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Question 10

Q10

**Is the building which is or forms part of the property at risk of internal flooding due to overloaded public sewers?**

No

The property is not recorded as being at risk of internal flooding due to overloaded public sewers.

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Guidance Notes

A sewer is "overloaded" when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded. "Internal flooding" from public sewers is defined as flooding which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes. "At Risk" properties are those that the Sewerage Undertaker is required to include in the Regulatory Register that is reported annually to the Water Services Regulation Authority. These are defined as properties that have suffered or are likely to suffer internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Sewerage Undertaker's reporting procedure. Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the "At Risk" register. Please note that from 1st October 2011 the majority of private sewers and lateral drains connected to the public network as of 1st July 2011 transferred into public ownership. Details of formerly private sewers at risk from internal flooding are not recorded in the Regulatory Register and will not be added until a flooding occurrence. There may therefore be public sewers at risk from internal flooding that are not recorded on the "At Risk" register.

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Question 11

Q11

**Please state the distance from the property to the nearest boundary of the nearest sewage treatment works.**

See Details

The nearest sewage treatment works is 1.954 KM to the South West of the property. The name of the nearest sewage treatment works is Leek .

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Guidance Notes

The nearest sewage treatment works will not always be the sewage treatment works serving the catchments within which the property is situated. The Sewerage Undertakers records were inspected to determine the nearest sewage treatment works. It should be noted therefore that there may be private sewage treatment works closer than the one detailed above that have not been identified.

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## Question 12

Q12

### Is the property connected to mains water supply?

Records indicate that the property is not connected to mains water supply and water is therefore likely to be provided by virtue of a private supply.

No

#### Guidance Notes

The connection status of the property is based on information held on the billing records by the responsible water company. This property maybe connected to a private water supply or indirectly supplied by a third party who is connected to the public water supply and it is recommended this is checked with the current owner. Details of private supplies or third party private arrangements are not kept by the Company.

## Question 13

Q13

### Are there any water mains, resource mains or discharge pipes within the boundaries of the property?

The map of waterworks does not indicate any water mains, resource mains or discharge pipes within the boundaries of the property.

No

#### Guidance Notes

The approximate boundary of the property has been determined by reference to the Ordnance Survey record. The presence of a public water main, resource main or discharge pipe within the boundary of the property may restrict further development within it. Water Undertakers have a statutory right of access to carry out work on their assets, subject to notice. This may result in employees of the Company or its contractors needing to enter the property to carry out work.

## Question 14

Q14

### Is any water main or service pipe serving, or which is proposed to serve the property, the subject of an existing adoption agreement or an application for such an agreement?

Records confirm that water mains or service pipes serving the property are not the subject of an existing adoption agreement or an application for such an agreement.

No

#### Guidance Notes

Where the property is part of a very recent or ongoing development and the water mains and service pipes are not the subject of an adoption application, buyers should consult with the developer to confirm that the Water Undertaker will be asked to provide a water supply to the development or to ascertain the extent of any private water supply system for which they will hold maintenance and renewal liabilities.

**Question 15**

**Q15**

**Is the property at risk of receiving low water pressure or flow?**

Records confirm that the property is not recorded on a register kept by the Water Undertaker as being at risk of receiving low water pressure or flow.

**No**

**Guidance Notes**

'Low water pressure' means water pressure below the regulatory reference level which is the minimum pressure when demand on the system is not abnormal. Water Undertakers are required to include in the Regulatory Register that is reported annually to the Water Services Regulation Authority properties receiving pressure below the reference level, provided that allowable exclusions do not apply (i.e. events which can cause pressure to temporarily fall below the reference level). Water Companies are required to include in the Regulatory Register that is reported annually to the Director General of Water Services properties receiving pressure below the reference level, provided that allowable exclusions do not apply (i.e. events which can cause pressure to temporarily fall below the reference level). The reference level of service is a flow of 9 litres/minute at a pressure of 10 metres head on the customer's side of the main stop tap (mst). The reference level of service must be applied on the customer's side of a meter or any other company fittings that are on the customer's side of the main stop tap. The reference level applies to a single property. Where more than one property is served by a common service pipe, the flow assumed in the reference level must be appropriately increased to take account of the total number of properties served. For two properties, a flow of 18 litres/minute at a pressure of 10 metres head on the customer's side of the mst is appropriate. For three or more properties the appropriate flow should be calculated from the standard loadings provided in BS6700 or Institute of Plumbing handbook. Allowable exclusions: The Company is required to include in the Regulatory Register properties receiving pressure below the reference level, provided that allowable exclusions listed below do not apply. Abnormal demand: This exclusion is intended to cover abnormal peaks in demand and not the daily, weekly or monthly peaks in demand which are normally expected. Companies should exclude from the reported DG2 figures properties which are affected by low pressure only on those days with the highest peak demands. During the report year Companies may exclude, for each property, up to five days of low pressure caused by peak demand. Planned maintenance: Companies should not report under DG2 low pressures caused by planned maintenance. It is not intended that Companies identify the number of properties affected in each instance. However, Companies must maintain sufficiently accurate records to verify that low pressure incidents that are excluded from DG2 because of planned maintenance are actually caused by maintenance. One-off incidents: This exclusion covers a number of causes of low pressure, mains bursts, failures of Company equipment (such as PRVs or booster pumps), firefighting and action by a third party. However, if problems of this type affect a property frequently, they cannot be classed as one-off events and further investigation will be required before they can be excluded.

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Question 16

Q16

**Please include details of a water quality analysis made by the Water Undertaker for the water supply zone in respect of the most recent calendar year.**

Pass

The analysis confirmed that all tests met the standards prescribed by the 2000 Regulations or the 2001 Regulations.

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Guidance Notes

The response to this question provides information about the water supply zone within which the property is situated. Water companies are responsible for ensuring that the water provided is wholesome and is safe to drink. The quality of drinking water is monitored throughout the various stages of treatment and distribution. This includes source water abstractions, reservoirs and aquifers; the treatment process and finished treated water; the distribution system; and finally water at customers taps. The standards which must be complied with are some of the tightest in the world. They incorporate standards from the European Drinking Water Directive and UK Legislation (National Standards). These standards are used to monitor compliance against microbiological and chemical standards, including aesthetic standards such as colour, clarity and taste. Thousands of sample tests are carried out in a year. Sampling is carried out at randomly selected customer properties usually at the cold water tap in the kitchen. On rare occasions where a standard is not met an immediate investigation is carried out and remedial actions initiated as necessary. This includes consultation with Public Health Doctors and Environmental Health teams. The majority of these cases are minor or temporary in nature and are often associated with the condition or maintenance of the plumbing within an individual property. Customers are normally advised by letter of any specific individual property issues and a copy would be available from the vendor, if applicable. For further information on water quality information for a postcode, and facts leaflets on water quality, please contact the responsible water company. The primary responsibility for enforcing the standards and regulations lies with the Drinking Water Inspectorate (DWI). They independently assess the performance of all water companies and undertake technical audits of procedures and assets. They also produce an annual independent report summarising the performance of the water company.

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Question 17

Q17

**Please include details of any departures, authorised by the Secretary of State under Part 6 of the 2000 Regulations, from the provisions of Part 3 of those Regulations; or authorised by the Welsh Ministers under Part 6 of the 2001 Regulations, from the provisions of Part 3 of those Regulations.**

N/A

There are no such authorised departures for the water supply zone.

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Guidance Notes

Authorised departures are not permitted if the extent of the departure from the standard is likely to constitute a potential danger to human health. Please contact your Water Company if you require further information.

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**Question 18**

**Q18**

**Please include details of the location of any water meter serving the property.**

Records indicate that the property is not served by a water meter. Where the property is not served by a meter and the customer wishes to consider this method of charging they should contact:

**N/A**

Severn Trent Water  
Sherbourne House  
St Martins Road  
Coventry  
CV3 6SD

Tel: 0845 7500 500 For Billing Enquiries only  
Tel: 0845 7090 646 For Metering Enquiries only  
Tel: 0115 971 3550 For Search Enquiries only

<http://www.stwater.co.uk>

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**Question 19**

**Q19**

**Who are the Sewerage and Water Undertakers for the area?**

The Sewerage Undertakers for the area are:

**See Answer**

Severn Trent Water  
Sherbourne House  
St Martins Road  
Coventry  
CV3 6SD

Tel: 0845 7500 500 For Billing Enquiries only  
Tel: 0845 7090 646 For Metering Enquiries only  
Tel: 0115 971 3550 For Search Enquiries only

<http://www.stwater.co.uk>

The Water Undertakers for the area are:

Severn Trent Water  
Sherbourne House  
St Martins Road  
Coventry  
CV3 6SD

Tel: 0845 7500 500 For Billing Enquiries only  
Tel: 0845 7090 646 For Metering Enquiries only  
Tel: 0115 971 3550 For Search Enquiries only

<http://www.stwater.co.uk>

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**Question 20**

**Q20**

**Who bills the property for sewerage services?**

The property is not billed for sewerage services.

