#### Sarah Westwood

From:

Richard Percy [richardp@abbott-associates co uk]

Sent:

05 October 2012 15:35

To:

Sarah Westwood

Subject:

FW: 4 Acres Residential Site, Clitheroe - Outline Drainage Strategy Report

Attachments: Outline Drainage Strategy\_Final Report 12390i1.pdf

Sarah

Drainage report as discussed. Appendices to follow.

Regards.

#### Richard

From: sammy\_spaine@amec.com [mailto:sammy\_spaine@amec.com]

Sent: Wednesday October 03 2012 17:04

To: Richard Percy

Cc: chris\_prydderch@amec.com; Guy Pearson; john.hall3@amec.com; kath.smithers@amec.com;

tracey.wood2@amec.com

Subject: 4 Acres Residential Site, Clitheroe - Outline Drainage Strategy Report

Richard,

Please find attached the final version of our Outline Drainage Strategy Report as promised The Appendices will be forwarded to you under a separate email cover I will await your formal instruction before forwarding the report to United Utilities.

#### Regards Sammy Spaine

From: Ric

Richard Percy < richardp@abbott-associates.co.uk >

To:

'sammy spaine@amec com'' < sammy.spaine@amec.com >

Cc:

"chris.prydderch@amec.com" <chris.prydderch@amec.com>, Guy Pearson <guy.pearson@tayloryoung.co.uk>, "john.hall3@amec.com" <john.hall3@amec.com>, "kath.smithers@amec.com" <kath.smithers@amec.com>

"tracey.wood2@amec.com" <tracey.wood2@amec.com>

Date: 03/10/2012 13:48

Subject: RE: 5613 - 4 Acres Residential Site Clitheroe Issue 5

Thanks Sammy Regards

#### Richard

From: <a href="mailto:sammy.spaine@amec.com">sammy.spaine@amec.com</a>]

Sent: Wednesday October 03 2012 11:57

To: Richard Percy

Cc: chris.prydderch@amec.com; Guy Pearson; john.hall3@amec.com; kath.smithers@amec.com;

tracey.wood2@amec.com

Subject: RE: 5613 - 4 Acres Residential Site, Clitheroe Issue 5

#### Richard,

I received the copy of your revised Masterplan from Guy Pearson yesterday afternoon. The Final version of our Outline Drainage Strategy Report has been completed, incorporating the revised Masterplan. This is now being formatted by Professional Support Team and will be issued to you today.

#### Regards Sammy Spaine

From: Richard Percy < richardp@abbott-associates.co.uk >

"sammy spaine@amec.com" <sammy.spaine@amec.com> Guy Pearson <guy.pearson@tayloryoung.co.uk>

john.hall3@amec.com' <john.hall3@amec.com> "chris.prydderch@amec.com" <chris.prydderch@amec.com>

Date: 02/10/2012 13:54

Subject: RE: 5613 - 4 Acres Residential Site, Clitheroe Issue 5

Sammy

Can you give me an ETA for the revised report?

Thanks.

#### Richard

From: <a href="mailto:sammy.spaine@amec.com">sammy.spaine@amec.com</a>[mailto:sammy.spaine@amec.com]

**Sent:** Tuesday October 02 2012 13:36

To: Guy Pearson

Cc: Richard Percy; john.hall3@amec.com; chris.prydderch@amec.com

Subject: RE: 5613 - 4 Acres Residential Site, Clitheroe Issue 5

Guy,

Thanks for forwarding a copy of your revised Masterplan to me yesterday. Our Constraints Plan (Drawing No. 29421 N CVD 109B), has been updated accordingly and a copy is attached. I note however that there is still insufficient clearance for the required easement strip for the section of the existing private surface water drain between Manholes' MH S13 and MH 1.

#### Regards

# Sammy Spaine BEng Hons, CEng MICE, AMAE, APMP Technical Director

#### **AMEC**

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From: Guy Pearson < guy.pearson@tayloryoung.co.uk >

To: Richard Percy < richardp@abbott-associates.co.uk> "sammy spaine@amec.com" < sammy.spaine@amec.com>

Date: 02/10/2012 11:55

Subject: RE: 5613 - 4 Acres Residential Site Clitheroe Issue 5

#### Richard,

we have shown a garage for 2 - 3 properties on the southern boundary. There is also plenty of room for parking in front of the gable end of the NE most unit

Kind Regards

Guy Pearson Associate Director

# **IBI TaylorYoung**

Chadsworth House Wilmslow Road Handforth Cheshire SK9 3HP DDI +44(0)1625 542 252

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guy.pearson@tayloryoung.co.uk
www.tayloryoung.co.uk
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From: Richard Percy [mailto:richardp@abbott-associates.co.uk]

**Sent:** 02 October 2012 08:54

To: Guy Pearson; 'sammy spaine@amec.com'

Subject: RE: 5613 - 4 Acres Residential Site, Clitheroe Issue 5

Guy

Thanks for that and for turning this round so quickly.

I appreciate that this is only illustrative, but I can't see how the new/repositioned units to the south east of the pond will work, particularly parking-wise. Can you have another quick look at that please.

Sammy – as this is only a drafting issue, can you proceed with your report on the basis of what Guy has currently produced and we can slot any further amended plan later today/this week.

Regards

#### Richard

From: Guy Pearson (IBI Taylor Young (Handforth)) [mailto:guy.pearson@tayloryoung.co.uk]

**Sent:** Monday October 01 2012 16:19

To: Richard Percy

Subject: 5613 - 4 Acres Residential Site, Clitheroe Issue 5

5613 - 4 Acres Residential Site, Clitheroe Issue 5

Please click here to access the documents for this issue

Richard/Sammy,

following our meeting last week would you download and review the revised drawings and let me know if any amendments are required.

Richard, will any amendments be required to the D&AS?

Regards,

Guy Kind Regards

Guy Pearson Associate Director

# **IBI** TaylorYoung

Chadsworth House Wilmslow Road Handforth Cheshire SK9 3HP

Tel 01625 542252 Fax +44(0)1625 542 250

Guy.Pearson@tayloryoung.co.uk www.tayloryoung.co.uk IBI TaylorYoung is part of the IBI Group

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# Trustees of the Standen Estate 4 Acre Site at Littlemoor, Clitheroe

Outline Drainage Strategy

October 2012

AMEC Environment & Infrastructure UK Limited



#### Report for

Trustees of the Standen Estate C/o Mr Richard Percy Steven Abbott Associates LLP Broadsword House 2 Stonecrop North Quarry Business Park Appley Bridge Wigan Lancashire WN6 9DL

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# Trustees of the Standen Estate

# 4 Acre Site at Littlemoor, Clitheroe

**Outline Drainage Strategy** 

October 2012

AMEC Environment & Infrastructure UK Limited







Certificate No. FS 13881

Certificate No. EMS 69090



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#### **Document Revisions**

No	Details	Date
1	Draft Report 12378i1	Sept 2012
2	Final Report 12390i1	Oct 2012



# **Executive Summary**

AMEC Environment & Infrastructure UK Ltd (AMEC) was commissioned in September 2012 by the Trustees of the Standen Estate to produce an Outline Drainage Strategy in support of their Planning Application for the development of 49 Residential Units at a parcel of land located between Littlemoor and Whalley Road, in Clitheroe, Lancashire.

With respect to Surface Water Flows, drainage calculations undertaken by AMEC show that there will be a requirement for attenuation to reduce the anticipated Peak Surface Water Runoff Rate to the existing Greenfield runoff rate. The existing characteristics of the site (sloping topography from north east to south west, Culverted Watercourse, Open Watercourse downstream of the site) make it possible to incorporate a combination of the SUDS Structures (Permeable Paving and Attenuation Pond/ Sub-Surface Storage), into the management of the anticipated Surface Water Runoff from the site

The assessment undertaken by AMEC shows that the anticipated Surface Water Runoff from the proposed development can be safely managed within the site boundary. (Estimated flows - 185m³: using Sub Surface Storage/ Permeable Paving, and 540m³: using Attenuation Pond Storage). Formal approval will be required from the Environment Agency and other Local Statutory Authorities at Reserve Matters/ Detailed Design stage

With regards to foul drainage, our calculations show that the anticipated Foul Flow from the proposed development is approximately 2.5 l/s. The hydraulic capacity of the existing combined sewer crossing the site is estimated to be approximately 45 l/s, based on information obtained on site. Our calculations therefore show that the existing combined sewer crossing the site should have sufficient capacity to accommodate the anticipated foul flows from the proposed development. The section of the existing public combined sewer crossing the site was surveyed in its entirety and found to be generally in a good state, both structurally and hydraulically. The proposed connection points into the public sewer network from the development are as shown on a "Constraints Plan" Drawing No. 29421\_N\_CVD\_109B

Formal approval to discharge anticipated foul drainage from the proposed development into the existing public combined sewer crossing the site will be required from United Utilities at Reserve Matters/ Detailed Design Stage

The existing public combined sewer crossing the site will require a 6m wide easement, over which there can be no development. The current housing layout does take into account this need for a 6m wide easement.





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Appendix A Copy of Current Illustrative Masterplan
Appendix B Copy of United Utilities' (UU) Letter Dated 10<sup>th</sup> August 2012.
Appendix C Copy of Email Correspondence between AMEC and Graham Perry (United Utilities)
Appendix D Drawing No 29421\_N\_CVD\_107
Appendix E Copy of Correspondence between AMEC and The Environment Agency
Appendix F Copy of Marked-up Site Survey Plan
Appendix G Calculations – Proposed Surface Water Sewers
Appendix H Calculations – Proposed Foul Sewers
Appendix I Drawing No 29421\_N\_CVD\_109B
Appendix J Manhole Record Cards



# 1. Introduction

#### 1.1 Context

AMEC Environment & Infrastructure UK Ltd (AMEC) was commissioned in September 2012 by the Trustees of the Standen Estate to undertake an Outline Drainage Strategy in support of their Planning Application for the development of 49 Residential Units at a parcel of land located between Littlemoor and Whalley Road, in Clitheroe, Lancashire (referred to as the site).

The site is currently entirely a Greenfield site, with periodic low-level cattle grazing activity (See photograph 1 below).

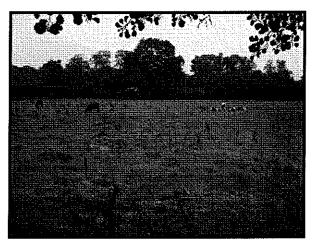


Photo 1 Greenfield Site (with cattle grazing activity)

The Planning Application was submitted in April 2012, but not validated until 21st May. The application is at the Outline Stage at present. The current Illustrative Masterplan shows 8 No. Bungalows, 19 No. 2/3 Bed Semi/Terraced Properties, 12 No. 3 Bed Semi-Detached properties, and 10 No. 3/4 Bed Detached Properties. (A copy of the illustrative Masterplan has been included in Appendix A of this report). We do not have any details of the current programme for developing the site.

The current requirement for an Outline Drainage Strategy is in response to United Utilities' (UU's) Holding Objection to the Planning Application for the 4-Acre site, pending the submission of a Load and Flow Impact Assessment for the foul drainage (Copy of UU's letter dated 10<sup>th</sup> August 2012 has been included in Appendix B of this report).

An email dated 30<sup>th</sup> August 2011 was sent by Mr John Lunt (Business Analyst, UU) to Ms Sarah Westwood, (Senior Planning Officer, Ribble Valley Borough Council), granting approval in principle to this proposed development, subject to provision of "separate drainage systems, with foul water flows only discharging into the combined public sewerage system serving the area. Surface Water Run-off generated from the proposed development would have to discharge directly into the adjacent watercourse with the prior consent of The Environment Agency".



AMEC contacted Mr. Daniel McDermott, (the author of UU's afore-mentioned letter) on Tuesday 4<sup>th</sup> September 2012 to discuss the contents of his letter and was referred to Mr. Graham Perry, also at UU

UU's letter dated 10<sup>th</sup> August 2012, superseding the aforementioned email, has been sent out on the basis of the many planning applications for new developments within the catchment which have been submitted over the past twelve months. UU are concerned that their current infrastructure may not have sufficient capacity to serve all the proposed development currently up for planning.

On Wednesday 5<sup>th</sup> September 202, AMEC received a call from Mr. Graham Perry of UU. Mr. Perry explained the reasoning behind UU's holding objection to the Planning Application. The final scope of works for this report was eventually defined following discussions between AMEC and Mr. Graham Perry of UU. (See Appendix C for copy of email correspondence).

The full detail of the agreed scope of works for this Outline Drainage Strategy is as follows:

- An estimation of the anticipated Foul Flows and Surface Water Run-offs from the proposed development. (Surface Water Run-offs to be assessed on the basis of the Greenfield Run-off Rate for the catchment);
- · Identification of the proposed discharge outfalls;
- A Masterplan showing details of the house types being proposed including the Phasing (Programming) of the development; and
- A "Constraints Plan" consisting of current topographical survey data, superimposed over the current Masterplan, merged with the existing sewer information. This plan would also contain the discharge points, together with the values of the anticipated flows. (Foul & Surface Water)

AMEC attended the site on Wednesday 12<sup>th</sup> and Friday 13<sup>th</sup> September 2012, following formal approval from United Utilities, to undertake CCTV/ Connectivity and Manhole Surveys of the sections of public and private sewers crossing the proposed development site. The findings are discussed in detail in section two of this report.

This assessment is limited to the provision of an Outline Drainage Strategy for the proposed development of the site.

The following documents were issued to AMEC prior to confirmation of our appointment:

- A copy of UU's letter dated 10th August 2012, forwarded to AMEC by Mr. Richard Percy via email dated 4<sup>th</sup> September 2012;
- An illustrative Masterplan of the development in PDF Format, showing the indicative red line Phase 1 boundary of the proposed development, together with details of the house types being proposed; and
- A Topographical Survey Plan, (in digital format), undertaken by Survey Operations and dated March 2011.



#### 1.2 Previous Work Undertaken

#### 1.2.1 Services Study N028i2

In March 2012, AMEC was commissioned by the Trustees of the Standen Estate to undertake a "Services Study" for the 4-Acre Site located between Littlemoor and Whalley Road, Clitheroe, Lancashire A report of the "Services Study" was issued by AMEC in April 2012, reference: N028i2

This "Services Study" was undertaken to support the Planning Application for a proposed residential development at the site. The requirement for the "Services Study Report" was mainly to identify and described the extent of existing key services located within the footprint of, and the immediate vicinity of the proposed development site, and not to confirm whether there was sufficient capacity in the system to service the development. Records of existing services/utilities, including drawings, were obtained from the relevant Statutory Undertakers. Additional information was also obtained from a site visit undertaken by AMEC on 15 March 2012. The "Services Study" confirmed the presence of a number of existing public/ private services, including a Private 300mm diameter Surface Water Drain, a 300mm diameter Public Combined Sewer, and a 100mm diameter Private Combined Sewer, crossing the site, and likely to present a potential constraint to the future development of the site.

The approximate alignments of the services identified were presented on Drawing No 29421\_N\_CVD\_107, (copy included in Appendix D of this report), and was considered sufficient for the purpose of lodging an initial Planning Application to develop the site. The Service Plan drafted by AMEC (see Appendix E), shows the existence of a Private 300mm Surface Water Drain, as well as one Private and one Public Combined Sewer crossing the site.

#### 1.2.2 Flood Risk Assessment

In April 2012, AMEC was commissioned by the Trustees of the Standen Estate to undertake a Flood Risk Assessment for the proposed construction of 49 Residential Units at the 4-Acre Site located between Littlemoor and Whalley Road, Clitheroe, Lancashire. Listed below are a number of points extracted from the Flood Risk Assessment Report which are considered relevant to this Outline Drainage Strategy:

#### The Site:

The site and the area immediately surrounding it are relatively flat with a gentle fall from east to west. A topographic survey carried out in July 2011 (see Appendix A) shows that the site has a gentle slope of approximately 0.032m/m from northeast to southwest, with the ground elevations ranging between 76.89mAOD to 82.91mAOD.

The Environment Agency has stated in recent correspondence (see Appendix E) that the existing Greenfield Runoff Rate adopted for the calculations should be 10 l/s/ha (Litres per second per hectare).

#### Hydrology and Drainage

Pendleton Brook is the nearest watercourse to the site, flowing in an east-southeast to west-northwest direction. At its closest point to the site (130m) the ground elevation is approximately 73mAOD (as shown on Ordnance Survey mapping). Another watercourse, Mearley Brook, flows in a north to south direction via a series of weirs and a reservoir. The reservoir is located 225m west southwest of the site (at an elevation of approximately 70mAOD).



#### Geology, Hydrogeology and Soils

British Geological Survey (BGS) DiGMap3 data shows the bedrock at the site to be Bowland High Group and Craven Group, made up of Mudstone, Siltstone and Sandstone. The BGS website13 shows the Clitheroe Limestone Formation and Hodder Mudstone formation to be the dominant bedrock formation while the superficial geology is made up of Iill and Diamicton. There is an extensive limestone quarry at Clitheroe from which limestone is extracted for cement production. Pendle Hill, Waddington Fell, the Bowland Hills and Longridge Fell are all predominantly formed of Millstone Grit.

At the site location the bedrock is designated as a Secondary A aquifer. The Environment Agency website 14 defines this as "A permeable layer 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." This area is also defined as having soils with a high leaching potential, which means any liquid discharges have the potential to move rapidly to underlying strata or shallow groundwater.

#### Permeability

The FEH CD-ROM gives an SPRHOST value of 42.1 for the site. This indicates a moderate to low soil permeability hence high Greenfield Run-off Rate provided by the Environment Agency. The Flood Studies Report Winter Rainfall Acceptance Potential (WRAP) Map also indicates that the site is located with a zone of low permeability, on the basis of soil characteristics. This is consistent with the FEH CD-ROM. The FEH CD-ROM gives a BFIHOST value of 0.349 which confirms the low permeability of the catchment.

#### Groundwater Flooding

The SFRA10 determined that using the best available information groundwater flooding was not considered to be a significant risk at the time of writing (2010). However the Envirocheck report11 presents BGS groundwater flooding susceptibility maps and shows the site to have a moderately high susceptibility over the large majority of the area. The area is known to be underlain by Limestone which is fairly permeable; however the WRAP map and FEH CD ROM suggest that the soils have a low permeability which would act as a barrier to rising groundwater. This low soil permeability, coupled with a high Annual Rainfall (SAAR of 1274mm) means that surface water only drains away at a slow rate, resulting in Ponding. This correlates with our observations during our site visit as indicated by the photograph below

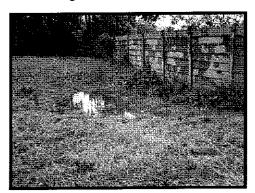


Photo 2 Ponding noted on Site (adjacent to 157/ 159 Whalley Road

#### Sewer Flooding

There is currently a minor risk of sewer flooding on the site due to the existence of at least 2 No. sections of Public Sewers and 1 No. Private Drain crossing the site. UU have been contacted to



request that as part of the development, the Public Sewers should be diverted around the site to reduce the risk of sewer flooding and enable the construction of the development. UU have confirmed that they would have no objection to diverting the existing sewer as long as a Section 185 Diversion Agreement is entered into prior to commencement. UU's stipulation is for all anticipated foul discharge from the proposed 49 No. Residential Units be discharged offsite via the existing 300mm diameter Public Combined Sewer. No surface water flow would be allowed into the existing Combined Sewer. This should be dealt with separately within the surface water drainage strategy. UU have stated that the points of connection and discharge rates cannot be reserved for a particular development and they reserve the right to revise any points of connection and discharge rates between the date of enquiry and the date that the connection is required. Consultation with the owners of the private sewers will need to be undertaken to determine whether an agreement can be meet for the diversion of these pipes. Therefore a low residual risk of sewer flooding remains.

UU have recorded a sewer flooding incident 300m north of the site. There are no other records of sewer flooding near the site.

#### Recommendations made in AMEC's FRA Report

The following recommendations made in the previous FRA Report produced by AMEC are deemed to be relevant to this Outline Drainage Strategy:

- A site-specific investigation should be undertaken prior to installation of the SuDS features to determine the infiltration rate and whether infiltration SuDS options are appropriate for this site. This investigation to support detailed drainage proposals would be undertaken as a pre-commencement planning condition attached to the outline consent;
- The proposed development will result in an approximate increase in impermeable surfaces of 7,426m2, which will increase surface runoff. To comply with the discharge rate and NFFP, 476.5m3 of storage would have to be provided to attenuate the runoff for 1% AEP plus climate change event if no other SuDS were proposed. It is therefore recommended that permeable paving is utilised where ever possible and that filter strips are included along the access road verges. All remaining surface water runoff would then be diverted to an attenuation basin which would control the discharge rate to: 10 l/s/ha;
- The preferred surface water outfall option would be via the existing privately owned surface water pipes. An agreement with the owner should be sought together with an investigation as to whether it is feasible to discharge into this network. The investigation would need to determine the discharge location and current state and capacity of the network to ensure that the additional discharge (of 10 l/s/ha) did not result in any increase in flood risk elsewhere; and
- Low points within the site where water might pond should be avoided by careful profiling of the ground to allow overland drainage away from the buildings and safe discharge to SuDs storage features without causing increased flood risk elsewhere. This may require some raised shallow bunds to convey water to the storage feature and prevent the water leaving the site in an uncontrolled manner.



# 1.3 Structure of the Report

The remainder of this report is structured as follows:

- Section 2: Description of Existing Public Sewers (Based on records held by UU);
- Section 3: Findings of the CCTV/ Connectivity and Manhole Surveys;
- Section 4: Outline Drainage Strategy;
- · Section 5: Conclusions; and
- Section 6: Recommendations.



# 2. Existing Sewers: based on UU's Record

#### 2.1 Foul Sewer

Records procured from United Utilities indicate that there is a 300mm diameter Vitrified Clay, Public Combined Sewer crossing the site from a manhole chamber located in Littlemoor. This combined sewer then follows a north-westerly direction, downstream towards Little Moor View. (As indicated by the red line on Figure 1 below). From Little Moor View the combined sewer connects into a 375mm diameter sewer located in Whalley Road.

There are no other Public Foul/ Combined Sewers shown on UU's record, within the footprint of the proposed development.

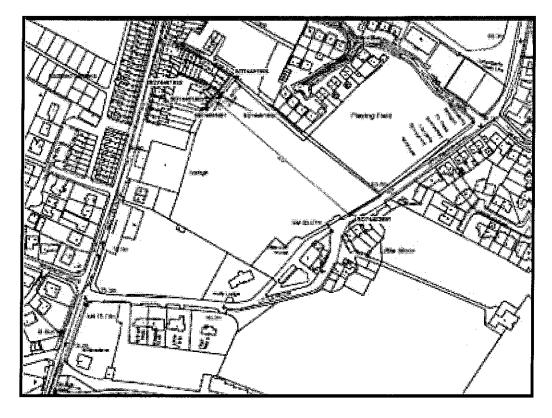


Figure 1 Extract from Public Sewer Record

#### 2.2 Surface Water Sewer

UU's Public Sewer Records indicate that there is no Public Surface Water Sewer either within the footprints of, or in close proximity of the site.





# 3. CCTV/Connectivity Survey

#### 3.1 Results of CCTV/Connectivity Surveys

As mentioned earlier, AMEC attended the site on Wednesday 12<sup>th</sup> and Thursday 13<sup>th</sup> September 2012, following formal approval from United Utilities, to undertake CCTV/ Connectivity and Manhole Surveys of the sections of both Public and Private Sewers crossing the proposed development site. The findings are listed in section 3.1.1 below, and should be read in conjunction with the site plan (Figure 2) below. A full-sized copy of this plan has been included in Appendix F of this report.

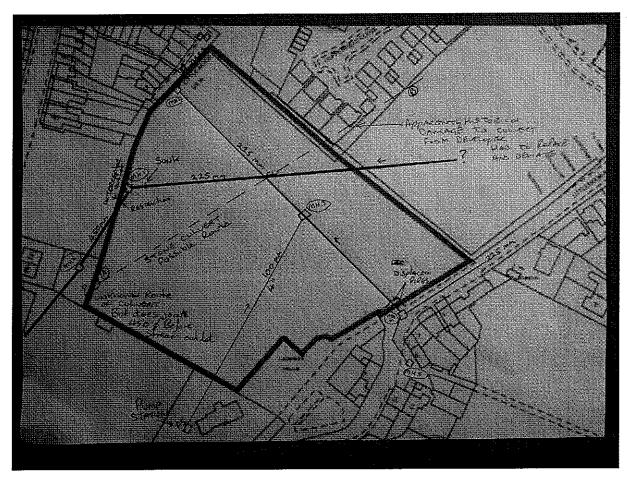


Figure 2 Copy of Site Sketch Received from Survey Contractor

#### 3.1.1 Findings

The following information was confirmed following the CCTV/ Connectivity and Manhole Surveys:



#### **Public Combined Sewer**

• The survey confirmed the existence of a 225mm (marked as 300mm diameter on UU's Sewer Records) Combined Public Sewer crossing the site from Manhole Ref. 4, located in Littlemoor and follows a north-westerly direction, downstream towards Manhole Ref. 2, at Whalley Road. The survey confirmed that this section of sewer is generally in a fair state both structurally and hydraulically. However, it was noted that the section of this sewer immediately downstream of Manhole Ref. 4 contains a number of slightly displaced joints, and approximately 5 – 10% silt deposits within the pipe section.



