

**PROPOSED RESIDENTIAL DEVELOPMENT ON LAND OFF SELSDON CLOSE, WYTHALL  
TECHNICAL NOTE: FOUL AND SURFACE WATER DRAINAGE  
FEBRUARY 2011  
REF: AB/20045**

**Introduction**

This Technical Note has been prepared to provide a concise overview of foul and surface water drainage relating to a proposed residential development of 76 dwellings off Selsdon Close, Wythall. This note has been prepared to provide clarity on various drainage issues and to clearly outline the drainage strategies which have been presented in the Flood Risk Assessment and as agreed with the Statutory Authorities.

This information has been prepared following discussions with the Environment Agency, Severn Trent Water, Bromsgrove District Council and Redditch Borough Council.

**Site Description**

There is a natural watercourse running along the northern boundary of the site, running from the west to the north east. The watercourse takes highway drainage from Lea Green Lane as well as private surface water drainage and overland flow from the site. At the point where the watercourse runs under the railway line a culvert is present which is significantly larger than the watercourse and therefore flows are not restricted. On site observations show limited maintenance of the watercourse which will affect capacity and will be resolved through the adoption of the watercourse by Bromsgrove District Council.

The watercourse is not regarded as a main river by the Environment Agency and flood maps available from the Environment Agency show the site to be located in Flood Zone 1 (see below) which is the zone of little or no flood risk. Based on the Standing Advice available from the Environment Agency all land uses are applicable.



● SITE LOCATION

The River Cole is located approximately 0.2km east of the site and flood risk from this area is contained to the east of the railway line and does not affect the site.

The 1:50,000 British Geological Survey (BGS) map shows the site is underlain with Mercia Mudstone and on site soakage testing by M-EC confirms the ground conditions are deemed to be unsuitable for the use of soakaways.

The topography of the site varies between 149.60mAOD and 139.80mAOD. The site falls from the south west to the north east corner of the site and therefore the natural topography of the site encourages surface water run-off to the watercourse on the northern boundary of the site.

An adopted Severn Trent Water foul water sewer is located along the northern boundary extending from Selsdon Close to the railway line and beyond (see sewer plan attached). The sewer appears to serve the residential properties on Selsdon Close from the evidence of the existing connections at manhole 2001. However no public sewers are shown on available Severn Trent Water apparatus plans and therefore it is considered there is a private network serving Selsdon Close. Suitable easements for this foul sewer will be retained as part of the development proposal.

### **Consultation**

Extensive consultation has taken place with key statutory bodies both pre application and as part of the planning application process.

### Severn Trent Water

Severn Trent Water has confirmed that a 225mm public foul sewer is located along the northern boundary of the site and it has been confirmed that this has sufficient capacity to serve the proposed development.

### Environment Agency

Confirmed the site is in Flood Zone 1 and have raised no objection to the proposed development subject to Conditions about the delivery of a suitable surface water drainage strategy.

### Bromsgrove District Council

Detailed discussions have taken place with John Bailey at Bromsgrove District Council as part of the pre-application discussions and several key comments were provided which are outlined below (note M-EC responses are outlined in *italics*):

1. The watercourse takes highway drainage and private surface water drainage.

*This has been confirmed through discussions with Worcestershire County Council, interrogation of available sewer plans and on site observations.*

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2. Some recent complaints about flooding due to the limited maintenance of the watercourse.

*The limited maintenance of the ditch is evident on site and this will be resolved through adoption of the watercourse corridor by Bromsgrove District Council. The developer is to provide a suitable commuted sum as agreed with the Council.*

3. Generally happy with proposed storage pond being provided to attenuate flows.

*No further comment needed.*

4. Provide a minimum of a 5m stand off from the watercourse and provide access for maintenance.

*This has been provided as part of the indicative site layout and the developer is happy to accept conditions to ensure this is standoff distance secured through the Reserved Matters stage and on site construction.*

5. 5m corridor to be left as an 'open space' and should exclude back gardens.

*This has been provided as part of the indicative site layout and the developer is happy to accept conditions to ensure this corridor is retained as open space.*

#### Redditch Borough Council

Clive Wilson at Redditch Borough Council was commissioned by Bromsgrove District Council to review the Flood Risk Assessment in more detail and confirm that it is acceptable and what commuted sums would be required from the developer for the adoption of the pond and watercourse. A commuted sum has been agreed and will be paid by the developer as part of the Section 106 Agreement.

