Application for Residential Development at
Mitton Road, Whalley

Flood Risk and Drainage Assessment

July 2012

Where quality lives

David Wilson Homes

RSK GENERAL NOTES

Project No.: 880213-R1 (01)

Title: Proposed Residential Development Off Mitton Road, Whalley

Client: David Wilson Homes

Date: May 2012

Office: Helsby

Status: Final

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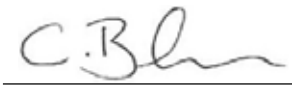
Signature	
Date:	May 2012

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK LDE.

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1 INTRODUCTION

RSK LDE Limited has been commissioned by David Wilson Homes to undertake a Flood Risk Assessment (FRA) and review the surface water drainage constraints for a proposed residential development on a parcel of land off Mitton Road, Whalley.

The assessment has been prepared in accordance with National Planning Policy Framework (NPPF) (Ref. 1) and its accompanying guidance document (Ref. 2), the Interim Code of Practice for Sustainable Drainage (Ref. 3) and BS 8533-2011 Assessing and managing flood risk in development Code of practice (Ref. 4), with site-specific advice from the Environment Agency (EA), the Local Planning Authority, the architect and the Client.

The NPPF sets out the criteria for development and flood risk by stating that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. The key definitions are:

- “areas at risk of flooding” means land within Flood Zones 2 and 3; or land within Flood Zone 1 which has critical drainage problems and which has been notified to the local planning authority by the Environment Agency
- “flood risk” means risk from all sources of flooding - including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.

For this site, the key aspects that require the assessment are:

- the Environment Agency’s (EA) indicative flood map (Figure 1) shows the whole site to lie within Flood Zone 1
- the site area is in excess of 1Ha.

The comments given in this report and opinions expressed are subject to RSK Group Service Constraints provided in **Appendix A**.

2 CONTEXT AND SCOPE OF WORKS

A key element of project development is to prepare a Flood Risk Assessment to establish the risk associated with the proposed development and to propose suitable mitigation, if required to reduce the risk to a more acceptable level.

The scope of work relating to a flood risk assessment is based on the guidance provided in NFFP (Ref. 1) and the accompanying guidance (Ref. 2) this comprise of the following elements:

- to obtain information on the hydrology and hydrological regime in and around the site
- to obtain the views of the Environment Agency including scope, location and impacts
- to determine the extent of new flooding provision and the influence on the site
- to review site surface water drainage based on the proposed layout. To determine the extent of infrastructure required
- to review architect plans and planning information and other studies to determine the existing site conditions
- to assess the impact on the site from global warming effects and anticipated increases in rainfall over a 100 year period for residential use or 60 years for commercial uses
- preparation of a report including calculations and summaries of the source information and elements reviewed.

3 SITE DESCRIPTION

3.1 Site location and description

The site can be located to the western edge of Whalley in an area predominantly consisting of residential and commercial developments. The site is currently a Greenfield site and may be located by National Grid reference E372712 N436404. A site location plan is presented in **Figure 1**.

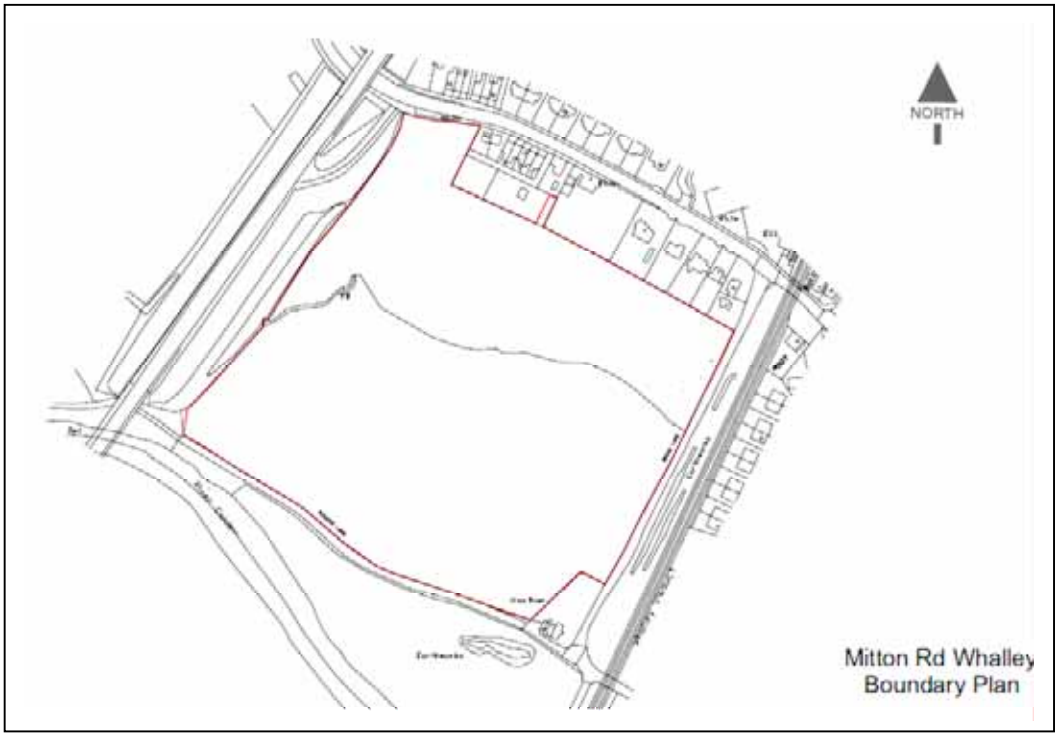


Figure 1: Site location plan

The site is bounded by:

- north – directly bounded by Mitton Road, residential properties, cricket ground and a playing field
- east – directly bounded by Broad Lane, Whalley viaduct, residential properties, and Whalley Abbey
- south – directly bounded by the River Calder, open fields, Allotments, Judge Walmsley Mill and beyond this the village of Billington
- west – the A59 directly bound the site the western edge of the site, Abbey Farm is located beyond the A59, an unnamed stream, sewage works and Nethertown village beyond this point.

The total site area is approximately 8.5ha, comprising of a open field. Currently vehicular access is off Mitton Road to the north, which will remain following development.

A topographical survey has been carried out and is included as Appendix B. The survey shows that the site slopes from 49.39mAOD on the north west boundary to 43.13mAOD on the south eastern boundary.

3.2 Development proposals

This assessment has been based on the proposed site as detailed in **Appendix C**. The latest proposals are for the development of approximately 137 residential units, associated parking, access and areas of soft landscaping and gardens.

4 SOURCE OF FLOOD RISK

The flood risk elements that need to be considered for any site are defined in NPPF as the "Forms of Flooding" and are listed as:

- flooding from rivers (fluvial flood risk)
- flooding from the sea (tidal flood risk)
- flooding from the land (overland pluvial flood risk)
- flooding from groundwater
- flooding from sewers (sewer and drain exceedance, pumping station failure etc)
- flooding from reservoirs, canals and other artificial structures.

The following section reviews each of these in respect of the subject site.

4.1 Environment Agency flood zone

The Environment Agency has produced Flood Zone maps for much of England and Wales. The current displayed map is reproduced as **Figure 2**. The latest Flood Zone map shows the majority of the site lies within Flood Zone 1 an area to the south lies within Flood Zone 2 and the land adjacent to the River Calder lies within Flood Zone 3.

Figure 2: Environment Agency flood zone map

4.2 Flooding from rivers (fluvial flood risk)

The nearest Main River watercourse is the River Calder this borders the southern boundary of the site and flows in a westerly direction. An unnamed ditch is located in the western portion of the site, following a site walkover this was noted as a dry ditch, which takes runoff from the current site and runs in a westerly direction, towards the River Calder and does not pose a flood risk to the site. The site is located within Flood Zone 3, 2 and 1 according to the latest Environment Agency Flood Zone Maps (Figure 2).

The River Calder is a main river and therefore the Environment Agency will require a standard easement of 8m from top of bank, on the development.

Following a review of the topographical survey and the Environment Agency detailed floodplain; it shows that the floodplain correlates with the site-specific topographical survey levels.

4.3 Flooding from the sea (tidal flood risk)

On the coast storm surges and high tides can threaten low lying coastal areas, and can be sometimes large and rapid enough to overtop defence works, causing significantly more damage than river flooding.

However, tidal flooding is not considered a risk to the site.

4.4 Flooding from the land (overland pluvial flood risk)

If intense rain is unable to soak into the ground or be carried through man made drainage systems, for a variety of reasons, it can run off over the surface causing localised floods before reaching a river or other watercourse.

Generally, where there is impermeable surfacing or where the ground infiltration capacity is exceeded, surface water runoff will occur. Excess surface water flows from the site are believed to drain naturally to the local water features, either by overland flow or through infiltration. There is no evidence, however, that pluvial or overland flooding will affect the site, according to the SFRA (Ref 5) and the PFRA (Ref 6).

The risk from this source of flooding is considered low. This will be considered within the layout and design of the site to ensure that the development will not increase risk and is not at an increased risk from this source of flooding.

4.5 Flooding from groundwater

Groundwater flooding tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as Chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground. Where groundwater exists it flows through strata very slowly and in limited quantities.

The site overlies a Secondary A aquifer according to the Environment Agency, which means it is has permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The Environment Agency has no record of any historical flooding incidences arising from groundwater on the site. The SFRA (Ref 5) also does not state that ground water flooding has been a problem on the site in the past.

Taking into account the above information and that the site is located within a Secondary A aquifer, there is a small risk of groundwater flooding due to the groundwater's approximate depth of 2m. The site historically has not suffered from groundwater flooding and is not in an area classed as at risk.

According to the Environment Agency the site is not located within a Source Protection Zone and therefore the proposed development will not effect public water supply abstractions.

4.6 Flooding from sewers

Most adopted surface water drainage networks are designed to the criteria set out in Sewers for Adoption (Ref. 3). One of the design parameters is that sewer systems be designed such that no flooding of any part of the site occurs in a 1 in 30 year rainfall event. By definition a 1 in 100 year event would exceed the capacity of the surrounding sewer network as well as any proposed drainage.

When exceeded, the surcharged pipework will lead to flooding from backed up manholes and gully connections. This will lead to immediate flooding within highways surrounding the site.

A number of foul and surface water sewers have been identified in proximity to the site, a copy of the United Utilities sewer records are included as **Appendix C**. The sewerage infrastructure to note is the combined sewer network, which is located along the viaduct at the southern point of the site, this then runs along Ridding Lane. Another combined sewer 450mm runs within the western area of the site and will be avoided by the proposal. Consultation with United Utilities will be carried out on the potential connection of foul water and surface water into one or more of the sewers. In addition to the combined sewer network, an abandoned sewer runs along the southern area of the site and partially within the north western section of the site. According to the SFRA no properties in the area have been affected by flooding from sewers.

Flood risk from this source is therefore considered to be low.

Providing any new infrastructure is installed in line with current best practice, the flood risk from this source is considered low.

An easement will be required for each of the sewers onsite both will require a 7m easement, therefore 3.5m from centre of sewer, either side.

4.7 Flooding from reservoirs, canals and other artificial structures

The Environment Agency has recently published flood risk mapping as a result of potential failure of reservoirs and artificial structures.

This 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's unlikely that any actual flood would be this large.

Reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925. Since then reservoir safety legislation has been introduced to make sure reservoirs are well maintained.

Only flood maps for large reservoirs are displayed. Flood maps are not displayed for smaller reservoirs or for reservoirs commissioned after reservoir mapping began in spring 2009. The reservoir flood maps also don't give any information about how likely any area is to be flooded.

Figure 3 shows that the site is potentially at risk from flooding from this source. This is from the Dean Clough Lower Reservoir owned by United Utilities Water Plc, which is located at grid reference 371820 433250. This is located to the south of the site, if an event were to happen the reservoir flood water would flow into the River Calder upstream of the site and then flow past the site and may encroach onto the site in the way **Figure 3** illustrates. Flooding from this source will only be an issue following a failure of the banking of the reservoir and is not known to have impacted on the site or the surrounding area in the past.

