FLOOD RISK ASSESSMENT
FOR
PROPOSED RESIDENTIAL DEVELOPMENT, FORMER TETROSYL SITE
WALMERSLEY OLD ROAD, BURY, GREATER MANCHESTER
ON BEHALF OF
BARRATT HOMES MANCHESTER

OCTOBER 2019

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1.0 INTRODUCTION

1.1 This *Flood Risk Assessment* has been prepared by Cole Easdon Consultants Ltd (CEC) on behalf of Barratt Homes (Manchester) in support of a planning application for a residential development of land at the Former Tetrosyl Site, Walmersley Old Road, Bury. Refer to CEC Figure 6155/500 Figure 1 [*Site Location Plan*] in Appendix 1.

Development Proposals

1.2 Development proposals are the redevelopment of the Tetrosyl site including the removal of Mill Reservoir and existing buildings and hardstanding and the erection of 268 dwellings with associated access, parking and landscaping.

Need for Study

1.3 The purpose of this assessment is to demonstrate that the development proposal outlined above can be satisfactorily accommodated without worsening flood risk for the area and without placing the development itself at risk of flooding, as per National guidance provided within the National Planning Policy Framework document (NPPF).

1.4 Accordingly, this study has been prepared to:

i) assess flood risk to the development from fluvial sources;

ii) assess flood risk to the development from other potential sources, including ditches, sewers, groundwater and overland flows; and

iii) ensure that the proposed development will fully comply with the requirements of the Environment Agency's policy on the safeguarding of floodplains.

Scope of Study

1.5 In Section 2.0, we describe the characteristics of the proposed development site and surrounding area. In Section 3.0, we assess flood risk issues and outline the proposed surface water drainage strategy. In Section 4.0, we assess the foul water disposal. Finally, conclusions are presented in Section 5.0.

Local Policy

1.6 This assessment also demonstrates that the proposals meet the requirements of Bury Borough Council Draft Local Plan Policy OP3 (Climate change) which seeks to take a proactive approach towards mitigating against and adapting to the cause and effects of climate change. Policy OP5 (Flood Risk) seeks to manage flood risk from all sources by

ensuring that new development complies with the flood risk management hierarchy and is not subject to unacceptable levels of risk, does not result in increased flood risk elsewhere and where possible, achieves reductions in flood risk overall. In addition, it should seek to ensure that all new development proposals minimise the impact of development on surface water run-off, and where possible, seek to reduce it.

1.7 The following resources have been used for this study:

- *Flood Map for Surface Water – Environment Agency (EA, accessed November 2018);*
- *Flood Zone Map – Environment Agency (EA, accessed November 2018);*
- *Geological Map - British Geological Survey (BGS);*
- *Groundwater Source Protection Zones Map - Environment Agency (EA);*
- *Revised Climate Change Allowances (EA, March 2016);*
- *Topographical Survey Drawing (Drawing Ref SDL 2140/1 by Survey & Design Limited, March 2015);* and
- *United Utilities Sewer Records (February 2014).*

1.8 The following publicly available documents have also been reviewed as part of this assessment:

- *Building Regulations 2010 – Approved Document H (Drainage and Waste Disposal);*
- *Bury Metropolitan Borough Council Local Plan (under consultation) (2018);*
- *Bury, Rochdale and Oldham Strategic Flood Risk Assessment Level 1 (November 2009);*
- *C753 The SuDS Manual (CIRIA, November 2015);*
- *Greater Manchester Surface Water Management Plan (January 2013);*
- *National Planning Policy Framework (NPPF) (2018);*
- *Non-Statutory Technical Standards for Sustainable Drainage Systems (Defra, March 2015);*
- *Planning Practice Guidance (PPG) (March 2014);*
- *Rainfall Runoff Management for Developments (R&D Technical Report W5-074/A/TR/1 Revision E, Defra, June 2012);* and
- *Sewers for Adoption, 6th Edition – A Design and Construction Guide for Developers (SFA 6) (March 2006).*

1.9 The following abbreviations are used in this report:

- AOD – Above Ordnance Datum;
- BGS – British Geological Society;
- BRO – Bury, Rochdale and Oldham;

- CC – Climate Change;
- EA – Environment Agency;
- FZM – Flood Zone Map prepared by the EA;
- NPPF – National Planning Policy Framework;
- SFRA – Strategic Flood Risk Assessment;
- SUDS – Sustainable Urban Drainage Systems;
- SWMP – Surface Water Management Plan; and
- UU – United Utilities.

2.0 THE EXISTING SITE

Refer to CEC Plan 6155/501 [*Existing Site Layout (3 No. Sheets)*] in Appendix 4.

2.1 The proposed development site comprises 10.88ha area of brownfield land located In Walmersley, to the north of Bury town centre. Walmersley Old Road forms the site's western boundary. The site's southern boundary is formed by Mill Road. The north western boundary is formed by Bentley Lane with the M66 motorway bounding the site to the north east. The site's eastern boundary is formed by an un-named road which connects Mill Road to the south and White Carr Lane to the north.

2.2 Land use to the south and east of the site is predominantly residential with greenfield land to the north and east.

2.3 Large industrial buildings and associated hardstanding from the site's former use cover the southern and north-western parts of the site. The topographical survey indicates the site falls in a southerly direction. Levels vary between 159.6m -162.0m AOD along the northern boundary and 136.5m – 142.0m AOD to the south of the site.

Nearby Watercourses/Drainage Features

2.4 The River Irwell drains the wider local catchment. It rises from Irwell Springs on Derpwell Moor and drains in a generally southerly direction. South of Lower Broughton the Irwell joins the River Irk and River Medlock and continues as part of the Manchester Ship Canal which discharges into the River Mersey east of Irlam. The overall length of the River Irwell is some 63km.

2.5 One of the tributaries of the River Irwell as it passes between Ramsbottom and Bury is Pigs Lee Brook which discharges to the Irwell to the west of Limefield. Pigs Lee Brook rises upstream of Cob House Farm, to the west of Deeply Vale, and flows in a south-easterly direction beneath the M66 motorway. Downstream of the M66 culvert, Pigs Lee Brook flows in a south-westerly direction through two reservoirs before re-entering a culvert beneath the A56 Walmersley Road highway at Bevis Green. Downstream of the A56, the Brook continues as open channel to its confluence at the River Irwell.

2.6 The Study Area is drained by an un-named tributary of Pigs Lee Brook (referred to hereafter as PLB Tributary), which rises on the southern edge of Harden Moor, near Nangreaves. It flows in a generally southerly direction through open farmland and 3 smaller reservoirs at

Whitewall Wood before passing beneath the M66 motorway. Downstream of the motorway culvert the PLB Tributary continues for approximately 100m before entering Mill Reservoir which is located on the site. Outflow from the reservoir is controlled by a weir, with flow being culverted for over 475m through the development site, discharging to open channel some 175m to the south east of the site boundary. The watercourse continues through the Bevis Green area of Bury to its confluence with Pigs Lee Brook. Both watercourses are culverted at the confluence located upstream of the crossing beneath the A56 Walmersley Road highway.

2.7 Mill Reservoir, dates back to at least the late 1800s, and is understood to have been originally constructed to supply water to the Lumn Cotton Mill, the site's original occupier. Tetrosyl, the current occupier, are a chemical manufacturer who have been based on the site for approximately 45 years.

Existing Drainage

2.8 Asset records provided by United Utilities (UU) indicate the presence of a public 300mm diameter combined water sewer located to the west of the site within Walmersley Old Road. It flows in a southerly direction away from the site. Connections from the residential areas to the west of the site occur frequently along the length of sewer. Two existing public 225mm diameter surface water sewers are located to the south of the site. One flows in a southerly direction down Humber Drive with the second flowing in a south easterly direction and discharging to the Pigs Lee Brook. Refer to Appendix 2.

2.9 The site is brownfield. The existing site surface water drainage is directed to the public combined sewer via a public surface water sewer connection at the site access onto Walmersley Old Road, MH ref 8851. In addition, the existing onsite culvert downstream of Mill Reservoir has been surveyed on behalf of the EA, refer to Appendix 2. The survey indicates a number of incoming pipe connections, of varying diameters, along the culvert length which are assumed to be incoming surface water connections also discharging runoff generated by the site.

2.10 Brownfield runoff rates for the existing hard area (44,977m^2) on the site have been calculated using the modified rational method and are summarised in Table 2.1 below.

2.11 Greenfield runoff rates for the site have been calculated as 9.0l/s/ha for the 1:1 year event, 17.6l/s/ha for the 1:30 year event and 21.6l/s/ha for the 1:100 year event.

Table 2.1: Assessment of Brownfield Runoff Rates

Hard Area (ha)	Calculated Brownfield Runoff Rate (l/s)		
	1:1yr	1:30 yr	1:100 yr
4.49	368.2	905.3	1164.8

Existing Ground Conditions

Refer to SI Extract in Appendix 2.

2.12 Records acquired from the British Geological Society (BGS) indicate the site is situated on Rough Rock - Sandstone overlain by superficial till deposits of Diamicton. An intrusive site investigation was carried out in May 2014 by e3p which showed there were extensive depths of made ground present across the majority of the site extending to depths of 4.0m in the western areas, with depths of 2.0 – 3.0m in the central and southern areas. The nature of the backfilled materials encountered was highly variable, with inter-bedded granular and cohesive matrices present throughout the site. Beneath the made ground, stiff clay soils were encountered towards the northern part of the site overlying very dense sand and gravel stratum.

2.13 No discernible groundwater aquifer was identified as part of the intrusive investigation; however, perched groundwater was identified within the monitoring wells with seepages occurring within 7 of the 14 boreholes conducted. Seepages occurred between 0.75 – 3.5m bgl.

2.14 The EA mapping also shows the bedrock aquifer underlying the site is classified as a Secondary 'A' Aquifer with the superficial deposits classified as Secondary 'undifferentiated'.

3.0 FLOOD RISK ISSUES

Refer to CEC Plans 6155/501 [*Existing Site Layout (3 No. Sheets)*] and 6155/502(E) [*Proposed Site Layout*], both located in Appendix 4.

3.1 This section presents an assessment of flood risk to the development from:

a) external sources; and

b) surface water discharge from the proposed development.

3.2 Recommended flood risk mitigation measures appropriate to the level of perceived risk are included in the assessment. The mitigation measures are summarised in Table 3.1 below.

A) Assessment of Flood Risk to the Development Site from External Sources

Ai) Assessment of Flood Risk from Fluvial and Tidal Sources

Refer to the *Hydraulic Modelling Report* in Appendix 5.

3.3 The Flood Zone Map (FZM) for the locality as produced by the EA is shown on CEC Figure 6155/500/Figure 2 [*EA Flood Zone Map*] within Appendix 1. According to the FZM it can be seen that the site lies within Flood Zone 1 (Low Risk). The PLB tributary is classified as 'Main River' through the site. Notwithstanding this, the EA has advised that flood mapping has not been undertaken for the upper reach of the PLB Tributary and Mill Reservoir within the site. As such, they advise that the extent of Flood Zone 3 within the existing site remains unverified. The Applicant has therefore undertaken hydraulic modelling to determine the extent of Flood Zone 3 within the existing Application site. This is shown at Figure 3.1 below.

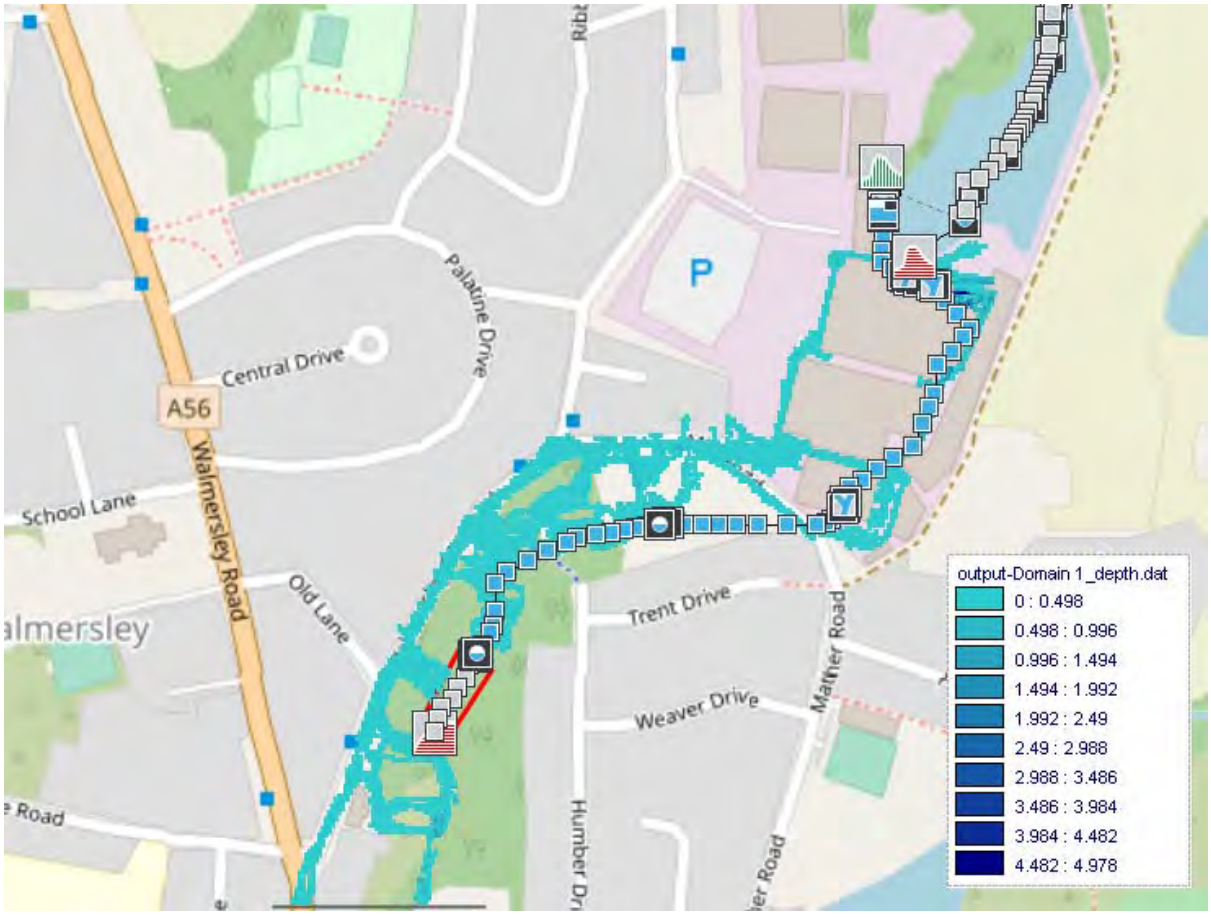


Figure 3.1: Extent of flooding from Mill Reservoir for the 1:100 year event (Existing Site)

3.4 The *NPPF* identifies Flood Zone 3 as low flood risk with an annual probability exceeding a 1 in 100 from river flooding. In accordance with NPPF PPG *Table 2: Flood Risk Vulnerability Classification*, residential development is classified as 'More vulnerable'. *PPG Table 3: Flood Risk Vulnerability and Flood Zone Compatibility* relates that more vulnerable land use is acceptable in Flood Zone 3 so long as the development is safe for its lifetime without increasing flood risk elsewhere. As such, the flood vulnerability of the proposed site use is compatible with the fluvial flood risks (as defined by the EA Flood Map for Planning) associated with the site.

Flood History

3.5 Tetrosyl, the former site occupiers, hold no records of historical flooding from Mill Reservoir. The Strategic Flood Risk Assessment (SFRA) for Bury, Rochdale and Oldham (BRO) also does not record any instances of fluvial flooding at the site.

Climate Change Allowances

3.6 In February 2016, the EA produced peak river flow allowances by river basin district for climate change. The development site falls within the north west river basin district. The site is partly within Flood Zone 3, and the proposed use is classified as 'more vulnerable'. Therefore, the EA advise that the appropriate peak river flow climate change allowance to be considered for this locality is 35%.

Hydraulic Modelling

Refer to the *Hydraulic Modelling Report* in Appendix 5.

3.7 PLB tributary has not been modelled hydraulically by the EA. Therefore, a 1D-2D linked hydraulic model of PLB tributary through the site, including Mill Reservoir, has been produced by CEC to determine the potential impact of the revised climate change allowances on water levels and potential floodplain. Refer to separate *Hydraulic Modelling Study Report* which has determined and assessed the mechanisms of flooding within the existing site arising from the PLB tributary. The report has identified that the primary flood mechanism would be rainfall events causing peak flows to exceed the in-bank capacity of Mill Reservoir resulting in overtopping.

3.8 It is intended to remove the existing Mill Reservoir as part of the development proposal. Hydraulic modelling has been undertaken to assess the impact on flood risk arising from reservoir removal. Mitigation proposals have also been modelled.

Hydraulic Modelling – Existing Site

3.9 Hydraulic modelling found that for the existing site:

- during the 1:20 year event all flows remain in-bank through the site, with no flooding occurring from Mill Reservoir.
- during the 1:100 year, 1:100 year+ 30%, 1:100 year + 70% climate change and 1:1000 year events, flooding occurred within the existing site occurring from the southern bank of Mill Reservoir. 2D flood mapping undertaken as part of the *Hydraulic Modelling Study* indicates that floodwaters issuing from Mill Reservoir travel southwards through the site and along Walmersley Old Road before re-entering the open channel section of PLB tributary some 120m downstream of the development site.
- Mill Reservoir provides some attenuation to flood flows downstream of the development site.

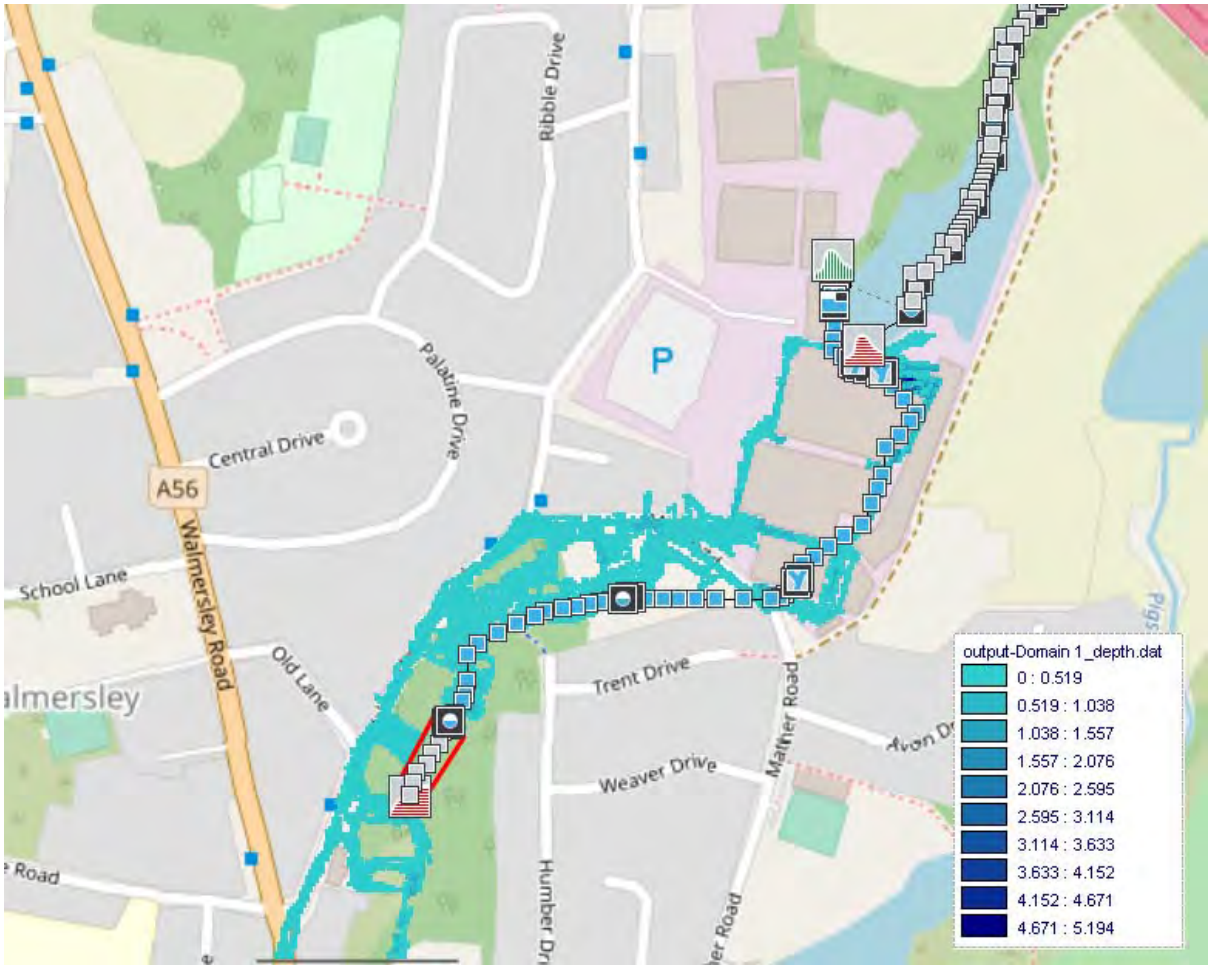


Figure 3.2: Maximum fluvial flood extent for the 1:100 year + 35% CC event (Existing Site)

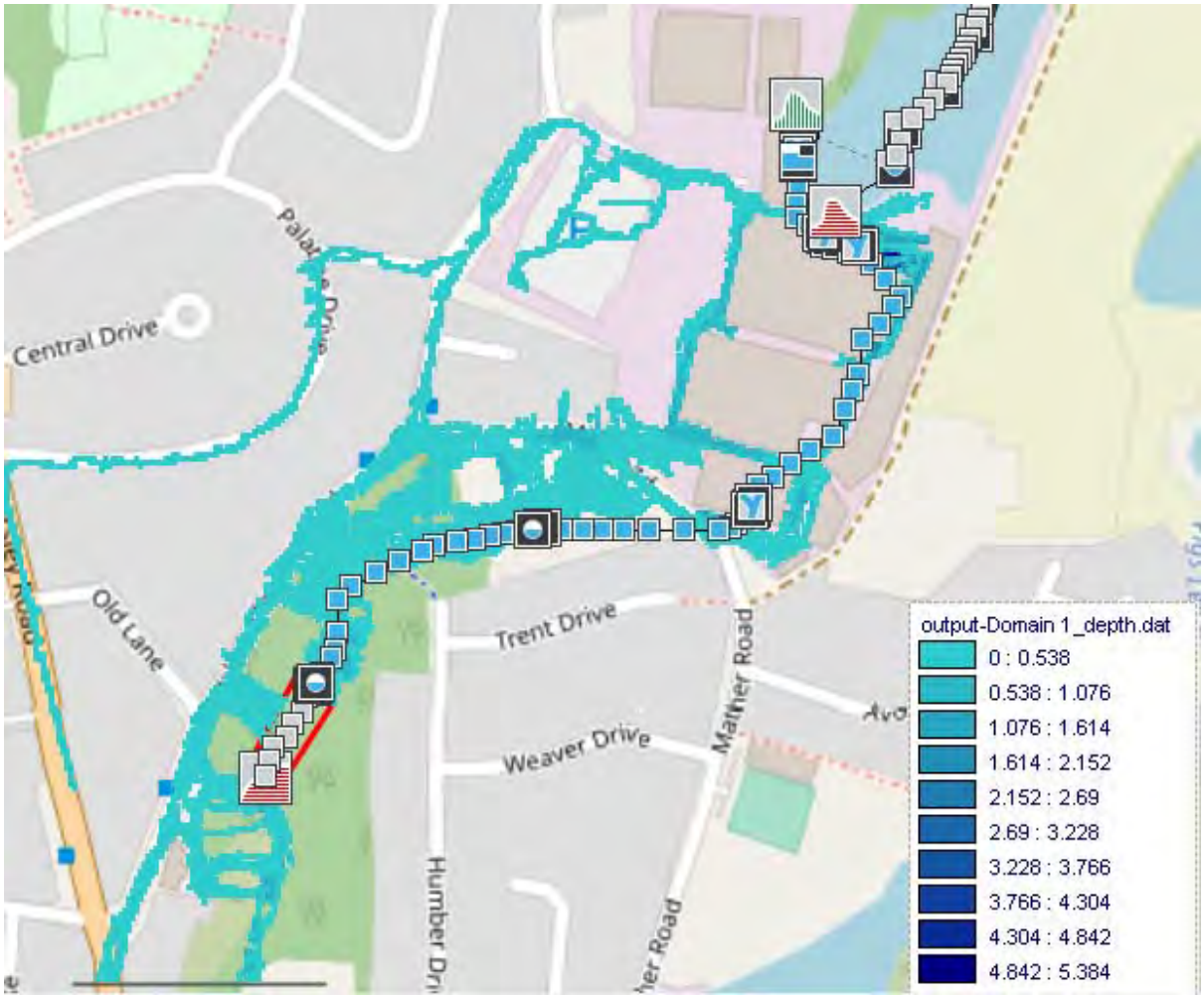


Figure 3.3: Maximum fluvial flood extent for the 1:1000 year event (Existing Site)

Hydraulic Modelling – Post Development Site

3.10 As part of proposed development, the existing culverted section of PLB tributary downstream of Mill Reservoir through the site will be deculverted and PLB tributary will be routed as open channel along the eastern boundary of the development site.

3.11 Furthermore, under development proposals the Mill Reservoir will be removed thus removing the existing fluvial flood risk to the site. However, due to the attenuating effect Mill Reservoir has upon flood flows it has been necessary to retain part of the reservoir as a Compensatory Flood Storage Area (FSA). The FSA has been modelled hydraulically in conjunction with the proposed open channel as part of the *Hydraulic Modelling Study* to ensure that flows within the PLB tributary downstream of the site do not increase as a result of the development. Outflow from the FSA to the proposed open channel will be controlled via an orifice opening.

3.12 Hydraulic modelling found that for the post development site:

- that the proposed compensatory flood storage area (FSA) (with top of bank set at 149.70mAOD) and 300m reach of proposed open channel, which is to largely replace the onsite existing culvert, are able to accommodate flows arising from the 1:20 year, 1:100 year, 1:100 year+ 35% CC, 1:100 year + 70% and 1:1000 year events without flooding;
- the proposed open channel and downstream pipework are appropriately sized to convey flows to the section of downstream existing culvert to be retained;
- flooding occurs from an existing manhole (Manhole 2) sited on the existing culvert some 10m west of the site boundary at the southern end of the site during the 1:1000 year event. However, flooding is not as extensive in comparison to the existing 1:1000 year flood extent as shown in Figure 3.4 below. The flooding does not impact on any proposed dwellings. Furthermore, the flood duration is less than 1 hour for the proposed scenario compared to some 5.25 hours during the existing flood scenario. There is, therefore, no increase in flood risk as a result of the proposed works arising from this event;
- A comparison of modelled water levels at the downstream end of the model shows that the water level in the post development model is some 30 to 60mm higher than in the existing model. This difference in water level is due to a proportion of flood flow that does not re-enter the PLB Tributary in the existing site model but continues southwards past the end of the model; and
- flood risk is not increased as a result of the proposed works. Indeed flood risk to downstream offsite existing development will be reduced post development.



Figure 3.4: Existing (light blue) & Proposed (orange) Site 2D Floodflow route & extent (1:1000yr)

Fluvial Flood Risk Mitigation Measures

3.13 The EA advise that detailed design of the proposed channel should have a preference for soft bio-engineering solutions where feasible and be guided by existing good practice design guides such as 'Rivers by Design' and the current draft Greater Manchester Spatial Framework policies in relation to green infrastructure and river valleys. Refer to Appendix 2. Bio-engineered solutions will be incorporated into the detailed design of the FSA and proposed open channel.

3.14 Groundraising in the southern extent of the development in accordance with finished levels shown on CEC Plan 6155/502(E) [*Proposed Site Layout*] (in Appendix 4) will ensure that flooding within the development does not occur for fluvial flows up to the 1:1000 year event.

3.15 The FSA top of bank level will be set at 149.70mAOD so as to be able to accommodate flows arising from fluvial events up the 1:1000 year event.

3.16 The Applicant acknowledges that culvert repairs to the existing culvert that is to be retained will be required as part of the development implementation. This, so as to ensure that the culvert has a structural life consistent with the lifetime of the development.

3.17 The culverted watercourse (comprising proposed 1200mm pipework downstream of the proposed open channel and the existing culvert to be retained) will have a minimum 10m wide easement for maintenance purposes. This minimum easement width is considered sufficient to enable future access to or replacement of the culvert.

Aii) Assessment of Flood Risk from Existing Ditches

3.18 A review of the topographic survey and OS mapping indicate no drainage ditches are present in the vicinity of the site.

Ditch Flood Risk Mitigation Measures

3.19 No mitigation required.

Aiii) Assessment of Flood Risk from Existing Sewers/ Drains

3.20 UU asset records indicate a public 300mm diameter combined water sewer to the west of the site within Walmersley Old Road, which flows in a southerly direction away from the site. Part of the existing surface water drainage generated within the site is conveyed to the public combined sewer via a public surface water sewer connection at the site access onto Walmersley Old Road, MH ref 8851. The remainder of surface water generated within the site discharges to the culverted section of PLB tributary.

3.21 The site is largely elevated above the Walmersley Old Road highway and therefore, should flooding of the combined sewer occur, flood waters would likely be conveyed in a southerly direction and contained within the highway corridor and away from the site.

3.22 The culverted section of PLB tributary has been included within the CEC *Hydraulic Modelling Study* (Appendix 5) and as such, flood risk from this has been assessed as part of the 'Fluvial Flood Risk' as outlined above. Should flooding of the onsite private surface water drainage system discharging to the culverted section of PLB tributary occur, runoff would follow local topography heading in a southerly direction.

3.23 The Strategic Flood Risk Assessment (SFRA) for Bury, Rochdale and Oldham (BRO) does not specify individual instances of sewer related flooding. The SFRA does state that Bury had the least recorded number of sewer flood instances in the Greater Manchester area with 51 flooded properties. Flood risk from the site can be therefore be considered low.

Sewer/ Drain Flood Risk Mitigation Measures

3.24 As a precautionary measure, finished floor levels will be raised some 150mm above finished ground levels.

Aiv) Assessment of Flood Risk from Overland Flow (Pluvial)

3.25 The Surface Water Flood Zone Map for the locality as produced by the EA is shown on CEC Figure 6155/500/Figure 3 [*EA Surface Water Flood Zone Map*] within Appendix 1. The surface water flood map indicates areas of low – high risk across the development site, with water typically routed around existing buildings with two potential areas for high risk pluvial flooding to occur. The first area is within the existing car park within the south western part of the site where EA maps indicate depths could reach over 900mm during events with a 0.1% - 1% probability with a velocity of less than 0.25m/s. The combination of depth and velocity indicates that this area is at risk from ponding of pluvial flows.

3.26 The second area of elevated risk is to the south eastern corner of the site within an area of low lying topography on the south eastern side of one of the existing buildings, having a flood depth of some 300mm during events with a 0.1% - 1% probability and a velocity greater than 0.25m/s. Pluvial flood mapping in the south eastern corner indicates a pluvial flow route originating from the south eastern corner of the site, travelling across Mill Road in a south westerly direction towards either Walmersley Old Road or land to the north of Trent Drive where flow discharges back into the open channel section of PLB tributary downstream of the site.

3.27 Pluvial flows generated within the north western part of the site flow around existing buildings and either discharge onto Walmersley Old Road via the site access or contribute to the pluvial floodwaters ponding within the existing south western car park.

3.28 The EA pluvial flood map indicates that 'Mill Reservoir' is considered to be at high risk of pluvial flooding and indicates a pluvial flood route from the south eastern corner of the reservoir onto the unnamed access road to the east of the site. However, this is not an accurate representation of pluvial risk in this area, with inaccuracies likely due to the

LiDAR data used within the pluvial flood mapping. The eastern banks of Mill Reservoir rise steeply from the top of the reservoir towards the unnamed access road to the east. The reservoir banks are lowest along the southern edge, as corroborated by the fluvial flood modelling results. In addition, the pluvial mapping does not account for the outflow weir from Mill Reservoir or the sub-surface continuation of PLB Tributary through the site. This false flood route originating from the reservoir re-enters the site at the south-eastern corner and as such may have an impact on the flood depths at the south eastern site boundary as described in Paragraph 3.21 above.

3.29 The SWMP for Greater Manchester which covers the Bury area does not state that the site is located within a Critical Drainage Area or that any specific flood instances have occurred within the vicinity of the site.

3.30 Pluvial flood risk is considered moderate for the site.

Overland Flow Flood Risk Mitigation Measures

3.31 Existing levels vary significantly across the site due to the site's former use. Existing levels are to be regraded as part of development proposals which will eliminate existing areas of ponding. As a precautionary measure, finished floor levels of proposed dwellings will be raised 150mm above surrounding finished ground levels.

Av) Assessment of Flood Risk from Groundwater

3.32 BGS records indicate the site is situated on geology of Rough Rock - Sandstone overlain by superficial till deposits of Diamicton. An intrusive site investigation has been undertaken which encountered made ground up to 4.0m in depth. No discernible groundwater aquifer was identified as part of the intrusive investigation. However, perched groundwater was identified within the monitoring wells with seepages occurring within 7 of 14 boreholes. Seepages occurred between 0.75 – 3.5m bgl. The BRO SFRA indicates that there have been relatively few recorded instances of groundwater flooding within Bury. Therefore, flood risk from groundwater is considered low.

Groundwater Flood Risk Mitigation Measures

3.33 Proposed attenuation SuDS features can be lined with an impermeable geomembrane as required in the areas where shallow groundwater seepages were found by the intrusive site investigation. In addition, finished floor levels will be raised some 150mm above finished ground levels.

Avi) Assessment of Flood Risk from Artificial Sources

3.34 The flood risk posed by Mill Reservoir has been outlined within the fluvial flood risk section of this report. The EA Flood Risk from Reservoirs mapping indicates the site is at risk of flooding from Ashworth Moor Reservoir, an upland water supply reservoir belonging to UU serving the Rochdale area, some 2.2km to the north of the site. Refer to CEC Figure 6155/500 Figure 4 [*EA Flood Risk from Reservoirs Map*] in Appendix 1. Regular maintenance and inspection of Ashworth Moor Reservoir is undertaken by UU and is enforceable by the Environment Agency under the Reservoir Act 1975. Therefore, flood risk is considered to be low.

Reservoir Flood Risk Mitigation Measures

3.35 No mitigation required.

Table 3.1: Assessment of Flood Risk to the Development Site Arising from External Sources

Source of Potential Flooding to the Development Site	Flood Risk	Mitigation/Comments
Fluvial	Moderate	▪ Hydraulic modelling has determined that the site is partly within Flood Zone 3, arising from overtopping of the Mill Reservoir. ▪ Mill Reservoir to be removed as part of development proposals reducing existing risk ▪ Existing culverted section of PLB tributary to be abandoned and replaced with open watercourse designed to contain the 1:100 year + 70% climate change event without flooding ▪ Compensatory flood storage area (FSA) proposed to ensure flows do not increase downstream of the site for events up to the 1:1000 year event. ▪ Bio-engineered solutions will be incorporated into the detailed design of the FSA and proposed open channel. ▪ Groundraising in the southern extent of the development in accordance with finished levels shown on CEC Plan 6155/502(E) *Proposed Site Layout* (Appendix 4) will ensure that flooding within the development does not occur for fluvial flows up to the 1:1000 year event. ▪ The FSA top of bank level will be set at 149.70mAOD so as to be able to accommodate flow arising from fluvial events up the 1:1000 year event. ▪ the proposed open channel and downstream pipework are appropriately sized to convey flows without flooding
Overland Flow	Moderate	▪ Site to be reprofiled as part of proposed development reducing potential areas for ponding ▪ Finished floor levels to be raised 150mm above surrounding finished ground levels
Groundwater	Low	▪ Proposed SuDS features to be lined with an impermeable geomembrane in areas of site with potential for elevated perched groundwater ▪ Finished floor levels to be raised 150mm above surrounding finished ground levels
Public Sewers	Low	Finished floor levels to be 150mm above surrounding finished ground levels

Source of Potential Flooding to the Development Site	Flood Risk	Mitigation/Comments
Ditches	Low	No mitigation required
Reservoirs		

B) Assessment of Flood Risk Arising from Surface Water Discharge from the Proposed Development

Refer to CEC Plan 6155/502(E) [*Proposed Site Layout*] in Appendix 4.

3.36 In order to mitigate flood risk posed by post development runoff, adequate control measures will need to be considered within the site.

Bi) Surface Water Runoff Control

Refer to Appendix 3 for Calculations and Table 3.2 below.

3.37 The proposed development will introduce some 3.4ha of impermeable surfaces in the form of access roads and roof areas. For calculation purposes an impermeable area of 50% of the total developable area (6.8ha) has been assumed. The additional runoff arising from development will need to be managed in accordance with sustainable drainage principles.

Bii) Infiltration Potential

3.38 Intrusive investigation indicated extensive made ground across the site, with depths of up to 4.0m. Refer to SI extract in Appendix 2. In addition, due to the site's former use contamination may be present across the site with the intrusive investigation indicating a presence of hydrocarbon impacted soils. Therefore, an infiltration-based strategy is unlikely to be appropriate and an attenuation-based strategy is proposed, with discharge to be made to PLB tributary.

Biii) Proposed Discharge Rate

3.39 Equivalent greenfield runoff rates and existing brownfield rates from the proposed and existing hard areas respectively have been calculated. Please refer to calculated runoff rates in Section 2.0.

3.40 Post development runoff will be restricted to the equivalent QBAR runoff rate for a site area of 9.0ha (i.e. the site area of 10.9ha – 1.9ha of retained public open space) which is

equivalent to 93l/s. This will provide some 75% betterment over the 1:1 year brownfield runoff rate of 368.2l/s and 92% betterment over the 1:100 year brownfield rate of 1164.8l/s.

3.41 All attenuation facilities will be designed to accommodate and dispose of runoff from storms up to the 1:100 year + 40% climate change event, without flooding.

Biv) Proposed Discharge Location

3.42 It is proposed to discharge post development surface water to the existing culverted section of PLB tributary to remain at the south of the site where it passes beneath Mill Road.

Bv) Proposed Surface Water Drainage

3.43 Surface water runoff generated from impermeable areas within the development will be managed utilising attenuation SuDS. This will comprise online storage within oversize pipes for storms up to the 1:30 year runoff event and offline storage provided in below ground crates, subject to detailed design, for storms greater than the 1:30 year event up to the 1:100 year + 40% climate change event.

3.44 Calculations indicate that some 672m^3 of storage is required to restrict runoff for the 1:30 year event and that some 1638m^3 of runoff is required to restrict runoff from the 1:100 year + 40% climate change event to the equivalent QBAR runoff rate of 93l/s. A preliminary surface water drainage strategy has been prepared by Barratt Homes Manchester and indicates sufficient space exists within the development layout to accommodate both the online and offline storage. Post development discharge is to be controlled using a HydroBrake flow device, or similar. See calculations within Appendix 3. Preliminary modelling has been undertaken using MicroDrainage software.

3.45 The 672m^3 of storage for the 1:30 year can be provided in 300m of 1500mm diameter pipe and 12no. 3m diameter manholes. The additional 966m^3 of storage required to attenuate post development flows from the 1:100 year + 40% event will be provided within below ground cellular storage.

Table 3.2: Summary of Existing & Proposed Surface Water Discharge Rates

Area (ha)		Discharge Point	Calculation Method	Discharge Rate (l/s)				Attenuation Volume Required (m^3)
				1:1 yr	1:30 yr	1:100 yr	1:100 yr +40%	
Green-field	10.88 (soft)	To ground	ICP SUDS	97.9	191.5	235.0	-	-
Brown-field	4.49 (hard)	Unattenuated to public combined sewer and PLB tributary	Micro Drainage	368.2	905.3	1164.8	-	-
Proposed hard area	3.4	Attenuated to PLB tributary	Micro Drainage	<93.0	<93.0	93.0	93.0	672 (1:30yr) 1638 (100 yr)

Design Exceedance

3.46 Should the onsite drainage system fail under extreme rainfall events or blockage, flooding may occur within the site. Any resultant floodwater will be routed along the highways in a southerly and easterly direction, towards the open channel of the PLB tributary where flows will be conveyed away from the site.

Water Quality

3.47 Water quality has been assessed in line with the Simple Index approach from Chapter 26 of CIRIA *C753 The SuDS Manual:*

1. Step 1 – Allocate suitable pollution hazard indices for the proposed land use.
2. Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index.

3.48 The highest pollution hazard level for the proposed land use is Low (residential car parks and low trafficked roads). The pollution hazard indices for this land use are shown in Table 3.3 below.

Table 3.3: Pollution Hazard Indices for the Proposed Site (from Table 26.2 of CIRIA C753 The SuDS Manual)

Total suspended solids (TSS)	Metals	Hydrocarbons
0.5	0.4	0.4

3.49 SuDS components to be used in the development should be assessed for their effectiveness in pollutant removal prior to discharge to surface waters in accordance with Table 26.3 in CIRIA *C753 The SuDS Manual*. Runoff from residential roofs is considered to be of a low pollution hazard. Petrol/ oil interceptors will be used to treat runoff from proposed parking

areas and highways. No pollution mitigation indices are available for this proprietary treatment system but their use will ensure sufficient water quality treatment prior to discharge to PLB tributary.

Adoption & Maintenance

3.50 All on-site sewers, including oversized pipe attenuation storage and offline storage will be offered for adoption by United Utilities. The proposed open channel of the PLB tributary with associated structures, compensatory FSA and offline storage (if not adopted by UU) will be maintained by a private management company. A suggested Maintenance Schedule is outlined in Table 3.4 below.

Cellular Storage

3.51 It is not envisaged that silt build up within the cellular crate systems will require a rigorous maintenance regime so long as silt is removed from upstream catch pits and inspection chambers on a regular basis. Notwithstanding this, a suitable maintenance regime for the systems will comprise of routine inspection and silt removal (as necessary). Inspection should be undertaken using CCTV equipment offered up the inspection tunnels located within the crate system. Camera access can be gained via inspection chambers and inlet pipework located at each end of the tunnels.

3.52 Silt removal can be achieved by jetting the inspection tunnels. Jetting should be undertaken in accordance with current jetting guidelines, in particular the Code of Practice for Sewer Jetting published by The Water Research Centre. Jetting at 150bar at 300l/min should be more than adequate in removing any build-up of material within the tunnel. The crate system will take higher pressures. However, unlike regular jetting which relies heavily on high pressure to remove hardened deposits on the inner bore of pipes, effective cleansing of a crate system relies more on the delivery flow rate to flush solids back through the system.

3.53 A standard jet head with rear facing nozzles should be used. The head should be fed to the far end of the crate tunnel via the nearest inspection chamber, activated and retracted. As the nozzle is removed, debris will be swept back into the inspection chamber where it can then be removed with the use of a standard gully sucker. This method will ensure the effective removal of gross solids (carrier bags, cans, leaf litter etc.) from the system. Whilst 100% removal cannot be guaranteed, it has been shown that this jetting

method will also remove an element of finer material which would otherwise be 'lost' within the system.