Photo 3 Manhole Ref. 4 Internal View

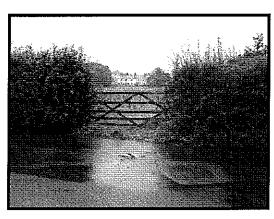


Photo 4 Manhole Ref. 4 – Plan View Looking towards Site



Photo 5 Manhole Ref. 2 - Internal View



Manhole Ref. 2 – Plan View Sewer Turning Northwards

• A third manhole was noted along the sewer line between Manhole Ref. 4 and Manhole Ref. 2, approximately 70m downstream of Manhole Ref. 4. Dye testing confirmed that this manhole receives foul flows from a Pumping Station serving the property known as Holly Lodge (See photograph 7 on page 11). The sewer section between Holly Lodge and Manhole Ref. 3 is a 100mm diameter Rising Main.

Photo 6



- The Public Combined Sewer leaves the site at Manhole Ref 2 where it turns northwards towards an existing 300mm diameter sewer located at Littlemoor View (See photo 5 above).
- · No other Foul or Combined Public Sewer was noted on the site.

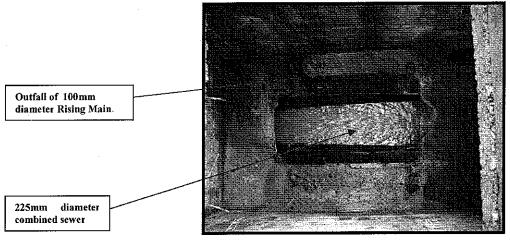


Photo 7 Manhole Ref. MH3, Showing Connectivity to Combined Sewer (between MH4 & MH2); also showing Incoming 100mm Rising Main from Holly Lodge

#### Private Surface Water Drain

- · There are no recorded Public Surface Water Sewers crossing the site.
- Our site survey however confirmed the existence of a 225mm diameter Private Surface Water Drain crossing the site from beneath the adjacent Rugby Pitch and connecting into Existing Manhole Ref. 1 located at the rear of the existing Petrol Filling Station
- A CCTV Survey was undertaken commencing from Manhole Ref. 1 upstream. The survey was abandoned approximately 4m upstream of Manhole Ref. 1 due to the presence of a high percentage of debris within the pipe. There is a possibility of a partial pipe collapse at this point. This was evidenced from the turbulence in the flows arriving into Manhole Ref. 1 upstream, suggesting a restriction to the incoming flows from upstream of the manhole (See photo 8 below).
- The section of drain surveyed was noted to be a 225mm diameter Vitrified Clay Surface Water Drain





Photo 8 Manhole Ref. 1; 225mm Diameter Sewer Changes Direction at Whalley Road; also Turbulent Flows noted

- A CCTV Survey was undertaken commencing from Manhole Ref. 1 downstream towards Manhole Ref. 6. The drain had to be cleaned out for the first 10m of its length to enable to survey to proceed. The survey confirmed that the section of drain between Manhole Ref. 1 and Manhole Ref. 6, is a 450mm diameter Vitrified Clay Circular Drain containing settled deposits of debris resulting in a loss of internal cross-sectional area within the drain. Copies of Record Cards for all manholes surveyed are to be found in Appendix K of this report.
- The section of drain from Manhole Ref. 6 downstream was also surveyed. It was proven to be a 450mm diameter Vitrified Clay Circular Drain. There's a restriction of flow noted within this section of drain, approximately 5.6m downstream of Manhole Ref. 6, which was causing approximately 30% loss of internal pipe capacity, leading to a backup of flows towards Manhole Ref. 6. Dye testing confirmed that this drain discharges into the stream via a sluice located at Primrose Bridge. (See photo 9 below). The small trickle of flow noted at the outfall pipe even though it was raining heavily at the time of the survey, would indicate the presence of a possible structural defect within this section of the drain.

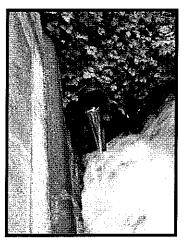


Photo 9 Confirmation of Surface Water Outfall Point at Primrose Bridge, Whalley Road



#### **Culverted Watercourse**

• From anecdotal evidence, (discussions with local residents during the time of the survey) we note that there's a Culverted Watercourse crossing the site in a south westerly direction from Copperfield Close. It was not possible to survey this structure as there was no formal access to it above ground. However during our site investigations, we noted the presence of a "Sink" (See Photo 10 below) at the lowest point of the field, close to its boundary with the properties located at No.'s 157-159 Whalley Road. This is believed to be a point over the existing Brick/Stone Culvert Structure currently used to drain sections of the field. Further investigation of this structure is highly recommended at Reserve Matters/ Detailed Design Stage.

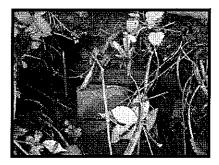


Photo 10 Sink - Possible Point where Surface Runoff from the Field Leave the Site





# 4. Outline Drainage Strategy

#### 4.1 Surface Water Drainage

The standard requirement for surface water drainage design on a Greenfield site is for the anticipated Surface Water Run-off Rates from the proposed development to be limited to the existing 1 in 1 year Greenfield Run-off Rate, up to and including the 1 in 100 Year Rainfall Event, plus an allowance for climate change

Limiting the anticipated Surface Water Run-off from the site to a level which is equivalent to the Greenfield runoff rate for the site, will ensure that the there are no detrimental effects downstream of the site.

#### 4.1.1 Baseline (Greenfield) Runoff Rates

Following discussions between AMEC and the Environment Agency (EA) during the preparation of the FRA Report for the site, it was agreed that a Greenfield Runoff Rate of 10 Litres per second per hectare (l/s/ha) should be adopted to assess the anticipated Surface Water Run-offs.

#### 4.1.2 Anticipated Surface Water Runoffs

The anticipated volumes of Surface Water Run-off from the proposed development, for both the 1 in 30 Year and the 1 in 100 Year Rainfall Events, have been assessed using the WinDes Micro Drainage Hydraulic Modelling software. The design module using Micro Drainage WinDes Simulation has been used to assess the extent of the storage needed to attenuate the 100-Year Rainfall Event, including a 30% increase for climate change. A skeletal Hydraulic Model was developed by AMEC for this assessment as shown on Drawing No. 29421\_CVD\_N\_109B.

The results show that the management of the anticipated Surface Water Runoff from the proposed development will require the provision of adequate on-site storage facilities in accordance with the stipulations in the Technical Guidance to the National Planning Policy Framework (NPPF). The extent of the storage requirement for the proposed development is as shown in table 4.1 below.

Table 4.1 Extent of Surface Water Storage Requirements

Rainfall Event	Surface Water Storage Requirement	
1 in 100 Year Rainfall	185m3 (Option 1: using Sub Surface Storage) 540m3 (Option 2: using Attenuation Pond Storage)	
1 in 30 Year Rainfall	86m3 (Option 1: using Sub Surface Storage) 302m3 (Option 2: using Attenuation Pond Storage)	

#### 4.1.3 Design Philosophy

The presence of natural surface water drainage features lends the site prime for a Sustainable Urban Drainage System (SUDS) Approach in the general management of the anticipated



Surface Water Runoff from the proposed development. The design philosophy adopted for this hydraulic assessment has been summarized below:

- The Hydraulic Model developed for this aspect of the work had a restriction to limit anticipated Surface Water Run-off to a value equivalent to the Green Field Runoff Rate of 10 liters per second per hectare (1/s/ha);
- All Surface Water Run-offs from the proposed development will be restricted to the existing Greenfield Runoff Rate, to ensure that there's no flooding downstream as a result of the development;
- Anticipated Surface Water Run-off from the proposed development will be managed on site either via a network of Subsurface Storage Structures (Flexible Paving) or Attenuation Pond;
- The Subsurface Storage will be sized to accommodate the anticipated Surface Water Run-off:
- Surface water runoff from the network of Subsurface Storage Structures/or Attenuation Pond has been assessed to discharge into the existing Private Surface Water Drain via a number of Outfall Points, as shown on Drawing No. 29421 N CVD 109B;
- Flow Control Structures (Hydro-Brakes) would be used to control the anticipated Surface Water Run-offs from the proposed development, to ensure that they are maintained at the Greenfield Runoff Rate. This would be assessed at Detailed Design stage;
- The highways are proposed to drain directly to the Subsurface Storage Structures through Permeable Surface Features;
- All driveways and rainwater pipes are to be connected directly into the Subsurface Storage Structures; and
- The type of Permeable Paving proposed would need to be confirmed at Reserve Matters/ Detailed Design Stage subject to the completion of suitable Soakaway Tests.

Any residual Surface Water Run-off can drain off site via the existing watercourses, as long as the flows are restricted to the existing Greenfield Runoff Rate so as to not increase flooding downstream of the proposed development.

#### 4.1.4 Options for Managing Anticipated Surface Water Runoffs

In this Outline Strategy, we have assessed several options for dealing with anticipated Surface Water Run-offs from the proposed development. The preferred option which has been selected moving forward, offers the best solution from a Sustainable Urban Drainage (SuDS) perspective and this is described below:

Preferred Surface Water Drainage Option – Subsurface Drainage with Attenuation Pond This option should be read in conjunction with Drawing No. 29421\_N\_CVD\_109B. It involves the provision of a subsurface drainage system located on the access roads, together with an Attenuation Pond (to be located on the south western corner of the site, believed to be the lowest spot from the topographical survey). At normal low flows, the anticipated surface runoffs



would be managed by the network of Permeable Paving designed to slow down the surface water flows. The anticipated Surface Water Run-offs would then be discharged off site via an outfall located at a new Manhole Ref: PW03, located along the line of the existing Private Surface Water Drain crossing the site.

At higher flows, the anticipated Surface Water Run-offs would overflow into the Attenuation Pond. The Attenuation Pond has been assessed to provide a storage capacity of 540m³, which is the volume of water expected to be generated during a 1 in 100 Year Rainfall Event. Any overspill greater than the capacity of the Attenuation Pond would eventually discharge into the downstream section of the existing Private Water Drain at Whalley Road, via a new Surface Water Outfall No. 3. The current combined storage capacity requirement is 725m³. (Proposed capacity of the Attenuation Pond is 540m³; the proposed storage capacity of the Permeable Paving is 185m³).

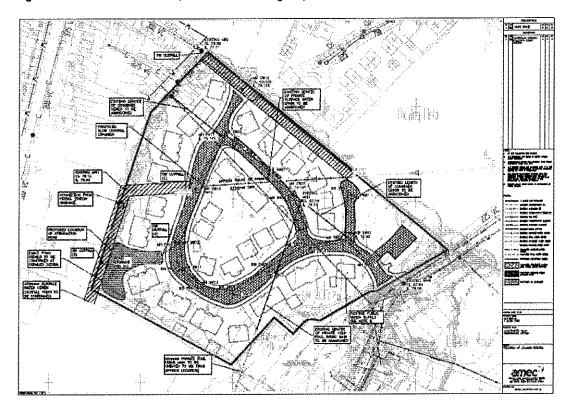


Figure 3 Constraints Plan, Preferred Drainage Option

The following considerations must be given should this proposed surface water drainage option be adopted moving forward:

Connection into the existing Private Water Drain is presently outside the remit of UU. There will be a requirement to confirm the ownership of this Private Water Drain prior to making any connection to it. A document entitled "Living on the Edge 4<sup>th</sup> Edition" published by the Environment Agency, states that the owner of land or property next to a river, stream or ditch is classed as a "Riparian"



Landowner". The document defines the "Rights and Responsibilities" of the Riparian Owner;

- From the current Illustrative Masterplan provided to AMEC for this work, there
  will be a need to divert some sections of existing services currently crossing the
  site. The possible diversions have been identified on the Constraints Plan produced
  by AMEC. Any diversion of existing services crossing the site (Water, Combined
  Sewer, Surface Water etc.) will require approval from the relevant Statutory
  Undertakers at Reserve Matters/ Detailed Design Stage;
- Existing low spots within the site where water might pond should be avoided by
  careful re-profiling of the ground to allow overland flows to drain away from the
  buildings and safely discharge to the proposed storage features without causing
  increased flood risk elsewhere. This may require some raised shallow bunds to
  convey water to the storage features and prevent the water leaving the site in an
  uncontrolled manner.

#### 4.2 Foul Drainage

Anticipated foul flows from the proposed development have been assessed in accordance with the stipulations in Sewers for Adoption 6th Edition. A copy of the calculations is contained in Appendix H of this report.

The estimated anticipated foul flow from the proposed development is approximately 2.5 l/s (Litres per second). There is presently a 225mm (noted as 300mm diameter on UU's public sewer records) Public Combined Sewer crossing the proposed development site.

Note that the existing Combined Public Sewer crossing the site, will require a 6m wide easement, over which there can be no development. The housing layout will need to accommodate this easement.

The estimated pipe capacity of the 225mm diameter Public Combined Sewer crossing the development site is 43 l/s at an approximate hydraulic gradient of 1 in 112, compared to the anticipated foul flow from the proposed development of 2.5 l/s. Although this sewer appears presently to be catering for off site discharge of sewerage for a large catchment area upstream of the site, it would appear that the catchment for the 225mm diameter Public Combined Sewer is more of a rural nature. We therefore expect that this section of the combined public sewer network to have sufficient capacity to accommodate the anticipated foul flows from the proposed development. The proposed connection points into the public sewer network from the development are as shown on the Constraints Plan, Drawing No. 29421 N. CVD. 109B.

Potential diversions of the Public Combined Sewer have been identified on the Constraints Plan produced by AMEC. Any diversion of existing Public Sewers would require approval from the relevant Statutory Undertaker, UU at Reserve Matters/ Detailed Design Stage.

Formal approval will also be required from UU to connect foul flows into this section of the public sewer.



# 5. Conclusions

#### 5.1 Surface Water Flow

Drainage calculations undertaken by AMEC show that there will be a requirement for attenuation to reduce the peak surface water runoff rate to the existing Greenfield runoff rate. These measures would ensure that the potential increase in impermeable areas arising from the proposed development does not increase the potential flood risk associated with the anticipated surface water runoff.

The existing characteristics of the site (sloping topography from north east to south west, Culverted Watercourse, Open Watercourse downstream of the site) make it possible to incorporate a combination of the SUDS Structures (Permeable Paving and Attenuation Pond), into the management of the anticipated Surface Water Run-off from the site.

The assessment undertaken by AMEC shows that the anticipated Surface Water Run-off from the proposed development can be safely managed within the site boundary

The current combined storage capacity requirement is  $725\text{m}^3$  (Proposed capacity of the Attenuation Pond is  $540\text{m}^3$ ; the proposed storage capacity of the Permeable Paving is  $185\text{m}^3$ ).

#### 5.2 Foul Flows

With regards to foul drainage, our calculations show that the anticipated Foul Flow from the proposed development is approximately 2.5 l/s

Our calculations also show that the existing Public Combined Sewer crossing the site should have sufficient capacity to accommodate the anticipated Foul Flows from the proposed development. The proposed connection points into the public sewer network from the development are as shown on the Constraints Plan, Drawing No. 29421\_N\_CVD\_109B

Formal approval to connect into the existing Public Combined Sewer will be required from United Utilities prior to Reserve Matters/ Detailed Design Stage.

The existing Public Combined Public Sewer crossing the site will require a 6m wide easement, over which there can be no development. The housing layout will need to accommodate this easement.





# 6. Recommendations

#### 6.1 Recommendations

The following works are recommended to be undertaken prior to Reserve Matters/ Detailed Design Stage:

- A CCTV Survey of the existing surface water drain has confirmed that sections of this drain contained fairly high percentage of debris/ possible pipe collapse, leading to flow restrictions. Further investigations of the drainage network will be required before it can be fully utilised. Connection into the existing Private Water Drain is presently outside the remit of UU and confirmation of ownership will be required. There will be a requirement to confirm the ownership of this Private Water Drain prior to making any connection to it. A document entitled "Living on the Edge 4th Edition" published by the Environment Agency, states that the owner of land or property next to a river, stream or ditch is classed as a "Riparian Landowner". The document defines the "Rights and Responsibilities" of the Riparian Owner;
- From the current Illustrative Masterplan provided to AMEC for this work, there
  will be a need to divert some sections of existing services currently crossing the
  site. The possible diversions have been identified on the Constraints Plan produced
  by AMEC. Any diversion of existing services crossing the site (Water, Combined
  Sewer, Surface Water etc.) will require approval from the relevant Statutory
  Undertakers at Reserve Matters/ Detailed Design Stage;
- Existing low spots within the site where water might pond should be avoided by
  careful re-profiling of the ground to allow overland flows to drain away from the
  buildings and safely discharge to the proposed storage features without causing
  increased flood risk elsewhere. This may require some raised shallow bunds to
  convey water to the storage features and prevent the water leaving the site in an
  uncontrolled manner;
- The Envirocheck Report11 presents BGS groundwater flooding susceptibility maps and shows the site to have a moderately high susceptibility over the large majority of the area. The area is known to be underlain by Limestone which is fairly permeable; however the WRAP map and FEH CD ROM suggest that the soils have a low permeability which would act as a barrier to rising groundwater. This low soil permeability, coupled with a high Annual Rainfall (SAAR of 1274mm) means that surface water only drains away at a slow rate, resulting in Ponding. There will therefore be a need to undertake Soakaway Tests at sufficient locations to understand the drainage characteristics of the existing soil on the site, prior to detailed design of SUDS structures;
- Further investigation is required to confirm the nature, source, and true alignment of the existing Culverted Watercourse, prior to Detailed Design Stage; and
- Formal liaison will be necessary with the Environment Agency (EA) at Detailed Design Stage with respect to surface water discharge from the site. There will also be a requirement to seek formal approval from the Local Authority for the



discharge of surface water into the ditches/watercourse if they are considered to be Non-Main Rivers.



#### 7. References

- Sewers for Adoption- A Design & Construction Guide for Developers, 6<sup>th</sup> Edition (March 2006) – Water Research Centre plc.
- Services Study Report for the 4 Acre Site located between Littlemoor and Whalley Road, Clitheroe, Lancashire issued by AMEC in April 2012, reference: N028i2.
- Flood Risk Assessment Report for the proposed construction of 49 Residential Units at the 4 Acre Site located between Littlemoor and Whalley Road, Clitheroe, Lancashire - issued by AMEC in April 2012.
- Environment Agency, 2011. "What's In My Backyard" website, Flood risk from reservoirs:(<a href="http://maps.environmentagency.gov.uk/wiyby/wiybyController?ep=ma">http://maps.environmentagency.gov.uk/wiyby/wiybyController?ep=ma</a> ptopics&lang= e).
- Technical Guidance to the National Planning Policy Framework. London: HMSO 2012.
- British Geological Survey (BGS) DiGMapGB-625 data 1:625,000.
- CIRIA. The SUDS Manual, C697 2007
- Landmark Information Group. Envirocheck Report. Flood Screening Report Datasheet. 2012.





## Appendix A Copy of Current Illustrative Masterplan







### Appendix B Copy of United Utilities' (UU) Letter Dated 10<sup>th</sup> August 2012.





United Utilities Water PLC Developer Services & Planning Thirimere House Lingley Mere Business Park Lingley Green Avenue Great Sankey Warrington WAS 3LP

Telephone 01925 678307 Planning liaison@uuplc.co.uk

Your ref: 3/2012/0420

Our ref:

DC/12/2376

Date:

10-AUG-12

Ribble Valley Borough Council Council Officers, Church Walk Clitheroe BB7 2RA

Dear Sir/Madam

Location: Land North and West of Littlemoor Clitheroe Lancashire Proposal: Outline Application for a Residential Development

With reference to the above planning application,

Recent investigations have confirmed that the sewer network serving the area is nearing capacity. To ensure that there is a consistent & fair approach taken by United Utilities we would ask that all development applications include an indicative layout plan, a schedule showing the type of housing to be built, a program of works showing build rates, a Load & Flow impact assessment, preferred discharge points and proposed rates of flow for each discharge point so that United Utilities can determine the full impact that the development has on our assets. Therefore United Utilities will object to the application pending the submission of the additional information.

Our water mains will need extending to serve any development on this site. The applicant, who may be required to pay a capital contribution, will need to sign an Agreement under Sections 41, 42 & 43 of the Water Industry Act 1991

United Utilities offer a fully supported mapping service at a modest cost for our water mains and sewerage assets. This is a service, which is constantly updated by our Property Searches Team (Tel No: 0870 7510101) It is the applicant's responsibility to demonstrate the exact relationship between any assets that may cross the site and any proposed development

Please note, due to the public sewer transfer, not all sewers are currently shown on the statutory sewer records, if a sewer is discovered during construction, please contact a Building Control Body to discuss the matter further

Yours Faithfully,

Daniel McDermott **Developer Services & Asset Protection United Utilities** 



### Appendix C Copy of Email Correspondence between AMEC and Graham Perry (United Utilities)





"Perry, Graham" <Graham..Perry@uuplc.. co..uk>

06/09/2012 13:10

To: <sammy.spaine@amec.com>,

cc: Richard Percy <richardp@abbott-associates.co uk>, John Hall

<john.hall3@amec.com>, Chris Prydderch

<chris.prydderch@amec.com>

Subject: RE: Clitheroe - 4 Acre Site: Proposed Development

#### Hello Sammy

I would agree that the below is a true reflection of our discussion however the letter from John Lunt was I believe dated 30/08 2011 which is over 12 months ago.

I can also confirm that the Ross officer who will authorize access into the sewer is Emily Astbridge who can be contacted by the following e-mail <a href="mailto:Emily.Asbridge@uuplc.co.uk">Emily.Asbridge@uuplc.co.uk</a>

Thanks

Graham Perry

**From:** sammy\_spaine@amec\_com [mailto:sammy\_spaine@amec\_com]

Sent: 06 September 2012 09:58

To: Perry, Graham

Cc: Richard Percy; John Hall; Chris Prydderch

Subject: Clitheroe - 4 Acre Site: Proposed Development

Graham,

I refer to our telephone conversation of yesterday's date regarding the above, and in particular the letter from your Mr. Daniel McDermott dated 10th August 2012. (copy attached).

Please find below my summary of our telephone conversation as agreed:

- An Approval-In-Principle was previously granted by UU via email sent from John Lunt dated 30.08.2012
- The attached letter superseding the aforementioned email, has been sent out by UU on the basis
  of the many planning applications for new developments within the catchment which have been
  submitted over the past twelve months.
- UU are concerned that their current infrastructure may not have sufficient capacity to serve all the
  proposed development currently up for planning.
- In this regard, UU are now requesting that an Outline Drainage Strategy be submitted consisting
  of the following information:
- 1. An estimation of the anticipated foul flows and surface run-offs from the proposed development.
- 2. Surface Run-offs to be assessed on the basis of the Greenfield Run-off Rate for the catchment.
- 3. Identification of the proposed discharge outfalls
- 4 A Masterplan showing details of the house types being proposed including the Phasing (Programming) of the development
- 5 A "Constraints Plan" consisting of current topographical survey data, superimposed over the current Masterplan, merged with the existing sewer information would be suitable at this stage. This plan would also contain the discharge points, together with the values of the anticipated flows. (Foul & Surface Water)
- UU will plug the above information into their current Hydraulic Model for the catchment, to assess

- the true impact of this development on their infrastructure.
- The flows and discharge points identified would then be used to define the final Planning Conditions;
- An old copy of the sewer records show a combined Public Sewer, together with a Culverted
  Watercourse crossing the site. There's a need to undertake a survey of these sections of sewer
  crossing the site, and to identify any other uncharted sewers within the footprint of the proposed
  development. AMEC will be required to liaise with the ROSS officer at UU to obtain permission to
  work within their network. Graham will forward the contact details of their ROSS officer to me via
  email asap.