**N/A**

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**Question 21**

**Q21**

**Who bills the property for water services?**

The property is not billed for water services.

**N/A**

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**Question 22**

**Q22**

**What is the current basis for charging for sewerage and water services at the property?**

Records indicate that this property is not connected for sewerage and water services.

**Not Connected**

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[Guidance Notes](#)

Water and Sewerage Companies full charges are set out in their charges schemes which are available from the Company free of charge upon request.

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**Question 23****Q23****Is there a Consent to discharge Trade Effluent under S118 of the Water Industry Act, 1991 into the public sewer?****No Consent**

There is no Consent to Discharge Trade Effluent at this address. However, your client should be reminded that it is an offence under S129 of the Water Industry Act of Discharge Trade Effluent without Consent. If you have any queries please contact Operations Support Services, Severn Trent Water Limited, Raynesway, Derby, DE21 7JA. Tel: 01332 683369. Email: [commercial.waste@severntrent.co.uk](mailto:commercial.waste@severntrent.co.uk)

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**Guidance Notes**

Disputes between an occupier of a Trade Premises and the Sewerage Undertaker can be referred to the Director General of Water Services (OFWAT) on telephone number 0121 625 1300. Trade Effluent is defined by S141 of the Water Industry Act as "any liquid, with or without particles of matter in suspension in the liquid, which is wholly or in part produced in the course of any trade or industry carried on at trade premises" but does not include "domestic sewerage". As defined by the same Act as "any premises used or intended to be used for carrying on any trade or industry". Any Consent to Discharge Trade Effluent is used under S118 of the Water Industry Act 1991 and will be subject to certain conditions. Disputes between an occupier of a Trade Premises and the Sewerage Undertaker can be referred to the Director General of Water Service (OFWAT) on telephone number 0121 625 1300.

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## Glossary for Commercial Drainage and Water Search

Definition of terms:

**'the 1991 Act'** means the Water Industry Act 1991;

**'the 2000 Regulations'** means the Water Supply (Water Quality) Regulations 2000;

**'the 2001 Regulations'** means the Water Supply (Water Quality) Regulations 2001;

**'adoption agreement'** means an agreement made or to be made under Section 51A(1) or 104(1) of the 1991 Act;

**'bond'** means a surety granted by a developer who is a party to an adoption agreement;

**'bond waiver'** means an agreement with a developer for the provision of a form of financial security as a substitute for a bond;

**'calendar year'** means the twelve months ending 31st December;

**'discharge pipe'** means a pipe which discharges are made or are to be made under Section 165(1) of the 1991 Act;

**'disposal main'** means (subject to section 219(2) of the 1991 Act) any outfall pipe or other pipe which - (a) is a pipe for the conveyance of effluent to or from any sewage disposal works, whether of a Sewerage Undertaker or of any other person; and (b) is not a public sewer;

**'drain'** means (subject to Section 219(2) of the 1991 Act) a drain used for the drainage of one building or of any buildings or yards appurtenant to buildings within the same curtilage;

**'effluent'** means any liquid, including particles of matter and other substance in suspension in the liquid;

**'financial year'** means the twelve months ending with 31st March;

**'lateral drain'** means - (a) that part of a drain which runs from the curtilage of a building (or buildings or yards within the same curtilage) to the sewer with which the drain communicates or is to communicate; or (b) (if different and the context so requires) the part of a drain identified in a declaration of vesting made under Section 102 of the 1991 Act or in an agreement made under Section 104 of that Act;

**'licensed water supplier'** means a company which is the holder for the time being of a water supply license under Section 17A(1) of the 1991 Act;

**'maintenance period'** means the period so specified in an adoption agreement as a period of time - (a) from the date of issue of a certificate by a Sewerage Undertaker to the effect that a developer has built (or substantially built) a private sewer or lateral drain to that Undertakers satisfaction; and (b) until the date that private sewer or lateral drain is vested in the Sewerage Undertaker;

**'map of waterworks'** means the map made available under Section 198(3) of the 1991 Act in relation to the information specified in subsection (1A);

**'private sewer'** means a pipe or pipes which drain foul or surface water, or both, from premises, and are not vested in a Sewerage Undertaker;

**'public sewer'** means, subject to Section 106(1A) of the 1991 Act, a sewer for the time being vested in a Sewerage Undertaker in its capacity as such, whether vested in that Undertaker - (a) by virtue of a scheme under Schedule 2 to the Water Act 1989; (b) by virtue of a scheme under Schedule 2 to the 1991 Act; (c) under Section 179 of the 1991 Act; or (d) otherwise;

**'public sewer map'** means the map made available under Section 199(5) of the 1991 Act;

**'resource main'** means (subject to Section 219(2) of the 1991 Act) any pipe, not being a trunk main, which is or is to be used for the purpose of- (a) conveying water from one source of supply to another, from a source of supply to a regulating reservoir or from a regulating reservoir to a source of supply; or (b) giving or taking a supply of water in bulk;

**'sewerage services'** includes the collection and disposal of foul and surface water and any other services which are required to be provided by a Sewerage Undertaker for the purpose of carrying out its functions;

**'Sewerage Undertaker'** means the company appointed to be the Sewerage Undertaker under Section 6(1) of the 1991 Act for the area in which the property is or will be situated;

**'surface water'** includes water from roofs and other impermeable surfaces within the curtilage of the property;

**'trade effluent'** any liquid, either with or without suspended particles, which is wholly or partly produced in the course of any trade or industry carried on at trade premises. It does not include domestic sewage.

**'water main'** means (subject to Section 219(2) of the 1991 Act) any pipe, not being a pipe for the time being vested in a person other than the Water Undertaker, which is used or to be used by a Water Undertaker or licensed water supplier for the purpose of making a general supply of water available to customers or potential customers of the Undertaker or supplier, as distinct from for the purpose of providing a supply to particular customers;

**'water meter'** means any apparatus for measuring or showing the volume of water supplied to, or of effluent discharged from any premises;

**'water supplier'** means the company supplying water in the water supply zone, whether a Water Undertaker or licensed water supplier;







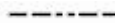

**'water supply zone'** in relation to a calendar year, means the names and areas designated by a Water Undertaker within its area of supply that are to be its water supply zones for that year;









**'Water Undertaker'** means the company appointed to be the Water Undertaker under Section 6(1) of the 1991 Act for the area in which the property is or will be situated.

In this Report, references to a pipe, including references to a main, a drain or a sewer, shall include references to a tunnel or conduit which serves or is to serve as the pipe in question and to any accessories for the pipe.

### Explanation of the main Map Keys

For an explanation of the full key, please visit <http://www.severntrentsearches.com/glossary>

Water Record		
Distribution Main		A local water main that distributes water supplies to premises within a geographical area
Trunk Main		A water main that provides water supplies to distribution mains or transfers water between water sources, water treatment works and reservoirs
Abandoned Main		A water main no longer in use that formerly supplied water and is still in existence
Aqueduct		A large diameter pipe that carries water from a water supply source to a water treatment works or reservoir
Protective Strip		A strip of land over the line of a water main within which no buildings should be placed or ground levels altered in order to protect the integrity of and access to the pipe
Discharge		A point where water can be flushed from a water supply system into a watercourse
Fire Main		A pipe that supplies water into an area to enable connections to be made solely for the purpose of extinguishing fires
Water Facility Connection		Inlet to a water pumping facility or outlet from a water pumping facility

Sewer Record		
Public Combined Gravity Sewer		A public sewer that is in the ownership and control of Severn Trent Water that drains by gravity and receives both foul and surface water flows from more than one property.
Public Foul Gravity Sewer		A public sewer that is in the ownership and control of Severn Trent Water that drains by gravity and receives foul water flows from more than one property.
Public Surface Water Gravity Sewer		A public sewer that is in the ownership and control of Severn Trent Water that drains by gravity and receives surface water flows from more than one property.
Abandoned Gravity Sewer		A sewer no longer in use that formerly received drainage by gravity and is still in existence.
Combined Use Pressurised Sewer		A public sewer that is in the ownership and control of Severn Trent Water through which both foul and surface water flows are pumped and receives drainage from more than one property
Foul Use Pressurised Sewer		A public sewer that is in the ownership and control of Severn Trent Water through which foul water flows are pumped and receives drainage from more than one property.
Foul Use Manhole		A vertical access shaft from ground level to a foul sewer to allow cleaning, inspection, connections and repairs
Sewage Pumping Facility		This is usually an underground facility which may be accommodated in an above ground building and pumps from a low-lying area to a higher one. Foul sewage and/or surface water flows from a sewerage system by gravity into the pumping station and the flows are then pumped into another sewerage system or to a sewage works.

## Guidance Notes

### General protection of sewers and water mains

The Water Industry Act 1991 gives rights to the Water Companies in respect of pipes which are their responsibility but which are situated in private land. These rights which are usually in respect of sewers or water mains; permit the Water Company to carry out future works on such pipes such as general repair and maintenance.