Pipework and Catchpits

3.54 It is not envisaged that silt build up within the pipework systems (including oversize pipes) will require a rigorous maintenance regime so long as silt is removed from upstream catch pits on a regular basis. Notwithstanding this, a suitable maintenance regime for the systems will comprise of routine inspection (every six months) and silt removal (as necessary).

Flow Controls

3.55 Flow controls should be inspected regularly for blockages and silt/ debris removed as necessary.

Table 3.4: Suggested Maintenance Regime for Elements of the Drainage Infrastructure

Drainage Element	Maintenance Requirement	Frequency
Catchpits	Inspect and remove silt	To be inspected every 6 months and silt removed as necessary
Inspection chambers & flow controls	Inspect and remove silt/ debris	To be inspected every 6 months and silt/ debris removed as necessary. Flow control to be checked for blockages.
Cellular Storage	Inspect and remove debris	CCTCV inspection following first storm event. Monthly CCTV inspections for first 3 months. 6 monthly CCTV inspections thereafter. Jetting to remove silt as necessary.

Note: In addition to the above maintenance requirements, it is recommended that all drainage elements are inspected:

- Following the first storm event
- Monthly for the first 3 months following commissioning

4.0 FOUL WATER DRAINAGE

4.1 UU asset records indicate the presence of a public 300mm diameter combined water sewer located to the west of the site within Walmersley Old Road. Refer to Appendix 2.

4.2 It is proposed to discharge foul water by gravity from the site to the existing public combined sewer at the junction of Mill Road and Walmersley Old Road. A new manhole will be installed on the line of the existing public combined sewer to which post development foul flows will discharge.

4.3 The anticipated peak foul flows generated by the 268 dwellings will be 12.4l/s.

4.4 All proposed foul water infrastructure will be offered for adoption by United Utilities.

5.0 DISCUSSION AND CONCLUSIONS

Assessment of Flood Risk from External Sources

5.1 Flood risk to the proposed development from various sources, sewers, groundwater, drains, ditches and overland flow has been considered in this study. Flood risk from fluvial and pluvial sources are considered moderate, all other sources are considered to be low.

5.2 As part of the proposed development Mill Reservoir is to be removed, reducing existing fluvial flood risk. Furthermore, a proposed compensatory flood storage area (FSA), 300m reach of proposed open channel (that will largely replace the onsite existing culvert) and new linking pipework will have sufficient capacity to be able to accommodate all events up to the 1:1000 year event without increasing flood risk to the application site or elsewhere. The proposed works will provide a reduction in flood risk compared to the existing situation.

5.3 Bio-engineered solutions will be incorporated into the detailed design of the FSA and proposed open channel.

5.4 Groundraising in the southern extent of the development in accordance with finished levels shown on CEC Plan 6155/502(E) [*Proposed Site Layout*] (Appendix 4) will ensure that flooding within the development does not occur for fluvial flows up to the 1:1000 year event.

5.5 The FSA top of bank level will be set at 149.7mAOD so as to be able to accommodate flow arising from fluvial events up the 1:1000 year event.

5.6 The Applicant acknowledges that culvert repairs to the existing culvert that is to be retained will be required as part of the development implementation. This, so as to ensure that the culvert has a structural life consistent with the lifetime of the development.

5.7 The culverted watercourse (comprising proposed 1200mm pipework downstream of the proposed open channel and the existing culvert to be retained) will have a minimum 10m wide easement for maintenance purposes. This minimum easement width is considered sufficient to enable future access to or replacement of the culvert.

5.8 Other mitigation measures include reprofiling as part of the proposed development to reduce potential areas for ponding and raising finished floor levels to be raised 150mm above surrounding finished ground levels. Proposed SuDS features will also be lined with an impermeable geomembrane in areas of site with the potential for elevated perched groundwater.

Assessment of Flood Risk Arising from Surface Water Discharge from the Proposed Development

5.9 The development site is on brownfield land. The proposed development will introduce impermeable surfaces in the form of access roads and roof areas. Surface water runoff from the development site will be managed on site for storms up to the 1:100 year + 40% climate change event, without flooding.

5.10 Post development runoff will be discharged via the use of attenuation SuDS. All attenuation facilities will be designed to accommodate and dispose of runoff from storms up to the 1:100 year + 40% climate change event, without flooding.

5.11 Post development runoff will be restricted to the equivalent QBAR runoff rate of 93l/s.

5.12 Preliminary calculations indicate that some 1638m^3 of storage is required within the proposed attenuation system to restrict flows from the 1:100 year + 40% event to 93l/s. Attenuation SuDS will comprise 672m^3 of online storage within oversize pipes for storms up to the 1:30 year runoff event and 966m^3 of offline storage provided in below ground crates, subject to detailed design, for storms greater than the 1:30 year event up to the 1:100 year + 40% climate change event. Outflow from the surface water drainage system will be controlled using a HydroBrake or similar flow control device.

5.13 Should the onsite drainage system fail under extreme rainfall events or blockage, flooding may occur within the site. Any resultant floodwater will be routed along the highways in a southerly and easterly direction, towards the open channel of the PLB tributary where flows will be conveyed away from the site.

5.14 Runoff from roofs is considered relatively clean. However, an oil interceptor will be implemented to treat runoff from parking areas.

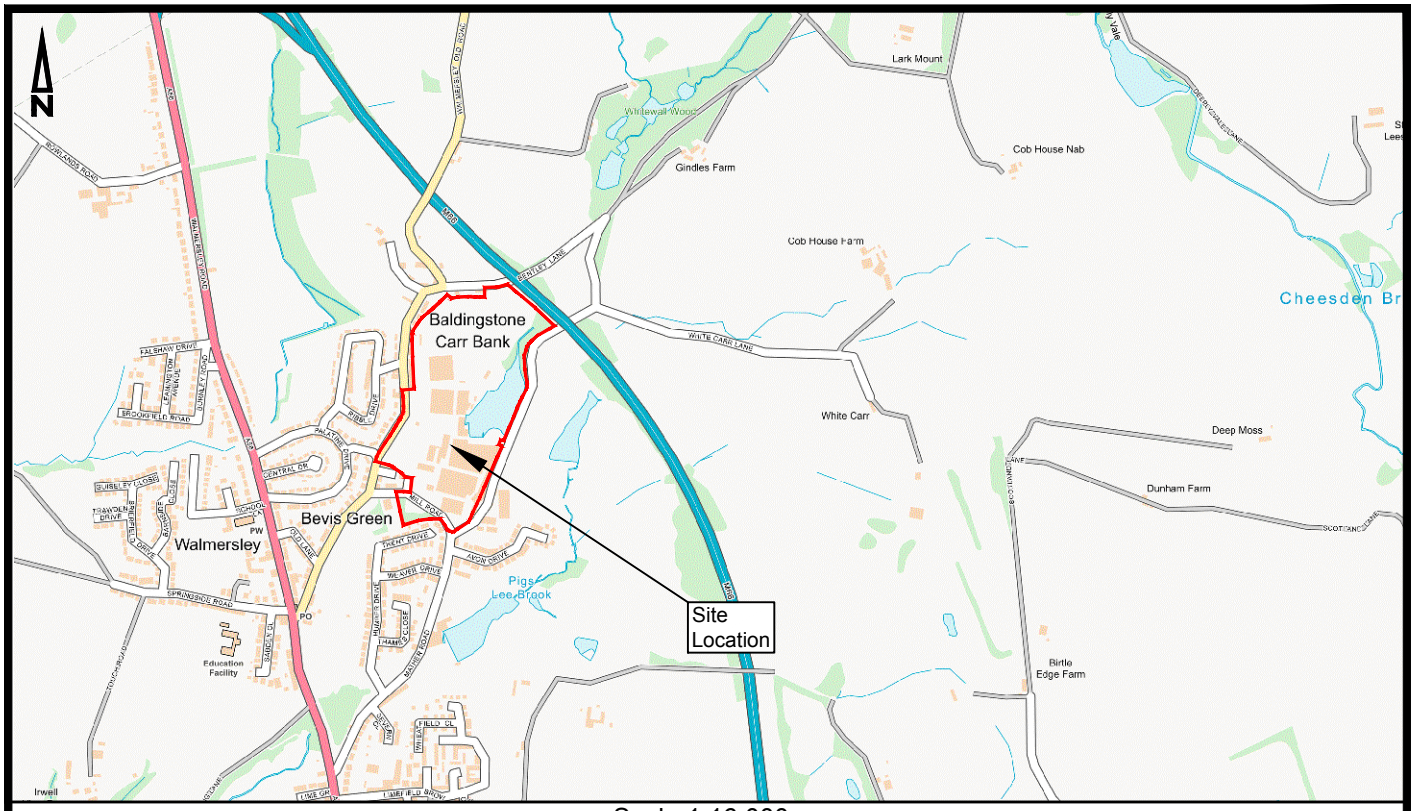
5.15 All on-site sewers, including oversized pipe attenuation storage and offline storage will be offered for adoption by United Utilities. The proposed open channel of the PLB tributary with associated structures, compensatory FSA and offline storage (if not adopted by UU) will be maintained by a private management company.

5.16 Foul water from the proposed development will be discharged via gravity to the public combined sewer. Proposed foul water pipework will be offered for adoption by United Utilities.

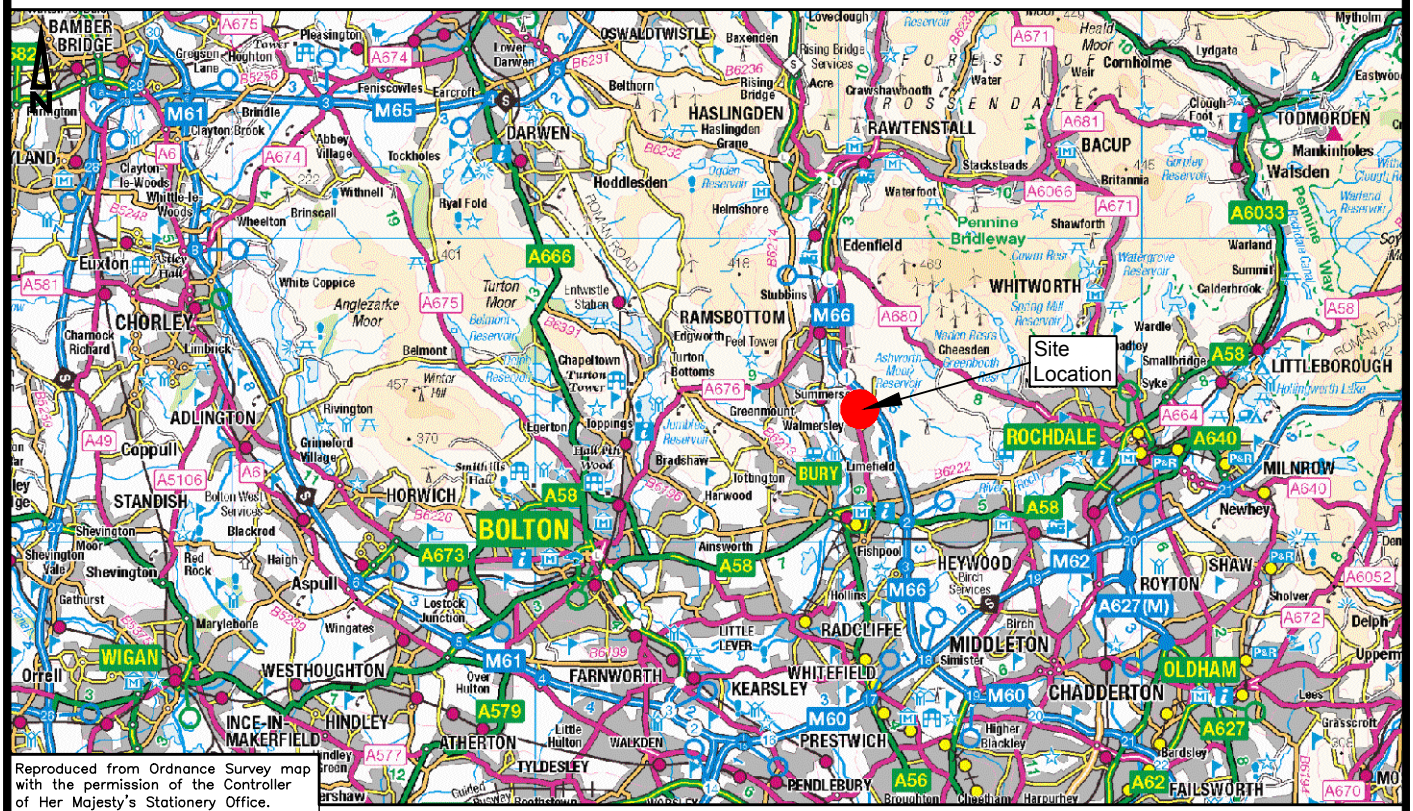
5.17 This study has been undertaken in accordance with the principles set out in NPPF. We can conclude that providing the development adheres to the conditions advised in Paragraphs 5.1 to 5.16 above, the said development proposals can be accommodated without increasing flood risk within the locality in accordance with objectives set by Central Government and the EA.

Cole Easdon Consultants Limited
October 2019

Appendix 1



Scale 1:16,000



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Job Title:
Proposed Residential Development
Former Tetrosyl Site
Walmersley Old Road
Bury

Client:
Barratt Homes (Manchester)

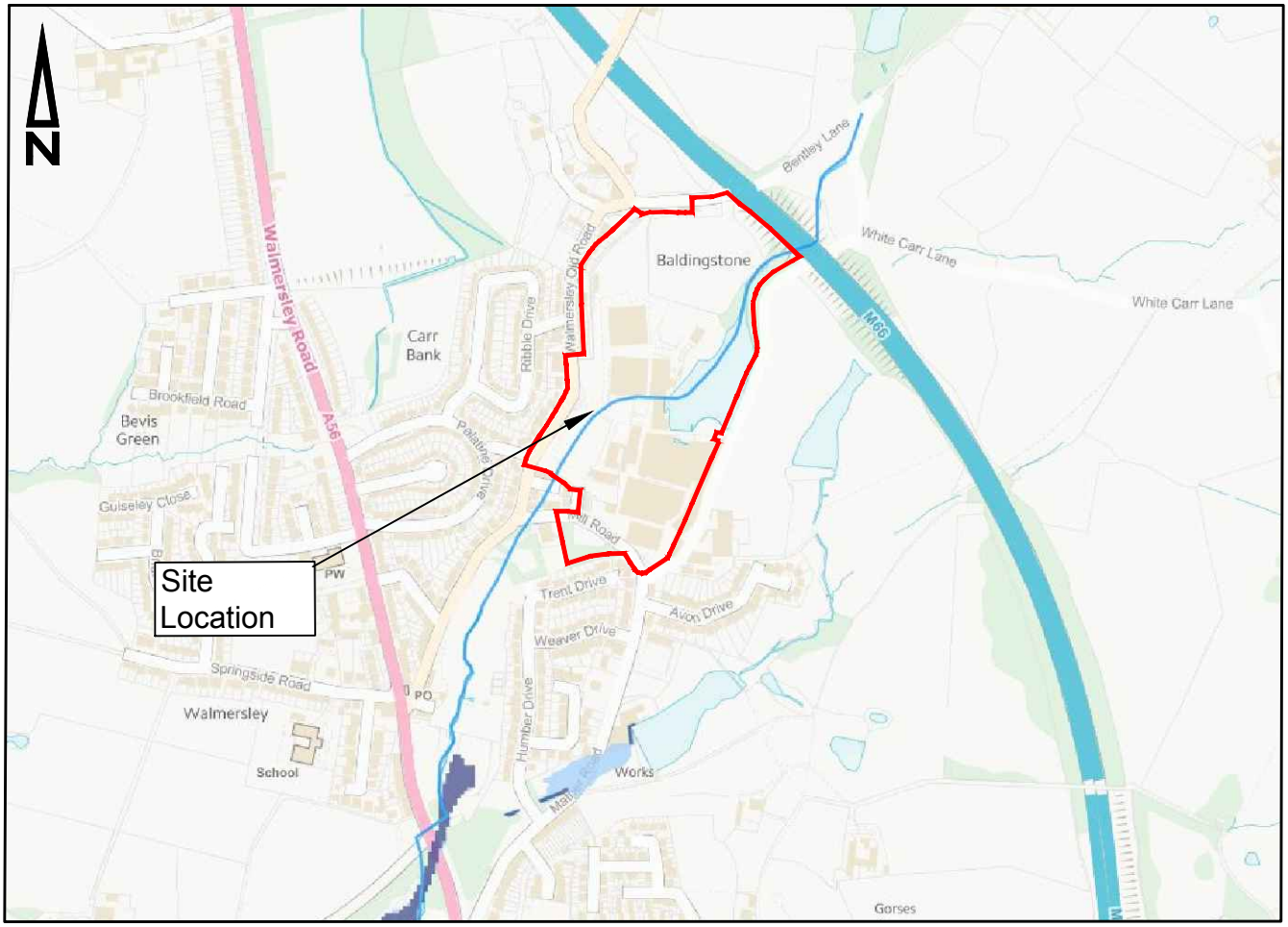
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	FOR COMMENT	
	FOR PLANNING	X
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	FOR APPROVAL	
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Drawing Title:
Site Location Plan

Drawn By	Date Drawn	Scale
NJ	April 2018	As shown (A4)

Checked By	Drawing No.	Revision
DF	6155/500 Figure 1	



Flood Zone 1 - Low Risk

Flood Zone 2 - Medium Risk

Flood Zone 3 - High Risk

Main Rivers

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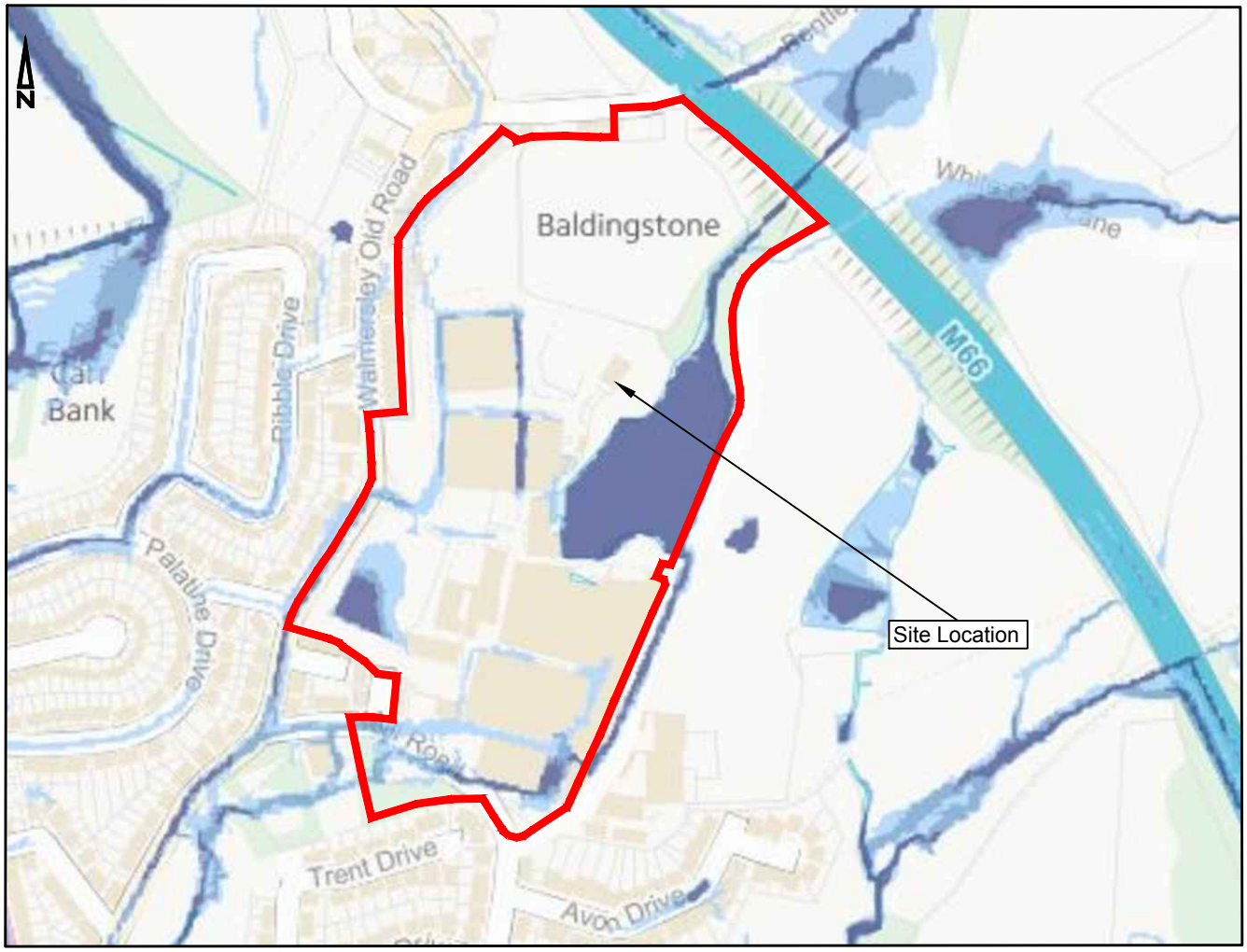
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	FOR PLANNING	X
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	FOR APPROVAL	
	FOR CONSTRUCTION	
	AS BUILT	

Drawing Title:
EA Flood Zone Map

Drawn By	Date Drawn	Scale
NJ	April 2018	1:10,000 @ A4

Checked By	Drawing No.	Revision
DF	6155/500 Figure 2	



Surface Water Flooding - Low Risk

Surface Water Flooding - Medium Risk

Surface Water Flooding - High Risk

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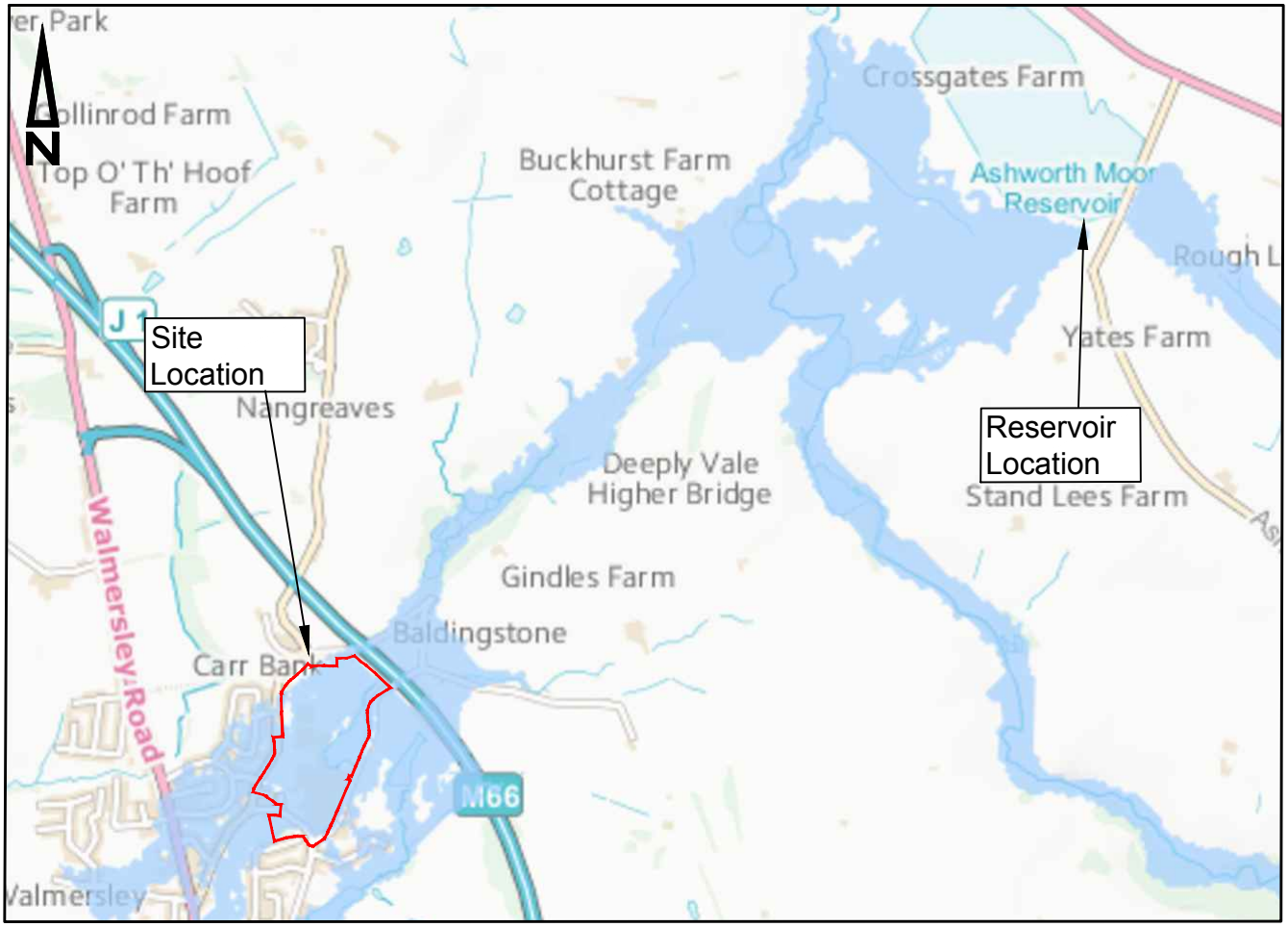
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	FOR PLANNING	X
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Drawing Title:
EA Surface Water Flood Zone Map

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DF	6155/500 Figure 3	



Maximum extent of flooding

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Bury

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Barratt Homes (Manchester)

Drawing Status:

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	FOR PLANNING	X
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Drawing Title:
EA Flood risk from reservoirs Map

Drawn By	Date Drawn	Scale
ZB	November 2018	1:20,000 @ A4

Checked By	Drawing No.	Revision
DF	6155/500 Figure 4	

Appendix 2

PHASE I AND PHASE II
GEO-ENVIRONMENTAL SITE INVESTIGATION

Bevis Green Works (Tetrosyl)
Mill Road
Walmersley
Bury
Lancashire
UK
BL9 6RE

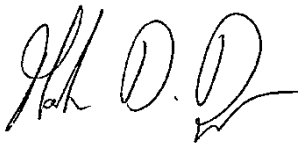
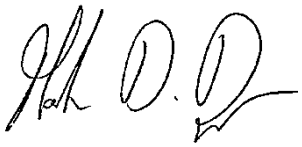
E3P Report: 10-110-r1
Issued: May 2014

Prepared for

Tetrosyl
Group Limited

e3p | Environmental | Energy | Engineering

QUALITY ASSURANCE

Remarks	Final
Date	May 2014
Prepared by	M. Dyer
Qualifications	BSc, FGS, AIEMA, MIEnvSc, CEnv
Signature	
Checked by	A. Edgar
Qualifications	BSc, AIEMA, MIEnvSc, CEnv
Signature	
Authorised by	M. Dyer
Qualifications	BSc, FGS, AIEMA, MIEnvSc, CEnv
Signature	
Project number	10-110

Environment – Energy – Engineering

E3P
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UK

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EXECUTIVE SUMMARY

Site Address	Tetrosyl Ltd, Bevis Green Works, Mill Road, Walmersley, Bury
Grid Reference	380950, 413950
Site Area	10.46 hectares or 25.85 acres
Current Site Use	The site is an operational formulation plant for Tetrosyl's car care products, with mixing, blending, packaging, storage and distribution activities being undertaken within various buildings across the site. A large reservoir is located within the central eastern sector of the landholding with the dam / high wall at the southerly end. The majority of the proposed development footprint is occupied by large industrial buildings that comprise 19th century mills and more modern portal frame warehousing.
Topography	The site can be split between the upper and lower sectors with large 19th century mill buildings and reservoir dams forming retaining features. The developable area falls from circa 154m AOD at the northern tank farm to circa 139m AOD at the entrance from Mill Lane at the south west boundary. The eastern boundary is formed by Cross Hall Lane, which is at a similar elevation to the north eastern boundary, however the current site levels drop significantly at the southern end of the reservoir which results in a level change from the top of the embankment at 149.38 to 138.90 at the lower level building floor slab. This 11.0m level difference appears to have been a result of the forming of the reservoir dam in the 19th century. Two further in-filled reservoirs are present within the central and southwest sectors which have also resulted in notable level changes as the site appears to have been redeveloped from a level plateau formed by the in-filling works.
Environmental Setting	The site is underlain by a Secondary Aquifer. Five groundwater abstractions have been identified within a 1km radius of the site. The site is not within an area that is at risk from flooding.
Site History	Historical maps indicate that the site has been used to house Cotton Mills, a Dye Works and later a Print Works. A second reservoir was formerly situated in the south western sector of the site and a quarry was present in the northern sector.
Utility Locations	A review of online data held by United Utilities shows no sewer or drainage services on site, however facilities are available in the immediate surrounding area.
Landfill Sites & Ground Gases	Made Ground associated with the in-filled reservoirs and quarries has been identified as a potential source of ground gas and chemical vapours.
Radon	Unaffected – no special precautions required.
Coal Mining / Land Stability	Three recorded Coal Authority assets are present within the curtilage of the proposed development site, these are: - Adit – South eastern boundary; - Shaft – Far Southeast boundary; and,

	• Air Shaft Central northern sector. A review of the detailed Coal Authority Mine Abandonment Plans in consultation with Coal Authority surveyors suggests that the south eastern sector of the subject site may be underlain by shallow mine workings which could pose a theoretical risk of subsidence at the surface due to successive cavitation's of any workings. Further detailed intrusive Ground Investigation and risk assessments are required in accordance with the Coal Authority Permissions Process to confirm the following: • Location of the historic Adit & its current condition; • Presence / absence of shallow mine workings; • Location of historic mine shaft at southeast boundary; • Location, size and depth of historic sir shaft in the central north; • Confirm the absence of shallow coal workings within the area of the historic air shaft; and, • Preparation of a suitable programme of stabilisation works in accordance with the Coal Authority Permissions Process.
Intrusive Ground Investigation	
Ground Conditions	Made Ground Extensive depths of Made Ground are present across the majority of the proposed development site, extending to depths of circa 4.0m in the western sectors within the area of in-filled reservoirs, generally 2.0 to 3.0m in the central and southern sectors. No Made Ground was identified within the sampling location toward the northern margins of the wider landholding, albeit this is outside the area of proposed development. The backfilled materials are highly variable, and the extent of exploratory investigations is limited by the operational nature of the subject site. Inter-bedded granular and cohesive matrices are present throughout the site. Drift Stiff / high strength glacial clay soils have been identified underlying the Made Ground towards the northern sector of the site, overlying very dense sand and gravel stratum (possible weathered Millstone Grit bedrock). Ground Water No discernable aquifer has been identified (partially due to the limitation of the exploratory investigative technique). Perched groundwater has been identified within the monitoring wells. The underlying weathered bedrock may provide some degree of effective porosity. In general the current buildings have been 'cut' into the natural landform, with former reservoirs and lower elevations in-filled to create level plateaus across the site.

Tier 1 Contaminated Land Risk Assessment	
Human Health	Elevated concentrations of non-volatile inorganic heavy metals, PAH and trace asbestos fibres have been identified within the underlying Made Ground across the subject site. Further post decommissioning investigation will be required to quantify the exact level of risk, however this pollutant linkage can be mitigated through the adoption of the following mitigation processes; • ***Careful management of soils during the remediation & enabling works and placement of problematic materials within area of low / non sensitivity; and,*** • ***Construction of a suitable cover system (nominally 600mm) within all areas of private garden, soft landscaping and Public Open Space.*** Elevated volatile (aliphatic and aromatic) petroleum range (BTEX) compounds have been identified within the shallow soil and groundwater adjacent to the AST's used for the storage / recovery of bulk solvents and UST's used to store petrol, diesel and white spirit. The elevated contaminants of concern would pose an unacceptable level of risk to chronic human health. Therefore; upon safe decommissioning of all AST's and UST's, further detailed intrusive investigations will be required to inform the production of a Tier 2 Detailed Quantitative Risk Assessment, (DQRA) that will derive the Site Specific Remediation Targets (SSRT's) and ultimately define the extent of remediation works. It is considered that the potential pollutant linkage associated with volatile hydrocarbon compounds can be mitigated through the bioremediation of impacted soil and on-site treatment of groundwater to ensure the most cost effective, legislatively compliant and sustainable development solutions. On completion of site decommissioning and demolition works, further intrusive Ground Investigation works will be required.
Controlled Waters	Elevated concentrations of volatile, soluble phase C5-C12 (aliphatic & Aromatic) hydrocarbon impact has been identified within the immediate vicinity of the Above-ground Storage Tanks (AST's) in the northern sector of the site. The reported concentrations would pose an unacceptable level of risk to the critical on-site controlled waters receptors (reservoir & culvert) and underlying aquifer. Further intrusive sampling will be required as and when the site has been fully decommissioned, to inform the production of a robust Tier 2 DQRA that will define the Site Specific Remediation Targets, to ensure the site is developed in a manner that will pose no unacceptable level of risk to controlled waters and the wider environ.
Eco-toxic	No significantly elevated concentrations of eco-toxic contaminants have been identified within the intrusive ground investigation works completed to date.
Ground Gas	The initial assessment has identified significantly elevated concentrations of methane and carbon dioxide, attributed to the decomposition of organic materials within the deep Made Ground (reservoirs) and possibly the anaerobic degradation of hydrocarbon (solvent) impact to the near surface soil and groundwater. Extensive land remediation and enabling works will be required to facilitate the construction of a suitable development platform, which will accommodate the proposed low rise residential structures. As part of the enabling works process, a significant amount of material will be excavated and treated, to

	either remove the hydrocarbon contamination or degradable organic matter, and thus treat the identified sources of hazardous ground gasses. Ground Gas Monitoring including (VOC analysis) is currently on-going, the results of which will be reported as an addendum to this document in July 2014.
Potable Water Infrastructure	It is likely that hydrocarbon resistant potable water supply infrastructure will be required for this development site. On completion of the land remediation and enabling works, a UKWIR assessment should be completed, to inform the detailed design of potable water supply infrastructure.
Geotechnical Assessment	
Underground Obstructions	The site is underlain by notable historic features in the form of backfilled reservoirs, quarries that contain notable quantities of large buried obstructions and high walls. Historical mapping confirms the presence of features such a large chimneys, culverts, machine beds and reservoir high walls. In light of the site history, it is considered that the entire site will be underlain by large relict obstructions, which will need to be removed to facilitate the proposed development.
Allowable Bearing Capacity	The site is underlain by stiff high strength clay soils, with a calculated Allowable Bearing Pressure in excess of 125kN/m2, overlying very dense sand and gravels at circa 3.0-5.0m bgl with an ABP in excess of 300kN/m2.
Foundation Options	It is considered that a well-designed remediation and enabling works programme is to be completed in conjunction with a site wide cut / fill works, to ensure the placement of granular materials beneath the proposed plot footprints to facilitate re-engineering through the construction of vibro replacement stone columns. Plots within the in-filled reservoir, adjacent to sensitive retaining structures and deep cohesive fills will require a piled foundation.
Soak-away Drainage	The underlying weathered bedrock will provide some degree of infiltration potential, therefore soak-away drainage may be viable within the central, northwest and southwest sectors of the site. The presence of soluble hydrocarbon impacted soil and groundwater may result in limitations in the use of Soak-away drainage.
Sulphate Assessment	Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005).
CBR Design %	It is considered that site remediation and enabling works will re-engineer the Made Ground to ensure a CBR of 5% and thus ensure standard highway construction.
Cut / Fill	The site has significant topographical variances, which are formed by retaining features, incorporated into the existing 19th century mill buildings. It is considered that a large scale cut / fill exercise will be required to achieve a development platform, suitable to accommodate the proposed low rise residential units and critically the adopted infrastructure.
Waste Classification	Stable Non-Reactive (Non Hazardous & Inert)
Surface Water	The existing culvert will need to be addressed as part of the detailed surface water management plan and external works design.

	An initial appraisal of the subject site in relation to the proposed development, would suggest that a large scale earthworks exercise is required to construct a suitable development platform, which will accommodate the appropriate highway and pavement grade.
Earthworks	The current reservoir and adjacent highway levels will constrain the proposed development at the central and eastern boundary, with existing properties in the south-western also a factor. It is likely that large scale up-filling, combined with some retaining structure will provide the optimum development platform.

Development Considerations

To facilitate the cost effective, legislatively compliant and sustainable regeneration of the Bevis Green Works for a low rise residential end use, the following key development constraints must be addressed within the site Remediation & Enabling Works:

- Safe decommissioning of all above ground and below ground solvent, petroleum and diesel storage tanks and all associated infrastructure;
- Further detailed contamination investigation within the immediate vicinity of each and every identified tank / piece of infrastructure to accurately define the extent of vertical and lateral migration of soluble / volatile hydrocarbon impact within the underlying soils;
- Further investigation within the areas of identified deep Made Ground to characterise the nature across the site;
- Confirmation with respect to the absence of any soluble phase hydrocarbon impact to the underlying aquifer within the superficial drift deposits and solid rock formations;
- Development of Site Specific Remediation Targets to inform the pragmatic remediation of impacted soil and groundwater;
- Development of a suitable on-site (in-situ / ex-situ) remediation solution to treat impacted soils to ensure they comply with the SSRT's;
- Completion of further detailed intrusive investigations within the areas of the known mine workings at the central northern sector (air shaft) and south east (Adit, shaft & possible shallow workings) to inform an appropriate risk assessment in accordance with the standards and guidance set out within CIRIA32;
- Identify the precise location of all mine entries and if present shallow coal workings, undertake stabilisation works in accordance with the Coal Authority Permissions Process and in general accordance with CIRIA 665;
- Define the extent of the in-filled quarry within the central northern sector, demarcation of all high walls and assess the need for ground work in this sector to facilitate development of residential dwellings, highways and infrastructure;
- Removal of all Asbestos Containing Material from within the building fabric, in strict accordance with the UK Control of Asbestos Regulations (CAR 1212);
- Identify the location of the large surface water culvert emanating from the reservoir in the central eastern sector and exiting at the southwest boundary;
- Demolition of all buildings, slabs, foundations, drainage infrastructure and anthropogenic obstructions across the entirety of the site in a controlled manner;
- Treatment of all invasive plant species;
- Treatment of all in-filled reservoirs to remove any deleterious content and render the ground suitable for re-engineering to facilitate the development of residential housing and ancillary

7.0 GROUND INVESTIGATION

7.1 General

A ground investigation has been designed based on the findings in consideration of the historic reports and findings of the desk study review completed with exploratory holes advanced to target specific potential contaminant sources summarised in Table 7.1.

It must be noted that the current operational nature of the site restricted the extent of the ground investigation works and as such exploratory holes were limited in to specific locations adjacent to point sources of contamination as identified within the E3P site walkover survey.

Table 7.1 Summary of Fieldwork

Potential Source/Rationale	Location Hole	Type	Maximum Depth (m bgl)	Monitoring Wells Response Zone
In-filled reservoir	WS101	Window Sample	3.00	N/A
Undeveloped land to north	WS102	Window Sample	1.60	N/A
Northern extremity of Solvent Tank Farm	WS103	Window Sample	2.00	N/A
Eastern edge of solvent recovery plant	WS104	Window Sample	4.45	N/A
Southern UST's	WS105	Window Sample	3.37	N/A
Down gradient of Solvent AST	WS106	Window Sample	3.00	N/A
Southern UST's	WS107	Window Sample	2.70	N/A
Infilled reservoir	WS108	Window Sample	4.00	N/A
Reservoir dam / tank	WS109	Window Sample	4.00	N/A
Solvent storage	WS110	Window Sample	1.00	N/A
Central Solvent Tanks	WS111	Window Sample	1.00	N/A
Central solvent tanks	WS112	Window Sample	1.55	N/A
In-filled reservoir	WS113	Window Sample	4.45	N/A
Diesel AST	WS114	Window Sample	5.45	N/A

Notes
m bgl – metres below ground level.

The window sample probeholes were designed to provide geotechnical information and confirm the findings of the Initial Conceptual Site Model (ICSM).

Return visits were made to monitor installations for groundwater level and gas concentrations. In addition, selected wells were purged and samples of groundwater recovered for chemical analysis. Ground gas monitoring is ongoing with the results to be provided within an addendum to this report.

Selected soil samples were submitted for a range of chemical analysis comprising, metals, pH, total sulphate, water soluble sulphate (2:1 extract), sulphide, cyanide, phenols, total and speciated polycyclic aromatic hydrocarbons (PAHs), asbestos, organic carbon and total and speciated petroleum hydrocarbon (TPH).

The analytical work was completed at an appropriately certified analytical laboratory with testing to UKAS accreditation standards where applicable.

7.2 In-Situ Standard Penetration Testing (SPT)

In-situ geotechnical testing was conducted using the Standard Penetration Test (SPT) and where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube. The testing was conducted using the Cone Penetration Test (CPT). The results are shown in the probehole logs in Appendix VI.

7.3 In-Situ California Bearing Ration (CBR)

No in-situ CBR testing has been completed as part of this phase of intrusive investigation works due to the operational nature of the site**.**

7.4 Laboratory Analysis

Selected soil samples were submitted for a range of chemical analysis comprising, metals, pH, total sulphate, water soluble sulphate (2:1 extract), sulphide, cyanide, phenols, total and speciated poly-aromatic hydrocarbons (PAHs), asbestos, organic carbon and total and speciated petroleum hydrocarbon (TPH).

Exova Laboratories undertook the analytical work and the testing results are included in Appendix VIII.

8.0 GROUND AND GROUNDWATER CONDITIONS

8.1 Ground Conditions

8.1.1 Summary of Ground Conditions

The ground investigation generally confirms the published geology, historic ground investigations and identifies the strata set out in Table 8.1 below:

Table 8.1 Summary of Strata

Strata:	General Description:	Typical Depth (mbgl):			
		Top:		Base:	
		Min:	Max:	Min:	Max:
Made Ground[1]	Dark brown, black clayey gravelly fine to coarse sand. Gravel is fine to medium sub-angular brick sandstone.	0.00	3.00	0.10	4.50
Made Ground[2]	Firm to stiff brown gravelly sandy clay. Gravel is occasional brick gritstone sandstone shale.	0.10	3.30	0.40	4.00
Made Ground[3]	Soft grey brown slightly medium coarse sandy gravelly clay. Gravel is medium to coarse sub-angular to sub-rounded brick gritstone.	0.00	2.70	0.10	3.37
Made Ground [4]	Yellow medium coarse sandy gravel. Gravel is fine to medium sub-angular gritstone.	0.00	0.36	0.18	1.25
Made Ground-Boulders	Grey yellow clayey boulders. Boulders are sub-angular gritstone.	1.00	1.00	1.70	1.70
CLAY	Brown very stiff slightly sandy gravelly CLAY. Gravel is sub-angular to sub-rounded gritstone sandstone shale.	0.00	0.45	1.50	3.80
GRAVEL	Light brown medium coarse sandy GRAVEL. Gravel is fine to coarse sub-angular to sub-rounded gritstone.	0.35	3.80	1.00	4.45
SAND	Yellow brown gravelly SAND. Gravel is fine to medium sub-angular gritstone.	4.50	4.50	5.45	5.45

8.1.2 Made Ground

Made Ground

Extensive depths of Made Ground are present across the majority of the proposed development site, extending to depths of circa 4.0m in the western sectors within the area of in-filled reservoirs, generally 2.0 to 3.0m in the central and southern sectors.