I trust the above is a true representation of what was discussed and agreed

# Regards Sammy Spaine BEng Hons, CEng MICE, AMAE, APMP Technical Director AMEC

Environment and Infrastructure UK Ltd Windsor House, Gadbrook Business Centre, Northwich Cheshire CW9 7TN UK Tel +44 (0) 01606 354800, Fax +44(0) 01606 354810

Direct +44 (0)01606 354842 mobile/cell 07803 078418

mailto:sammy.spaine@amec.com

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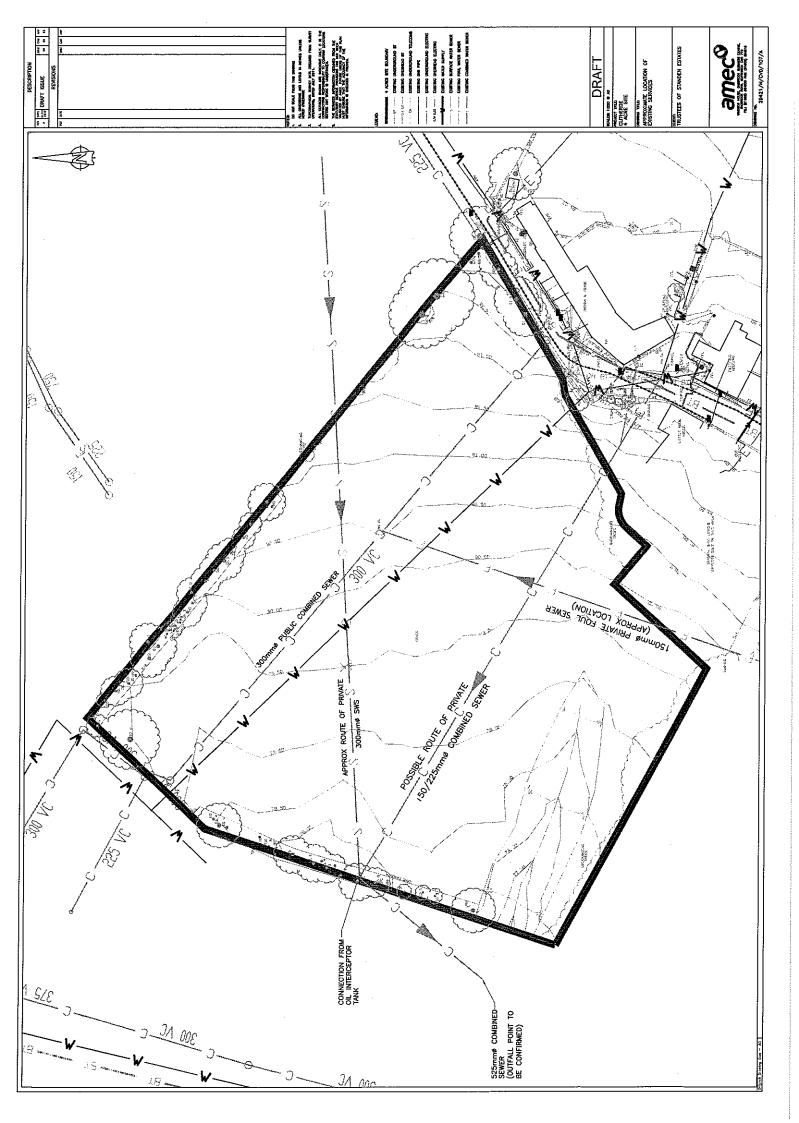
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# Appendix D Drawing No. 29421\_N\_CVD\_107







# Appendix E Copy of Correspondence between AMEC and the Environment Agency



#### Dawson, Emily

From:

Worswick, Colin

Sent:

03 April 2012 10:33

To:

NW North Preston, Information Requests

Subject:

PRE3187\_DFR 31936 - Land at Higher Standon, Clitheroe - FRA

#### Colin Worswick

Development and Flood Risk Engineer North Area, North West Region 01772 714259 07741 019565

From: Worswick, Colin Sent: 22 March 2012 10:02 To: 'stewart.griffiths@amec..com'

Subject: RE: 31936 - Land at Higher Standon, Clitheroe - FRA

Stewart,

I can confirm that both sites lie within Flood Zone 1. We are not aware of any flooding incidents, however you are advised to contact Ribble Valley Borough Council who may have more detailed local records. Surface water run-off must be restricted to existing greenfield rates which is 10l/s/hectare. You will require Flood Defence Consent to culvert or divert any watercourses.

Regards

Colin Worswick

Development and Flood Risk Engineer North Area, North West Region 01772 714259 07741 019565

From: stewart.griffiths@amec.com [mailto:stewart.griffiths@amec.com]

Sent: 20 March 2012 14:28

To: Worswick, Colin

Subject: 31936 - Land at Higher Standon, Clitheroe - FRA

Click here to report this email as spam.

#### FAO: Colin Worswick

I understand that you cover the Clitheroe Area.

We are undertaking a Flood Risk Assessment for a couple of development sites in Clitheroe - see attached layout plan(s).

#### a) Site 1 - 4 Acre Site(Post Code BB7 1HF)

The site is located between Little Moor and Little Moor View as indicated by the attached plan.

#### b) Site 2 - Main Development Site(covering an area of approx 70 ha)

Located to the east of Little Moor Road, as indicated on the Drawing.

Could you advise me whether there are any flooding restrictions on this site, for our inclusion in our Flood Risk Assessment Report?

We understand that the site is located in a Flood Zone 1 Area, but could you confirm this.

Any queries then contact me on the number below.

Regards

#### Stewart Griffiths Senior Civil Engineer AMEC

Amec Environment & Infrastructure UK Limited Windsor House, Gadbrook Road, Northwich CW9 7TN UK Tel +99 (0)1606 354800 Direct +44 (0)1606 354812 mobile +44(0)7896 213922 stewart.griffiths@amec.com amec.com/ukenvironment

From:

"Welsby, Cliff" <cliff welsby@environment-agency gov uk> "stewart griffiths@amec.com <stewart griffiths@amec.com>

To: Date:

15/03/2012 12:15

Subject:

RE: 31936 - Land at Higher Standon, Clitheroe - FRA

Stewart.

Colin Worswick is the engineer for Clitheroe area.

Tel. 07741 019565

**From:** stewart.griffiths@amec.com [mailto:stewart.griffiths@amec.com]

Sent: 14 March 2012 10:08

To: Welsby, Cliff

Cc: Carter, Philip A; andrew.worsdale@amec.com

Subject: 31936 - Land at Higher Standon, Clitheroe - FRA

Hi Cliff,

We have a couple of Greenfield sites in Clitheroe where we have been asked to undertake an Outline FRA.

Who is the EA contact for this area?

Regards

#### **Stewart Griffiths** Senior Civil Engineer **AMEC**

Amec Environment & Infrastructure UK Limited Windsor House, Gadbrock Road, Northwich CW9 7TN, UK Tel +99 (0)1606 354800 Direct +44 (0)1606 354812 mobile +44(0)7896 213922 stewart.griffiths@amec.com amec.com/ukenvironment

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From:

'Welsby, Cliff" <cliff welsby@environment-agency gov uk> 'stewart griffiths@amec com" <stewart griffiths@amec com> Carter, Philip A" <PCARTER@environment-agency gov uk>

To: Cc:

07/03/2012 10:28

Date: Subject:

RE: 31936 - Site at Lightfoot Lane Fulwood, Preston - FRA

#### Stewart

As detailed by Philip on site attenuation will be required for surface water at existing "green field" rates usually considered to be 10l/sec/hec

Any works to the culverted watercourse may require Agency formal consent.

Please contact me again should you need to apply for any consents.

Regards

Cliff.

**From:** stewart.griffiths@amec.com [mailto:stewart.griffiths@amec.com]

Sent: 07 March 2012 09:59

To: Welsby, Cliff

**Cc:** andrew.worsdale@amec.com; sammy.spaine@amec.com **Subject:** 31936 - Site at Lightfoot Lane, Fulwood, Preston - FRA

Cliff,

Further to Phil Carter's e:mail below, are you aware of any site specific issues for the site at Lightfoot Lane (location plan attached) which will need to be included in the FRA?

Many Thanks

#### Stewart Griffiths Senior Civil Engineer AMEC

Amec Environment & Infrastructure UK Limited Windsor House, Gadbrook Road, Northwich CW9 7TN, UK Tel +99 (0)1606 354800 Direct +44 (0)1606 354812 mobile +44(0)7896 213922 stewart.griffiths@amec.com amec.com/ukenvironment

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----- Forwarded by Stewart Griffiths/NOR/ENTEC/NWG on 07/03/2012 09:53 -----

From:

"Carter Philip A" <PCARTER@environment-agency gov uk>
"stewart griffiths@amec com" <stewart griffiths@amec com>
"Welsby Cliff" <cliff.welsby@environment-agency gov uk>

Cc: Date:

07/03/2012 09:47

Subject:

RE: 31936 - Site at Lightfoot Lane Fulwood Preston - FRA

#### Stewart

The engineer who covers the area is Cliff Welsby - you can contact him directly on 01772 714016 but I've also copied him into this e-mail.

I can confirm that the area is Flood Zone 1 and any development must ensure that surface water run-off from the site is restricted to existing rates (to be identified in the FRA). From the OS map of the area, there is an ordinary watercourse flowing through the site in a northerly direction, under the motorway, in culvert. The risk of flooding due to blockage or under capacity of the watercourses and culverts on site will need to be considered in the FRA, as will the potential for removal of any culverts that could reduce flood risk.

I would recommend contacting Cliff to see if he has any other site specific issues that would need to be considered in the FRA. Kind regards

Philip

Philip Carter
Planning Liaison Officer
Environment Agency
PO Box 519
South Preston
PR5 8GD
01772 714219



#### Flooding data Request - Standen Road, Clitheroe

Finch, Peter o richard breakspear

14/02/2012 14:42

Richard,

\*\*\*\*\*\*

Thank you for your Email dated 13th.February 2012.

There are no major recorded flooding incidents on Standen Road, except for the occasional blocked gully that can cause a localised flooding problem.

Regards
Peter Finch
Principal Engineer (Ribble Valley)
Environment Services East
Lancashire County Council
01254 770960

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#### RE: Sewer flooding data request, site at Standen, Clitheroe, Lancashire

Planning Liaison o richard.breakspear

20/02/2012 12:23

Hello Richard

Information as requested

#### **DG5 Sewer Flooding**

I have checked our records and have found a DG5 flooding issues within the immediate vicinity of the proposed development. The reported issue is on Turner Street, Clitheroe.

Please note that United Utilities Water plc (UUW) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events to place on the 'at risk' register

This assessment does not include any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which UUW has no control and not a facet of sewer capacity

If I can be of any further assistance in the meantime then please don't hesitate to get in touch. Regards
Graham Perry

**From:** richard.breakspear@amec.com [mailto:richard.breakspear@amec.com]

Sent: 13 February 2012 10:15

To: Planning Liaison

**Subject:** Sewer flooding data request, site at Standen, Clitheroe, Lancashire

Hi,

I would like to request information on <u>past/existing incidences of sewer flooding</u> in support of a Flood Risk Assessment being prepared for a residential development site at Standen, Clitheroe, Lancashire.

I've checked on your website, under Developer Enquiries ( <a href="http://www.unitedutilities.com/Wastewaterconnections.aspx">http://www.unitedutilities.com/Wastewaterconnections.aspx</a>) and cannot find a link to the information I require

The site is immediately west of the A59, (see attached plan). The approximate grid reference for the centre of the area of interest is: SD 74917 40684 Or see:

http://gridreferencefinder.com/?gr=SD7491740684%7CPoint\_s\_E%7C0&z=15&v=h&t=Point\_s\_E

Best regards,

Richard

Dr Richard Breakspear

From: Sent: To: Subject:	Griffiths, Stewart on behalf of Dawson, Emily 26 March 2012 10:13 Dawson, Emily 29421 - Land at Higher Standon, Clitheroe, Lancs	
Note the response I receive	red from UU last week, for your information.	
Regards		
Stewart Griffiths Senior Civil Engineer AMEC Amec Environment & Infras (0)1606 354800 Direct +44 amec.com/ukenvironment	istructure UK Limited Windsor House, Gadbrook Road, Northwich CW9 7TN, U 4 (0)1606 354812 mobile +44(0)7896 213922 stewart griffiths@amec.com	JK Tel +99
Business sustainability star Business sustainability star	k before you print.  urts here. AMEC is committed to reducing its carbon footprint.  urts here. AMEC is a signatory to the UN Global Compact.  urts here AMEC supports SOS Children  t Griffiths/NOR/ENTEC/NWG on 26/03/2012 10:13	
i "'		
"Porry Graham" -Graha		
>  To:		
Lastowart griffiths@amos	ı	
>   Date:    >	·	I
19/03/2012 16:21	]	
>   Subject:    >		ı
>	her Standon Clitherne Lancs	· <del></del>

#### Hello Stewart

Dawson, Emily

Further to our discussion, I can confirm that we would accept free foul discharge from 50 domestic units into the 300mm combined sewer crossing the site but we would not accept any surface water. Under the terms of Building regulation H3 & PPS25, you must discharge to either soakaway on site or to the nearby watercourse.

We would have no objection to you diverting the existing 300mm combined sewer that crosses the site providing that you enter into a Section 185 Diversion agreement before starting.

"United Utilities Water plc (UUW) will provide information on connection points and maximum permitted discharge rates to public sewers in response to enquiries by developers and in response to Planning Applications where Planning Authorities have elected to consult UUW on drainage matters

However, the points of connection and discharge rates cannot be allocated and reserved for a particular development. UUW reserves the right to revise the connection point and discharge rate current at the time that a formal application for connection to public sewer is made, in order to take account of possible changes in discharges to the public sewer between the date of the enquiry and the date of the connection being required".

Regards

Graham Perry

From: stewart.griffiths@amec.com [mailto:stewart.griffiths@amec.com]

Sent: 13 March 2012 13:17

To: Perry, Graham

Subject: 29421 - Land at Higher Standon, Clitheroe, Lancs

Graham,

FY!

I don't think you received this drawing last time!

Regards

Stewart Griffiths Senior Civil Engineer AMEC

Amec Environment & Infrastructure UK Limited Windsor House, Gadbrook Road, Northwich CW9 7TN, UK Tel +99 (0)1606 354800 Direct +44 (0)1606 354812 mobile +44(0)7896 213922 stewart.griffiths@amec.com/amec.com/ukenvironment

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----- Forwarded by Stewart Griffiths/NOR/ENTEC/NWG on 13/03/2012 13:20

From: Stewart Griffiths/NOR/ENTEC/NWG

To: "Perry, Graham" < Graham Perry@uuplc.co.uk>

Date: 13/03/2012 13:09

Subject: 29421 - Land at Higher Standon, Clitheroe, Lancs

Hello Stewart,

My initial thoughts would be that this is a significant development that will have a major impact to our network and receiving treatment works.

Surface Water

All surface water from this site must be drained directly soakaway / SUDS or to the watercourses running through the site. You will need to discuss your proposals with the EA to agree discharge points / flow rates

Foul

We are currently carrying out a detailed assessment of the area and we should know the impact that your site has to our assets in the near future.

For your purposes I would suggest that will be capacity issues on the network & treatment works.

Regards

Graham Perry

From: stewart griffiths@amec.com [mailto:stewart griffiths@amec.com]

Sent: 05 January 2012 16:34

To: Perry, Graham

Subject: 29421 - Land at Higher Standon, Clitheroe, Lancs

Hi Graham,

Happy New Year!

We have a site in your area which we are assessing from a drainage capacity point of view.

The location of the site is attached (Postcode BB7 1PP) for your information, which is located to the South East of Clitheroe.

We are in the process of requesting Sewer Record information from UU

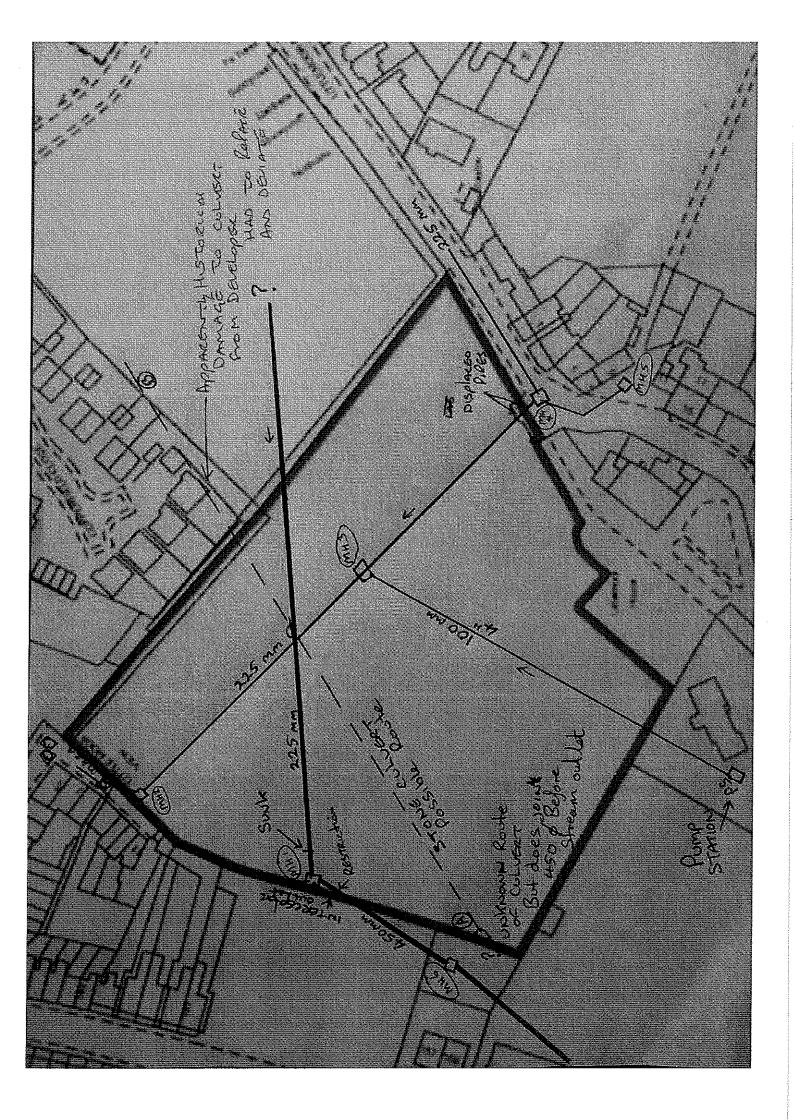
Anticipated development will consist of approx 1040 residential properties and 7500 m2 of office space

Could you advise me on the capacity of the local sewerage systems to accommodate such a development?



## Appendix F Copy of Marked-up Site Survey Plan







# Appendix G Calculations – Proposed Surface Water Sewers



Entec UK Limited		Page 1
Windsor House	Land off Littlemoor Lane	DISTRICT WHICH IN PROPERTY OF THE PROPERTY OF
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	A STATE OF THE PROPERTY OF THE
Micro Drainage	Network W.12.6.1	

#### Existing Network Details for Storm

 $\mbox{\scriptsize \star}$  - Indicates pipe has been modified outside of System 1

	P	N Len	oth Fa	ll Slope	I Area	TE.	k	HYD	DIA	
			_	n) (1:X)	(ha)			SECT		
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	* 1.0	01 30.	463 0 2	202 150.8	0.144	0.00	0.600	0	225	
	* 2.0	00 17.	692 02	246 719	0042	500	0600	o	225	
	* 30	00 26.	019 0.1	171 152.2	0.036	5 00	0,600	0	225	
	* 2 0	01 22	361 14	154 15.4	0.050	000	0600	0	225	
	* 40	00 28	460 0.0	569.2	0 025	5.00	0.600	0	225	
	* 2 0	02 22	025 0 1	.64 139.2	0.000	0.00	0 600		225	
					0.029		0.600	0	225	
				.66 138.7 .23 139.2	0.069 0.081		0600 0.600	0	225	
								0	225	
				.02 1386			0.600	0	300	
				.02 138 6			0 600	0	300	
	* 2 0	07 33.	242 0.2	40 138 5	0.067	000	0.600	0	300	
	* 1.0	02 5	000 03	38 148	0.139	0.00	0600	٥	300	
			125 0.9				0.600	0	450	
PN	US/MH U		US/IL		DS/CL	DS/IL	DS	_	Ctrl	US/MH
	Name	(m)	(m)	C Depth	(m)		Depth			(mm)
		•		(m)	,,	(,	(m)			,,
							,,			
1.000	SW01 7	9.800	78.375	1.200 7	79.500	78 180	1.095			1200
1001	SW02 7	9 500	78.180	1095 7	78800	77.978	0 597			1200
2.000	SW03 8	2.000	80.575	1 200 8	31.700	80329	1.146			1200
3000	SW04 8	1.700	80.500	0.975 8	1.700	329	1.146			1200
2.001	SW05 8	1 700	80.329	1146 8	0.500	78 875	1.400			1200
4 000	~~~~		70 00=							
4 000	SW06 8	0300	78.925	1 150 8	0.500	78 - 875	1.400			1200
2.002	SW07 8	0.500	70 075	1.400 7	0 000	70 711	0 864			1200
2.002	SW07 0			0.864 7			1.030			1200
2.003	SW09 7			and the second second						
2.004	SW10 7			1 030 7 0 353 7			0.353			1200
							0.455			1200
2.006	SW11 7			0.455 7			0.557			1200
2.007	SW12 7	9,000	78.143	0.557 7	8 " 800	77 903	0 597			1200
1 000	01410 7	0 000	77 000	0 507 7	0 000	77 565	0.005	***		1000
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1003	PW03 7	8.800	11.565	0.785 7	8 " T00	6 600	1050			1200

Entec UK Limited		Page 2
Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7IN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

#### Free Flowing Outfall Details for Storm

Outfall Outfall C. Level I. Level Min D,L W
Pipe Number Name (m) (m) I Level (mm) (mm)
(m)

1.003 Ex MH 78 100 76 600 0.000 450 0

#### Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750 Additional Flow - % of Iotal Flow 0.000
Areal Reduction Factor 1.000 MADD Factor \* 10m³/ha Storage 2.000
Hot Start (mins) 0 Inlet Coefficient 0.800
Hot Start Level (mm) 0 Flow per Person per Day (1/per/day) 0.000
Manhole Headloss Coeff (Global) 0.500 Run Iime (mins) 60
Foul Sewage per hectare (1/s) 0.000 Output Interval (mins) 1

Number of Input Hydrographs 0 Number of Storage Structures 13 Number of Online Controls 1 Number of Iime/Area Diagrams 0 Number of Offline Controls 0 Number of Real Iime Controls 0

#### Synthetic Rainfall Details

Rainfall Model		FEH
Return Period (years)		1
Site Iocation G	GB 373850 440650 SD 738	50 40650
C (1km)		-0.025
D1 (1km)		0.398
D2 (1km)		0.385
D3 (1km)		0 430
E (1km)		0 299
F (1km)		2 444
Summer Storms		Yes
Winter Storms		Yes
Cv (Summer)		0750
Cv (Winter)		0840
Storm Duration (mins)		30

Entec UK Limited		Page 3
Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	TV Para
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

#### Online Controls for Storm

#### Hydro-Brake® Manhole: SW13, DS/PN: 1.002, Volume (m³): 4.4

Design Head (m) 0.800 Hydro-Brake® Type Md4 Invert Level (m) 77.903 Design Flow (1/s) 8.9 Diameter (mm) 112

Depth	(m)	Flow	(1/s)	Depth (m	) Flow	(1/s)	Depth (r	n) Flow	(1/s)	Depth (	(m)	Flow (l	/s)
				İ									
0.	100		3.3	1.20	0	10.7	3.00	00	16.9	7.0	000	2	5.9
0.	200		8 0	140	0	11.6	3.50	00	18 3	75	500	2	6.8
	300		7 8	1.60	0	12.4	4.00	00	19 6	80	000	2	7.6
	400		6.9	1.80	0	13 1	4.50	00	20 7	85	500	2	8 5
	500		7.1	2.00	0	13 8	5.00	00	21 9	9.0	000	2	9 3
	600		7.6	2.20	0	14 5	5 50	00	22 9	95	500	3	0.1
	800		8.7		•	15.1	6 00	00	23 9				
	000		9.8	2.60	_	15.8	6 50		24.9				

Entec UK Limited		Page 4
Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7IN	Clitheroe	TWO COLOR
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	Communication of the Communica
Micro Drainage	Network W.12.6.1	

#### Storage Structures for Storm

#### Porous Car Park Manhole: SW01, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	42
Membrane Percolation (mm/hr)	1	Length (m)	30.0
Max Percolation (1/s)	00	Slope (1:X)	153 0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	78375	Cap Volume Depth (m)	0.000

#### Porous Car Park Manhole: SW02, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5 5
Membrane Percolation (mm/hr)	1	Length (m)	30.4
Max Percolation (1/s)	0.0	Slope (1:X)	151.0
Safety Factor	20	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	78.180	Cap Volume Depth (m)	0.000