### Permitted activities/uses within the strip of land above such pipes

This strip of land, generally known as 'the sterilized strip', has statutory protection and its width varies according to the size and depth of the pipe in question.

#### Acceptable:

- Use of the strip of land for agricultural or garden purposes or as an open space
- Placing of fences over the line of the pipe which are of an easily removable nature
- Placing of sewers, drains, cables or wires within the strip of land, subject to prior consultation
- Construction of roads or access across the strip of land, subject to prior consultation

#### Unacceptable:

- Construction of any permanent building, wall or structure even for agricultural purposes or garden purpose expect in certain circumstances where our formal consent is given (please see below)
- Use the strip of land for any purpose which may endanger or damage the pipe
- Removal of any earth supporting the pipe
- Planting of trees or shrubs within the strip of land
- Alteration to the level of the strip of land whether by excavation or tipping of any materials
- Covering any apparatus on the surface of the strip of land e.g. manholes, air valves etc
- Making access to the pipe more difficult/expensive e.g. by special or ornamental surfacing

### Building over public sewers

Severn Trent Water is responsible for public sewers within its area and many public sewers cross private land. The Company have to ensure that no development is carried out which may damage a public sewer, cause risk of flooding or restrict future access for maintenance

Wherever possible Severn Trent Water prefers to avoid the need to build over or close to a sewer by repositioning the proposed development or diverting the sewer. "Close to" is normally defined as being within 3 metres of the sewer.

However, in some cases where the risk to the public sewer is small or can be reduced to acceptable levels and where diversion is not possible, Severn Trent may be willing to allow building over or close to a sewer.

Building close to or over a public sewer without having obtained our formal approval is illegal and it may also jeopardise the future sale of your property.

If you are unsure whether your building works affect a public sewer you can find out by calling the relevant office number, as detailed below:

	West Office	East Office
<b>Areas Covered</b>	Shropshire Staffordshire Worcestershire West Midlands (except Coventry) Powys Herefordshire	Nottinghamshire Derbyshire Leicestershire Warwickshire Coventry Lincolnshire Yorkshire Northamptonshire Cambridgeshire Oxfordshire
<b>Telephone Number</b>	01902 793 871	0116 2343 834
<b>Opening Times</b>	Mon-Thurs 08:00-17:00hrs Fri 08:30-16:30	Mon-Thurs 08:00-17:00hrs Fri 08:30-16:30
<b>Postal Address</b>	Severn Trent Water Ltd. Asset Protection West Regis Road Tettenhall Wolverhampton WV6 8RU	Severn Trent Water Ltd. Asset Protection East Gorse Hill Anstey Leicester LE7 7GU

## **Rights to discharge Trade Effluent**

All industrial waste waters (trade effluents) are subject to a discharge consent system under either the Water Resources Act 1991 or the Water Industry Act 1991.

Three categories of waste waters are can be discharged from commercial premises:

**Domestic Sewage** - effluent from staff toilets, wash hand basins, showers, and kitchen areas. This is also sometimes known as foul drainage and will usually be kept separate from the trade effluent whilst on the company site, although it is mixed once it reaches the main sewerage system. The charge for this is usually included as part of a water bill.

**Trade Effluent** - effluent from all processes on the site, including all rinse water, washing water and any other discharge related to the process (even if it is clean water). The local water company charge for this if it goes to sewer. Occasionally, effluent is discharged directly into a river or other water course: in this instance, the Environment Agency make a charge.

Trade effluent is legally defined as "any liquid, either with or without suspended particles, which is wholly or partly produced in the course of any trade or industry carried on at trade premises". It does not include domestic sewage.

**Rainwater** - rainwater from roofs, car parks and other outside areas discharges into a surface drainage system. This is separate from the foul drainage system and is regulated by the Environment Agency rather than the water company. Rainwater is either channelled to surface drains located in roads adjacent to the property or is sometimes discharged directly to a river or stream. There is not normally a charge for discharge of rainwater, although companies do have a duty to ensure it is not contaminated by oils or any other substance.

### **Consent to discharge**

The Water Industry Act gives companies the right to discharge to a public sewer but only with the prior consent or agreement of the water company.

Water companies maintain the sewerage system, provide treatment for the waste, and dispose of the final treated effluent. To allow them to do this effectively, they can impose special restrictions on an effluent before allowing the discharge.

These restrictions depend upon the type of treatment provided by the water company, the size of connecting sewers and the capacity of the waste water treatment works (WWTW). They can also include:

- the nature or composition of the effluent
- the maximum daily volume allowed
- the maximum rate of flow
- the sewer into which the effluent is discharged.

A number of other factors may also be included in a consent to discharge, eg the temperature or pH of the effluent. Certain substances are prohibited from being disposed of in this way.

In addition to the type and quality of the effluent, the Water Industry Act also gives the water companies the right to charge for carrying, treating and disposing of the waste.

**Complaint Procedure**

Whilst Severn Trent Searches has made every effort to ensure the information contained in this Commercial Drainage and Water Search is accurate we do accept that on occasions, customers may not be happy and seek clarification or confirmation that our records are correct. For such instances, Severn Trent Searches has developed a set of minimum standards that would apply when dealing with customer enquiries and complaints. These are listed below.

**Severn Trent Searches: Commercial Drainage and Water Search Complaint Procedure**

As a minimum standard Severn Trent Searches, PO Box 10155, Nottingham, NG1 9HQ.

We will endeavour to resolve any telephone contact or complaint at the time of the call, however, if that isn't possible, we will advise you on how soon we can respond. If you are not happy with our initial response, we will advise you to write in via email, fax or letter explaining the reasons why you are not satisfied.

We will investigate and research the matter in detail and provide a written response within 5 working days of receipt of your complaint.

Depending on the scale of investigation required, we will keep you informed of the progress and update you with new timescales if necessary.

If we find your complaint to be justified, or we have made any errors that change the outcome in your search result, we will automatically provide you with a revised search and also undertake the necessary action, as within our control, to put things right as soon as practically possible. Customers will be kept informed of the progress of any action required.

If the search takes us longer than 15 working days to complete and we have not communicated the reasons for the delay, we will provide the search free of charge.

A complaint will normally be dealt with fully within 20 working days of the date of its receipt. If there are valid reasons for the consideration taking longer, you will be kept fully informed in writing or via telephone or email as you prefer and receive a response at the very latest within 40 working days.

If you are still not satisfied with our response or action, we will refer the matter to a Senior Manager/ Company Director for resolution. At your request we will liaise with counseling organisations on your behalf.

Complaints should be sent to:

Customer Services  
Severn Trent Searches  
PO Box 10155  
Nottingham  
NG1 9HQ  
Tel: 0115 971 3550  
Email: [enquiries@severntrentsearches.com](mailto:enquiries@severntrentsearches.com)

## **Appendix 2**

## **Private Sewer Transfer - Notes for Property Owners and Conveyancers**

1st October 2011 saw the majority of private sewers and lateral drains within England and Wales transfer into the ownership of the relevant Sewerage companies.

### **The Transfer**

#### **Drains, lateral drains and sewers**

A drain is a disposal pipe serving a single property or properties within a single curtilage. A lateral drain is any section of that drain which extends beyond the curtilage of the property. A sewer is a disposal pipe serving two or more properties. Full legal definitions of these terms can be found in the Glossary.

#### **Assets transferred into public ownership**

The majority of all sewers and lateral drains that were connected to the public system prior to 1st July 2011 with the exceptions of any successful appeals.

Private pumping stations and associated apparatus will transfer by 1st October 2016.

#### **Assets not transferred into public ownership**

Any assets not connected prior to 1st July 2011. These will transfer under a secondary scheme at a later date.

Drains within the boundary of the property it serves.

Sewers on Crown Land (such as prisons) where notice has been received from the relevant authority that the sewers should be exempt.

Sewers owned by Railway Authorities.

Sewers and drains which do not discharge to the public system.

Drainage systems contained within a single property curtilage (e.g. retail parks, caravan parks).

Private Pumping stations and associated pressurised mains which serve one property.

Sewers where the owner successfully appeals to OFWAT to retain ownership (see below).

Private treatment works, septic tanks and cesspits.

#### **Appeals**

Any owner of a private sewer, lateral drain or pumping station had the right to appeal to OFWAT to retain ownership. These had to be lodged before 30th September 2011\* OFWAT will then determine whether the asset in question should be exempt from the transfer.

During the appeal process, the asset will remain private.

\*Appeals process differs slightly for pumping stations, Visit Ofwat's website for more details ([ofwat.gov.uk](http://ofwat.gov.uk)).

### **Procedures for new sewers from 2012**

#### **The Flood and Water Management Act 2010**

During 2012, Section 42 of the Flood and Water Management Act 2010 will come into force. It will then be a requirement for a Section 104 agreement to be in place prior to connection to the public system. A Section 104 agreement will need to be applied for and completed before the Sewerage Company grants a Section 106 (permission to connect to the public sewerage system) agreement. A new national Mandatory Build Standard will also be introduced specifying the standards to which new sewers must be built.

