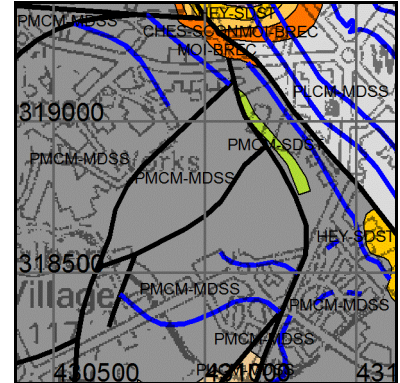
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Superficial deposits



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Bedrock



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Fault

Coal, ironstone or mineral vein

Note: Faults and Coals, ironstone & mineral veins are shown for illustration and to aid interpretation of the map. Not all such features are shown and their absence on the map face does not necessarily mean that none are present

Key to Artificial deposits:

Map colour	Computer Code	Rock name	Rock type
	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
	WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT

Key to Superficial deposits:

No deposits recorded by BGS in the search area



Key to Bedrock geology:

Map colour	Computer Code	Rock name	Rock type
	HEY-MDST	HELSEBY SANDSTONE FORMATION	MUDSTONE
	HEY-SDST	HELSEBY SANDSTONE FORMATION	SANDSTONE
	CHES-SCON	CHESTER FORMATION	SANDSTONE AND CONGLOMERATE, INTERBEDDED
	MOI-BREC	MOIRA FORMATION	BRECCIA
	PUCM-MDSS	PENNINE UPPER COAL MEASURES FORMATION	MUDSTONE, SILTSTONE AND SANDSTONE
	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION	MUDSTONE, SILTSTONE AND SANDSTONE
	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION	SANDSTONE
	PLCM-MDSS	PENNINE LOWER COAL MEASURES FORMATION	MUDSTONE, SILTSTONE AND SANDSTONE



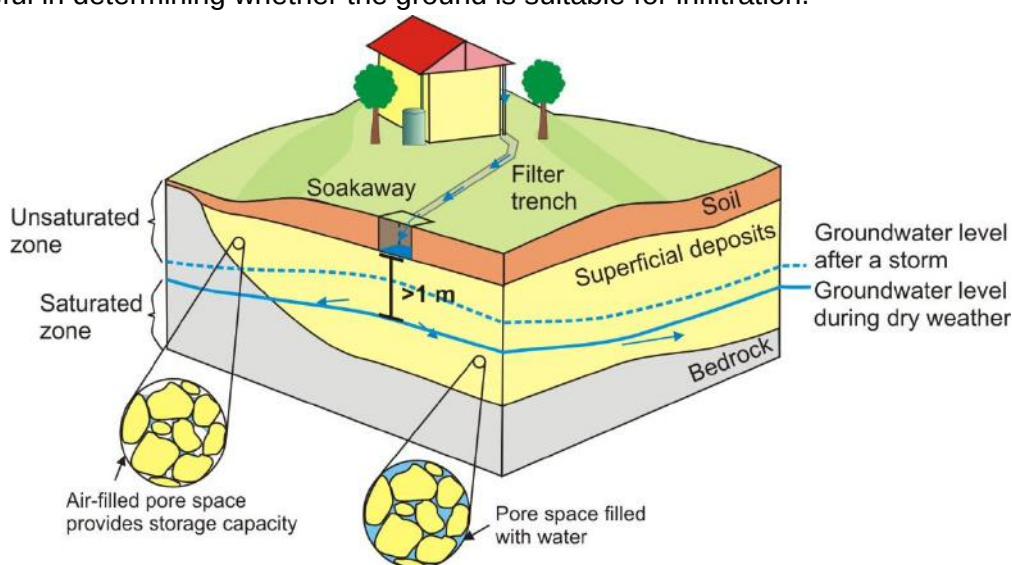
Limitations of this report:

- This report is concerned with the potential for infiltration-to-the-ground to be used as a SuDS technique at the site described. It only considers the subsurface beneath the search area and does NOT consider potential surface or subsurface impacts outside of that area.
- This report is NOT an alternative for an on-site investigation or soakaway test, which might reach a different conclusion.
- This report must NOT be used to justify disposal of foul waste or grey water.
- This report is based on and limited to an interpretation of the records held by the British Geological Survey (BGS) at the time the search is performed. The datasets used (with the exception of that showing depth to water table) are based on 1:50 000 digital geological maps and not site-specific data.
- Other more specific and detailed ground instability information for the site may be held by BGS, and an assessment of this could result in a modified assessment.
- To interpret the maps correctly, the report must be viewed and printed in colour.
- The search does NOT consider the suitability of sites with regard to:
 - previous land use,
 - potential for, or presence of contaminated land
 - presence of perched water tables
 - shallow mining hazards relating to coal mining. Searches of coal mining should be carried out via The Coal Authority Mine Reports Service: www.coalminingreports.co.uk.
 - made ground, where not recorded
 - proximity to landfill sites (searches for landfill sites or contaminated land should be carried out through consultation with local authorities/Environment Agency)
 - zones around private water supply boreholes that are susceptible to groundwater contamination.
- This report is supplied in accordance with the GeoReports Terms & Conditions available separately, and the copyright restrictions described at the end of this report

Explanation of terms

Depth to groundwater

In the shallow subsurface, the ground is commonly unsaturated with respect to water. Air fills the spaces within the soil and the underlying superficial deposits and bedrock. At some depth below the ground surface, there is a level below which these spaces are full of water. This level is known as the groundwater level, and the water below it is termed the groundwater. When water is infiltrated, the groundwater level may rise temporarily. To ensure that there is space in the unsaturated zone to accommodate this, there should be a minimum thickness of 1 m between the base of the infiltration system and the water table. An estimate of the *depth to groundwater* is therefore useful in determining whether the ground is suitable for infiltration.



Groundwater flooding

Groundwater flooding occurs when a rise in groundwater level results in very shallow groundwater or the emergence of groundwater at the surface. If infiltration systems are installed in areas that are susceptible to groundwater flooding, it is possible that the system could become inundated. The susceptibility map seeks to identify areas where the geological conditions and water tables indicate that groundwater level rise could occur under certain circumstances. A high susceptibility to groundwater flooding classification does not mean that groundwater flooding has ever occurred in the past, or will do so in the future as the susceptibility maps do not contain information on how often flooding may occur. The susceptibility maps are designed for planning; identifying areas where groundwater flooding might be an issue that needs to be taken into account.

Geological indicators of flooding

In floodplain deposits, groundwater level can be influenced by the water level in the adjacent river. Groundwater level may increase during periods of fluvial flood and therefore this should be taken into account when designing infiltration systems on such deposits. The *geological indicators of flooding* dataset shows where there is geological evidence (floodplain deposits) that flooding has occurred in the past.

For further information on flood-risk, the likely frequency of its recurrence in relation to any proposed development of the site, and the status of any flood prevention measures in place, you are advised to contact the local office of the Environment Agency (England and Wales) at www.environment-agency.gov.uk/ or the Scottish Environment Protection Agency (Scotland) at www.sepa.org.uk.

Artificial ground

Artificial ground comprises deposits and excavations that have been created or modified by human activity. It includes ground that is worked (quarries and road cuttings), infilled (back-filled quarries), landscaped (surface re-shaping), disturbed (near surface mineral workings) or classified as made ground (embankments and spoil heaps). The composition and properties of artificial ground are often unknown. In particular, the permeability and chemical composition of the artificial ground should be determined to ensure that the ground will drain and that any contaminants present will not be remobilised.

Superficial permeability

Superficial deposits are those geological deposits that were formed during the most recent period of geological time (as old as 2.6 million years before present). They generally comprise relatively thin deposits of gravel, sand, silt and clay and are present beneath the pedological soil in patches or larger spreads over much of Britain. The ease with which water can percolate through these deposits is controlled by their permeability and varies widely depending on their composition. Those deposits comprising clays and silts are less permeable and thus infiltration is likely to be slow, such that water may pool on the surface. In comparison, deposits comprising sands and gravels are more permeable allowing water to percolate freely.

Bedrock permeability

Bedrock forms the main mass of rock forming the Earth. It is present everywhere, commonly beneath superficial deposits. Where the superficial deposits are thin or absent, the ease with which water will percolate into the ground depends on the permeability of the bedrock.