#### Porous Car Park Manhole: SW03, DS/PN: 2.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	55
Membrane Percolation (mm/hr)	1		36.0
Max Percolation (1/s)	0.1		
Safety Factor		Depression Storage (mm)	5
Porosity	030		3
Invert Level (m)	80.575		

#### Porous Car Park Manhole: SW04, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	000000	Width (m)	42
Membrane Percolation (mm/hr)	1	Length (m)	260
Max Percolation (1/s)	0.0	Slope (1:X)	152.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	030	Evaporation (mm/day)	3
Invert Level (m)	80.500	Cap Volume Depth (m)	0.000

#### Porous Car Park Manhole: SW05, DS/PN: 2.001

Infiltration Coefficient Base (m/hr)	000000	Width (m)	5.5
Membrane Percolation (mm/hr)	1	Length (m)	22.5
Max Percolation (1/s)	0.0	Slope (1:X)	15.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.329	Cap Volume Depth (m)	0.000

#### Porous Car Park Manhole: SW06, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	0.00000 Safety Factor	2.0
Membrane Percolation (mm/hr)	<pre>1 Porosity</pre>	0.30
Max Percolation (1/s)	0.0 Invert Level (m)	78.925

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Entec UK Limited		Page 5
Windsor House	Land off Littlemoor Lane	E-7
Gadbrook Business Centre	4 Acre Site	I Wara M
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

#### Porous Car Park Manhole: SW06, DS/PN: 4.000

 Width (m)
 4.2 Depression Storage (mm)
 5

 Length (m)
 28.5 Evaporation (mm/day)
 3

 Slope (1:X)
 569.0 Cap Volume Depth (m)
 0.000

#### Porous Car Park Manhole: SW07, DS/PN: 2.002

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.5

Membrane Percolation (mm/hr) 1 Iength (m) 22.8

Max Percolation (1/s) 0.0 Slope (1:X) 139.0

Safety Factor 2.0 Depression Storage (mm) 5

Porosity 0.30 Evaporation (mm/day) 3

Invert Level (m) 78.875 Cap Volume Depth (m) 0.000

## Porous Car Park Manhole: SW08, DS/PN: 2.003

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5 5 Membrane Percolation (mm/hr) 1 Length (m) 23.0 Max Percolation (1/s) 0.0 Slope (1:X) 139.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 78.711 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW09, DS/PN: 2.004

Infiltration Coefficient Base (m/hr) 0 00000 Width (m) 5.5

Membrane Percolation (mm/hr) 1 Length (m) 17.1

Max Percolation (1/s) 0 0 Slope (1:X) 139.0

Safety Factor 2.0 Depression Storage (mm) 5

Porosity 0.30 Evaporation (mm/day) 3

Invert Level (m) 78.545 Cap Volume Depth (m) 0.000

# Porous Car Park Manhole: SW10, DS/PN: 2.005

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) Length (m) 14.1 Membrane Percolation (mm/hr) 1 0..0 Slope (1:X) 0..0 Max Percolation (1/s) 2.0 Depression Storage (mm) 5 Safety Factor 0.30 Evaporation (mm/day) 3 Porosity Invert Level (m) 78.347 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW11, DS/PN: 2.006

 Infiltration Coefficient Base (m/hr)
 0 00000
 Width (m)
 5 5

 Membrane Percolation (mm/hr)
 1
 Length (m)
 14 1

 Max Percolation (1/s)
 0 0
 Slope (1:X)
 139 0

 Safety Factor
 2.0
 Depression Storage (mm)
 5

 Porosity
 0.30
 Evaporation (mm/day)
 3

 Invert Level (m)
 78 245
 Cap Volume Depth (m)
 0 000

Entec UK Limited		Page 6
Windsor House	Land off Littlemoor Lane	Standard Management of the Standard Management o
Gadbrook Business Centre	4 Acre Site	Wileso
Northwich CW9 7IN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

## Porous Car Park Manhole: SW12, DS/PN: 2.007

Infiltration Coefficient Base (m/hr)	0 00000	Width (m)	5 5
Membrane Percolation (mm/hr)	1	Length (m)	330
Max Percolation (1/s)	0.1	Slope (1:X)	1390
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	78.143	Cap Volume Depth (m)	0000

## Cellular Storage Manhole: SW13, DS/PN: 1.002

Invert Level (m) 77.903 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²) Inf	Area (m²)
0.000	700.0	4500	1.300	00	530.6
0100	7000	4585	1.400	0.0	530 6
0.200	7000	467 0	1 500	0.0	530.6
0 300	7000	475 5	1.600	0.0	530.6
0 400	700.0	483 9	1.700	0 0	5306
0.500	-700.0	492.4	1.800	0.0	530.6
0600	700 0	5009	1900	00	5306
0700	7000	5094	2000	0 0	5306
0.800	700.0	5179	2.100	0 0	530 6
0.900	7000	526 4	2 200	00	530 6
1.000	7000	530 6	2 300	0.0	530.6
1.100	0.0	530 6	2.400	0 0	530.6
1.200	0 0	530.6	2.500	0.0	5306

Entec UK Limited		Page 7
Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	T. Para
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

#### Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0

Analysis Limestep 2.5 Second Increment (Extended)

DIS Status

DVD Status

ON

Inertia Status

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,

720, 960, 1440, 2160, 2880, 4320, 5760,

7200, 8640, 10080

Return Period(s) (years)
Climate Change (%)

1, 30 0, 0

PN	Storm		Climate Change		st X harge	First Y Flood	First Z Overflow	O/F Act	Lvl Exc
1.000	15 Winte	30	0%						
1 001	15 Winte	30	90	30/15	Summer				
2.000	15 Winte	30	0%		-				
3.000	15 Winte	30	0%						
2.001	15 Winte	g 30.	0%						
4000	15 Winte	30	0%						
2002	15 Winte	30	0%						
2.003	15 Winte	30	0%	30/15	Summer				
2.004	15 Winte	g 30	0%	30/15	Summer				
2005	15 Winte	30	0%						
2006	15 Winte:	30	0%						
2007	30 Winte	30	0%						
1002	720 Winte	: 30	0%	30/60	Winter				
1.003	2880 Summe:	30	0 %						

		Water		Flooded			Pipe	
	US/MH	Level	Surch'ed	Volume	Flow /	O'flow	Flow	
PN	Name	(m)	Depth (m)	(m³)	Cap	(1/s)	(l/s)	Status
1000	SW01	78.480	-0.120	0.000	0 43	0.0	16.8	OK
1.001	SW02	78.445	0.040	0.000	1 12	0 0	44.1	SURCHARGED
2000	SW03	80.656	-0.144	0.,000	0.28	0 0	15.3	OK
3000	SW04	80.587	-0.138	0000	0.31	0.0	12 2	OK
2.001	SW05	80.426	-0.128	0000	0.37	0 0	450	OK
4.000	SW06	79.071	-0.079	0000	0.41	0 0	82	OK
2.002	SW07	79 088	-0.012	0000	093	0 0	373	OK
2.003	SW08	78 980	0.044	0000	0.96	0 0	38.9	SURCHARGED
2.004	SW09	78.830	0.060	0.000	1 25	0.0	49.2	SURCHARGED
2.005	SW10	78.588	-0.059	0.000	084	0.0	65.6	OK
2.006	SW11	78.518	-0027	0 000	1.00	00	78.3	OK
2.007	SW12	78.393	-0.050	0 000	1.00	00	86.4	OK
1.002	SW13	78.357	0154	0 000	0.05	00	7.9	SURCHARGED
1.003	PW03	77601	-0.414	0 000	0.02	00	7.9	OK

Entec UK Limited		Page 1
Windsor House	Land off Littlemoor Lane	Provident Control of C
Gadbrook Business Centre	4 Acre Site	TYTO DO NOT
Northwich CW9 7TN	Clitheroe	THE COLUMN
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

# Existing Network Details for Storm

 $\ensuremath{^{\star}}$  - Indicates pipe has been modified outside of System 1

		PN	Length	Fall	Slope	I Area	T.E.	k	HYD	DIA	
			(m)	(m)	(1:X)	(ha)	(mins)	(mm)	SECT	(mm)	
										005	
			29.833					0600	0	225	
	* 1	.UUI	30463	0202	150 8	0144	0.00	0600	0	225	
	* 2	.000	17.692	0246	719	0 042	5.00	0 600	0	225	
	* 3	000	26.019	0.171	152.2	0.036	500	0.600	0	225	
	* 2	.001	22361	1.454	15 4	0.050	000	0.,600	0	225	
	* 1	٥٥٥	28.460	0.050	560.2	0.025	5 00	0600	0	225	
	~ 4.	.000	20.400	0030	309.2	0.023	3 00	0000		223	
	* 2	002	22 825	0 164	139.2	0 029	0.00	0 600	0	225	
	* 2	003	23.022	0 166	1387	0.069	000	0.600	0	225	
			17117					0.600	0	225	
	* 2	.005	14142	0.102	138 6	0088	000	0.600	0	300	
			14142					0600	0	300	
			33.242					0600	0	300	
	* 1	002	5 000	0.338	14.8	0.139	0.00	0 600	٥	300	
	* 1		36.125		37.4			0.600	0	450	
PN	US/MH	US/0	CL US/	'IL	US	DS/CL	D\$/IL	DS		Ctrl	US/MH
	Name	(m)	) (n	a) C I	Depth	(m)	(m) (	Depth			(mm)
					(m)			(m)			
1 000	GMO1	70.0	00 70			70 E00 :	79 100				1200
1.000			00 78	375	1 200	79 500 1		1095			1200
1.000			00 78 00 78.	375	1 200	79 500 1 78.800 1					1200 1200
1001	SW02	79.5	00 78.	375 : 180 :	1 200 1.095	78800	77978	1095 0597			1200
	SW02	79.5		375 : 180 :	1 200 1.095		77978	1095			
1001	SW02 SW03	79.5 82.0	00 78.	375 : 180 :	1 200 1 095	78800	77978	1095 0597			1200
2.000	SW02 SW03	79.5 82.0	00 78. 00 80.	375 : 180 :	1 200 1 095	78.800 T 81.700 E	77978	1.095 0.597 1 146			1200 1200
2.000	SW02 SW03 SW04	79.5 82.0 81.7	00 78. 00 80.	375 : 180 : 575 :	1 200 1 095 1 200 {	78.800 T 81.700 E	77.978 30.329 30.329	1.095 0.597 1 146			1200 1200
1001 2.000 3.000 2001	SW02 SW03 SW04 SW05	79.5 82.0 81.7 81.7	00 78. 00 80. 00 80. 00 80.	375 : 180 : 575 : 500 : 6	1 200 1 095 1 200 8 0 975 8	78.800 1 81.700 8 81.700 8 80.500 7	77.978 80.329 80.329 78.875	1.095 0.597 1 146 1.146			1200 1200 1200 1200
1.001 2.000 3.000	SW02 SW03 SW04 SW05	79.5 82.0 81.7 81.7	00 78. 00 80. 00 80.	375 : 180 : 575 : 500 : 6	1 200 1 095 1 200 8 0 975 8	78.800 1 81.700 8 81.700 8	77.978 80.329 80.329 78.875	1.095 0.597 1 146 1.146			1200 1200 1200
1.001 2.000 3.000 2.001 4.000	SW02 SW03 SW04 SW05 SW06	79.5 82.0 81.7 81.7	00 78. 00 80. 00 80. 00 80.	375 : 180 : 575 : 575 : 3329 : 3329 : 3	1 200 1 095 1 200 1 200 1 146 1 146 1 150	78.800 1 81.700 8 81.700 8 80.500 1	77978 30.329 30.329 78875	1095 0597 1 146 1.146 1400			1200 1200 1200 1200 1200
1.001 2.000 3.000 2.001 4.000 2.002	SW02 SW03 SW04 SW05 SW06	79.5 82.0 81.7 81.7 80.3	00 78. 00 80. 00 80. 00 80. 00 78.	375 :: 180 :: 575 :: 500 (0 329 :: 925 ::	1 200 1 095 1 200 8 1 200 8 1 146 8 1 150 8	78.800	77.978 30.329 30.329 78.875 78.875	1.095 0.597 1 146 1.146 1.400 1.400 0 864			1200 1200 1200 1200 1200 1200
1.001 2.000 3.000 2.001 4.000 2.002 2.003	SW02 SW03 SW04 SW05 SW06 SW07 SW08	79.5 82.0 81.7 81.7 80.3	00 78. 00 80. 00 80. 00 80. 00 78. 00 78.	375 :: 180 :: 575 :: 575 :: 329 :: 329 :: 3875 :: 6875	1 200 1 095 1 200 8 1 200 8 1 146 8 1 150 8 1 400 1	78.800	77.978 30.329 30.329 78.875 78.875 78.711 78.545	1.095 0.597 1 146 1.146 1.400 1.400 0 864 1 030			1200 1200 1200 1200 1200 1200 1200
1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004	SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09	79.5 82.0 81.7 81.7 80.3 80.5 79.8 79.8	00 78 . 00 80 . 00 80 . 00 80 . 00 78 . 00 78 . 00 78 . 00 78 .	375 :: 180 :: 575 :: 575 :: 329 :: 329 :: 329 :: 37711 :: 6545 :: 5545	1 200 1 095 1 200 8 1 200 8 1 146 8 1 150 8 1 400 1 0 864 1	78.800	77.978 30.329 30.329 78.875 78.875 78.711 78.545 78.422	1.095 0.597 1 146 1.146 1.400 1.400 0.864 1.030 0.353			1200 1200 1200 1200 1200 1200 1200 1200
1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004 2.005	SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09 SW10	79.5 82.0 81.7 81.7 80.3 80.5 79.8 79.8 79.0	00 78 . 00 80 . 00 80 . 00 80 . 00 78 . 00 78 . 00 78 . 00 78 . 00 78 .	375 :: 180 :: 575 :: 575 :: 329 :: 329 :: 329 :: 37711 :: 67545 :: 3347 :: 67545 :: 347	1 200 1 095 1 200 8 1 200 8 1 146 8 1 150 8 1 400 1 0 864 1 1 030 1	78.800	77.978 30.329 30.329 78.875 78.875 78.711 78.545 78.422 78.245	1.095 0.597 1 146 1.146 1.400 1.400 0.864 1.030 0.353 0.455			1200 1200 1200 1200 1200 1200 1200 1200
1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004 2.005 2.006	SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09 SW10 SW11	79.5 82.0 81.7 81.7 80.3 80.5 79.8 79.0 79.0	00 78 . 00 80 . 00 80 . 00 78 . 00 78 . 00 78 . 00 78 . 00 78 . 00 78 . 00 78 .	375 :: 180 :: 575 :: 57	1 200 1 095 1 200 8 1 200 8 1 146 8 1 150 8 1 400 1 0 864 1 1 030 1 0 353 1 0 455 1	78.800 1 81.700 8 81.700 8 80.500 7 79.800 7 79.800 7 79.000 7 79.000 7	77.978 30.329 30.329 78.875 78.875 78.711 78.545 78.422 78.245 78.143	1.095 0.597 1 146 1.146 1.400 1.400 0.864 1.030 0.353 0.455 0.557			1200 1200 1200 1200 1200 1200 1200 1200
1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004 2.005	SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09 SW10 SW11	79.5 82.0 81.7 81.7 80.3 80.5 79.8 79.0 79.0	00 78 . 00 80 . 00 80 . 00 80 . 00 78 . 00 78 . 00 78 . 00 78 . 00 78 .	375 :: 180 :: 575 :: 57	1 200 1 095 1 200 8 1 200 8 1 146 8 1 150 8 1 400 1 0 864 1 1 030 1 0 353 1 0 455 1	78.800	77.978 30.329 30.329 78.875 78.875 78.711 78.545 78.422 78.245 78.143	1.095 0.597 1 146 1.146 1.400 1.400 0.864 1.030 0.353 0.455			1200 1200 1200 1200 1200 1200 1200 1200
1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004 2.005 2.006 2.007	SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09 SW10 SW11 SW12	79.5 82.0 81.7 81.7 80.3 80.5 79.8 79.0 79.0	00 78 . 00 80 . 00 80 . 00 78 . 00 78 . 00 78 . 00 78 . 00 78 . 00 78 .	375 :: 180 :: 575 :: 57	1 200 1 095 1 200 1 200 1 146 1 146 1 150 1 400 1 030 1 035 1 035	78.800 1 81.700 8 81.700 8 80.500 7 79.800 7 79.800 7 79.000 7 79.000 7 78.800 7	77.978 30.329 30.329 78.875 78.875 78.711 78.545 78.422 78.245 78.143 77.903	1.095 0.597 1 146 1.146 1.400 1.400 0.864 1.030 0.353 0.455 0.557 0.597		a_Drake*	1200 1200 1200 1200 1200 1200 1200 1200
1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004 2.005 2.006	SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09 SW10 SW11 SW12 SW13	79.5 82.0 81.7 81.7 80.3 80.5 79.8 79.0 79.0 79.0	00 78 . 00 80 . 00 80 . 00 78 . 00 78 . 00 78 . 00 78 . 00 78 . 00 78 . 00 78 .	375 : : : : : : : : : : : : : : : : : : :	1 200 1 095 1 200 1 1 200 1 1 146 1 146 1 150 1 400 1 0 353 1 0 353 0 455 0 557	78.800 1 81.700 8 81.700 8 80.500 7 79.800 7 79.800 7 79.000 7 79.000 7	77.978 30.329 30.329 78.875 78.875 78.711 78.545 78.422 78.245 78.143 77.903	1.095 0.597 1 146 1.146 1.400 1.400 0.864 1.030 0.353 0.455 0.557 0.597		o-Brake®	1200 1200 1200 1200 1200 1200 1200 1200

Entec UK Limited		Page 2
Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	TYPOTA
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

#### Free Flowing Outfall Details for Storm

Outfall Outfall C Level I Level Min D,L W
Pipe Number Name (m) (m) I Level (mm) (mm)

1.003 Ex MH 78.100 76 600 0.000 450 0

#### Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750	Additional Flow - % of Iotal Flow 0 000
Areal Reduction Factor 1 000	MADD Factor * 10m³/ha Storage 2 000
Hot Start (mins) 0	Inlet Coefficient 0.800
Hot Start Level (mm) 0	Flow per Person per Day (1/per/day) 0.000
Manhole Headloss Coeff (Global) 0.500	
Foul Sewage per hectare (1/s) 0 000	Output Interval (mins) 1

Number of Input Hydrographs 0 Number of Storage Structures 13 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0

#### Synthetic Rainfall Details

Rainfall Model			FEH
Return Period (years)			1
Site Location	GB 373850	<b>44</b> 0650 SD	73850 40650
C (1km)			-0.025
D1 (1km)			0398
D2 (1km)			0 385
D3 (1km)			0.430
E (1km)			0.299
F (1km)			2,444
Summer Storms			Yes
Winter Storms			Yes
Cv (Summer)			0.750
Cv (Winter)			0840
Storm Duration (mins)			30

Entec UK Limited		Page 3
Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7TN	Clitheroe	March Call
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

#### Online Controls for Storm

## Hydro-Brake® Manhole: SW13, DS/PN: 1.002, Volume (m³): 4.4

Design Head (m) 0.800 Hydro-Brake® Type Md4 Invert Level (m) 77.903 Design Flow (1/s) 8.9 Diameter (mm) 112

Depth (m)	Flow (1/s)	Depth (m)	Flow (1/s)	Depth (m) F	low (1/s)	Depth (m)	Flow (1/s)
0.100	3.3	1 200	10.7	3.000	169	7.000	25.9
0.200	8.0	1.400	11.6	3500	18.3	7.500	26.8
0 300	7.8	1.600	12.4	4.000	19 6	8000	27 6
0.400	6.9	1.800	13.1	4.500	20 7	8500	28.5
0500	7 1	2.000	138	5 000	21.9	9.000	29.3
0.600	7.6	2.200	14.5	5.500	22.9	9.500	30.1
0.800	8.7	2 400	15 1	6.000	239		
1 000	9.8	2.600	15.8	6500	24.9		

Entec UK Limited	<del></del>	Page 4
Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	T.V. Papa
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

#### Storage Structures for Storm

## Porous Car Park Manhole: SW01, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0 00000	Width (m)	42
Membrane Percolation (mm/hr)	1	Length (m)	300
Max Percolation (1/s)	0.0	Slope (1:X)	1530
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	78 375	Cap Volume Depth (m)	0.000

#### Porous Car Park Manhole: SW02, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0 00000	Width (m)	5 . 5
Membrane Percolation (mm/hr)	1	Length (m)	304
Max Percolation (1/s)	0.0	Slope (1:X)	151.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	78 180	Cap Volume Depth (m)	0.000

## Porous Car Park Manhole: SW03, DS/PN: 2.000

Infiltration Coefficient Base (m/hr)	0 00000	Width (m)	5.5
Membrane Percolation (mm/hr)	1	Length (m)	36.0
Max Percolation (1/s)	0.1	Slope (1:X)	72.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.575	Cap Volume Depth (m)	0.000

# Porous Car Park Manhole: SW04, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4 2
Membrane Percolation (mm/hr)	1	Length (m)	26.0
Max Percolation (1/s)	0.0	Slope (1:X)	152.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.500	Cap Volume Depth (m)	0000

#### Porous Car Park Manhole: SW05, DS/PN: 2.001

5 5	Width (m)	000000	Infiltration Coefficient Base (m/hr)
22.5	Length (m)	1	Membrane Percolation (mm/hr)
15.0	Slope (1:X)	00	Max Percolation (1/s)
5	Depression Storage (mm)	2 0	Safety Factor
3	Evaporation (mm/day)	0.30	Porosity
0000	Cap Volume Depth (m)	80.329	Invert Level (m)

## Porous Car Park Manhole: SW06, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	000000	Safety Factor	2.0
Membrane Percolation (mm/hr)	1	Porosity	0.30
Max Percolation (1/s)	0.0	Invert Level (m)	78 925

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Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7TN	Clitheroe	THICK A
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

#### Porous Car Park Manhole: SW06, DS/PN: 4.000

 Width (m)
 4.2 Depression Storage (mm)
 5

 Length (m)
 28.5 Evaporation (mm/day)
 3

 Slope (1:X)
 569.0 Cap Volume Depth (m)
 0.000

#### Porous Car Park Manhole: SW07, DS/PN: 2.002

Infiltration Coefficient Base (m/hr) 0.00000 5..5 Width (m) Length (m) 22.8 Membrane Percolation (mm/hr) 1 Max Percolation (1/s) 0..0 Slope (1:X) 139.0 2.0 Depression Storage (mm) 5 Safety Factor Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 78.875 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW08, DS/PN: 2.003

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5 5 Membrane Percolation (mm/hr) 1 Length (m) 23.0 Max Percolation (1/s) 0.0 Slope (1:X) 139.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 78.711 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW09, DS/PN: 2.004

Infiltration Coefficient Base (m/hr) 0 00000 5..5 Width (m) Length (m) 17.1 Membrane Percolation (mm/hr) 1 Max Percolation (1/s) 0.0 Slope (1:X) 139.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) Invert Level (m) 78.545 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW10, DS/PN: 2.005

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) Membrane Percolation (mm/hr) 1 Length (m) 14.1 Max Percolation (1/s) 0..0 Slope (1:X) 0..0 Safety Factor 2.0 Depression Storage (mm) 5 0.30 Evaporation (mm/day) 3 Porosity Invert Level (m) 78.347 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW11, DS/PN: 2.006

5..5 Infiltration Coefficient Base (m/hr) 0.00000 Width (m) Membrane Percolation (mm/hr) 1 Length (m) 14.1 0.0 Max Percolation (1/s) Slope (1:X) 139 0 2.0 Depression Storage (mm) Safety Factor 0.30 Evaporation (mm/day) Porosity 3 Invert Level (m) 78.245 Cap Volume Depth (m) 0.000

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Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	TV PODA
Northwich CW9 71N	Clitheroe	March C
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

## Porous Car Park Manhole: SW12, DS/PN: 2.007

Infiltration Coefficient Base (m/hr)	000000	Width (m)	55
Membrane Percolation (mm/hr)	1	Length (m)	330
Max Percolation (1/s)	0.1	Slope (1:X)	139.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	78.143	Cap Volume Depth (m)	0.000

## Cellular Storage Manhole: SW13, DS/PN: 1.002

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	7000	450.0	1.300	00	530.6
0.100	7000	4585	1.400	00	530 . 6
0.200	7000	4670	1.500	0 0	530.6
0.300	700.0	475.5	1.600	00	530.6
0 400	7000	4839	1.700	00	530.6
0.500	7000	4924	1.800	00	530.6
0.600	7000	500.9	1.900	00	530.6
0.700	7000	509.4	2.000	00	530.6
0 800	7000	517.9	2.100	00	530.6
0 900	7000	526.4	2.200	00	530.6
1.000	700.0	5306	2.300	0 0	530.6
1.100	00	530.6	2.400	00	530.6
1 200	00	5306	2.500	0 0	530,6