The drainage officer provided several comments on the submitted Flood Risk Assessment and these comments are outlined below (note M-EC responses are outlined in *italics*):

1. Impermeable site – Agreed, SI results confirm this.

*No further comment needed.*

2. 14.9 l/sec discharge rate appears to have been accepted by EA. No details of how this is to be achieved are included and/or demonstrated (see 12 below).

*Detailed drainage calculations have been prepared in order to produce the drainage strategy for the site and the calculations demonstrate how the discharge rates have been calculated and we intend to use the balancing pond and the hydrobrake control device to restrict flows into the watercourse. All this information is available in the Flood Risk Assessment document which has been accepted by the Environment Agency.*

3. STW confirms existing easement width requirements – I would be concerned at its proximity to watercourse.

*The line of the existing foul sewer is the responsibility of Severn Trent Water and therefore it is the responsibility of the adopting body to raise any concerns about its proximity to the watercourse. No issue has been raised by Severn Trent Water.*

4. Access corridor to ordinary watercourse (OWC) should be equivalent to minimum 10m total for an OWC or if an arterial ditch 6m, with a minimum clearance of 5m from any hard structures/features from top of bank (see 3 above). This appears to have been done/shown.

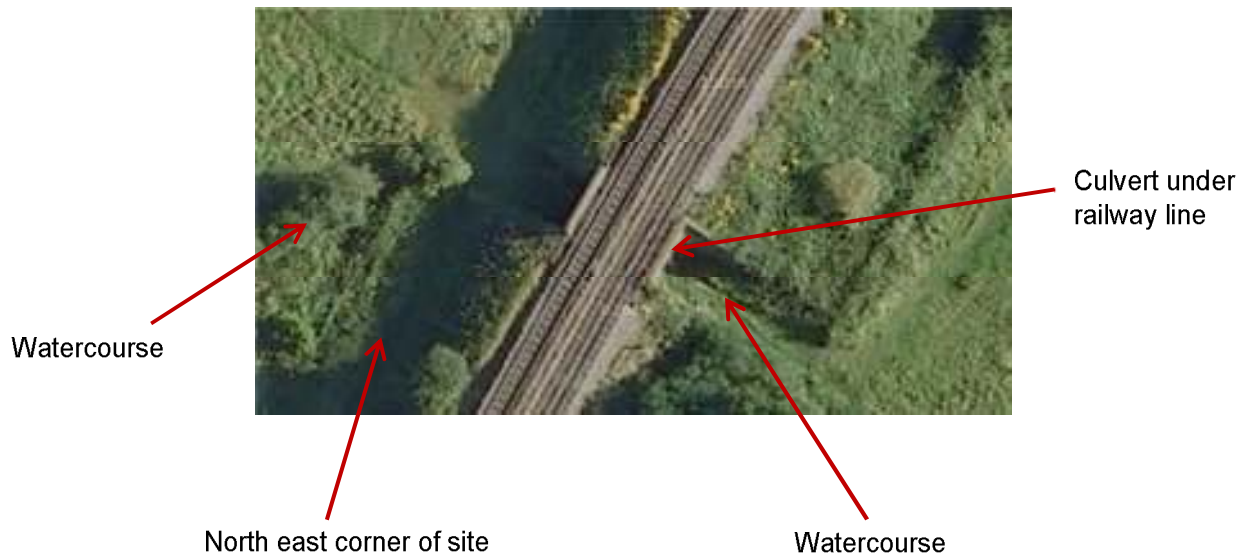
*An easement width has been provided as requested and discussed with John Bailey at Bromsgrove District Council.*

5. I'm concerned that the size and condition of the OWC has not been properly confirmed – guesstimated only.

*A detailed topographical survey has been prepared and site visits have been completed and therefore the size of the watercourse has been accurately determined. In relation to the condition of the watercourse we are aware of maintenance issues which were evident on site and this will be resolved as part of the adoption by Bromsgrove District Council. Calculations on capacity have been undertaken in the FRA based on the actual sizing of the watercourse and these confirm sufficient capacity is available.*

6. I'm concerned that size/condition of culvert under railway line has not been properly confirmed – guesstimated only.

*Access restrictions appear to have limited the extent of the topographical survey in this location, however on site observations show that the culvert under the railway is very large and sufficient in size to enable access for farm vehicles. The aerial photograph below highlights the size of the culvert and the watercourse ditch is evident in the middle which is significantly smaller. It is therefore considered the culvert beneath the railway line will not restrict the flow of water.*



7. R Cole flooding unlikely to impact upon site – Agreed.

*No further comment needed.*

8. Design criteria for land drainage, 1 in 100 year return period plus 30% - Agreed.

*No further comment needed.*

9. We would normally adopt any BA and OWC in future POS areas to secure their regular maintenance in accordance with current sewerage and land drainage legislation. Please note that the Flood and Water Management Act 2010 (FWMA) although enacted last year has not legally commenced in this regard yet. I append below a calculation estimating the likely S106 levy required.