Natural ground instability

Natural ground instability refers to the propensity for upward, lateral or downward movement of the ground that can be caused by a number of natural geological hazards (e.g. ground dissolution/compressible ground). Some movements associated with particular hazards may be gradual and of millimetre or centimetre scale, whilst others may be sudden and of metre or tens of metres scale. Significant natural ground instability has the potential to cause damage to buildings and structures, especially when the drainage characteristics of a site are altered. It should be noted, however, that many buildings, particularly more modern ones, are built to such a standard that they can remain unaffected in areas of significant ground movement.

Shrink-swell

A shrinking and swelling clay changes volume significantly according to how much water it contains. All clay deposits change volume as their water content varies, typically swelling in winter and shrinking in summer, but some do so to a greater extent than others. Contributory circumstances could include drought, leaking service pipes, tree roots drying-out the ground or changes to local drainage patterns, such as the creation of soakaways. Shrinkage may remove support from the foundations of buildings and structures, whereas clay expansion may lead to uplift (heave) or lateral stress on part or all of a structure; any such movements may cause cracking and distortion.

Landslides (slope stability)

A landslide is a relatively rapid outward and downward movement of a mass of ground on a slope, due to the force of gravity. A slope is under stress from gravity but will not move if its strength is greater than this stress. If the balance is altered so that the stress exceeds the strength, then movement will occur. The stability of a slope can be reduced by removing ground at the base of the slope, by placing material on the slope, especially at the top, or by increasing the water content of the materials forming the slope. Increase in subsurface water content beneath a soakaway could increase susceptibility to landslide hazards. The assessment of landslide hazard refers to the stability of the present land surface. It does not encompass a consideration of the stability of excavations.

Soluble rocks (dissolution)

Some rocks are soluble in water and can be progressively removed by the flow of water through the ground. This process tends to create cavities, potentially leading to the collapse of overlying materials and possibly subsidence at the surface. The release of water into the subsurface from infiltration systems may increase the dissolution of rock or destabilise material above or within a cavity. Dissolution cavities may create a pathway for rapid transport of contaminated water to an aquifer or water course.

Compressible ground

Many ground materials contain water-filled pores (the spaces between solid particles). Ground is compressible if a building (or other load) can cause the water in the pore space to be squeezed out, causing the ground to decrease in thickness. If ground is extremely compressible the building may sink. If the ground is not uniformly compressible, different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion. The compressibility of the ground may alter as a result of changes in subsurface water content caused by the release of water from soakaways.

Collapsible deposits

Collapsible ground comprises certain fine-grained materials with large pore spaces (the spaces between solid particles). It can collapse when it becomes saturated by water and/or a building (or other structure) places too great a load on it. If the material below a building collapses it may cause the building to sink. If the collapsible ground is variable in thickness or distribution, different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion. The subsurface underlying a soakaway will experience an increase in water content that may affect the stability of the ground. This hazard is most likely to be encountered only in parts of southern England.

Running sand

Running sand conditions occur when loosely-packed sand, saturated with water, flows into an excavation, borehole or other type of void. The pressure of the water filling the spaces between the sand grains reduces the contact between the grains and they are carried along by the flow. This can lead to subsidence of the surrounding ground. Running sand is potentially hazardous during the drainage system installation. During installation, excavation of the ground may create a space into which sand can flow, potentially causing subsidence of surrounding ground.

Shallow mining hazards (non coal)

Current or past underground mining for coal or for other commodities can give rise to cavities at shallow or intermediate depths, which may cause fracturing, general settlement, or the formation of crown-holes in the ground above. Spoil from mineral workings may also present a pollution hazard. The release of water into the subsurface from soakaways may destabilise material above or within a cavity. Cavities arising as a consequence of mining may also create a pathway for rapid transport of contaminated water to an aquifer or watercourse. The mining hazards map is derived from the geological map and considers the potential for subsidence associated with mining on the basis of geology type. Therefore if mining is known to occur within a certain rock, the map will highlight the potential for a hazard within the area covered by that geology.



For more information regarding underground and opencast **coal mining**, the location of mine entries (shafts and adits) and matters relating to subsidence or other ground movement induced by **coal mining** please contact the Coal Authority, Mining Reports, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG; telephone 0845 762 6848 or at www.coal.gov.uk. For more information regarding other types of mining (i.e. non-coal), please contact the British Geological Survey.