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Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	LY Person -
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	The state of the s
Micro Drainage	Network W.12.6.1	

#### Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300 0
Analysis Iimestep 2.5 Second Increment (Extended)
DIS Status
ON
DVD Status
ON
Inertia Status

Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080 Return Period(s) (years) 1, 30, 100

0, 0, 30

Climate Change (%)

First Y First Z O/F Lvl Return Climate First X PN Storm Period Change Surcharge Flood Overflow Act Exc +30% 100/15 Summer 1.000 720 Winter 100 +30% 30/15 Summer 1.001 720 Winter 100 2..000 15 Winter 100 +30% +30% 3..000 15 Winter 100 2.001 +30% 15 Winter 100 4 000 15 Winter 100 +30% 100/15 Summer 2 002 +30% 100/15 Summer 15 Winter 100 +30% 30/15 Summer 2.003 15 Winter 100 2.004 15 Winter 100 +30% 30/15 Summer 2.005 15 Winter 100 +30% 100/15 Summer 2.006 15 Winter 100 +30% 100/15 Summer 2.007 720 Winter +30% 100/15 Summer 100 1 002 720 Winter 100 +30% 30/60 Winter 1.003 720 Winter 100 +30%

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow /	O'flow (1/s)	Pipe Flow (1/s)	Status
1 000	SW01	78 716	0.116	0000	0.07	0 0	29	SURCHARGED
1.001	SW02	78 715	0 310	0000	0.23	0 0	9.1	SURCHARGED
2.000	SW03	80.694	-0.106	0000	054	0.0	29.7	OK
3000	SW04	80.628	-0.097	0 000	0.61	00	23 6	OK
2001	SW05	80.474	-0.080	0 000	0.72	00	87.5	OK
4.000	SW06	79.367	0.217	0 000	0.65	0.0	12.9	SURCHARGED
2 002	SW07	79 384	0.284	0.000	0.97	00	38.9	SURCHARGED
2 003	SW08	79 276	0 340	0000	1.04	0 0	42.0	SURCHARGED
2 004	SW09	79.108	0.338	0.000	1.45	0.0	56.9	SURCHARGED
2.005	SW10	78.860	0.213	0.000	1.07	0.0	83.7	FLOOD RISK
2.006	SW11	78.750	0.205	0.000	1.34	00	105 2	FLOOD RISK
2.007	SW12	78717	0.274	0 000	0.31	0 0	26 8	FLOOD RISK
1.002	SW13	78 710	0.507	0.000	0 06	0 0	8 8	FIOOD RISK
1003	PW03	77 605	-0.410	0000	0.02	0 0	8.8	OK



# Appendix H Calculations – Proposed Foul Sewers



# **DESIGN/CALCULATION SHEET**

Project No:	29421	Project Title:		4 Acre	Site, Clithe	eroe	Sheet:	1 of 1
Customer Organisation:	Trustees of Sta	anded Estates					Date:	20/09/12
Subject:	FOUL WATER C	CALCULATIONS					Made by:	AW
For Computer	alculations:	Operation Perfor	med:				·-··	Checker's Initials
Software Used:				on:Filename adsheet):				and date:
Data Source (Re Filename/Path):	eference &							
Ref:	Foul Water Department of "Sewers Found o	or Adoption of dwelling r dwelling =	- 6th E s = 4 4000 49 x 4 196,0	9	lause 2	91 Litres		ogy
					+ - 4 - 4 1		L - L - J 1	
			1 1		1 - 1 - <del>1</del> 1 - 1 - 7		;;	$\frac{1}{1} - \frac{1}{1} - \frac{1}{1}$
			j j I I I		; - ; - ; ! ! !		<del> </del>	=
-	+-+			ii	Y - Y - J			
				1 I	 		i i i	 
1 1	1 1 1 1	1 1 1 1	1_1_1	1 L			1   1 1   1 1 - 7 - 7	. <b>-</b> 1 1
	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;		<sub>1</sub> <sub>1</sub> 1 7		γ-γ-3 1 1 1 1-1-3		: ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	- 1 - 1
		1 1 1			1 1 1		i i i	i i



# Appendix I Drawing No. 29421\_N\_CVD\_109B







# **Appendix J Manhole Record Cards**





# Manhole Survey Form

Manhole Number

Contractor   Survey   Surveys by   Ox Creck   Pack No.   Survey index   Sheet No.   Sheet No.   Survey index   Sheet No.	am	ec y				ole Survey lect from Lis		Manhole Number		MH 04	
Dose of Survey   Dose	Contractor										arte e Ele
Table   Tabl			11 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1			<del></del>					
		*						Job No.		Survey Index	Sheet No
Leard in Littlemoor Road, Clitheroe   Co-ordinates   Easting   Northing	i signai	13.09.2012	W. ZYMLA	<u>na a tale stalif</u>	W. ZYMLA	<u> </u>	<u> </u>				
Land in Littlemoor Road, Clitheroe   Coordinates   Easting   Northing	. Special and a succession	- I		· ·			<b></b>				
Design   D		: <b>1</b>	r Road Clith	erne			Place Name	Egiji bilizma			
Tear Laid   Status	<u>1 2004, 384 (1.3.</u>	Leanna III Electrico	noau, ciiti	CIUC	eres e acaradan		<u> </u>	<u> </u>		<u></u>	<u> </u>
Status	Drain Unit	Drainage Area	······································		Co-ordinates	1	Easting			Northing	
COVER   Shape					(5 figures)			-line line			
COVER   Shape		1	7_	T.,	7	7584 (1-2-d)			ITOM I		
COVER	rear Lard	Status	Function	Nade Type		THIN Usea:			I RIVI FEASI:		
		. Primare promote and an en-	· • · · · · · · · · · · · · · · · · · ·				At .		Table Media		aring against trees.
R		Shape	Hinged	Lockable	Dutý	Τ		,	dia/length	(mm)	width
Depth Flow (mm)	.OVER	Haller (R. 1919)			M				680	х	530
HANDER											
Construction   No Landings	HÁFT		terreronani	Construction	ł .				1	(mm)	
Depth Flow (mm)			200			<u> </u>			- 600	. X	500
Depth Flow (mm)		valleter merlet bestellt statistisch	3 Co	Indiana (					T		1.51
Depth Flow (mm)   Depth Silt (mm)   Height Surchg (mm)   1520   78.100	HAMBER		<b>:1</b>	tell combine			4		1		
(mm)	D. L. C. CHEVERSET	i i jerikip diredene osop den de dopet godi Sedid							11030	. ^	330
1520   78.100   1520   78.100   78.100   16.000   78.100   16.000   78.100   16.000   78.100   16.000   78.100   16.000   76.00		Depth Silt (mm)		T		,	Chamber floor o	lepth from cover	Cover Level (m /	(OD)	**
Incoming			(mm)				•	-20	1	70 100	
(mm)   (mm)   (mm)   (mm)   (mm)   (mm)   (mmO)   (maOD)   (maOD	30			L			1: 1:	)ZU		18'TOO	<u>. 15.41 %</u>
Cover (m)   Cove	Incoming	upstream MH Ref.	Pipe shape	Width/dia	height/dia	Backdrop dia	Pipe mat	Lin. Mat	Depth from	invert Level	O/C
S				1				disprise politic	1		
C C 100 x 100 VC 0.850 77.250  D C 225 x 225 VC 1.520 76 580  E C 150 x 150 VC 1.100 77.000  F C 100 x 100 VC 1.400 76.700  Outgoing downstream MH Ref. Pipe shape width/dia height/dia Backdrop dia Pipe mat. Lin. Mat. Depth from [mxcn Level 0/C cover (m) [mxcn Level 2] X C 450 x 450 1.520 76 580				<del> </del>	<del> </del>	<u> </u>	·		1	ļ	
Description   C   225   x   225   VC   1.520   76 580	Strate Control of								*******************************		
E	C		-1		-		<del></del>				
Cutgoing   downstream MH Ref.   Pipe shape   Width/dia   height/dia   Backdrop dia   Pipe mat.   Lin Mat.   Depth from   Invert Level   O/C   (cover (rn))   (mAOD)	D			<b> </b>			VC ·		1.520	76 580	
Outgoing downstream MH Ref. Pipe shape width/dia height/dia Backdrop dia Pipe mat. Lin. Mat. Depth from Invert Level Cover (m) [mAOD]  X C 450 x 450 1.520 76 580	the E		<del> </del>	ļ			VC .			77.000	
Cover (m)   madD)   ma	F		C	100 ×	100		VC .		1.400	76.700	
Cover (m)   madD)   ma	Outroine	downstream MH Ref	E Bira ekana	F suestes	hoidht/dia	Parketon dia	. Birin mat	i da asak	Capth from	Invest level	l or
The state of the s								107 v. 4. 705 7 50		\$1527 Ababa and mades about	
	X		C	450 x	450		e Maria		1.520	76.580	
	il i Yestik			×				<u> </u>	3000 3000 3000 3000 3000 3000 3000 300		
Ondition (Y if attention req): Cover irons/tadders Shaft Chamber Benching Other	<b>100.2</b> 2000			×				,			
Offdition (Y if attention red) Cover (rons/Ladders Shaft Chamber Benching Other)	olenes energ	versioner (v	Islande international		North Cognigation of Automatic		1 2				
	ouaitios f.	t ii attendon regj	Cover	rons/Ladders	Shaft	Chamber	Benching	Other			
					1. (11. 11. 11. 11.	1 47 444					<u> </u>
									***************************************		•
America (AVA): White Control (			<u> </u>			<u> </u>	<u> </u>	<u>. :                                   </u>	<u> i . : i</u>		· . · . · · · · · · · · · · · · · · · ·
	antian (m)	in of 2 diamentary	tinus.		6.52L. (C)	Auto 1000000000000000000000000000000000000					
	A KE	HI II	7/	- 1 <b>.</b> 444	INIAITHOLE SKE	CCII		E1. 11.74			· · · · · · · · · · · · · · · · · · ·
Ocation (min of 3 dimensions required)  Manhole Sketch		41/62	7/	* ::			עוויי				
		레//	Flore	<u></u>		r			<u></u>	7	
Ocation (min of 3 dimensions required)  Manhole Sketch	居士	1/40 bon /	145				_ ¥ -	71	E		
Ocation (min of 3 dimensions required)  Manhole Sketch	专业	18/17						1/5		+-	
Ocation (min of 3 dimensions required)  Manhole Sketch	\$##	114	7/				<u> </u>		F		
Discation (min of 3 dimensions required)  Manhole Sketch	Test//	157 =	y carage		χ .		X			- 1. % 5-	
Ocation (min of 3 dimensions required)  Manhole Sketch	=/	11 15 1	/				14				117.24
Discation (min of 3 dimensions required)  Manhole Sketch	门殿	上掛一十					ご 小 ハ	لد			
ocation (min of 3 dimensions required)  Manhole Sketch	·// <i>周</i>	7				<u> </u>		/			

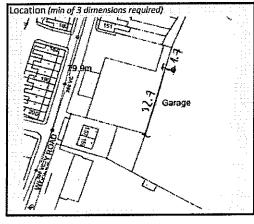


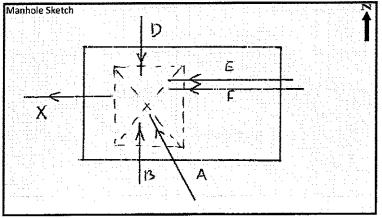
Manhole

Contractor				Se	lect from Lis	t				
									I	Jan territori
Date of Survey	3.09.2012	Surveyed by W. ZYMLA		QA Check W. ZYMLA			lob No.		Survey Index	Sheet No.
annian	Road Name Land in Littlemoor	Road, Clith	eroe			Place Name				
rain Unit	Oralnage Area			Co-ordinates (6 figures)		• Easting			Northing	
ear Laid	Status	Function	Node Type		TBM Used:	· · · · · · · · · · · · · · · · · · ·		TBM Level:		
OVER	Shape:	Hinged	Lockable	Duty M				die/length 530	(mm) X	width 530
HAFT	Step Irons/Ladders	Depth (mm)	Construction	Red Slab/ Tapes				length 460	(mm) X	width 460
HAMBER		Construction	No. Landings					length 860	(mm) X	width 460
Depth Flow (mm) 30	Depth Silt (mm)	Height Surchg (mm)				(mm)	epih from cover 90	Cover Level (m. A		
ncoming	upstream MK Ref.	Pipe shape	width/dia (mm)	height/dia (mm)	Backdrop dia	Pipe mat	Lin. Mat	Depth from cover (m)	Invertilevel	0/C
A		Ċ	300 ×			VC		0.890	78.450	
B.			x x	<del></del>				1 1 1 1 1 1		
Ď	**************************************		x							
<b>E</b> 31.5			×	~^^~						
			] : . · ×							<u> </u>
Outgoing	downstream MH Ref.	Pipe shape	width/dia	height/dia	Backdrop dia	Pipe mat;	Lin. Mat.	Depth from	Invert Level (mAOD)	O/C
X		С	300 ×			VC		0.890	78.450	14-11-11
Y.			x x							
		L	<u> </u>				L			<u> </u>
ndition (Y	if attention req)	Cover	irons/Ladders	Shaft	Chamber	Benching	Other			
444,406,702,400		<u> </u>		1						
narks										
narks		<del></del>								



Manhole Manhole Survey Form MH 04 Number Select from List Contractor Surveyed by OA Check oh dol Servey Index Sheet No. Date of Survey W. ZYMLA 13.09.2012 W. ZYMLA Place Name Road Name Location Land in Littlemoor Road, Clitheroe Northing Easting Drain Unit Drainage Area Co-ordinates (6 figures) TBM Used: TBM Level: Year Laid Status Node Type Function (mm) width Shape Hinged Lockable dia/length COVER 530 680 R Μ Х length width Construction Red Slab/ Taper Step Irons/Ladders Depth (mm) SHAFT 600 500 200 width (mm) onstruction No Landings length CHAMBER 950 1050 Chamber floor depth from cover | Cover Level [m AOD] Depth Flow Depth Silt (mm) Height Surchg mm) (mm) 78.100 1520 50 upstream MH Ref. Pipe shape width/dia height/dia Backdrop dia Pipe mat. Lin. Mat, Depth from invert Level (mAOD) O/C Incoming (mm) cover (m) C 225 ۷Ç 1.500 76.600 A 100 100 VC 1.490 76.610 C VC 0.850 77 250 ¢ 100 100 C 225 225 ۷C 1.520 76.580 D C 150 150 ۷C 1.100 77.000 VC 1.400 76.700 C 100 100 invert Level downstream MH Ref. Pipe shape width/dia height/dia Backdrop dia Pipe mat. Lin. Mat. Depth from O/C Outgoing (mAOD) cover (m) 76.580 C 450 450 1.520 х Z Condition (Y if attention reg) rons/Ladders Shaft Chamber Benching Other Cover Remarks Manhole Sketch Location (min of 3 dimensions required) 151 D E





am	ec®			Sel	ole Survey lect from Lis	st	Manhole Number		MH 01	
Contractor										
Date of Survey	13.09.2012	Surveyed by W. ZYMLA		QA Check W. ZYMLA	April (C		Jab No		Survey Index	Sheet No
Location	Road Name Land in Littlemoor	r Road, Clith	іегое			Place Name				
Drain Unit	Dramage Area			Co-ordinates (6 figures)		Easting			Northing	
Year Laid	Status-	Function	Node Type	]	TBM Used:			TBM Level:		
COVER	Shape	Hinged	Lockable	Duty		A RAME OF STREET		dia/length	(mm) : X	width
SHAFT	Step irons/Ladders	Dépth (mm)	Construction	Red Slab/Taper				length	{mm} : x	width
CHAMBER		Construction	No Landings					length	(mm)	width
Depth Flow (mm)	Depth 5lft (mm)	Height Surchg (mm)				(mm)	depth from cover	Cover Level (m A	82.920	
Incoming	upstream MH Ref	Pipe shape	width/dia (mm) x		Backdrop dia	Pipe mat.	Lin: Mat	Depth from cover (m)	(mAOD):::80.070	<b>0/</b> C
E C D		C C	225 × 225 × 300 ×	225				2.100 2.800 3.060	80.820 80.120 79.860	
E		: C	x x							
Outgoing X Y	downstream Mti Ref.	Fipe shape	width/dia 300 x		Backdrop dia	Pipe mat.	Un Mat	Depth from cover (m)	(mAOD) 79.860	0/cs::-:
Z Condition ()	Y. if attention req)	Cover	krons/Ladders		Chamber:	Beriching	Other		(85)85)85(2)	
Remarks										
EM 83.0	orn of 3 dimensions required	83.8m	Shasto  Moor	Manhole Ske	G			) <u> </u>		



# Manhole Survey Form

Manhole Number

MH 02

OIIICC			Sel	ect from List	ţ				
Contractor									
Date of Survey 13.09.2012	Surveyed by W. ZYMLA		QA Check W. ZYMLA			Jab No		Survey Index	Sheet No.
Road Name Land in Littlemoor	Road, Clithe	eroe			Place Name				
Drain Unit Drainage Area			Co-ordinates. (6 figures)		Easting			Northing	
Year Laid Status	Function	Node Type	***************************************	TBM Used:			TBM Level:		
COVER Shape	Hinged	Lockable	Duty H				dla/length 620	(mm) X	width 520
SHAFT Slep Irons/Ladders	Depth (mm)	Construction	Red Slab/Taper		4		length 610	(mm)	width 610
CHAMBER	Construction	No. Landings					length 1270	(mm)	width 800
Depth Flow   Depth Silt (mm) (mm)   20	Height Surchg (mm)				(mm)	depth from cover	Cover Level (m A	80.540	
Incoming upstresm MH Ref	Pipe shape :: C C	wigth/dia / (mmj) / (m	1	Backdrop dia	VC VC	Lin Matter	Depth from cover (m) 1.390 1.220	Invert Level (mAOD) 79.150 79.320	<b>O</b> /C
Outgoing downstream MH Ref.  X Y 2	Pipe shape	x   width/dia   300 x   x	height/dia	Backdrop dia	Pipe mati.	Lin: Mat	Depth from Cover (m) 1,400	Invert Level (mAOD) 79.140	<b>O/C</b>
Condition (Y if attention req)	Cover	irons/Ladders	Shaft	Cnamber	Benching	Other			
Remarks									
Location (min of 3 dimensions requ	ired)		Manhole Ske	etch		B		<b>X</b>	



# Manhole Survey Form

Manhole

MH 02

diliec			Se	lect from Lis	t.	Number		14111 02	
Contractor			<del>- , , , , , , , , , , , , , , , , , , ,</del>						
Date of Survey 13.09.2012	Surveyed by W. ZYMLA		QA Check W. ZYMLA			Job No.	***********	Survey index	Sheet No
Road Name Location Land in Littlemod	r Road, Clith	eroe			Place Name			- THE DESCRIPTION	
Drain Unit Drainage Area			Co-ordinates (6 figures)		Easting			Northing	
Year Laid Status	Function	Node Type		TBM Used:			TBM Level:		
COVER R	Hinged	Lockable	Duty				dia/length	(mm) X	width 620
Step Irons/Ladders	Depth (mm)	Construction	Red Siab/ Yaper				length	(mm) X	width 610
CHAMBER	Construction	No Landings					length	(mm)	width
Depth Flow (mm) (mm) 20	Height Surchg (mm)		,,,,		(mm)	epth from cover	Cover Level (m A	80.540	
Incoming upstream MH, Ref.	Pipe shape	width/dia (mm) 300 x 100 x x x x x	300	Backdrop dia	VC VC	Lin. Mat	Depth from cover (m) 1.390 1.220	(mAOD) 79.150 79.320	OJC
Outgoing downstream MH Ref.	Pipe shape	width/dia	. 4	Backdrop dia	Pipe mat. VC	Lin; Mat	Depth from cover (m) 1.400	invert Level (mAOD) 79.140	O/C
Condition (Y if attention reg)	Cover	irons/Ladders			Benching	Other			
Location (min of 3 dimensions requirements)	0.32	83	Manhole Ske	etch >		13		X	



## Manhole Survey Form Notes

Additional Notes or Sketches

bbreviati		Node Type		Shaft/Cham	hor	Pipe Material	
Status	Public	MH	Manhole	Construction		AC	Asbestos Cement
PR	Private	4	Junction (Saddle)	in the Boston	Brick	AK	Alkathene
		เห	Lamphole	р	Precast Units	86	Bitumen (Lining)
HD	Highway Drain	Ln HB	Hatchbox	G	Glass Reinforced Plastic	BR	Brick
WC	Watercourse				In-Situ	a a la	Concrete Box Culvert
Å	Abandoned	RE OF	Rodding Eye Outfall		Segmental		Cast Iron
TC	To Be Constructed				Plastic (Other)	n line ä	Cement Mortar (Lining)
104	Section 104	CS0	Combined Storm Overllaw		Rendered	<b>2</b>	Concrete
102	Section 102	SPS	Pumping Station	u u	kendered Unspecified	CII .	Concrete Segments Bolted
DM:	Disposal Main	stw	Treatment Works	lina ana Ug	Unspecifica		
OV	Overflow Pipe	01	Oil Interceptor			6 6 CSO 6	Concrete Segments Unbolted
EO	Emergency Overflow	IN	Inlet	Pipe Shape		D1	Ductile Iron
		XXX	Undefined Structure	A	Arch	EP	Epoxy
Function		CE	Capped End	В	Barrel	FC	Fibre Cement
F	Foul	BP	Balancing Pond	C:	Crcular	FRP	Fibre Reinforced Plastics
	Surface		Termination Node	E	EBB	<b>G</b> )	Grey Cast Iron
. C	Combined	AV	Air Valve	H	Horseshoe	GRC	Glass Reinforced Concrete
(i.t.	Transition	. 272	Unknown End	κ	Kerb Block	GRP	Glass Reinforced Plastic
o e	Overflow	CN CN	Continuation Node	0	S Ovales and the second	MAC	Masonry, Coursed
D	Unspecified	ATC	Attribute Change	R	Rectangular	MAR	Masonry, Random
		HC.	Flow Control	5	Square	es es PE	Polyethylene
ye(		87	Balancing Tank	<b>T</b>	Trapezoidat	PF.	Pitch Fibre
ape		TC	Treatment Chamber	U	U-Shaped with Flat Top	PP	Polypropylene
Ś	Square	ST	Storage Tank	<b>Z</b>	Other	PS	Polyester
. п	Rectangular	FC	Elushing Chamber	Manhole Lir	ing Material	PSC	Plastic/Steel Composite
Т	Triangular	BS	Blind Shaft	FIBRE	Fibre Glass	PVC	Polyvinyl Chloride
D	Double Triangle	AO	Access Only	CEMENT	Cementitious	RC	Reinforced Concrete
C	Circular	CP	Catch Pit	POLY	Polyethylene	RPM	Reinforced Plastic Matrix
<b>a</b>	Oval	GI	Grease interceptor			SI .	Spun Iron
erine	CloverLeaf					SPC	Sprayed Concrete
U	Unspecified	Stepsfrons/Lad	ders	Pipe Type		24 ST	Steel
лy		s	steps	PMP	Rising Main		Unspecified
	Light	1	Jadder .	GRV	Gravity Main	vc	Vitrified Clay
M	Medium	e di kalimark sera		LAT	Lateral	X	Unidentified Material
H	Heavy	RedSlab/Taper		SYP	Syphon	ХI	Unidentified Type of Iron/Stee
Ü	Unspecified	R.	Reduced Stab	VAC	Vacuum	XP	Unidentified type of Plastics
		1 T	Taper			7	Other

- All yellow fields to be completed
- It is essential that the upstream and downstream manhole reference is filled in along with the O/C. The O/C value is the direction of the pipe in relation to North (ie North = 12, East = 3, etc.