### **Issues for property owners**

#### **Liability**

Following the transfer the majority of property owners have a greatly reduced liability for repairs to the drainage system. Should the search indicate that the property is not connected to mains drainage or that there are no public assets near to the property, it is recommended that further investigations be made into the drainage arrangements, as the property owner may have a substantial liability.

#### **Sewers within property boundaries**

The transfer has resulted in a greater number of public sewers and lateral drains within property boundaries, many of which are not plotted on the Public Sewer Map. Property owners need to be aware that Severn Trent Water have statutory rights of access to land where their assets are located should they need to access the mains.

There are also formerly private sewers which have been built over without the Sewerage Undertaker's consent. Providing normal planning procedures were followed, this should not present any significant issues, although property owners need to be aware that the Sewerage Undertaker may need to access the sewer.

#### **Developing Properties**

Building over or close to a public asset requires consent from Severn Trent Water. This includes newly transferred private sewers and lateral drains within property boundaries. Full details can be found on the Severn Trent Water website. Should you wish to develop a property, Severn Trent Searches are able to arrange a survey of both private and public drainage at a property. This survey meets the required standard to accompany an application to build over or close to a public sewer made to Severn Trent Water.

#### **What to do if there is a Blockage in the Sewer within the Property Boundary**

If there is a problem with a pipe within the property boundary, the occupier should call Severn Trent Water on 0800 783 4444. If the pipe is within the property boundary, the Sewerage Undertaker will then decide whether this is a private matter or if they are responsible. The Sewerage Undertaker may charge the homeowner for clearing a blockage etc for which they are not responsible. Any works needed would be agreed beforehand.

## Changes to Drainage and Water searches

### **Section 104 sites**

The transfer applied to sites undergoing adoption under Section 104 of the Water Industry Act. However, some assets on these sites, such as pumping stations and surface water sewers which do not connect to the public system, were either exempt from the transfer or will transfer at a later date. In these circumstances the search will continue to show a Section 104 agreement in place.

### **Sewers and lateral drains within property boundaries**

Because private sewers were not previously required to be recorded on the public sewer records there will be circumstances when we are unable to confirm the location of newly transferred sewers. On these occasions, the CON29DW report will advise as to whether there is likely to be a public asset within the boundary.

### **Proximity of sewers to the property**

The majority of properties particularly within urban areas, will have public sewers within 100 feet (30.48 metres). In the case of newly transferred assets not being shown on public sewer record, there will be many occasions when we are unable to confirm this. In these circumstances we will advise whether there are likely to be assets in close proximity to the property. The absence of nearby public sewers could result in a property owner having a substantial liability for repairs to the drainage system.

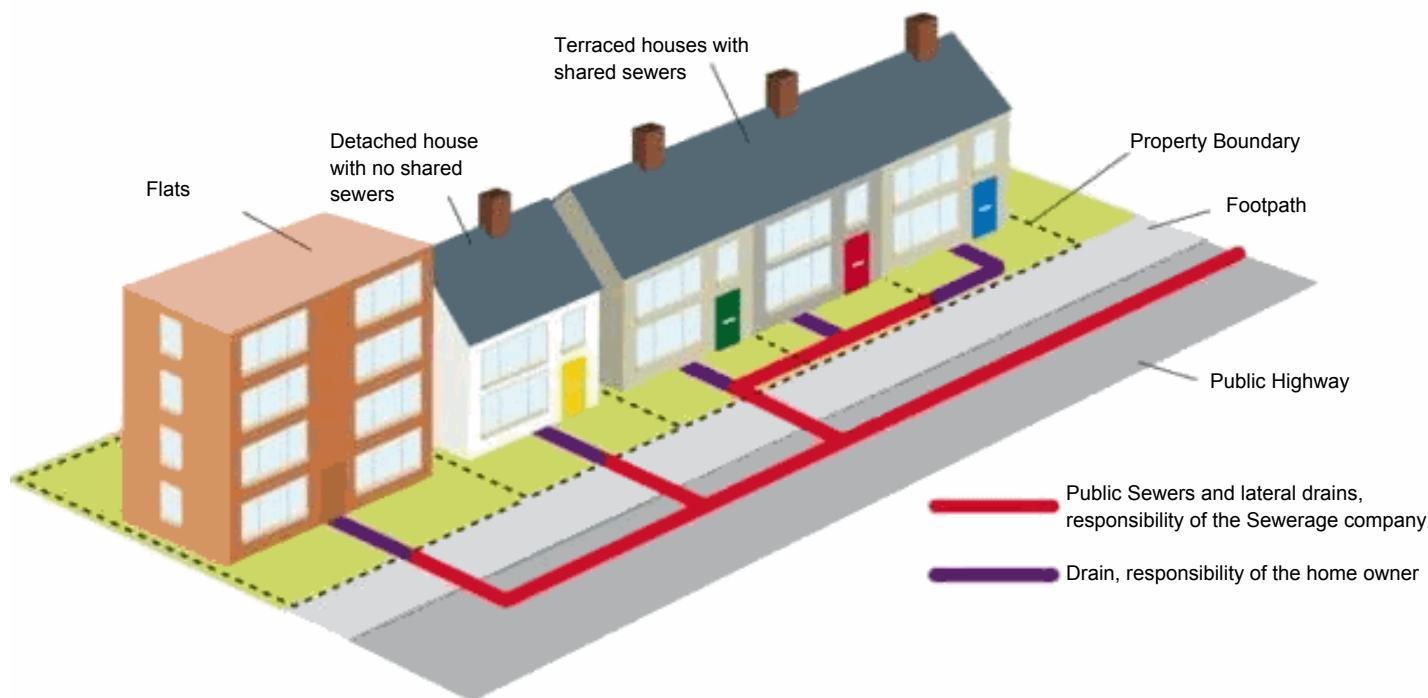
### **Building over public sewers**

A number of formerly private sewers have been built over and are now the responsibility of Severn Trent Water. Although the search will highlight whether there has been a build over enquiry to Severn Trent Water this will only apply to sewers which were public at the time of development.

### **Sewer flooding**

Whilst the search will still report the risk of sewer flooding to a property, following the transfer there may be the possibility of sewer flooding from newly transferred sewers which will not have been previously recorded. The register will be updated as and when there is an occurrence.

### **Typical Examples**



This diagram reflects some common scenarios following the sewer transfer.

#### **Terraced Properties**

It is common for terraced properties to have a public sewer passing within the property boundary. There are some exceptions, such as an end terrace that is upstream of the other properties as the section of drain will only serve that one property and so will remain private. Besides the situation shown in the diagram, an alternative arrangement is for terraced houses to be served by a shared sewer to the rear which may also run in passageways between properties to join the main sewer in the highway.

#### **Semi-detached**

The majority of semi-detached properties are connected to the public sewer via a shared connection. The section of drain which serves both properties is now public. Typically, the public sewer will be within the boundary of the property which is downstream on the drainage system as most sewers work on a gravity system.

#### **Detached Properties**

It is common for most detached properties to be connected to the public sewer via a direct connection. Therefore, for many detached properties it is unlikely that assets within the boundary of the property will have transferred. But the individual drainage arrangements at a specific property should be checked if details are required.

#### **Flats/Apartments**

Any shared drainage systems within a property curtilage remain private. This means with flats, only drains and sewers outside the boundary have transferred.

## COMMERCIAL EXTRA DRAINAGE AND WATER SEARCH TERMS & CONDITIONS

These Terms govern the basis on which the Report is supplied and the basis upon which the Customer and the Client have relied upon the Report.

### Definitions

'Apparatus' means the sewers, disposal mains or lateral drains, water mains, resource mains or discharge pipes and associated infrastructure for which an Undertaker holds statutory responsibility under the Water Industry Act 1991 shown on the map attached to the Report;

'Client' means the person who is the intended recipient of the Report with an actual or potential interest in the Property.

'Company' means Severn Trent Retail and Utility Services Limited, the company producing the Report.

'Customer' means the person placing the Order, either on its own behalf as Client, or, as an agent for or a reseller to a Client.

'Order' means any request completed by the Customer requesting the Report in accordance with the Company's order procedure.

'Report' means the drainage and/or water report prepared by the Company in respect of the Property.

'Partner Undertakers' means Severn Trent Water Plc or South Staffordshire Water Plc.

'Person' means any individual, firm, body corporate, unincorporated association or partnership.

'Property' means the address or location supplied by the Customer in the Order which satisfies one or more of the requirements set out in paragraph 2.1.

'Purpose' shall have the meaning set out in paragraph 2.2.

'Terms' means these Commercial Extra Drainage and Water Search Terms and Conditions.

'Third Party Undertaker' means any Undertaker other than a Partner Undertaker.

'Undertaker' means a Sewerage and/or Water Undertaker (both as defined in the Water Industry Act 1991) providing water and sewerage services.