The provision of an overland flow route will allow floodwaters from this source to flow through the site and enters the River Calder.

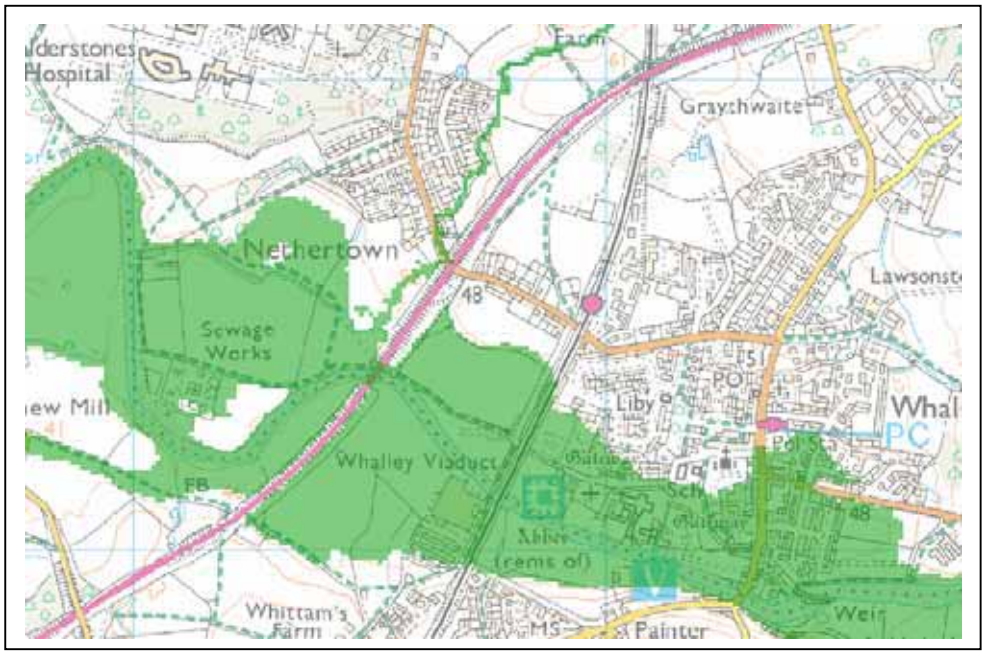


Figure 3: Environment Agency reservoir flood map

4.8 Historic flooding

According to data obtained from the Strategic Flood Risk Assessment (Ref. 5) there is no known historic flooding of the site or the immediate surrounding area. The PFRA (Ref. 6) also shows that there has not been any historic flooding on the site.

5 SURFACE WATER DRAINAGE ASSESSMENT

5.1 Scope

A drainage strategy has been carried out to identify the options for the design of the surface water drainage system and how it will affect the site layout.

5.2 Pre-development situation

As there is currently no active surface water drainage within or in the vicinity of the site, surface water is believed to drain into the River Calder located to the south of the site. As well as, into the ditch that is located within the western portion of the site, this then flows into the River Calder approximately 585m to the west of the site.

In terms of estimating the potential runoff from the site, the pro-rated IOH method has been used to estimate the existing runoff from the site in a Greenfield condition. Additional information is contained in **Appendix E**.

Return Period	Peak flow
Greenfield (undeveloped – urban extent 0.01 Ha)	
$QBAR_{URBAN}$	38.5 l/sec
1 in 1 year peak flow	33.5 l/sec
1 in 30 year peak flow	65.2 l/sec
1 in 100 year peak flow	79.8 l/sec

TABLE 5.1 : IoH surface water runoff calculations (greenfield)

The existing site is undeveloped and is more than 95% permeable land. For the range of annual flow rate probabilities up to and including the one per cent annual exceedence probability (1 in 100 years) event, including an appropriate allowance for climate change, the developed rate of run-off into a watercourse, or other receiving water body, should be no greater than the existing rate of run-off for the same event.

Therefore, it is essential that the volume of runoff generated as a result of development should either remain the same as the existing discharge rate or be reduced. Preferably the discharge rate should be restricted to near the greenfield runoff rate if possible, by combining the use of SuDS onsite where feasible.

Any drainage system for the site should, therefore be designed such that peak flows are to be restricted to 79.8 l/sec for the 1 in 100 year rainfall event including climate change of 30%, to replicate or improve the current discharge. It should be noted that in restricting flows to a given value and providing appropriate attenuation provides additional benefit for storm events in excess of the peak discharge criteria (i.e. if

discharge is limited to the 1 in 100 year existing then runoff for a 1 in 250 year event will be better controlled).

5.3 Site discharge

An order of preference exists for drainage receptors. Infiltration drainage should be used where possible. Where this is not possible, or does not provide sufficient capacity, attenuated discharge to watercourses should be sought. Only where neither of these two options are available should discharge to sewers be considered and this is unlikely to be the case for this site.

Infiltration testing has been carried out on site, results are contained within RSK in-situ hydraulic conductivity tests report ref 17116PL 01. The results show that infiltration is not possible on the site the hydraulic conductivity recorded was 3.51X10-7ms-1 and 4.34X10-7ms-1. The logs from these tests show that groundwater was encountered at approximately 2m bgl.

The sampling was carried out in mid February and therefore is considered to be the seasonally high water table levels. According to C697, The SUDS manual (Ref 7), infiltration based systems should not be utilised where the seasonally high groundwater table is within 1.0m of the base of the infiltration system.

As infiltration techniques are not suitable on this site, attenuation storage of some kind should be used to achieve the requisite run-off rates. This method involves restricting site runoff to an agreed limit (normally those assigned to greenfield) and then temporarily storing any excess storm water on the site. The way this water is stored and attenuated can vary depending on the context and nature of the development being proposed.

A quickstorage estimate using FSR Rainfall has been used to estimate attenuation that will be needed for the proposed development. An estimate of 30% permeable area for the developable area has been used to estimate the amount of attenuation needed. The discharge from the site will be limited to the 1 in 100 event (79.8 l/sec), therefore for the 1 in 100 year event + climate change of 30%, will give an approximate storage of between **555m3 – 931m3**.

A more detailed design will be progressed once a fixed layout is developed.

5.4 SuDs drainage principles

A SuDs system aims to mimic natural systems whereby water is held close to the source, then released slowly over time. This acts to both reduce peak discharge and to promote the settlement of sediment thereby improving the water quality of any resulting discharge.

The final sustainable drainage strategy for this site will be designed in line with the SuDS management train. This requires that:

1. source control techniques such as permeable paving, green roofs and rainfall harvesting are incorporated into the development design wherever reasonably possible
2. where appropriate infiltration drainage is encouraged

3. in situations where it is not possible to discharge all surface water to the ground, storm water will be controlled and discharged as locally as possible with excess storm water stored on the site in surface water features
4. off site solutions and hard engineering to achieve the design criteria will only be considered where it can be demonstrated that more sustainable options above are not possible.

5.5 Post-development situation

As mentioned in Section 5.3, ground conditions do not permit the use of infiltration drainage. Therefore connection to watercourse will be the preferred option at a peak rate of 124.1l/sec for the 1 in 100 year + climate change, with all flows in excess of this rate being retained onsite in a suitably size attenuation structure. Further details of this system should be provided at a detailed design stage.

Therefore there are two options for discharge to watercourse:

Option A

To discharge via a new connection to the River Calder.

Option B

To discharge to the existing ditch onsite, which flows, into the River Calder 585m to the west of the site.

All calculations will need an additional 30% for climate change to be added to all calculations.

6 PLANNING CONTEXT

6.1 Application of planning policy

NPPF includes (Section 10) measures specifically dealing with development planning and flood risk using a sequential characterisation of risk based on planning zones and the EA Flood Map. The main study requirement is to identify the flood zones and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions.

Within NPPF Technical Guidance on flood risk each flood zone has a list of appropriate land uses dependent on vulnerability to flooding.

6.2 Land use vulnerability

From the NPPF Technical Guidance, a “less vulnerable” land use could be appropriate to Flood Zone 3a (High Probability of flooding at higher than 1 in 100 annual probability) with the “more vulnerable” use only permitted if the exception test is passed. For a “more vulnerable” class, development on this site could be appropriate within Flood Zone 2 (Medium Probability of flooding at less than 1 in 100 but higher than 1 in 1,000 annual probability).

In applying the sequential test, reference is made to the following table (reproduced from Table 3 contained within NPPF).

Table 6.1 Flood risk vulnerability and flood zone ‘compatibility’

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
	Zone 2	Appropriate	Appropriate	Exception Test Required	Appropriate	Appropriate
	Zone 3a	Exception Test Required	Appropriate	Should not be permitted	Exception Test Required	Appropriate
	Zone 3b functional floodplain	Exception Test Required	Appropriate	Should not be permitted	Should not be permitted	Should not be permitted

With reference to the development proposal and Table 2 of the NPPF, this residential development can be classed as ‘more vulnerable’.

6.3 Sequential and exception tests

The Sequential Test is required to assess flood risk and NPPF Technical Guidance recommends that the test be applied at all stages of the planning process to direct new development to areas with the lowest probability of flooding (Flood Zone 1).

According to NPPF, if there is no reasonably available site in Flood Zone 1, the flood vulnerability of the proposed development (see NPPF Technical Guidance Table 2) can be taken into account in locating development in Flood Zone 2 and then Flood Zone 3. Within each Flood Zone new development should be directed to sites at the lowest probability of flooding from all sources.

The development proposal includes ‘more vulnerable’ residential uses to be developed on this site. With reference to Table 6.1 above, this development would be appropriate for areas within Flood Zone 1.

7 CONCLUSIONS AND RECOMMENDATIONS

This Flood Risk Assessment has been prepared in support of the proposed residential development off Mitton Road, Whalley.

The site is partially located within Flood Zone 3, Flood Zone 2 and the majority of the site within Flood Zone 1 according to the latest Environment Agency Flood Zone maps. Suitable mitigation should be incorporated for example attenuation on site, to ensure that flood risk to the proposed properties remains low and meets the requirements of NPPF.

Residential development is to only be located within Flood Zone 1; no development is to take place within Flood Zone 2 or 3. Area to be left as public open space and will not alter the floodplain hydrology.

The site is partially located within the Environment Agency reservoir flood zone.

Data obtained from the SFRA and PFRA also places the area of development at low risk of flooding from other sources.

In accordance with NPPF and local policy, this FRA has considered the impact on the surface water regime in the area should development occur. A detailed surface water strategy should be developed to assess the system most suitable for surface water discharge from the site.

The site should also give an 8m easement from the top of bank for the River Calder and a 7m from centre for sewers on site.

Based on the information available the flood risk to the proposed development is **low** and **development should not be precluded** on flood risk grounds.

8 REFERENCES

1. NPPF - Nation Planning Policy Framework, March 2012.

2. Technical Guidance to the National Planning Policy Framework, March 2012.

3. DEFRA “Interim Code of Practice for Sustainable Drainage Systems” National SUDS Working Group, July 2004.

4. British Standard BS 8533-2011 "Assessing and managing flood risk in development Code of practice" October 2011.

5. Ribble Valley Borough Council, Strategic Flood Risk Assessment. Level 1 May 2010.

6. Environment Agency PFRA Lancashire Area, May 2011.

7. ‘Sustainable Drainage System (SUDs) Manual’ February 2007.