am	ec®				le Survey		Maahale Number		MH 01	
Contractor				11.11.11.11.11.11						
Date of Survey	13.09.2012	Surveyed by W. ZYMLA		QA Check W, ZYMLA			Job No		Survey Index	Sheet No
Location	Road Name Land in Littlemoor	Road, Clith	eroe			Place Name			4.4781.	
Drain Unit	Drainage Area			Co-ordinates (6 figures)		Easting			Northing	
Year Laid	Status	Function	Node Type		TBM Used:			TBM Level:		
COVER	Shape	Hinged	Lockable	Duty H			un er er eine o * du * delen et elle elle	dia/tength	(mm) X	wath
SHAFT	Stép irons/Ladders	Death (mm)	Construction	Red Slab/ Taper	allife a effects to Microsofter of Selection (Assessment			length	(mm) X	width
CHAMBER		Construction	No Landings					length	(mm) X	width
Depth Flow (mm)	Depth Sik (mm)	Height Surchg (mm)		TANK TANK		(mm)	epth from cover	Cover Level (m A		
Přesa			<u> </u>		·	3.	.06	<u> </u>	82.920	
Incoming	upstream MH Ref.	Pipe shape	width/dia (mm)	height/dia (mm)	Backdrop dia	Pipe mat.	Lin. Mat	Depth from cover (m)	Invert Level: (mAOD)	O/C
А		C	300 x	300	300			2.850	80.070	
E		C	225 ×				11 1 1 1 1 2	2.100 2.800	80.820 80.120	
D		C	300 ×	<del></del>				3.060	79.860	
£		С	×						:	
f		C.	x					PERM		
Outgoing	downstream MH Ref.	Pipe shape	width/dia	height/dia	Backdrop dia	Pipe mat.	Lin. Mat	Depth from	Invert Leval	D/C
x		С	300 x	300				3.060	(mAGD) 79.860	Pizoseri za i se i
Carrier Y			300 ×	300				3.000	75.500	
z										
Condition (	Yifattention req)	Cover	Jrons/Ladders	Shaft	Civamber	Senching	Other:	vevenie ve	andoulant III	
Remarks										
Location (m	in of 3 dimensions requ	ired)		Manhole Ske	tch					7
BM 83.0	)7rm	83 8m	Shasto	84ck i				) D		
of se		Little	Moor		A			<b>/</b>		



#### Manhole Survey Form Notes

Additional Notes or Sketches

	ions Key	reger   Instruct as keeps   if	SANTE AND EDWARD CONTRACTOR OF	Il a data vie bevee			
Status		Node Type		Shaft/Chan		Pipe Materia	
PU	Public	HtA	Manhole	Constructio		AC	Asbestos Cement
PR	Privale		Junction (Saddle)	В	Brick	j AK	Alkathene
HD	Highway Drain	Ł <b>H</b>	Lamphole	P	Precast Units	BL.	Bitumen (Lining)
wc	Watercourse	HB	Hatchbox	G	Glass Reinforced Plastic	8R	Brick
A	Abandoned	RE	Rodding Eye	1	In-Situ	cc	Concrete Box Culvert
TC	To Be Constructed	OF	Outfall	8/	Segmental	CI.	Cast Iron
104	Sectson 104	cso	Combined States Coordings		Plastic (Other)	CC .	Cement Morter (Lining)
102	Section 102	5P5	Pumping Station	R	Rendered	ca	Concrete
DM	Disposal Main	STW	Treatment Works	u	Unspecified	CSB	Concreté Ségments Bolted
OΥ	Overflow Pipe	- 01	Oil Interceptor			CSU	Concrete Segments Unbolted
ΕO	Emergency Overflow	ln.	talet	Pipe Shape		į Di	Ductile Iron
	A SHIPLE AND THE STATE OF THE S	XXX	Underned Structure		Arch	EP	Epoxy
unction		CE	Capped End	8	Barrel .	FC	Fibre Cement
F	Foul	BP	Balancing Pond		Circular	FRP	Fibre Reinforced Plastics
S	Surface	ΤE	Termination Node		Egg.	G)	Grey Cast Iron
C	Combined	ÄV	Air Valve	н	Horseshoe	SRC	Glass Reinforced Concrete
	Transition	222	Unknown End	, <b>K</b>	Kerb Block	GRP	Glass Reinforced Plassic
0	Overflow	CN	Continuation Node	O	Oval	MAC	Masonry, Coursed
Ú	Unspecified	ATC	Attribute Change	R	Rectangular	MAR	Masonry, Random
		нс	Flow Control		5quare:	PE	Polyethylene
rii kaija		BT	Balancing Tank	o A.T.	Trapezoidal	PF-	Pitch Fibre
ا <b>د</b>		TG	Treatment Chamber	U	U-Shaped with Flat Top	PP	Polypropylene
5	Square	5T.	Storage Tank	<b>Z</b>	Other	PS.	Polyestet
R	Rectangular	rc .	Flushing Chamber	Manholé Lin	ing Material	PSC	Plastic/Steel Composite
T	Triangular	BS	Blind Shaft	FIBRE	Fibre Glass	PVC	Polyvinyl Chloride
D	Double Triangle	AO	Access Only	CEMENT	Cementilious	RC	Reinforced Concrete
Ċ.	Circular	CP.	Catch Pit	POLY	Polyethylene	RPM	Reinforced Plastic Matrix
0	Ovaf	Gl.	Grease interceptor			51	Spun iron
t.	Clover Leaf					SPC	Sprayed Concrete
v =	Unspecified	Stepsirons/Lac	lders	Pipe Type		SI	Steel
		5 6	steps	PMP	Rising Main	U	Unspecified
L	Ught	il il il Lilia	ladder	GRV	Gravity Main	VC.	Vitrified Clay
M	Medium			IAT	Lateral	- x	Unidentified Material
Ñ	Heavy	RedSlab/Taper		5YP	Syphon	xa 🧢	Unidentified Type of Iron/Steel
Ú	Vaspecified	R	Reduced Slab	VAC	Vacuum	ХP	Unidentified type of Plastics
		i i de la constanta	Taper			z	Other

- All yellow fields to be completed
- It is essential that the upstream and downstream manhole reference is filled in along with the O/C. The O/C value is the direction of the pipe in relation to North (ie North = 12, East = 3, etc...)



#### Sarah Westwood

From:

Richard Percy [richardp@abbott-associates co.uk]

Sent:

08 October 2012 09:46

To:

Sarah Westwood

Subject:

FW: 4 Acres Residential Site, Clitheroe - Outline Drainage Strategy Report

Attachments: Copy of UU's Letter Dated 10 08.2012 pdf; Appendix C\_Email from Graham Perry (UU) to AMEC dated 6 09 2012 pdf; 29421\_N\_CVD\_107\_A pdf; Appendix E - Consulation.pdf; Marked Up Site Plan\_CCTV Survey.jpg; Marked Up Site Plan\_CCTV Survey pdf; 4 Acre Site

30yr.pdf; 4 Acre Site 100yr.pdf; Foul Calcs.pdf; 29421\_N\_CVD\_109 REV B pdf;

29421\_N\_CVD\_109 REV B pdf

Sarah

This is the one which bounced back, I think. Please confirm receipt of the full (3 part) set.

Regards.

#### Richard

From: Richard Percy

**Sent:** Friday October 05 2012 15:36

To: 'Sarah Westwood'

Subject: FW: 4 Acres Residential Site, Clitheroe - Outline Drainage Strategy Report

Sarah

Appendices to drainage report

This is the last email Please confirm receipt of all 3

Regards.

## Richard

From: <a href="mailto:sammy.spaine@amec.com">sammy.spaine@amec.com</a>]

Sent: Wednesday October 03 2012 17:11

To: Richard Percy

Cc: chris.prydderch@amec.com; Guy Pearson; john.hall3@amec.com; tracey.wood2@amec.com

Subject: Re: 4 Acres Residential Site, Clitheroe - Outline Drainage Strategy Report

Richard,

Please find attached a complete set of the Appendices to the Outline Drainage Strategy Report as promised.

#### Regards

Sammy Spaine

Sammy Spaine/NOR/ENTEC/NWG From:

To: Richard Percy < richardp@abbott-associates.co.uk >

chris.prydderch@amec.com" <chris.prydderch@amec.com>, Guy Pearson <guy.pearson@tayloryoung.co.uk,",

<u>"john.hall3@amec.com" <john.hall3@amec.com</u>>, "<u>kath.smithers@amec.com</u>" <<u>kath.smithers@amec.com</u>>

"tracey.wood2@amec.com" <tracey.wood2@amec.com>

03/10/2012 17:03

Subject: 4 Acres Residential Site Clitheroe - Outline Drainage Strategy Report



Richard.

Please find attached the final version of our Outline Drainage Strategy Report as promised. The Appendices will be forwarded to you under a separate email cover. I will await your formal instruction before forwarding the report to United Utilities

[attachment "Outline Drainage Strategy\_Final Report 12390i1 pdf" deleted by Sammy Spaine/NOR/ENTEC/NWG]

Regards Sammy Spaine

From: Richard Percy < richardp@abbott-associates.co.uk >

sammy spaine@amec.com" <sammy.spaine@amec.com> To:

"chris.prydderch@amec.com" <chris.prydderch@amec.com>, Guy Pearson <quy.pearson@tayloryoung.co.uk>
iohn.hall3@amec.com" <iohn.hall3@amec.com>, "kath.smithers@amec.com" <kath.smithers@amec.com> Cc:

'tracey.wood2@amec.com" <tracey.wood2@amec.com>

Date: 03/10/2012 13:48

Subject: RE: 5613 - 4 Acres Residential Site Clitheroe Issue 5

Thanks Sammy Regards

#### Richard

From: sammy.spaine@amec.com [mailto:sammy.spaine@amec.com]

Sent: Wednesday October 03 2012 11:57

To: Richard Percy

Cc: <a href="mailto:chris.prydderch@amec.com">chris.prydderch@amec.com</a>; Guy Pearson; <a href="mailto:john.hall3@amec.com">john.hall3@amec.com</a>; <a href="mailto:kath.smithers@amec.com">kath.smithers@amec.com</a>;

tracey.wood2@amec.com

Subject: RE: 5613 - 4 Acres Residential Site, Clitheroe Issue 5

#### Richard,

I received the copy of your revised Masterplan from Guy Pearson yesterday afternoon. The Final version of our Outline Drainage Strategy Report has been completed, incorporating the revised Masterplan This is now being formatted by Professional Support Team and will be issued to you today

#### Regards Sammy Spaine

Richard Percy < richardp@abbott-associates.co.uk >

"sammy spaine@amec.com" <sammv.spaine@amec.com> Guy Pearson <guy.pearson@tayloryoung.co.uk> To: "john.hall3@amec.com" <john.hall3@amec.com> "chris.prydderch@amec.com" <chris.prydderch@amec.com> Cc:

02/10/2012 13:54

Subject: RE: 5613 - 4 Acres Residential Site Clitheroe Issue 5

#### Sammy

Can you give me an ETA for the revised report? Thanks

## Richard

From: sammy.spaine@amec.com[mailto:sammy.spaine@amec.com]

Sent: Tuesday October 02 2012 13:36

To: Guy Pearson

Cc: Richard Percy; john.hall3@amec.com; chris.prydderch@amec.com

Subject: RE: 5613 - 4 Acres Residential Site, Clitheroe Issue 5

Guy,

Thanks for forwarding a copy of your revised Masterplan to me yesterday. Our Constraints Plan (Drawing No. 29421\_N\_CVD\_109B), has been updated accordingly and a copy is attached. I note however that there is still insufficient clearance for the required easement strip for the section of the existing private surface water drain between Manholes' MH S13 and MH 1.

# Sammy Spaine BEng Hons, CEng MICE, AMAE, APMP Technical Director AMEC

Environment and Infrastructure UK Ltd Windsor House, Gadbrook Business Centre, Northwich Cheshire CW9 7TN UK Tel +44 (0) 01606 354800, Fax +44(0) 01606 354810 Direct +44 (0)01606 354842 mobile/cell 07803 078418 mailto:sammy.spaine@amec.com amec.com

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Business sustainability starts here AMEC supports SOS Children

From: Guy Pearson < guy.pearson@tayloryoung.co.uk >

To: Richard Percy < <a href="mailto:richardp@abbott-associates.co.uk">richardp@abbott-associates.co.uk</a>, "sammy spaine@amec.com" <a href="mailto:sammy.spaine@amec.com">sammy.spaine@amec.com</a>

Date: 02/10/2012 11:55

Subject: RE: 5613 - 4 Acres Residential Site. Clitheroe Issue 5



#### Richard,

we have shown a garage for 2 - 3 properties on the southern boundary. There is also plenty of room for parking in front of the gable end of the NE most unit

Kind Regards

Guy Pearson Associate Director

# IBI TaylorYoung

Chadsworth House Wilmslow Road Handforth Cheshire SK9 3HP

DDI +44(0)1625 542 252 Tel +44(0)1625 542 200 Fax +44(0)1625 542 250

auv.pearson@tayloryoung.co.uk
www.tayloryoung.co.uk
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legal notice

Sent: 02 October 2012 08:54

To: Guy Pearson; 'sammy\_spaine@amec.com'

Subject: RE: 5613 - 4 Acres Residential Site, Clitheroe Issue 5

From: Richard Percy [mailto:richardp@abbott-associates.co.uk]

Guy

Thanks for that and for turning this round so quickly.

I appreciate that this is only illustrative, but I can't see how the new/repositioned units to the south east of the pond will work, particularly parking-wise. Can you have another quick look at that please.

Sammy – as this is only a drafting issue, can you proceed with your report on the basis of what Guy has currently produced and we can slot any further amended plan later today/this week.

Regards

#### Richard

From: Guy Pearson (IBI Taylor Young (Handforth)) [mailto:guy.pearson@tayloryoung.co.uk]

Sent: Monday October 01 2012 16:19

To: Richard Percy

Subject: 5613 - 4 Acres Residential Site, Clitheroe Issue 5

5613 - 4 Acres Residential Site, Clitheroe Issue 5

Please click hereto access the documents for this issue

Richard/Sammy,



following our meeting last week would you download and review the revised drawings and let me know if any amendments are required

Richard, will any amendments be required to the D&AS?

Regards,

Guy Kind Regards

Guy Pearson Associate Director

# **IBI TaylorYoung**

Chadsworth House Wilmslow Road Handforth Cheshire SK9 3HP

Tel 01625 542252 Fax +44(0)1625 542 250

Guy.Pearson@tayloryoung.co.uk www.tayloryoung.co.uk IBI TaylorYoung is part of the IBI Group

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**United Utilities Water PLC Developer Services & Planning** Thirlmere House Lingley Mere Business Park Lingley Green Avenue Great Sankey

Warrington WA5 3LP Telephone 01925 678307 Planning liaison@uuplc.co.uk

Your ref: 3/2012/0420

Our ref:

DC/12/2376

Date:

10-AUG-12

Ribble Valley Borough Council Council Officers, Church Walk Clitheroe BB7 2RA

Dear Sir/Madam

Location: Land North and West of Littlemoor Clitheroe Lancashire Proposal: Outline Application for a Residential Development

With reference to the above planning application,

Recent investigations have confirmed that the sewer network serving the area is nearing capacity. To ensure that there is a consistent & fair approach taken by United Utilities we would ask that all development applications include an indicative layout plan, a schedule showing the type of housing to be built, a program of works showing build rates, a Load & Flow impact assessment, preferred discharge points and proposed rates of flow for each discharge point so that United Utilities can determine the full impact that the development has on our assets Therefore United Utilities will object to the application pending the submission of the additional information.

Our water mains will need extending to serve any development on this site. The applicant, who may be required to pay a capital contribution, will need to sign an Agreement under Sections 41, 42 & 43 of the Water Industry Act 1991.

United Utilities offer a fully supported mapping service at a modest cost for our water mains and sewerage assets. This is a service, which is constantly updated by our Property Searches Team (Tel No: 0870 7510101) It is the applicant's responsibility to demonstrate the exact relationship between any assets that may cross the site and any proposed development

Please note, due to the public sewer transfer, not all sewers are currently shown on the statutory sewer records, if a sewer is discovered during construction, please contact a Building Control Body to discuss the matter further

Yours Faithfully,

Daniel McDermott **Developer Services & Asset Protection United Utilities** 





"Perry, Graham" <Graham Perry@uuplc. co.uk>

06/09/2012 13:10

To: <sammy.spaine@amec.com>,

cc: Richard Percy <richardp@abbott-associates.co.uk>, John Hall

<john.hall3@amec.com>, Chris Prydderch
<chris.prydderch@amec.com>

Subject: RE: Clitheroe - 4 Acre Site: Proposed Development

#### Hello Sammy

I would agree that the below is a true reflection of our discussion however the letter from John Lunt was I believe dated 30/08 2011 which is over 12 months ago.

I can also confirm that the Ross officer who will authorize access into the sewer is Emily Astbridge who can be contacted by the following e-mail <a href="mailto:Emily.Asbridge@uuplc.co.uk">Emily.Asbridge@uuplc.co.uk</a>

Thanks

Graham Perry

From: sammy\_spaine@amec\_com [mailto:sammy\_spaine@amec\_com]

Sent: 06 September 2012 09:58

To: Perry, Graham

Cc: Richard Percy; John Hall; Chris Prydderch

Subject: Clitheroe - 4 Acre Site: Proposed Development

Graham.

I refer to our telephone conversation of yesterday's date regarding the above, and in particular the letter from your Mr. Daniel McDermott dated 10th August 2012. (copy attached).

Please find below my summary of our telephone conversation as agreed:

- An Approval-In-Principle was previously granted by UU via email sent from John Lunt dated 30 08 2012
- The attached letter superseding the aforementioned email, has been sent out by UU on the basis
  of the many planning applications for new developments within the catchment which have been
  submitted over the past twelve months.
- UU are concerned that their current infrastructure may not have sufficient capacity to serve all the proposed development currently up for planning
- In this regard, UU are now requesting that an Outline Drainage Strategy be submitted consisting
  of the following information:
- 1. An estimation of the anticipated foul flows and surface run-offs from the proposed development.
- Surface Run-offs to be assessed on the basis of the Greenfield Run-off Rate for the catchment.
- Identification of the proposed discharge outfalls
- 4 A Masterplan showing details of the house types being proposed including the Phasing (Programming) of the development.
- 5 A "Constraints Plan" consisting of current topographical survey data, superimposed over the current Masterplan, merged with the existing sewer information would be suitable at this stage. This plan would also contain the discharge points, together with the values of the anticipated flows. (Foul & Surface Water)
- UU will plug the above information into their current Hydraulic Model for the catchment, to assess

- the true impact of this development on their infrastructure.
- The flows and discharge points identified would then be used to define the final Planning Conditions;
- An old copy of the sewer records show a combined Public Sewer, together with a Culverted
  Watercourse crossing the site. There's a need to undertake a survey of these sections of sewer
  crossing the site, and to identify any other uncharted sewers within the footprint of the proposed
  development. AMEC will be required to liaise with the ROSS officer at UU to obtain permission to
  work within their network. Graham will forward the contact details of their ROSS officer to me via
  email asap.

I trust the above is a true representation of what was discussed and agreed

# Regards Sammy Spaine BEng Hons, CEng MICE, AMAE, APMP Technical Director AMEC

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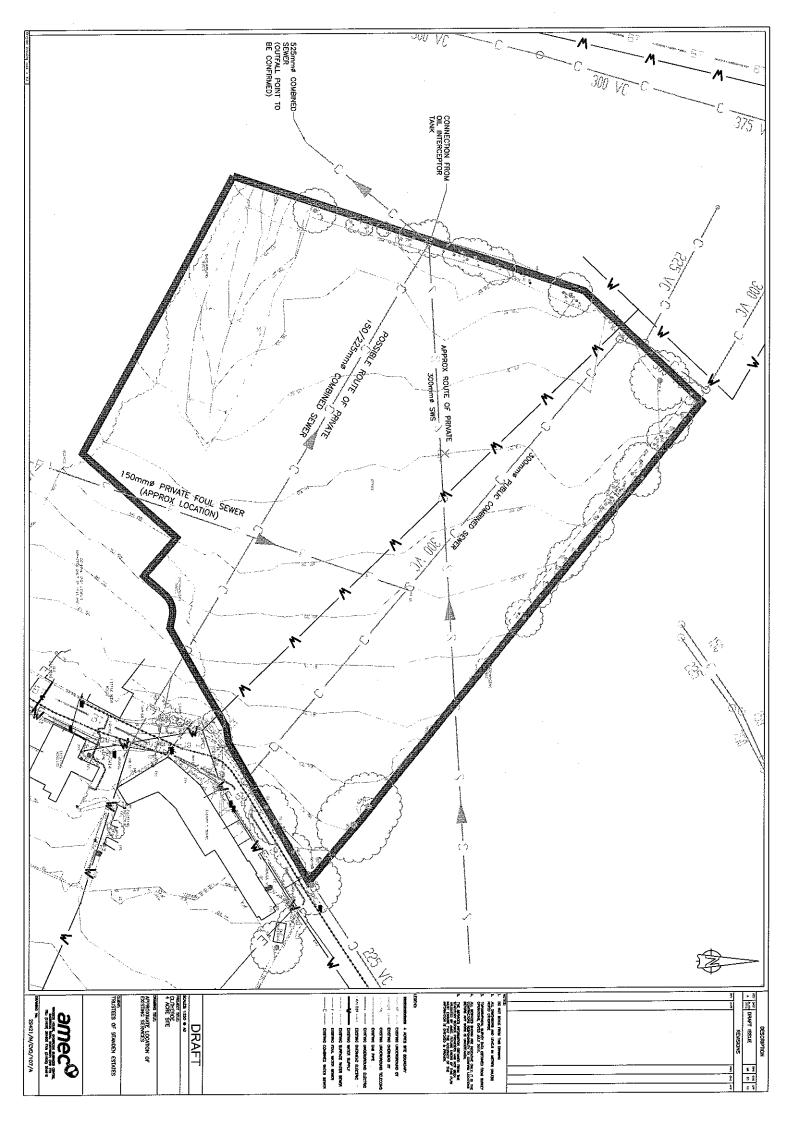
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# Dawson, Emily

From:

Worswick, Colin

Sent:

03 April 2012 10:33

To:

NW North Preston, Information Requests

Subject:

PRE3187\_DFR 31936 - Land at Higher Standon, Clitheroe - FRA

Colin Worswick

Development and Flood Risk Engineer North Area, North West Region 01772 714259 07741 019565

From: Worswick, Colin Sent: 22 March 2012 10:02 To: 'stewart.griffiths@amec.com'

Subject: RE: 31936 - Land at Higher Standon, Clitheroe - FRA

Stewart,

I can confirm that both sites lie within Flood Zone 1. We are not aware of any flooding incidents, however you are advised to contact Ribble Valley Borough Council who may have more detailed local records. Surface water run-off must be restricted to existing greenfield rates which is 10l/s/hectare. You will require Flood Defence Consent to culvert or divert any watercourses.

Regards

Colin Worswick

Development and Flood Risk Engineer North Area, North West Region 01772 714259 07741 019565

**From:** stewart\_griffiths@amec.com [mailto:stewart\_griffiths@amec.com]

Sent: 20 March 2012 14:28

To: Worswick, Colin

Subject: 31936 - Land at Higher Standon, Clitheroe - FRA

Click here to report this email as spam

# FAO: Colin Worswick

I understand that you cover the Clitheroe Area.

We are undertaking a Flood Risk Assessment for a couple of development sites in Clitheroe - see attached layout plan(s)

# a) Site 1 - 4 Acre Site(Post Code BB7 1HF)

The site is located between Little Moor and Little Moor View as indicated by the attached plan.

# b) Site 2 - Main Development Site(covering an area of approx 70 ha)

Located to the east of Little Moor Road, as indicated on the Drawing

Could you advise me whether there are any flooding restrictions on this site, for our inclusion in our Flood Risk Assessment Report?

We understand that the site is located in a Flood Zone 1 Area, but could you confirm this.

Any queries then contact me on the number below.

Regards

# Stewart Griffiths Senior Civil Engineer AMEC

Amec Environment & Infrastructure UK Limited Windsor House, Gadbrook Road Northwich CW9 7TN UK Tel +99 (0)1606 354800 Direct +44 (0)1606 354812 mobile +44(0)7896 213922 stewart.griffiths@amec.com amec.com/ukenvironment

From: Welsby Cliff <cliff welsby@environment-agency gov uk>
To: stewart griffiths@amec com> <stewart griffiths@amec com>

Date: 15/03/2012 12:15

RE: 31936 - Land at Higher Standon, Clitheroe - FRA

#### Stewart

Subject:

Colin Worswick is the engineer for Clitheroe area.

Tel. 07741 019565

**From:** stewart\_griffiths@amec.com [mailto:stewart.griffiths@amec.com]

Sent: 14 March 2012 10:08

To: Welsby, Cliff

Cc: Carter, Philip A; andrew.worsdale@amec.com

Subject: 31936 - Land at Higher Standon, Clitheroe - FRA

Hi Cliff,

We have a couple of Greenfield sites in Clitheroe where we have been asked to undertake an Outline FRA.

Who is the EA contact for this area?