*We fully support the adoption of the pond and watercourse for future maintenance.*

10. The proposals require that Selsdon Close be extended requiring the OWC to be bridged or culverted. The applicant currently requires formal consent from EA for this pending any further commencement orders for FWMA (next tranche possibly 04/11).

*This is a detailed design issue to be considered at the Reserved Matters stage but there has been no objection from EA to the proposals.*

11. Drainage design/parameters have been based upon indicative layout. Actual values must be used for any formal consent purposes as these have a habit of changing, predominantly for the worse.

*This is a detailed design issue and will be considered further at the Reserved Matters stage however the calculations assume a robust 65% impermeable area and the discharge rates are restricted below actual greenfield run off rates. There is also flexibility in the layout and the housing density to increase the size of the balancing pond if needed. The pond design has been considered in detail using topographical survey data to give accurate account of land take.*

12. There are no details of the vortex flow control device. These should include a properly designed trash screen and planting to reduce regular maintenance/blockages.

*This is a detailed design issue. The Hydrobrake and other similar drainage details will be provided at the Reserved Matters stage for approval by Bromsgrove District Council and Severn Trent Water.*

### **Watercourse Capacity**

We are aware from discussions with local residents and the drainage officer at Bromsgrove District Council that maintenance of the ditch has been limited and this may have resulted in some out of bank flooding from the watercourse located along the northern boundary of the site. The issue of maintenance will be resolved through the adoption of the watercourse area as agreed with Bromsgrove District Council however to ensure the watercourse has sufficient capacity in any event to accommodate flows, hydraulic modelling has been completed as part of the Flood Risk Assessment.

The watercourse has been assessed using the Manning Equation (an equation for simulating water flows in channels and culverts where the water is open to the atmosphere) and it has been estimated that the Greenfield runoff from the local catchment into the watercourse in a 1 in 100 year storm event is approximately 0.35 m<sup>3</sup>/s. Analysis of various cross sections along the ditch using the topographical survey data indicate the maximum capacity of the watercourse is 0.472 m<sup>3</sup>/s which is greater than the predicted 1 in 100 year flow of 0.35 m<sup>3</sup>/s.

It is therefore suggested the ditch does not pose a flood risk to the site for up to a 1 in 100 year return period. The Environment Agency and District Councils have not objected to the calculations presented in the Flood Risk Assessment and the findings are therefore considered acceptable.

It should also be noted the proposed drainage strategy for the site will reduce peak discharge flows into the watercourse with a 39% reduction achieved in the 100 year event plus 30% climate change storm event.

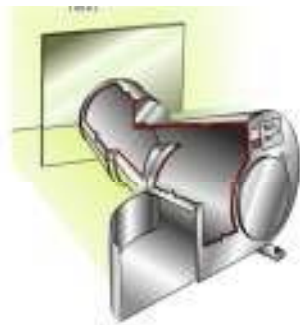
### **Surface Water Drainage Strategy**

As the ground is not suitable for soakaway drainage the surface water run-off from the dwellings, roads and hard pavings will be connected into a piped network discharging to a storage pond which

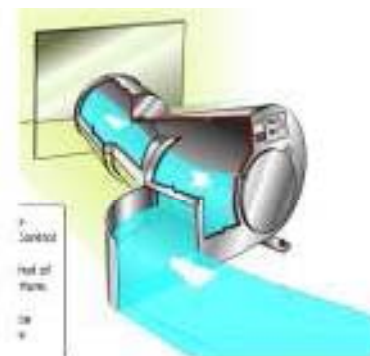
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will cater for the 1 in 100 year storm event plus 30% climate change. The pond has a volume of 997m<sup>3</sup>. Flows will be restricted to a maximum 14.9 litres per second for all return periods including the 1 in 100 year storm event which provides a 39% betterment over existing Greenfield runoff rates during this period.

Discharge rates into the watercourse will be controlled through the use of a Hydrobrake or similar flow control device. For information a hydrobrake is self-activating vortex flow control device which activates when flow increases. The velocity of the water induces an air-filled core with resulting back pressure that reduces the discharge. An example of how the Hydrobrake operates is detailed below.