Groundwater source protection zones

In England and Wales, the Environment Agency has defined areas around wells, boreholes and springs that are used for the abstraction of public drinking water as source protection zones. In conjunction with Groundwater Protection Policy the zones are used to restrict activities that may impact groundwater quality, thereby preventing pollution of underlying aquifers, such that drinking water quality is upheld. The Environment Agency can provide advice on the location and implications of source protection zones in your area (www.environment-agency.gov.uk/)



Contact Details

Keyworth Office

British Geological Survey
Environmental Science Centre
Nicker Hill
Keyworth
Nottingham
NG12 5GG
Tel: 0115 9363143
Fax: 0115 9363276
Email: enquiries@bgs.ac.uk

Wallingford Office

British Geological Survey
Maclean Building
Wallingford
Oxford
OX10 8BB
Tel: 01491 838800
Fax: 01491 692345
Email: hydroenq@bgs.ac.uk

Edinburgh Office

British Geological Survey
Lyell Centre
Research Avenue South
Edinburgh
EH14 4AP
Tel: 0131 6671000
Email: enquiry@bgs.ac.uk



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Important notes about this Report

- The data, information and related records supplied in this Report by BGS can only be indicative and should not be taken as a substitute for specialist interpretations, professional advice and/or detailed site investigations. You must seek professional advice before making technical interpretations on the basis of the materials provided.
- Geological observations and interpretations are made according to the prevailing understanding of the subject at the time. The quality of such observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, and better access to sampling locations.
- Raw data may have been transcribed from analogue to digital format, or may have been acquired by means of automated measuring techniques. Although such processes are subjected to quality control to ensure reliability where possible, some raw data may have been processed without human intervention and may in consequence contain undetected errors.
- Detail, which is clearly defined and accurately depicted on large-scale maps, may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
- Data may be compiled from the disparate sources of information at BGS's disposal, including material donated to BGS by third parties, and may not originally have been subject to any verification or other quality control process.
- Data, information and related records, which have been donated to BGS, have been produced for a specific purpose, and that may affect the type and completeness of the data recorded and any interpretation. The nature and purpose of data collection, and the age of the resultant material may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.
- If a report or other output is produced for you on the basis of data you have provided to BGS, or your own data input into a BGS system, please do not rely on it as a source of information about other areas or geological features, as the report may omit important details.
- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.
- Note that for some sites, the latest available records may be quite historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

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**Report issued by
BGS Enquiry Service**

Appendix C

Derbyshire County Council Correspondence

Severn Trent Water Correspondence

Pre-application Response Form

DCC REFERENCE:	SDDC/2018/27. Land at Woodville, Swadlincote		
DCC CONTACT:	Robert Matthews (flood.team@derbyshire.co.uk)		
PLANNING REFERENCE:	N/A		
ADDRESS OF SITE:	Land Adjacent to Moira Road, Swadlincote, DE11 8DH		
DATE RECEIVED:	27/02/2018	DATE DUE:	19/03/2018

SURFACE WATER:

The Lead Local Flood Authority (LLFA) has completed a brief, high level review of the Council's surface water model outputs for the proposed site indicate that surface water is modelled to accumulate across the site following the 1 in 100 year critical storm duration rainfall event. Surface water is modelled to accumulate to the south west of the site and to the east of the site. The model also shows surface water accumulating in a linear pattern from east-west across the centre of the site, to the north of the site boundary and to the west of the site boundary. This may be associated with the watercourses/ditches present within the proposed site boundary. An analysis of the County Council surface water model outputs for the 1 in 1000 year critical storm duration rainfall event indicate that the site is likely to be subject to surface water flooding in a similar yet extended pattern to that of the 1 in 100 year return period event. Any alteration to the impermeable surface area of the development site may have the opportunity to exacerbate surface water flood risk on and off the site.

The LLFA expect development to include Sustainable Drainage Systems (SuDS) within the design of a drainage strategy for any proposed development, applying the SuDS management train. Developments that do not include any SuDS features are expected to provide evidence as to why these principles cannot be followed. The applicant is advised to review the **Planning and Development Guidance Notes** available on Derbyshire County Council's website (www.derbyshire.gov.uk/flooding/strategy) should any guidance on the drainage strategy for the proposed development be required.