### 1. Agreement

**1.1** The Company agrees to supply the Report to the Customer and, if applicable, the Customer shall provide the Report to the Client, subject to these Terms to the exclusion of all other terms and conditions including any terms and conditions which the Customer and/or Client purports to apply under any Order, confirmation of Order or any other document. The scope and limitations of the Report are described in paragraph 2 of these Terms.

**1.2** Where the Customer is not the Client, then the Customer shall ensure that these Terms are brought to the attention of the Client on or prior to the Customer placing the Order and that the Terms are provided with any copy of the Report provided by the Customer to the Client. The Customer is responsible for making sure that the Client is aware of the limitations and exclusions that are contained in these Terms and must draw the Client's attention to any disclaimers set out in the Report.

**1.3** The Customer agrees that the placing of an Order for a Report indicates its acceptance of these Terms.

**1.4** Where the Customer is placing an Order on behalf of a Client, it warrants and represents to the Company that it is authorised to accept these Terms on behalf of the Client and to bind the Client to these Terms.

### 2. The Report

**2.1** This Report should only be used where the Property, which is the subject of the Report, is used for carrying out a trade or business. This Report should not be used if the Property is a residential, domestic property.

**2.2** The Report is produced solely for use by the Client for the intended purpose of the Report (the "**Purpose**"). The Purpose is the identification of the location and connection of existing drainage (save that which is identified in clause 2.3.7) and/or water services at the Property in relation to the individual commercial property transaction in respect of the Property which is in the contemplation of the Client at the time of ordering the Report the Company shall not be liable in any circumstances in connection with the Report if it is used for any other purpose.

**2.3** Whilst the Company will use its reasonable care and skill in producing the Report, it is provided to the Customer on the basis that the Customer and the Client acknowledge and agree to the following:-

**2.3.1** the information contained in the Report details only the location and connection of existing drainage and/or water services at the Property at the date stated in the Report;

**2.3.2** the Company's obligation in respect of the Report is to correctly reproduce and compile the information provided by the Partner Undertakers and any Third Party Information (in accordance with paragraph 3.8);

**2.3.3** the Report does not give details about the actual state or condition of the Property or the existing drainage and/or water services nor should it be used or taken to indicate actual suitability or unsuitability of the Property for any particular purpose, or relied upon for determining saleability or value, or used as a substitute for any physical investigation or inspection. Further advice and information from appropriate experts and professionals should always be obtained if the Customer or the Client requires;

**2.3.4** the information contained in the Report is dependent upon the accuracy of the information supplied by the Customer or Client including, but not limited to the address of the Property and any plan of the Property;

**2.3.5** the statements in the Report marked as 'Guidance Notes' are intended to be general statements and advice in addition to the report on the Property. The Company cannot ensure that any such guidance notes are accurate, complete or valid and accepts no liability for such general statements and advice provided; and

**2.3.6** the position and depth of any Apparatus shown on any maps attached to the Report is approximate, and is intended as a general guide only and no warranty as to its correctness is given or implied and the Company shall have no liability for any inaccuracy in respect of the position of the Apparatus shown on any map. The exact positions and depths should be obtained by excavation trial holes and the maps must not be relied on in the event of excavation or other works made in the vicinity of the Apparatus.

**2.3.7** subject to the terms of this agreement, the Company is not liable to the Customer or the Client where the report does not provide details about the private sewers, drains, lateral drains, pumping stations and any associated apparatus that have transferred into the Undertaker and/or Partnership Undertaker's and/or the Third Party Undertaker's ownership as a direct result of the 'The Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011' and which are not shown on the public sewer record at the point at which the search was completed.

**2.4** The Client and/or Customer shall notify the Company as soon as is practicable if it becomes aware of any defect or inaccuracy in the Report.

### 3. Limitation of Liability

**3.1** The Company does not exclude its liability (if any) to the Customer and/or the Client:

**3.1.1** for personal injury or death resulting from the Company's negligence;

**3.1.2** for any matter for which it would be illegal for the Company to exclude or to attempt to exclude its liability; or

**3.1.3** for fraud.

**3.2** Subject to paragraph 3.1 the Company accepts no responsibility for and excludes its liability (whether for breach of contract, negligence or any other tort, under statute or statutory duty, restitution or otherwise at all) for:

**3.2.1** any inaccuracy or error in the Report based on incomplete or inaccurate information supplied by the Customer and/or the Client;

**3.2.2** any use of the Report by the Customer for any purpose other than the Purpose;

**3.2.3** any inaccuracy or error in information provided by any Third Party Undertaker;

**3.2.4** any error in a Report, which is based on any error or inaccuracy in a public register; or

**3.2.5** any change in the location and connection of existing drainage and/or water services at the Property after the date stated in the Report.

**3.3** Except as provided in paragraph 3.1 and paragraph 3.4 the Company's entire liability in respect of all causes of action arising by reason of or in connection with the Report (whether for breach of

contract, negligence or any other tort, under statute or statutory duty or restitution or otherwise at all) shall not exceed £5,000,000.

**3.4** Except as provided in paragraph 3.1, the Company will be under no liability to the Customer and/or the Client whatsoever (whether in contract, tort (including negligence), breach of statutory duty, restitution or otherwise) for any indirect or consequential loss (both of which terms include, without limitation, pure economic loss, loss of profits, loss of business, depletion of goodwill and like loss) however caused arising out of or in connection with these Terms and/or the provision of the Report.

**3.5** Except as set out in paragraph 3.1, the Company hereby excludes to the fullest extent permissible in law, all conditions, warranties and stipulations, express (other than those set out in these Terms) or implied, statutory, customary or otherwise which, but for such exclusion, would or might subsist in favour of the Customer and/or the Client.

**3.6** The Company shall not be in breach of these Terms or otherwise liable to the Customer and/or the Client for any failure to provide or delay in providing the Report to the extent that such failure or delay is due to an event or circumstance beyond the reasonable control of the Company including but not limited to any delay, failure of or defect in any machine, processing system or transmission link or any failure or default of a supplier or sub-contractor of the Company or any provider of any third party Information except to the extent that such failure or delay is caused by the negligence of the Company.

**3.7** Where the Customer sells this Report to a Client under its own name or as a reseller of the Company (other than in the case of a bona fide legal adviser recharging the cost of the Report as a disbursement) the Company shall not in any circumstances (whether for breach of contract, negligence or any other tort, under statute or statutory duty, restitution or otherwise at all) be liable to the Customer for any loss (whether direct, indirect or consequential loss (all three of which terms include without limitation, pure economic loss, loss of profit, loss of business, depletion of goodwill and like loss)) or damage whatsoever caused in respect of the Report or any use of the Report or reliance placed upon it and the Customer shall indemnify and keep indemnified the Company in respect of any claim by the Client that the Company may incur or suffer.

**3.8** Where the Property falls within a geographical area where two or more different Undertakers provide water and sewerage services, the Company shall use extracts from reports provided by Third Party Undertakers in respect of the part of the Property that falls within the provision of services by Third Party Undertakers and such information shall not be produced specifically for the Company ("**Third Party Information**"). Liability for accuracy of the Third Party Information used for the purpose of the Report will remain with that Third Party Undertaker and is subject to the Third Party Undertakers' terms and conditions of supply of such reports. The Company gives no warranty as to the correctness, accuracy or completeness of the Third Party Information and provided that the Company reproduces the Third Party Information in the Report correctly, the Company excludes all liability (whether for breach of contract, negligence or any other tort, under statute or statutory duty, restitution or otherwise) for any Third Party Information.

**3.9** If the Customer and/or Client is acting as a consumer in purchasing the Report, then in respect of the party dealing as a consumer (the "**Consumer**"), the provisions of paragraphs, 3.3 to 3.5 shall not be deemed to apply and subject to paragraph 3.1, the Company shall only be liable to the Consumer for losses which the Consumer suffers as a result of the Company not providing the Report in accordance with these Terms. The Company is not responsible to the Consumer for any losses which it may incur which were not a foreseeable consequence of the Company breaching these Terms, including if the Consumer and the Company could not have contemplated those losses before or when the parties entered into these Terms. The Company's liability to the Consumer shall not in any circumstances include any business losses that it may incur, including but not limited to lost data, lost profits or business interruption.

### 4. Copyright and Confidentiality

**4.1** The Customer acknowledges and where the Customer is not the Client, the Customer shall procure that the Client acknowledges that the Report is confidential to the Customer and/or the Client and may only be used by the Customer and/or the Client for the Purpose and the proper performance of these Terms.

**4.2** The copyright and any other intellectual property rights in the Report shall remain the property of the Company. No intellectual or other property rights are transferred or licensed to the Customer or the Client except to the extent expressly provided in these Terms. The maps contained in the Report are protected by Crown Copyright and must not be used for any purpose not anticipated by the Report.

**4.3** The Customer and the Client are entitled to make copies of the Report for the Purpose but may only copy Ordnance Survey mapping or data contained in or attached to the Report if it has an appropriate licence from the originating source of that mapping or data.