APPENDIX A
RSK SERVICE CONSTRAINTS

RSK GROUP
SERVICE CONSTRAINTS

1. This report (the "Service") was compiled and carried out by RSK LDE Ltd (RSK) for David Wilson Homes (the "client") in accordance with the terms of a contract between RSK and the "client. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable Civil Engineer at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

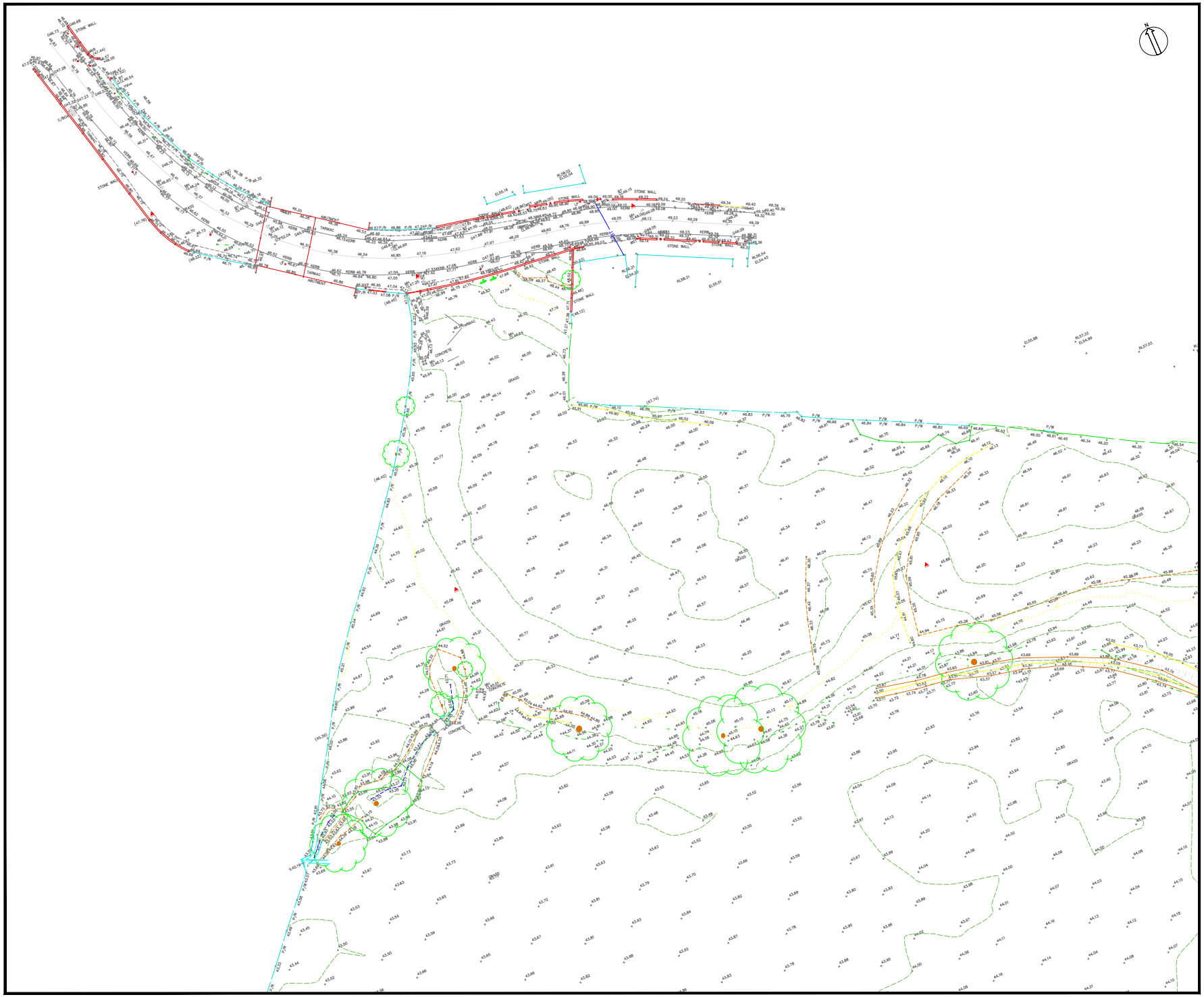
6. The observations and conclusions described in this report are based solely upon the Services, which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

APPENDIX B
SITE TOPOGRAPHICAL SURVEY



Topographical Survey Legend

All levels relate to Ordnance Survey Datum.
Orientation to a Ordnance Survey Grid.

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A	01.03.12	Issued for Information	PB	GL	GT

Dimensions	Projection	Scale	Orig Size
m		1:500	A1

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CLIENT
BARRATT CENTRAL

PROJECT
MITTON ROAD, WHALLEY

TITLE
TOPOGRAPHIC SURVEY

JOB No.:	DRAWING FILE:
293106	293106 - T - 01

BY:	DATE:	CONTRACT NO.		REV:
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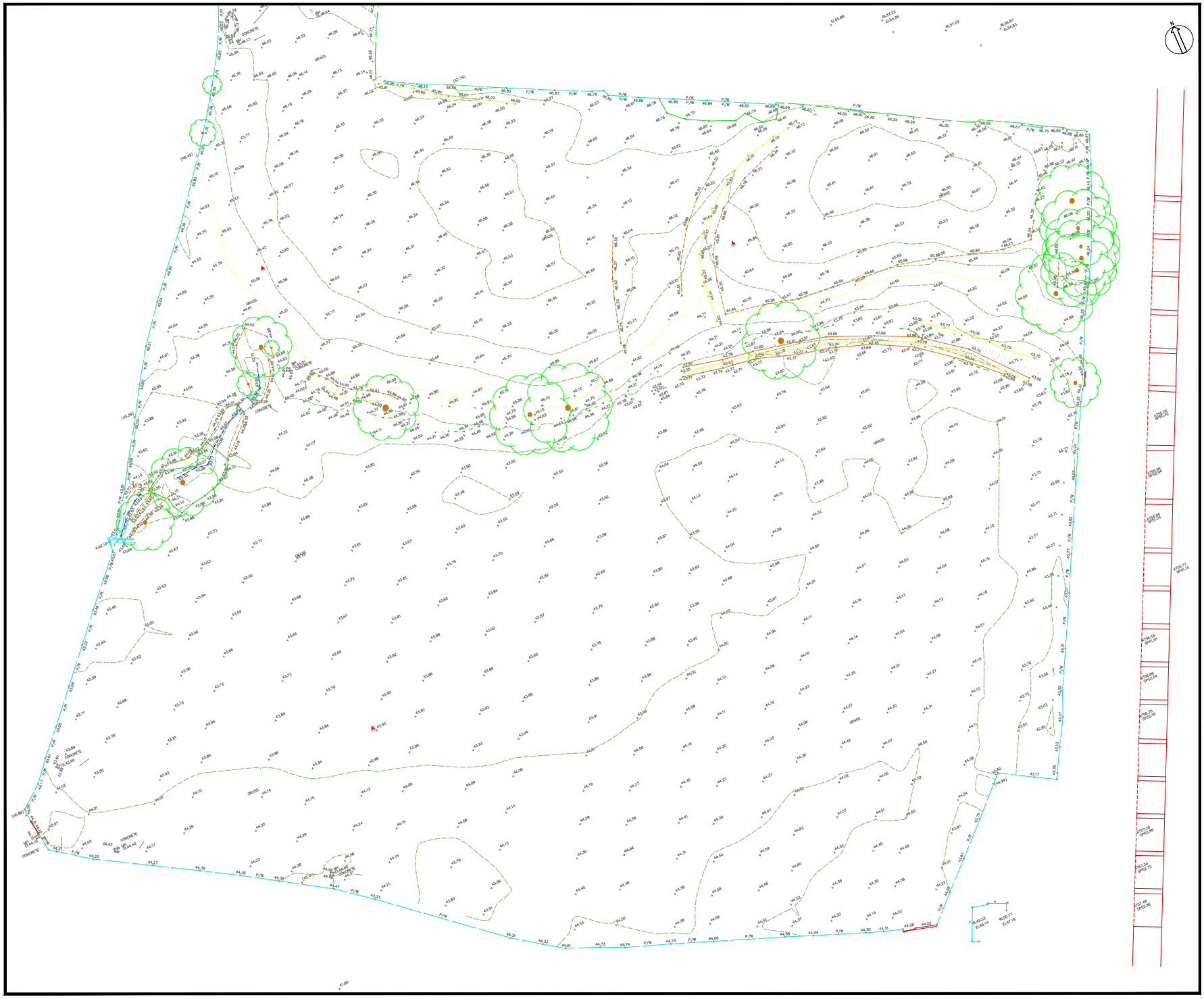

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Dimensions	Projection	Scale	Orig Size
m		1:500	A1

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BARRATT CENTRAL

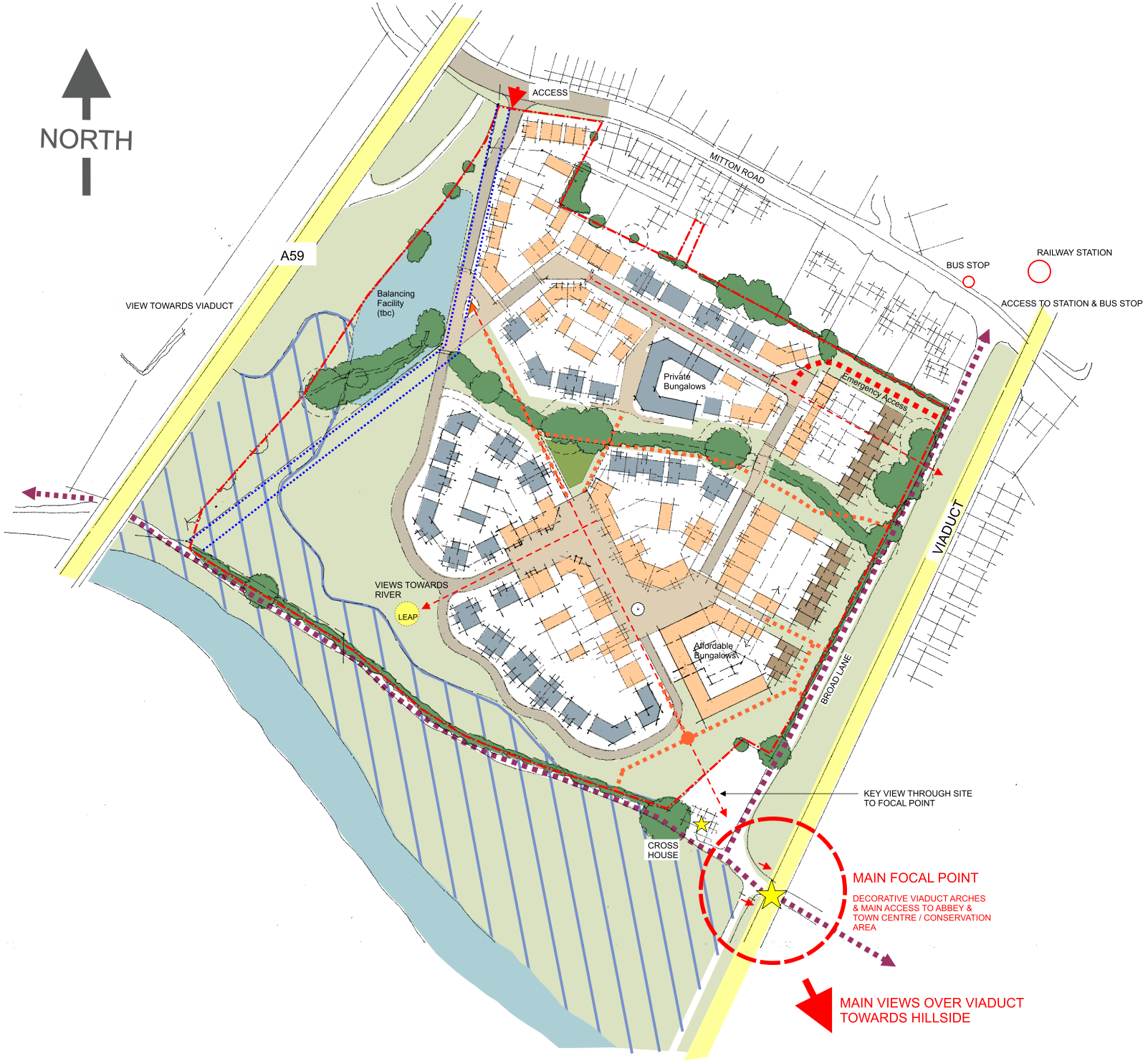
PROJECT
MITTON ROAD, WHALLEY

TITLE
TOPOGRAPHIC SURVEY

JOB No.:	DRAWING FILE:
293106	293106 - T - 01

BY:	DATE:	CONTRACT NO.		REV:
PB	02-12			A

APPENDIX C
PROPOSED SITE PLAN



CHARACTER AREAS (please see separate dwgs)

Low density = The Sands & N of King St.2 - 2.5 storey. Brick/render
Boundaries = Larger frontage 3 - 4 m lawned & 900 ht box hedging. Close bd timber fence / hedge to side boundary.