The LLFA requires that site surface water drainage is designed in line with DEFRA's Non statutory technical standards for SuDS, including restricting developed discharge of surface water to greenfield runoff rates, making suitable allowances for climate change (in line with the latest guidance from the Environment Agency) and urban creep (allowance of 10%), managing surface water as close to the surface as possible and prioritising infiltration as a means of surface water disposal. There should be no increase in the current greenfield runoff rate and the LLFA require that this should be measured in l/s/ha for all proposed development sites.

It should be confirmed prior to commencement of works which organisation will be responsible for SuDS maintenance once the development is completed. The LLFA also strongly encourage that the developer should take into account designing drainage systems for exceedence working with the natural topography of the site, utilising natural mini sub-catchments.

HISTORICAL DATA:

According to LLFA held datasets, there is 1 incidence of flooding from an unknown source approximately 100 metres from the south east of the site. Additionally, 130 metres to the north of the site, there is an incidence of sewer flooding reported to the LLFA. There are seven records of highway flooding held by the LLFA along the southern boundary of the site, on Occupation Lane, attributed to the ponding of surface water within the highway. South Derbyshire District Council may hold further information on these flooding events.

FLUVIAL DATA (ORDINARY WATERCOURSE AND MAIN RIVER WHERE APPLICABLE):

The LLFA note that several ordinary watercourses are located within the site boundary, including an ordinary watercourse following the northern boundary of the site, an ordinary watercourse along the eastern boundary of the site and an ordinary watercourse flowing east-west across the site flowing into a pond located within the west of the site.

The LLFA do not generally undertake or hold any data relating to modelling on specific ordinary watercourses. The applicant is advised to contact the Environment Agency who hold modelling data for Main Rivers and some ordinary watercourses.

Due to the historic mining and mineral extraction operations in Derbyshire, networks of old stone soughs (drainage channels, sometimes known as adits) may exist beneath the ground surface in parts of the County (particularly North East Derbyshire District, High Peak Borough, Derbyshire Dales District and the

BRITISH GEOLOGICAL SURVEY DATA:

It is recommended that a site specific ground investigation is undertaken for the site.

OTHER RELEVANT INFORMATION AND COMMENTS:

The County Council do not hold any records for sewer flooding (DG5). Please contact your local water company for this information.

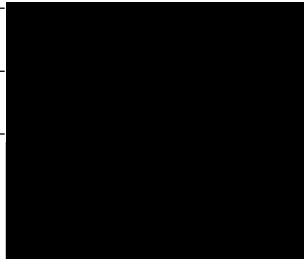
The County Council do not adopt any private SuDS schemes. As such, it should be confirmed prior to commencement of works which organisation will be responsible for SuDS maintenance once the development is completed.

Any works in or nearby to an ordinary watercourse require consent from the LLFA (e.g. an outfall that encroaches into the profile of the watercourse, etc.) under the Land Drainage Act (1991). Upon receipt of any application (including the legislative fee) the LLFA has an 8 week legislative period in which to make a decision and either consent or object the proposals. If the applicant wishes to make an application for any works please contact Flood.Team@derbyshire.gov.uk.

The LLFA are currently formulating Local Guidance for planning applications for major development with surface water implications. In the interim period and as this information may be used to inform an application for major development to which the LLFA are a statutory consultee it should be noted the minimum details required on all major planning applications (at outline) are as follows:

- Site plan and impermeable area
- Topographic survey of the site
- Appropriate evidence to support how the site will drain (photographs / maps / a confirmation letter from a water company)
- Basic calculations of the greenfield/brownfield runoff and discharge rates, in l/s/Ha, for the site
- A quick storage estimate to show the required storage volume of surface water on site and an indication of the likely location
- Calculations should include allowances for the current Environment Agency guidance for climate change and urban creep
- Basic ground investigation (desktop survey as a minimum)
- Evidence of consideration of a variety of SuDS methods

These details are required at the early planning stage to demonstrate that the proposed site is able to drain and that due consideration has been given to the space required on site for surface water storage.