**4.4** The Customer agrees and where the Customer is not the Client, the Customer shall procure that the Client agrees, (in respect of both the original and any copies made) to respect and not to alter any trademark, copyright notice or other property marking which appears on the Report.

**4.5** The Customer agrees and where the Customer is not the Client, the Customer shall procure that the Client agrees to indemnify and keep indemnified the Company against any losses, costs, claims and damage suffered by the Company as a result of any breach by either of them of the terms of paragraphs 4.1 to 4.4 inclusive.

**4.6** The obligation to procure the compliance of the Client to the obligations set out in this paragraph 4 and in paragraph 6.5 shall not apply to Customers who are bona fide legal advisers recharging the cost of the Report to the Client as a disbursement.

### 5. Payment

**5.1** Unless otherwise stated all prices are inclusive of VAT. The Customer shall pay the price of the Report specified by the Company, without any set off, deduction or counterclaim. Unless the Customer or Client has an account with the Company for payment for Reports, the Company must receive payments for Reports in full before the Report is produced. For Customers or Clients with accounts, payment terms will be as agreed with the Company.

**5.2** Where the Property consists of a site with four or more separate metered or un-metered water supplies, additional fees may be charged as notified to the Customer by the Company.

### 6. General

**6.1** If any provision of these Terms is or becomes invalid or unenforceable, it will be taken to be removed from the rest of these terms to the extent that it is invalid or unenforceable. No other provision of these terms shall be affected.

**6.2** Any failure by the Company to enforce any breach of the Terms shall not be deemed to be a waiver of any future breach of the Terms by the Customer or Client.

**6.3** These Terms shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts.

**6.4** Nothing in these Terms shall in any way restrict the Customer or Client's statutory or any other rights of access to the information contained in the Report.

**6.5** The Company and the Customer agree and where the Customer is not the Client, the Customer shall procure that the Client agrees that these Terms contain all the terms which the Company and the Customer and/or the Client have agreed in relation to the subject matter of these Terms and supersede any prior written or oral agreements, representations or understandings between any of them in relation to such subject matter. Nothing in this paragraph 6.5 will exclude any liability which one party would otherwise have to another party in respect of any statements made fraudulently.

**6.6** The Company may assign, delegate, licence, hold on trust or sub-contract all or any part of its rights and obligations under these Terms.

Severn Trent Searches is a trading name of Severn Trent Retail and Utility Services Ltd. Registered in England and Wales no.2562471 Registered office, Severn Trent Centre, 2 St John's Street, Coventry, CV1 2LZ.

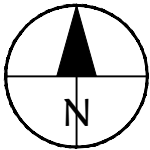
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## **Appendix E – Hydrock Drawings**

<b>CONTENTS</b>	
<b>Identifier</b>	<b>Name</b>
Hydrock	C14141/101 Drainage Strategy Layout

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- KEY:
- Area of study.
  - Proposed geocellular storage.
  - Proposed surface water drainage.

Refer to latest development framework plan for further details of the proposed development.

GREENFIELD RUNOFF RATES FOR EXISTING SITE:

Total site area = 6.18ha

- Q1 = 16.1 l/s
- Q30 = 38.0 l/s
- Q100 = 49.8 l/s

POST DEVELOPMENT STORAGE REQUIREMENTS

Developable area = 3.29ha

Assuming 50% of the developable area is impermeable, storage volumes will be designed to accommodate runoff from 1.645ha

- Q1 = 153m³
- Q30 = 422m³
- Q100 + 30% climate change = 685m³

Above calculations derived using Micro Drainage software. refer to Hydrock report 14141 - 002 for details.

D	30.09.14	Final Issue - Developable Area Change	HJ	ED
C	29.09.14	Final Issue - Development Framework Plan change	HJ	ED
B	24.09.14	Final Issue - Red Line Boundary Change	HJ	ED
A	11.08.14	Draft	PB	JH
Rev	Date	Description	By	Ckd

Architect :



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www.hydrock.com

Client :

GLADMAN DEVELOPMENTS

Project Title:

LAND OFF MILLTOWN WAY  
LEEK

Drawing Title:

DRAINAGE STRATEGY

Drawing Status:

FINAL

Hydrock Job No:

C14141

Drawn	Checked	Scale @ A1	Date	Issue Date
HJ	ED	1:1000	24/09/14	24/09/14

Drawing Number:	Revision:
101	D

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## **Appendix F – Channel Capacity Analysis**

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### Channel Capacity Analysis

Following EA's guidance the FEH statistical method was used to calculate catchment flows.

<b>AEP (%)</b>	<b>Return Period (Yrs)</b>	<b>FEH Flow (m<sup>3</sup>/s)</b>
<b>50</b>	<b>2</b>	0.34
<b>20</b>	<b>5</b>	0.454
<b>10</b>	<b>10</b>	0.547
<b>5</b>	<b>20</b>	0.654
<b>4</b>	<b>25</b>	0.692
<b>2</b>	<b>50</b>	0.828
<b>1</b>	<b>100</b>	0.993
<b>0.5</b>	<b>200</b>	1.194
<b>0.2</b>	<b>500</b>	1.531
<b>0.1</b>	<b>1000</b>	1.852

### Method

The flow capacity in each channel cross-section was calculated using Manning's equation (Chow 1959):

$$Q = \frac{1}{n} AR^{2/3} S^{1/2} = 3.168 \text{m}^3/\text{s}$$

Q= Flow

n= Manning's Number

A= Cross section Area

R= Hydraulic Radius

S=Slope

The flow capacity of the cross section was then compared to the 1000 year return period flow (1.852m<sup>3</sup>/s) to make sure that it was larger.