High Density = Church La. 2-3 storey. Brick with stone features
Boundaries = 1.5 max. 600 ht stone walls & copings or none. Generally hard surface

High Density = The Viaduct / railway architecture. 3 storey.
Boundaries = open soft landscaped. Brick.

Proposed new path/cycle links

Existing path routes

Key Feature Buildings

Line Of Sewer Easement

Flood Zone

Urban Design
Unit 1A
Interlink Way West
Bardon Hill
Leicestershire
LE67 1GG

telephone 01530 513900
fax 01530 812506

Project
Whalley
Mitton Road

Drawing Title
Sketch Master Plan

Scale *
1:1250 @ A2

Date
28-02-12

Drawn
PJLivesley

Drawing Ref
NW-09-03D

BARRATT

APPENDIX D
UNITED UTILITIES SEWER RECORDS

United Utilites Water PLC
Property Searches
Ground Floor Grasmere House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP
DX 715568 Warrington
Telephone 0870 751 0101
Fax Number 0870 7510102
Property.searches@uuplc.co.uk

Your Ref:
Our Ref: 11/ 835180
Date: 14/11/2011

RSK Land and Development Engineering Limited
Spring Lodge
172 Chester Road
Helsby
Cheshire
WA6 0AR

FAO: CHRIS

Dear Sirs

Location: LAND OFF RIDDING LANE/BROAD LANE WHALLEY

I acknowledge with thanks your request dated 02/11/11 for information on the location of our services.

Please find enclosed plans showing the approximate position of our apparatus known to be in the vicinity of this site.
I attach General Condition Information sheets, which details contact numbers for additional services (i.e. new supplies, connections, diversions) which we are unable to deal with at this office. In addition you should ensure they are made available to anyone carrying out any works which may affect our apparatus.

I trust the above meets with you requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please telephone us on 0870 7510101.

Yours Faithfully,

S McManus.

Sue McManus
Operations Manager
Property Searches

United Utilities Water PLC
Registered in England & Wales No. 2366678
Registered Office: Haweswater House,
Lingley Mere Business Park, Lingley Green Avenue,
Great Sankey, Warrington, WA5 3LP

TERMS AND CONDITIONS - WASTERWATER & WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUW apparatus) of United Utilities Water PLC ("UUW").

TERMS AND CONDITIONS:

1. This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.

2. This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.

3. In particular, the position and depth of any UUW apparatus shown on the Map are approximate only. UUW strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUW apparatus. The exact location, positions and depths should be obtained by excavation trial holes.

4. The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.

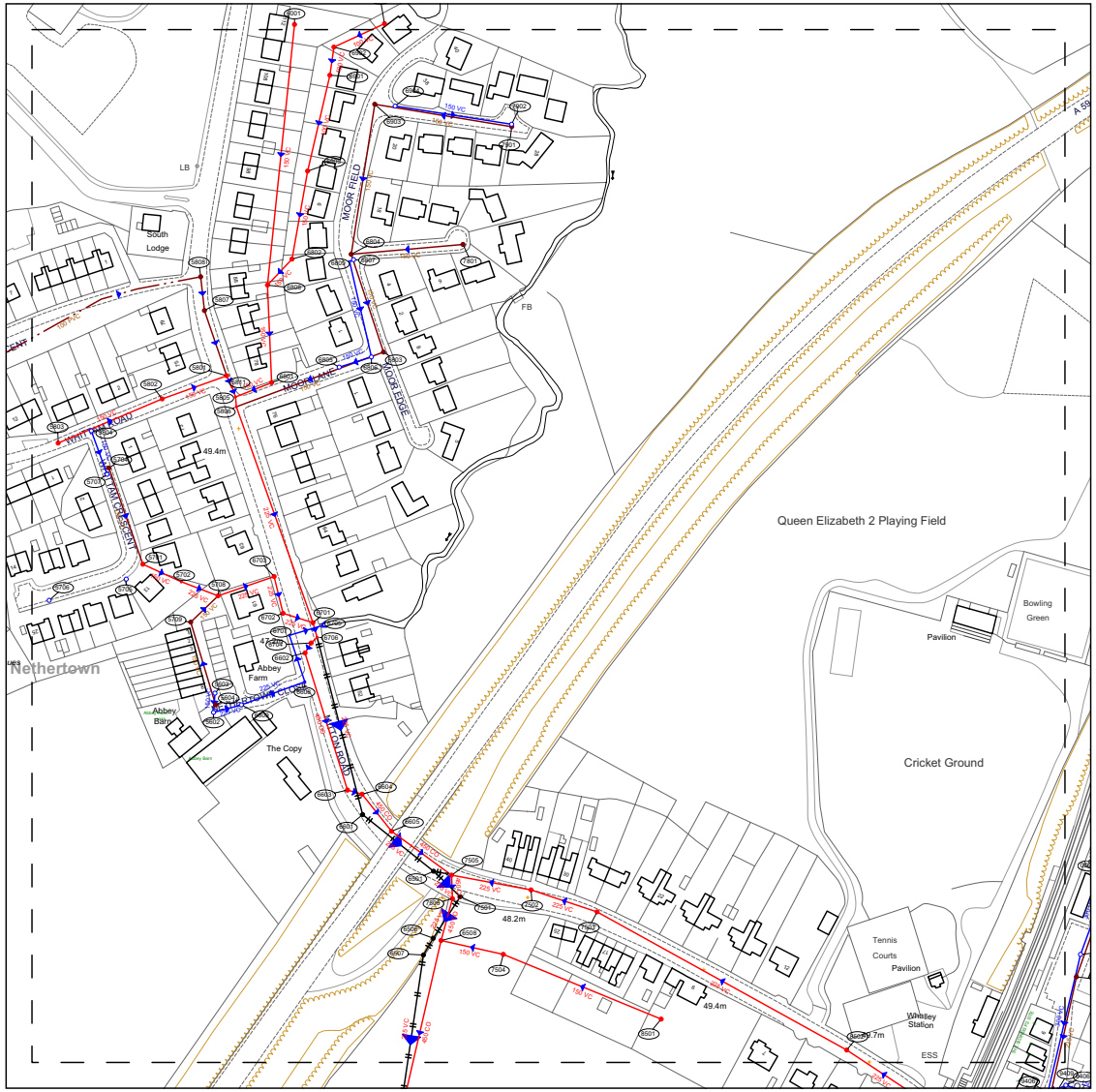
5. The position and depth of UUW apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been ade subsequent to issue and prior to any works being carried out.

6. This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUW apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.

7. No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUW apparatus by reason of the actual position and/or depths of UUW apparatus being different from those shown on the Map and any information supplied with it.

8. If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.

9. This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUW from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



OS Sheet No: SD7236NE

Scale 1:1250 Date: 14-Nov-2011

Printed by: Lea Robertson

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
5602	49.1	S	M	47.34	225		C	VC	107	13.97
5603	49.39	S	M	47.9	150		C	VC	24	9.37
5604		F	M		150		C	VC		41.8
5701	49.46	C	M	47.46	150		C	VC	51	26.33
5702		C	Q	47.06	225		C	VC	48	19.17
5704	49.65	F	M	48.4	150		C	VC	55	49.37
5705	49.48	S	M							
5706	48.56	S	M							
5707	49.62	S	M							
5708	49.63	C	M	46.61	225		C	VC	38	28.69
5709		F	M		150		C	VC		18.35
5801	50.06	C	M	48.38	150		C	VC		5.85
5802	50.18	C	M	48.57	150		C	VC	195	33.16
5803	50	C	M	49.31	150		C	VC	76	54.67
5804	50.07	S	M	48.98	150		C	VC	448	22.39
5805		C	J		225		C	VC		4.76
5806		C	J		225		C	VC		110.9
5807		F	M		150			VC		33.35
5808	50.98	F	M		100			PVC		16.42
5811		C	Q		225		C	VC		5.28
6501	46.57	C	M							
6506		C	M							
6507		C	M							
6508	45.8	C	M	43.4	450		C	CO		91.95
6601	46.53	C	M							
6602	47.2	C	M	44.63	450		C	CO	204	69.47
6603	46.6	C	M	44.29	450		C	CO	245	7.34
6604	46.23	C	M	44.26	450		C	CO		22.9
6605	46.17	C	M	44.26	450		C	CO	138	35.98
6608		S	J		225			VC		23.66
6609	48.55	S	M	47.18	225		C	VC		32.64
6701	47.26	C	M	44.79	225		C	VC		7.3
6702	47.5	C	M	45.32	225		C	VC	30	15.16
6703	47.91	C	M	45.83	225		C	VC	37	18.32
6704	47.09	C	M		450		C	CO		5.68
6705		S	F							
6706		C	J		225			VC		3.97
6707		S	G		225			VC		16.94
6801	50.08	C	M	49	150		C	VC		18.76
6802	51.69	C	M	50.83	150		C	VC		17.32
6803	50.45	F	M	48.95	150		C	VC		75.97
6804	51.62	F	M	50.31	150		C	VC	44	49.84
6805	50.55	S	M							
6806	50.47	S	M	49.48	150		C	VC	409	16.34
6807	51.45	S	M	49.81	150		C	VC		2.13
6808		C	M		150		C	VC		47.25
6809		S	G		150		C	VC		47.3
6901	55.33	C	M	54.22	100		C	VC		47.61
6902	55.98	C	M	55.02	100		C	VC	18	13.76
6903	54.95	F	M	51.76	150		C	VC	51	73.5
6904	54.82	S	M	53.09	150		C	VC	272	57.04
6905		C	M		150		C	VC		43.27
7501	47.34	C	M							
7502	48.46	C	M	45.96	225		C	VC	20	39.1
7503	49.15	C	M	46.64	225		C	VC	51	33.71
7504	46.6	C	M	45.36	150		C	VC	19	30.86
7505	46.72	C	M	44	450		C	CO	163	11.39
7506	47.29	C	M	43.92	450		C	CO	42	21
7507		F	Q							
7801	52.08	F	M	50.9	150		C	VC	95	54.3
7901	54.15	F	M	52.17	150		C	VC	172	67.15
7902	54.32	S	M							
8501	48.82	C	M	47.55	150		C	VC	38	82.56
8502		C	M		225		C	VC		138.03

WASTE WATER SYMBOLOGY

MANHOLE (FOUL, SURFACE, COMBINED, DUAL)
SIDE ENTRY MANHOLE
PRIVATE SEWER
ABANDONED SEWER
SITE TERMINATION
T-JUNCTION (SADDLE)
AIRVALVE
LAMP HOLE
CASCADE
OIL INTERCEPTOR
CONTROL KIOSK
PENSTOCK
CONTROL VALVE
RODDING EYE
GULLEY
SOAKAWAY
HATCHBOX
TUMBLING BAY
HEADWALL
UNSPECIFIED
HYDROBRAKE
VALVE
INLET
WASHOUT
GHOST NODE (inc. GN - Rising Main & GN - Dual Function)
EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)
CATCHPIT
SIDE ENTRY CATCHPIT
CHAMBER
SIDE ENTRY CHAMBER
DROPSHAFT
SIDE ENTRY DROPSHAFT
SHEET EDGE
VENT COLUMN
SEWER OVERFLOW
DISCHARGE POINT (OUTFALL)
TANK
WASTE WATER TREATMENT WORKS
PUMPING STATION
EJECTOR STATION
SLUDGE PUMPING STATION