Hydrobrake with no flows



Hydrobrake with low flows and therefore discharge controlled by the size of the outlet i.e. narrow outlet results in restricted discharge



Hydrobrake in high storm event. Central vortex is created which displaces water to further control discharge rates.

The surface water balancing pond and watercourse will be adopted and maintained by Bromsgrove District Council with appropriate commuted sums paid by the developer as part of the Section 106 Agreement.

### **Foul Drainage Strategy**

Severn Trent Water have confirmed that the development can have a connection into the 225mm public foul sewer is located along the northern boundary of the site where sufficient capacity is available.

This foul sewer does **not** connect with the sewers located in Lea Green Lane which are part of a separate network. The only sewers which connect to the 225mm sewer within the site boundary are private connections extending from Selsdon Close. The network in Selsdon Close is considered to be private as no public sewers are shown on the Severn Trent Water apparatus plans however the topographical survey for the site shows connections into the end manhole (ref. 2001) from the directions of Selsdon Close.

In relation to Lea Green Lane discussions with Severn Trent Water have indicated that the only reported instances of flooding in the local area have occurred at the junction of Lea Green Lane and Station Road. It should be noted however that if flooding has not been reported Severn Trent Water will not have any records.

The Severn Trent Water sewer network plan for Lea Green Lane shows a mixture of shallower foul sewers connecting into a much deeper main/trunk sewer. The shallow sewers follow the topography of the land and fall to the south, however the deeper sewer runs northwards. Levels on the sewer plans show the sewer travelling north to be greater than 2m deeper and the plans show that this sewer falls by gravity. It is likely the shallower sewers backdrop into the deeper sewer and this could be the potential cause of flooding issues as blockages are more likely to occur in backdrops.

The development will not exacerbate any existing problems in Lea Green Lane as foul water flows will connect into a separate network.

### **Summary**

In summary the foul and surface water drainage strategies for the proposed residential development off Selsdon Close, Wythall are robust and will not exacerbate flooding within the local area. Through investigation and analysis the following is confirmed:

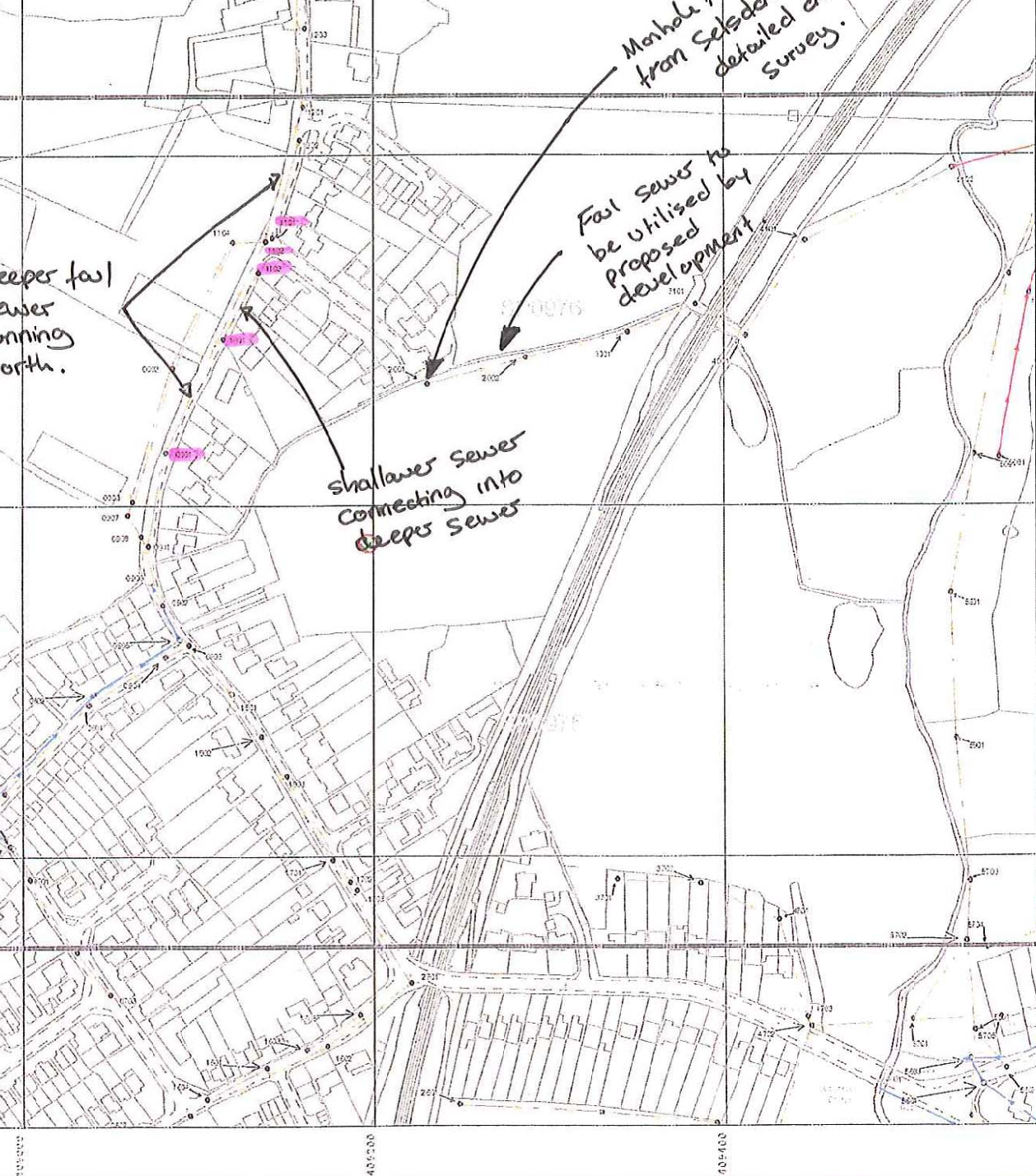
- The site is not located within a flood zone.
- The watercourse within the site is sufficiently sizes to accommodate its catchment area.
- A suitable balancing pond to attenuate surface water drainage flows from the site can be provided and this will provide betterment in discharge rates over existing Greenfield conditions.
- Overland flow from the site will be captured in the new sewer network which will be directed and contained within the balancing pond. This is likely to reduce flows in order sections of the watercourse further west along the site boundary.
- The pond and watercourse will be maintained by Bromsgrove District Council.
- Severn Trent Water have confirmed sufficient capacity exists within the 225mm foul sewer located along the northern boundary of the site.
- This sewer does not connect to the foul sewers in Lea Green Lane and therefore the proposed development will not exacerbate any existing issues which may be present.