COMPLETED BY:		DATE:	13/03/2018
CHECKED BY:		DATE:	14/03/2018
SIGNATURE:			
DATE SUBMITTED TO LPA:	19/03/2018		

The County Council holds a suite of information that can inform site development across Derbyshire. The information within this document has been interpreted and provided by an officer from the flood risk management team.

- Historical data has been collated from a range of sources and is anecdotal. The provision of this data is suggested to act as a guide only.
- Fluvial data has been provided by the Environment Agency however the applicant is advised to contact the Environment Agency for further information should the site lie within the floodplain of a Main River.
- The County Council hold BGS data under a licenced agreement and therefore are not licenced to reproduce this information into the public domain.
- The County Council have modelled surface water flooding for the whole of Derbyshire. The model output gives an indication of the broad areas likely to be at risk of surface water flooding and is intended to act as a guide only and cannot be used to identify specific properties at risk.
- Further information regarding the Water Framework Directive, ecology and biodiversity should be obtained from the Environment Agency and Natural England.

Curtins Consulting,
Merchant Exchange,
17-19 Whitworth Street West,
Manchester,
M1 5WG.

FAO: Andrea McGee

15th March 2018



Severn Trent Water

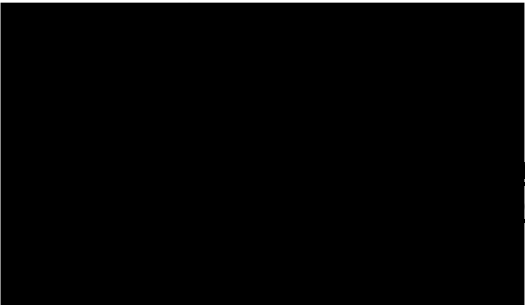
Severn Trent Water Ltd
Leicester Water Centre
Gorse Hill
Anstey
Leicester
LE7 7GU

Tel: 02477716843
www.stwater.co.uk

Contact:
Emma Nowak

Email:
Net.Dev.East@SevernTrent.co.uk

Our ref: 8302096



**ment (300 dwellings with 5.8 Ha employment
ote, DE11 8EX.**

I refer to your Development Enquiry Request submitted in respect of the above site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes (SGN) referred to below.

Public Sewers in Site – Required Protection

Sewer Records show there is a 600mm public surface water sewer close to/within the boundary of the proposed development. This will require a 10m easement about the pipe's centreline where no building or planting of trees shall be permitted.

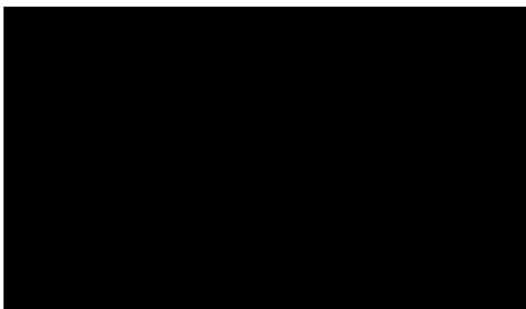
Please note: *On 1st October 2011 many private sewers were transferred into the ownership of Severn Trent Water as public sewers, where two or more properties in separate ownership are served by those sewers. Most of these former private sewers will not be shown on the public sewer records, therefore a full site survey should be carried out prior to any layout design or construction works to identify where these sewers may be and to avoid later delays and possible added costs.*

Foul Water Drainage

Sewer Records show that the closest gravitational FW connection point would be to the 150mm FW sewer south of the site at MH8501. According to our calculations the foul water discharge from 300 dwellings & 5.8 ha would equate to approximately 5 litres / second.

Based on the information that you have provided and our desk top assessment, we feel that modelling of the site is required. This will enable us to ensure that we fully understand the impact of your proposals on our network. As this development does

not currently have planning approval we will contact you in due course for further information to enable us to carry out the modelling exercise. In the meantime if you could provide further information when available on any possible phasing and build programme updates, any planning progress or any changes to the proposed dwelling numbers which may affect how we have currently moderated the risk from your site that would be greatly appreciated. In a change to our previous process, we no longer charge developers for the hydraulic modelling service. We will liaise with you over time with regard to the outcome of our investigations and any impact that may have on the planning status, occupation, or phasing of the site. However while we can provide a brief summary of our findings if you need us to, we will no longer provide the full report.



ge proposals based on these comments for review

Under the terms of Section H of the Building Regulations 2000, the disposal of surface water by means of soakaways should be considered as the primary method. If this is not practical and no watercourse is available as an alternative, the use of sewerage should be considered. In addition, other sustainable drainage methods should also be explored before a discharge to the public sewerage system is considered.