# Regards

# Stewart Griffiths Senior Civil Engineer **AMEC**

Amec Environment & Infrastructure UK Limited Windsor House, Gadbrook Road Northwich CW9 7TN, UK Tel +99 (0)1606 354800 Direct +44 (0)1606 354812 mobile +44(0)7896 213922 stewart.griffiths@amec.com amec.com/ukenvironment

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From: To:

"Welsby, Cliff' <cliff welsby@environment-agency gov uk> stewart griffiths@amec com" <stewart griffiths@amec com>

Cc:

"Carter, Philip A" <PCARTER@environment-agency gov uk>

Date:

07/03/2012 10:28

Subject:

RE: 31936 - Site at Lightfoot Lane Fulwood, Preston - FRA

# Stewart

As detailed by Philip on site attenuation will be required for surface water at existing "green field" rates usually considered to be 10l/sec/hec

Any works to the culverted watercourse may require Agency formal consent.

Please contact me again should you need to apply for any consents.

Regards

Cliff.

From: stewart\_griffiths@amec.com [mailto:stewart.griffiths@amec.com]

Sent: 07 March 2012 09:59

To: Welsby, Cliff

**Cc:** andrew.worsdale@amec.com; sammy.spaine@amec.com **Subject:** 31936 - Site at Lightfoot Lane, Fulwood, Preston - FRA

Cliff,

Further to Phil Carter's e:mail below, are you aware of any site specific issues for the site at Lightfoot Lane (location plan attached) which will need to be included in the FRA?

Many Thanks

# Stewart Griffiths Senior Civil Engineer AMEC

Amec Environment & Infrastructure UK Limited Windsor House, Gadbrook Road Northwich CW9 7TN UK Tel +99 (0)1608 354800 Direct +44 (0)1606 354812 mobile +44(0)7896 213922 stewart.griffiths@amec.com amec.com/ukenvironment

From:

Carter Philip A' <PCARTER@environment-agency gov ukstewart griffiths@amec.com <stewart griffiths@amec.com

To: Cc:

'Welsby. Cliff' <cliff.welsby@environment-agency gov uk>

Date:

07/03/2012 09:47

Subject:

RE: 31936 - Site at Lightfoot Lane Fulwood Preston - FRA

# Stewart

The engineer who covers the area is Cliff Welsby - you can contact him directly on 01772 714016 but I've also copied him into this e-mail.

I can confirm that the area is Flood Zone 1 and any development must ensure that surface water run-off from the site is restricted to existing rates (to be identified in the FRA). From the OS map of the area, there is an ordinary watercourse flowing through the site in a northerly direction, under the motorway, in culvert. The risk of flooding due to blockage or under capacity of the watercourses and culverts on site will need to be considered in the FRA, as will the potential for removal of any culverts that could reduce flood risk.

I would recommend contacting Cliff to see if he has any other site specific issues that would need to be considered in the FRA. Kind regards

Philip

Philip Carter
Planning Liaison Officer
Environment Agency
PO Box 519
South Preston
PR5 8GD
01772 714219



# Flooding data Request - Standen Road, Clitheroe

Finch, Peter o richard breakspear

14/02/2012 14:42

Richard,

\*\*\*\*\*\*

Thank you for your Email dated 13th.February 2012.

There are no major recorded flooding incidents on Standen Road, except for the occasional blocked gully that can cause a localised flooding problem.

Regards
Peter Finch
Principal Engineer (Ribble Valley)
Environment Services East
Lancashire County Council
01254 770960

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RE: Sewer flooding data request, site at Standen, Clitheroe, Lancashire

Planning Liaison o richard breakspear

20/02/2012 12:23

Hello Richard

Information as requested

#### DG5 Sewer Flooding

I have checked our records and have found a DG5 flooding issues within the immediate vicinity of the proposed development. The reported issue is on Turner Street, Clitheroe.

Please note that United Utilities Water plc (UUW) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events to place on the 'at risk' register.

This assessment does not include any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which UUW has no control and not a facet of sewer capacity

If I can be of any further assistance in the meantime then please don't hesitate to get in touch. Regards
Graham Perry

**From:** richard\_breakspear@amec.com [mailto:richard\_breakspear@amec.com]

**Sent:** 13 February 2012 10:15

To: Planning Liaison

Subject: Sewer flooding data request, site at Standen, Clitheroe, Lancashire

Hi,

I would like to request information on <u>past/existing incidences of sewer flooding</u> in support of a Flood Risk Assessment being prepared for a residential development site at Standen, Clitheroe, Lancashire.

I've checked on your website, under Developer Enquiries ( <a href="http://www.unitedutilities.com/Wastewaterconnections.aspx">http://www.unitedutilities.com/Wastewaterconnections.aspx</a>) and cannot find a link to the information I require.

The site is immediately west of the A59, (see attached plan). The approximate grid reference for the centre of the area of interest is: SD 74917 40684 Or see:

http://gridreferencefinder.com/?gr=SD7491740684%7CPoint s E%7C0&z=15&v=h&t=Point s E

Best regards,

Richard

Dr Richard Breakspear

# Dawson, Emily

From: Sent: To: Subject:	Griffiths, Stewart on behalf of Dawson, Ed 26 March 2012 10:13 Dawson, Emily 29421 - Land at Higher Standon, Clithero		
Note the response I receive	d from UU last week, for your information.		
Regards			
	ructure UK Limited Windsor House, Gadb (0)1606 354812 mobile +44(0)7896 21392		lK Tel +99
Business sustainability start Business sustainability start	before you print. s here AMEC is committed to reducing is here AMEC is a signatory to the UN G is here AMEC supports SOS Children Griffiths/NOR/ENTEC/NWG on 26/03/2012	Global Compact.	
From:    >			
	Perry@uuplc.co.uk>		
>   To:			•
<pre> <stewart.griffiths@amec.c< pre=""></stewart.griffiths@amec.c<></pre>	>		•
>>  >   Date:    >			
19/03/2012 16:21			
>>  >   Subject:   			<b></b>
>  RE: 29421 - Land at Highe >	r Standon, Clitheroe, Lancs		   

# Hello Stewart

Further to our discussion, I can confirm that we would accept free foul discharge from 50 domestic units into the 300mm combined sewer crossing the site but we would not accept any surface water. Under the terms of Building regulation H3 & PPS25, you must discharge to either soakaway on site or to the nearby watercourse

We would have no objection to you diverting the existing 300mm combined sewer that crosses the site providing that you enter into a Section 185 Diversion agreement before starting

"United Utilities Water plc (UUW) will provide information on connection points and maximum permitted discharge rates to public sewers in response to enquiries by developers and in response to Planning Applications where Planning Authorities have elected to consult UUW on drainage matters

However, the points of connection and discharge rates cannot be allocated and reserved for a particular development. UUW reserves the right to revise the connection point and discharge rate current at the time that a formal application for connection to public sewer is made, in order to take account of possible changes in discharges to the public sewer between the date of the enquiry and the date of the connection being required.

# Regards

Graham Perry

From: stewart.griffiths@amec.com [mailto:stewart.griffiths@amec.com]

Sent: 13 March 2012 13:17

To: Perry, Graham

Subject: 29421 - Land at Higher Standon, Clitheroe, Lancs

Graham,

FYI

I don't think you received this drawing last time!

# Regards

Stewart Griffiths Senior Civil Engineer AMEC

Amec Environment & Infrastructure UK Limited Windsor House, Gadbrook Road, Northwich CW9 7TN, UK Tel +99 (0)1606 354800 Direct +44 (0)1606 354812 mobile +44(0)7896 213922 stewart griffiths@amec.com/amec.com/ukenvironment

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Business sustainability starts here... AMEC is a signatory to the UN Global Compact
Business sustainability starts here... AMEC supportsSOS Children
----- Forwarded by Stewart Griffiths/NOR/ENTEC/NWG on 13/03/2012 13:20

From: Stewart Griffiths/NOR/ENTEC/NWG

"Perry, Graham" < Graham Perry@uuplc.co.uk>

Date: 13/03/2012 13:09

To:

Subject: 29421 - Land at Higher Standon, Clitheroe, Lancs

Hello Stewart,

My initial thoughts would be that this is a significant development that will have a major impact to our network and receiving treatment works...

Surface Water

All surface water from this site must be drained directly soakaway / SUDS or to the watercourses running through the site. You will need to discuss your proposals with the EA to agree discharge points / flow rates

Foul

We are currently carrying out a detailed assessment of the area and we should know the impact that your site has to our assets in the near future.

For your purposes I would suggest that will be capacity issues on the network & treatment works.

Regards

Graham Perry

From: stewart griffiths@amec.com [mailto:stewart griffiths@amec.com]

Sent: 05 January 2012 16:34

To: Perry, Graham

Subject: 29421 - Land at Higher Standon, Clitheroe, Lancs

Hi Graham,

Happy New Year!

We have a site in your area which we are assessing from a drainage capacity point of view.

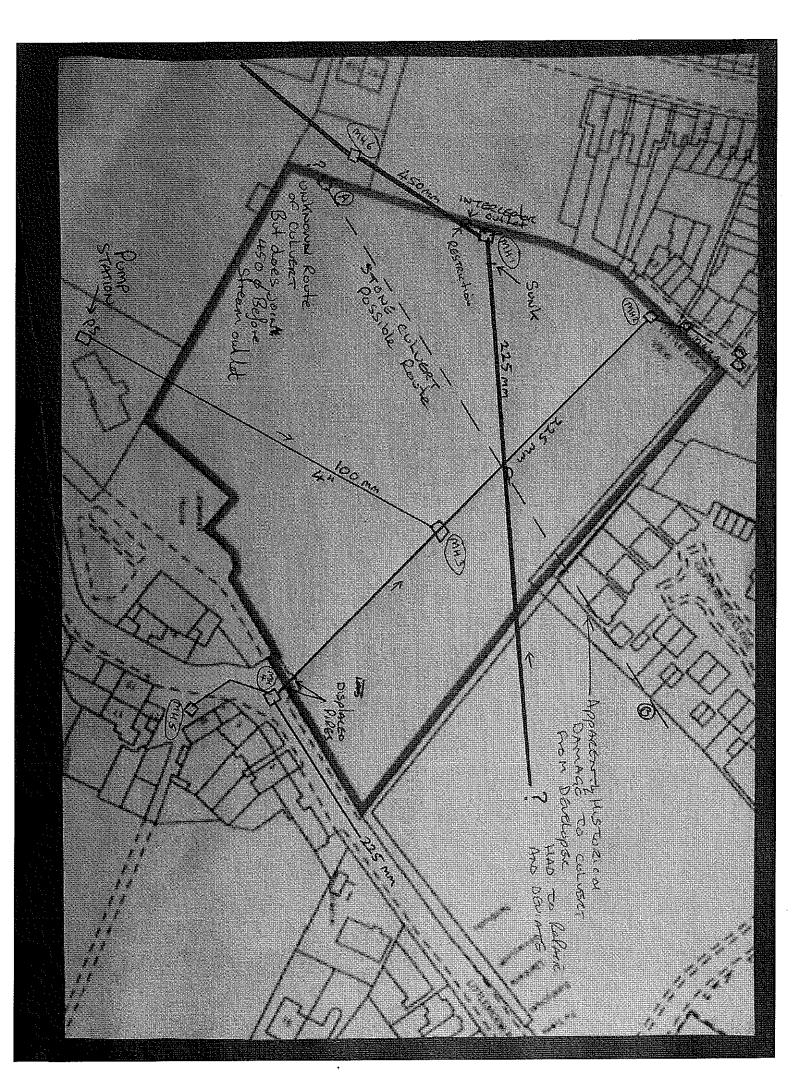
The location of the site is attached (Postcode BB7 1PP) for your information, which is located to the South East of Clitheroe.

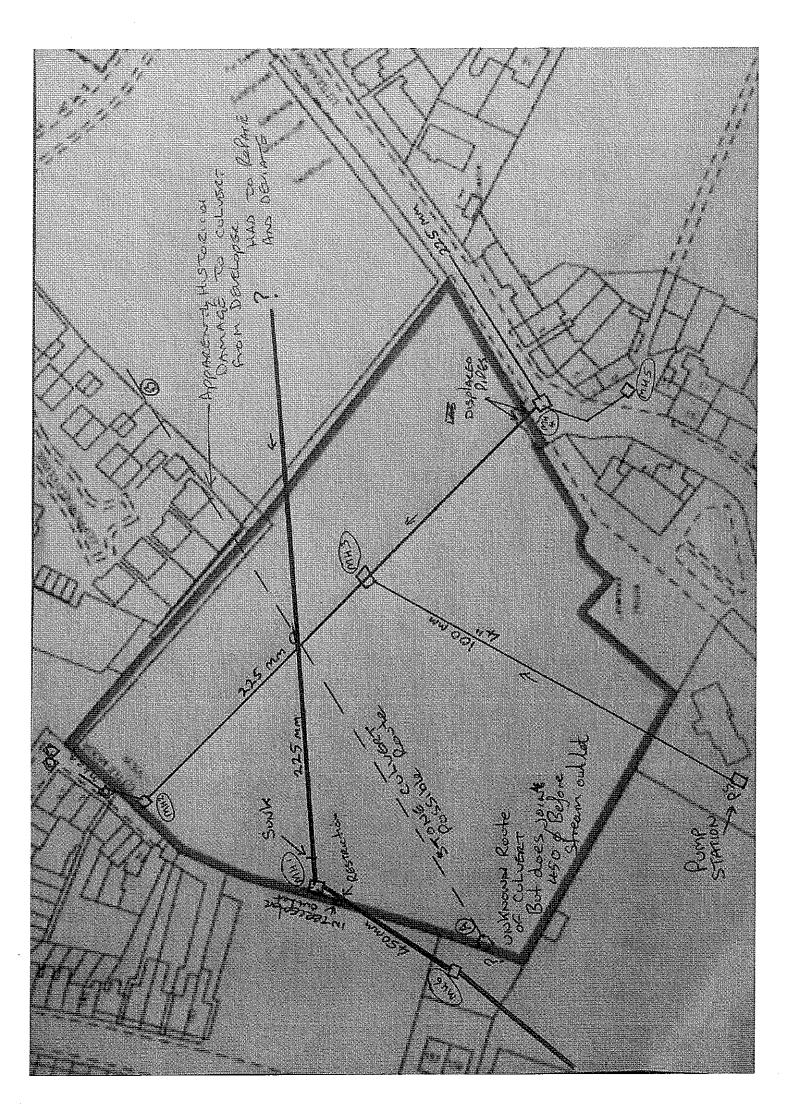
We are in the process of requesting Sewer Record information from UU

Anticipated development will consist of approx 1040 residential properties and 7500 m2 of office space

Could you advise me on the capacity of the local sewerage systems to accommodate such a development?









Entec UK Limited		Page 1
Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

# Existing Network Details for Storm

\* - Indicates pipe has been modified outside of System 1

			•	. ~					_		
	Pi	N Le	ngth	Fall	Slope	I Area	T E	k	HYD	DIA	
			(m)	(m)	(1:X)	(ha)		(mm)	SECT	(mm)	
				0 195			5.00		0	225	
	* 10	01 30	.463	0 202	150.8	0.144	000	0.600	0	225	
	* 2 0	NOO 1-	. 600	0.246	71,9	0 042	E 00	0 600	0	225	
	~ ∠ ∪	100 I	092	0.240	11.9	0 042	3.00	0 000	Ü	223	
	* 3 0	100 26	5.019	0171	152.2	0 036	500	0600	0	225	
	* 2 0	01 22	361	1.454	154	0.050	0 00	0600	0	225	
				0.050	565.0	0 005	<b>5</b> 00	0 600		225	
	* 4.0	100 28	4.60	0.050	5692	0.025	5 00	0600	0	225	
	* 2.0	102 22	825	0.164	139.2	0029	0.00	0 600	0	225	
				0 166				0 600	0	225	
				0 123		0.081		0 600	0	225	
	* 2.0	05 14	142	0102	138 6	0 088	01.00	0.600	0	300	
	* 2 0	06 14	142	0.102	138 6	0 070	000	0.600	0	300	
	* 2 0	07 33	242	0.240	138.5	0.067	000	0.600	0	300	
										222	
	* 1 0			0338				0.600	0	300	
PN	* 1 0 US/MH 1			0.:965		0.000 DS/CL		0600 <b>DS</b>	0	450 <b>Ctrl</b>	US/MH
PN	Name	(m)	(m.)		os Depth	(m)		C Depth		CLII	(mm)
	Name	(111)	(112	•	(w) Seban	\III.)	(1117)	(m)			(mun)
					(,			\ <i>\</i>			
1000	SW01 7	9.800	78.3	375	1200	79 500	78180	1095			1200
1001	SW02 7	9 500	781	.80	1 095	78 800	77978	0.597			1200
2.000	SW03 8	32 000	80.5	75 1	1 200	81.700	80.329	1 146			1200
3 000	SW04 8	2 700	90 5	:00 (	0.75	81700	80 330	1 146			1200
3 000	5W04 0	1.700	00 3	100 (	3 313	01700	00 329	1 110			1200
2 001	SW05 8	31.700	80 3	29 :	1.146	80500	78 875	1 400			1200
4.000	SW06 8	300	78.9	25	1.150	80.500	78.875	1.400			1200
2 606	05207 0		. 70 0	. 7 =	1 400	70 000	70 711	0.064			1200
2.002	SW07 8					79.800		0.864			1200
2003	SW08 7					79.800		1030			
2004	SW09 7					79.000		0353			1200
2005	SW10 7					79 000		0.455			1200
2.006	SW11 7					79.000	•	0.557			1200
2.007	SW12 7	9 000	78.1	.43 (	557	78800	77.903	0.597			1200
1 000	crist 5 7			.02 (		70 000	77 565	0 035	U el	o_Broko®	1200
1 002	SW13 7						77.565			o-Brake®	1200
1.003	PW03 7	ช.ช00	115	) כס	7.785	78100	υυσ σι	1 050			1200

Entec UK Limited		Page 2
Windsor House	Land off Littlemoor Lane	5-33-23-30-30-30-30-30-30-30-30-30-30-30-30-30
Gadbrook Business Centre	4 Acre Site	[V.782(20)
Northwich CW9 7IN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

# Free Flowing Outfall Details for Storm

Outfall Outfall C. Level I. Level Min D,L W
Pipe Number Name (m) (m) I Level (mm) (mm)
(m)

1.003 Ex MH 78 100 76 600 0.000 450 0

# Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750 Additional Flow - % of Iotal Flow 0.000
Areal Reduction Factor 1.000 MADD Factor \* 10m³/ha Storage 2.000
Hot Start (mins) 0 Inlet Coefficient 0 800
Hot Start Level (mm) 0 Flow per Person per Day (1/per/day) 0 000
Manhole Headloss Coeff (Global) 0.500 Run Iime (mins) 60
Foul Sewage per hectare (1/s) 0.000 Output Interval (mins) 1

Number of Input Hydrographs 0 Number of Storage Structures 13 Number of Online Controls 1 Number of Iime/Area Diagrams 0 Number of Offline Controls 0 Number of Real Iime Controls 0

# Synthetic Rainfall Details

	Rainfal	.l Model					FEH
Return	Period	(years)					1
	Site I	ocation	GB	373850	440650	SD	73850 40650
		C (1km)					-0.025
	D	1 (1km)					0 398
	D	2 (1km)					0 385
	D	3 (1km)					0 430
		E (1km)					0.299
		F (1km)					2.444
	Summer	Storms					Yes
	Winter	Storms					Yes
	Cv (	Summer)					0 750
	Cv (	Winter)					0 840
Storm D	uration	(mins)					30

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Entec UK Limited		Page 3
Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

# Online Controls for Storm

# Hydro-Brake® Manhole: SW13, DS/PN: 1.002, Volume (m³): 4.4

Design Head (m) 0 800 Hydro-Brake® Type Md4 Invert Level (m) 77.903 Design Flow (1/s) 8.9 Diameter (mm) 112

Depth (m)	Flow (1/s)	Depth (m) Fl	ow (1/s)	Depth (m) Flor	w (1/s)	Depth (m)	Flow (1/s)
			]				
0.100	3.3	1.200	10 7	3.000	16.9	7.000	25.9
0.200	8 0	1.400	11 6	3.500	18 3	7.500	26.8
0300	7 8	1600	12.4	4 000	19 6	8000	27.6
0.400	6.9	1800	13.1	4 500	20 7	8500	28 5
0.500	7.1	2.000	13.8	5.000	21.9	9 000	29 3
0 600	7.6	2 200	14.5	5.500	22.9	9 500	30.1
0 800	87	2 400	15.1	6.000	239		
1.000	9.8	2.600	15 8	6.500	249		

Entec UK Limited		Page 4
Windsor House	Land off Littlemoor Lane	F-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

# Storage Structures for Storm

# Porous Car Park Manhole: SW01, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4 2
Membrane Percolation (mm/hr)	1	Length (m)	30.0
Max Percolation (1/s)	0.0	Slope (1:X)	1530
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	030	Evaporation (mm/day)	3
Invert Level (m)	78 375	Cap Volume Depth (m)	0.000

# Porous Car Park Manhole: SW02, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	000000	Width (m)	55
Membrane Percolation (mm/hr)	1	length (m)	30.4
Max Percolation (1/s)	00	Slope (1:X)	151 0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert level (m)	78.180	Cap Volume Depth (m)	0.000

# Porous Car Park Manhole: SW03, DS/PN: 2.000

Infiltration Coefficient Base (m/hr)	0 00000	Width (m)	5 5
Membrane Percolation (mm/hr)	1	Length (m)	36 0
Max Percolation (1/s)	0 1	Slope (1:X)	72.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.575	Cap Volume Depth (m)	0.000

# Porous Car Park Manhole: SW04, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.2
Membrane Percolation (mm/hr)	1	Length (m)	26.0
Max Percolation (1/s)	0.0	Slope (1:X)	152.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	030	Evaporation (mm/day)	3
Invert Level (m)	80 500	Cap Volume Depth (m)	0.000

# Porous Car Park Manhole: SW05, DS/PN: 2.001

Infiltration Coefficient Base (m/hr)	000000	Width (m)	5.5
Membrane Percolation (mm/hr)	1	length (m)	22.5
Max Percolation (1/s)	00	Slope (1:X)	15 0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.329	Cap Volume Depth (m)	0000

# Porous Car Park Manhole: SW06, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	000000	Safety Factor	2.0
Membrane Percolation (mm/hr)	1	Porosity	0.30
Max Percolation (1/s)	0 0	Invert Level (m)	78.925

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Entec UK Limited	•	Page 5
Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7IN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo.	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

# Porous Car Park Manhole: SW06, DS/PN: 4.000

Width (m) 4.2 Depression Storage (mm) 5 Length (m) 28.5 Evaporation (mm/day) 3 Slope (1:X) 569.0 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW07, DS/PN: 2.002

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.5 Membrane Percolation (mm/hr) 1 Length (m) 22.8 Max Percolation (1/s) 0.0 Slope (1:X) 139.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 78 875 Cap Volume Depth (m) 0.000

# Porous Car Park Manhole: SW08, DS/PN: 2.003

Infiltration Coefficient Base (m/hr) 0 00000 Width (m) 5.5

Membrane Percolation (mm/hr) 1 Length (m) 23.0

Max Percolation (1/s) 0.0 Slope (1:X) 139.0

Safety Factor 2.0 Depression Storage (mm) 5

Porosity 0.30 Evaporation (mm/day) 3

Invert Level (m) 78.711 Cap Volume Depth (m) 0.000

# Porous Car Park Manhole: SW09, DS/PN: 2.004

Infiltration Coefficient Base (m/hr) 0 00000 Width (m) 5.5

Membrane Percolation (mm/hr) 1 Length (m) 17.1

Max Percolation (1/s) 0 0 Slope (1:X) 139 0

Safety Factor 2.0 Depression Storage (mm) 5

Porosity 0.30 Evaporation (mm/day) 3

Invert Level (m) 78.545 Cap Volume Depth (m) 0.000

# Porous Car Park Manhole: SW10, DS/PN: 2.005

Infiltration Coefficient Base (m/hr) 0 00000 Width (m) 5 5 Membrane Percolation (mm/hr) 1 Length (m) 14 1 Max Percolation (1/s) 0.0 Slope (1:X) 0.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 78.347 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW11, DS/PN: 2.006

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.5 Membrane Percolation (mm/hr) 1 Length (m) 14.1 Max Percolation (1/s) 0.0 Slope (1:X) 139.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 78.245 Cap Volume Depth (m) 0.000

Entec UK Limited		Page 6
Windsor House	Land off Littlemoor Lane	PROVIDENCE VARIABLE IN THE PROVIDENCE AND ANALYSIS ANA
Gadbrook Business Centre	4 Acre Site	T. Cara
Northwich CW9 7IN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