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

- F Foul
- S Surface
- C Combined
- T Transition
- O Overflow
- U Unspecified

MANHOLE / NODE TYPE

- M Manhole
- J Junction
- L Lamphole
- H Hatchbox
- R Rodding Eye
- F Outfall
- V Combined Sewer Overflow
- P Pumping Station
- S Soakaway
- D Dual Function Manhole
- W Treatment Works
- Z Ghost in Rising Main
- C Cascade
- Y Gulley
- E Ejector
- O Oil Injector
- I Inlet
- B Hydrobrake
- T Vent Column
- X Valve
- U Unspecified
- Q Expediency Node
- G Ghost (to allow pipe bends)

SEWER SHAPE

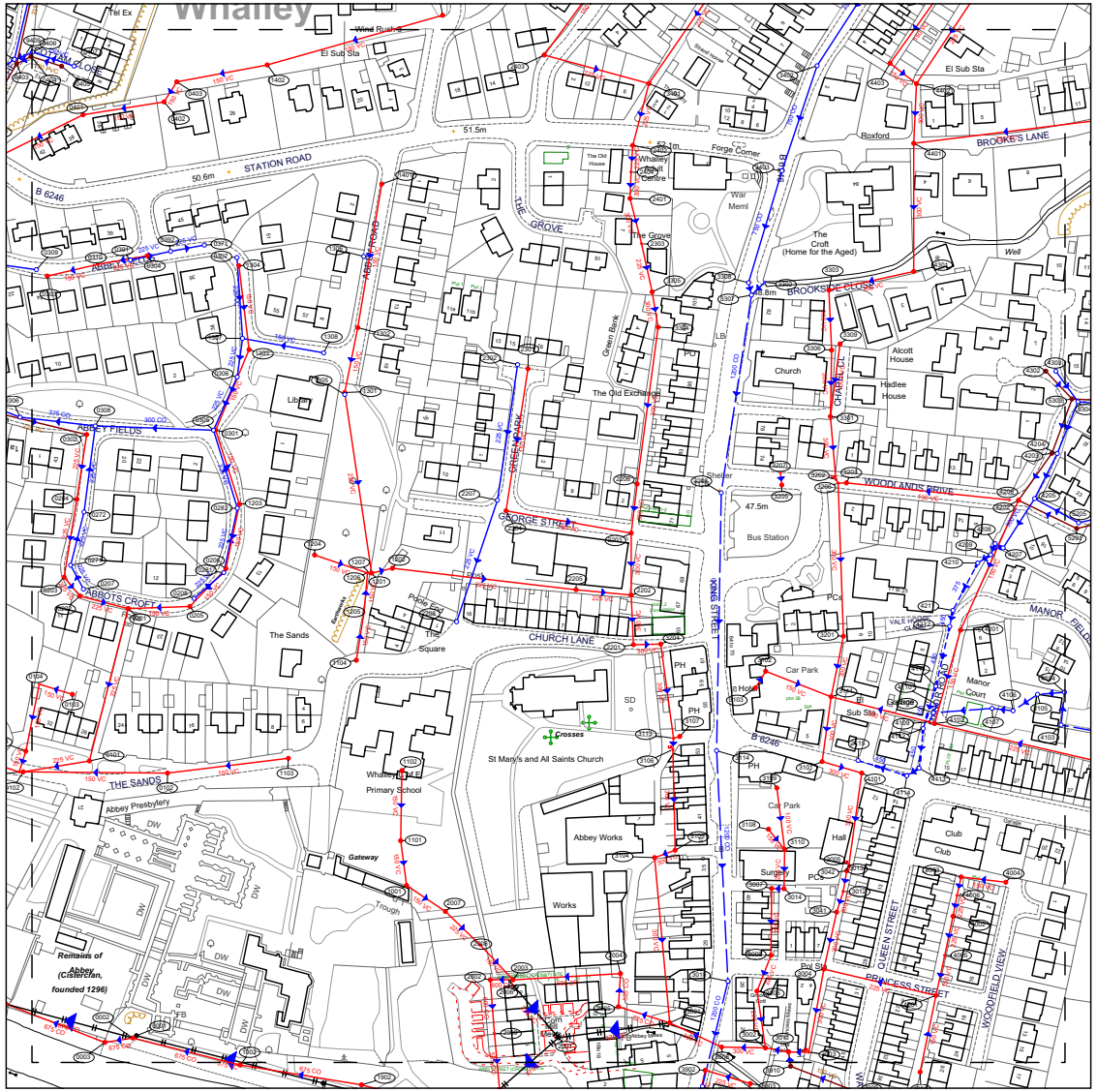
- C Circular
- E Egg
- O Oval
- F Flat Top
- R Rectangular
- S Square
- T Trapezoidal
- A Arch
- B Barrel
- H Horseshoe
- U Unspecified

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- CI Cast Iron
- SI Spun (Grey) Iron
- CO Concrete
- CS Concrete Segments (Bolted)
- CS Concrete Segments (Unbolted)
- CC Concrete Box Culvert
- DI Ductile Iron
- GR Glass Reinforced Concrete
- GR Glass Reinforced Plastic
- PS Plastic / Steel Composite
- PV Polyvinyl Chloride
- PE Polythene
- RP Reinforced Plastic Matrix
- ST Steel
- VC Vitrified Clay (All Clayware)
- PP Polypropylene
- PF Pitch Fibre
- MA Masonry - In Regular Courses
- MA Masonry - Randomly Coursed
- U Unspecified

OS Sheet No: SD7236NE
Scale 1:1250 Date: 14-Nov-2011
64 Nodes
Sheet 1 of 1

United Utilities
SEWER RECORDS



OS Sheet No: SD7336SW

Scale 1:1250 Date: 14-Nov-2011

Printed by: Lea Robertson

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
0001	43.44	C	M							
0002	43.53	C	M	43.53	675		C	CO	12	13.7
0003	43.62	C	M	42.34	675		C	CO	165	51.16
0101	44.75	C	M	43.45	225		C	VC	147	32.41
0102	45.08	C	M	44	150		C	VC	91	69.78
0103	44.89	C	M	43.75	150		C	VC		16.76
0104		C	G		150		C	VC		33.05
0201	46.25	C	M	43.73	225		C	VC	293	76.05
0202	45.86	C	M	43.95	225		C	VC	160	24.04
0203	45.83	C	M	44.06	225		C	VC	132	11.9
0204	46.19	C	M	44.16	225		C	VC	477	38.18
0205	47.04	C	M	44.08	150		C	VC	115	29.94
0206	47.2	C	M	44.35	150		C	VC	101	25.29
0207	45.89	S	M	45	225		C	VC	262	13.1
0208	47.07	S	M	46.13	225		C	VC	76	19.07
0271	45.84	S	M	44.93	225		C	VC	166	26.59
0272	46.16	S	M	44.73	225		C	VC	300	41.99
0281	47.22	S	M	45.84	225		C	VC	118	31.85
0282	47.14	S	M	45.56	225		C	VC	72	39.47
0301	46.91	C	M	44.86	150		C	VC	121	37.56
0302	46.76	C	M	44.42	225		C	VC	132	31.73
0303	47.81	C	M							
0304	48.27	C	M	46.25	225		C	VC	174	24.3
0305	46.91	S	M	44.92	300		C	CO	155	57.23
0306	46.78	S	M	45.43	225		C	VC	69	28.19
0307	47.91	S	M	46.23	225		C	VC	112	39.22
0308	46.73	S	M	44.44	375		C	CO	262	36.64
0309	47.76	S	M	46.6	225		C	VC	165	39.63
0310		C	Q	46.11	150		C	VC	167	25.02
0371	48.05	S	M							
0391	48.08	S	M	46.38	225		C	VC	497	19.88
0392	48.23	S	M	46.32	225		C	VC		16.59
0401	51.18	C	M	49.49	150		C	VC	73	47.24
0402	50.89	C	M	49.91	150		C	VC	99	39.67
0403		C	M		150		C	VC		11.49
0405		F	M		150		C	PVC		15.52
0406	53.24	S	M	52.1	150		C	VC	23	3.95
0407	54.52	S	M	52.75	150		C	VC	35	21.24
1001	45.21	C	M	43.99	150		C	VC		22.58
1101	45.35	C	M	44.49	150		C	VC	45	21.84
1102	45.43	C	M	45.24	150		C	VC	47	33.98
1103	46.03	C	M	45.09	150		C	VC	55	58.93
1104	47.07	C	M	46.08	150		C	VC		23.46
1201	47.07	C	M	45.77	225		C	VC		10.36
1202		C	M		225		C	VC		89.41
1203	47.07	C	M	44.53	150		C	VC	200	31.95
1204		C	M		150		C	VC		27.01
1205		C	G		150		C	VC		19.16
1206		C	J		150		C	VC		0.99
1207		C	Q		225		C	VC		0.98
1301	46.95	C	M	46.14	225		C	VC	252	88.33
1302	47.42	C	M	46.15	150		C	VC	-3204	32.04
1303	46.93	C	M	45.43	150		C	VC	77	42.17
1304	47.77	C	M	45.99	150		C	VC	76	40.92
1305	46.92	S	M	46.22	225		C	VC	16	0.99
1306	46.97	C	M							
1307	46.97	S	M	45.85	225		C	VC	47	18.84
1308	47.12	S	M	46.16	150		C	VC	148	39.9
1401	51.04	C	M	49.67	150		C	VC	20	70.42
1402		C	M		150		C	VC		44.54
2001	44.28	C	M							
2002	44.58	C	M	42.79	600		C	CO	373	26.08
2003	44.81	C	M	42.83	600		C	CO	550	11
2004	45.01	C	M	42.95	600		C	CO	521	52.09
2005	44.55	C	M	43.06	525		C	CO		16.03
2006		C	G							
2007		C	M		225		C	VC		23.44
2008		C	Q	21.65	150		C	VC	-1	23.12
2009		C	Q	42.72	525		C	CO	451	27.07
2201	47.17	C	M	44.31	300		C	VC	660	13.21
2202	47.85	C	M	44.5	300		C	VC	141	24.05
2203	47.79	C	M	44.63	300		C	VC	273	29.99
2204	47.75	C	M	45.43	150		C	VC	79	61.51
2205		C	M		225		C	VC		26.83
2206	47.89	C	M	44.63	300		C	VC	-1198	23.95
2207	47.47	S	M	45.95	225		C	VC	132	62.03
2208	47.56	S	M							
2301	48.04	C	M	46.4	150		C	VC	73	69.57
2302	47.99	S	M	46.53	225		C	VC	118	66.33
2303		C	Q	47.56	225		C	VC	36	23.78
2401	51.96	C	M	48.23	300		C	VC	34	22.75
2402	52.07	C	M	48.99	225		C	VC	35	13.02
2403	52.29	C	M	50.49	225		C	VC	117	52.49
2404		C	Q	48.62	300		C	VC	35	12.67
3001	44.5	C	M	43.31	525		C	CO	104	26.03
3002	44.49	C	M	43.46	300		C	VC		21.23
3003		C	L		300		C	VC		9.81