- The drainage strategies have been agreed with Severn Trent Water, Environment Agency, Bromsgrove District Council and Redditch Borough Council.

Prepared By:



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SP08750002 X	151.39	150.42	149.77	F	VC	C	150	nil	23.94	nil	SP09765101 X	nil	nil	nil
SP08750003 X	159.56	149.76	nil	F	VC	C	150	nil	0	nil	SP09765103 X	137.77	135.39	135.0
SP08750004 X	151.43	150.47	149.48	S	VC	C	150	nil	27.14	nil	SP09765104 X	139.082	135.23	134.6
SP08750006 X	158.02	147.97	146.84	F	VC	C	225	nil	61.34	nil				
SP09750701 X	152.42	151.59	150.43	F	VC	C	150	nil	20.85	nil				
SP09750602 X	144.95	146.81	146	F	VC	C	225	nil	63.73	nil				
SP09750601 X	149.01	147.57	147	S	VC	C	150	nil	101.72	nil				
SP09750901 X	147.181	145.804	145.589	F	CO	C	450	0	31.63	2007				
SP09750901 Y	147.181	145.37	144.87	F	VC	C	300	nil	131.85	nil				
SP09750902 X	147.24	145.63	145.38	F	CI	C	300	nil	143.92	nil				
SP09750902 Y	147.24	145.63	145.3	F	VC	C	300	0	96.97	2007				
SP09750903 X	nil	nil	145.64	F	VC	C	225	nil	0	nil				
SP09750904 X	148.32	145.97	nil	F	VC	C	225	nil	0	nil				
SP09750905 X	148.41	146.89	nil	S	VC	C	150	nil	0	nil				
SP09750906	nil													
SP09750907 X	148.052	145.414	145.389	F	CO	C	450	0	295	2007				
SP09750908 X	147.226	145.859	145.414	F	CO	C	450	0	32.81	2007				
SP09751701 X	151.3	146.89	nil	F	VC	C	225	nil	0	nil				
SP09751702 X	151.24	149.38	nil	F	VC	C	150	nil	0	nil				
SP09751703 X	151.12	149.13	nil	F	VC	C	150	nil	0	nil				
SP09751801 X	148.65	146.07	nil	F	VC	C	150	nil	0	nil				
SP09751802 X	151.01	146.42	146.07	F	VC	C	225	nil	84.8	nil				
SP09751803 X	nil	nil	nil	F	VC	C	225	nil	0	nil				
SP09753701 X	144.539	143.63	nil	F	VC	C	150	nil	0	nil				
SP09753702 X	nil	nil	140.01	F	VC	C	150	nil	0	nil				
SP09754701 X	141.3	139.97	nil	F	VC	C	150	nil	0	nil				
SP09755702 X	140.55	136.72	136.55	F	CO	C	450	nil	200.76	nil				
SP09755703 X	140.63	136.54	136.24	F	CO	C	450	nil	271.67	nil				
SP09758001 X	140.06	136.21	135.94	F	CO	C	450	nil	307.48	nil				
SP09758001 X	138.83	135.93	nil	F	CO	C	450	nil	0	nil				
SP09760001 X	148.18	144.84	nil	F	VC	C	300	nil	0	nil				
SP09760002 X	153.27	145.05	144.784	F	CO	C	600	nil	269.62	2007				
SP09760002 Y	153.27	145.15	144.884	F	CO	C	600	0	269.62	2007				
SP09760003 X	148.203	145.409	145.15	F	CO	C	600	0	305.95	2007				