## Section A-A

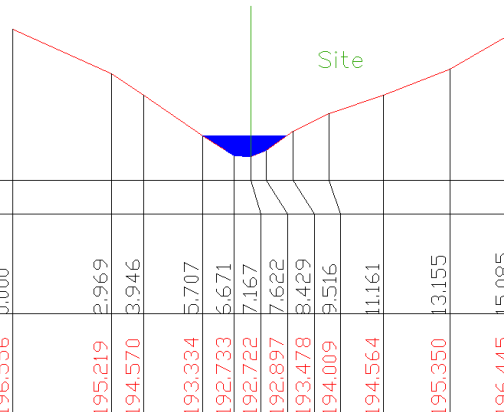
AA

Datum 192.000m

No Vertical Exaggeration

Chainage

Sections Elevation



Manning's Number,  $n = 0.07$

Channel Area,  $A = 0.9618\text{m}^2$

Wetted Perimeter,  $P = 2.87\text{m}$

Channel Gradient,  $s = 0.2284$

Hydraulic Radius,  $R = A/P = 0.335\text{m}$

Flow Rate,  $Q = \frac{1}{n} AR^{2/3} s^{1/2} = 3.168\text{m}^3/\text{s}$

## Section B-B

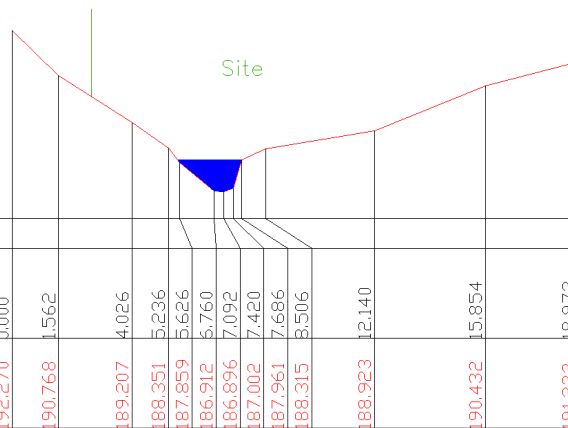
BB

Datum 186.000m

No Vertical Exaggeration

Chainage

Sections Elevation



Manning's Number,  $n = 0.07$

Channel Area,  $A = 1.467\text{m}^2$

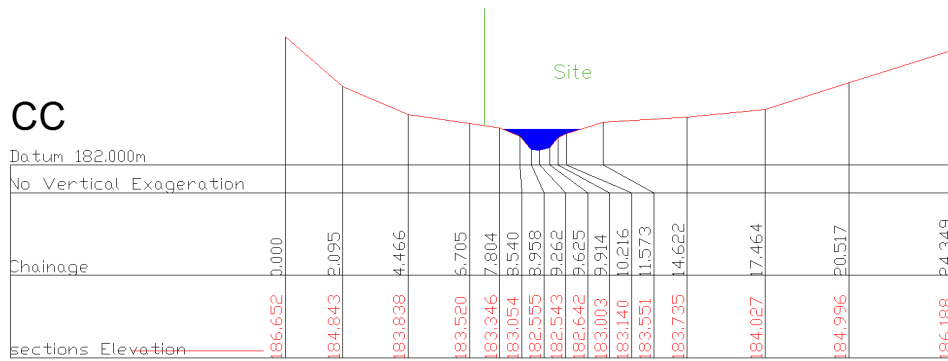
Wetted Perimeter,  $P = 3.28\text{m}$

Channel Gradient,  $s = 0.1823$

Hydraulic Radius,  $R = A/P = 0.447\text{m}$

Flow Rate,  $Q = \frac{1}{n} R^{2/3} s^{1/2} = 5.233\text{m}^3/\text{s}$

## Section C-C



Manning's Number,  $n = 0.07$

Channel Area,  $A = 1.018\text{m}^2$

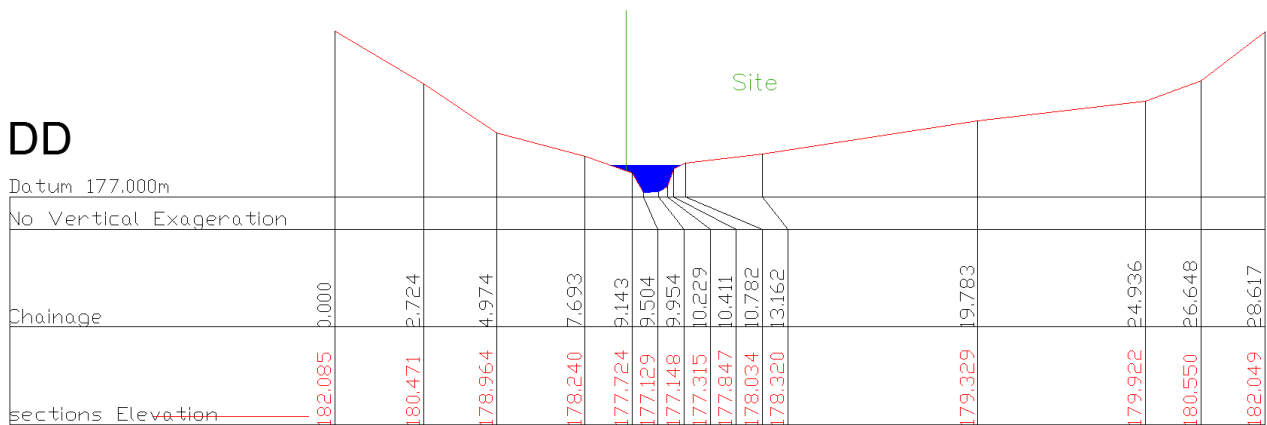
Wetted Perimeter,  $P = 3.344\text{m}$

Channel Gradient,  $s = 0.1296$

Hydraulic Radius,  $R = A/P = 0.304\text{m}$

Flow Rate,  $Q = \frac{1}{n} R^{2/3} s^{1/2} = 2.368\text{m}^3/\text{s}$

## Section D-D



Manning's Number,  $n = 0.07$

Channel Area,  $A = 0.912\text{m}^2$

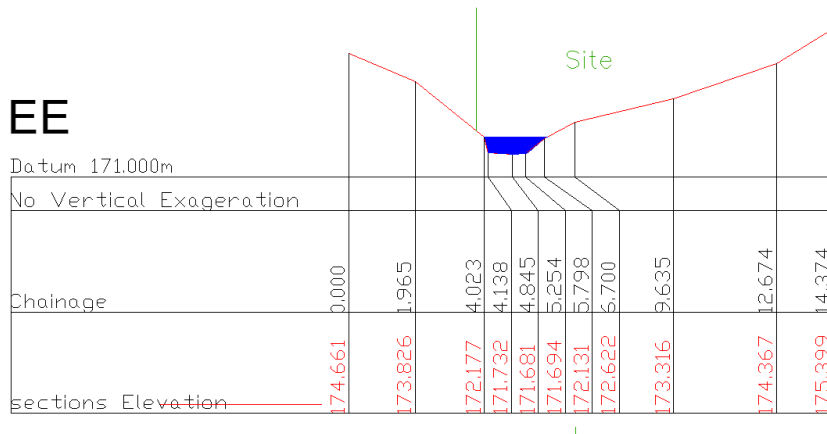
Wetted Perimeter,  $P = 2.959\text{m}$

Channel Gradient,  $s = 0.1362$

Hydraulic Radius,  $R = A/P = 0.308\text{m}$

Flow Rate,  $Q = \frac{1}{n} R^{2/3} s^{1/2} = 2.192\text{m}^3/\text{s}$

## Section E-E



Manning's Number,  $n = 0.07$

Channel Area,  $A = 0.71\text{m}^2$

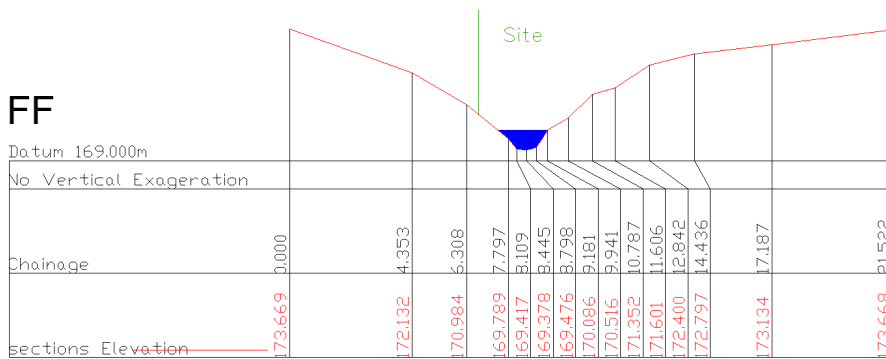
Wetted Perimeter,  $P = 2.37\text{m}$

Channel Gradient,  $s = 0.1789$

Hydraulic Radius,  $R = A/P = 0.3\text{m}$

Flow Rate,  $Q = \frac{1}{n} R^{2/3} s^{1/2} = 1.922\text{m}^3/\text{s}$

## Section F-F



Manning's Number,  $n = 0.07$

Channel Area,  $A = 0.786\text{m}^2$

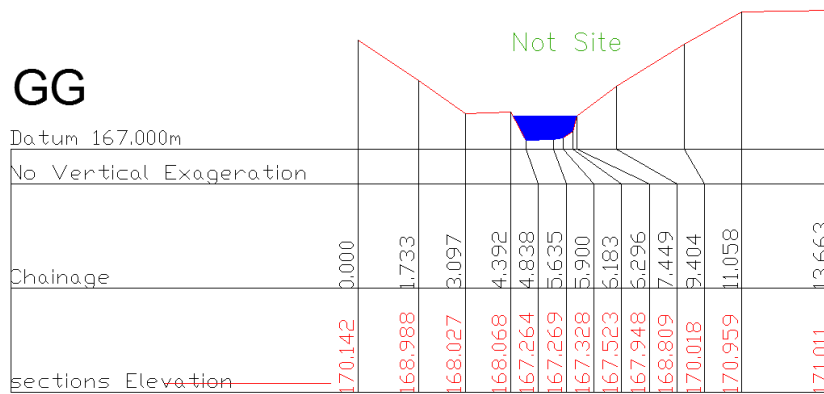
Wetted Perimeter,  $P = 2.385\text{m}$

Channel Gradient,  $s = 0.1284$

Hydraulic Radius,  $R = A/P = 0.33\text{m}$

Flow Rate,  $Q = \frac{1}{n} R^{2/3} s^{1/2} = 1.92\text{m}^3/\text{s}$

## Section G-G



Manning's Number,  $n = 0.07$

Channel Area,  $A = 1.017 \text{ m}^2$

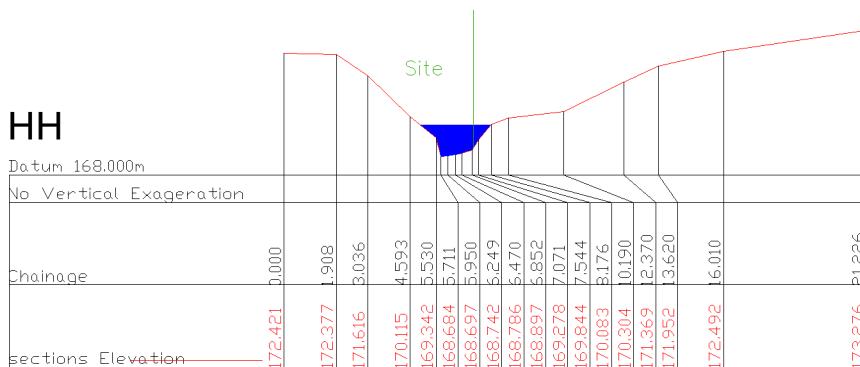
Wetted Perimeter,  $P = 2.634 \text{ m}$