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
3004	45.23	C	M	43.68	300		C	VC		40.87
3005		C	L		300		C	VC		1.02
3006	44.44	C	M	43.69	225		C	VC	126	27.75
3007	45.34	C	M	43.94	225		C	VC		32.32
3008		C	M		300		C	VC		27.69
3009		C	M		225		C	VC		18.64
3010		S	M		1200		C	CO		52.37
3011	44.81	C	M	43.51	300		C	VC	283	11.31
3012		C	Q	44.61	300		C	VC		10.46
3013		C	Q	44.82	520	540	R	BR	3	2.29
3014		C	M		225		C	VC		6.01
3041	45.35	C	M		300		C	VC		28.25
3042	45.49	C	M	43.87	720	560	R	BR	-14	10.2
3101	46.21	C	M	44.07	300		C	VC	332	19.95
3102	46.62	C	M	45.16	150		C	VC	33	33.96
3103	46.38	C	M	45.52	100		C	VC	34	9.44
3104	45.7	C	M	43.65	300		C	VC	259	80.29
3105	45.6	C	M	43.69	300		C	VC	529	10.57
3106		C	L	43.9	300		C	VC	256	48.7
3107	45.82	C	M	44.75	150		C	VC		3.14
3108	45.73	C	M	44.81	150		C	VC		12.5
3109	45.81	C	M	45.17	150		C	VC		30.01
3110		C	M		225		C	VC		19.03
3111	46.44	C	M	44.14	300		C	VC	452	31.67
3113		C	J		300		C	VC		5.48
3114		S	M		1200		C	CO		111.68
3115		S	M							
3201	46.53	C	M	44.38	300		C	VC	199	29.89
3202		C	L	45.08	300		C	VC		2.15
3203	47.61	C	M	45.8	150		C	VC		4.05
3204	46.83	C	M	44.27	300		C	VC		46.02
3205		C	M							
3206		C	J		300		C	VC		74.15
3207		C	G		150		C	VC		5.91
3208		S	M		1200		C	CO		124.84
3301	48.34	C	M	45.54	300		C	VC	68	30.51
3302		S	G							8.97
3303	49.46	C	M	46.79	300		C	VC		29.06
3304	48.53	C	M		300		C	VC		76.58
3305	49.63	C	M	46.88	300		C	VC		17.27
3306		C	M		300		C	VC		32.13
3307		S	M		1200		C	CO		96.76
3308	48.98	S	M		300		C	VC		6.16
3309		C	M		100		C	PVC		35.44
3401	52.44	C	M	49.75	225		C	VC	45	30.93
3402	51.61	C	M		750		C	CO		53.58
3403	50.17	S	M		750		C	CO		56.53
4001	45.47	C	M	44.02	225		C	VC	232	55.7
4002	45.56	C	M	44.35	225		C	VC	121	19.42
4003	45.7	C	M	44.54	150		C	VC	115	9.22
4004		C	M		150		C	VC		21.77
4005		C	Q	44.19	150		C	VC	132	19.78
4006		C	Q	44.46	225		C	VC	113	10.2
4101	46.3	C	M	43.99	300		C	VC		44.72
4102	46.33	C	M	44.38	300		C	VC		2.8
4103		S	M		225			VC		15.89
4104		S	M		225			VC		13.05
4105		S	M		300			VC		14.26
4106		S	M		300			VC		10.24
4107		S	M		300			VC		28.49
4108		S	M		300			VC		4.92
4109		C	J		300		C	VC		48.89
4110		S	G		300			VC		4.42
4111		S	M		450		C			21.29
4112		S	M		450		C			19.31
4113		S	M		450		C			7.05
4114		S	M		450		C			24.69
4201	46.08	C	M	45.1	150		C	VC	67	46.89
4202	47.95	C	M	46.8	150		C	VC	41	68.85
4203		S	M		150			VC		27.88
4204		S	M							24.42
4205		S	M		300		C	VC		28.34
4206		C	G		150		C	VC		79.3
4207		S	M		225		C	VC		4.42
4207		S	M		225		C	VC		5.3
4208		S	M		300		C	VC		5.77
4209		S	M		300		C	VC		7.44
4210		S	M		375		C			25.9
4211		S	M		450		C			7.85
4212		S	M		450		C			29.8
4301	50.61	C	M	47.64	300		C	VC	51	42.07
4302		F	M		150			VC		18.52
4303		S	M							18.24
4401	51.95	C	M	48.15	300		C	VC	138	62.02
4402	52.35	C	M	48.55	300		C	VC	76	28.88
4403	52.75	C	M	51.46	150		C	VC	10	16.14

WASTE WATER SYMBOLOGY

MANHOLE
FOUL SURFACE COMBINED DUAL
SIDE ENTRY MANHOLE
PRIVATE SEWER
ABANDONED SEWER
SITE TERMINATION
T-JUNCTION (SADDLE)
AIRVALVE
LAMP HOLE
CASCADE
OIL INTERCEPTOR
CONTROL KIOSK
PENSTOCK
CONTROL VALVE
RODDING EYE
GULLEY
SOAKAWAY
HATCHBOX
TUMBLING BAY
HEADWALL
UNSPECIFIED
HYDROBRAKE
VALVE
INLET
WASHOUT
GHOST NODE (inc. GN - Rising Main & GN - Dual Function)
EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)
CATCHPIT
SIDE ENTRY CATCHPIT
CHAMBER
SIDE ENTRY CHAMBER
DROPSHAFT
SIDE ENTRY DROPSHAFT
SHEET EDGE
VENT COLUMN
SEWER OVERFLOW
DISCHARGE POINT (OUTFALL)
TANK
WASTE WATER TREATMENT WORKS
PUMPING STATION
EJECTOR STATION
SLUDGE PUMPING STATION

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

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S Surface	O Overflow
C Combined	U Unspecified

MANHOLE / NODE TYPE

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J Junction	C Cascade
L Lamphole	Y Gulley
H Hatchbox	E Ejector
R Rodding Eye	O Oil Injector
F Outfall	I Inlet
V Combined Sewer Overflow	B Hydrobrake
	T Vent Column
P Pumping Station	X Valve
S Soakaway	U Unspecified
D Dual Function Manhole	Q Expediency Node
	G Ghost (to allow pipe bends)
W Treatment Works	

SEWER SHAPE

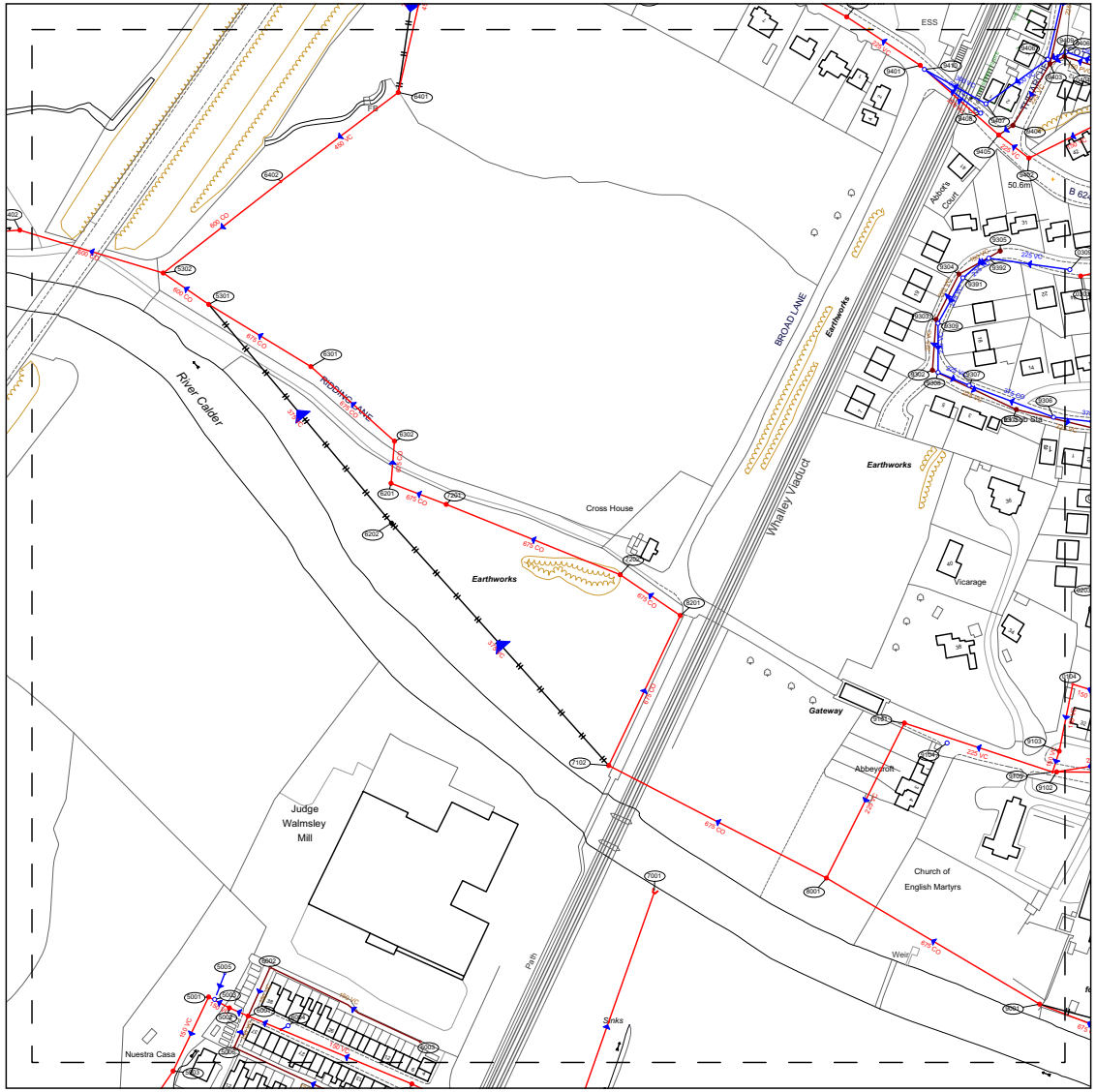
C Circular	T Trapezoidal
E Egg	A Arch
O Oval	B Barrel
F Flat Top	H Horseshoe
R Rectangular	U Unspecified
S Square	

SEWER MATERIAL

AC Asbestos Cement	
BR Brick	
CI Cast Iron	
SI Spun (Grey) Iron	
CO Concrete	
CS Concrete Segments (Bolted)	
CS Concrete Segments (Unbolted)	
CC Concrete Box Culvert	
DI Ductile Iron	
GR Glass Reinforced Concrete	
GR Glass Reinforced Plastic	
PS Plastic / Steel Composite	
PV Polyvinyl Chloride	
PE Polythene	
RP Reinforced Plastic Matrix	
ST Steel	
VC Vitrified Clay (All Clayware)	
PP Polypropylene	
PF Pitch Fibre	
MA Masonry - In Regular Courses	
MA Masonry - Randomly Coursed	
U Unspecified	