SP09760003 Y	148.203	145.309	145.05	F	CO	C	600	nil	306.95	2007				
SP09761101 X	148.28	146.86	nil	F	VC	C	150	nil	0	nil				
SP09761101 X	150.65	148.82	nil	F	VC	C	150	nil	0	nil				
SP09761102 X	150.52	144.68	nil	F	VC	C	300	nil	0.04	nil				
SP09761103 X	150.27	148.02	146.86	F	VC	C	150	nil	37.02	nil				
SP09761104 X	151.205	144.784	144.68	F	VC	C	300	0	174.9	2007				
SP09761201 X	151.32	144.16	nil	F	CO	C	525	nil	0	nil				
SP09761202 X	151.12	149.49	148.83	F	VC	C	150	nil	88.24	nil				
SP09762001 X	143.01	141.12	140.15	F	VC	C	225	nil	56.76	nil				
SP09762002 X	141.87	140.13	139.11	F	VC	C	225	nil	59.15	nil				
SP09763001 X	140.6	139.11	138.66	F	VC	C	225	nil	93.67	nil				
SP09763101 X	139.94	138.64	138.24	F	VC	C	375	nil	85.33	nil				

a. Sewer pipe data refers to downstream sewer pipe  
 b. Reference number is for upstream nodes followed by X or X and Y where sewer bifurcates.  
 c. Gradient is stated as 1 in ...

<ul style="list-style-type: none"> <li> Combined Lateral Drain (SS)</li> <li> Foul Lateral Drain (SS)</li> <li> Surface Water Lateral Drain (SS)</li> </ul>	<ul style="list-style-type: none"> <li> Culverted Watercourse</li> <li> Access Right</li> <li> Cable, Earthing</li> <li> Cable Junction</li> <li> Cable, Optical Fibre / Instrumentation</li> </ul>	<ul style="list-style-type: none"> <li> Blind Shaft</li> <li> Combined Use Manhole</li> <li> Disposal Site</li> <li> Flushing Chamber</li> <li> Foul Use Manhole</li> </ul>	<ul style="list-style-type: none"> <li> Sewer Blockage</li> <li> Sewer Chemical Injection Point</li> <li> Sewer Collapse</li> <li> Sewer Junction</li> <li> Sewerage Air Valve</li> </ul>	<p><b>MATERIALS</b></p> <ul style="list-style-type: none"> <li>NC - NONE</li> <li>AC - ACCESS REQUIREMENT</li> <li>AK - ALUMINUM</li> <li>BR - BRICK</li> <li>CC - CONCRETE BOX CULVERT</li> <li>CI - CAST IRON</li> <li>CO - CONCRETE</li> <li>CS - CONCRETE SEGMENTS (SOLID)</li> <li>CSU - CONCRETE SEGMENTS (UNBOLTED)</li> </ul>	<p><b>CATEGORIES</b></p> <ul style="list-style-type: none"> <li>W - WER</li> <li>C - CASBIDE</li> <li>CS - CANS/FRD</li> <li>SE - SIDE ENTRY</li> <li>FL - FLAP VALVE</li> <li>BD - BACKFLOW</li> <li>SP - SP-ON</li> <li>HD - HIGHWAY DRAIN</li> <li>ST - STREET</li> </ul>
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