No Made Ground was identified within the sampling location toward the northern margins of the wider landholding, albeit this is outside the area of proposed development.

The backfilled materials are highly variable, and the extent of exploratory investigations is limited by the operational nature of the subject site. Inter-bedded granular and cohesive matrices are present throughout the site.

Drift

Stiff / high strength glacial clay soils have been identified underlying the Made Ground towards the northern sector of the site, overlying very dense sand and gravel stratum (possible weathered Millstone Grit bedrock).

Ground Water

No discernable aquifer has been identified (partially due to the limitation of the exploratory investigative technique). Perched groundwater has been identified within the monitoring wells.

The underlying weathered bedrock may provide some degree of effective porosity.

In general the current buildings have been ‘cut’ into the natural landform, with former reservoirs and lower elevations in-filled to create level plateaus across the site.

Table 8.2 Standard/Cone Penetration Test Results

Boreholes	Depth (m bgl) (i)	Material Field Description	CPT/SPT "N" Value	Corrected "N" Value $(N_1)_{60}$	Terzaghi & Peck Relative Density (Sands)	Eurocode Soil strength	Consistency (BS5930)	Terzaghi & Peck Approximate Undrained Shear Strength (kN/m^2)
WS101	1	MG Gravelly Clay	11	11.09	N/A	Medium strength	Stiff	55.45
WS101	2	MG Gravelly Clay	23	21.01	N/A	High strength	Very Stiff	105.06
WS101	2.5	MG Gravelly Clay	16	14.21	N/A	Medium strength	Stiff	71.05
WS101	3	MG Gravelly Clay	32	27.83	N/A	High strength	Very Stiff	139.14
WS102	1	Sandy Gravelly Clay	43	43.35	N/A	Very high strength	Very Stiff	216.75
WS102	1.5	Sandy Gravelly Clay	50	47.51	N/A	Very high strength	Very Stiff	237.54
WS103	1	Gravelly Clay	15	15.12	N/A	High strength	Very Stiff	75.61
WS103	2	Gravelly Clay	50	45.68	N/A	Very high strength	Very Stiff	228.38
WS104	1	MG Gravelly Sand	1	1.01	Very Loose	N/A	N/A	N/A
WS104	2	Sandy gravelly clay	9	8.22	N/A	Medium strength	Stiff	41.11
WS104	3	Sandy Gravelly Clay	9	7.83	N/A	Low strength	Firm	39.13
WS104	4	Very Sandy GRAVEL	50	42.24	Dense	N/A	N/A	N/A
WS105	1	MG Clayey Boulders	8	8.07	Loose	N/A	N/A	N/A
WS105	2	MG Sandy Gravelly Clay	0	0.00	N/A	FALSE	FALSE	0.00
WS105	3	MG Sandy Gravelly Clay	40	34.79	N/A	Very high strength	Very Stiff	173.93
WS106	1	MG Sandy Gravelly Clay	6	6.05	N/A	Low strength	Firm	30.24
WS106	2	MG Gravelly Clay	8	7.31	N/A	Low strength	Firm	36.54
WS106	3	MG Gravelly Clay	33	28.70	N/A	High strength	Very Stiff	143.49
WS107	1	MG Gravelly Sandy Clay	0	0.00	N/A	FALSE	FALSE	0.00
WS107	2	MG Sandy Clay	0	0.00	N/A	FALSE	FALSE	0.00

Boreholes	Depth (m bgl) (i)	Material Field Description	CPT/SPT "N" Value	Corrected "N" Value $(N_1)_{60}$	Terzaghi & Peck Relative Density (Sands)	Eurocode Soil strength	Consistency (BS5930)	Terzaghi & Peck Approximate Undrained Shear Strength (kN/m^2)
WS107	2.7	Sandy GRAVEL	35	30.80	Dense	N/A	N/A	N/A
WS108	1	MG Gravelly Sand	15	15.12	Medium Dense	N/A	N/A	N/A
WS108	2	MG Gravelly Clay	4	3.65	N/A	Very low strength	Soft	18.27
WS108	3	MG Sand	5	4.35	Loose	N/A	N/A	N/A
WS108	4	MG Gravelly Clay	5	4.22	N/A	Low strength	Firm	21.12
WS109	1	MG Sandy Gravel	13	13.11	Medium Dense	N/A	N/A	N/A
WS109	2	MG Gravelly Clay	6	5.48	N/A	Low strength	Firm	27.41
WS109	3	MG Gravelly Clay	9	7.83	N/A	Low strength	Firm	39.13
WS109	4	MG Gravelly Clay	15	12.67	N/A	Medium strength	Stiff	63.36
WS109	5	MG Gravelly Clay	50	41.48	N/A	Very high strength	Very Stiff	207.41
WS110	1	MG Gravelly Clay	50	50.41	N/A	Very high strength	Very Stiff	252.04
WS111	1	Sandy Gravel	50	50.41	Very Dense	N/A	N/A	N/A
WS112	1	MG Sandy Gravel	8	8.07	Loose	N/A	N/A	N/A
WS112	2	MG Gravelly clay	50	45.68	N/A	Very high strength	Very Stiff	228.38
WS113	1	MG Sandy Gravel	5	5.04	Loose	N/A	N/A	N/A
WS113	2	MG Sandy Gravel	1	0.91	Very Loose	N/A	N/A	N/A
WS113	3	MG Sandy Gravel	2	1.74	Very Loose	N/A	N/A	N/A
WS113	4	MG Sandy Gravel	10	8.45	Loose	N/A	N/A	N/A
WS114	1	MG Gravelly Sand	4	4.03	Loose	N/A	N/A	N/A
WS114	2	MG Clay	2	1.83	N/A	Low strength	Very Soft	9.14
WS114	3	MG Gravelly Sand	1	0.87	Very Loose	N/A	N/A	N/A
WS114	4	MG Gravelly Sand	2	1.69	Very Loose	N/A	N/A	N/A
WS114	5	Gravelly Sand	10	8.30	Loose	N/A	N/A	N/A

Notes
Undrained shear strength values have been taken from correlations with SPT values based on Stroud and Butler and take account of the soil plasticity summarised in Table 2.5.
Stroud and Butler use un-corrected SPT values for the correlations which are based on empirical data.
Certificate of Calibration for the Er Value should be available.
Corrections for overburden and length of rods.
Design SPT values should be corrected below groundwater.

8.1.3 pH and Sulphate

Chemical analyses for pH and soluble sulphate content contained in Appendix VIII (summarised below in Table 8.3), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005).

Table 8.3 Summary of pH and Sulphate Data

Location	Depth (m)	SO_4 in 2:1 water / soil (g/l)	pH Value
WS101	0.5	0.02	7.54
WS102	0.6	0.02	7.26
WS104	0.3	0.01	7.20
WS104	2.5	N/A	N/A
WS105	2.3	N/A	N/A
WS106	0.5	<0.01	7.46
WS107	0.7	0.02	7.69
WS108	1.8	0.02	7.27

8.2 Groundwater Conditions

Groundwater strikes were encountered as seepages at WS104, WS105, WS106, WS107, WS108, WS110 and WS113. The depth of the seepages and the depth to which groundwater rose are shown on the exploratory hole records and summarised in Table 8.2 below:

Table 8.4 Summary Groundwater Strikes

Location	Depth to strike (m)	Depth to standing water (m)	Notes
WS104	3.5	N/A	Seepage
WS105	1.0	N/A	Seepage
WS106	1.5	N/A	Seepage
WS107	1.10	N/A	Seepage
WS108	2.20	N/A	Seepage
WS110	0.75	N/A	Seepage
WS113	1.0	N/A	Seepage

8.3 Ground Gas

Concentrations of methane (CH_4), carbon dioxide (CO_2) and Oxygen (O_2) were measured using an infra-red gas analyser (GA2000) calibrated to a reference standard (before and after each survey) and gas flow rates were measured using an attached flow pod.

Gas measurements were recorded for a minimum of sixty seconds at each location, at which point the maximum concentration of CH_4 and CO_2 together with the lowest concentration of O_2 were recorded. The results of the ground gas monitoring are presented in Appendix VII

APPENDIX VI
E3P EXPLORATORY LOGS

Borehole Log

Borehole No. **WS101**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.50	ES		0.80			MADE GROUND: Dark brown clayey gravelly fine to coarse sand. Gravel is fine to medium sub-angular brick sandstone.
		1.00 1.00 - 1.45	D	N=11 (1,2/2,3,3,3)				MADE GROUND: Stiff brown gravelly clay. Gravel is occassional brick gritstone sandstone shale.
		2.00 2.00 - 2.45	D	N=23 (3,4/5,5,6,7)				
		2.50		N=16 (21 for 0mm/16 for 0mm)				
		3.00 3.00 - 3.45	D	N=32 (5,6/7,7,8,10)	3.00			MADE GROUND: Stiff brown gravelly clay. Gravel is occassional brick gritstone sandstone shale.
					3.45			End of borehole at 3.45 m

Remarks
Refusal - No water strikes.

Borehole Log

Borehole No. **WS102**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.60	ES					Brown very stiff slightly sandy gravelly CLAY. Gravel is sub-angular to sub-rounded gritstone sandstone shale.
		1.00 1.00 - 1.45	D	N=43 (3,3/8,12,15,8)				
		1.50 1.50 - 1.60	D	N=50 (6,12/50 for 236mm)	1.50 1.70			Light brown medium coarse sandy GRAVEL. Gravel is fine to coarse sub-angular to sub-rounded gritstone. End of borehole at 1.70 m

Remarks
Refusal

Borehole Log

Borehole No. **WS103**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.10			MADE GROUND: Soft to firm brown clay with rootlets.
					0.18			MADE GROUND: Yellow medium coarse sandy gravel. Gravel is fine to medium sub-angular gritstone.
		1.00		N=15 (2,3/3,4,4,4)	0.45			MADE GROUND: Firm black brown slightly gravelly clay. Gravel is fine to medium sub-angular shale.
		2.00		N=50 (4,4/8,13,15,14)				Stiff to very stiff gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded sandstone gritstone shale.
					2.45			End of borehole at 2.45 m

Remarks
Refusal

Borehole Log

Borehole No. **WS104**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES					MADE GROUND: Firm to stiff brown slightly sandy gravelly clay. Sand is fine to medium. Gravel is fine to medium angular to sub-angular brick ash and clinker.
		1.00		N=1 (1,0/0,0,0,1)	1.00			MADE GROUND: Dark brown slightly clayey gravelly fine to coarse sand. Gravel is fine to medium angular to sub-angular ash sandstone shale.
		1.50	ES					
		2.00		N=9 (2,2/2,3,2,2)	1.90			Firm to stiff brown slightly sandy gravelly clay. Gravel is fine to medium shale sandstone and gritstone.
		2.50	ES					
		3.00		N=9 (3,3/3,2,2,2)				
		4.00		N=50 (4,6/50 for 285mm)	3.80			Yellow grey very sandy GRAVEL. Sand is coarse. Gravel is fine to coarse sub-angular to sub-rounded gritstone.
					4.45			End of borehole at 4.45 m

Remarks
Refusal

Borehole Log

Borehole No. **WS105**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.40	ES		0.30			MADE GROUND: Black medium coarse sandy gravel. Gravel is fine to coarse sub-angular occassional ash gritstone brick.
					0.70			MADE GROUND: Black gravelly clay. Gravel is fine to coarse sub-angular occassional ash gritsone brick.
	▼	1.00		N=8 (2,2/2,2,2,2)	1.00			MADE GROUND: Black medium coarse sandy gravel. Gravel is fine to coarse sub-angular to sub-rounded occassional ash brick gritstone.
		1.00 - 1.45	D					
		1.20	ES					MADE GROUND: Grey yellow clayey boulders. Boulders are sub-angular gritstone.
					1.70			MADE GROUND: Clayey medium coarse sandy gravel. Gravel is sub-angular ash.
		2.00		N=0 (1,0/0,0,0,0)	2.00			MADE GROUND: Very soft black grey gravelly sandy clay. Gravel is fine to medium sub-angular to sub-rounded occassional ash brick gritstone.
		2.00 - 2.45	D					
		2.30	ES					
					2.70			MADE GROUND: Soft grey brown slightly medium coarse sandy gravelly clay. Gravel is medium to coarse sub-angular to sub-rounded brick gritstone.
		3.00		N=40 (5,8/40 for 255mm)	3.17			MADE GROUND: Soft grey brown slightly medium coarse sandy gravelly clay. Gravel is medium to coarse sub-angular to sub-rounded brick gritstone.
		3.00 - 3.37	D		3.37			End of borehole at 3.17 m

Remarks
Refusal

Borehole Log

Borehole No. **WS106**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.50	ES					MADE GROUND: Stiff brown sandy gravelly clay. Gravel is fine to coarse brick shale gritstone.
		1.00 1.00 - 1.45	D	N=6 (1,1/1,2,1,2)				
	▼				1.50			MADE GROUND: Soft grey brown gravelly clay. Gravel is fine to medium sub-angular brick gritstone. Moderate odour.
		1.90 2.00 2.00 - 2.45	ES D	N=8 (2,2/2,2,2,2)	2.20			MADE GROUND: Firm to stiff slightly gravelly gravelly clay. Gravel is fine sub-angular brick grit stone.
		3.00		N=33 (6,6/8,9,8,8)	3.00			MADE GROUND: Firm to stiff slightly gravelly gravelly clay. Gravel is fine sub-angular brick gritstone.
		3.20 3.50	ES	0 (50 for 95mm/0 for 0mm)	3.59			End of borehole at 3.59 m

Remarks
Refusal

Borehole Log

Borehole No. **WS107**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			MADE GROUND: Grey white medium coarse sandy gravel. Gravel is fine to coarse sub-angular to sub-rounded gritstone.
		0.70	ES					MADE GROUND: Black fine to medium sandy gravel. Gravel is fine to medium sub-angular to sub-rounded ash coal brick gritstone.
	▼	1.00		N=0 (1,0/0,0,0,0)				
					1.20			MADE GROUND: Very soft grey gravelly sandy clay. Gravel is fine to medium sub-angular to sub-rounded ash brick gritstone.
		1.50	ES					
		2.00		N=0 (1,0/0,0,0,0)				
					2.50			Yellow grey very sandy GRAVEL. Sand is coarse. Gravel is fine to coarse sub-angular to sub-rounded gritstone.
		2.70		35 (25,15/35 for 180mm)	2.70			End of borehole at 2.88 m

Remarks
Refusal

Borehole Log

Borehole No. **WS108**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			MADE GROUND: Ashphalt.
		1.00		N=15 (2,7/6,5,2,2)				MADE GROUND: Firm to stiff grey gravelly clay. Gravel is medium sub-angular to sub-rounded gritstone brick.
					1.15			MADE GROUND: Grey gravelly medium coarse sand. Gravel is fine to medium sub-angular to sub-rounded gritstone.
					1.55			MADE GROUND: Firm grey gravelly clay. Gravel is fine to medium sub-angular to sub-rounded brick gritstone sandstone shale.
		1.80	ES					
	▼	2.00		N=4 (2,1/1,1,1,1)				
		3.00		N=5 (1,1/2,1,1,1)	3.00			MADE GROUND: Orange brown sand.
					3.30			MADE GROUND: Firm grey gravelly clay. Gravel is fine to medium sub-angular to sub-rounded brick gritstone sandstone shale.
		4.00		N=5 (1,1/1,2,1,1)	4.00			MADE GROUND: Firm grey gravelly clay. Gravel is fine to medium sub-angular to sub-rounded brick gritstone sandstone shale.
		5.00		N=23 (3,4/4,6,6,7)				
					5.45			End of borehole at 5.45 m

Remarks
Refusal

Borehole Log

Borehole No. **WS109**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			MADE GROUND: Black gravelly medium coarse sand. Gravel is fine to medium brick sandstone.
		1.00		N=13 (11,8/3,4,4,2)	1.20			MADE GROUND: Grey white medium coarse sandy gravel. Gravel is fine to coarse sub-angular to sub-rounded occassional brick gritstone sandstone.
		2.00 2.00 - 2.45	D	N=6 (2,2/2,1,2,1)				MADE GROUND: Very stiff grey brown gravelly clay. Gravel is sub-angular fine to medium sandstone brick gritstone.
		2.90 3.00 3.00 - 3.45	ES D	N=9 (2,2/2,3,2,2)	2.70 3.10			MADE GROUND: Soft to firm brown mottled grey CLAY. Unusual odour.
		3.90 4.00 4.00 - 4.45	ES D	N=15 (2,3/3,4,4,4)	4.00			MADE GROUND: Very stiff grey brown gravelly clay. Gravel is sub-angular fine to medium sandstone brick gritstone.
		5.00		N=50 (8,9/13,13,14,10)	5.45			End of borehole at 5.45 m

Remarks
Refusal

Borehole Log

Borehole No. **WS110**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.20			MADE GROUND: Concrete.
		0.50	ES		0.24 0.30			MADE GROUND: Soft to firm blue grey clay.
					0.75			MADE GROUND: Grey clayey fine to medium sandy gravel. Gravel is coarse sub-angular siltstone.
		1.00		50 (3,3/50 for 160mm)	0.85 1.00			MADE GROUND: Stiff gravelly clay. Gravel is fine to medium sub-angular to sub-rounded siltstone brick.
		1.00 1.00 - 1.45	ES D		1.21			MADE GROUND: Black very clayey gravel. Gravel is fine to medium sub-angular ashphalt.
								MADE GROUND: Black brown gravelly clay. Gravel is fine to medium sub-angular ashphalt.
								MADE GROUND: Black brown gravelly clay. Gravel is fine to medium sub-angular ashphalt.
								End of borehole at 1.21 m

Remarks
Refusal

Borehole Log

Borehole No. **WS111**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.20			MADE GROUND: Concrete.
		0.50	ES		0.35			MADE GROUND: Black clayey gravelly fine to medium sand. Gravel is fine sub-angular to sub-rounded brick sandstone ash.
		1.00		50 (3,4/50 for 145mm)				Yellow medium coarse sandy GRAVEL. Gravel is fine to coarse sub-angular fine to coarse sub-angularto sub-rounded gritstone.
		1.00 - 1.45	D		1.19			End of borehole at 1.19 m

Remarks
Refusal

Borehole Log

Borehole No. **WS112**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.21			MADE GROUND: Concrete.
					0.40			MADE GROUND: Firm to stiff brown fine to medium sandy clay.
		1.00		N=8 (2,2/2,2,2,2)				MADE GROUND: Yellow brown fine to medium sandy gravel. Gravel is fine to coarse sub-angular sandstone.
		1.30	ES		1.25			
					1.55			MADE GROUND: Soft to firm brown gravelly clay.gravel is fine to medium sub-angular to sub-rounded very fissile sheeted muscovite mica and carbonaceous material.
		2.00		N=50 (11,11/10,9,19,12)				MADE GROUND: Soft to firm brown gravelly clay.gravel is fine to medium sub-angular to sub-rounded very fissile sheeted muscovite mica and carbonaceous material.
					2.45			End of borehole at 2.45 m

Remarks
Refusal

Borehole Log

Borehole No. **WS113**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.04			MADE GROUND: Ashphalt.
		0.40	ES		0.36			MADE GROUND: Red grey fine to coarse sandy gravel. Gravel is fine to medium sub-angular brick concrete.
	▼	1.00 1.00 - 1.45	D	N=5 (2,2/2,2,1,0)	0.90			MADE GROUND: Very stiff brown gravelly clay. Gravel is fine to medium sub-angular to sub-rounded ash brick sandstone.
		2.00 2.20	ES	N=1 (1,0/0,0,0,1)				MADE GROUND: Black clayey medium coarse sandy gravel. Gravel is fine to medium sub-angular occassional brick ash clinker siltstone.
		3.00		N=2 (1,0/1,0,1,0)				
		4.00		N=10 (1,1/2,2,3,3)				
					4.45			End of borehole at 4.45 m

1 2 3 4 5 6 7 8 9 10

Remarks
Hole collapsing

Borehole Log

Borehole No. **WS114**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05			MADE GROUND: Ashphalt.
					0.35			MADE GROUND: Yellow brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded sandstone.
		0.60	ES					MADE GROUND: Firm to stiff black and brown clayey gravelly sand. Gravel is fine to medium sub-angular to sub-rounded brick clinker ash.
		1.00		N=4 (3,2/1,1,1,1)				
		1.00 - 1.45	D		1.20			MADE GROUND: Black and grey gravelly fine to medium sand. Gravel is fine to medium sub-angular sandstone ash.
		1.50	ES					
		2.00		N=2 (1,0/0,0,1,1)	1.90			MADE GROUND: Firm to stiff light brown CLAY.
		3.00		N=1 (3,2/1,0,0,0)	3.00			MADE GROUND: Black clayey gravelly fine to medium sand. Gravel is fine sub-angular to sub-rounded ash clinker fissile micaceous material and carbonaceous material.
		4.00		N=2 (2,2/0,0,1,1)				
					4.50			Yellow brown gravelly SAND. Gravel is fine to medium sub-angular gritstone.
		5.00		N=10 (2,2/2,2,3,3)				
		5.00 - 5.45	D		5.45			End of borehole at 5.45 m

Remarks
Complete

Borehole Log

Borehole No. **WS114**

Sheet 1 of 1

Project Name: Tetrosyl	Project No. 10110	Co-ords: -	Hole Type WS
Location: Bury		Level:	Scale 1:50
Client: WHR Proporty Consultants LLP		Dates: 10/03/2014 -	Logged By J.O'K

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05			MADE GROUND: Ashphalt.
					0.35			MADE GROUND: Yellow brown gravelly fine to medium sand. Gravel is fine to coarse sub-angular to sub-rounded sandstone.
		0.60	ES					MADE GROUND: Firm to stiff black and brown clayey gravelly sand. Gravel is fine to medium sub-angular to sub-rounded brick clinker ash.
		1.00		N=4 (3,2/1,1,1,1)				
		1.00 - 1.45	D		1.20			MADE GROUND: Black and grey gravelly fine to medium sand. Gravel is fine to medium sub-angular sandstone ash.
		1.50	ES					
		2.00		N=2 (1,0/0,0,1,1)	1.90			MADE GROUND: Firm to stiff light brown CLAY.
		3.00		N=1 (3,2/1,0,0,0)	3.00			MADE GROUND: Black clayey gravelly fine to medium sand. Gravel is fine sub-angular to sub-rounded ash clinker fissile micaceous material and carbonaceous material.
		4.00		N=2 (2,2/0,0,1,1)				
					4.50			Yellow brown gravelly SAND. Gravel is fine to medium sub-angular gritstone.
		5.00		N=10 (2,2/2,2,3,3)				
		5.00 - 5.45	D		5.45			End of borehole at 5.45 m

Remarks
Complete

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

Your Ref: SGARTH/WALMERSLEYRD
Our Ref: 13/ 999160
Date: 19/02/2014

Barratt Manchester

4 Brindley Road, City Park
Manchester

M16 9HQ

FAO: Steve Garth

Dear Sirs

Location: Walmersley Od Road Bury

I acknowledge with thanks your request dated 18/02/14 for information on the location of our services.

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

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

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

Yours Faithfully,

S McManus.

Sue McManus
Operations Manager
Property Searches

TERMS AND CONDITIONS - WASTERWATER & WATER DISTRIBUTION PLANS

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

TERMS AND CONDITIONS:

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

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

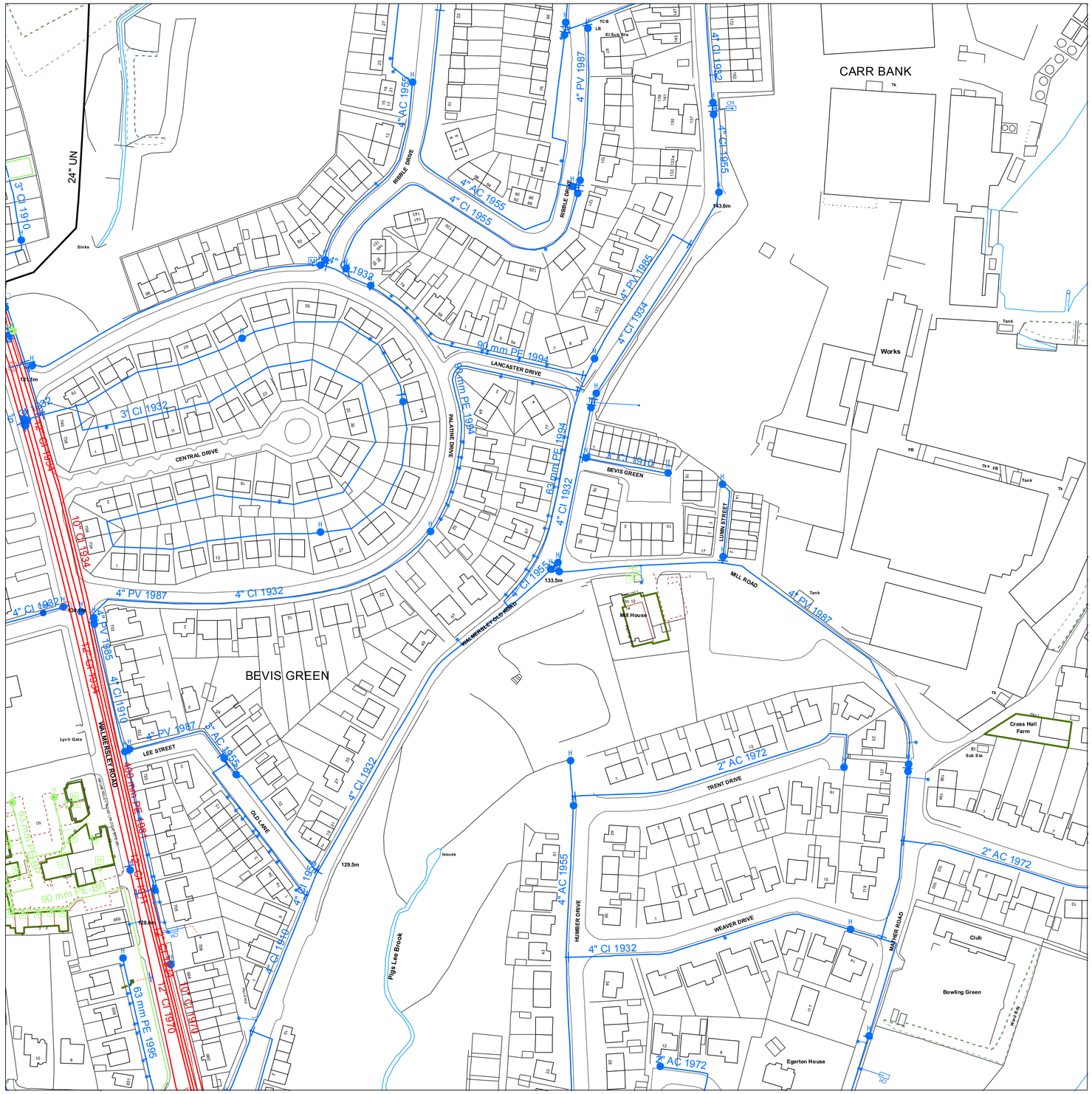
3. In particular, the position and depth of any UUW apparatus shown on the Map are approximate only. UUW strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUW apparatus. The exact location, positions and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

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

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

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

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



OS Sheet No: SD8013NE

Scale: 1: 1250 Date: 19/02/2014

Printed By: Nicola Morris

LEGEND

PIPE WORK

Live	Proposed
	Trunk Main - PressurisedMain
	Raw Water Aqueduct - PressurisedMain
	Raw Water Aqueduct - GravityMain
	LDTM Raw Water Distribution - PressurisedMain
	LDTM Raw Water Distribution - GravityMain
	LDTM Treated Water Distribution - PressurisedMain
	LDTM Treated Water Distribution - GravityMain
	Private Pipe - LateralLine
	Distribution Main - PressurisedMain
	Comms Pipe - LateralLine
	Concessionary Service - LateralLine

ABANDONED PIPE

- Trunk Main
- Raw Water Aqueduct
- LDTM Raw Water Distribution
- LDTM Treated Water Distribution
- Private Pipe
- Distribution Main
- Comms Pipe
- Concessionary Service

NODES/ FURNITURE

Live	Proposed	
		End Cap
		CC Valve
		AC Valve
		Air Valve
		Sluice Valve
		Non Return Valve
		Pressure Management Valve
		Change of Characteristic
		Anode
		Chlorination Point
		De Chlorination Point
		Bore Hole
Inlet		Inlet Point
		Bulk Supply Point
FH		Fire Hydrant
H		Hydrant
PFH		Private Fire Hydrant
		Pump
		Site Termination
		Service Start
		Service End
PM		Process Meter
		Stop Tap
		Monitor Location
SP		Strainer Point
AP		Access Point
HB		Hatch Box
IP		IP Point
RM		Route Marker
SPT		Sampling Station
LB		Logger Box

PROPERTY TYPES

Live	Proposed	
		Condition Report
		Pipe Bridges
		Tunnels (non carrier)
		Pumping Station
		Water Treatment Works
		Private Treatment Works
VH		Valve House
		Water Tower
SR		Service Reservoir
SR RES		Supply Reservoir
Inlet AP		Abstraction Point
M		Domestic meter
CM		Commercial meter
		Telemetry Outstation

MATERIAL TYPES

AC ASBESTOS CEMENT	OT OTHERS
CI CAST IRON	PB LEAD
CU COPPER	PV uPVC
CO CONCRETE	SI SPUN IRON
DI DUCTILE IRON	ST STEEL
GI GALVANISED IRON	UN UNKNOWN
GR GREY IRON	PE POLYETHYLENE

LINING TYPES

CL CEMENT LINING	ERL EPOXY RESIN
TB TAR OR BITUMEN	

INSERTION TYPES

DD DIE DRAWN	MO MOLING
DR DIRECTIONAL DRILLING	PI PIPELINE
	SL SLIP LINED

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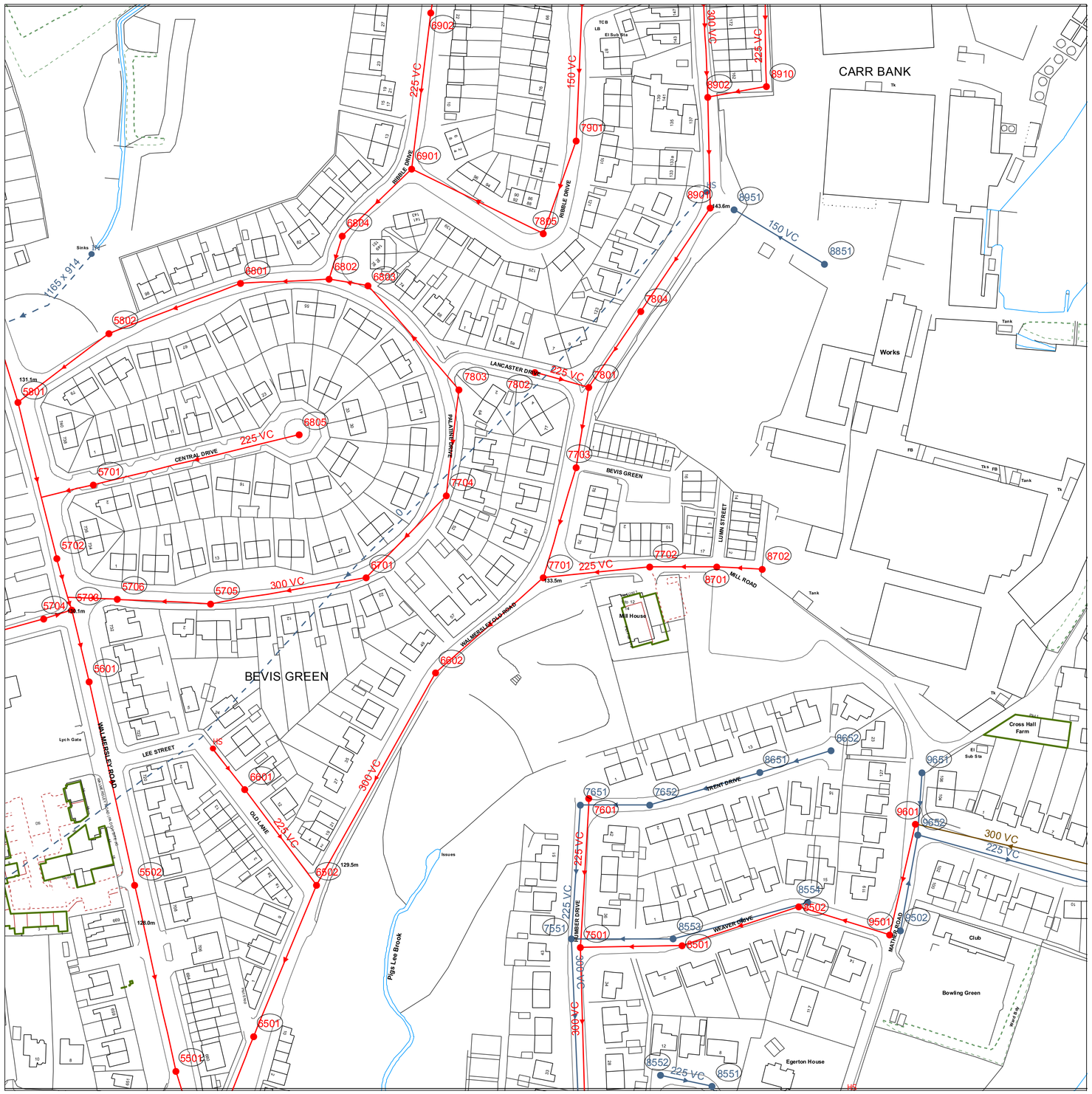
OS Sheet No: SD8013NE

Scale: 1: 1250

Date: 19/02/2014

United Utilities

WATER MAIN RECORDS



Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
5501	127.18	CO	124.06	300		CI	VC	43.97	0
5502	128.5	CO	124.8	300		CI	VC	88.07	0
5601	129.77	CO	126.58	300		CI	VC	96.32	0
5701	130.99	CO	0	225		CI	VC	24.74	7
5702	130.51	CO	127.65	300		CI	VC	18.68	0
5703	130.34	CO	127.23	300		CI	VC	33.96	0
5704	130.34	CO	127.39	300		CI	VC	13.8	0
5705	131.17	CO	129.72	300		CI	VC	43.05	0
5706		CO							
5801	131.05	CO							
5802	131.61	CO							
6501	127.8	CO	124.57	300		CI	VC	62.39	0
6502	129.61	CO							
6601	130.59	CO	128.05	225		CI	VC	55	0
6602	131.96	CO	129.52	300		CI	VC	112.38	0
6701	133.23	CO	132.08	300		CI	VC	72.59	0
6801	134.93	CO	133.53	300		CI	VC	65.19	0
6802	136.22	CO	134.92	225		CI	VC	41.05	0
6803	136.83	CO	135.33	225		CI	VC	18.25	0
6804	137.06	CO	135.45	225		CI	VC	20.88	0
6805	133.73	CO	131.98	225		CI	VC	97.74	0
6901	139.41	CO	137.45	225		CI	VC	44.55	0
6902	141.74	CO							
7501	132.96	CO	130.48	300		CI	VC	69.03	0
7551	133.05	SW	131.07	300		CI	VC	72.06	0
7601	134.66	CO	132.69	225		CI	VC	69.12	0
7651	134.54	SW	132.13	225		CI	VC	62.13	0
7652	135.67	SW	133.82	225		CI	VC	32	0
7701	134.01	CO	130.95	300		CI	VC	66.6	0
7702	135.24	CO	132.68	225		CI	VC	49.25	0
7703	136.13	CO	133.03	300		CI	VC	53.16	0
7704	135.15	CO	133.93	225		CI	VC	53.04	0
7801	138.21	CO	135.54	300		CI	VC	37.48	0
7802	137.7	CO	135.97	225		CI	VC	25.96	0
7803		CO	0	225		CI	VC	49.37	40
7804	140.85	CO	138.16	300		CI	VC	42.44	0
7805	141.41	CO	139.09	225		CI	VC	67.98	0
7901	143.62	CO							
8501	134.49	CO	131.88	300		CI	VC	47.01	0
8502	137.4	CO	133.45	300		CI	VC	56.92	0
8551		SW							
8552	131.25	SW	129.5	225		CI	VC	24.52	0
8553	134.42	SW	132.32	300		CI	VC	47	0
8554	137.09	SW	133.15	300		CI	VC	64.29	0
8651	138	SW	136.03	225		CI	VC	53.16	0
8652	139.16	SW	137.45	225		CI	VC	34.48	0
8701	135.65	CO							
8702	135.89	CO	133.14	225		CI	VC	21.02	0
8851	146.1	SW	144.67	150		CI	VC	48.88	0
8901	143.72	CO	141.03	300		CI	VC	57.69	0
8902	146.17	CO	143.45	300		CI	VC	51.01	0
8910		CO							
8951	143.91	SW							
9501	138.83	CO	134.83	300		CI	VC	43.97	0
9502	138.62	SW	137.62	225		CI	VC	44.72	0
9601	140.2	CO	135.2	300		CI	VC	52.39	0
9651	140.61	SW	139.01	225		CI	VC	29.07	0
9652	140.12	SW	136.22	225		CI	VC	87.09	0
5602		CO	0	225		CI	VC	24.21	9
8903		CO							
8904		SW	0					485.31	
5707		CO							
5708		CO							
5803		SW	1165	914		EG		86.94	

OS Sheet No: SD8013NE

Scale: 1: 1250 Date: 19/02/2014

Printed By: Nicola Morris

WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

Manhole
Manhole, Side Entry
MainSewer, Public
MainSewer, Private
MainSewer, S104
Rising Main, Public
Rising Main, Private
Rising Main, S104
Highway Drain, Private

Foul Surface Combined

WW Site Termination
Air Valve
Cascade
Non Return Valve
Extent of Survey
Flow Meter
Gulley
Hatch Box
Head of System
Hydrobrake / Vortex
Inlet
Inspection Chamber
Bifurcation
Catchpit
Contaminated Surface Water
WW Pumping Station
Sludge Pumping Station
Sewer Overflow
T Junction/Saddle
LampHole
OilInterceptor
PenStock
Pump
RoddingEye
Soakaway
Summit
Valve
Valve Chamber
Washout Chamber
DropShaft
WW Treatment Works
Septic Tank
Vent Column
Network Storage Tank
Orifice Plate
Vortex Chamber
Penstock Chamber
Blind Manhole

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

Foul Surface Combined Overflow

Screen Chamber
Discharge Point
Outfall

Control Kiosk
Unspecified

LEGEND

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

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OS Sheet No: SD8013NE

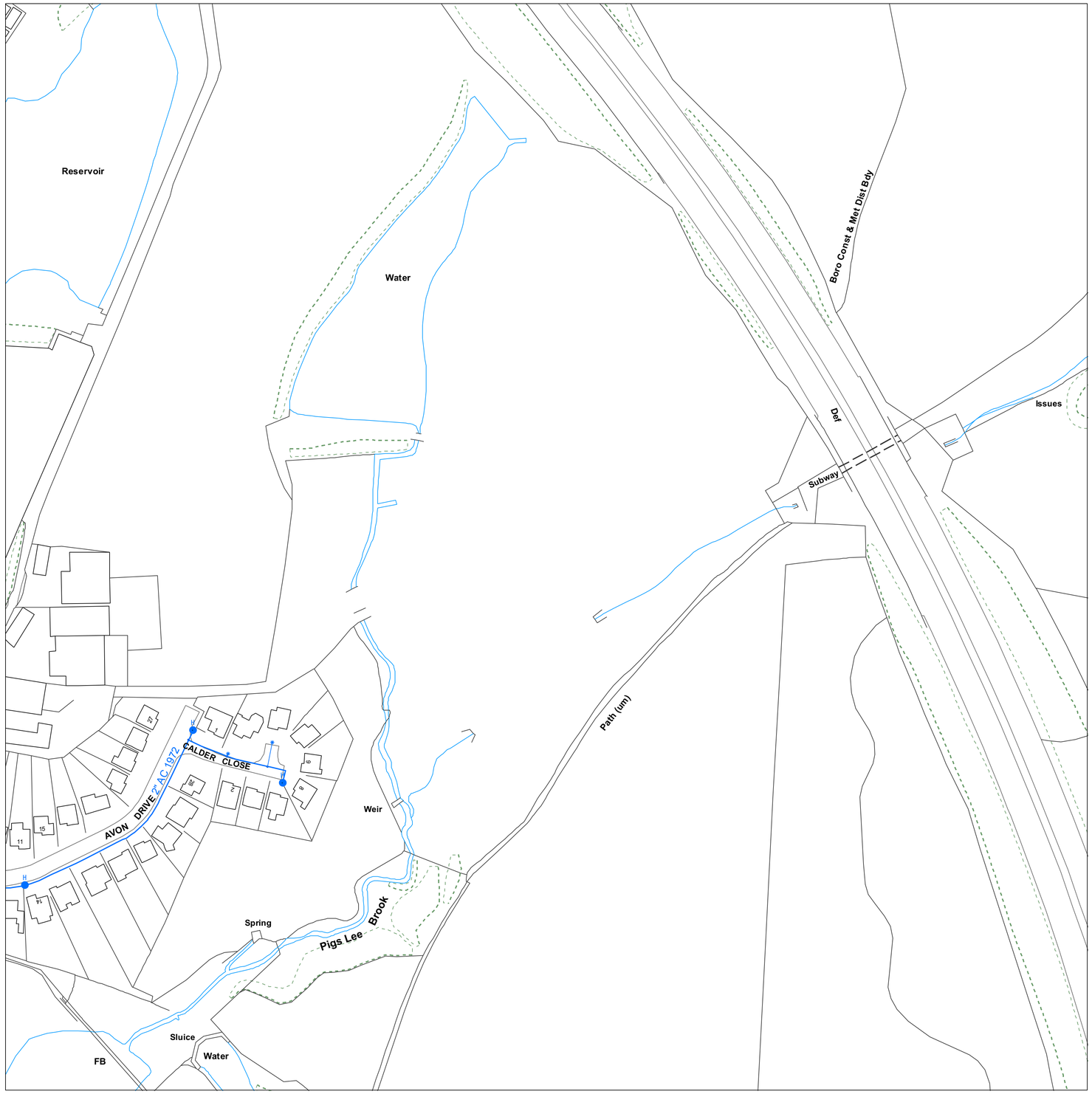
Scale: 1: 1250 Date: 19/02/2014

64 Nodes

Sheet 1 of 1

United Utilities

SEWER RECORDS



OS Sheet No: SD8113NW

Scale: 1: 1250 Date: 19/02/2014

Printed By: Nicola Morris

LEGEND

PIPE WORK

Live	Proposed	
		Trunk Main - PressurisedMain
		Raw Water Aqueduct - PressurisedMain
		Raw Water Aqueduct - GravityMain
		LDTM Raw Water Distribution - PressurisedMain
		LDTM Raw Water Distribution - GravityMain
		LDTM Treated Water Distribution - PressurisedMain
		LDTM Treated Water Distribution - GravityMain
		Private Pipe - LateralLine
		Distribution Main - PressurisedMain
		Comms Pipe - LateralLine
		Concessionary Service - LateralLine