OS Sheet No: SD7336SW
Scale 1:1250 Date: 14-Nov-2011
173 Nodes
Sheet 1 of 1

United Utilities
SEWER RECORDS



OS Sheet No: SD7236SE

Scale 1:1250 Date: 14-Nov-2011

Printed by: Lea Robertson

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
0404		F	M		150		C	PVC		7.85
5001	44.17	C	M	42.52	150		C	VC	142	39.69
5002	43.73	C	M	42.4	150		C	VC	-88	11.38
5003		S	M							
5005		S	G							13.44
5006		F	G		150		C	VC		16.69
5301	44.48	C	M	41.55	600		C	CO		26.72
5302	44.19	C	M	41.54	600		C	CO	905	72.43
6001		C	M		150		C	VC		9.87
6002		F	G		150		C	VC		25.86
6003		F	G		150		C	VC		81.28
6004		S	M		150		C	VC		3.93
6005		F	J		150		C	VC		17.2
6201	43.16	C	M	41.74	675		C	CO	682	20.46
6202		C	M							
6301	44.44	C	M	41.65	675		C	CO	827	57.86
6302	44.19	C	M	41.71	675		C	CO	904	54.22
6401	44.8	C	M	43.13	450		C	VC	92	71.2
6402		C	Q	42.36	600		C	CO	94	72.2
7001		O	F							
7102	48.18	C	M	46.28	675		C	CO	18	80.41
7201	45.72	C	M	41.77	675		C	CO	952	28.55
7202	43.56	C	M	41.87	675		C	CO	908	90.77
8001	43.53	C	M	41.71	675		C	CO	-26	118.59
8201	48.84	C	M	41.91	675		C	CO	880	35.19
9001	43.76	C	M	42.01	675		C	CO	413	119.85
9101	43.48	C	M	42.66	225		C	VC	102	83.96
9102	43.92	C	M	43.21	225		C	VC		2
9103	44.47	C	M	43.34	150		C	VC		10.58
9104	43.49	S	M							
9105		C	J		225		C	VC		75.48
9301	46.38	F	M	44.37	225		C	VC	-738	51.64
9302	46.45	F	M	44.94	225		C	VC	81	44.81
9303	46.55	F	M	44.99	225		C	VC	821	24.63
9304	46.83	F	M	45.08	225		C	VC	351	24.57
9305	47.38	F	M	45.57	150		C	VC	49	22.87
9306	46.5	S	M	44.29	375		C	CO	174	43.62
9307	46.33	S	M							
9308	46.47	S	M	44.6	225		C	VC	39	16.31
9309	46.56	S	M	45.13	225		C	VC	48	23.73
9391	46.9	S	M	45.81	225		C	VC	37	25.09
9392	47.34	S	M	46.28	225		C	VC	36	15.74
9401	49.58	C	M	48.06	225		C	VC		42.63
9402	50.23	C	M	48.82	225		C	VC		18.4
9403	52.25	F	M	50.04	225		C	VC		34.77
9404		F	M		225		C	VC		8.27
9405		C	M		225		C	VC		50.75
9406	52.4	S	M	50.82	300		C	VC		36.84
9407	50.27	S	M		300		C	VC		34.08
9408	50.01	S	M	48.92	300		C	VC		34.48
9409		S	Q	51.93	150		C	PVC	31	5.5
9410		S	M							

WASTE WATER SYMBOLOGY

MANHOLE (FOUL, SURFACE, COMBINED, DUAL)
SIDE ENTRY MANHOLE
PRIVATE SEWER
ABANDONED SEWER
SITE TERMINATION
T-JUNCTION (SADDLE)
AIRVALVE
LAMP HOLE
CASCADE
OIL INTERCEPTOR
CONTROL KIOSK
PENSTOCK
CONTROL VALVE
RODDING EYE
GULLEY
SOAKAWAY
HATCHBOX
TUMBLING BAY
HEADWALL
UNSPECIFIED
HYDROBRAKE
VALVE
INLET
WASHOUT
GHOST NODE (inc. GN - Rising Main & GN - Dual Function)
EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)
CATCHPIT
SIDE ENTRY CATCHPIT
CHAMBER
SIDE ENTRY CHAMBER
DROPSHAFT
SIDE ENTRY DROPSHAFT
SHEET EDGE
VENT COLUMN
SEWER OVERFLOW
DISCHARGE POINT (OUTFALL)
TANK
WASTE WATER TREATMENT WORKS
PUMPING STATION
EJECTOR STATION
SLUDGE PUMPING STATION

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F	Foul	T	Transition
S	Surface	O	Overflow
C	Combined	U	Unspecified

MANHOLE / NODE TYPE

M	Manhole	Z	Ghost in Rising Main
J	Junction	C	Cascade
L	Lamphole	Y	Gulley
H	Hatchbox	E	Ejector
R	Rodding Eye	O	Oil Injector
F	Outfall	I	Inlet
V	Combined Sewer Overflow	B	Hydrobrake
		T	Vent Column
P	Pumping Station	X	Valve
S	Soakaway	U	Unspecified
D	Dual Function Manhole	Q	Expediency Node
		G	Ghost (to allow pipe bends)
W	Treatment Works		

SEWER SHAPE

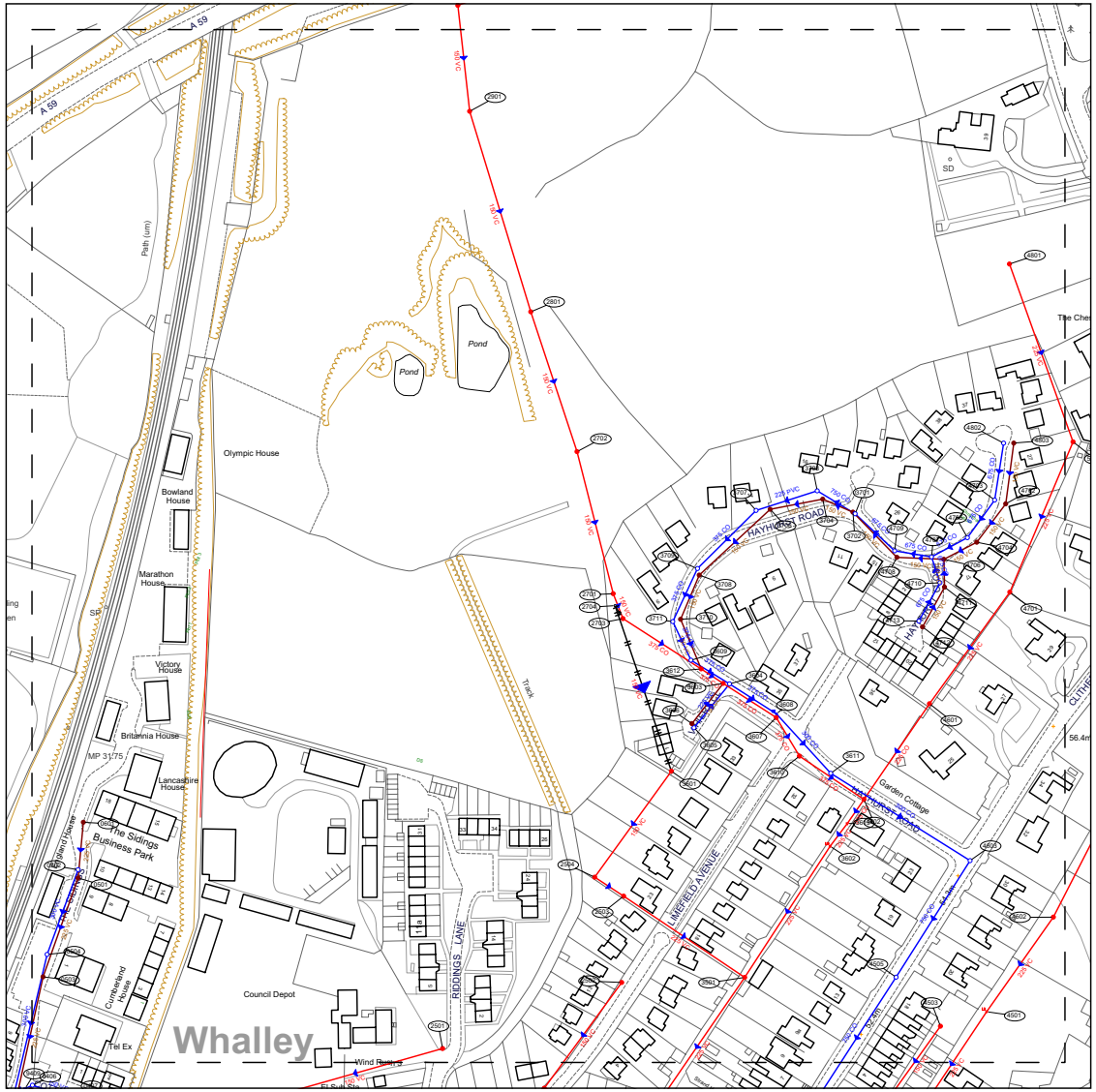
C	Circular	T	Trapezoidal
E	Egg	A	Arch
O	Oval	B	Barrel
F	Flat Top	H	Horseshoe
R	Rectangular	U	Unspecified
S	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
CI	Cast Iron
SI	Spun (Grey) Iron
CO	Concrete
CS	Concrete Segments (Bolted)
CS	Concrete Segments (Unbolted)
CC	Concrete Box Culvert
DI	Ductile Iron
GR	Glass Reinforced Concrete
GR	Glass Reinforced Plastic
PS	Plastic / Steel Composite
PV	Polyvinyl Chloride
PE	Polythene
RP	Reinforced Plastic Matrix
ST	Steel
VC	Vitrified Clay (All Clayware)
PP	Polypropylene
PF	Pitch Fibre
MA	Masonry - In Regular Courses
MA	Masonry - Randomly Coursed
U	Unspecified

OS Sheet No: SD7236SE
Scale 1:1250 Date: 14-Nov-2011
52 Nodes
Sheet 1 of 1

United Utilities
SEWER RECORDS



OS Sheet No: SD7336NW

Scale 1:1250 Date: 14-Nov-2011

Printed by: Lea Robertson

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
0501	55.15	F	M	52.11	225		C	VC	69	50.76
0502	55.14	S	M		300		C	VC		43.68
0503	55	F	M	51.34	225		C	VC	49	59.6
0504	55.05	S	M	52.05	300		C	VC	58	68.7
0601	55.23	F	M	52.45	225		C	VC	85	27.09
2501	52	C	M	50.75	150		C	VC		88.19
2502	52.91	C	M	51.56	150		C	VC	67	63.43
2503		C	M		225		C	VC		70.56
2504		C	M		150			VC		16.75
2701	53.86	C	M	52.99	150		C	VC	259	12.97
2702	55.74	C	M	53.51	150		C	VC	142	70.92
2703	54.28	C	M	52.82	375		C	CO	237	44.98
2704		C	G							
2705		F	G							
2801	58.02	C	M	54.12	150		C	VC	121	71.27
2901	60.24	C	M	55.08	150		C	VC	108	101.44
3501	53.3	C	M	51.07	225		C	VC	63	81.83
3601	54.12	C	M	52.45	150		C	VC		63.32
3602		C	L	52.23	225		C	VC	66	75.72
3603	55.22	C	M	52.67	375		C	CO	610	30.51
3604	55.18	S	M	52.05	375		C	CO	898	26.94
3605	54.88	S	M	52.37	225		C	VC	144	27.3
3606	54.89	F	M	53	150		C	VC	352	24.65
3607	55.35	C	M	52.61	375		C	CO	726	21.78
3608		S	B		300		C	CO		38.95
3609	54.98	S	M	52.2	375		C	CO	183	21.91
3610	55.17	C	M	52.55	375		C	CO	376	37.62
3611	55.02	S	M	51.92	300		C	CO	530	79.54
3612	55.05	C	M	52.62	375		C	CO	-213	12.77
3613		C	Q	52.34	225		C	VC	138	13.81
3701	59.46	S	M	53.61	750		C	CO	82	21.44
3702		F	M		150		C	VC		15.89
3703	59.71	S	M	53.51	225		C	PVC	91	31.07
3704		F	M		150		C	VC		23.9
3706		F	M		150		C	VC		46.82
3707	58.94	S	M	53.07	375		C	CO	81	39.93
3708		F	M		150		C	VC		23.21
3709	56.64	S	M	52.5	375		C	CO	472	28.32
3710		F	M		150		C	VC		25.99
3711	54.87	S	M	52.42	375		C	CO	109	20.65
4501		C	L		225		C	VC		61.21
4502	54.33	C	M	51.48	225		C	VC		56
4503	53.52	C	M	52.38	150		C	VC	47	41.88
4505		S	M		750		C	CO		70.25
4601	55.86	C	M	53.56	225		C	CO	53	56.12
4602	54.86	C	M	52.44	375		C	CO	142	14.17
4603	54.53	S	M	51.27	750		C	CO		66.81
4701	57.92	C	M	54.58	225		C	VC	65	66.56
4702		F	M		150		C	VC		23.27
4703	58.7	S	M	54.83	675		C	CO	75	22.48
4704		F	M		150		C	VC		17.91
4705	58.11	S	M	54.48	675		C	CO	90	19.69
4706		F	M		150		C	VC		22.78
4707	57.49	S	M	54.18	675		C	CO	100	18.06
4708		F	M		150		C	VC		30.54
4709	57.48	S	M	53.96	675		C	CO	79	26.21
4710	57.39	S	M	54.31	675		C	CO	164	13.16
4711		F	M		150		C	VC		13.44
4712		F	M		150		C	VC		22.01
4713	57.06	S	M	54.39	675		C	CO	302	21.16
4801	62.93	C	M	59.32	225		C	VC	38	91.38
4802	59.34	S	M	55.16	675		C	CO	96	27.89
4803		F	M		150		C	VC		29.65