In the event that following testing, it is demonstrated that soakaways would not be possible on the site; satisfactory evidence will need to be submitted. The evidence should be either percolation test results or a statement from the SI consultant (extract or a supplementary letter). This would satisfy Supplementary Guidance Notes 1 (SGN1 enclosed).

Sewer Records show a local watercourse running through the proposed development. It is advised that all SW flows should discharge to the watercourse subject to the EA's approval.

No surface water to the public sewers will be authorised until all other options have been exhausted.

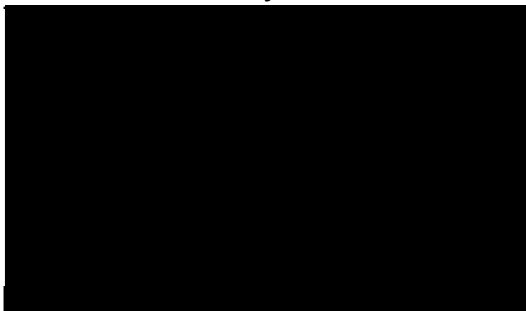
Please submit surface water drainage proposals based on these comments for review when available. Any flows in excess of the agreed discharge rate will have to be satisfactorily attenuated within the development site and discharged at a controlled rate.

New Connections

For any new connections (including the re-use of existing connections) to the public sewerage system, you will need to submit a Section 106 application form. Our New Connections department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 7076600 or download from www.stwater.co.uk.

Please quote 8302096 in any future correspondence (including e-mails) with STW Limited. Please note that 'Development Enquiry' responses are only valid for 6 months from the date of this letter.

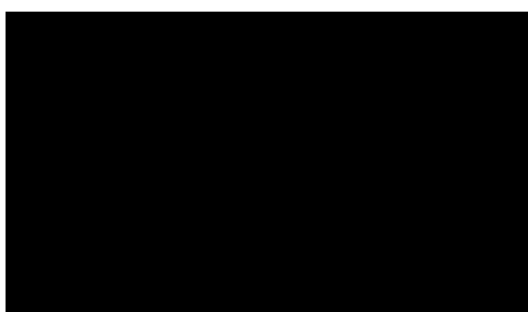
Yours sincerely,



Emma Nowak.
Asset Protection East.
Asset Management.
Wholesale Operations.