Channel Gradient,  $s = 0.082$

Hydraulic Radius,  $R = A/P = 0.386 \text{ m}$

Flow Rate,  $Q = \frac{1}{n} R^{2/3} s^{1/2} = 2.206 \text{ m}^3/\text{s}$

## Section H-H



Manning's Number,  $n = 0.07$

Channel Area,  $A = 1.743 \text{ m}^2$

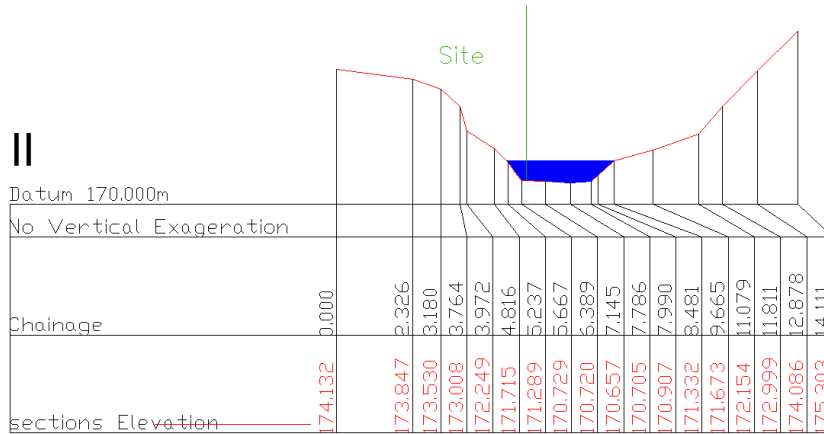
Wetted Perimeter,  $P = 3.71 \text{ m}$

Channel Gradient,  $s = 0.0402$

Hydraulic Radius,  $R = A/P = 0.47 \text{ m}$

Flow Rate,  $Q = \frac{1}{n} R^{2/3} s^{1/2} = 3.017 \text{ m}^3/\text{s}$

## Section I-I



Manning's Number,  $n = 0.07$

Channel Area,  $A = 1.703\text{m}^2$

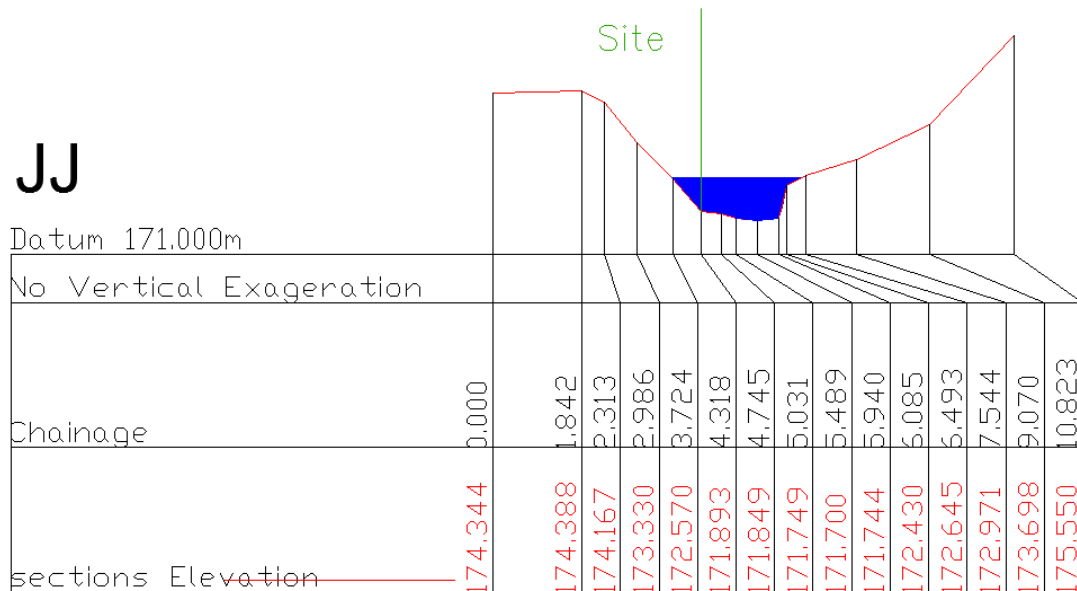
Wetted Perimeter,  $P = 3.826\text{m}$

Channel Gradient,  $s = 0.0436$

Hydraulic Radius,  $R = A/P = 0.445\text{m}$

Flow Rate,  $Q = \frac{1}{n} R^{2/3} s^{1/2} = 2.962\text{m}^3/\text{s}$

## Section J-J



Manning's Number,  $n = 0.07$

Channel Area,  $A = 1.625\text{m}^2$

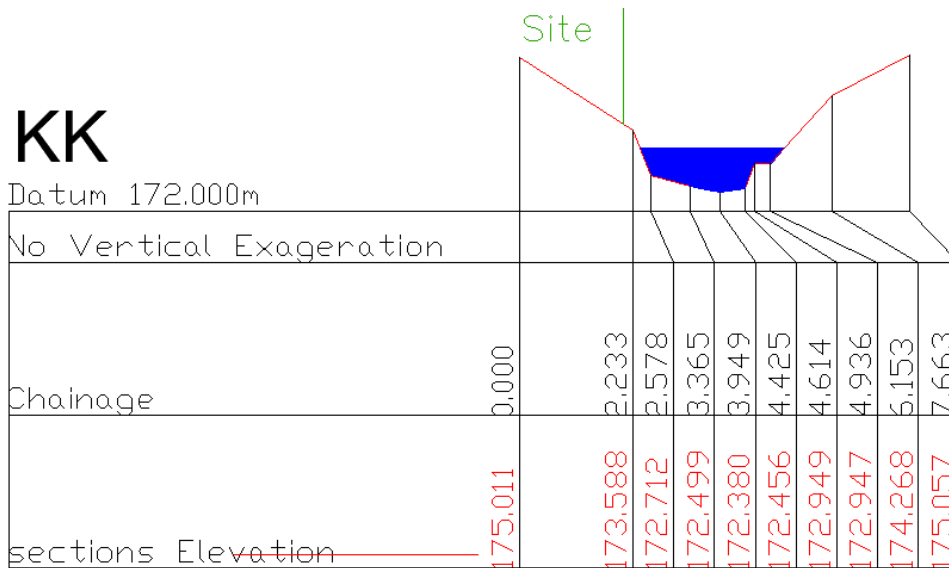
Wetted Perimeter,  $P = 3.609\text{m}$

Channel Gradient,  $s = 0.0307$

Hydraulic Radius,  $R = A/P = 0.45\text{m}$

Flow Rate,  $Q = \frac{1}{n} R^{2/3} s^{1/2} = 2.389\text{m}^3/\text{s}$

## Section K-K



Manning's Number,  $n = 0.07$

Channel Area,  $A = 1.644\text{m}^2$

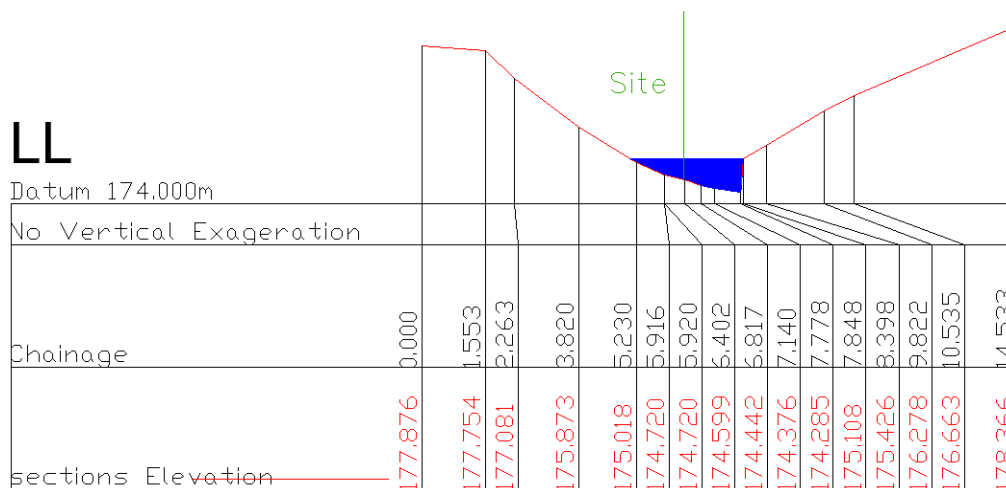
Wetted Perimeter,  $P = 3.703\text{m}$

Channel Gradient,  $s = 0.0371$ 

Hydraulic Radius,  $R = A/P = 0.444\text{m}$

$$\text{Flow Rate, } Q = \frac{1}{n} R^{2/3} S^{1/2} = 2.631 \text{ m}^3/\text{s}$$

## Section L-L



Manning's Number,  $n = 0.07$

Channel Area,  $A = 1.383\text{m}^2$

Wetted Perimeter,  $P = 3.666\text{m}$

Channel Gradient,  $s = 0.0442$

Hydraulic Radius,  $R = A/P = 0.377\text{m}$

$$\text{Flow Rate, } Q = \frac{1}{n} R^{2/3} S^{1/2} = 2.169 \text{ m}^3/\text{s}$$

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## **Appendix G – Hydrock Hydraulic Calculations**

### **Existing Drainage**

Existing greenfield runoff rates

### **Proposed Drainage**

- I. 1 year summary Attenuation Volumes
- II. 30 year summary Attenuation Volumes
- III. 100 year summary Attenuation Volumes (Including the 30% allowance for Climate Change)

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