ABANDONED PIPE

- Trunk Main
- Raw Water Aqueduct
- LDTM Raw Water Distribution
- LDTM Treated Water Distribution
- Private Pipe
- Distribution Main
- Comms Pipe
- Concessionary Service

NODES/ FURNITURE

Live	Proposed	
		End Cap
		CC Valve
		AC Valve
		Air Valve
		Sluice Valve
		Non Return Valve
		Pressure Management Valve
		Change of Characteristic
		Anode
		Chlorination Point
		De Chlorination Point
		Bore Hole
Inlet		Inlet Point
		Bulk Supply Point
FH		Fire Hydrant
H		Hydrant
PFH		Private Fire Hydrant
		Pump
		Site Termination
		Service Start
		Service End
PM		Process Meter
		Stop Tap
		Monitor Location
SP	SP	Strainer Point
AP		Access Point
HB		Hatch Box
IP		IP Point
RM		Route Marker
SPT		Sampling Station
LB		Logger Box

PROPERTY TYPES

Live	Proposed	
		Condition Report
		Pipe Bridges
		Tunnels (non carrier)
		Pumping Station
		Water Treatment Works
		Private Treatment Works
VH		Valve House
		Water Tower
SR		Service Reservoir
SR RES		Supply Reservoir
Inlet AP		Abstraction Point
M		Domestic meter
CM		Commercial meter
T		Telemetry Outstation

MATERIAL TYPES

AC	ASBESTOS CEMENT	OT	OTHERS
CI	CAST IRON	PB	LEAD
CU	COPPER	PV	uPVC
CO	CONCRETE	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
GI	GALVANISED IRON	UN	UNKNOWN
GR	GREY IRON	PE	POLYETHYLENE

LINING TYPES

CL	CEMENT LINING	ERL	EPOXY RESIN
TB	TAR OR BITUMEN		

INSERTION TYPES

DD	DIE DRAWN	MO	MOLING
DR	DIRECTIONAL DRILLING	PI	PIPELINE
		SL	SLIP LINED

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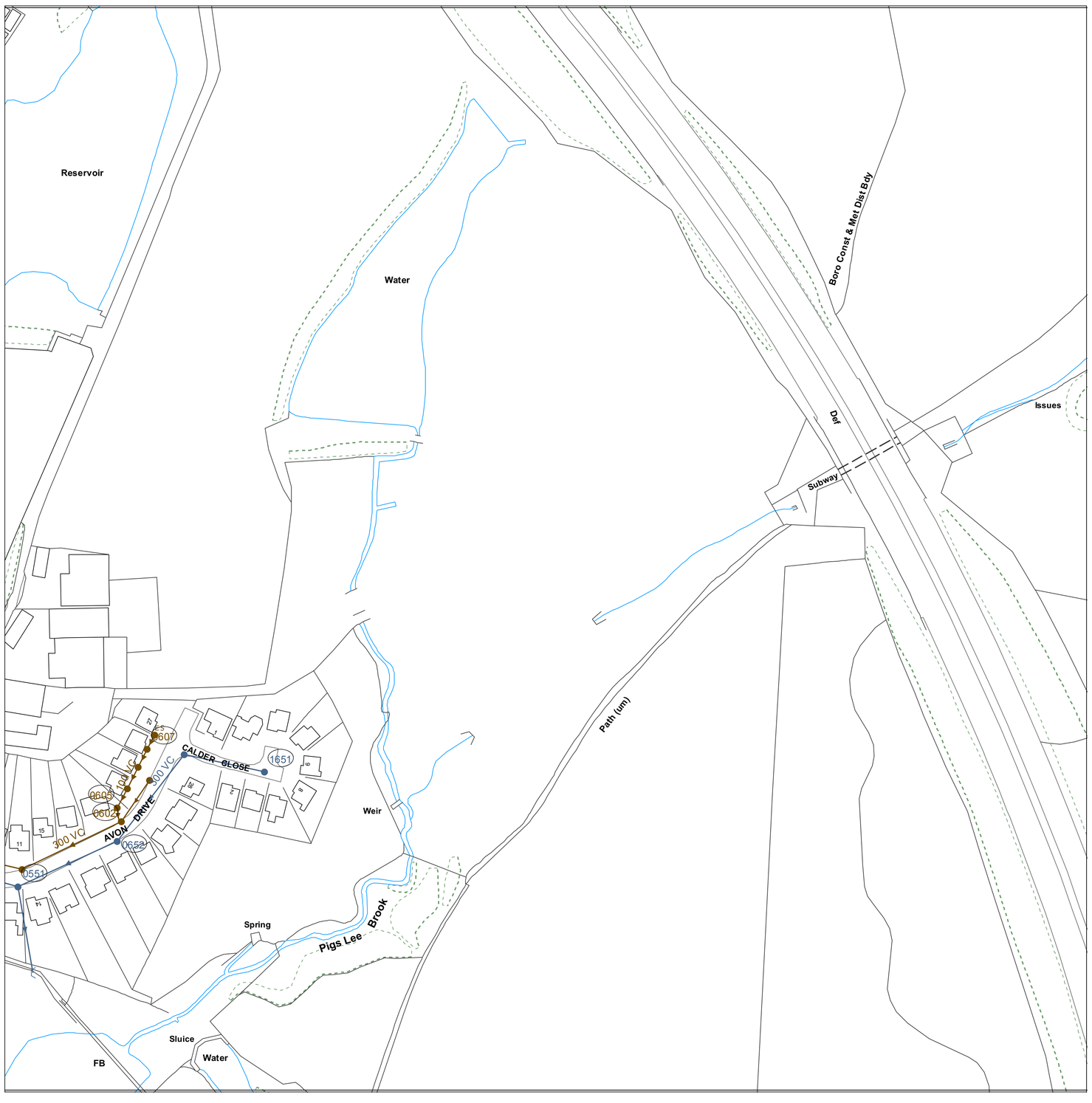
OS Sheet No: SD8113NW

Scale: 1: 1250

Date: 19/02/2014

United Utilities

WATER MAIN RECORDS



Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
0551	138.59	SW							
0601	139.98	FO	136.93	300		CI	VC	23.02	0
0602	138.37	FO							
0603	138.84	FO							
0605		FO							
0607		FO		100		CI	VC	9.39	
0608		FO							
0609		FO		100		CI	VC	10.14	
0651	140.39	SW	136.52	300		CI	VC	50.61	0
0652	138.48	SW							
1651	138.57	SW	136.99	300		CI	VC	37.85	0
0606		FO							

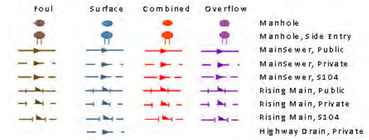
Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad

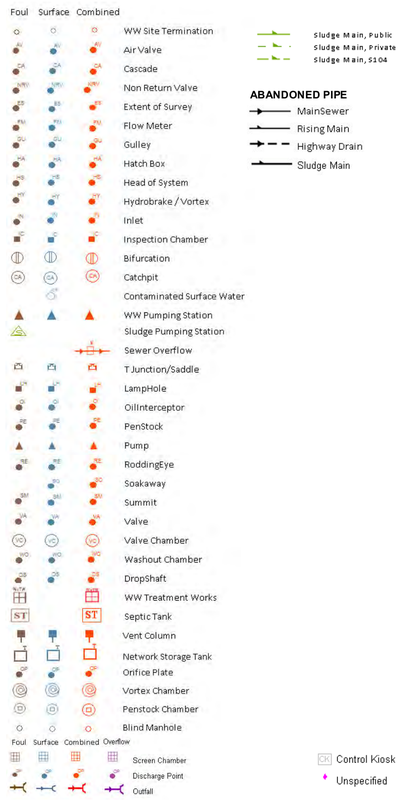
OS Sheet No: SD8113NW

Scale: 1: 1250 Date: 19/02/2014

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WASTE WATER SYMBOLOGY





ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

LEGEND

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

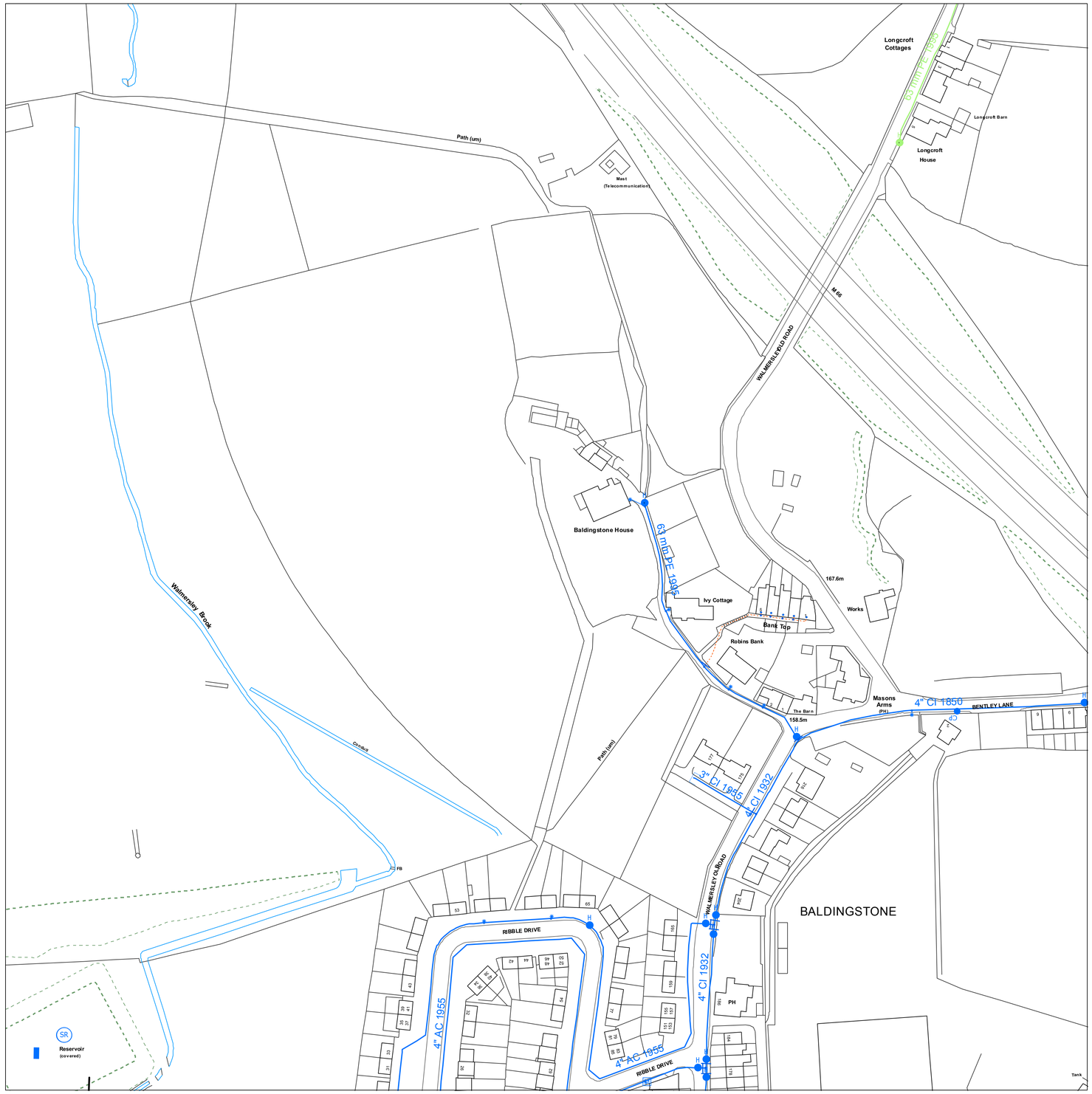
AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

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OS Sheet No: SD8113NW
Scale: 1: 1250 Date: 19/02/2014
12 Nodes
Sheet 1 of 1

United Utilities

SEWER RECORDS



OS Sheet No: SD8014SE

Scale: 1: 1250 Date: 19/02/2014

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LEGEND

PIPE WORK

Live	Proposed	
		Trunk Main - PressurisedMain
		Raw Water Aqueduct - PressurisedMain
		Raw Water Aqueduct - GravityMain
		LDTM Raw Water Distribution - PressurisedMain
		LDTM Raw Water Distribution - GravityMain
		LDTM Treated Water Distribution - PressurisedMain
		LDTM Treated Water Distribution - GravityMain
		Private Pipe - LateralLine
		Distribution Main - PressurisedMain
		Comms Pipe - LateralLine
		Concessionary Service - LateralLine

ABANDONED PIPE

- Trunk Main
- Raw Water Aqueduct
- LDTM Raw Water Distribution
- LDTM Treated Water Distribution
- Private Pipe
- Distribution Main
- Comms Pipe
- Concessionary Service

NODES/ FURNITURE

Live	Proposed	
		End Cap
		CC Valve
		AC Valve
		Air Valve
		Sluice Valve
		Non Return Valve
		Pressure Management Valve
		Change of Characteristic
		Anode
		Chlorination Point
		De Chlorination Point
		Bore Hole
Inlet		Inlet Point
		Bulk Supply Point
FH		Fire Hydrant
H		Hydrant
PFH		Private Fire Hydrant
		Pump
		Site Termination
		Service Start
		Service End
PM		Process Meter
		Stop Tap
		Monitor Location
SP		Strainer Point
AP		Access Point
HB		Hatch Box
IP		IP Point
RM		Route Marker
SPT		Sampling Station
LB		Logger Box

PROPERTY TYPES

Live	Proposed	
		Condition Report
		Pipe Bridges
		Tunnels (non carrier)
		Pumping Station
		Water Treatment Works
		Private Treatment Works
VH		Valve House
		Water Tower
SR		Service Reservoir
SUPPLY RES		Supply Reservoir
Inlet AP		Abstraction Point
M		Domestic meter
CM		Commercial meter
T		Telemetry Outstation

MATERIAL TYPES

AC	ASBESTOS CEMENT	OT	OTHERS
CI	CAST IRON	PB	LEAD
CU	COPPER	PV	uPVC
CO	CONCRETE	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
GI	GALVANISED IRON	UN	UNKNOWN
GR	GREY IRON	PE	POLYETHYLENE

LINING TYPES

CL	CEMENT LINING	ERL	EPOXY RESIN
TB	TAR OR BITUMEN		

INSERTION TYPES

DD	DIE DRAWN	MO	MOLING
DR	DIRECTIONAL DRILLING	PI	PIPELINE
		SL	SLIP LINED

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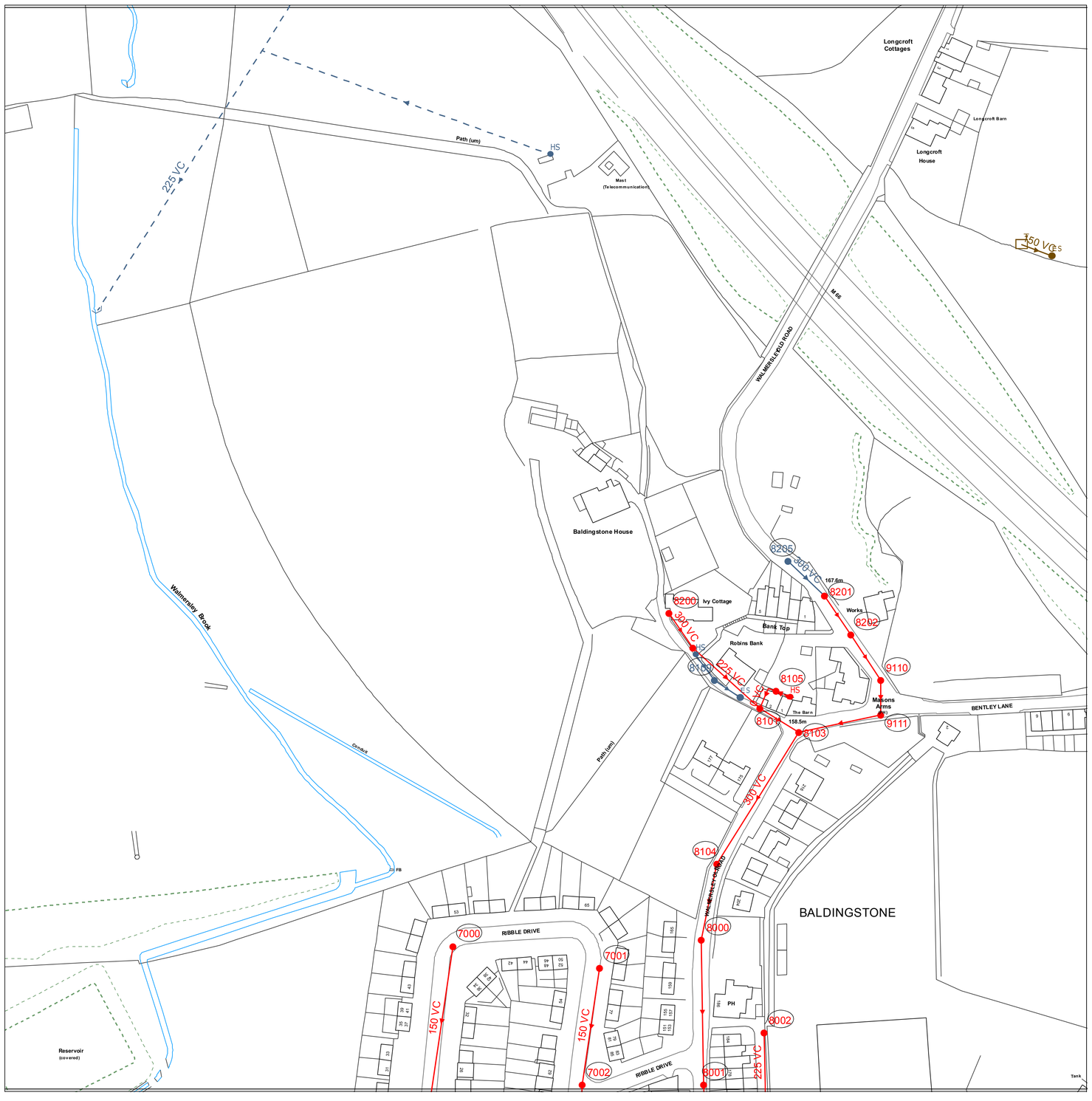
OS Sheet No: SD8014SE

Scale: 1: 1250

Date: 19/02/2014

United Utilities

WATER MAIN RECORDS



Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
7000	145.29	CO	143.75	150		CI	VC	69.72	0
7001	147	CO	145.43	150		CI	VC	54.59	0
7002	145.41	CO							
8000	150.76	CO							
8001	148.28	CO							
8002		CO	0	225		CI	VC	63.01	16
8101	159.07	CO							
8103	158.05	CO							
8104	152.53	CO							
8105		CO		0		CI	VC	13.63	
8109		SW							
8200	163.51	CO	0	300		CI	VC	19.42	22
8201	167.79	CO	165.66	300		CI	VC	21.63	0
8202	165.8	CO							
8203	161.7	CO	159.57	225		CI	VC	41.77	0
8205		SW	0	300		CI	VC	23.35	26
9110	163.28	CO							
9111	161.56	CO							
7401		SW		225			VC	141.4	
8102		CO							
8106		CO							
8206		SW	0	150		CI	VC	15	9
6401		SW							
9301		FO	0	150		CI	VC	14.99	9

Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad

WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

Manhole
Manhole, Side Entry
MainSewer, Public
MainSewer, Private
MainSewer, S104
Rising Main, Public
Rising Main, Private
Rising Main, S104
Highway Drain, Private

Foul Surface Combined

WW Site Termination
Air Valve
Cascade
Non Return Valve
Extent of Survey
Flow Meter
Gulley
Hatch Box
Head of System
Hydrobrake / Vortex
Inlet
Inspection Chamber
Bifurcation
Catchpit
Contaminated Surface Water
WW Pumping Station
Sludge Pumping Station
Sewer Overflow
T Junction/Saddle
LampHole
OilInterceptor
PenStock
Pump
RoddingEye
Soakaway
Summit
Valve
Valve Chamber
Washout Chamber
DropShaft
WW Treatment Works
Septic Tank
Vent Column
Network Storage Tank
Orifice Plate
Vortex Chamber
Penstock Chamber
Blind Manhole

Foul Surface Combined Overflow

Screen Chamber
Discharge Point
Outfall

Control Kiosk
Unspecified

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

LEGEND

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
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24 Nodes
Sheet 1 of 1

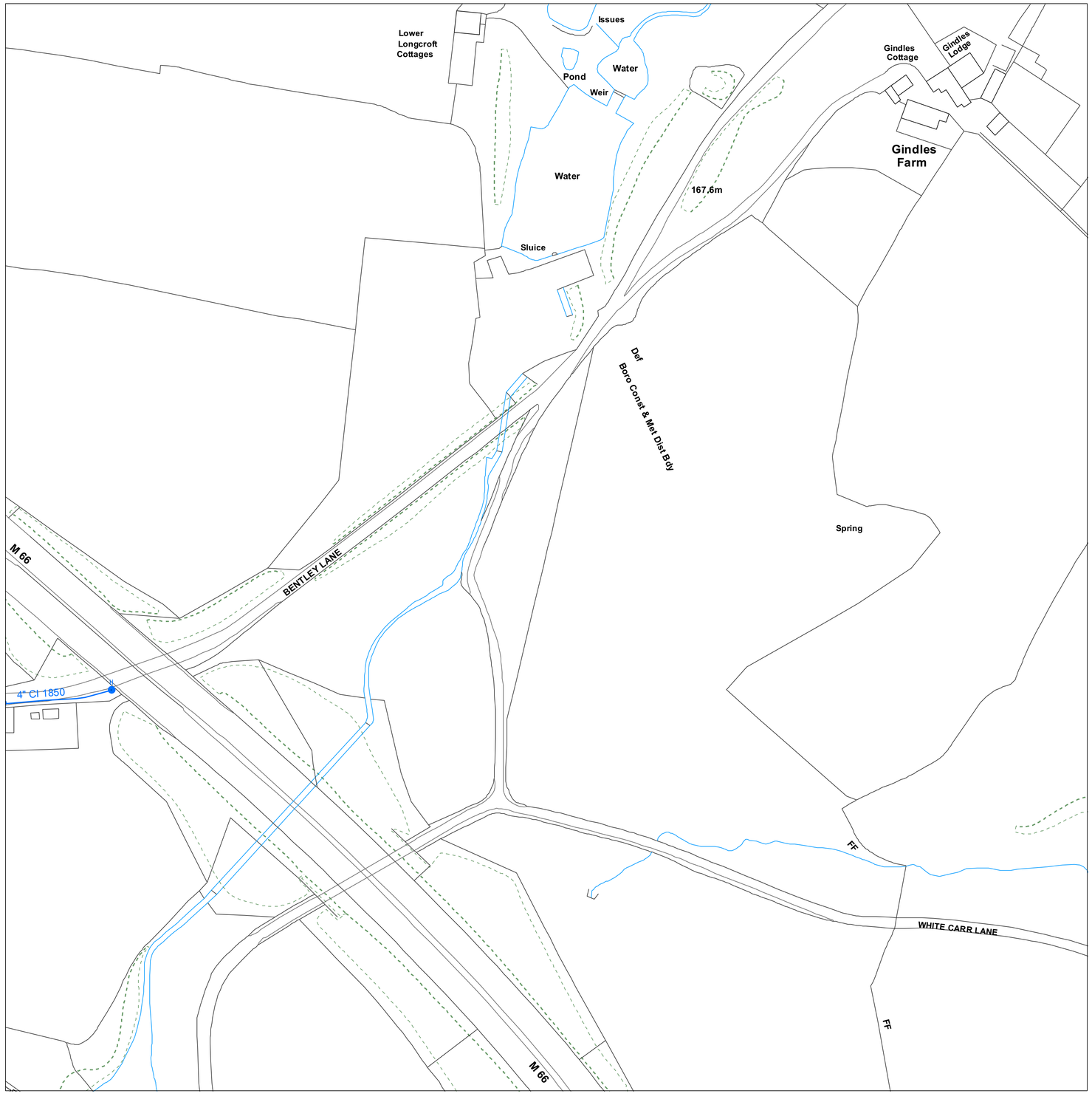
United Utilities

SEWER RECORDS

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OS Sheet No: SD8014SE

Scale: 1: 1250 Date: 19/02/2014



OS Sheet No: SD8114SW

Scale: 1: 1250 Date: 19/02/2014

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LEGEND

PIPE WORK

Live	Proposed	
		Trunk Main - PressurisedMain
		Raw Water Aqueduct - PressurisedMain
		Raw Water Aqueduct - GravityMain
		LDTM Raw Water Distribution - PressurisedMain
		LDTM Raw Water Distribution - GravityMain
		LDTM Treated Water Distribution - PressurisedMain
		LDTM Treated Water Distribution - GravityMain
		Private Pipe - LateralLine
		Distribution Main - PressurisedMain
		Comms Pipe - LateralLine
		Concessionary Service - LateralLine

ABANDONED PIPE

- Trunk Main
- Raw Water Aqueduct
- LDTM Raw Water Distribution
- LDTM Treated Water Distribution
- Private Pipe
- Distribution Main
- Comms Pipe
- Concessionary Service

NODES/ FURNITURE

Live	Proposed	
		End Cap
		CC Valve
		AC Valve
		Air Valve
		Sluice Valve
		Non Return Valve
		Pressure Management Valve
		Change of Characteristic
		Anode
		Chlorination Point
		De Chlorination Point
		Bore Hole
Inlet		Inlet Point
		Bulk Supply Point
FH		Fire Hydrant
H		Hydrant
PFH		Private Fire Hydrant
		Pump
		Site Termination
		Service Start
		Service End
PM		Process Meter
		Stop Tap
		Monitor Location
SP		Strainer Point
AP		Access Point
HB		Hatch Box
IP		IP Point
RM		Route Marker
SPT		Sampling Station
LB		Logger Box

PROPERTY TYPES

Live	Proposed	
		Condition Report
		Pipe Bridges
		Tunnels (non carrier)
		Pumping Station
		Water Treatment Works
		Private Treatment Works
VH		Valve House
		Water Tower
SR		Service Reservoir
SUP RES		Supply Reservoir
Inlet AP		Abstraction Point
M		Domestic meter
CM		Commercial meter
		Telemetry Outstation

MATERIAL TYPES

AC	ASBESTOS CEMENT	OT	OTHERS
CI	CAST IRON	PB	LEAD
CU	COPPER	PV	uPVC
CO	CONCRETE	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
GI	GALVANISED IRON	UN	UNKNOWN
GR	GREY IRON	PE	POLYETHYLENE

LINING TYPES

CL	CEMENT LINING	ERL	EPOXY RESIN
TB	TAR OR BITUMEN		

INSERTION TYPES

DD	DIE DRAWN	MO	MOLING
DR	DIRECTIONAL DRILLING	PI	PIPELINE
		SL	SLIP LINED

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OS Sheet No: SD8114SW

Scale: 1: 1250

Date: 19/02/2014

United Utilities

WATER MAIN RECORDS

Conditions and information regarding water distribution apparatus

These general conditions and precautions apply to the water distribution system of United Utilities.

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

1. United Utilities provides approximate locations of its water mains or apparatus according to its records. These records are not necessarily accurate or complete nor do they normally show the positions of private service pipes from the mains to properties. Where service pipes are shown, a blue broken line indicates their approximate position. No person or company shall be relieved from liability for any damage caused by reason of the actual positions and/or depths being different from those indicated.

2. Special requirements relative to our apparatus may be indicated. United Utilities employees will visit any site at reasonable notice to assist in the location of its underground water apparatus and advise any precautions that may be required to obviate any damage. To arrange a visit or for further information regarding new supplies, connections, diversions, costing, future proposals for construction of company apparatus or any notification required under these General Conditions, please telephone us on **0845 746 2200** or write to United Utilities, PO Box 453, Warrington, WA5 3QN.

3. In order to achieve safe working conditions adjacent to any water apparatus the following should be observed;

(a) All water apparatus should be located by hand digging prior to the use of mechanical excavation.

(b) During construction work where heavy plant may have to cross the line of a water main, and the main is not under a carriageway of adequate standard of construction, crossing points should be suitably reinforced with sleepers, steel plates or a specially constructed reinforced concrete raft as necessary. These crossing points should be clearly indicated and crossing the line of the water main at other places should be prevented. United Utilities employees will advise on the type of reinforcement necessary. This is particularly important on agricultural or open land, where tilling or erosion may have significantly reduced the original cover.

(c) No explosive should be used within 32 metres of any United Utilities apparatus without prior consultation with United Utilities.

(d) Where it is proposed to carry out piling within 15 metres of any water main United Utilities should be consulted so that the affected main may be surveyed.

4. During any excavation, it is important that measures should be taken to ensure continued support for any water main:

(a) Where excavation of trenches adjacent to any water main is likely to affect its support, the main must be supported to the satisfaction of United Utilities.

(b) Where a trench is excavated crossing or parallel to the line of a water main, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the main. In special cases it may be necessary to provide permanent support to a main which has been exposed over the length of the excavation before back-filling and reinstatement is carried out. No back-filled concrete should contact the main.

5. No other apparatus should be laid over and along the line of a water main irrespective of clearance. A minimum clearance of 450 millimetres should be allowed between any plant being installed and an existing main, to facilitate maintenance and repair, whether the adjacent plant is parallel to or crossing the main. No manhole, chamber, or other obstruction should be built over or around a water main.

6. Where a water main is coated with special wrapping and the wrapping is damaged, even to a minor extent, United Utilities must be notified, and the excavation must be left open for ready access so that repairs can be made. In case of any material damage to the main itself causing leakage, or weakening of the mechanical strength of the pipe, the person or body responsible should immediately notify United Utilities in order that the necessary remedial work can be carried out. The full cost of the necessary remedial work will be charged to the person or body responsible for the damage.

7. If you propose to change existing levels over water mains you will need to inform us. We will need specific locations to be identified together with precise details as to the scale of the proposed changes to existing ground levels. Changes to existing levels may require the diversion of our apparatus at your cost. However, in certain circumstances we may wish to leave our apparatus where it is. On these occasions you will usually be required to protect our apparatus by means of a concrete raft and either raise or lower any surface boxes affected.

8. Under no circumstances should our surface boxes be either buried or left in a situation where they are raised above finished ground levels. You should re-use and re-set any surface boxes affected by your works into the new surface so that they align over the water apparatus below. You will be responsible for the cost of repairing any damage to our apparatus as a result of your works.

9. Where proposals involve resurfacing, you must notify United Utilities if your excavation will be greater than 750mm in the highway and 300mm in a footpath, verge or other location.

10. For information regarding easements, deeds, grants, licences or wayleaves, please write to United Utilities Property Solutions, Coniston Buildings, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3UU (**Tel 01925 731 365**).

Tree planting restrictions over water mains

a) Poplar and willow trees have extensive root systems and should not be planted within 10 metres of any water main.

b) The following trees and those of a similar size, whether they are deciduous or evergreen, should not be be planted within six metres of any water main:
• Ash, beech, birch, elm, horse chestnut, lime, oak, sycamore;
• Apple trees and pear trees;
• Most conifers.

c) United Utilities requires access to the route of its mains at all times to inspect for leaks and carry out surveys.
We recommend that no shrubs or bushes which might obstruct or interfere with our access should be planted within one metre of the centre line of any water main.

d) There may be instances when both United Utilities and the landowner will wish to plant shrubs or bushes close to the water main for screening or other purposes. The following shallow rooting shrubs would be suitable for this purpose:
• Blackthorn, broom, cotoneaster, elder;
• Hazel, laurel, privet, quickthorn, snowberry;
• Most ornamental flowering shrubs.

e) In areas where soft fruit is grown, blackcurrant, raspberries and gooseberries may be planted close to the main, provided that a path is left clear for inspection access and surveys. United Utilities can give additional advice where required in particular circumstances.

United Utilities Water PLC
Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington WA5 3LP
www.unitedutilities.com
Registered in England and Wales Registered Number 2366678

Do you really need to print me?
Really? Think of the trees!
unitedutilities.com

United Utilities
helping life flow smoothly

Conditions and information regarding wastewater network

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

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

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

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

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

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

5. Where there is a public sewer along the line of a proposed development/building, arrangements shall be made by the developer at his cost to divert the sewer around the development. Where this is not possible and as a last resort, a “Building Over Agreement” will need to be completed under section 18 of the Building Act 1984. The developer shall design building foundations to ensure that no additional loading is transferred to the sewer and submit such details both to the Local Authority’s Building Control Officer and to United Utilities for approval/acceptance. United Utilities on a rechargeable basis would normally undertake all aspects of design work associated with the diversion of any part of the operational wastewater network. For further advice please call asset protection on **01925 678 306**

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

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

8. Your attention is drawn also to the following:

• Private drains or sewers which may be within the site. On 1 October 2011 all privately owned sewers and lateral drains which communicate with (that is drain to) an existing public sewer as at 1 July 2011 will become the responsibility of the sewerage undertaker. This includes private sewers upstream of pumping stations that have yet to transfer, but excludes lengths of sewer or drain that are the subject of an on-going appeal or which have been excluded from transfer as a result of an appeal or which are on or under land opted-out by a Crown body. The transfer specifically excludes sewers and lateral drains owned by a railway undertaker. Sewers upstream of such assets, however, are transferred. Such assets may not be recorded on the public sewer record currently as it was not a requirement to keep records of previously private sewers and drains.

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

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

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

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

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

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

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

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

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

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

11. For information regarding easements, deeds, grants or wayleaves please write to United Utilities Property Solutions, Coniston Buildings, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3UU (**Tel: 01925 731 365**).

United Utilities Water PLC
Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington WA5 3LP
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United Utilities
helping life flow smoothly

Cole Easdon Consultants
160 Aztec West
Almondsbury
Bristol
BS32 4TU

Our ref: SO/2018/118439/01-L01
Your ref: 180717/JW05

Date: 06 August 2018

Dear Sir/Madam

PRELIMINARY OPINION - PROPOSED RESIDENTIAL DEVELOPMENT. INVOLVES INFILLING OF RESERVOIR.
FORMER TETROSYL SITE, WALMERSLEY OLD ROAD, BURY

Thank you for submitting the above enquiry which we received on 18th July 2018.

We would like to make the following comments.

Flood Risk

The site is shown as Flood Zone 1 on the Environment Agency flood maps but previous applications relating to this site have shown that some areas of the site are actually within flood zone 2 and 3 therefore being of a higher flood risk. A Flood Risk Assessment (FRA) should be prepared to support any future planning application.

Any modelling undertaken to evidence this risk should consider a range of return periods and take the impacts of climate change into account in setting finished floor levels, new climate change allowances have been published on 19th February 2016, see https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances for full details.

The Environment Agency does not have updated flood levels with the revised climate change allowances and as such the flood risk consultant should consider the appropriate mitigation measures to mitigate against fluvial and pluvial flooding. Our general recommendation is that floor levels are at least 600mm above the 1% plus 35% climate change flood level.

Culverted Watercourse

There is a culverted watercourse that runs through the site. The culvert position will have an impact on the area available for development and ultimately the number of units that the site will accommodate. Construction above culverts is not good practice as it restricts future access for maintenance/repair. The culvert will also be a liability for the individual landowners. We would suggest that these high risk areas of the site

accommodate the public open space and the dwellings avoid the high risk area and therefore, follow the sequential approach to development within the site.

Infilling the reservoir
Infilling the reservoir will result in loss of surface water and flood water storage. The FRA will need to demonstrate no increase in flood risk elsewhere and the provision of compensatory flood storage for the infilling of the reservoir proposals may be required.

The effect of this on flood flows downstream will need to be considered in the FRA as the reservoir will provide some balancing effect on flood flows.

This development may require a permit under the Environmental Permitting (England and Wales) Regulations 2016 from the Environment Agency for any proposed works or structures, in, under, over or within eight metres of the top of the bank of Pigs Lee Brook, designated a 'main river'. This was formerly called a Flood Defence Consent. Some activities are also now excluded or exempt. A permit is separate to and in addition to any planning permission granted. Further details and guidance are available on the GOV.UK website: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

The Environment Agency has discretionary powers to carry out maintenance works on the channels of "main river" watercourses to remove blockages and ensure the free flow of water. The responsibility for the repair and condition of Pigs Lee Brook, its channel, banks and adjacent structures, lies ultimately with the riparian owner.

Ecology

We would seek that an appropriate environmental and ecological assessment is undertaken for this large mixed greenspace and brownfield site, and be guided by identified environmental constraints and opportunities, and ensuing in particular the protection of Pigs Lee Brook watercourse, WFD waterbody (Ref: GB112069064620) which is a key ecological receptor of the site. Any decommissioning and decontamination of former industrial site will need to be carefully managed to protect the aquatic environment.

Any ecological assessment should be conducted prior to development of any detailed plans to enable an assessment of level of risk posed by future development. The detailed design, construction, mitigation and compensation measures should be based on the results of a survey carried out at an appropriate time of year by a suitably experienced surveyor using recognised survey methodology.

The survey and risk assessment should:

- identify any rare, declining, protected or otherwise important terrestrial and aquatic flora, fauna or habitats within the site;
- assess the importance of the above features at a local, regional and national level;
- identify the impacts of the scheme on those features;
- demonstrate how the development will avoid adverse impacts
- propose mitigation for any adverse ecological impacts or compensation for loss;
- propose wildlife/ habitat enhancement measures;
- Propose post-project appraisal, management plans and management responsibilities with details of how biodiversity enhancement will be incorporated

Cont/d..

into the development and maintained over the long term.

We would recommend any ecological impact assessment follow IEEM ecological assessment guidelines (https://www.cieem.net/data/files/Website_Downloads/Guidelines_for_Ecological_Impact_Assessment_2015.pdf) particularly in regards ecological impact associated with proposed loss of relatively large and well established reservoir and wetland.

Whilst we welcome the retention of an open channel watercourse and the preferable 'skylighting' of some of the 400m of existing culverted sections of Pigs Lee Brook tributary as part of future development proposals. The design of the new open channel watercourse should be shaped by not just flood modelling and high flows, but also look to provide a high quality riparian corridor that is resilient and ecological valuable in dominant dry weather flows, one that has a wide undeveloped green space corridor that is accessible for both people and wildlife, a riparian design that ensures new development positively integrates with restored river corridor i.e. front facing development, use of above ground Sustainable Urban Drainage as part of site surface water drainage; a riparian channel design that has a preference soft bio-engineering solutions where feasible (http://www.hrwallingford.com/news/supporting-green-river-engineering), and provides commensurate mitigation for loss of reservoir wetland and high quality green infrastructure asset.

We would also recommend any new open channel watercourse be guided by existing good practice design guides such as 'Rivers by design' (http://www.ecrr.org/Portals/27/Publications/131223%20Rivers%20by%20Design.pdf) and current draft Greater Manchester Spatial Framework policies in regards to rivers valleys and green infrastructure (https://www.greatermanchester-ca.gov.uk/downloads/file/371/draft_greater_manchester_spatial_framework_october_2016_-_full_version).

It is understood from previous development plans for redeveloping Tetrosyl site, that a number of protected species have been confirmed present within the site. This will mean Natural England licensing (https://www.gov.uk/guidance/wildlife-licences) would be required, and we would recommend Natural England are consulted in regards to redeveloping the Tetrosyl site.

Our Fisheries Team understand that the existing reservoir was an active fishery. The Agency regulates the removal of fish from inland waters in order to protect fisheries and the environment from the impacts of inappropriate fish transfers, disease transmission and poaching. The applicant will require written permission (consent) from us in regards to the draining of the existing reservoir and:

i. removal of fish from any inland water.
ii. Use any fishing instruments, such as nets, traps or electric equipment.

Contaminated Land

The site is a former industrial area where elevated concentrations of contamination may be present and could adversely impact the water environment now and in the future.

Should the site be brought forward for development then land conditions should be considered. We would expect ground investigation to be undertaken prior to the commencement of any in-filling and onwards development.

Cont/d..

Model Procedures and good practice:

Due to the former land use(s), soil and /or groundwater contamination may exist at the site and the associated risks to controlled waters should be addressed by:

1. Following the risk management framework provide in CLR11, Model procedures for the management of land contamination
    - https://www.gov.uk/government/publications/managing-land-contamination
2. Referring to the Environment Agency guiding principles for land contamination and the land contamination sections in the Environment Agency's Groundwater Protection: Principles and Practice
    - https://www.gov.uk/government/publications/managing-and-reducing-land-contamination
    - https://www.gov.uk/government/collections/groundwater-protection
3. Further information may be found on the land contamination technical guidance pages on the direct.gov website
    - https://www.gov.uk/government/collections/land-contamination-technical-guidance

All investigations of land potentially affected by contamination should be carried out by or under the direction of a suitably qualified competent person and in accordance with BS 10175 (2001) Code of practice for the investigation of potentially contaminated sites. The competent person would normally be expected to be chartered member of an appropriate body (such as the Institution of Civil Engineers, Geological Society of London, Royal Institution of Chartered Surveyors, Institution of Environmental Management) and also have relevant experience of investigating contaminated sites. The Specialist in Land Condition (SilC) qualification administered by the Institution of Environmental Management provides an accredited status for those responsible for signing off LCR's. For further information see - www.silc.org.uk
we are keen to work with the developer in resolving any problems or issues that may occur so that any further possible delays are minimise or avoided.

Waste Management

Depending on the material proposed to be used to fill the reservoir, the proposed development may require a Waste Management Licence in accordance with the requirements of the Environmental Protection Act 1990. Further information can be obtained from www.gov.uk

Should you wish to discuss the above comments in further detail or would like a meeting we can do this as part of our cost recovery service which is £100+VAT per hour, per person.

Yours faithfully

Ms Sylvia Whittingham
Planning Advisor

Direct dial 02030250159
Direct e-mail Sylvia.whittingham@environment-agency.gov.uk

CCTV Culvert Survey

Pig Lee Tributary,
Off Walmersley Old Road,
Bury

Job No: SALE1308031

25th October 2012

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

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Executive Summary

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CCTV SURVEY – EXECUTIVE SUMMARY

Client:	Environment Agency	NFCDD Ref:	01313PIGT0101B02
Site Address:	Pig Lee Trib, Off Walmersley Old Road, Bury	Contact:	Mark Whittaker
Date of Report:	25th October 2012	Job No:	SALE1308031

Objective

A CCTV survey was undertaken by Aquajet (GB) Ltd using Man assisted CCTV techniques. This was conducted on behalf of the Environment Agency.

The purpose of the survey was to determine the route of the culvert and to visually ascertain the condition of the culvert/headwalls.

Location and Description

Pedestrian and vehicle access to the culvert is gained via Tetrosyl for the Inlet (ladders are required), and opposite 27 Walmersley Old Road for the Outlet.

The culvert flows in a North Easterly direction from the Inlet, the direction then changes to Southerly and continues to MH01. The direction then changes to Westerly and continues to MH01 where just after it changes again to South Westerly and continues to flow to the Outlet which is situated opposite 27 Walmersley Old Road.

The Inlet headwall is of concrete and brick construction and appears to be in good condition.
The Outlet headwall is of masonry construction but is covered in moss so we are therefore unable to comment on the condition.

The following information should be viewed in conjunction with the CCTV report.

The culvert is made up of the following:

1. Outlet upstream to MH01 – Date of Survey: 17-09-12 - Weather: Dry - Flow Level: Low

- The culvert is 1200mm circular brick construction.
- There is infiltration gushing at 15.9m.
- There is infiltration dripping at 15.9m and 26.9m.
- There is medium encrustation at various points in the length.
- There is medium scale from a connection at 120.2m.
- The survey was completed at 158.8m.