WASTE WATER SYMBOLOGY

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FOUL SURFACE COMBINED DUAL
SIDE ENTRY MANHOLE
PRIVATE SEWER
ABANDONED SEWER
SITE TERMINATION
T-JUNCTION (SADDLE)
AIRVALVE
LAMP HOLE
CASCADE
OIL INTERCEPTOR
CONTROL KIOSK
PENSTOCK
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RODDING EYE
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SIDE ENTRY CHAMBER
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SIDE ENTRY DROPSHAFT
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	G Ghost (to allow pipe bends)
W Treatment Works	

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SI Spun (Grey) Iron
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CS Concrete Segments (Unbolted)
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GR Glass Reinforced Plastic
PS Plastic / Steel Composite
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PE Polythene
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VC Vitrified Clay (All Clayware)
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PF Pitch Fibre
MA Masonry - In Regular Courses
MA Masonry - Randomly Coursed
U Unspecified

OS Sheet No: SD7336NW
Scale 1:1250 Date: 14-Nov-2011
63 Nodes
Sheet 1 of 1

United Utilities
SEWER RECORDS

Conditions and information regarding wastewater network

These general conditions and precautions apply to the wastewater network of United Utilities.

Please ensure that a copy of these conditions is passed to your representative and contractor on site.

1. United Utilities provides the approximate locations of its sewers according to its records. These records are not necessarily accurate or complete nor do they normally show the positions of every sewer culvert or drain, private connections from properties to the public sewers or the particulars of any private system. No person or company shall be relieved from liability for any damage caused by reason of the actual positions and/or depths being different from those indicated. The records do indicate the position of the nearest known public sewer from which the likely length of private connections can be estimated together with the need for any off site drainage rights or easements.

2. Special requirements relative to our sewers may be indicated. United Utilities employees or its contractors will visit any site at reasonable notice to assist in the location of its underground sewers and advise any precautions that may be required to obviate any damage. To arrange a visit or for further information regarding new supplies, connections, diversions, costing, or any notification required under these General Conditions, please call us on **0845 746 2200**.

3. Where public sewers are within a site which is to be developed and do not take any drainage from outside the area, they are from an operational viewpoint redundant. The developer must identify all redundant sewers affected by the development and apply to United Utilities in writing for these sewers to be formally closed. The developer shall bear all related costs of the physical abandonment work.

4. Public sewers within the site that are still live outside the area, will be subject to a “Restricted Building zone”. This would normally be a surface area equivalent to the depth of the sewer measured from the centre line of the sewer on either side. No construction will be permitted within that zone. The developer should also note that deep and wide rooted trees must not be planted in close proximity to live sewers. Access to public sewers must be maintained at all times and no interference to manholes will be permitted during construction work.

5. Where there is a public sewer along the line of a proposed development/building, arrangements shall be made by the developer at his cost to divert the sewer around the development. Where this is not possible and as a last resort, a “Building Over Agreement” will need to be completed under section 18 of the Building Act 1984. The developer shall design building foundations to ensure that no additional loading is transferred to the sewer and submit such details both to the Local Authority’s Building Control Officer and to United Utilities for approval/acceptance. United Utilities on a rechargeable basis would normally undertake all aspects of design work associated with the diversion of any part of the operational wastewater network.

6. Where there is a non-main river watercourse/culvert passing through the site, the landowner has the responsibility of a riparian owner for the watercourse/culvert and is responsible for the maintenance of the fabric of the culvert and for all works involved in maintaining the unrestricted flow through it. Building over the watercourse/culvert is not recommended. The developer must contact the local authority before any works are carried out on the watercourse/culvert. Where it is necessary to discharge surface water from the site into the watercourse/culvert the developer shall make an assessment of the available capacity of the watercourse/culvert (based on a 1 in 50 year event) and ensure that the additional flow to be discharged into the watercourse/culvert will not cause any flooding. In appropriate cases, flooding may be prevented by on-site storage. The developer shall submit the relevant details required to substantiate his development proposals. Details of any outfall proposed shall also be submitted to the Environment Agency, PO Box 12, Richard Fairclough House, Knutsford Road, Warrington, Cheshire, WA4 1HT for their approval.

7. Where there is a main river watercourse/culvert passing through the site, the developer shall submit all proposals affecting the river to the Environment Agency at the address stated in paragraph 6 for approval/acceptance.

8. Your attention is drawn also to the following:

- **Private drains or sewers which may be within the site.** United Utilities has no duty to keep records of private drains and sewers, and there are no comprehensive records kept elsewhere. Local Authority Building Control Officers may have records of recent developments and they or the developer may be able to provide information in this respect.

- **Applications to make connections to the public sewer.** The developer must write to United Utilities requesting an application form that must be duly completed and returned. No works on the public sewer shall be carried out until a letter of consent is received from United Utilities.

- **Sewers for adoption.** If an agreement for the adoption of sewers under Section 104 of the Water Industry Act 1991 is being contemplated, a submission in accordance with "Sewers for Adoption", Fifth Edition, published by the Water Research Centre (2001) Plc, Henley Road, Medmenham, PO Box 16, Marlow, Buckinghamshire, SL7 2HD will be required, taking into consideration any departures from the general guide stipulated by United Utilities.

- **Further consultation with United Utilities.** Developers wishing to seek advice or clarification regarding sewer record information provided should contact United Utilities to arrange an appointment. A consultation fee may be charged, details of which will be made available at the time of making an appointment.

9. Combined sewers, foul sewers, surface water sewers, and pumped mains. These are shown separately in a range of colours or markings to distinguish them on our drawings, which are extracts from the statutory regional sewer map. A legend and key is provided on each extract for general use, although not all types of sewer will be shown on every extract.

Combined sewers shown coloured red carry both surface water and foul sewage, especially in areas where there is no separate surface water sewerage system.

Foul sewers coloured brown may also carry surface water and there may be no separate surface water system indicated in the immediate area. Both combined and foul sewers carry wastewater to our treatment works before it can safely be returned to the environment.

Surface water sewers coloured blue on our drawings are intended only to carry uncontaminated surface water (e.g. rainfall from roofs, etc) and they usually discharge into local watercourses. It is important for the protection of the environment and water quality that only uncontaminated surface water is connected to the surface water sewers. Improper connections to surface water sewers from sink wastes, washing machines and other domestic use of water can cause significant pollution of watercourses.

Pumped mains, rising mains and sludge mains will all be subject to pumping pressures and are neither suitable nor available for making new connections.

Highway drains, when included, show as blue and black dashed lines. Highway drains are not assets belonging to United Utilities and are the responsibility of local authorities.

10. For information regarding future proposals for construction of company apparatus please write to United Utilities, PO Box 453, Warrington, WA5 3QN.

11. For information regarding easements, deeds, grants or wayleaves please write to United Utilities Property Solutions, Coniston Buildings, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3UU (**Tel: 01925 463 654**).

United Utilities Water PLC
Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington WA5 3LP
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APPENDIX E
MICRO DRAINAGE CALCULATIONS

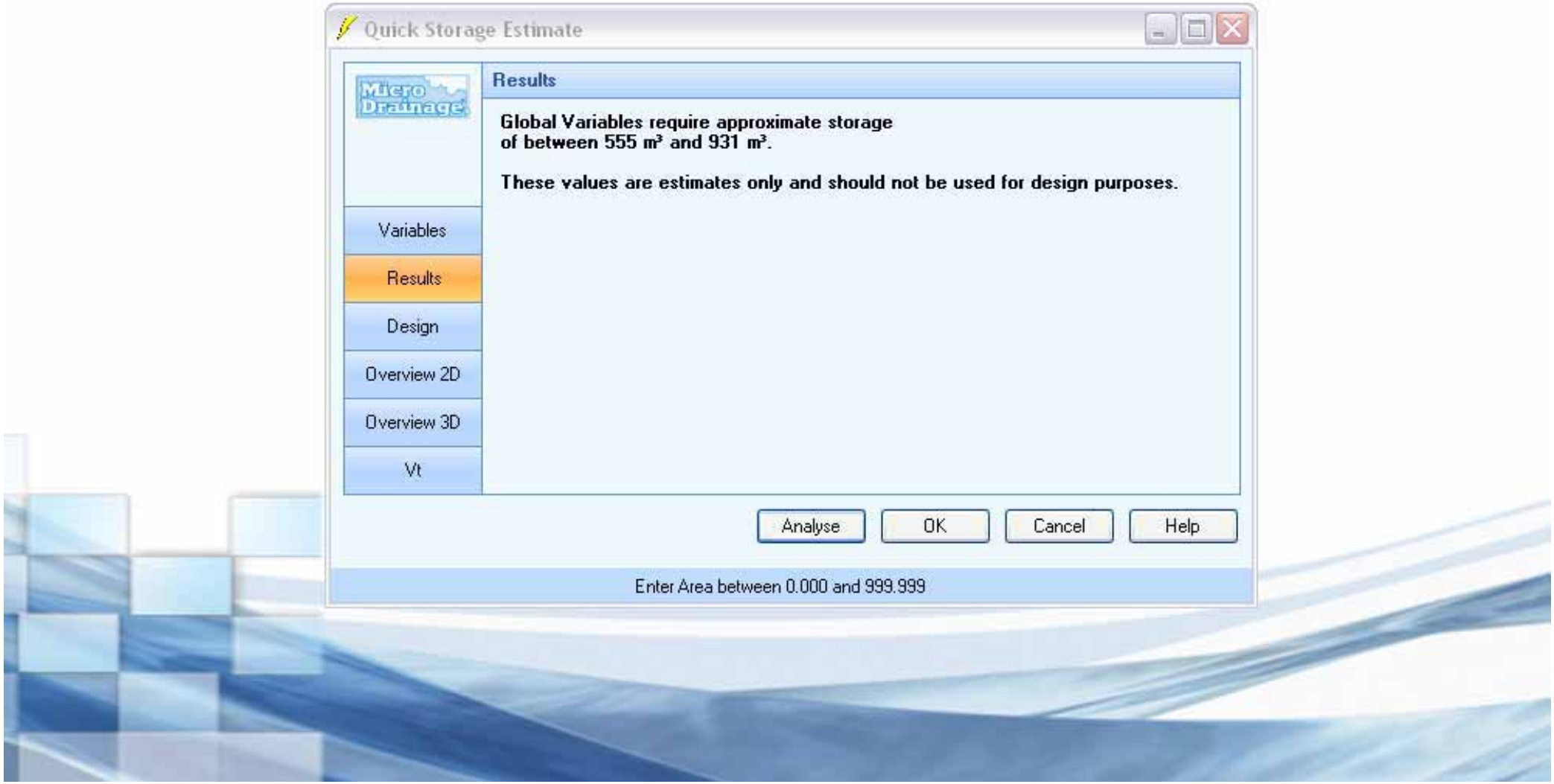
ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	6.000	Urban	0.010
SAAR (mm)	956	Region Number	Region 10

Results l/s

QBAR Rural	38.0
QBAR Urban	38.5
Q100 years	79.8
Q1 year	33.5
Q30 years	65.2
Q100 years	79.8


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 555 m³ and 931 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Area between 0.000 and 999.999