# Porous Car Park Manhole: SW12, DS/PN: 2.007

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.5
Membrane Percolation (mm/hr)	1	Length (m)	33.0
Max Percolation (1/s)	0.1	Slope (1:X)	139 0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	030	Evaporation (mm/day)	3
Invert Level (m)	78.143	Cap Volume Depth (m)	0000

# Cellular Storage Manhole: SW13, DS/PN: 1.002

Invert Level (m) 77.903 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0 00000 Porosity 0 95 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²) Inf	Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0 000	7000	4500	1 300	0.0	530 6
0 100	7000	458 5	1 400	00	530.6
0.200	7000	467 0	1.500	0 0	530.6
0.300	700.0	475.5	1.600	0 0	5306
0400	700 0	483.9	1.700	0.0	530.6
0.500	700 0	492.4	1 800	0 0	530.6
0 600	700 0	5009	1 900	0 0	530 6
0 700	700.0	509 4	2.000	00	530.6
0 800	700.0	517 9	2.100	00	530.6
0.900	700.0	526 4	2.200	0.0	530.6
1.000	700 0	530.6	2.300	0.0	530.6
1100	0 0	530.6	2.400	0 0	530 6
1.200	0 0	5306	2,500	0 0	530 6

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Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7IN	Clitheroe	
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File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

# Summary of Critical Results by Maximum Level (Rank 1) for Storm

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
720, 960, 1440, 2160, 2880, 4320, 5760,
7200, 8640, 10080
Return Period(s) (years) 1, 30
Climate Change (%) 0, 0

First Y First Z O/F Lvl Return Climate First X PN Flood Overflow Act Exc Period Change Surcharge Storm 1 000 15 Winter 30 0% 1.001 15 Winter 30 0% 30/15 Summer 2.000 15 Winter 30 0% 3.000 15 Winter 30 0 음 2..001 30 08 15 Winter 4.000 15 Winter 30 0% 2 002 15 Winter 30 0% 2 003 15 Winter 30 0% 30/15 Summer 2 004 15 Winter 30 0% 30/15 Summer 2.005 15 Winter 30 0% 2..006 15 Winter 30 0% 2..007 30 Winter 30 0% 1.002 720 Winter 30 0% 30/60 Winter 1.003 2880 Summer 30 0%

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	0'flow (1/s)	Pipe Flow (1/s)	Status
1 000	SW01	78.480	-0 120	0000	043	0 0	16 8	OK
1.001	SW02	78 445	0 040	0000	1.12	0 0	44 1	SURCHARGED
2.000	SW03	80 656	-0.144	0 000	0.28	0.0	15.3	OK
3.000	SW04	80.587	-0.138	0 000	0 31	0.0	12.2	OK
2001	SW05	80.426	-0.128	0.000	0.37	00	45.0	OK
4.000	SW06	79071	-0.079	0000	0.41	00	8 2	OK
2.002	SW07	79088	-0.012	0000	0.93	0.0	37.3	OK
2 003	SW08	78.980	0 044	0000	096	0 0	38.9	SURCHARGED
2 004	SW09	78.830	0.060	0.000	1 25	0.0	49.2	SURCHARGED
2.005	SW10	78 588	-0.059	0 000	0.84	0.0	656	OK
2006	SW11	78.518	-0.027	0 000	1.00	00	78.3	OK
2.007	SW12	78393	-0.050	0.,000	1.00	0.0	86.4	OK
1.002	SW13	78.357	0.154	0000	0.05	0 0	7 9	SURCHARGED
1.003	PW03	77 601	-0 414	0000	002	0 0	7.9	OK

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Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	
Northwich CW9 7TN	Clitheroe	
Date 17 September 2012	Designed by Andrew Wo	
File 4 Acre Site.mdx	Checked by	
Micro Drainage	Network W.12.6.1	

# Existing Network Details for Storm

\* - Indicates pipe has been modified outside of System 1

			PN	Length	Fall	Slope	I.Area	T.E.	k	HYD	DIA	
				(m)	(m)	(1:X)	(ha)	(mins)	(mm)	SECT	(mm)	
		* ]	000	29833	0 195	153.0	0.050	500	0600	0	225	
		* 3	.001	30.463	0.202	150.8			0.600	0	225	
		* 2	2000	17.692	0.246	719	0042	5 00	0 600	0	225	
		* 3	000	26019	0.171	152.2	0 036	5.,00	0600	0	225	
		* 2	2001	22.361	1.454	15.4	0.050	0.00	0600	0	225	
		* 4	000	28.460	0050	569.2	0.025	500	0.600	٥	225	
		* 2	.002	22.825	0 164	139.2	0 029	000	0600	0	225	
				23022				000	0600	0	225	
				17.117					0 600	0	225	
				14 142					0.600	0	300	
				14 142					0.600	0	300	
		* 2	.007	33242	0 240	138.5	0 067	000	0600	0	300	
		* 1	002	5.000	0338	14.8	0.139	0.00	0600	0	300	
				36.125					0.600	0		/
	PN		US/	•			DS/CL		DS Doorth		Ctrl	US/MH
	PN	Name	(m	•	) C I	us Depth (m)	(m)		DS Depth (m)		Ctrl	(mm)
•	1.000	Name	(m	.) (m	) C I	Depth (m)	(m)	(m) (	Depth (m)		Ctrl	
,		Name SW01	<b>(m</b>	(m. 300 78 3	) <b>с</b> 1 375 1	Depth (m)	(m) 79500		m) (m) 1.095		Ctrl	(mm)
•	1.000	Name SW01 SW02	79 .8	(m. 300 78 3	) <b>C</b> I	Cepth (m) 1 200 1 095	(m) 79500	(m) ( 78180 77978	m) (m) 1.095		Ctrl	(mm) 1200
•	1.000	Name SW01 SW02	79 .8 79 .5	(m. 300 78.3500 78.1	375 1 80 1	Cepth (m) 1 200 1 095	(m) 79500 78.800	(m) (78180 77978	m) (m) 1.095 0.597		Ctrl	(mm) 1200 1200
•	1.000 1.001 2.000	SW01 SW02 SW03	79 .8 79 .5 82 .0	(m)	375 1 375 1 375 1	Depth (m) 1 200 1 095 1 200 8	(m) 79500 78.800	(m) (78180 77978 80.329	Depth (m)  1.095 0.597		Ctrl	(mm) 1200 1200 1200
•	1.000 1.001 2.000 3.000	SW01 SW02 SW03 SW04	79 .8 79 .5 82 .0 81 .5	(m) (m) (800 78.3 78.1 700 80.5	) <b>c</b> i i i i i i i i i i i i i i i i i i i	Depth (m) 1 200 1 095 1 200 8 1 200 8	(m) 79500 78.800 31700	(m) (78180 77978 80.329 80329 78875	1.095 0 597 1.146		Ctrl	(mm)  1200 1200 1200 1200
•	1.000 1.001 2.000 3.000 2.001	SW01 SW02 SW03 SW04 SW05	79.8 79.8 82.0 81.1 81.3	300 78.3 500 78.1 300 80.5 700 80.5	c i i i i i i i i i i i i i i i i i i i	Depth (m)  1 200 1 095  1 200 8  1 200 8  1 146 8  1 150 8	(m) 79500 78.800 31700 31700	(m) (78180 77978 80.329 80329 78875	Depth (m)  1.095 0.597  1.146  1.146 1.400		Ctrl	(mm)  1200 1200 1200 1200 1200
•	1.000 1.001 2.000 3.000 2.001 4.000 2.002 2.003	SW01 SW02 SW03 SW04 SW05 SW06 SW07 SW07	79.8 79.5 82.0 81.3 80.3 80.5 79.8	300 78.3 500 78.1 000 80.5 700 80.3 300 78.9 500 78.8	c i i i i i i i i i i i i i i i i i i i	Depth (m)  1 200 1 095  1 200 8  1 200 8  1 146 8  1 150 8  1 400 7  864 7	(m) 79500 78.800 31700 31700 30500 30500 79800 79800	(m) (78180 77978 80.329 80.329 78875 78711 78545	1 .095 0 597 1 .146 1 .146 1 .400 1 .400 0 .864 1 .030		Ctrl	(mm)  1200 1200 1200 1200 1200 1200 1200 12
•	1.000 1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004	SW01 SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09	79.8 79.8 82.0 81.3 80.3 80.5 79.8	300 78.3 500 78.1 000 80.5 700 80.3 300 78.9 800 78.8 800 78.7	) c i i i i i i i i i i i i i i i i i i	Depth (m)  1 200 1 095  1 200 8  1 200 8  1 146 8  1 150 8  1 400 7  8 84 7  1 030 7	(m) 79500 78.800 31700 31700 30500 79800 79800 79800	(m) (78180 77978 80.329 80.329 78875 78711 78545 78422	1.095 0.597 1.146 1.146 1.400 1.400 0.864 1.030 0.353		Ctrl	(mm)  1200 1200 1200 1200 1200 1200 1200 12
•	1.000 1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004 2.005	SW01 SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09 SW10	79.8 79.8 82.0 81.3 80.3 80.3 79.8 79.8	300 78.3 500 78.1 000 80.5 700 80.3 300 78.9 800 78.7 800 78.5	) c : : : : : : : : : : : : : : : : : :	Depth (m)  1 200 1 095  1 200 8  1 200 8  1 146 8  1 150 8  1 400 7  8 84 7  1 030 7  1 353 7	(m) 79500 78.800 31700 31700 30500 79800 79800 79000 79.000	(m) (78180 77978 80.329 80.329 78875 78711 78545 78422 78245	1 .095 0 597 1 .146 1 .146 1 .400 1 .400 0 .864 1 .030 0 .353 0 .455		Ctrl	(mm)  1200 1200 1200 1200 1200 1200 1200 12
•	1.000 1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004 2.005 2.006	SW01 SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09 SW10 SW11	79.8 79.8 82.0 81.3 80.3 80.3 79.8 79.8 79.0	300 78.3 500 78.1 000 80.5 700 80.3 300 78.9 800 78.9 800 78.7 800 78.3	) c : : : : : : : : : : : : : : : : : :	Depth (m)  1 200 1 095  1 200 8  1 200 8  1 146 8  1 150 8  1 400 7  8 84 7  1 030 7  1 353 7  2 455 7	(m) 79500 78.800 31700 31700 30500 79800 79800 79000 79000 79000	(m) (78180 77978 80.329 80.329 78875 78711 78545 78422 78422 78245 78143	1.095 0.597 1.146 1.146 1.400 1.400 0.864 1.030 0.353 0.455 0.557		Ctrl	1200 1200 1200 1200 1200 1200 1200 1200
•	1.000 1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004 2.005	SW01 SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09 SW10 SW11	79.8 79.8 82.0 81.3 80.3 80.3 79.8 79.8 79.0	300 78.3 500 78.1 000 80.5 700 80.3 300 78.9 800 78.7 800 78.5	) c : : : : : : : : : : : : : : : : : :	Depth (m)  1 200 1 095  1 200 8  1 200 8  1 146 8  1 150 8  1 400 7  8 84 7  1 030 7  1 353 7  2 455 7	(m) 79500 78.800 31700 31700 30500 79800 79800 79000 79.000	(m) (78180 77978 80.329 80.329 78875 78711 78545 78422 78422 78245 78143	1 .095 0 597 1 .146 1 .146 1 .400 1 .400 0 .864 1 .030 0 .353 0 .455		Ctrl	(mm)  1200 1200 1200 1200 1200 1200 1200 12
•	1.000 1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004 2.005 2.006 2.007	SW01 SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW09 SW10 SW11	79.8 79.8 82.0 81.3 80.3 80.3 79.8 79.0 79.0	300 78.3 500 78.1 000 80.5 700 80.3 300 78.9 800 78.9 800 78.7 800 78.3 000 78.3	) <b>c</b> i i i i i i i i i i i i i i i i i i i	Depth (m)  1 200 1 095  1 200 8  1 200 8  1 146 8  1 150 8  1 400 7  8 84 7  1 30 30 7  3 30 455 7	(m)  79500 78.800  31700  31700  30500  79800 79000 79000 79000 78800	(m) (78180 77978 80.329 80.329 78875 78711 78545 78422 78245 78143 77903	1.095 0.597 1.146 1.146 1.400 1.400 0.864 1.030 0.353 0.455 0.557			(mm)  1200 1200 1200 1200 1200 1200 1200 12
•	1.000 1.001 2.000 3.000 2.001 4.000 2.002 2.003 2.004 2.005 2.006	SW01 SW02 SW03 SW04 SW05 SW06 SW07 SW08 SW10 SW11 SW12	79.8 79.8 82.0 81.3 81.3 80.3 80.5 79.6 79.0 79.0	300 78.3 500 78.1 000 80.5 700 80.3 300 78.9 800 78.9 800 78.7 800 78.3	c i i i i i i i i i i i i i i i i i i i	Depth (m)  1 200 1 095  1 200 8  1 200 8  1 146 8  1 150 8  1 400 7  2 864 7  3 0 455 7  3 0 557 7  3 0 597 7	(m)  79500 78.800  31700  31700  30500  79800 79000 79000 79000 78800	(m) (78180 77978 80.329 80329 78875 78711 78545 78422 78245 78143 77903	1.095 0.597 1.146 1.146 1.400 1.400 0.864 1.030 0.353 0.455 0.557		o-Brake®	(mm)  1200 1200 1200 1200 1200 1200 1200 12

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Windsor House	Land off Littlemoor Lane	
Gadbrook Business Centre	4 Acre Site	
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Micro Drainage	Network W.12.6.1	

# Free Flowing Outfall Details for Storm

Outfall Outfall C Level I Level Min D,L W
Pipe Number Name (m) (m) I Level (mm) (mm)

1 003 Ex MH 78 100 76 600 0 000 450 0

# Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750 Additional Flow - % of Iotal Flow 0.000
Areal Reduction Factor 1.000 MADD Factor \* 10m³/ha Storage 2.000
Hot Start (mins) 0 Inlet Coefficient 0 800
Hot Start Level (mm) 0 Flow per Person per Day (1/per/day) 0.000
Manhole Headloss Coeff (Global) 0.500 Run Iime (mins) 60
Foul Sewage per hectare (1/s) 0 000 Output Interval (mins) 1

Number of Input Hydrographs 00 Number of Storage Structures 13 Number of Online Controls 10 Number of Iime/Area Diagrams 00 Number of Offline Controls 00 Number of Real Iime Controls 00

# Synthetic Rainfall Details

	Rainfall	Model					FEH
Return	Period (	years)					1
	Site Io	cation	GB	373850	440650	SD	73850 40650
	C	(1km)					-0.025
	D1	(1km)					0398
	D2	(1km)					0385
	D3	(1km)					0.430
	E	(1km)					0299
	F	(1km)					2.444
	Summer S	Storms					Yes
	Winter S	Storms					Yes
	Cv (St	ummer)					0 750
	Cv (Wi	inter)					0 840
Storm I	Duration	(mins)					30

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Gadbrook Business Centre	4 Acre Site	17.18ara
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# Online Controls for Storm

# Hydro-Brake® Manhole: SW13, DS/PN: 1.002, Volume (m³): 4.4

Design Head (m) 0.800 Hydro-Brake® Iype Md4 Invert Level (m) 77 903 Design Flow (1/s) 8.9 Diameter (mm) 112

Depth (m)	Flow (1/s)	Depth (m) F	low (1/s)	Depth (m) Flo	w (1/s)	Depth (m)	Flow (1/s)
0100	3 3	1.200	10.7	3.000	16 9	7.000	25.9
0.200	8.0	1.400	11.6	3500	18 3	7.500	26.8
0.300	7.8	1600	12.4	4.000	19 6	8.000	27.6
0.400	6.9	1.800	13.1	4.500	20.7	8500	28.5
0.500	7.1		138	5.000	21.9	9.,000	29.3
0.600	7.6		145	5.500	22.9	9.500	30 1
0 800	8.7		151	6 000	23.9		
1.000	9.8	2600	158	6 500	24.9		

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Gadbrook Business Centre	4 Acre Site	TY PROPERTY MAN
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# Storage Structures for Storm

# Porous Car Park Manhole: SW01, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0 00000	Width (m)	4.2
Membrane Percolation (mm/hr)	1	Iength (m)	30.0
Max Percolation (1/s)	0.0	Slope (1:X)	153.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	78375	Cap Volume Depth (m)	0000

# Porous Car Park Manhole: SW02, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5 5
Membrane Percolation (mm/hr)	1	Length (m)	30.4
Max Percolation (1/s)	00	Slope (1:X)	151.0
Safety Factor	20	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
<pre>Invert Level (m)</pre>	78 180	Cap Volume Depth (m)	0.000

# Porous Car Park Manhole: SW03, DS/PN: 2.000

5 . 5	Width (m)	000000	Infiltration Coefficient Base (m/hr)
360	Length (m)	1	Membrane Percolation (mm/hr)
720	Slope (1:X)	0.1	Max Percolation (1/s)
5	Depression Storage (mm)	2.0	Safety Factor
3	Evaporation (mm/day)	030	Porosity
0.000	Cap Volume Depth (m)	80 575	Invert Level (m)

# Porous Car Park Manhole: SW04, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0 00000	Width (m)	4 2
Membrane Percolation (mm/hr)	1	Length (m)	26.0
Max Percolation (1/s)	0 0	Slope (1:X)	152.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0 30	Evaporation (mm/day)	3
Invert Level (m)	80.500	Cap Volume Depth (m)	0000

# Porous Car Park Manhole: SW05, DS/PN: 2.001

Infiltration Coefficient Base (m/hr)	000000	Width (m)	5.5
Membrane Percolation (mm/hr)	1	Length (m)	22.5
Max Percolation (1/s)	00	Slope (1:X)	15 0
Safety Factor	20	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.329	Cap Volume Depth (m)	0.000

# Porous Car Park Manhole: SW06, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	0.00000	Safety Factor	2.0
Membrane Percolation (mm/hr)	1	Porosity	0 30
Max Percolation (1/s)	0.0	Invert Level (m)	78.925

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#### Porous Car Park Manhole: SW06, DS/PN: 4.000

Width (m) 4.2 Depression Storage (mm) 5 Length (m) 28.5 Evaporation (mm/day) 3 Slope (1:X) 569.0 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW07, DS/PN: 2.002

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.5 Membrane Percolation (mm/hr) 1 Length (m) 22.8 Max Percolation (1/s) 0.0 Slope (1:X) 139.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 78.875 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW08, DS/PN: 2.003

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.5

Membrane Percolation (mm/hr) 1 Length (m) 23.0

Max Percolation (1/s) 0.0 Slope (1:X) 139.0

Safety Factor 2.0 Depression Storage (mm) 5

Porosity 0.30 Evaporation (mm/day) 3

Invert Level (m) 78 711 Cap Volume Depth (m) 0.000

#### Porous Car Park Manhole: SW09, DS/PN: 2.004

Infiltration Coefficient Base (m/hr) 0 00000 Width (m) 5.5

Membrane Percolation (mm/hr) 1 Length (m) 17.1

Max Percolation (1/s) 0.0 Slope (1:X) 139.0

Safety Factor 2.0 Depression Storage (mm) 5

Porosity 0.30 Evaporation (mm/day) 3

Invert Level (m) 78.545 Cap Volume Depth (m) 0.000

# Porous Car Park Manhole: SW10, DS/PN: 2.005

Infiltration Coefficient Base (m/hr) 0 00000 Width (m) 5 5 Membrane Percolation (mm/hr) 1 Length (m) 14.1 Max Percolation (1/s) 0.0 Slope (1:X) 0.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 78.347 Cap Volume Depth (m) 0.000

# Porous Car Park Manhole: SW11, DS/PN: 2.006

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 5.5

Membrane Percolation (mm/hr) 1 Length (m) 14 1

Max Percolation (1/s) 0.0 Slope (1:X) 139.0

Safety Factor 2.0 Depression Storage (mm) 5

Porosity 0.30 Evaporation (mm/day) 3

Invert Level (m) 78.245 Cap Volume Depth (m) 0.000

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# Porous Car Park Manhole: SW12, DS/PN: 2.007

Infiltration Coefficient Base (m/hr)	000000	Width (m)	5.5
Membrane Percolation (mm/hr)	1	Length (m)	33.0
Max Percolation (1/s)	0.1	Slope (1:X)	1390
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	78 143	Cap Volume Depth (m)	0.000

# Cellular Storage Manhole: SW13, DS/PN: 1.002

Invert Level (m) 77.903 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²) Int	Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0 000	700.0	450.0	1.300	0.0	5306
0.100	700 0	4585	1 400	0 0	530.6
0.200	. 700 0	467.0	1.500	0.0	530.6
0300	7000	475 5	1.600	0 0	530 6
0.400	7000	483.9	1.700	0 0	530.6
0.500	7000	492.4	1800	0 0	530.6
0 600	700.0	500.9	1.900	0.0	5306
0 700	700 0	509.4	2.000	0 0	530.6
0.800	700 0	5179	2.100	0 0	5306
0.900	700 0	526 4	2.200	0.0	530.6
1000	7000	530 6	2.300	00	530 6
1.100	00	530 6	2.400	0 0	530 6
1.200	0 0	530.6	2500	00	530.6

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# Summary of Critical Results by Maximum Level (Rank 1) for Storm

Margin for Flood Risk Warning (mm) 300.0

Analysis Iimestep 2.5 Second Increment (Extended)

DIS Status

DVD Status

ON

Inertia Status

ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
720, 960, 1440, 2160, 2880, 4320, 5760,
7200, 8640, 10080
1 Period(s) (years) 1, 30, 100

Return Period(s) (years)
 Climate Change (%)

0, 0, 30

			Return	${\tt Climate}$	First X		First Y	First Z	O/F	Lvl
PN	5	torm	Period	Change	Surci	harge	Flood	Overflow	Act	Exc
1000	720	Winter	100	+30%	100/15	Summer				
1.001	720	Winter	100	+30%	30/15	Summer				
2.000	15	Winter	100	+30%						
3 000	15	Winter	100	+30%						
2.001	15	Winter	100	+30%						
4.000	15	Winter	100	+30%	100/15	Summer				
2002	15	Winter	100	+30%	100/15	Summer				
2.003	15	Winter	100	+30%	30/15	Summer				
2.004	15	Winter	100	+30%	30/15	Summer				
2 005	15	Winter	100	+30%	100/15	Summer				
2 006	15	Winter	100	+30%	100/15	Summer				
2.007	720	Winter	100	+30%	100/15	Summer				
1.002	720	Winter	100	+30%	30/60	Winter				
1.003	720	Winter	100	+30%						

		Water Flooded					Pipe			
	US/MH	Level	Surch'ed	Volume	Flow /	O'flow	Flow			
PN	Name	(m)	Depth (m)	(m³)	Cap.	(1/s)	(1/s)	Status		
1000	SW01	78716	0116	0 000	0.07	00	29	SURCHARGED		
1.001	SW02	78.715	0310	0.,000	023	0 0	9.1	SURCHARGED		
2.000	SW03	80 694	-0.106	0000	0.54	0 0	29.7	OK		
3.000	SW04	80 628	-0 097	0000	0.61	0 0	23.6	OK		
2.001	SW05	80.474	-0.080	0 000	0 72	0.0	87.5	OK		
4.000	SW06	79.367	0.217	0 000	0.65	0.0	12.9	SURCHARGED		
2002	SW07	79384	0284	0 000	0.97	00	38.9	SURCHARGED		
2.003	SW08	79276	0.340	0.000	1.04	0.0	42.0	SURCHARGED		
2.004	SW09	79.108	0.338	0.000	1.45	0.0	56.9	SURCHARGED		
2.005	SW10	78 860	0.213	0.000	1 07	0 0	83.7	FICOD RISK		
2.006	SW11	78 750	0.205	0.000	1 34	0 0	105.2	FLOOD RISK		
2.007	SW12	78717	0.274	0 000	0 31	0.0	26.8	FLOOD RISK		
1002	SW13	78710	0.507	0 000	0.06	0 0	8 8	FLOOD RISK		
1.003	PW03	77605	-0.410	0000	002	0 0	8 8	OK		



# **DESIGN/CALCULATION SHEET**

Project No:	29421	Project Title:		4 Acre Site, Clitheroe Sheet:			1 of 1				
Customer Organisation:	Trustees of Sta	anded Estates		Date:					2	20/09/12	
Subject:	FOUL WATER CALCULATIONS Made by:							AW			
For Computer Calculations: Operation Performed:							Checker's Initials				
Software Used:	(Spre		on:Filename adsheet):					and date:			
Data Source (Reference & Filename/Path):											
Ref:		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			<del></del>	1 1 1	l l	1 . 1	,	T i	
	Foul Water D					based o	n the n	nethodolo	gy	1	
	of "Sewers F		- 6th E	dition".				( _ 1 _ 1		i 	
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