Observations & Anomalies

Service defects have been recorded on this length. We were unable to obtain GPS for the Outlet due to trees. The complete frame of MH01 had to be removed to survey as the cover had seized.

2. MH01 upstream to MH02 – Date of Survey: 17-09-12 - Weather: Dry - Flow Level: Low

- The culvert is 2500mm x 1300mm rectangular masonry in regular courses construction.
- The culvert changes to a 2220mm x 1300mm arched masonry randomly coursed construction at 2.0m.
- There are missing bricks approximately every 1.0m starting at 2.0m through to 95.3m.
- The invert steps up twice at 82.7m.
- The dimensions of the culvert change to 2600mm x 1600mm at 83.7m.
- The invert steps up at 95.3m.
- The survey was abandoned as communication was lost due to step up of invert at 95.3m.

CCTV SURVEY – EXECUTIVE SUMMARY

Client:	Environment Agency	NFCDD Ref:	01313PIGT0101B02
Site Address:	Pig Lee Trib, Off Walmersley Old Road, Bury	Contact:	Mark Whittaker
Date of Report:	25th October 2012	Job No:	SALE1308031

Observations & Anomalies

Service and structural defects have been recorded on this length. The complete frame of MH01 had to be removed to survey as the cover had seized. We were unable to obtain GPS for MH02.

3. MH02 downstream to MH01 – Date of Survey: 18-09-12 - Weather: Showers - Flow Level: Low

- The culvert is 1700mm x 2800mm rectangular masonry randomly coursed construction.
- There is a metal corrugated soffit at 0.0m.
- There are missing bricks at 2.0m.
- There is a connection with an intrusion of 30mm at 2.0m.
- The culvert changes to an arched 1800mm x 280mm construction at 2.0m.
- The invert steps down twice at 2.0m.
- The invert steps down at 6.9m.
- The dimensions of the culvert change to 2600mm x 1600mm at 10.8m.
- The invert steps down at 27.3m.
- The survey was abandoned as due to the overlap being completed at 27.3m.

Observations & Anomalies

Structural and constructional defects have been recorded on this length. The complete frame of MH01 had to be removed to survey as the cover had seized. We were unable to gain GPS for MH02.

4. MH02 upstream to Inlet – Date of Survey: 18-09-12 - Weather: Showers - Flow Level: Low

- The culvert is 1100mm x 900mm rectangular masonry in regular courses construction.
- There is a flagged soffit at 2.0m.
- There is a small chamber with metal bars visible at 8.3m.
- The culvert changes to a 1000mm x 1100mm masonry randomly coursed construction at 9.1m.
- The dimensions of the culvert change to 1070mm x 900mm at 22.1m.
- The width at 10 o'clock – 2 o'clock is 600mm at 22.1m.
- There is a blind chamber at 34.7m.
- There is an exiting blind chamber at 37.8m.
- There are intruding connections at various points in the length.
- There is a blind chamber at 54.7m.
- The dimensions of the culvert change to 100mm x 900mm at 54.7m.
- The dimensions of the culvert change to 1300mm x 1000mm at 56.7m.
- The material of the culvert changes to brick on the right hand side of the wall at 56.7.
- Benching starts on the right hand side at 56.7m and finishes at 100.8m.
- The culvert changes to a 100mm x 1100mm masonry randomly coursed construction at 60.5m.
- The dimensions of the culvert change to 1750mm x 1100mm at 62.5m.
- There are services across the culvert at 63.2m, 65.5m and 93.4m.
- There is brick 9 o'clock – 3 o'clock at 66.3m.
- There is infiltration gushing at 88.5m and 94.2m.
- The dimensions of the culvert change to 1250mm x 1500mm at 100.8m.
- The brick at 10 o'clock – 2 o'clock stops at 100.8m.
- There are metal brackets attached to the soffit at 104.9m, 107.6m and 136.3m.
- There is a beam across the soffit at 114.4m.

CCTV SURVEY – EXECUTIVE SUMMARY

Client:	Environment Agency	NFCDD Ref:	01313PIGT0101B02
Site Address:	Pig Lee Trib, Off Walmersley Old Road, Bury	Contact:	Mark Whittaker
Date of Report:	25th October 2012	Job No:	SALE1308031

- The culvert changes to a 1500mm x 1500mm square culvert at 117.8m.
- There is medium encrustation at 153.2m.
- There is infiltration running at 153.2m.
- The survey was completed at 163.7m.

Observations & Anomalies

Service and constructional defects have been recorded on this length. We were unable to gain access to the Inlet as ladders are required. We were unable to obtain GPS at MH02 or the Inlet.

Recommendations

Our survey has highlighted debris, encrustation and scale which need removed using high pressure water removal. Our survey has also highlighted gushing and running infiltrations and also missing bricks which will all require remedial works. There were a number of dripping infiltrations which will require monitoring over the next twelve months. Our survey has also highlighted a number of intruding connections, however as the do not impede the flow no works will be required.

Health & Safety

We were unable to gain access to the Inlet and the Outlet is covered in moss so we are unable to comment on the condition of the headwalls.

Remaining Life

Culvert – Visually assessed in excess as between 3 and 5 years, subject to our recommendations.

Note:

This report is compiled from information provided by our trained and certified CCTV operators.

Thank you for using Aquajet (GB) Ltd

Executive Summary produced by J. Warren

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Area Plan

The Area Plan is printed on 100% recycled paper

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Grade Defect Report

The Grade Defect Report is printed on 100% recycled paper

Grade Defect Report

Aquajet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031,Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
1	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Start of Survey	0
2	BURY	OFF MILL ROAD	MH02	u/s	INLET	0	Start of Survey	0
3	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	0	Start of Survey	0
4	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	Start of Survey	0
5	BURY	OFF MILL ROAD	MH02	u/s	INLET	0	Manhole Remark: MH02	0
6	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Manhole Remark: MH01	0
7	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	Manhole Remark: MH02	0
8	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	0	Manhole Remark: OUTLET	0
9	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	0	Water level, 10 % height/diameter	0
10	BURY	OFF MILL ROAD	MH02	u/s	INLET	0	Water level, 15 % height/diameter	0
11	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	Water level, 10 % height/diameter	0
12	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Water level, 05 % height/diameter	0
13	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	General Observation, Remark: METAL CORRAGATED SOFFIT	0
14	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	2	General Condition photograph	0
15	BURY	OFF MILL ROAD	MH02	u/s	INLET	2	General Condition photograph	0
16	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	General Condition photograph	0
17	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	General Condition photograph	0
18	BURY	OFF MILL ROAD	MH02	u/s	INLET	2	General Observation, Remark: FLAGGED SOFFIT	0
19	BURY	OFF MILL ROAD	MH02	u/s	INLET	7.3	General Condition photograph	0
20	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Dimension of sewer changes, new dimension dia 2220 mm, Remark: X 1300MM	0
21	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Sewer shape changes at this point, Remark: ARCHED	0
22	BURY	OFF MILL ROAD	MH02	u/s	INLET	8.3	General Observation, Remark: SMALL CHAMBER ON LEFT METAL BARS VISIBLE	0
23	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	14.1	General Condition photograph	0
24	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Sewer shape changes at this point, Remark: ARCHED	0
25	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Sewer Material changes at this point, Masonry - rand. coursed	0
26	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	Line of Sewer deviates right, Remark: SHARP	0
27	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	Dimension of sewer changes, new dimension dia 1000 mm, Remark: X 1100MM	0
28	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Dimension of sewer changes, new dimension dia 1800 mm, Remark: X 2800MM	0
29	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	Sewer Material changes at this point, Masonry - rand. coursed	0
30	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	22.5	Line of Sewer deviates left, Remark: SHARP	0
31	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	General Observation, Remark: INVERT STEPS DOWN X 2	0
32	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	General Condition photograph	0
33	BURY	OFF MILL ROAD	MH02	d/s	MH01	6.9	General Observation, Remark: INVERT STEPS DOWN 1.0M APPROX	0
34	BURY	OFF MILL ROAD	MH01	u/s	MH02	16.2	General Condition photograph	0
35	BURY	OFF MILL ROAD	MH02	d/s	MH01	9.9	Connection, at 03 o´clock, dia 450 mm, Remark: X 300MM	0
36	BURY	OFF MILL ROAD	MH01	u/s	MH02	16.2	General Observation, Remark: TIMBER ACROSS CULVERT 10 - 02 O'CLOCK	0
37	BURY	OFF MILL ROAD	MH02	u/s	INLET	20	General Condition photograph	0
38	BURY	OFF MILL ROAD	MH01	u/s	MH02	22.7	Connection, at 02 o´clock, dia 225 mm	0
39	BURY	OFF MILL ROAD	MH02	d/s	MH01	10.8	Line of Sewer deviates right, Remark: GRADUAL	0
40	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	Connection, at 11 o´clock, dia 100 mm	0

Grade Defect Report

Aquajet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031,Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
41	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	Dimension of sewer changes, new dimension dia 1070 mm, Remark: X 900MM	0
42	BURY	OFF MILL ROAD	MH02	d/s	MH01	10.8	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	0
43	BURY	OFF MILL ROAD	MH01	u/s	MH02	26.7	Connection, at 08 o´clock, dia 225 mm, Remark: X 225MM LIVE	0
44	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	32.3	Line of Sewer deviates left, Remark: QUITE SHARP	0
45	BURY	OFF MILL ROAD	MH02	d/s	MH01	10.8	General Condition photograph	0
46	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	32.3	General Condition photograph	0
47	BURY	OFF MILL ROAD	MH01	u/s	MH02	26.7	General Condition photograph	0
48	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	General Observation, Remark: 10 - 02 O'CLOCK WIDTH 600MM	0
49	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	General Condition photograph	0
50	BURY	OFF MILL ROAD	MH02	d/s	MH01	15	Connection, at 09 o´clock, dia 225 mm	0
51	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	39.5	Line of Sewer deviates right, Remark: QUITE SHARP	0
52	BURY	OFF MILL ROAD	MH01	u/s	MH02	31.8	General Condition photograph	0
53	BURY	OFF MILL ROAD	MH02	u/s	INLET	26.8	Connection, at 11 o´clock, dia 100 mm	0
54	BURY	OFF MILL ROAD	MH02	d/s	MH01	17.5	Connection, at 03 o´clock, dia 225 mm, Remark: X 225MM	0
55	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	39.5	General Condition photograph	0
56	BURY	OFF MILL ROAD	MH01	u/s	MH02	44.7	General Condition photograph	0
57	BURY	OFF MILL ROAD	MH02	u/s	INLET	26.8	General Condition photograph	0
58	BURY	OFF MILL ROAD	MH01	u/s	MH02	52.1	Connection, at 10 o´clock, dia 150 mm	0
59	BURY	OFF MILL ROAD	MH02	d/s	MH01	20	General Condition photograph	0
60	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	44.3	Line of Sewer deviates right, Remark: SHARP	0
61	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	44.3	General Condition photograph	0
62	BURY	OFF MILL ROAD	MH02	u/s	INLET	34.7	General Observation, Remark: BLIND CHAMBER	0
63	BURY	OFF MILL ROAD	MH02	d/s	MH01	20	Line of Sewer deviates right, Remark: GRADUAL	0
64	BURY	OFF MILL ROAD	MH01	u/s	MH02	61.7	General Condition photograph	0
65	BURY	OFF MILL ROAD	MH01	u/s	MH02	69.9	Connection, at 12 o´clock, dia 225 mm, Remark: LIVE	0
66	BURY	OFF MILL ROAD	MH02	d/s	MH01	26.9	Connection, at 02 o´clock, dia 500 mm, Remark: X 300MM	0
67	BURY	OFF MILL ROAD	MH01	u/s	MH02	69.9	Line of Sewer deviates right, Remark: SLIGHT	0
68	BURY	OFF MILL ROAD	MH02	d/s	MH01	27.3	General Observation, Remark: INVERT STEPS DOWN	0
69	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	52.3	General Condition photograph	0
70	BURY	OFF MILL ROAD	MH02	u/s	INLET	37.8	General Observation, Remark: EXITING BLIND CHAMBER	0
71	BURY	OFF MILL ROAD	MH02	u/s	INLET	37.8	General Condition photograph	0
72	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	70.1	General Condition photograph	0
73	BURY	OFF MILL ROAD	MH02	d/s	MH01	27.3	Survey abandoned, Remark: OVERLAP COMPLETED	0
74	BURY	OFF MILL ROAD	MH01	u/s	MH02	73.8	Connection, at 09 o´clock, dia 100 mm	0
75	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	83	General Condition photograph	0
76	BURY	OFF MILL ROAD	MH01	u/s	MH02	80.5	General Condition photograph	0
77	BURY	OFF MILL ROAD	MH01	u/s	MH02	82.7	Connection, at 04 o´clock, dia 600 mm, Remark: X 450MM	0
78	BURY	OFF MILL ROAD	MH02	u/s	INLET	48.6	General Condition photograph	0
79	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	95.4	General Condition photograph	0
80	BURY	OFF MILL ROAD	MH01	u/s	MH02	82.7	General Observation, Remark: INVERT STEPS UP TWICE	0

Grade Defect Report

Aquajet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031,Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
81	BURY	OFF MILL ROAD	MH02	u/s	INLET	54.7	General Observation, Remark: BLIND CHAMBER	0
82	BURY	OFF MILL ROAD	MH01	u/s	MH02	83.7	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	0
83	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	103	Line of Sewer deviates right, Remark: SHARP	0
84	BURY	OFF MILL ROAD	MH01	u/s	MH02	87.8	Line of Sewer deviates right, Remark: QUITE SHARP	0
85	BURY	OFF MILL ROAD	MH02	u/s	INLET	54.7	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 900MM	0
86	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	103	General Condition photograph	0
87	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	Dimension of sewer changes, new dimension dia 1300 mm, Remark: X 1000MM	0
88	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	116	General Condition photograph	0
89	BURY	OFF MILL ROAD	MH01	u/s	MH02	91.3	General Condition photograph	0
90	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	General Observation, Remark: INVERT STEPS UP	0
91	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	120.2	Connection, at 10 o´clock, dia 225 mm	0
92	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	General Condition photograph	0
93	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	Sewer Material changes at this point, Brick, Remark: RIGHTSIDE WALL	0
94	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	General Observation, Remark: BENCHING STARTS ON RIGHTSIDE	0
95	BURY	OFF MILL ROAD	MH02	u/s	INLET	60.5	Sewer Material changes at this point, Masonry - rand. coursed, Remark: RIGHTSIDE WALL	0
96	BURY	OFF MILL ROAD	MH02	u/s	INLET	60.5	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 1100MM	0
97	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Survey abandoned, Remark: LOSS OF COMMUNICATION DUE TO STEP UP OF INVERT	0
98	BURY	OFF MILL ROAD	MH02	u/s	INLET	61.8	Line of Sewer deviates left, Remark: SHARP	0
99	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	General Condition photograph	0
100	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	138	General Condition photograph	0
101	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	150.9	General Condition photograph	0
102	BURY	OFF MILL ROAD	MH02	u/s	INLET	62.5	Dimension of sewer changes, new dimension dia 1750 mm, Remark: X 1100MM	0
103	BURY	OFF MILL ROAD	MH02	u/s	INLET	63.2	General Observation, Remark: SERVICE ACROSS CULVERT 11 - 01O'CLOCK	0
104	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	158.8	Manhole Remark: MH01	0
105	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	158.8	Finish Survey	0
106	BURY	OFF MILL ROAD	MH02	u/s	INLET	65.5	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	0
107	BURY	OFF MILL ROAD	MH02	u/s	INLET	66.3	General Observation, Remark: BRICK 09 - 03 O'CLOCK	0
108	BURY	OFF MILL ROAD	MH02	u/s	INLET	70.3	Connection, at 01 o´clock, dia 100 mm	0
109	BURY	OFF MILL ROAD	MH02	u/s	INLET	70.3	General Condition photograph	0
110	BURY	OFF MILL ROAD	MH02	u/s	INLET	82.1	General Condition photograph	0
111	BURY	OFF MILL ROAD	MH02	u/s	INLET	91.1	Connection, at 10 o´clock, dia 150 mm	0
112	BURY	OFF MILL ROAD	MH02	u/s	INLET	91.1	General Condition photograph	0
113	BURY	OFF MILL ROAD	MH02	u/s	INLET	93.4	Connection, at 10 o´clock, dia 100 mm	0
114	BURY	OFF MILL ROAD	MH02	u/s	INLET	93.4	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	0
115	BURY	OFF MILL ROAD	MH02	u/s	INLET	94.2	General Condition photograph	0
116	BURY	OFF MILL ROAD	MH02	u/s	INLET	96.5	Connection, at 08 o´clock, dia 150 mm, Remark: LIVE	0
117	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.7	Line of Sewer deviates left, Remark: QUITE SHARP	0
118	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	General Observation, Remark: BENCHING ON RIGHT STOPS	0
119	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	Dimension of sewer changes, new dimension dia 1250 mm, Remark: X 1500MM	0
120	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	General Condition photograph	0

Grade Defect Report

Aquajet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031,Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
121	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	General Observation, Remark: BRICK STOPS 10 - 02 O'CLOCK	0
122	BURY	OFF MILL ROAD	MH02	u/s	INLET	104.1	Connection, at 11 o´clock, dia 150 mm	0
123	BURY	OFF MILL ROAD	MH02	u/s	INLET	104.9	General Observation, Remark: 2 X METAL BRACKETS ATTATCHED TO SOFFIT	0
124	BURY	OFF MILL ROAD	MH02	u/s	INLET	107.6	General Observation, Remark: METAL BRACKET ATTATCHED TO SOFFIT	0
125	BURY	OFF MILL ROAD	MH02	u/s	INLET	112.2	Line of Sewer deviates left, Remark: SHARP	0
126	BURY	OFF MILL ROAD	MH02	u/s	INLET	112.2	General Condition photograph	0
127	BURY	OFF MILL ROAD	MH02	u/s	INLET	114.4	General Observation, Remark: BEAM ACROSS SOFFIT	0
128	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	Line of Sewer deviates right, Remark: SHARP	0
129	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	General Condition photograph	0
130	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	Dimension of sewer changes, new dimension dia 1500 mm, Remark: X 1500MM	0
131	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	Sewer shape changes at this point, Remark: SQUARE	0
132	BURY	OFF MILL ROAD	MH02	u/s	INLET	130	General Condition photograph	0
133	BURY	OFF MILL ROAD	MH02	u/s	INLET	136.3	General Observation, Remark:3 X METAL BEAMS ACROSS SOFFIT	0
134	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.1	Connection, at 12 o´clock, dia 150 mm	0
135	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.5	Water level, 20 % height/diameter	0
136	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.5	General Condition photograph	0
137	BURY	OFF MILL ROAD	MH02	u/s	INLET	150.4	Line of Sewer deviates left, Remark: SHARP	0
138	BURY	OFF MILL ROAD	MH02	u/s	INLET	150.4	General Condition photograph	0
139	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.3	General Condition photograph	0
140	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.7	Manhole Remark: INLET	0
141	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.7	Finish Survey	0
142	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Light Scale from 07 to 05 o´clock, Start, Remark: CLOCKS VARY	1
143	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	2	Light Scale from 03 to 05 o´clock, Start, Remark: CLOCKS VARY	1
144	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	2	Light Scale from 07 to 09 o´clock, Start, Remark: CLOCKS VARY	1
145	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Light Scale from 07 to 05 o´clock, Finish, Remark: CLOCKS VARY	1
146	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	Light Scale from 03 to 05 o´clock, Finish, Remark: CLOCKS VARY	1
147	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	Light Scale from 07 to 09 o´clock, Finish, Remark: CLOCKS VARY	1
148	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	Light Scale from 07 to 05 o´clock, Start, Remark: CLOCKS VARY	1
149	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	158.8	Light Scale from 07 to 05 o´clock, Finish, Remark: CLOCKS VARY	1
150	BURY	OFF MILL ROAD	MH02	u/s	INLET	120.4	Debris, 10 % cross-sectional area loss, Start, Remark: RUBBLE	1
151	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.5	Debris, 20 % cross-sectional area loss, Changed, Remark: RUBBLE	1
152	BURY	OFF MILL ROAD	MH02	u/s	INLET	146.6	Debris, 25 % cross-sectional area loss, Remark: ROCKS ON LEFT	1
153	BURY	OFF MILL ROAD	MH02	u/s	INLET	146.6	Debris, 15 % cross-sectional area loss, Changed, Remark: RUBBLE	1
154	BURY	OFF MILL ROAD	MH02	u/s	INLET	156.6	Debris, 25 % cross-sectional area loss, Remark: ROCK	1
155	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.7	Debris, 15 % cross-sectional area loss, Finish, Remark: RUBBLE	1
156	BURY	OFF MILL ROAD	MH02	u/s	INLET	34.7	Obstruction, 50 % height/diameter loss, Remark: SERVICE ACROSS CULVERT	2
157	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	15.9	Infiltration Dripping at 12 o´clock	3
158	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	26.9	Infiltration Dripping at 12 o´clock	3
159	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Connection, at 11 o´clock, dia 150 mm, intrusion 30 mm	4
160	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	22.5	Encrustation medium, from 03 to 05 o´clock, 15% cross-sectional area loss	4

Grade Defect Report

Aquajet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031,Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
161	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	26.9	Encrustation medium, from 10 to 12 o´clock, 10% cross-sectional area loss	4
162	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	52.3	Encrustation medium, from 11 to 12 o´clock, 10% cross-sectional area loss	4
163	BURY	OFF MILL ROAD	MH02	u/s	INLET	40.8	Connection, at 11 o´clock, dia 150 mm, intrusion 80 mm	4
164	BURY	OFF MILL ROAD	MH02	u/s	INLET	41.3	Connection, at 11 o´clock, dia 100 mm, intrusion 50 mm	4
165	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	86.7	Encrustation medium, from 07 to 09 o´clock, 10% cross-sectional area loss	4
166	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	120.2	Medium Scale from 07 to 10 o´clock, 10% cross-sectional area loss, Remark: FROM CONN	4
167	BURY	OFF MILL ROAD	MH02	u/s	INLET	62	Connection, at 01 o´clock, dia 225 mm, intrusion 50 mm	4
168	BURY	OFF MILL ROAD	MH02	u/s	INLET	62.5	Connection, at 10 o´clock, dia 225 mm, intrusion 40 mm	4
169	BURY	OFF MILL ROAD	MH02	u/s	INLET	66.3	Connection, at 02 o´clock, dia 100 mm, intrusion 500 mm	4
170	BURY	OFF MILL ROAD	MH02	u/s	INLET	74	Connection, at 10 o´clock, dia 225 mm, intrusion 60 mm	4
171	BURY	OFF MILL ROAD	MH02	u/s	INLET	77.2	Connection, at 01 o´clock, dia 150 mm, intrusion 60 mm	4
172	BURY	OFF MILL ROAD	MH02	u/s	INLET	78.1	Connection, at 10 o´clock, dia 150 mm, intrusion 40 mm	4
173	BURY	OFF MILL ROAD	MH02	u/s	INLET	82.1	Connection, at 11 o´clock, dia 100 mm, intrusion 60 mm	4
174	BURY	OFF MILL ROAD	MH02	u/s	INLET	85	Connection, at 10 o´clock, dia 150 mm, intrusion 50 mm, Remark: LIVE	4
175	BURY	OFF MILL ROAD	MH02	u/s	INLET	92.4	Connection, at 03 o´clock, dia 150 mm, intrusion 80 mm, Remark: LIVE	4
176	BURY	OFF MILL ROAD	MH02	u/s	INLET	93.4	Infiltration Running from 07 to 10 o´clock	4
177	BURY	OFF MILL ROAD	MH02	u/s	INLET	99.5	Connection, at 09 o´clock, dia 150 mm, intrusion 30 mm	4
178	BURY	OFF MILL ROAD	MH02	u/s	INLET	101.8	Connection, at 01 o´clock, dia 100 mm, intrusion 30 mm, Remark: LIVE	4
179	BURY	OFF MILL ROAD	MH02	u/s	INLET	110.9	Connection, at 03 o´clock, dia 150 mm, intrusion 30 mm	4
180	BURY	OFF MILL ROAD	MH02	u/s	INLET	146.1	Connection, at 11 o´clock, dia 100 mm, intrusion 350 mm	4
181	BURY	OFF MILL ROAD	MH02	u/s	INLET	151.4	Connection, at 02 o´clock, dia 100 mm, intrusion 300 mm	4
182	BURY	OFF MILL ROAD	MH02	u/s	INLET	151.4	Connection, at 03 o´clock, dia 400 mm, intrusion 200 mm	4
183	BURY	OFF MILL ROAD	MH02	u/s	INLET	153.2	Encrustation medium, from 04 to 05 o´clock, 10% cross-sectional area loss	4
184	BURY	OFF MILL ROAD	MH02	u/s	INLET	153.2	Infiltration Running from 04 to 05 o´clock	4
185	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Missing bricks at 09 o´clock	5
186	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	15.9	Infiltration Gushing at 12 o´clock	5
187	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Missing bricks at 02 o´clock, Start, Remark: EVERY 1.0M APPROX	5
188	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Missing bricks at 10 o´clock, Start, Remark: EVERY 1.0M APPROX	5
189	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Missing bricks at 02 o´clock, Finish, Remark: EVERY 1.0M APPROX	5
190	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Missing bricks at 10 o´clock, Finish, Remark: EVERY 1.0M APPROX	5
191	BURY	OFF MILL ROAD	MH02	u/s	INLET	88.5	Infiltration Gushing at 07 o´clock	5
192	BURY	OFF MILL ROAD	MH02	u/s	INLET	94.2	Infiltration Gushing at 10 o´clock	5
193	BURY	OFF MILL ROAD	MH02	u/s	INLET	98.6	Infiltration Gushing at 08 o´clock	5

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

WinCan Report (3rd Edition)

The WinCan Report is printed on 100% recycled paper

Aquajet (GB) Ltd
Retford
Nottinghamshire, DN22 6HG
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Project-information

Project name:	Contract number:	Contact:	Date:
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Aquajet (GB) Ltd
Retford
Nottinghamshire, DN22 6HG
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Inspection report

Date:	Job N°:	Weather:	Operator:	section number:	PLR:
17.09.2012	**1308031**	**Dry**	**G.Smith**	**1**	**MH01 X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	

Road:	**OFF WALMERSLEY OLD ROAD**	Division:		start MH:	**OUTLET**
Place:	**BURY**	District:	**NW**	end MH:	**MH01**
Location:	**Difficult access**	Tape No.:	**AQSER**	Total length:	**158.8 m**

Purpose:	**Asset condition**	Shape/Size:	**Circular 1200**
Use:	**Watercourse**	Material:	**Brick** Pipe length:
Catchment:		Lining:	
		Category:	

Comment: **01313PIGT0101B02**

Location details: **Pig Lee Trib**

Depth: 1.60



1:527 position		code	observation	MPEG	photo	grade
OUTLET						
0.00		ST	Start of Survey	00:00:00		(Misc) 0
0.00		MH	Manhole Remark: OUTLET	00:00:00		(Constr) 0
0.00		WL	Water level, 10 % height/diameter	00:00:00		(Serv) 0
2.00		GP	General Condition photograph	00:00:28	4_4a	(Misc) 0
2.00	**S1**	ESL	Light Scale from 03 to 05 o´clock, Start, Remark: CLOCKS VARY	00:00:34	5_5a	(Serv) 1
2.00	**S2**	ESL	Light Scale from 07 to 09 o´clock, Start, Remark: CLOCKS VARY	00:00:34	6_6a	(Serv) 1
14.10		GP	General Condition photograph	00:01:48	7_7a	(Misc) 0
15.90		IG	Infiltration Gushing at 12 o´clock	00:02:11	8_8a	(Serv) 5
15.90		ID	Infiltration Dripping at 12 o´clock	00:02:15	9_9a	(Serv) 3
22.50		LL	Line of Sewer deviates left, Remark: SHARP	00:02:56		(Serv) 0
22.50		EM	Encrustation medium, from 03 to 05 o´clock, 15% cross-sectional area loss	00:02:57	11_11a	(Serv) 4
26.90		EM	Encrustation medium, from 10 to 12 o´clock, 10% cross-sectional area loss	00:03:36	12_12a	(Serv) 4
26.90		ID	Infiltration Dripping at 12 o´clock	00:03:39	13_13a	(Serv) 3
32.30		LL	Line of Sewer deviates left, Remark: QUITE SHARP	00:04:18		(Serv) 0
32.30		GP	General Condition photograph	00:04:21	15_15a	(Misc) 0
39.50		LR	Line of Sewer deviates right, Remark: QUITE SHARP	00:05:05		(Serv) 0
39.50		GP	General Condition photograph	00:05:05	17_17a	(Misc) 0
44.30		LR	Line of Sewer deviates right, Remark: SHARP	00:05:45		(Serv) 0
44.30		GP	General Condition photograph	00:05:45	19_19a, b	(Misc) 0
52.30		EM	Encrustation medium, from 11 to 12 o´clock, 10% cross-sectional area loss	00:06:42	20_20a	(Serv) 4
52.30		GP	General Condition photograph	00:06:52	21_21a	(Misc) 0
70.10		GP	General Condition photograph	00:08:44	22_22a	(Misc) 0

Aquajet (GB) Ltd
Retford
Nottinghamshire, DN22 6HG
Tel:01777 701335, Fax:01777 701344

Inspection report

Date:	Job nr.:	Weather:	Operator:	section number:	PLR:
17.09.2012	**1308031**	**Dry**	**G.Smith**	**1**	**MH01 X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	



1:527 position		code	observation	MPEG	photo	grade
83.00		GP	General Condition photograph	00:10:13	23_23a	(Misc) 0
86.70		EM	Encrustation medium, from 07 to 09 o´clock, 10% cross-sectional area loss	00:11:08	24_24a	(Serv) 4
95.40		GP	General Condition photograph	00:12:14	25_25a	(Misc) 0
103.00		LR	Line of Sewer deviates right, Remark: SHARP	00:13:18		(Serv) 0
103.00		GP	General Condition photograph	00:13:18	27_27a	(Misc) 0
116.00		GP	General Condition photograph	00:14:39	28_28a	(Misc) 0
120.20		CN	Connection, at 10 o´clock, dia 225 mm	00:15:22		(Constr) 0
120.20		ESM	Medium Scale from 07 to 10 o´clock, 10% cross-sectional area loss, Remark: FROM CONNECTION	00:15:22	30_30a	(Serv) 4
124.30	F1	ESL	Light Scale from 03 to 05 o´clock, Finish, Remark: CLOCKS VARY	00:16:09		(Serv) 1
124.30	F2	ESL	Light Scale from 07 to 09 o´clock, Finish, Remark: CLOCKS VARY	00:16:09		(Serv) 1
124.30	S3	ESL	Light Scale from 07 to 05 o´clock, Start, Remark: CLOCKS VARY	00:16:09		(Serv) 1
124.30		GP	General Condition photograph	00:16:10	34_34a	(Misc) 0
138.00		GP	General Condition photograph	00:17:50	35_35a	(Misc) 0
150.90		GP	General Condition photograph	00:19:29	36_36a	(Misc) 0
158.80	F3	ESL	Light Scale from 07 to 05 o´clock, Finish, Remark: CLOCKS VARY	00:21:00		(Serv) 1
158.80		MH	Manhole Remark: MH01	00:21:00	38_38a, b	(Constr) 0
158.80		FH	Finish Survey	00:21:27		(Misc) 0

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

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Inspection report

Date:	Job N°:	Weather:	Operator:	section number:	PLR:
17/09/2012	**1308031**	**Dry**	**G.Smith**	**2**	**MH02 X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	

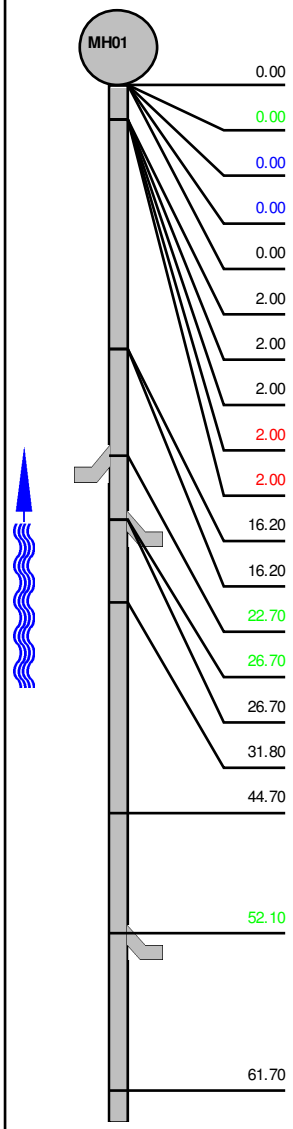
Road:	**OFF MILL ROAD**	Division:		start MH:	**MH01**
Place:	**BURY**	District:	**NW**	end MH:	**MH02**
Location:	**Difficult access**	Tape No.:	**AQSER**	Total length:	**122.6 m**

Purpose:	**Asset condition**	Shape/Size:	**Rectangular 2500/1300**	
Use:	**Watercourse**	Material:	**Masonry - in reg. courses**	Pipe length:
Catchment:		Lining:		
		Category:		

Comment: **01313PIGT0101B02**

Location details: **Pig Lee Trib**

Depth: 13.36



1:465 position		code	observation	MPEG	photo	grade
0.00		ST	Start of Survey	00:00:00		(Misc) 0
0.00		MH	Manhole Remark: MH01	00:00:00		(Constr) 0
0.00		WL	Water level, 05 % height/diameter	00:00:00		(Serv) 0
0.00	**S1**	ESL	Light Scale from 07 to 05 o´clock, Start, Remark: CLOCKS VARY	00:00:00		(Serv) 1
0.00		GP	General Condition photograph	00:00:24	76_5a	(Misc) 0
2.00		DC	Dimension of sewer changes, new dimension dia 2220 mm, Remark: X 1300MM	00:00:55		(Misc) 0
2.00		SC	Sewer shape changes at this point, Remark: ARCHED	00:01:03		(Misc) 0
2.00		MC	Sewer Material changes at this point, Masonry - rand. coursed	00:01:04		(Misc) 0
2.00	**S2**	MB	Missing bricks at 02 o´clock, Start, Remark: EVERY 1.0M APPROX	00:01:05	80_9a	(Struct) 5
2.00	**S3**	MB	Missing bricks at 10 o´clock, Start, Remark: EVERY 1.0M APPROX	00:01:05	81_10a	(Struct) 5
16.20		GP	General Condition photograph	00:02:07	82_11a	(Misc) 0
16.20		GO	General Observation, Remark: TIMBER ACROSS CULVERT 10 - 02 O'CLOCK	00:02:20	83_12a	(Misc) 0
22.70		CN	Connection, at 02 o´clock, dia 225 mm	00:02:52		(Constr) 0
26.70		CN	Connection, at 08 o´clock, dia 225 mm, Remark: X 225MM LIVE	00:03:13		(Constr) 0
26.70		GP	General Condition photograph	00:03:19	86_15a	(Misc) 0
31.80		GP	General Condition photograph	00:03:49	87_16a	(Misc) 0
44.70		GP	General Condition photograph	00:04:41	88_17a	(Misc) 0
52.10		CN	Connection, at 10 o´clock, dia 150 mm	00:05:38		(Constr) 0
61.70		GP	General Condition photograph	00:06:20	90_19a	(Misc) 0

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Inspection report

Date:	Job nr.:	Weather:	Operator:	section number:	PLR:
17/09/2012	**1308031**	**Dry**	**G.Smith**	**2**	**MH02 X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	



1:465 position		code	observation	MPEG	photo	grade
69.90		CN	Connection, at 12 o´clock, dia 225 mm, Remark: LIVE	00:06:56		(Constr) 0
69.90		LR	Line of Sewer deviates right, Remark: SLIGHT	00:06:56		(Serv) 0
73.80		CN	Connection, at 09 o´clock, dia 100 mm	00:07:19		(Constr) 0
80.50		GP	General Condition photograph	00:07:56	94_23a	(Misc) 0
82.70		CN	Connection, at 04 o´clock, dia 600 mm, Remark: X 450MM	00:08:33		(Constr) 0
82.70		GO	General Observation, Remark: INVERT STEPS UP TWICE	00:08:47	96_25a, b	(Misc) 0
83.70		DC	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	00:08:00		(Misc) 0
87.80		LR	Line of Sewer deviates right, Remark: QUITE SHARP	00:10:26	2_27a	(Serv) 0
91.30		GP	General Condition photograph	00:11:06	2_28a	(Misc) 0
95.30		GO	General Observation, Remark: INVERT STEPS UP	00:11:44		(Misc) 0
95.30	F1	ESL	Light Scale from 07 to 05 o´clock, Finish, Remark: CLOCKS VARY	00:11:45		(Serv) 1
95.30	F2	MB	Missing bricks at 02 o´clock, Finish, Remark: EVERY 1.0M APPROX	00:11:47		(Struct) 5
95.30	F3	MB	Missing bricks at 10 o´clock, Finish, Remark: EVERY 1.0M APPROX	00:11:47		(Struct) 5
95.30		SA	Survey abandoned, Remark: LOSS OF COMMUNICATION DUE TO STEP UP OF INVERT	00:11:55	2_33a	(Misc) 0

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

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Inspection report

Date:	Job N°:	Weather:	Operator:	section number:	PLR:
18/09/2012	**1308031**	**Showers**	**G.Smith**	**3**	**MH02 X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	

Road:	**OFF MILL ROAD**	Division:		start MH:	**MH02**
Place:	**BURY**	District:	**NW**	end MH:	**MH01**
Location:	**Warehouse**	Tape No.:	**AQSER**	Total length:	**122.6 m**

Purpose:	**Asset condition**	Shape/Size:	**Rectangular 1700/2800**	
Use:	**Watercourse**	Material:	**Masonry - rand. coursed**	Pipe length:
Catchment:		Lining:		
		Category:		

Comment: **01313PIGT0101B02**

Location details: **Pig Lee Trib**

Depth: 2.22



1:200 position		code	observation	MPEG	photo	grade
0.00		ST	Start of Survey	00:00:00		(Misc) 0
0.00		MH	Manhole Remark: MH02	00:00:00		(Constr) 0
0.00		WL	Water level, 10 % height/diameter	00:00:00		(Serv) 0
0.00		GO	General Observation, Remark: METAL CORRAGATED SOFFIT	00:00:24	108_4a	(Misc) 0
0.00		GP	General Condition photograph	00:00:35	109_5a	(Misc) 0
2.00		MB	Missing bricks at 09 o´clock	00:01:08	110_6a	(Struct) 5
2.00		CNI	Connection, at 11 o´clock, dia 150 mm, intrusion 30 mm	00:01:20	111_7a	(Constr) 4
2.00		SC	Sewer shape changes at this point, Remark: ARCHED	00:01:44		(Misc) 0
2.00		DC	Dimension of sewer changes, new dimension dia 1800 mm, Remark: X 2800MM	00:01:45	113_9a	(Misc) 0
2.00		GO	General Observation, Remark: INVERT STEPS DOWN X 2	00:01:57	114_10a	(Misc) 0
6.90		GO	General Observation, Remark: INVERT STEPS DOWN 1.0M APPROX	00:03:39	115_11a	(Misc) 0
9.90		CN	Connection, at 03 o´clock, dia 450 mm, Remark: X 300MM	00:04:11		(Constr) 0
10.80	S1	LR	Line of Sewer deviates right, Remark: GRADUAL	00:04:46		(Serv) 0
10.80		DC	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	00:04:46		(Misc) 0
10.80		GP	General Condition photograph	00:04:54	119_15a	(Misc) 0
15.00		CN	Connection, at 09 o´clock, dia 225 mm	00:05:32		(Constr) 0
17.50		CN	Connection, at 03 o´clock, dia 225 mm, Remark: X 225MM	00:05:51		(Constr) 0
20.00		GP	General Condition photograph	00:06:19	122_18a	(Misc) 0
20.00	F1	LR	Line of Sewer deviates right, Remark: GRADUAL	00:06:22		(Serv) 0
26.90		CN	Connection, at 02 o´clock, dia 500 mm, Remark: X 300MM	00:07:04		(Constr) 0
27.30		GO	General Observation, Remark: INVERT STEPS DOWN	00:07:25		(Misc) 0
27.30		SA	Survey abandoned, Remark: OVERLAP COMPLETED	00:07:31	126_22a	(Misc) 0

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

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Inspection report

Date:	Job N°:	Weather:	Operator:	section number:	PLR:
18/09/2012	**1308031**	**Showers**	**G.Smith**	**4**	**INLET X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	

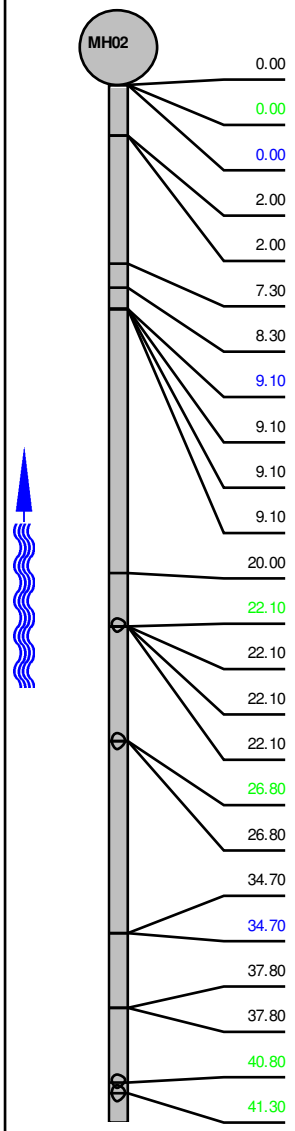
Road:	**OFF MILL ROAD**	Division:		start MH:	**MH02**
Place:	**BURY**	District:	**NW**	end MH:	**INLET**
Location:	**Warehouse**	Tape No.:	**AQSER**	Total length:	**163.7 m**

Purpose:	**Asset condition**	Shape/Size:	**Rectangular 1100/900**	
Use:	**Watercourse**	Material:	**Masonry - in reg. courses**	Pipe length:
Catchment:		Lining:		
		Category:		