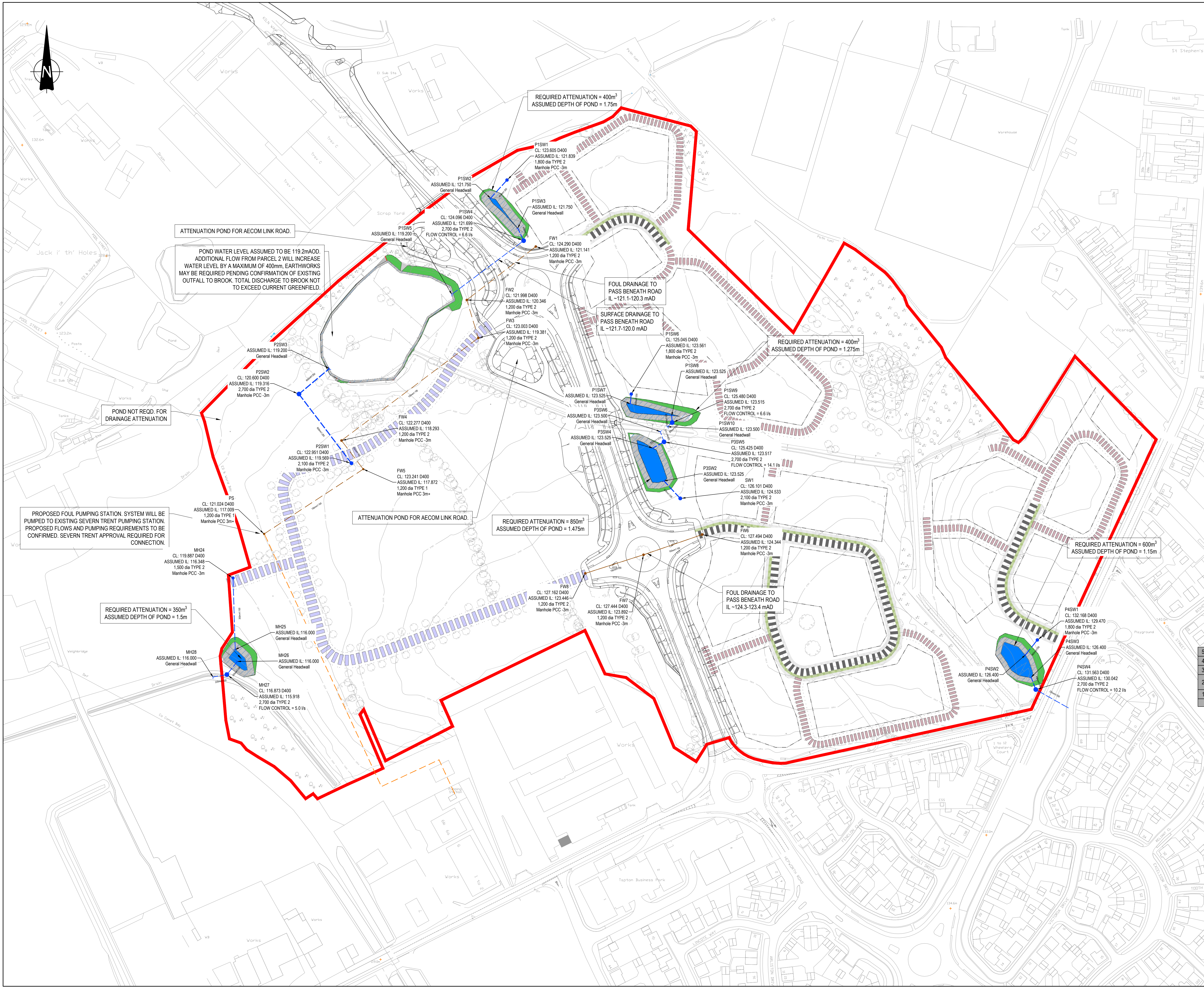


Severn Trent Water



Appendix D

Drainage Strategy



GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. FOR GENERAL NOTES REFER TO DRAWING.
5. PLOT LAYOUT TO BE CONFIRMED BY THE ARCHITECT.
6. ATTENUATION REQUIREMENTS ARE APPROXIMATE AND TO BE CONFIRMED AT DETAILED DESIGN STAGE.
7. NO INFILTRATION IS ACCOUNTED FOR IN THE RESULTS SHOWN.

KEY

SITE BOUNDARY

PROPOSED ATTENUATION POND - DISCHARGE LIMITED BY HYDROBRAKE CHAMBERS

SWMH

SIA SW SEWER

FWMH

SIA FW SEWER

INDICATIVE FOUL RISING MAIN

5	P05	MASTERPLAN AMENDMENTS	23/07/19	JDB	AR
4	P04	BOUNDARIES AMENDED	19/07/19	JDB	AR
3	P03	UPDATED FOR PLANNING	17/07/19	JDB	WIP
2	P02	UPDATED TO INCLUDE AECOM HIGHWAY DRAINAGE & CHANGES TO MASTERPLAN	12/03/19	RM	AR
1	P01	ISSUED FOR CO-ORDINATION (S1)	26/04/18	JDB	AD
Rev.			Description:	Drawn By:	Checked By:



Merchant Exchange, 17-19 Whitworth Street, West Manchester M1 5WG
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Status: **ISSUED FOR CO-ORDINATION** **S1**

Project: **HARWORTH ESTATES WOODVILLE**

Dwg Title: **SKETCH OUTLINE DRAINAGE PLAN**

Size:	A1	Date:	02/05/2018	Drawn By:	JDB	Designed By:	JDB	Checked By:	AD
Scale:	1:1,250	Project No:	067895	Originator:	CUR	Volume:	00	Level:	XX
		Type:	DR	Role:	D	Category/Number:	03001		P05

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