Comment: **01313PIGT0101B02**

Location details: **Pig Lee Trib**

Depth: 2.22



1:310 position	code	observation	MPEG	photo	grade
0.00	ST	Start of Survey	00:00:00		(Misc) 0
0.00	MH	Manhole Remark: MH02	00:00:00		(Constr) 0
0.00	WL	Water level, 15 % height/diameter	00:00:00		(Serv) 0
2.00	GP	General Condition photograph	00:00:21	130_4a	(Misc) 0
2.00	GO	General Observation, Remark: FLAGGED SOFFIT	00:00:30	131_5a	(Misc) 0
7.30	GP	General Condition photograph	00:01:16	132_6a	(Misc) 0
8.30	GO	General Observation, Remark: SMALL CHAMBER ON LEFT METAL BARS VISIBLE	00:02:09	133_7a	(Misc) 0
9.10	LR	Line of Sewer deviates right, Remark: SHARP	00:02:47		(Serv) 0
9.10	DC	Dimension of sewer changes, new dimension dia 1000 mm, Remark: X 1100MM	00:02:48		(Misc) 0
9.10	MC	Sewer Material changes at this point, Masonry - rand. coursed	00:02:49		(Misc) 0
9.10	GP	General Condition photograph	00:02:50	137_11a	(Misc) 0
20.00	GP	General Condition photograph	00:03:43	138_12a	(Misc) 0
22.10	CN	Connection, at 11 o´clock, dia 100 mm	00:04:08		(Constr) 0
22.10	DC	Dimension of sewer changes, new dimension dia 1070 mm, Remark: X 900MM	00:04:16		(Misc) 0
22.10	GO	General Observation, Remark: 10 - 02 O'CLOCK WIDTH 600MM	00:04:25		(Misc) 0
22.10	GP	General Condition photograph	00:04:27	142_16a	(Misc) 0
26.80	CN	Connection, at 11 o´clock, dia 100 mm	00:04:58		(Constr) 0
26.80	GP	General Condition photograph	00:05:13	144_18a	(Misc) 0
34.70	GO	General Observation, Remark: BLIND CHAMBER	00:05:55	145_19a	(Misc) 0
34.70	OB	Obstruction, 50 % height/diameter loss, Remark: SERVICE ACROSS CULVERT	00:06:04	146_20a	(Serv) 2
37.80	GO	General Observation, Remark: EXITING BLIND CHAMBER	00:06:40		(Misc) 0
37.80	GP	General Condition photograph	00:06:41	148_22a	(Misc) 0
40.80	CNI	Connection, at 11 o´clock, dia 150 mm, intrusion 80 mm	00:07:09	149_23a	(Constr) 4
41.30	CNI	Connection, at 11 o´clock, dia 100 mm, intrusion 50 mm	00:07:19	150_24a	(Constr) 4

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Inspection report

Date:	Job nr.:	Weather:	Operator:	section number:	PLR:
18/09/2012	**1308031**	**Showers**	**G.Smith**	**4**	**INLET X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	



1:310 position	code	observation	MPEG	photo	grade
48.60	GP	General Condition photograph	00:08:10	151_25a	(Misc) 0
54.70	GO	General Observation, Remark: BLIND CHAMBER	00:09:12	152_26a	(Misc) 0
54.70	DC	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 900MM	00:09:35		(Misc) 0
56.70	DC	Dimension of sewer changes, new dimension dia 1300 mm, Remark: X 1000MM	00:11:10		(Misc) 0
56.70	GP	General Condition photograph	00:11:12	4_29a	(Misc) 0
56.70	MC	Sewer Material changes at this point, Brick, Remark: RIGHTSIDE WALL	00:11:21	4_30a	(Misc) 0
56.70	GO	General Observation, Remark: BENCHING STARTS ON RIGHTSIDE	00:11:21		(Misc) 0
60.50	MC	Sewer Material changes at this point, Masonry - rand. coursed, Remark: RIGHTSIDE WALL	00:11:59	4_32a	(Misc) 0
60.50	DC	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 1100MM	00:11:59		(Misc) 0
61.80	LL	Line of Sewer deviates left, Remark: SHARP	00:12:26	4_34a	(Serv) 0
62.00	CNI	Connection, at 01 o´clock, dia 225 mm, intrusion 50 mm	00:12:47	4_35a	(Constr) 4
62.50	CNI	Connection, at 10 o´clock, dia 225 mm, intrusion 40 mm	00:13:12	4_36a	(Constr) 4
62.50	DC	Dimension of sewer changes, new dimension dia 1750 mm, Remark: X 1100MM	00:13:12		(Misc) 0
63.20	GO	General Observation, Remark: SERVICE ACROSS CULVERT 11 - 01O'CLOCK	00:13:26	4_38a	(Misc) 0
65.50	GO	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	00:13:50	4_39a	(Misc) 0
66.30	CNI	Connection, at 02 o´clock, dia 100 mm, intrusion 500 mm	00:14:05	4_40a	(Constr) 4
66.30	GO	General Observation, Remark: BRICK 09 - 03 O'CLOCK	00:14:18	4_41a	(Misc) 0
70.30	CN	Connection, at 01 o´clock, dia 100 mm	00:14:44		(Constr) 0
70.30	GP	General Condition photograph	00:14:56	4_43a	(Misc) 0
74.00	CNI	Connection, at 10 o´clock, dia 225 mm, intrusion 60 mm	00:15:16	4_44a	(Constr) 4
77.20	CNI	Connection, at 01 o´clock, dia 150 mm, intrusion 60 mm	00:16:02	4_45a	(Constr) 4
78.10	CNI	Connection, at 10 o´clock, dia 150 mm, intrusion 40 mm	00:16:31	4_46a	(Constr) 4
82.10	CNI	Connection, at 11 o´clock, dia 100 mm, intrusion 60 mm	00:16:55	4_47a	(Constr) 4
82.10	GP	General Condition photograph	00:17:02	4_48a	(Misc) 0
85.00	CNI	Connection, at 10 o´clock, dia 150 mm, intrusion 50 mm, Remark: LIVE	00:17:21	4_49a	(Constr) 4
88.50	IG	Infiltration Gushing at 07 o´clock	00:17:45	4_50a	(Serv) 5
91.10	CN	Connection, at 10 o´clock, dia 150 mm	00:18:12		(Constr) 0
91.10	GP	General Condition photograph	00:18:16	4_52a	(Misc) 0
92.40	CNI	Connection, at 03 o´clock, dia 150 mm, intrusion 80 mm, Remark: LIVE	00:18:31	4_53a	(Constr) 4

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Inspection report

Date:	Job nr.:	Weather:	Operator:	section number:	PLR:
18/09/2012	**1308031**	**Showers**	**G.Smith**	**4**	**INLET X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	



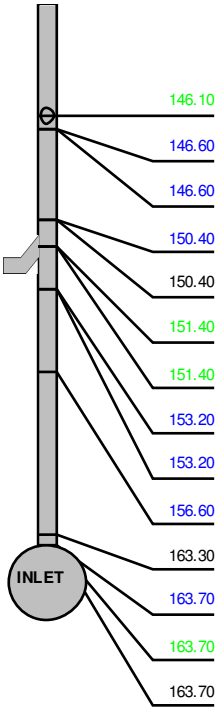
1:310 position	code	observation	MPEG	photo	grade
93.40	CN	Connection, at 10 o´clock, dia 100 mm	00:18:54		(Constr) 0
93.40	IR	Infiltration Running from 07 to 10 o´clock	00:18:55	4_55a	(Serv) 4
93.40	GO	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	00:19:11	4_56a	(Misc) 0
94.20	IG	Infiltration Gushing at 10 o´clock	00:19:35	4_57a	(Serv) 5
94.20	GP	General Condition photograph	00:19:47	4_58a	(Misc) 0
96.50	CN	Connection, at 08 o´clock, dia 150 mm, Remark: LIVE	00:20:04		(Constr) 0
98.60	IG	Infiltration Gushing at 08 o´clock	00:20:36	4_60a	(Serv) 5
99.50	CNI	Connection, at 09 o´clock, dia 150 mm, intrusion 30 mm	00:20:56	4_61a	(Constr) 4
100.70	LL	Line of Sewer deviates left, Remark: QUITE SHARP	00:21:14		(Serv) 0
100.80	GO	General Observation, Remark: BENCHING ON RIGHT STOPS	00:21:16		(Misc) 0
100.80	DC	Dimension of sewer changes, new dimension dia 1250 mm, Remark: X 1500MM	00:21:17		(Misc) 0
100.80	GP	General Condition photograph	00:21:17	4_65a	(Misc) 0
100.80	GO	General Observation, Remark: BRICK STOPS 10 - 02 O'CLOCK	00:21:24		(Misc) 0
101.80	CNI	Connection, at 01 o´clock, dia 100 mm, intrusion 30 mm, Remark: LIVE	00:21:57	4_67a	(Constr) 4
104.10	CN	Connection, at 11 o´clock, dia 150 mm	00:22:26		(Constr) 0
104.90	GO	General Observation, Remark: 2 X METAL BRACKETS ATTATCHED TO SOFFIT	00:22:53	4_69a, b	(Misc) 0
107.60	GO	General Observation, Remark: METAL BRACKET ATTATCHED TO SOFFIT	00:23:33	4_70a	(Misc) 0
110.90	CNI	Connection, at 03 o´clock, dia 150 mm, intrusion 30 mm	00:23:58	4_71a	(Constr) 4
112.20	LL	Line of Sewer deviates left, Remark: SHARP	00:24:17		(Serv) 0
112.20	GP	General Condition photograph	00:24:20	4_73a	(Misc) 0
114.40	GO	General Observation, Remark: BEAM ACROSS SOFFIT	00:24:43	4_74a	(Misc) 0
117.80	LR	Line of Sewer deviates right, Remark: SHARP	00:25:30		(Serv) 0
117.80	GP	General Condition photograph	00:25:30	4_76a	(Misc) 0
117.80	DC	Dimension of sewer changes, new dimension dia 1500 mm, Remark: X 1500MM	00:25:36		(Misc) 0
117.80	SC	Sewer shape changes at this point, Remark: SQUARE	00:25:36		(Misc) 0
120.40 **S1**	DE	Debris, 10 % cross-sectional area loss, Start, Remark: RUBBLE	00:26:06	4_79a	(Serv) 1
130.00	GP	General Condition photograph	00:27:18	4_80a	(Misc) 0
136.30	GO	General Observation, Remark:3 X METAL BEAMS ACROSS SOFFIT	00:27:53	4_81a	(Misc) 0
141.10	CN	Connection, at 12 o´clock, dia 150 mm	00:28:47		(Constr) 0
141.50 **C1**	DE	Debris, 20 % cross-sectional area loss, Changed, Remark: RUBBLE	00:29:04	4_83a	(Serv) 1
141.50	WL	Water level, 20 % height/diameter	00:29:04		(Serv) 0
141.50	GP	General Condition photograph	00:29:10	4_85a	(Misc) 0

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Inspection report

Date:	Job nr.:	Weather:	Operator:	section number:	PLR:
18/09/2012	**1308031**	**Showers**	**G.Smith**	**4**	**INLET X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	





1:310 position		code	observation	MPEG	photo	grade
146.10		CNI	Connection, at 11 o´clock, dia 100 mm, intrusion 350 mm	00:30:25	4_86a	(Constr) 4
146.60		DE	Debris, 25 % cross-sectional area loss, Remark: ROCKS ON LEFT	00:30:41	4_87a	(Serv) 1
146.60	C1	DE	Debris, 15 % cross-sectional area loss, Changed, Remark: RUBBLE	00:30:44		(Serv) 1
150.40		LL	Line of Sewer deviates left, Remark: SHARP	00:31:07		(Serv) 0
150.40		GP	General Condition photograph	00:31:09	4_90a	(Misc) 0
151.40		CNI	Connection, at 02 o´clock, dia 100 mm, intrusion 300 mm	00:31:54	4_91a	(Constr) 4
151.40		CNI	Connection, at 03 o´clock, dia 400 mm, intrusion 200 mm	00:31:54	4_92a	(Constr) 4
153.20		EM	Encrustation medium, from 04 to 05 o´clock, 10% cross-sectional area loss	00:32:21	4_93a	(Serv) 4
153.20		IR	Infiltration Running from 04 to 05 o´clock	00:32:24	4_94a	(Serv) 4
156.60		DE	Debris, 25 % cross-sectional area loss, Remark: ROCK	00:32:58	4_95a	(Serv) 1
163.30		GP	General Condition photograph	00:34:48	4_96a	(Misc) 0
163.70	F1	DE	Debris, 15 % cross-sectional area loss, Finish, Remark: RUBBLE	00:35:54		(Serv) 1
163.70		MH	Manhole Remark: INLET	00:35:56	4_98a	(Constr) 0
163.70		FH	Finish Survey	00:36:02		(Misc) 0

U.T.G.A TO INLET LADDERS REQUIRED

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Metre Report

The Metre Report is printed on 100% recycled paper

Aquajet (GB) Ltd
Retford
Nottinghamshire, DN22 6HG
Tel:01777 701335, Fax:01777 701344

Σ ∅

Project name:	Contract number:	Contact:	Date:
Environment Agency	**1308031**	**Mark Whittaker**	**31/12/2005**

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
1	OUTLET	MH01	17.09.2012	OFF WALMERSLEY OLD ROAD	AQSER	Brick	158.8	158.8

Profile: CIRCULAR 1200 = 158.8 m (158.8 m)

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
4	MH02	INLET	18/09/2012	OFF MILL ROAD	AQSER	Masonry - in reg.courses	163.7	163.7

Profile: RECTANGULAR 1100/900 = 163.7 m (163.7 m)

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
3	MH02	MH01	18/09/2012	OFF MILL ROAD	AQSER	Masonry - rand.coursed	122.6	**27.3**

Profile: RECTANGULAR 1700/2800 = 122.6 m (27.3 m)

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
2	MH01	MH02	17/09/2012	OFF MILL ROAD	AQSER	Masonry - in reg.courses	122.6	**95.3**

Profile: RECTANGULAR 2500/1300 = 122.6 m (95.3 m)

all sections = 567.7 m (445.1 m)

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

SRM Scoring Report

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Retford
Nottinghamshire, DN22 6HG
Tel:01777 701335, Fax:01777 701344

Service / Operational Defects (SRM 4)

Project name:	Contract number:	Contact:	Date:
Environment Agency	**1308031**	**Mark Whittaker**	**31/12/2005**

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Cat.	Peak Score	Grade	Mean Score	Total Score
1	MH01 X	U	W	C 1200	17.09.2012	BR	158.8	158.8	5	-	3	3	1.8	288
2	MH02 X	U	W	R 2500/1300	17/09/2012	MAC	122.6	95.3	1	-	1	2	1.0	95
3	MH02 X	D	W	R 1700/2800	18/09/2012	MAR	122.6	27.3	-	-	5	4	0.2	5
4	INLET X	U	W	R 1100/900	18/09/2012	MAC	163.7	163.7	5	-	20	5	1.4	236

Aquajet (GB) Ltd
Retford
Nottinghamshire, DN22 6HG
Tel:01777 701335, Fax:01777 701344

Structural Defects (SRM 4)

Project name:	Contract number:	Contact:	Date:
Environment Agency	**1308031**	**Mark Whittaker**	**31/12/2005**

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Cat.	Peak Score	Grade	Mean Score	Total Score
1	MH01 X	U	W	C 1200	17.09.2012	BR	158.8	158.8	-	-	0	1	0	0
2	MH02 X	U	W	R 2500/1300	17/09/2012	MAC	122.6	95.3	5	-	0	1	0	0
3	MH02 X	D	W	R 1700/2800	18/09/2012	MAR	122.6	27.3	5	-	0	1	0	0
4	INLET X	U	W	R 1100/900	18/09/2012	MAC	163.7	163.7	-	-	0	1	0	0

Site Coding Report

Pages 83 - 89

The Site Coding Report is printed on 100% recycled paper

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	MH01 X

Date	Time	Location - Road name	Location - Place name
170912		OFF WALMERSLEY OLD ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
OUTLET	1.60			MH01			

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	1200		C	BR			158.8	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	1	X	Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0000		0.0		ST				
0000		0.0		MH				OUTLET
0000		0.0		WL			10	
0002	4_4a	2.0		GP				
0003	5_5a	2.0	S1	ESL		03 - 05		CLOCKS VARY
0003	6_6a	2.0	S2	ESL		07 - 09		CLOCKS VARY
0014	7_7a	14.1		GP				
0021	8_8a	15.9		IG		12		
0021	9_9a	15.9		ID		12		
0025		22.5		LL				SHARP
0025	11_11a	22.5		EM		03 - 05	15	
0033	12_12a	26.9		EM		10 - 12	10	
0033	13_13a	26.9		ID		12		
0041		32.3		LL				QUITE SHARP
0042	15_15a	32.3		GP				
0050		39.5		LR				QUITE SHARP
0050	17_17a	39.5		GP				
0054		44.3		LR				SHARP
0054	19_19a	44.3		GP				
0064	20_20a	52.3		EM		11 - 12	10	
0065	21_21a	52.3		GP				
0084	22_22a	70.1		GP				
0101	23_23a	83.0		GP				
0110	24_24a	86.7		EM		07 - 09	10	
0121	25_25a	95.4		GP				
0131		103.0		LR				SHARP
0131	27_27a	103.0		GP				
0143	28_28a	116.0		GP				
0152		120.2		CN	225	10		
0152	30_30a	120.2		ESM		07 - 10	10	FROM CONNECTION
0160		124.3	F1	ESL		03 - 05		CLOCKS VARY
0160		124.3	F2	ESL		07 - 09		CLOCKS VARY
0160		124.3	S3	ESL		07 - 05		CLOCKS VARY

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	MH01 X

Date	Time	Location - Road name	Location - Place name
170912		OFF WALMERSLEY OLD ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
OUTLET	1.60			MH01			

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	1200		C	BR			158.8	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	1	X	Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0161	34_34a	124.3		GP				
0175	35_35a	138.0		GP				
0192	36_36a	150.9		GP				
0210		158.8	F3	ESL		07 - 05		CLOCKS VARY
0210	38_38a	158.8		MH				MH01
0212		158.8		FH				

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	MH02 X

Date	Time	Location - Road name	Location - Place name
170912		OFF MILL ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
MH01	13.36			MH02	02.22		

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	2500	1300	R	MAC			122.6	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	1	X	Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0000		0.0		ST				
0000		0.0		MH				MH01
0000		0.0		WL			10	
0000		0.0	S1	ESL		07 - 05		CLOCKS VARY
0002	76_5a	0.0		GP				
0005		2.0		DC			200	X 1300MM
0010		2.0		SC				ARCHED
0010		2.0		MC				Masonry - rand. coursed
0010	80_9a	2.0	S2	MB		02		EVERY 1.0M APPROX
0010	81_10a	2.0	S3	MB		10		EVERY 1.0M APPROX
0020	82_11a	16.2		GP				
0022	83_12a	16.2		GO				TIMBER ACROSS CULVERT 10 - 02 O'CLOCK
0025		22.7		CN	225	02		
0031		26.7		CN	225	08		X 225MM LIVE
0031	86_15a	26.7		GP				
0034	87_16a	31.8		GP				
0044	88_17a	44.7		GP				
0053		52.1		CN	150	10		
0062	90_19a	61.7		GP				
0065		69.9		CN	225	12		LIVE
0065		69.9		LR				SLIGHT
0071		73.8		CN	100	09		
0075	94_23a	80.5		GP				
0083		82.7		CN	600	04		X 450MM
0084	96_25a	82.7		GO				INVERT STEPS UP TWICE
0080		83.7		DC			600	X 1600MM
0102	2_27a	87.8		LR				QUITE SHARP
0110	2_28a	91.3		GP				
0114		95.3		GO				INVERT STEPS UP
0114		95.3	F1	ESL		07 - 05		CLOCKS VARY
0114		95.3	F2	MB		02		EVERY 1.0M APPROX
0114		95.3	F3	MB		10		EVERY 1.0M APPROX
0115	2_33a	95.3		SA				LOSS OF COMMUNICATION DUE TO STEP UP OF INVERT

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	MH02 X

Date	Time	Location - Road name	Location - Place name
180912		OFF MILL ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
MH02	2.22			MH01	13.36		

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	D	1700	2800	R	MAR			122.6	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	4		Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0000		0.0		ST				
0000		0.0		MH				MH02
0000		0.0		WL			10	
0002	108_4a	0.0		GO				METAL CORRAGATED SOFFIT
0003	109_5a	0.0		GP				
0010	110_6a	2.0		MB		09		
0012	111_7a	2.0		CNI	150	11	0030	
0014		2.0		SC				ARCHED
0014	113_9a	2.0		DC			800	X 2800MM
0015	114_10	2.0		GO				INVERT STEPS DOWN X 2
0033	115_11	6.9		GO				INVERT STEPS DOWN 1.0M APPROX
0041	a	9.9		CN	450	03		X 300MM
0044		10.8	S1	LR				GRADUAL
0044		10.8		DC			600	X 1600MM
0045	119_15	10.8		GP				
0053	a	15.0		CN	225	09		
0055		17.5		CN	225	03		X 225MM
0061	122_18	20.0		GP				
0062	a	20.0	F1	LR				GRADUAL
0070		26.9		CN	500	02		X 300MM
0072		27.3		GO				INVERT STEPS DOWN
0073	126_22	27.3		SA				OVERLAP COMPLETED
	a							

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	INLET X

Date	Time	Location - Road name	Location - Place name
180912		OFF MILL ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
MH02	2.22			INLET			

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	1100	900	R	MAC			163.7	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	4		Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0000		0.0		ST				
0000		0.0		MH				MH02
0000		0.0		WL			10	
0002	130_4a	2.0		GP				
0003	131_5a	2.0		GO				FLAGGED SOFFIT
0011	132_6a	7.3		GP				
0020	133_7a	8.3		GO				SMALL CHAMBER ON LEFT METAL BARS VISIBLE
0024		9.1		LR				SHARP
0024		9.1		DC			1000	X 1100MM
0024		9.1		MC				Masonry - rand. coursed
0025	137_11	9.1		GP				
0034	138_12	20.0		GP				
0040	a	22.1		CN	100	11		
0041		22.1		DC			1000	X 900MM
0042		22.1		GO				10 - 02 O'CLOCK WIDTH 600MM
0042	142_16	22.1		GP				
0045	a	26.8		CN	100	11		
0051	144_18	26.8		GP				
0055	145_19	34.7		GO				BLIND CHAMBER
0060	146_20	34.7		OB			50	SERVICE ACROSS CULVERT
0064	a	37.8		GO				EXITING BLIND CHAMBER
0064	148_22	37.8		GP				
0070	149_23	40.8		CNI	150	11	0080	
0071	150_24	41.3		CNI	100	11	0050	
0081	151_25	48.6		GP				
0091	152_26	54.7		GO				BLIND CHAMBER
0093	a	54.7		DC			100	X 900MM
0111		56.7		DC			1300	X 1000MM
0111	4_29a	56.7		GP				
0112	4_30a	56.7		MC				Brick, RIGHTSIDE WALL
0112		56.7		GO				BENCHING STARTS ON RIGHTSIDE
0115	4_32a	60.5		MC				Masonry - rand. coursed, RIGHTSIDE WALL
0115		60.5		DC			100	X 1100MM

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	INLET X

Date	Time	Location - Road name	Location - Place name
180912		OFF MILL ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
MH02	2.22			INLET			

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	1100	900	R	MAC			163.7	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	4		Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0122	4_34a	61.8		LL				SHARP
0124	4_35a	62.0		CNI	225	01	0050	
0131	4_36a	62.5		CNI	225	10	0040	
0131		62.5		DC			700	X 1100MM
0132	4_38a	63.2		GO				SERVICE ACROSS CULVERT 11 - 01O'CLOCK
0135	4_39a	65.5		GO				SERVICE ACROSS CULVERT 10 - 02 O'CLOCK
0140	4_40a	66.3		CNI	100	02	0500	
0141	4_41a	66.3		GO				BRICK 09 - 03 O'CLOCK
0144		70.3		CN	100	01		
0145	4_43a	70.3		GP				
0151	4_44a	74.0		CNI	225	10	0060	
0160	4_45a	77.2		CNI	150	01	0060	
0163	4_46a	78.1		CNI	150	10	0040	
0165	4_47a	82.1		CNI	100	11	0060	
0170	4_48a	82.1		GP				
0172	4_49a	85.0		CNI	150	10	0050	LIVE
0174	4_50a	88.5		IG		07		
0181		91.1		CN	150	10		
0181	4_52a	91.1		GP				
0183	4_53a	92.4		CNI	150	03	0080	LIVE
0185		93.4		CN	100	10		
0185	4_55a	93.4		IR		07 - 10		
0191	4_56a	93.4		GO				SERVICE ACROSS CULVERT 10 - 02 O'CLOCK
0193	4_57a	94.2		IG		10		
0194	4_58a	94.2		GP				
0200		96.5		CN	150	08		LIVE
0203	4_60a	98.6		IG		08		
0205	4_61a	99.5		CNI	150	09	0030	
0211		100.7		LL				QUITE SHARP
0211		100.8		GO				BENCHING ON RIGHT STOPS
0211		100.8		DC			1100	X 1500MM
0211	4_65a	100.8		GP				
0212		100.8		GO				BRICK STOPS 10 - 02 O'CLOCK

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	INLET X

Date	Time	Location - Road name	Location - Place name
180912		OFF MILL ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
MH02	2.22			INLET			

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	1100	900	R	MAC			163.7	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	4		Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0215	4_67a	101.8		CNI	100	01	0030	LIVE
0222		104.1		CN	150	11		
0225	4_69a	104.9		GO				2 X METAL BRACKETS ATTATCHED TO SOFFIT
0233	4_70a	107.6		GO				METAL BRACKET ATTATCHED TO SOFFIT
0235	4_71a	110.9		CNI	150	03	0030	
0241		112.2		LL				SHARP
0242	4_73a	112.2		GP				
0244	4_74a	114.4		GO				BEAM ACROSS SOFFIT
0253		117.8		LR				SHARP
0253	4_76a	117.8		GP				
0253		117.8		DC			1300	X 1500MM
0253		117.8		SC				SQUARE
0260	4_79a	120.4	S1	DE			10	RUBBLE
0271	4_80a	130.0		GP				
0275	4_81a	136.3		GO				3 X METAL BEAMS ACROSS SOFFIT
0284		141.1		CN	150	12		
0290	4_83a	141.5	C1	DE			20	RUBBLE
0290		141.5		WL			20	
0291	4_85a	141.5		GP				
0302	4_86a	146.1		CNI	100	11	0350	
0304	4_87a	146.6		DE			25	ROCKS ON LEFT
0304		146.6	C1	DE			15	RUBBLE
0310		150.4		LL				SHARP
0310	4_90a	150.4		GP				
0315	4_91a	151.4		CNI	100	02	0300	
0315	4_92a	151.4		CNI	400	03	0200	
0322	4_93a	153.2		EM		04 - 05	10	
0322	4_94a	153.2		IR		04 - 05		
0325	4_95a	156.6		DE			25	ROCK
0344	4_96a	163.3		GP				
0355		163.7	F1	DE			15	RUBBLE
0355	4_98a	163.7		MH				INLET
0360		163.7		FH				

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Manhole Surveys

Printed on 100% recycled paper

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	No GPS
MAINTAINER (DELETE AS APPROPRIATE)	E.A.

SURVEY RECORD FOR MANHOLE OR INLET/ OUTLET STRUCTURE

STC25 GRID REFERENCE: Inlet

LOCATION: Pig Lee Trib B02, In Tetrosyl

YEAR	STATUS	FUNCTION	NODE TYPE	SURVEY DATE
Z	PU	W	IN	18-09-12

COVER	SHAPE		HINGED		LOCK		DUTY		SIZE (MM)		TOXIC ATMOSPHERE: N
SHAFT	SIDE ENTRY		REGULAT COURCES		DEPTH				SIZE (MM)		EVIDENCE OF VERMIN: N
CHAMBER	SOFFIT		STEPS		LADDERS		LNDGS		SIZE (MM)		CONSTRUCT CODE: MAC

DEPTH OF FLOW (MM)	DEPTH OF SILT (MM)	HEIGHT OF SURCH (MM)	COVER LEVEL (M)

		UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	BROOK							
	B								
	C								
	D								
	E								
	F								

			COND CRITY						
Outgoing Pipes	X	MH01							
	Y								

CONDITION (Y/N) (Y IF ATTENTION REQUIRED)	COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER	

NOTES:

Unable to gain access to Inlet, ladders required. Unable to gain access for GPS.

WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)			
ID	TYPE	SUBTYPE	MATERIAL

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	No GPS
MAINTAINER (DELETE AS APPROPRIATE)	E.A.

ENVIRONMENT AGENCY

SURVEY RECORD FOR MANHOLE OR INLET/ OUTLET STRUCTURE

STC25 GRID REFERENCE: MH02

LOCATION: Pig Lee Trib B02, Warehouse in Tetrosyl

YEAR	Z	STATUS	PU	FUNCTION	W	NODE TYPE	MH	SURVEY DATE	18-09-12				
COVER	SHAPE	S	HINGED	N	LOCK	N	DUTY	H	SIZE (MM)	660 x 660	TOXIC ATMOSPHERE	N	
SHAFT	SIDE ENTRY		REGULAT COURCES	0	DEPTH	0.52	SIZE (MM)	610 x 610	EVIDENCE OF VERMIN	N			
CHAMBER	SOFFIT		STEPS	0	LADDERS		LNDGS		SIZE (MM)	3500 x 2800	CONSTRUCT CODE	MAC	

DEPTH OF FLOW (MM)	0	DEPTH OF SILT (MM)	150	HEIGHT OF SURCH (MM)		COVER LEVEL (M)	
---	---	---	---	---	---	---	---

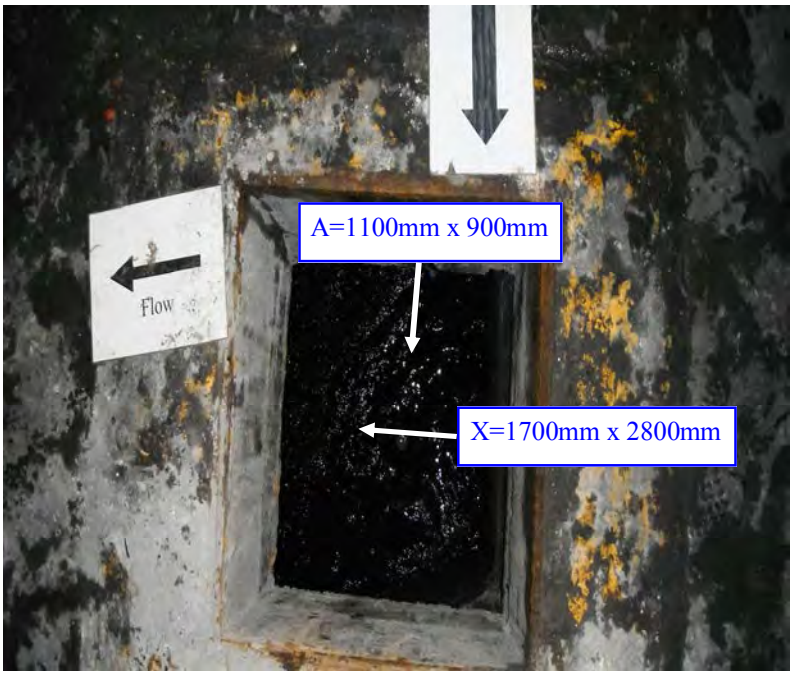
		UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	INLET	R	1100 x 900		MAC		2.19	
	B								
	C								
	D								
	E								
	F								
Outgoing Pipes	X	MH01	R	1700 x 2800		MAC		2.22	
	Y								

CONDITION (Y/N) (Y IF ATTENTION REQUIRED)	COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER	

NOTES:

WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)			
ID	TYPE	SUBTYPE	MATERIAL

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	SD8081913693
MAINTAINER (DELETE AS APPROPRIATE)	E.A.

SURVEY RECORD FOR MANHOLE OR INLET/ OUTLET STRUCTURE

STC25 GRID REFERENCE: MH01, (E:380819.08, N:413693.51)

LOCATION: Pig Lee Trib B02, Field R/O 11 Trent Drive

YEAR	Z	STATUS	PU	FUNCTION	W	NODE TYPE	MH	SURVEY DATE	18-09-12						
COVER	SHAPE	S	HINGED	N	LOCK	N	DUTY	H	SIZE (MM)	650 x 650	TOXIC ATMOSPHERE	N			
SHAFT	SIDE ENTRY		REGULAT COURCES	0	DEPTH	11.31	SIZE (MM)	700 x 500	EVIDENCE OF VERMIN	N					
CHAMBER	SOFFIT		STEPS	40	LADDERS		LNDGS		SIZE (MM)	1930 x 1400	CONSTRUCT CODE	BR			
DEPTH OF FLOW (MM)	100	DEPTH OF SILT (MM)	0	HEIGHT OF SURCH (MM)		COVER LEVEL (M)	135.76								

		UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	MH02	R	2500 x 1300		MAC		13.06	122.70
	B	UNKNOWN	C	300		VC		3.81	131.95
	C								
	D								
	E								
	F								

Outgoing Pipes	X	OUTLET	C	1200		BR		13.36	122.40
	Y								

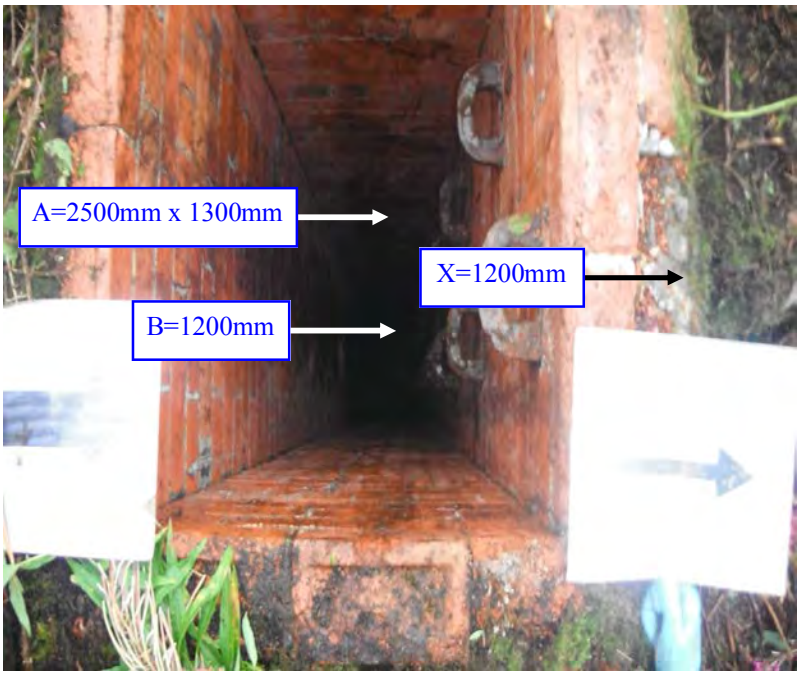
CONDITION (Y/N) (Y IF ATTENTION REQUIRED)	COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER	

NOTES:

Cover seized on MH01 the complete frame was removed to enable access into culvert.

WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)

ID	TYPE	SUBTYPE	MATERIAL

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	No GPS
MAINTAINER (DELETE AS APPROPRIATE)	E.A.

SURVEY RECORD FOR MANHOLE OR INLET/ OUTLET STRUCTURE

STC25 GRID REFERENCE: Outlet

LOCATION: Pig Lee Trib B02, Banking opp 27 Walmersley Old Road

YEAR	STATUS	FUNCTION	NODE TYPE	SURVEY DATE
Z	PU	W	OUT	17-09-12

COVER	SHAPE		HINGED		LOCK		DUTY		SIZE (MM)		TOXIC ATMOSPHERE: N
SHAFT	SIDE ENTRY		REGULAT COURCES		DEPTH				SIZE (MM)		EVIDENCE OF VERMIN: N
CHAMBER	SOFFIT		STEPS		LADDERS		LNDGS		SIZE (MM)		CONSTRUCT CODE: BR

DEPTH OF FLOW (MM)	DEPTH OF SILT (MM)	HEIGHT OF SURCH (MM)	COVER LEVEL (M)
100	0		

		UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	MH01	C	1200				1.60	
	B								
	C								
	D								
	E								
	F								

					COND	CRITY			
Outgoing Pipes	X	BROOK							
	Y								

CONDITION (Y/N) (Y IF ATTENTION REQUIRED)	COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER	

NOTES:

Unable to gain GPS signal due to deep valley and trees.

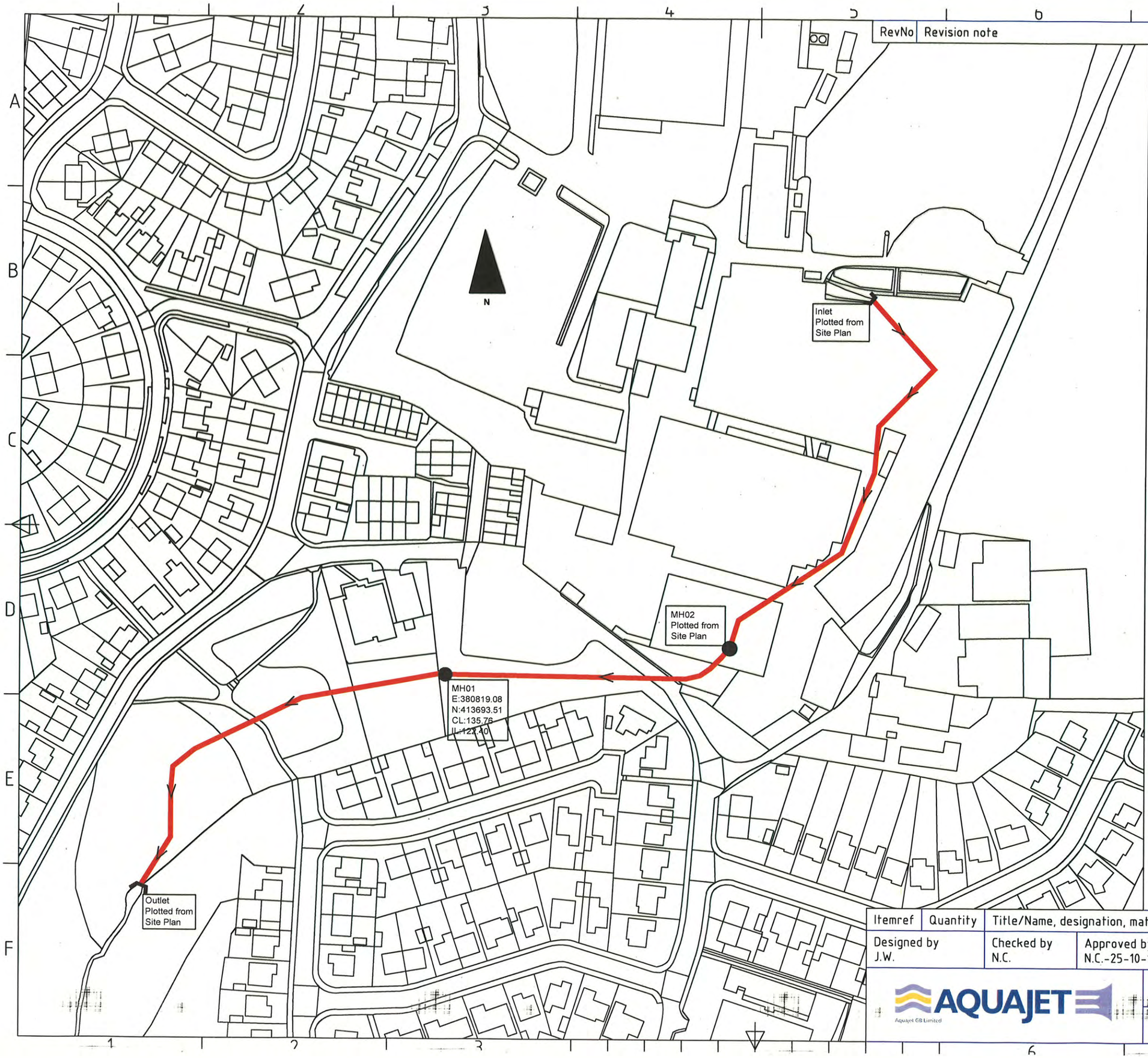
WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)			
ID	TYPE	SUBTYPE	MATERIAL

RevNo	Revision note	Date	Signature	Checked



Environment Agency

Aquajet (GB) Ltd

Surveyed

Inlet: Plotted from Site Plan
MH01: SD8081913696
MH02: Plotted from Site Plan
Outlet: Plotted from Site Plan

Itemref	Quantity	Title/Name, designation, material, dimension etc			Article No./Reference	
Designed by J.W.		Checked by N.C.	Approved by - date N.C.-25-10-12	File name SALE1308031	Date 25-12-12	Scale 1.1250
AQUAJET Aquajet GB Limited		01313PIGT0101B02				
		Pig Lee Trib, Bury			Edition 0	Sheet 1/1

CCTV SURVEY – EXECUTIVE SUMMARY

IWJS Ltd Manchester Depot
Unit 10 Huntsman Drive
North Bank Industrial Estate, Irlam
Manchester M44 5EG

Client:	Environment Agency	NFCDD Ref:	0131PIGT0101 B02
Site Address:	Pig Lee Brook, Walmersley, Bury	Contact:	Gareth Hamlett
Date of Report:	5th March	Job No:	EA052014065

Objective

A CCTV survey was undertaken by IWJS Ltd using CCTV remote techniques. This was conducted on behalf of the Environment Agency.

The purpose of the survey was to determine the route of the culvert and to visually ascertain the condition of the culvert/headwalls.

Location and Description

Pedestrian and vehicle access is gained off Walmersley Old Rd to the inlet.

The culvert flows in a southerly direction from Inlet to outlet.

The following information should be viewed in conjunction with the Grade Defect & CCTV reports.

The Culvert is made up of the following:

1. **Outlet upstream to Inlet**

- The Culvert is a 1200 x 2400mm randomly coursed rectangular masonry pipe.
- Culvert starts to gradually deviate right from 4.4m to 11.9m
- Culvert deviates right sharply at 20.3m
- Survey was abandoned at 21.2m due to 85% obstruction.

Observations and anomalies

Structural & service defects have been recorded on this length.

On completion of the survey a total of 21.2m of drainage runs were CCTV surveyed including 2 asset structures.

As a result of the structural survey there were 3 grade 4-5 defects identified.

Health & Safety

There are no issues to report

Note:

This report is compiled from information provided by our trained and certified CCTV operators.

Thank you for using IWJS Ltd

Executive Summary produced by S.Allsey

IWJS
Huntsman Drive
Irlam
Tel.: 0161 776 0499
Fax:
Email: paul.crane@iwjsgroup.co.uk

Table of contents

Project Name:	Project number:	Date:	Contact:	
EA 052014065, Pig Lee Bro	0131PIGT0101 B02	27/02/2015	Gareth Hamlett	

Profile Report 1

SRMReport : 2

Inspection: 1

Project Information 4

Section: 1, INLET --- OUTLET 5

Place :

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Huntsman Drive
Irlam
Tel: 0161 776 0499
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/ Main sections

Project name :	Project number :	Contact :	Date :
EA 052014065, Pig Lee Brook B02	**0131PIGT0101 B02**	**Gareth Hamlett**	**27/02/2015**

Nr.	US MH	DS MH	Date	Road	Tape No.	Material	m	(m)
1	INLET	OUTLET	27/02/2015	off Walmersley Old Road		Masonry - in regular courses	45.00	**21.20**

Pipe size: RECTANGULAR 1200/2400 = 45 m (21.2 m)

All sections = 45 m (21.2 m)

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Service / Operational Defects (SRM 4)

Project name :	Project Number :	Contact :	Date :
EA 052014065, Pig Lee Brook B02	**0131PIGT0101 B02**	**Gareth Hamlett**	**27/02/2015**

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Peak Score	Grade	Mean Score	Total Score
1	INLETX	U	W	R 1200/2400	27/02/2015	MAC	45.00	21.20	-	10	5	1.08	23

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Structural Defects (SRM 4)

Project name :	Project Number :	Contact :	Date :
EA 052014065, Pig Lee Brook B02	**0131PIGT0101 B02**	**Gareth Hamlett**	**27/02/2015**

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Peak Score	Grade	Mean Score	Total Score
1	INLETX	U	W	R 1200/2400	27/02/2015	MAC	45.00	21.20	-	0	1	0	0

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Project-information

Project name :	Project Number :	Contact :	Date :
EA 052014065, Pig Lee Brook B02	**0131PIGT0101 B02**	**Gareth Hamlett**	**27/02/2015**

Client:	**Environment Agency**
Contact Name:	**Gareth Hamlett**
Department:	
Road:	**Dodd Way**
Town:	**Bamber Bridge, PR5 8BX**
County:	**Lancashire**
Telephone:	**01772 714105**
Fax:	
Mobile:	
E-mail:	

Site:	**Pig Lee Brook**
Contact Name:	**Gareth Hamlett**
Department:	
Road:	**Walmersley Old Rd**
Town:	**Walmersley, Bury**
County:	**Lancashire**
Telephone:	
Fax:	
Mobile:	
E-mail:	

Contractor	**IWJS**
Contact Name:	**Paul Crane**
Department:	**Contracts Manager**
Road:	**Huntsman Drive**
Town:	**Irlam**
County:	**Manchester**
Telephone:	**0161 776 0499**
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Inspection report

Date :	Job number :	Weather :	Operator :	Section number :	PLR SUFFIX:
27/02/2015		**no rain or snow**	**G.Smith**	**1**	**X**
Weather	Vehicle :	Camera :	Preset :	Cleaned :	Operator :
no rain or snow	**GU62DLF**	**Camera assist**		**no**	**G.Smith**

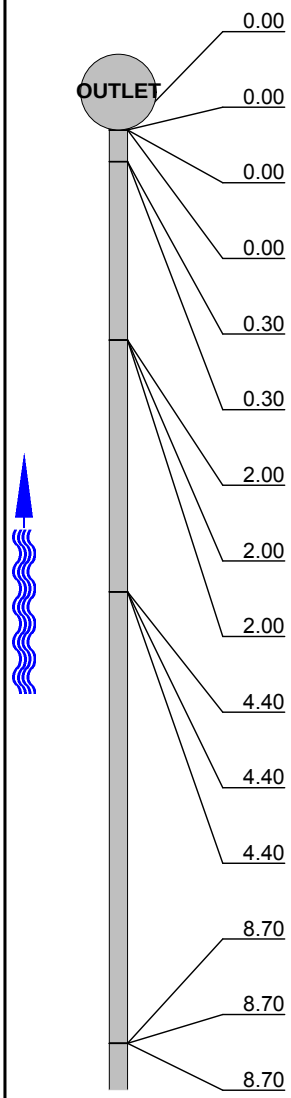
Place :	**Walmersley**	Location details:		U/S MH :	**INLET**
Road :	**off Walmersley Old Road**	Catchment:		U/S Depth :	**1.61**
Location	**Difficult access**	Tape number :		D/S MH :	**OUTLET**
Inspection Direction	**OUTLET (U/S) INLET**	Pipe Length		D/S Depth :	

Use:	**Culverted watercourse**	Pipe shape :	**Rectangular**
Year laid :	**Z**	Pipe size :	**1200 mm**
Purpose :	**Routine inspection of condition**	Pipe material :	**Masonry - in regular courses**
Total length :	**45.00 m**	Lining :	

Comment : **INLET and the Outlet are in Tetrosyl**

1:72 **Position** **Observation**

Building on top of the Outlet



Position		Observation
0.00		Start node type, manhole, reference number : OUTLET
0.00		Water level, 30% of the vertical dimension
0.00		General photograph taken at this point
0.00		General remark
0.30	**S01**	General remark, Start
0.30		Dimension changes, 1290mm high, 2400mm wide
2.00		Dimension changes, 1050mm high, 2400mm wide
2.00		General remark
2.00		General photograph taken at this point
4.40		Water level, 05% of the vertical dimension
4.40	**S02**	Line deviates right, Start
4.40		General photograph taken at this point
8.70		General remark
8.70		Dimension changes, 1500mm high, 2400mm wide
8.70		General photograph taken at this point



0 m



0 m



0.3 m



2 m



4.4 m

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Inspection Report

Date :	Job number :	Weather :	Operator :	Section number :	PLR :
27/02/2015		**no rain or snow**	**G.Smith**	**1**	**X**
Weather	Vehicle :	Camera :	Preset :	Cleaned :	Grade:
no rain or snow	**GU62DLF**	**Camera assist**		**no**	

1:72	Position		Observation
	11.90		General remark
	11.90		Material changes, masonry - randomly coursed
	11.90		Water level, 10% of the vertical dimension
	11.90	**F02**	Line deviates right, End
	11.90	**S03**	General remark, Start
	11.90		General photograph taken at this point
	14.80		Settled deposits, other, 20% cross-sectional area loss
	15.90		Connection other than junction, at 4 o'clock, diameter 150mm
	15.90		General remark
	17.30		General remark
	17.80		General photograph taken at this point
	19.20		Connection intruding, at 5 o'clock, diameter 150mm, intrusion 20%
	20.30		Connection intruding, at 5 o'clock, diameter 150mm, intrusion 05%
	20.30		Line deviates right
	20.30		Settled deposits, other, 20% cross-sectional area loss
	20.80		General remark

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Inspection Report

Date :	Job number :	Weather :	Operator :	Section number :	PLR :
27/02/2015		**no rain or snow**	**G.Smith**	**1**	**X**
Weather	Vehicle :	Camera :	Preset :	Cleaned :	Grade:
no rain or snow	**GU62DLF**	**Camera assist**		**no**	

1:72	Position		Observation
	21.20		Other obstacles, other object in invert, from 1 to 6 o'clock, 85% cross-sectional area loss
	21.20	**F03**	General remark, End
	21.20	**F01**	General remark, End
	21.20		Survey abandoned

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	**0**	**0**	**0**	**1**	**5**	**10**	**1.08**	**23**	**5**

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Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
Walmersley	**off Walmersley Old Road**	**27/02/2015**	**1**	**X**

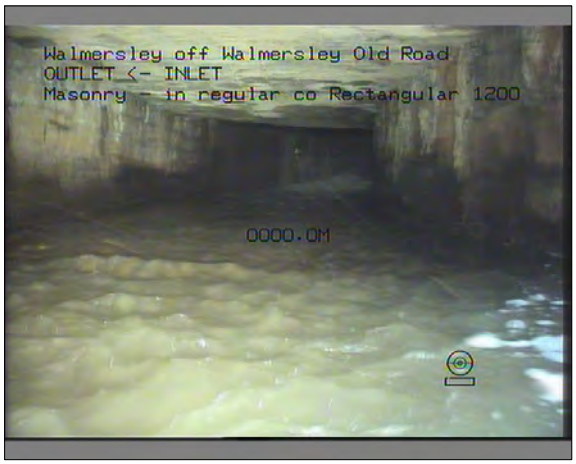


Photo: 001.JPG
0m, General photograph taken at this point



Photo: 002.JPG
0m, General remark

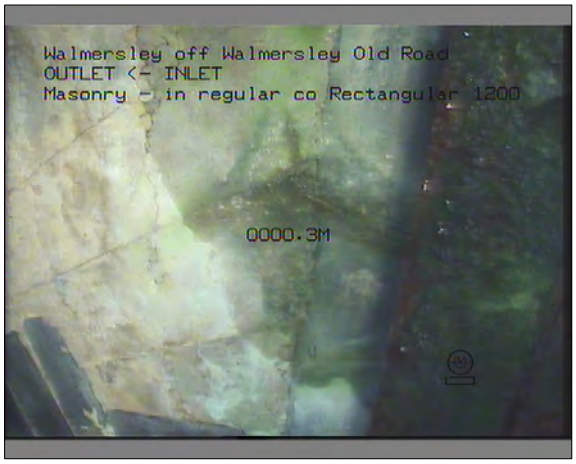


Photo: 003.JPG
0.3m, General remark, Start

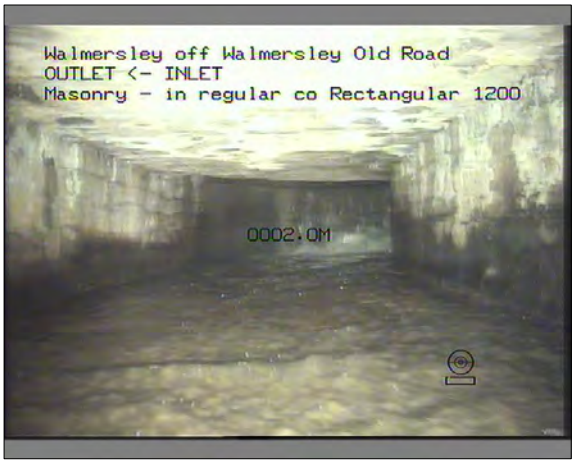


Photo: 004.JPG
2m, General photograph taken at this point

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Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
Walmersley	**off Walmersley Old Road**	**27/02/2015**	**1**	**X**

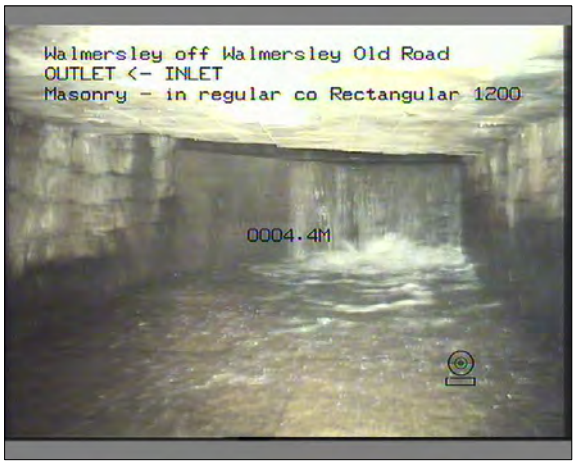


Photo: 005.JPG
4.4m, General photograph taken at this point



Photo: 006.JPG
8.7m, General remark

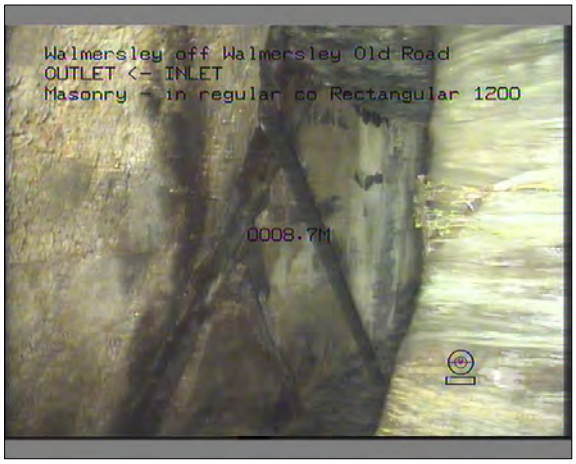


Photo: 007.JPG
8.7m, General photograph taken at this point



Photo: 008.JPG
11.9m, General remark

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Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
Walmersley	**off Walmersley Old Road**	**27/02/2015**	**1**	**X**



Photo: 009.JPG
11.9m, General remark, Start

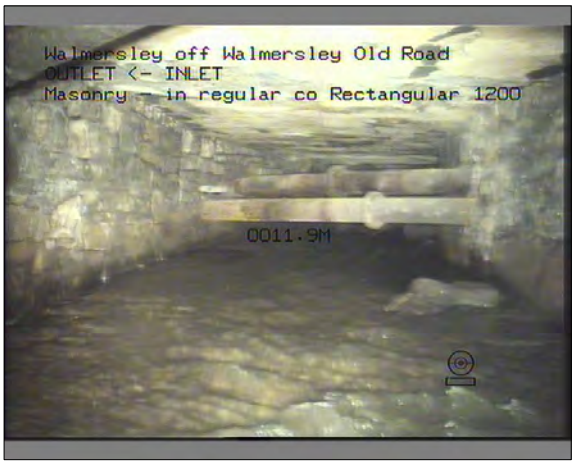


Photo: 010.JPG
11.9m, General photograph taken at this point



Photo: 011.JPG
14.8m, Settled deposits, other, 20% cross-sectional area loss

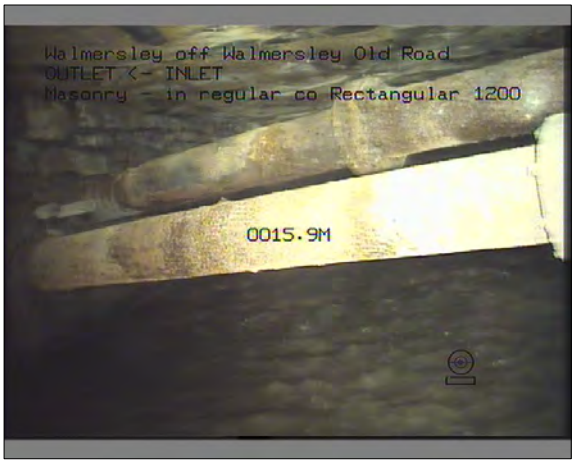


Photo: 012.JPG
15.9m, General remark

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Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
Walmersley	**off Walmersley Old Road**	**27/02/2015**	**1**	**X**



Photo: 013.JPG
17.3m, General remark

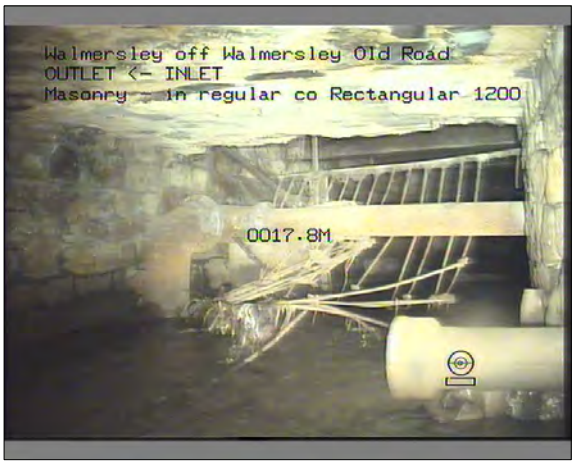


Photo: 014.JPG
17.8m, General photograph taken at this point



Photo: 015.JPG
19.2m, Connection intruding, at 5 o'clock, diameter 150mm, intrusion 20%



Photo: 016.JPG
20.3m, Connection intruding, at 5 o'clock, diameter 150mm, intrusion 05%

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Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
Walmersley	**off Walmersley Old Road**	**27/02/2015**	**1**	**X**



Photo: 017.JPG
20.3m, Settled deposits, other, 20% cross-sectional area loss



Photo: 018.JPG
21.2m, Other obstacles, other object in invert, from 1 to 6 o'clock, 85% cross-sectional area loss

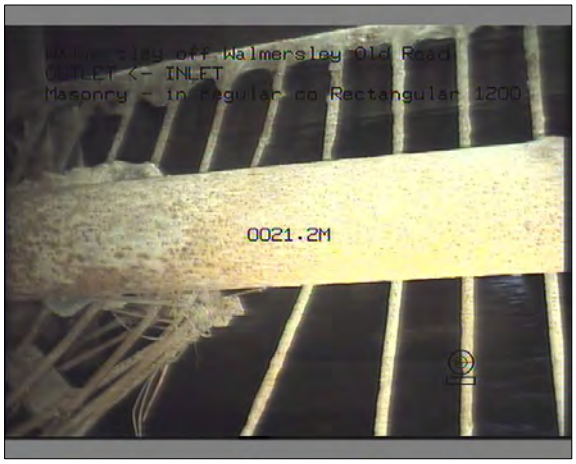


Photo: 019.JPG
21.2m, Survey abandoned

Pig Lee Brook

	No.	Upstream MH	Downstream MH	Observation	Grade
1	1	INLET	OUTLET	Other obstacles, other object in invert, from 1 to 6 o'	5
2	1	INLET	OUTLET	Settled deposits, other, 20% cross-sectional area lo	4
3	1	INLET	OUTLET	Settled deposits, other, 20% cross-sectional area lo	4
4	1	INLET	OUTLET	Connection intruding, at 5 o'clock, diameter 150mm	3
5	1	INLET	OUTLET	Dimension changes, 1500mm high, 2400mm wide	0
6	1	INLET	OUTLET	General remark	0
7	1	INLET	OUTLET	General photograph taken at this point	0
8	1	INLET	OUTLET	Line deviates right, Start	0
9	1	INLET	OUTLET	Water level, 05% of the vertical dimension	0
10	1	INLET	OUTLET	General photograph taken at this point	0
11	1	INLET	OUTLET	General photograph taken at this point	0
12	1	INLET	OUTLET	Dimension changes, 1050mm high, 2400mm wide	0
13	1	INLET	OUTLET	Line deviates right, End	0
14	1	INLET	OUTLET	Dimension changes, 1290mm high, 2400mm wide	0
15	1	INLET	OUTLET	General remark, Start	0
16	1	INLET	OUTLET	General remark	0
17	1	INLET	OUTLET	General photograph taken at this point	0
18	1	INLET	OUTLET	Water level, 30% of the vertical dimension	0
19	1	INLET	OUTLET	General remark	0
20	1	INLET	OUTLET	General remark	0
21	1	INLET	OUTLET	General remark, End	0
22	1	INLET	OUTLET	General remark, End	0
23	1	INLET	OUTLET	General remark	0
24	1	INLET	OUTLET	Line deviates right	0
25	1	INLET	OUTLET	Material changes, masonry - randomly coursed	0
26	1	INLET	OUTLET	General remark	0
27	1	INLET	OUTLET	General remark	0
28	1	INLET	OUTLET	Connection other than junction, at 4 o'clock, diamet	0
29	1	INLET	OUTLET	General photograph taken at this point	0
30	1	INLET	OUTLET	General remark, Start	0
31	1	INLET	OUTLET	Survey abandoned	0
32	1	INLET	OUTLET	Water level, 10% of the vertical dimension	0
33	1	INLET	OUTLET	Start node type, manhole, reference number : OUT	0
34	1	INLET	OUTLET	General photograph taken at this point	0
35	1	INLET	OUTLET	Connection intruding, at 5 o'clock, diameter 150mm	

RevNo	Revision note	Date	Signature	Checked

Environment Agency

IWJS Group

Surveyed

Not Surveyed

INLET MH: **No GPS**

Outlet MH: **No GPS**

CARR BANK

Reservoir

Inlet
NO GPS

Outlet
NO GPS

Tank

Works

PH

DRIVE

LUMN STREET

MILL ROAD

FB

Tks

Tk

143.6m

Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference

Designed by	Checked by	Approved by - date	File name	Date	Scale
SA	DT	DT - 06-03-2015	EA052014065	06-03-2015	1-1250

IWJS

Pig Lee Brook B02

0131PIGT0101 B02	Edition 0	Sheet 1/1

Appendix 3

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.500
Area (ha)	1.000	Urban	0.000
SAAR (mm)	1200	Region Number	Region 10

Results l/s

QBAR Rural	10.4
QBAR Urban	10.4
Q100 years	21.6
Q1 year	9.0
Q30 years	17.6
Q100 years	21.6

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The Rational Formula

$Q_p = CiA/0.36$

Q_p	**368.2l/s**	Peak discharge from catchment
A	4.49ha	Catchment area
i	25.2mm/hr	Average rainfall intensity
C	1.2mm/hr	Dimensionless coefficient

Determination of C

Value of C_V

C_V	0.9	Volumetric runoff coefficient

Value of C_R

C_R	1.3	Routing coefficient

Determination of i

Determination of M5-60 min and r

M5-60min	19mm	5 year - 60 minute rainfall depth
r	0.264	Ratio of the 5 year - 60 minute rainfall depth to the 5 year - 2 day rainfall depth
D	15min	Rainfall duration
T	1year	Return period

Determination of M5-D

Z_1	0.58	
M5-D	11.0mm	rainfall depth of 5 year return period for required duration

Determination of MT-D

Z_2	0.61	
MT-D	6.71mm	rainfall depth of the required return period

Determination of point rainfall intensities

i	26.8mm/hr

Aplication of areal reduction factor

A	0.0449km²
ARF	0.94
i	**25.2mm/hr**

COLE EASDON CONSULTANTS

The Rational Formula

$Q_p=CiA/0.36$

Q_p	**905.3l/s**	Peak discharge from catchment
A	4.49ha	Catchment area
i	62.0mm/hr	Average rainfall intensity
C	1.2mm/hr	Dimensionless coefficient

Determination of C

Value of C_V

C_V	0.9	Volumetric runoff coefficient

Value of C_R

C_R	1.3	Routing coefficient

Determination of i

Determination of M5-60 min and r

M5-60min	19mm	5 year - 60 minute rainfall depth
r	0.264	Ratio of the 5 year - 60 minute rainfall depth to the 5 year - 2 day rainfall depth
D	15min	Rainfall duration
T	30year	Return period

Determination of M5-D

Z_1	0.58	
M5-D	11.0mm	rainfall depth of 5 year return period for required duration

Determination of MT-D

Z_2	1.50	
MT-D	16.50mm	rainfall depth of the required return period

Determination of point rainfall intensities

i	66.0mm/hr

Aplication of areal reduction factor

A	0.0449km²
ARF	0.94
i	**62.0mm/hr**

COLE EASDON CONSULTANTS

The Rational Formula

$Q_p = CiA/0.36$

Q_p	**1164.8l/s**	Peak discharge from catchment
A	4.49ha	Catchment area
i	79.8mm/hr	Average rainfall intensity
C	1.2mm/hr	Dimensionless coefficient

Determination of C

Value of C_V

C_V	0.9	Volumetric runoff coefficient

Value of C_R

C_R	1.3	Routing coefficient

Determination of i

Determination of M5-60 min and r

M5-60min	19mm	5 year - 60 minute rainfall depth
r	0.264	Ratio of the 5 year - 60 minute rainfall depth to the 5 year - 2 day rainfall depth
D	15min	Rainfall duration
T	100year	Return period

Determination of M5-D

Z_1	0.58	
M5-D	11.0mm	rainfall depth of 5 year return period for required duration

Determination of MT-D

Z_2	1.93	
MT-D	21.23mm	rainfall depth of the required return period

Determination of point rainfall intensities

i	84.9mm/hr

Aplication of areal reduction factor

A	0.0449km²
ARF	0.94
i	**79.8mm/hr**

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	10.400	0.600	92.1	344.9	O K
30 min Summer	10.584	0.784	92.5	450.6	O K
60 min Summer	10.738	0.938	92.5	539.3	O K
120 min Summer	10.837	1.037	92.5	596.2	O K
180 min Summer	10.841	1.041	92.5	598.3	O K
240 min Summer	10.812	1.012	92.5	582.0	O K
360 min Summer	10.727	0.927	92.5	533.2	O K
480 min Summer	10.632	0.832	92.5	478.4	O K
600 min Summer	10.541	0.741	92.5	426.1	O K
720 min Summer	10.459	0.659	92.4	378.9	O K
960 min Summer	10.328	0.528	91.2	303.5	O K
1440 min Summer	10.176	0.376	86.8	216.2	O K
2160 min Summer	10.105	0.305	70.6	175.3	O K
2880 min Summer	10.068	0.268	58.9	154.1	O K
4320 min Summer	10.025	0.225	44.9	129.6	O K
5760 min Summer	10.000	0.200	36.9	115.2	O K
7200 min Summer	9.983	0.183	31.7	105.3	O K
8640 min Summer	9.971	0.171	28.0	98.1	O K
10080 min Summer	9.961	0.161	25.1	92.4	O K
15 min Winter	10.479	0.679	92.4	390.5	O K
30 min Winter	10.693	0.893	92.5	513.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	62.416	0.0	394.5	17
30 min Summer	43.566	0.0	551.9	31
60 min Summer	29.238	0.0	743.9	50
120 min Summer	19.018	0.0	968.2	86
180 min Summer	14.569	0.0	1112.7	120
240 min Summer	12.010	0.0	1223.2	156
360 min Summer	9.139	0.0	1396.4	222
480 min Summer	7.516	0.0	1531.4	286
600 min Summer	6.453	0.0	1643.5	350
720 min Summer	5.694	0.0	1740.1	408
960 min Summer	4.668	0.0	1902.3	522
1440 min Summer	3.522	0.0	2152.3	750
2160 min Summer	2.651	0.0	2432.4	1104
2880 min Summer	2.165	0.0	2648.9	1468
4320 min Summer	1.631	0.0	2990.6	2200
5760 min Summer	1.334	0.0	3264.5	2936
7200 min Summer	1.142	0.0	3493.5	3672
8640 min Summer	1.007	0.0	3694.5	4392
10080 min Summer	0.905	0.0	3874.8	5136
15 min Winter	62.416	0.0	442.2	17
30 min Winter	43.566	0.0	618.6	31

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	10.873	1.073	92.5	617.1	O K
120 min Winter	10.969	1.169	92.5	672.4	O K
180 min Winter	10.952	1.152	92.5	662.7	O K
240 min Winter	10.893	1.093	92.5	628.4	O K
360 min Winter	10.739	0.939	92.5	539.8	O K
480 min Winter	10.581	0.781	92.5	448.8	O K
600 min Winter	10.441	0.641	92.3	368.6	O K
720 min Winter	10.328	0.528	91.2	303.8	O K
960 min Winter	10.182	0.382	87.1	219.5	O K
1440 min Winter	10.100	0.300	69.3	172.8	O K
2160 min Winter	10.049	0.249	52.8	143.2	O K
2880 min Winter	10.020	0.220	43.3	126.6	O K
4320 min Winter	9.987	0.187	32.7	107.2	O K
5760 min Winter	9.967	0.167	26.8	95.7	O K
7200 min Winter	9.953	0.153	22.9	87.7	O K
8640 min Winter	9.943	0.143	20.3	81.9	O K
10080 min Winter	9.935	0.135	18.2	77.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	29.238	0.0	833.3	58
120 min Winter	19.018	0.0	1084.6	94
180 min Winter	14.569	0.0	1246.5	132
240 min Winter	12.010	0.0	1370.2	170
360 min Winter	9.139	0.0	1564.2	240
480 min Winter	7.516	0.0	1715.4	304
600 min Winter	6.453	0.0	1840.9	364
720 min Winter	5.694	0.0	1949.2	420
960 min Winter	4.668	0.0	2130.9	520
1440 min Winter	3.522	0.0	2411.0	750
2160 min Winter	2.651	0.0	2724.4	1104
2880 min Winter	2.165	0.0	2967.0	1468
4320 min Winter	1.631	0.0	3350.0	2196
5760 min Winter	1.334	0.0	3656.3	2936
7200 min Winter	1.142	0.0	3912.9	3600
8640 min Winter	1.007	0.0	4138.1	4376
10080 min Winter	0.905	0.0	4340.3	5104

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.262	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 3.400

Time (mins) From:	To:	Area (ha)
0	4	3.400

Time Area Diagram

Total Area (ha) 0.000

Time (mins) From:	To:	Area (ha)
0	4	0.000

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Model Details

Storage is Online Cover Level (m) 12.000

Tank or Pond Structure

Invert Level (m) 9.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	575.0	1.200	575.0	1.210	0.0

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0368-9300-2200-9300
Design Head (m)	2.200
Design Flow (l/s)	93.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	368
Invert Level (m)	9.800
Minimum Outlet Pipe Diameter (mm)	450
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.200	93.0
Flush-Flo™	0.698	92.5
Kick-Flo®	1.506	77.4
Mean Flow over Head Range	-	79.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.5	1.200	88.1	3.000	108.1	7.000	163.4
0.200	36.8	1.400	82.7	3.500	116.5	7.500	169.0
0.300	69.2	1.600	79.7	4.000	124.3	8.000	174.4
0.400	87.8	1.800	84.3	4.500	131.7	8.500	179.7
0.500	90.7	2.000	88.8	5.000	138.6	9.000	184.8
0.600	92.1	2.200	93.0	5.500	145.2	9.500	189.7
0.800	92.2	2.400	97.0	6.000	151.5		
1.000	90.6	2.600	100.8	6.500	157.6		

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	10.285	0.485	90.4	666.8	O K
30 min Summer	10.463	0.663	92.4	911.1	O K
60 min Summer	10.644	0.844	92.5	1160.7	O K
120 min Summer	10.786	0.986	92.5	1356.4	O K
180 min Summer	10.834	1.034	92.5	1421.2	O K
240 min Summer	10.851	1.051	92.5	1444.5	O K
360 min Summer	10.850	1.050	92.5	1444.1	O K
480 min Summer	10.823	1.023	92.5	1407.2	O K
600 min Summer	10.785	0.985	92.5	1353.9	O K
720 min Summer	10.740	0.940	92.5	1292.7	O K
960 min Summer	10.647	0.847	92.5	1164.8	O K
1440 min Summer	10.476	0.676	92.4	928.9	O K
2160 min Summer	10.291	0.491	90.5	675.5	O K
2880 min Summer	10.185	0.385	87.2	528.8	O K
4320 min Summer	10.108	0.308	71.6	423.6	O K
5760 min Summer	10.070	0.270	59.5	371.0	O K
7200 min Summer	10.045	0.245	51.3	336.5	O K
8640 min Summer	10.026	0.226	45.3	311.1	O K
10080 min Summer	10.012	0.212	40.7	291.8	O K
15 min Winter	10.346	0.546	91.5	750.8	O K
30 min Winter	10.549	0.749	92.5	1029.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	112.612	0.0	698.0	18
30 min Summer	79.525	0.0	993.1	32
60 min Summer	53.779	0.0	1361.1	62
120 min Summer	34.971	0.0	1772.9	110
180 min Summer	26.617	0.0	2025.3	144
240 min Summer	21.806	0.0	2213.1	176
360 min Summer	16.454	0.0	2506.0	246
480 min Summer	13.443	0.0	2730.5	314
600 min Summer	11.478	0.0	2914.7	382
720 min Summer	10.080	0.0	3071.7	448
960 min Summer	8.199	0.0	3331.5	578
1440 min Summer	6.111	0.0	3722.0	824
2160 min Summer	4.538	0.0	4158.5	1172
2880 min Summer	3.670	0.0	4483.0	1500
4320 min Summer	2.727	0.0	4991.1	2208
5760 min Summer	2.211	0.0	5408.4	2936
7200 min Summer	1.881	0.0	5749.2	3672
8640 min Summer	1.649	0.0	6048.2	4408
10080 min Summer	1.478	0.0	6314.6	5136
15 min Winter	112.612	0.0	783.9	18
30 min Winter	79.525	0.0	1114.5	32

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	10.760	0.960	92.5	1319.9	O K
120 min Winter	10.934	1.134	92.5	1559.4	O K
180 min Winter	10.981	1.181	92.5	1623.2	O K
240 min Winter	10.991	1.191	92.5	1638.2	O K
360 min Winter	10.975	1.175	92.5	1615.5	O K
480 min Winter	10.923	1.123	92.5	1543.4	O K
600 min Winter	10.854	1.054	92.5	1449.1	O K
720 min Winter	10.778	0.978	92.5	1345.4	O K
960 min Winter	10.626	0.826	92.5	1136.1	O K
1440 min Winter	10.372	0.572	91.8	786.3	O K
2160 min Winter	10.165	0.365	86.3	501.3	O K
2880 min Winter	10.109	0.309	71.8	424.2	O K
4320 min Winter	10.053	0.253	54.1	348.1	O K
5760 min Winter	10.023	0.223	44.1	306.1	O K
7200 min Winter	10.002	0.202	37.5	278.4	O K
8640 min Winter	9.988	0.188	33.0	258.0	O K
10080 min Winter	9.976	0.176	29.6	242.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	53.779	0.0	1525.6	60
120 min Winter	34.971	0.0	1986.8	116
180 min Winter	26.617	0.0	2269.5	168
240 min Winter	21.806	0.0	2479.8	190
360 min Winter	16.454	0.0	2807.8	268
480 min Winter	13.443	0.0	3059.4	344
600 min Winter	11.478	0.0	3265.6	416
720 min Winter	10.080	0.0	3441.6	486
960 min Winter	8.199	0.0	3732.9	618
1440 min Winter	6.111	0.0	4170.9	854
2160 min Winter	4.538	0.0	4658.4	1148
2880 min Winter	3.670	0.0	5022.1	1500
4320 min Winter	2.727	0.0	5592.6	2208
5760 min Winter	2.211	0.0	6058.0	2944
7200 min Winter	1.881	0.0	6440.0	3672
8640 min Winter	1.649	0.0	6775.4	4408
10080 min Winter	1.478	0.0	7075.4	5136

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.262	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 3.400

Time (mins) From:	To:	Area (ha)
0	4	3.400

Time Area Diagram

Total Area (ha) 0.000

Time (mins) From:	To:	Area (ha)
0	4	0.000

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Model Details

Storage is Online Cover Level (m) 12.000

Tank or Pond Structure

Invert Level (m) 9.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1375.0	1.200	1375.0	1.210	0.0

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0368-9300-2200-9300
Design Head (m)	2.200
Design Flow (l/s)	93.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	368
Invert Level (m)	9.800
Minimum Outlet Pipe Diameter (mm)	450
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.200	93.0
Flush-Flo™	0.698	92.5
Kick-Flo®	1.506	77.4
Mean Flow over Head Range	-	79.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.5	1.200	88.1	3.000	108.1	7.000	163.4
0.200	36.8	1.400	82.7	3.500	116.5	7.500	169.0
0.300	69.2	1.600	79.7	4.000	124.3	8.000	174.4
0.400	87.8	1.800	84.3	4.500	131.7	8.500	179.7
0.500	90.7	2.000	88.8	5.000	138.6	9.000	184.8
0.600	92.1	2.200	93.0	5.500	145.2	9.500	189.7
0.800	92.2	2.400	97.0	6.000	151.5		
1.000	90.6	2.600	100.8	6.500	157.6		

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Pipe Volume Check

Length of Pipe Provided	300.00	metres
Diameter of Pipe provided	1500.00	mm
Area of pipe provided	1.767	Sq m
Volume of Pipe provided	530.144	Cu m

Manhole Volume Check

No of Manholes	12	
Diameter of Manholes	3000	mm
Area of Manholes	7.069	
Avg Depth of MH	1.7	m
Total volumes of manholes	144.20	Cu m
Sum	**674.34**	Cu m

Appendix 4

N

WALMERSLEY OLD ROAD

RIBBLE DRIVE

BEVIS GREEN

Path (um)

LEY LANE

Weir

300ø

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Key

- Site boundary (10.88ha)
- Existing watercourse
- Existing culverted watercourse
- Existing public foul sewer
- Existing public surface water sewer
- Existing public combined sewer
- Overland flow route
- Existing roof area (2.29ha)
- Existing impermeable area (2.20ha)

Notes:

1. All levels are in metres above ordnance datum

2. All dimensions are in millimetres unless stated otherwise

3. Sewer records provided by United Utilities, February 2014

4. Topographical survey undertaken by Survey & Design Limited, March 2015.

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Client
Barratt Homes (Manchester)

Job Title
Proposed Residential Development
Former Tetrosyl Site
Warmersly Old Road
Bury

Drawing Title
Existing Site Layout
Sheet 1 of 3

Drawing Status

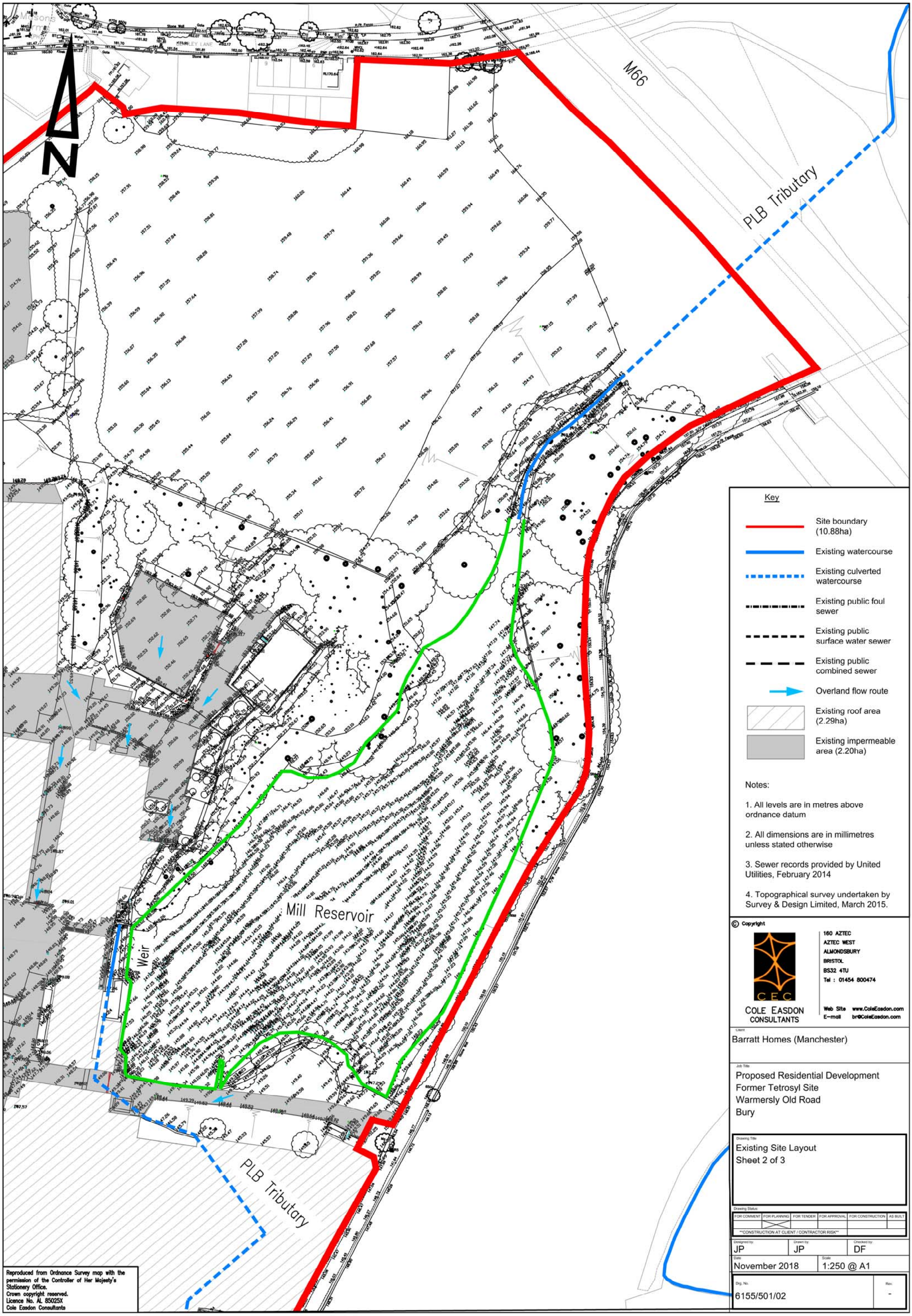
FOR COMMENT	FOR PLANNING	FOR TENDER	FOR APPROVAL	FOR CONSTRUCTION	AS BUILT
	X				

CONSTRUCTION AT CLIENT / CONTRACTOR RISK

Designed by:	Drawn by:	Checked by:
JP	JP	DF

Date	Scale
November 2018	1:250 @ A1

Drg. No.	Rev.
6155/501/01	-



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Client
Barratt Homes (Manchester)

Job Title
Proposed Residential Development
Former Tetrosyl Site
Warmersly Old Road
Bury

Drawing Title
Existing Site Layout
Sheet 2 of 3

Drawing Status:

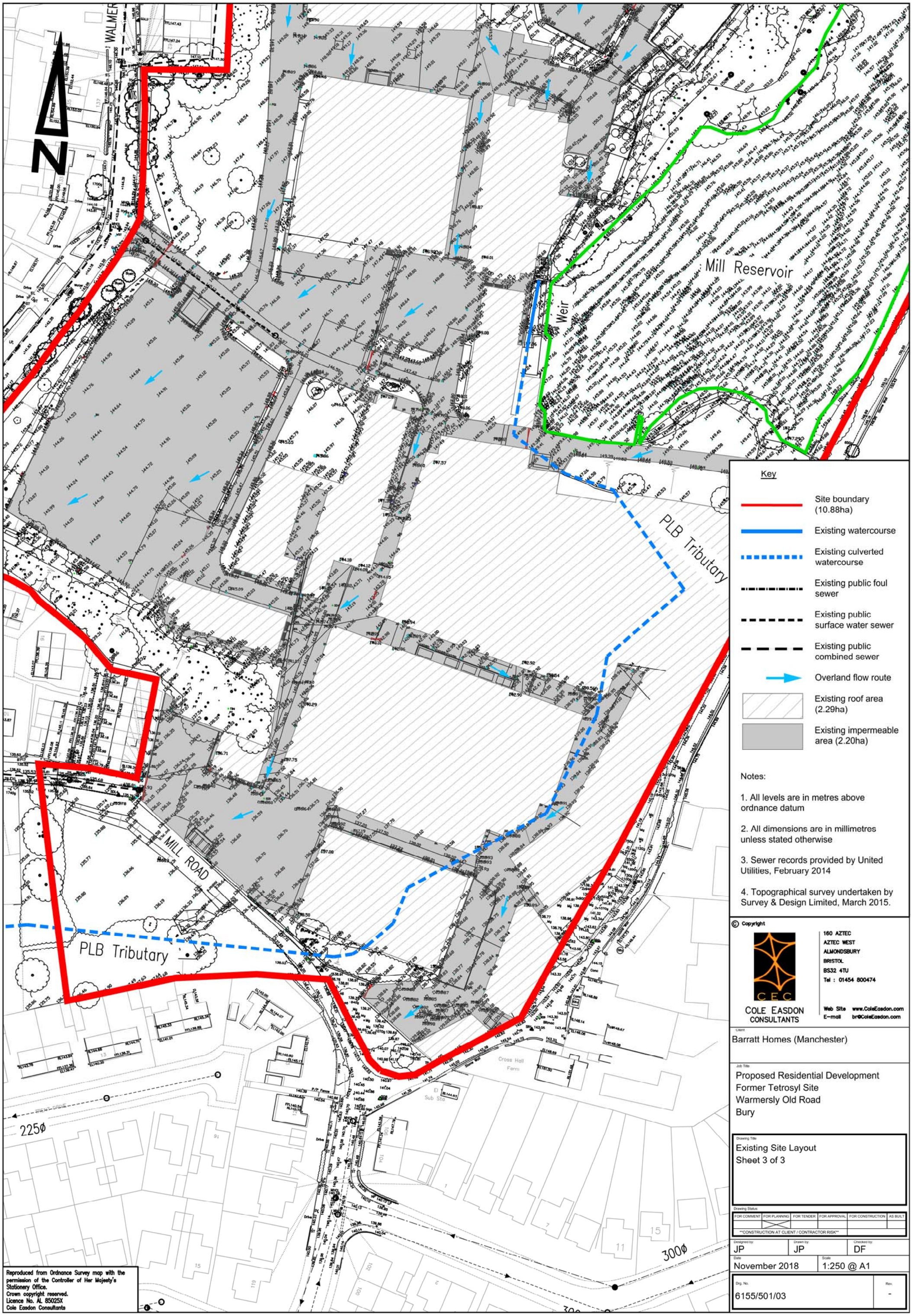
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Job Title
Proposed Residential Development
Former Tetrosyl Site
Warmersly Old Road
Bury

Drawing Title
Existing Site Layout
Sheet 3 of 3

Drawing Status:

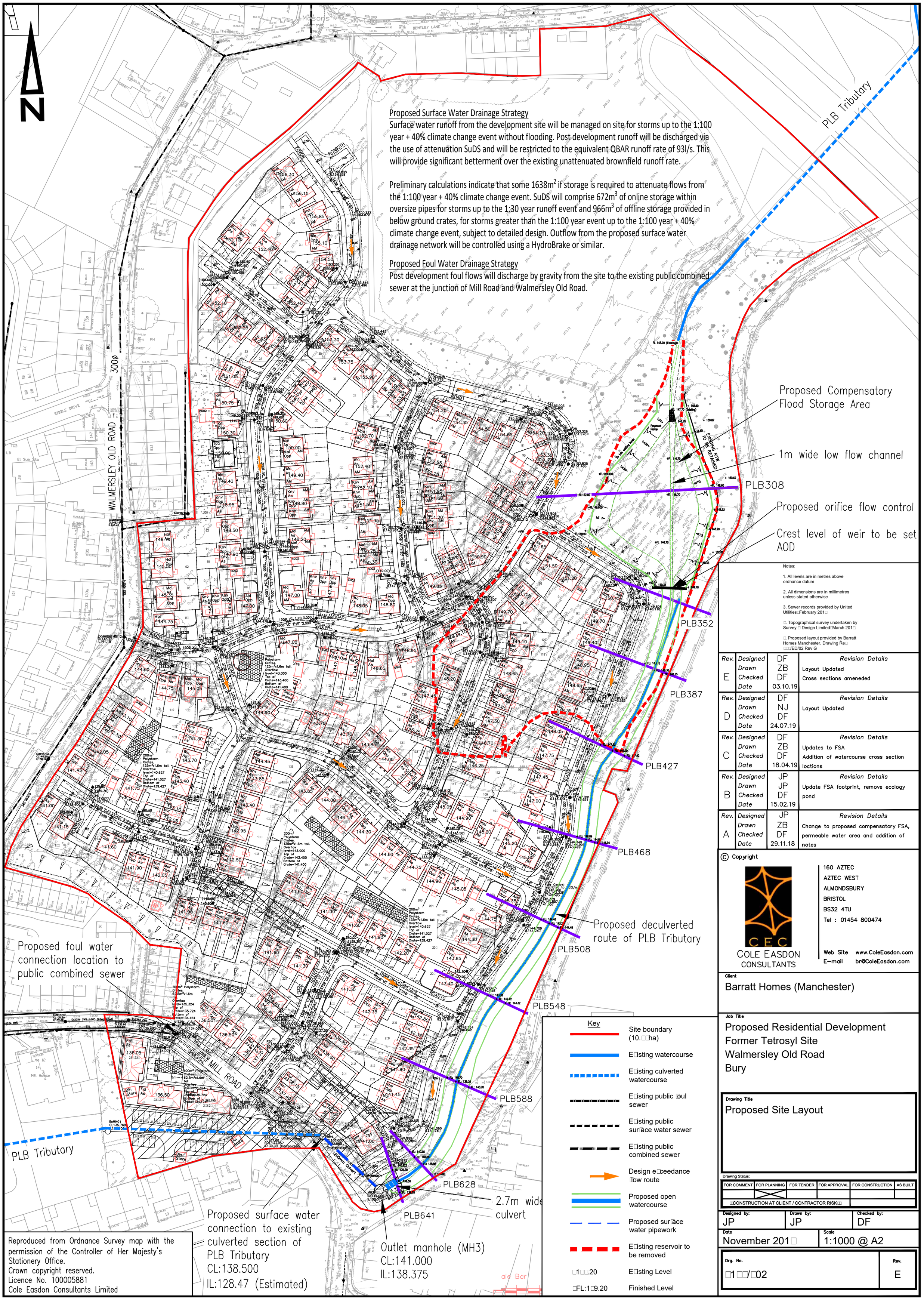
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N
PLB Tributary
Proposed Surface Water Drainage Strategy
Surface water runoff from the development site will be managed on site for storms up to the 1:100 year + 40% climate change event without flooding. Post development runoff will be discharged via the use of attenuation SuDS and will be restricted to the equivalent QBAR runoff rate of 93l/s. This will provide significant betterment over the existing unattenuated brownfield runoff rate.
Preliminary calculations indicate that some 1638m² if storage is required to attenuate flows from the 1:100 year + 40% climate change event. SuDS will comprise 672m³ of online storage within oversize pipes for storms up to the 1:30 year runoff event and 966m³ of offline storage provided in below ground crates, for storms greater than the 1:100 year event up to the 1:100 year + 40% climate change event, subject to detailed design. Outflow from the proposed surface water drainage network will be controlled using a HydroBrake or similar.
Proposed Foul Water Drainage Strategy
Post development foul flows will discharge by gravity from the site to the existing public combined sewer at the junction of Mill Road and Walmersley Old Road.
Proposed Compensatory Flood Storage Area
1m wide low flow channel
PLB308
Proposed orifice flow control
Crest level of weir to be set AOD
PLB352
PLB387
PLB427
PLB468
Proposed deculverted route of PLB Tributary
PLB508
PLB548
PLB588
PLB628
PLB641
2.7m wide culvert
Outlet manhole (MH3)
CL:141.000
IL:138.375
Proposed foul water connection location to public combined sewer
Proposed surface water connection to existing culverted section of PLB Tributary
CL:138.500
IL:128.47 (Estimated)
WALMERSLEY OLD ROAD
MILL ROAD
BENTLEY LANE
RIBBLE DRIVE
300ø
EXISTING RTW TO BE RETAINED
Notes:
1. All levels are in metres above ordnance datum
2. All dimensions are in millimetres unless stated otherwise
3. Sewer records provided by United Utilities□February 201□
□. Topographical survey undertaken by Survey □ Design Limited□March 201□
□. Proposed layout provided by Barratt Homes Manchester. Drawing Re□ □□□/ED/02 Rev G
Rev. | Designed | DF | Revision Details
E | Drawn | ZB | Layout Updated
Checked | DF | Cross sections ameneded
Date | 03.10.19
Rev. | Designed | DF | Revision Details
D | Drawn | NJ | Layout Updated
Checked | DF
Date | 24.07.19
Rev. | Designed | DF | Revision Details
C | Drawn | ZB | Updates to FSA
Checked | DF | Addition of watercourse cross section loctions
Date | 18.04.19
Rev. | Designed | JP | Revision Details
B | Drawn | JP | Update FSA footprint, remove ecology pond
Checked | DF
Date | 15.02.19
Rev. | Designed | JP | Revision Details
A | Drawn | ZB | Change to proposed compensatory FSA, permeable water area and addition of notes
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Date | 29.11.18
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□CONSTRUCTION AT CLIENT / CONTRACTOR RISK□□
Designed by: JP
Drawn by: JP
Checked by: DF
Date: November 201□
Scale: 1:1000 @ A2
Drg. No. □1□□/□02
Rev. E
Key
Site boundary (10.□□ha)
E□isting watercourse
E□isting culverted watercourse
E□isting public □oul sewer
E□isting public sur□ace water sewer
E□isting public combined sewer
Design e□ceedance □ow route
Proposed open watercourse
Proposed sur□ace water pipework
E□isting reservoir to be removed
□1□□.20 E□isting Level
□FL:1□9.20 Finished Level
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HYDRAULIC MODELLING STUDY

FOR

PROPOSED RESIDENTIAL DEVELOPMENT, FORMER TETROSYL SITE
WALMERSLEY OLD ROAD, BURY, GREATER MANCHESTER
ON BEHALF OF
BARRATT HOMES MANCHESTER

OCTOBER 2019

[ISSUE 4]

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COLE EASDON CONSULTANTS (CEC)

DOCUMENT ISSUE RECORD

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Document Check	S. Seed BA (Hons)	S. Seed BA (Hons)	S. Seed BA (Hons)	S. Seed BA (Hons)

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1.0 INTRODUCTION

1.1 This *Hydraulic Modelling Study* has been prepared by Cole Easdon Consultants Ltd (CEC) on behalf of Barratt Homes Manchester to describe hydraulic modelling work carried out as part of a flood risk study in respect of fluvial flood risk associated with land at the former Tetrosyl Site, Walmersley Old Road, Bury, Greater Manchester. Refer to CEC Figure 6155/500/Figure 1 [*Site Location Plan*] in Appendix 1.

1.2 The purpose of this study is to determine flood levels and the extent of fluvial flooding at the existing site associated with flooding of a tributary of Pigs Lee Brook (PLB). Flows arising from storms up to the 1:100 year + 35% climate change event have been considered in this study. The study will also quantify flood levels and extent associated with a residential development proposal comprising infilling of the existing Mill Reservoir, together with associated deculverting works of the PLB Tributary through the development site, and mitigation measures to ensure that no flood risk is posed to the development site, and that there will be no increase in flood risk elsewhere for all events up to and including the 1:100 year+ 35% climate change event.

1.3 The study area is currently the subject of a residential development proposal by Barratt Homes Manchester.

1.4 The results of this study have been used to inform a *Flood Risk Assessment* (*FRA*), which has been prepared to support a planning application for the development. The modelling undertaken within this Study has been used to inform the proposed masterplan for the development.

Scope of Study

1.5 In Section 2.0, we describe the characteristics of the local catchment. In Section 3.0, we assess the existing hydrology. In Section 4.0, we describe the hydraulic modelling process with the hydraulic modelling results presented in Section 5.0. Finally, conclusions are presented in Section 6.0.

1.6 The following resources have been used for this study:

- *Aquajet CCTV Culvert Survey – Pig Lee Tributary - October 2012;*
- *Environment Agency Flood Map for Planning;*
- *Flood Estimation Report - JBA Consulting – March 2018;*

- *IWJS CCTV Survey - Pig Lee Brook - March 2015;*
- *LiDAR Survey Open Data - Digital Terrain Model and Digital Surface Model (OS Tile SD81sw);*
- *Phase I and Phase II Geo-environmental Site Investigation by E3P (Report Reference 10-110-r1) dated May 2014;*
- *Revised Climate Change Allowances (EA, March 2016);*
- *Topographical Survey Drawing (Drawing Ref SDL 2140/1 by Survey & Design Limited, March 2015);* and
- *United Utilities Sewer Records (February 2014).*

1.7 The following abbreviations are used in this Report:

- AOD – Above Ordnance Datum;
- CEH – Centre for Ecology and Hydrology;
- EA – Environment Agency;
- FEH – Flood Estimation Handbook;
- FSR – Flood Studies Report;
- FZM – Flood Zone Map prepared by the EA;
- PLB – Pigs Lee Brook; and
- ReFH – Revitalised flood hydrograph.

2.0 THE LOCAL CATCHMENT

2.1 The River Irwell drains the wider local catchment. It rises from Irwell Springs on Derpwell Moor and drains in a generally southerly direction. South of Lower Broughton the Irwell joins the River Irk and River Medlock and continues as part of the Manchester Ship Canal which discharges into the River Mersey east of Irlam. The overall length of the River Irwell is some 63km.

2.2 One of the tributaries of the River Irwell as it passes between Ramsbottom and Bury is Pigs Lee Brook which discharges to the Irwell to the west of Limefield. Pigs Lee Brook rises upstream of Cob House Farm, to the west of Deeply Vale, and flows in a south-easterly direction beneath the M66 motorway. Downstream of the M66 culvert, Pigs Lee Brook flows in a south-westerly direction through two reservoirs before re-entering a culvert beneath the A56 Walmersley Road highway at Bevis Green. Downstream of the A56, the Brook continues as open channel to its confluence at the River Irwell.

2.3 The Study Area is drained by an un-named tributary of Pigs Lee Brook (referred to hereafter as PLB Tributary), which rises on the southern edge of Harden Moor, near Nangreaves. It flows in a generally southerly direction through open farmland and 3 smaller reservoirs at Whitewall Wood before passing beneath the M66 motorway. Downstream of the motorway culvert the PLB Tributary continues for approximately 100m before entering Mill Reservoir which is located on the site. Outflow from the reservoir is controlled by a weir, with downstream flow being culverted for over 475m through the development site, discharging to open channel some 222m to the south east of the site boundary. The watercourse continues through the Bevis Green area of Bury to its confluence with Pigs Lee Brook. Both watercourses are culverted at the confluence located upstream of the crossing beneath the A56 Walmersley Road highway.

2.4 Mill Reservoir, dates back to at least the late 1800s, and is understood to have been originally constructed to supply water to the Lumn cotton mill, the site's original occupier. Tetrosyl, the current occupier, a chemical manufacturer, has been based on the site for approximately 45 years.

2.5 The Tetrosyl site comprises 10.88ha area of brownfield land located In Walmersley, to the north of Bury town centre. Walmersley Old Road forms the site's western boundary. The site's southern boundary is formed by Mill Road. The north western boundary is formed by

Bentley Lane with the M66 motorway bounding the site to the north east. The site's eastern boundary is formed by an un-named road, which connects Mill Road to the south and White Carr Lane to the north.

2.6 Environment Agency mapping indicates that site lies within Flood Zone 1 and designates PLB Tributary as Main River. Refer to CEC Figure 6155/500 Figure 2 [*EA Flood Zone Map*] in Appendix 1. The EA have confirmed that they do not have updated modelled flood levels with current revised climate change allowances. Refer to Appendix 3.

2.7 Large industrial buildings and associated hardstanding cover the southern and north-western parts of the site. The existing onsite culvert downstream of Mill Reservoir has been surveyed on behalf of the EA. Refer to Appendix 3. It indicates a number of incoming pipe connections, of varying diameters, along its length which are assumed to be incoming surface water connections discharging runoff generated by the site. United Utilities (UU) sewer records also indicate a public surface water sewer connection originating from the site discharging to the public combined sewer system in Walmersley Old Road. Refer to Appendix 3.

Study Area

2.8 Topographical survey (referenced to Ordnance Datum) of the development site and Mill Reservoir has been carried out by Survey and Design Limited in March 2015 (refer to Drawing No. SDL 2140/1 [*Extension to Topo Survey*] in Appendix 4). The survey is representative of the site in its current condition. No buildings have yet been demolished. A topographical survey of PLB Tributary up- and down-stream of the site has been conducted by Survey Systems in February 2018. Refer to Drawing No. SSL:18583:200 [*Topographical & Sectional Survey - 2 No. Sheets*] (by Survey Systems) in Appendix 4. It is clear from the topographical survey data that ground levels fall steeply through the site varying from 154mAOD at the north eastern end of the site adjacent to the PLB Tributary to 136mAOD at the southern site boundary in the vicinity of the culverted PLB Tributary.

2.9 PLB Tributary has been surveyed along its length commencing some 78m upstream of the M66 culvert. Bed levels at this location are some 154.6mAOD. The downstream extent of the survey extends 222m downstream of the site boundary. Bed levels at this location are some 116.5mAOD.

Flood Mechanism

2.10 The mechanism of flooding within the site has been identified as extreme rainfall events causing peak watercourse flows to exceed the in-bank capacity of Mill Reservoir resulting in overtopping of the reservoir. The occurrence of flooding at the site is influenced partly by the attenuation effect of flood storage available within Mill Reservoir and the Whitewall Wood reservoirs further upstream within the catchment.

3.0 HYDROLOGY

Refer to the Flood Estimation Report and Hydrographs in Appendix 2.

Approach to Hydrology

3.1 Hydrological analysis has been undertaken by JBA Consulting and is based on the Flood Estimation Handbook (FEH) web-based service provided by the Centre for Ecology and Hydrology (CEH). The Revitalised Flood Hydrograph 2 (ReFH2) method has been used to generate hydrographs for the catchment area using FEH catchment descriptor output for the PLB Tributary catchment.

Hydrological Parameters

3.2 The parameters for the hydrological analysis have been obtained from the FEH which includes a GIS database containing catchment descriptor values that characterise the response of the catchment to rainfall. Using the software's digital terrain map, a river catchment can be selected and the relevant catchment descriptors obtained. Descriptors for catchments associated with PLB Tributary have been obtained in this way.

3.3 Flow estimation is based on a catchment extent that is defined by a point located immediately downstream of the Mill Reservoir (SD 80950 13850). This point has been selected as it is considered to accurately define the upstream catchment. Refer to CEC Figure 6155/500 Figure 5 [*FEH Catchment (Outlet from Mill Reservoir)*] in Appendix 1. The alternative choice would have been to determine a catchment that is based upon selection of a point at the downstream end of the model extent. The FEH shows that the only increase in catchment extent occurs at the downstream end and comprises the site and developed area external to the site. Refer to CEC Figure 6155/500 Figure 6 [*Extended FEH Catchment (End of Hydraulic Model*] in Appendix 1. Public sewer records (Appendix 3) show that the additional catchment area external to the site is sewered and the sewers do not connect to the watercourse. As such, there is no need to consider this element of the additional catchment within flow calculations. Refer to CEC Figures 6155/500 Figure 7 [*FEH Catchment Comparison*] & 6155/500 Figure 8 [*Catchment & Sewers Plan*] in Appendix 1. The element of additional catchment area that incorporates the site is served by piped drainage that discharges to the culverted PLB Tributary within the site. This evidenced by a number of piped connections into Culverts 2 & 3 that have been recorded by the CCTV Culvert Survey (Appendix 3). A hydrograph for the piped flow based on the existing developed site area within this additional area has been generated using Microdrainage

software and input into the hydraulic model to represent flow from this part of the catchment. Please refer to Paragraph 4.14 below for further detail.

3.4 Catchment descriptors have been adjusted where necessary to account for the pre-development case (including the flood attenuation effect of Mill Reservoir) and the post-development case (excluding the flood attenuation effect of Mill Reservoir).

ReFH Analysis

3.5 The critical storm duration for PLB Tributary considered in this Report has been identified by the ReFH2 method as being the 2.75-hour winter storm. The ReFH2 method does not represent the flood attenuation effect due to reservoirs.

Statistical Analysis

3.6 A statistical analysis has been undertaken to determine the reliability of the ReFH2 generated flow data. The statistical analysis is a recognised method for flow determination and is based on a pooling group analysis of gauged catchments which have similar FEH descriptors to the host catchment. The statistical method represents the attenuation effect due to reservoirs in the catchment via the catchment descriptor FARL. Two sets of data have been provided, one which includes the attenuation effect of Mill Reservoir and one which excludes the attenuation effect of Mil Reservoir.

Model Hydrology

3.7 As the ReFH2 method does not include for the attenuation effect of other reservoirs, flow data generated from the statistical method has been used for the pre- and post-development scenarios. Hydrographs from the ReFH2 model have been scaled to fit the statistical peaks. The data set 'MillRes_Post' has been used for both scenarios as this case excludes the attenuation effect of Mill Reservoir.

3.8 Datasets have been obtained for a number of return period events including the 1:100 year + 35% and 1:100 year + 70% events. These two latter events have been included for the reason that following initial modelling using the 1:100 year event hydrograph it was found that flooding occurs across part of the existing site thereby placing the affected part of the site within High Risk Flood Zone 3. In accordance with current Central Government climate change guidance the proposed development (residential) is classified as 'more vulnerable' with a lifetime of 100 years. As such, the higher central and upper end climate change allowances should be assessed in relation to the 1:100 year flood event. For this particular

catchment (North West River Basin District) the higher central and upper end allowances are 35% and 70% respectively.

Table 3.1: Summary of peak model flows (MillRes_Post) (2.75 hour storm duration)

Data Set	1:20 year peak flow (l/s)	1:100 year peak flow (l/s)	1:100 year + 35% peak flow (l/s)	1:100 year + 70% peak flow (l/s)
MillRes_Post	2.80	4.20	5.67	7.14

3.9 Initial modelling of the existing reservoir found that the existing Mill Reservoir delays the flood hydrograph by some 1.16 hours during the 1:100 year flood event. As such a longer storm duration of 5.25 hours duration has been tested. This duration has been derived using equation 8.1 of the FEH Volume 2 with the ReFH derived duration of 2.75 hours extended by adding the response time of the existing reservoir (1.16 hours) to the catchment response time (Tp = 1.23 hours).

4.0 HYDRAULIC MODELLING

Refer to CEC Plans 6155/502(E) [*Proposed Site Layout*], 6155/503(B) [*Existing Hydraulic Model Extent - 3 No. Sheets*] and 6155/505 [*Hydraulic Modelling Study - Mill Reservoir – Existing Cross-sections*], in Appendix 5.

4.1 Hydraulic modelling has been carried out using Flood Modeller Software Version 4.4.6803.28334 (2019). This is a hydraulic modelling package capable of handling one-dimensional, two-dimensional and 1D-2D linked models; the latter has been used in the construction of the PLB Tributary model. For the 1D element of the model the software can represent river systems as a series of nodes and links, with sections of the river channel applied to the model as nodes and the chainages between each section of links between the node. Flow through the channel is modelled in terms of changes in water levels (or 'stage') at each cross section.

4.2 For the linked 2D element the software can model the floodplain as a grid, using the 2D equations of flow to calculate the water depth and 'depth averaged' velocity over the grid. The 1D river model can be linked to the 2D floodplain model using a 'head', 'flow' or 'weir' links, whereby the 1D model supplies stage or flow data at a pre-defined point into the 2D model.

Existing Site: 1D Hydraulic Model Extent along PLB Tributary

Refer to CEC Plan 6155/511 [*Schematic Plan: Existing Model*] in Appendix 5.

4.3 The hydraulic model for the existing situation has been built using available topographical and CCTV survey information.

4.4 The model commences along PLB Tributary some 78m upstream of the M66 railway culvert and finishes some 222m downstream of the site boundary. Cross-sections of open channel immediately upstream and downstream of the site have been provided to CEC. Refer to Drawing No. SSL:18583:200 [*Topographical & Sectional Survey - 2 No. Sheets*] (by Survey Systems) in Appendix 4. CEC Plan 6155/503(B) [*Existing Hydraulic Model Extent – 3 No. Sheets*] in Appendix 5 shows the location of the surveyed sections in plan.

4.5 Interpolated sections have been placed between surveyed sections (such as stretches of watercourse featuring increased sinuosity or rapid changes in width or depth) in order to aid the stability of the model.

4.6 There are a number of structures along the length of PLB Tributary to be included within the 1D model, including Mill Reservoir itself. Mill Reservoir has been modelled in the 1D domain using 'extended sections' which were generated from the 2015 topographical survey data provided to CEC. Within the reach considered by the model there are 3 culverts and 2 weirs, which have been modelled based upon topographical survey and CCTV survey information (Appendix 3). Culvert 1 represents the 1.5m diameter precast concrete culvert beneath the M66. Culvert 2 is located some 19m downstream of the outflow weir from Mill Reservoir and terminates at an existing concrete lined spillway. Culvert 3 represents a 446m long culvert which is routed through the site, commencing at the downstream end of the spillway and continuing through the site via manholes 1 and 2 and greenfield land to the south where it discharges into open channel, 222m downstream of the site. Culvert details are summarised in Table 4.1 below. Culverts 2 and 3 vary in size along their length. The model has been built utilising the smallest culvert size along each reach. Photographs within the CCTV survey report show that both culverts 2 and 3 are constructed from stone/brick blockwork. The modelled roughness coefficient for the culverts has been determined from an assessment of the photographs.

4.7 The invert level of Culvert 3a at Manhole 1 has been assumed based on interrogation of the CCTV survey report data. Review of the CCTV culvert survey also confirms that there are five vertical drops within Culvert 3b along its length, estimated to total some 3.9m (CEC estimate). For the purpose of modelling the drop has been entered as a single 3.9m weir drop at the upstream end of Culvert 3b. Interpolated sections have been used between the upstream and downstream culvert sections to aid model stability.

Table 4.1: Existing Culvert Details

Culvert Reference	Size (m)	Length (m)	Start Point	End Point	Material & Condition	Mannings 'n'	Comments
1	1.5m dia.	106	PLB078	PLB184	Concrete Good	0.012	-
2	1.2hx2.4w 1.5hx2.4w **1.05hx2.4**	45	D/s of Weir 1	Spillway	Stone blocks. Good. Some encrustation	0.013	Modelled as 1.05mx2.4m
Spillway	-	-	-	-	Concrete with dressed stone sides	0.017	-
3a	1.5x1.5 1.25x1.5h 1.75x1.1h 1.0x1.1h 1.3hx1.0 **1.0hx0.9** 1.1hx0.9 1.1hx1.0 1.1hx0.9	164	Spillway	Manhole 1	Stone blocks. Good. Some encrustation	0.013	Modelled as 1.0mx0.9m
Culvert 3b	1.7hx2.8w 1.8hx2.8w 2.6hx1.6w **2.22hx1.3**	122.6	Manhole 1	Manhole 2	Uneven stone blockwork. Some encrustation	0.025	Modelled as 2.22mx1.3m 5 stepdowns totalling estimated 3.9m vertical drop
Culvert 3c	1.2m dia.	159	Manhole 2	PLB961	Stone blocks. Good. Some encrustation	0.025	-

4.8 Weir 1 forms the control mechanism for flow leaving Mill Reservoir. It is some 15m in length varying in elevation between 148.27m -148.290m AOD. Refer to Photograph 4.1 below. Flow spills into a concrete lined channel. Due to the manner in which flow is conveyed across Weir 1 from the reservoir into the channel it has been modelled as a spill unit.



Photograph 4.1: Weir 1 (beneath footbridge) from Mill Reservoir

4.9 Culvert 2 and Culvert 3 are separated by a 20m long concrete 'spillway' across which elevations fall rapidly. Refer to Photographs 4.2-4.4 below. Weir 2 is located at the downstream end of Culvert 2 (Photograph 4.2). Water levels build up in Culvert 2 before overtopping the weir and flowing down the spillway. Both the weir and concrete spillway have been modelled. The weir has been modelled as a weir drop.



Photograph 4.2: Weir 2 at the downstream end of Culvert 2



Photograph 4.3: Spillway (looking downstream) from Weir 2 towards Culvert 3



Photograph 4.4: Spillway (looking downstream) from left bank of Section PLB466

4.10 Initial conditions for each of the modelled scenarios have been generated using the steady state (direct) method.

Topographical Features

4.11 Dimensions of structures modelled within the study area have been taken from the 2015 topographical survey undertaken by Survey and Design Ltd (Drawing No. SDL 2140/1 [*Extension to Topo Survey*] in Appendix 4) and CCTV survey report (in Appendix 3). Watercourse channel cross sections have been provided within the 2018 topographical survey with sections extended in the 1D domain. Upstream of the M66 culvert, the channel has been extended as far as necessary in order to capture as much of the floodplain as possible and reduce the possibility of the model 'glass walling' i.e. water level rising beyond the height of the entire channel section, under high flow conditions.

1D Hydraulic Roughness

4.12 Channel roughness has been simulated in Flood Modeller through the specification of appropriate Manning's 'n' values for each modelled cross section. The modelled Manning's 'n' values were adopted in accordance with the values recommended in *Open – Channel Hydraulics* (Chow, 1959). Open channel and 1D floodplain roughness has been determined

from a review of photographs, aerial photographs and site visit. Refer to Table 4.2 below. As mentioned in Paragraph 4.6 above, the modelled roughness coefficient for the existing culverts has been determined from an assessment of photographs within the CCTV survey report. Refer to Appendix 3 and Table 4.1 above.

Table 4.2: Existing Site: Modelled Roughness Coefficients

Location	Modelled Mannings 'n' Coefficient	Comments
Open channel (upstream of Mill Reservoir)	0.045 Bed & Banks	Clean, winding channel with stones & weeds
Mill Reservoir	0.08 Bed & Banks 0.06 Floodplain	Deep pool
Open channel (downstream of Mill Reservoir)	0.05 Bed & Banks	Clean, winding channel with stones & weeds
1D Floodplain	0.06 0.12 Trees	Brush Trees
2D Floodplain	0.033 0.12	Paved Areas Trees

1D Boundary Conditions

Upstream Boundary Condition

4.13 Flow hydrographs obtained from JBA's hydrological analysis have been used as upstream boundary input flows in the hydraulic model.

Existing Situation

4.14 A hydrograph for piped flow based on the existing developed site area (4.51 ha) has been generated using Microdrainage software and input into the hydraulic model to represent flow from this part of the catchment. Refer to Appendix 6 and Figure 4.1 below. This hydrograph has been input to the open section of watercourse upstream of Culvert 2 and has been combined with the dummy inflow hydrograph referred to in Paragraph 4.15 below. This location is considered appropriate based on the CCTV Culvert Survey (Appendix 3) that records a number of piped connections into Culverts 2 & 3 within the site. The hydrograph is based upon a selected storm duration of 600 minutes to ensure that the hydrograph peak (0.41m3/s) coincides with the timing of the peak flow through the PLB Tributary at the Mill Reservoir outlet (Time to peak: 5.25 hours).

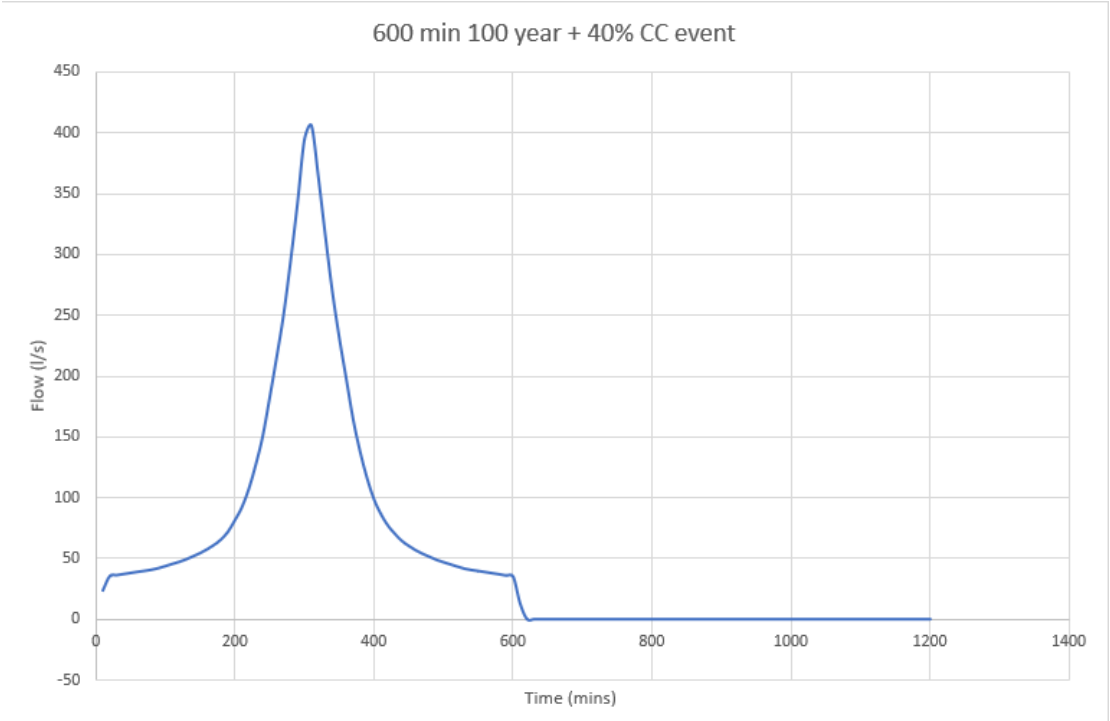


Figure 4.1: Brownfield Hydrograph input into Existing Model at upstream end of Culvert 2

4.15 A dummy inflow has been added to the hydrograph to ensure the culvert does not run dry at the beginning stages of the model. The dummy inflow is active for 10 hours, with a flow of 0.1m^3/s over the 10 hours duration. The upstream boundary hydrograph duration has therefore been increased by 10 hours at the beginning of the run prior to the storm commencing (total run time 53.75hours). The flow from 0 – 10 hours is equivalent to the 0-hours duration flow.

Downstream Boundary Condition

4.16 The downstream extent of the model terminates some 59m downstream of Culvert 3 within open channel and is some 222m downstream of the site. A standard ISIS downstream normal/critical depth boundary unit has been applied at this location. This location is considered to be an appropriate termination point for the model given the distance from the site (226m) and the significant difference in levels at this location (116.5mAOD) in comparison to site levels which vary between vary between 136mAOD – 154mAOD. It is therefore extremely unlikely that any backwater effect would impact on upstream water levels within the site and so downstream boundary sensitivity testing is considered unnecessary and has not been undertaken.

Existing Site: 2D Hydraulic Model Extent along PLB Tributary

4.17 The 2D domain is defined by an 'active area' which is a polygon determining active computation grid cells within a 2D model. The elevation data (or terrain model) on which the 2D model bases it computation has been obtained from DSM LiDAR which can be loaded into Flood Modeller. 2m resolution LiDAR data was downloaded in April 2018 for use in this modelling study. 4 polygons have been created in the model to represent the 'active area'; these extend to the east, west and south of the site to allow the model to represent how flood flow could affect both the site itself and the reservoir. Refer to Figure 4.2 below. A 2m x 2m 2D grid cell size has been specified as this is deemed sufficient for accurate floodflow mapping at this location. The DSM includes manmade obstructions to flow. In this instance, these obstructions comprise existing buildings, notably large warehouse type buildings within the site associated with its former chemical manufacturing use. A 1D – 2D link line has been created at the southern end of Mill Reservoir where the reservoir embankment is lowest. Overspill from the reservoir, if it was to occur, would spill from this location over some 13.5m length of lowlying embankment. As such, the spill has been modelled as a 13.5m long link line with representational spill levels varying from 149.335 – 149.38mAOD. A 1D-2D link line has also been created at the downstream end of the model where the culverted watercourse returns to open channel thereby facilitating a potential return point for any out of bank flooding that may occur upstream. LiDAR ground levels have been used to create the link line.

4.18 The 2D domain does not consider the floodplain upstream of the M66 culvert, as it is unlikely to impact the site due to the presence of the M66 embankment, and as such the floodplain upstream of the M66 has been modelled as 1D extended sections.

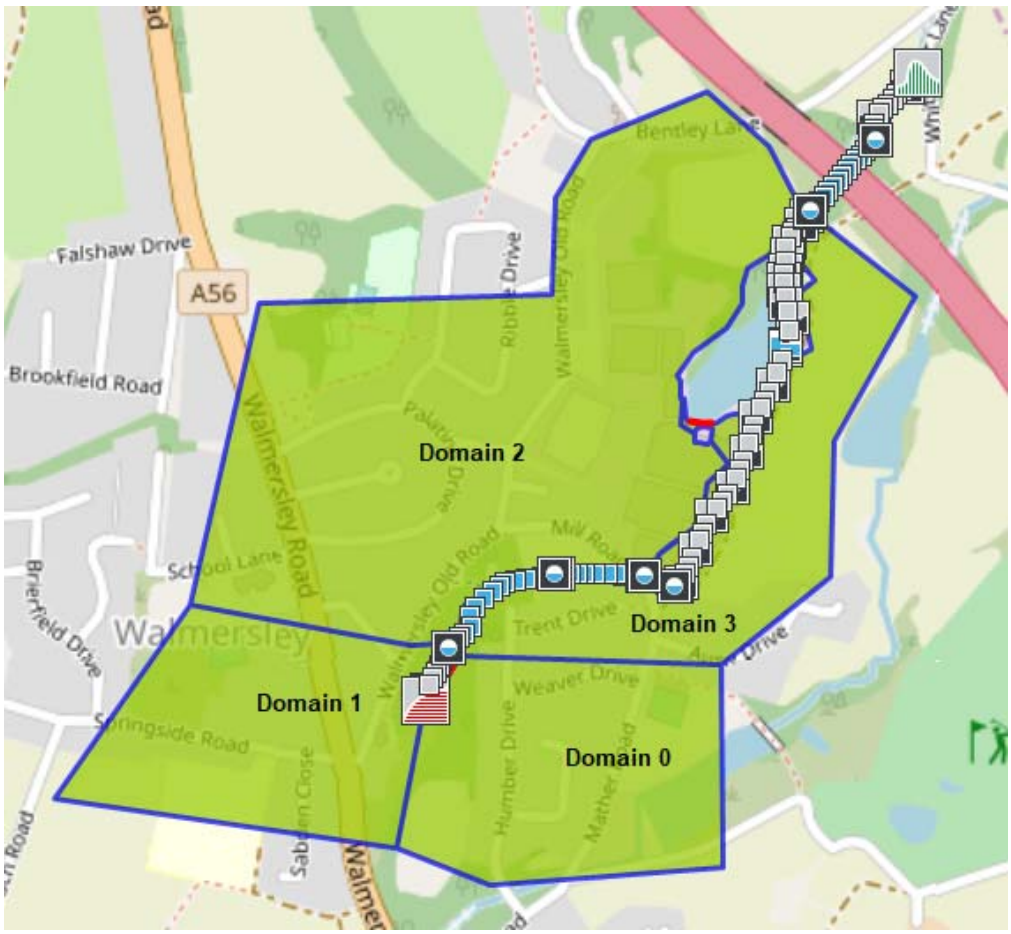


Figure 4.2: Existing Site Model: Modelled 2D Floodplain Domain

2D Hydraulic Roughness

4.19 A roughness value of 0.033 has been applied in the 2D domain as the floodplain is predominantly hardstanding. Where tree areas are present a 0.12 roughness value has been used. Where buildings are present a 0.2 roughness value has been used.

Model Calibration

4.20 No flood event data was available at the time of writing to use for model calibration. However, it should be noted that there is no known flood history associated with Mill Reservoir.

Post Development Site: 1D Hydraulic Model Extent along PLB Tributary

Refer to CEC Plan 6155/512(B) [*Schematic Plan: Post Development Model*] in Appendix 5.

4.21 Proposed development will comprise the infilling of Mill Reservoir, the demolition of existing buildings, the deculverting of Culvert 3 where it passes through the site (some

460m length) and ground reprofiling to facilitate development. A second model has been created to represent this proposed scenario. Refer to CEC Plans 6155/502(E) [*Proposed Site Layout*] and 6155/507(A) [*Hydraulic Modelling Study - Proposed Cross-sections - 3 No. Sheets*] in Appendix 5.

4.22 The hydraulic model for the existing situation has been utilised for the proposed site model with the following amendments:

i) the Mill Reservoir has been removed and replaced with a smaller Flood Storage Area (FSA).
ii) the existing culvert 2 has been removed from the model.
iii) the existing culvert 3 has been largely removed from the model. A 102m length of culvert upstream of existing manhole 2 has been retained.
iv) the redundant lengths of culvert have been replaced with new open channel (some 300m long) that links the proposed FSA to the existing culvert 3 length to be retained via a 40m length of new culvert.

Flood Storage Area

4.23 Under development proposals the Mill Reservoir will be removed thus removing the existing fluvial flood risk to the site. However, due to the attenuating effect Mill Reservoir has upon flood flows it has been necessary to retain part of the reservoir as a Flood Storage Area. The FSA has been modelled hydraulically as 1D extended sections to ensure that flows within the PLB tributary downstream of the site during the 1:100 year+ 35% climate change event do not increase as a result of the development. The FSA is represented in the model by Sections PLB291 to PLB337 located at intervals of less than 20m so as to accurately simulate FSA storage. These new FSA sections have not been surveyed as they do not yet exist. The FSA bed level has been set at 146.70mAOD. Top of bank level has been set at 149.7mAOD.

4.24 The FSA will essentially be a dry storage area with low flow routed through a channel and high flow retained in the FSA. The FSA bed will be vegetated with wetland grass.

Flow Control

4.25 An orifice flow control with dimensions 0.85m high and 1.42m wide has been inserted at the downstream end of the FSA between Sections PLB337 and PLB352. The invert level of the orifice has been set at a level of 146.450mAOD. In practice, the flow control is likely to comprise a concrete wall with the required orifice opening. The top of the wall will be set

slightly lower than top of bank at 149.35mAOD to facilitate weir flow during design exceedance events. The weir has been modelled as a 15m wide spill unit set at 149.35mAOD and spills back into the downstream proposed open channel at PLB352.

Open Channel

4.26 The proposed new reach of open channel downstream of the proposed FSA has been sized to accommodate the 1:100 year + 35% climate change event without flooding and is represented in the model by Sections PLB352 to PLB641 located at 40m intervals. A 1D model has been used. These new watercourse sections have not been surveyed as they do not yet exist. A 1m channel bed with 1:3 side slopes has been modelled. The bed widens to 2m at the downstream end. The channel bed and banks will be vegetated with an appropriate grass/shrub mix. Refer to Drawing No. c-1339-01(B) [*Outline Landscape Masterplan*] (by PDP Associates) in Appendix 4.

4.27 The open channel will discharge into a 2.70m wide x 1.5m high culvert at the downstream end of the site, before discharging over a proposed weir (Weir 4) with a 7.9m drop. Downstream of Weir 4, flow will be conveyed via a proposed 1.2m diameter culvert (Culvert 4) which will discharge to existing Culvert 3 via a new connection some 102m upstream of existing Manhole 2. In practice, the weir drop will be internalised within a manhole.

4.28 The modelled open channel sections and FSA have been sized so as to adequately accommodate flow arising from the 1:100 year + 35% flood event without increasing flood risk within the site or downstream of the site.

1D Hydraulic Roughness

4.29 Channel roughness has been simulated in Flood Modeller through the specification of appropriate Manning's 'n' values for each modelled cross section. The modelled Manning's 'n' values selected for the new FSA and open channel are based upon proposed landscaping shown on Drawing No. c-1339-01(B) [*Outline Landscape Masterplan*] (by PDP Associates) in Appendix 4 and in accordance with the values recommended in *Open – Channel Hydraulics* (Chow, 1959). The modelled roughness coefficient for the existing culverts to be retained have been taken from the existing site model. Refer to Table 4.3 below. New culverts have been assigned a relevant roughness coefficient.

Table 4.3: Proposed Site: Modelled 1D Roughness Coefficients

Location	Proposed Vegetation/Material	Modelled Mannings 'n' Coefficient
Flood Storage Area: Bed	Wetland Grass	0.05
Flood Storage Area: Banks	Shrubs	0.086
Open channel: Bed	Wetland Grass	0.05
Open channel: Banks	Grass/Shrubs	0.05/0.086
New culverts	Concrete	0.015
2D Floodplain	Paved Areas Trees	0.033 0.12

Post Development Site: 2D Hydraulic Model Extent along PLB Tributary

4.30 The 2D domain used within the existing model has been retained in the post development model. In addition to this, for the post development site, 10 polygons have been added to the domain to represent the 'active area' within the post development site. These extend to the west and south of the proposed open channel commencing between PLB588 and PLB641 to allow the model to accurately represent how flood flow could affect both the post development site and offsite areas downstream of the site. Refer to Figure 4.3 below. A 1D-2D link line has been created between the right banks of PLB588 – PLB641 to allow floodflow spill into the 2D floodplain.

4.31 A 4m x 4m 2D grid cell size has been specified within the model. A smaller grid cell size was found to result in model instability, possibly due to interfacing problems between the additional polygons and the LiDAR based polygons. The 1D-2D link line used at the downstream end of the existing model where the culverted watercourse returns to open channel, has been retained in the post development model to represent the potential return point for any out of bank flooding that may occur upstream.

4.32 The 2D domain does not consider the floodplain upstream of the M66 culvert, as it is unlikely to impact the site due to the presence of the M66 embankment, and as such the floodplain upstream of the M66 has been modelled as 1D extended sections.

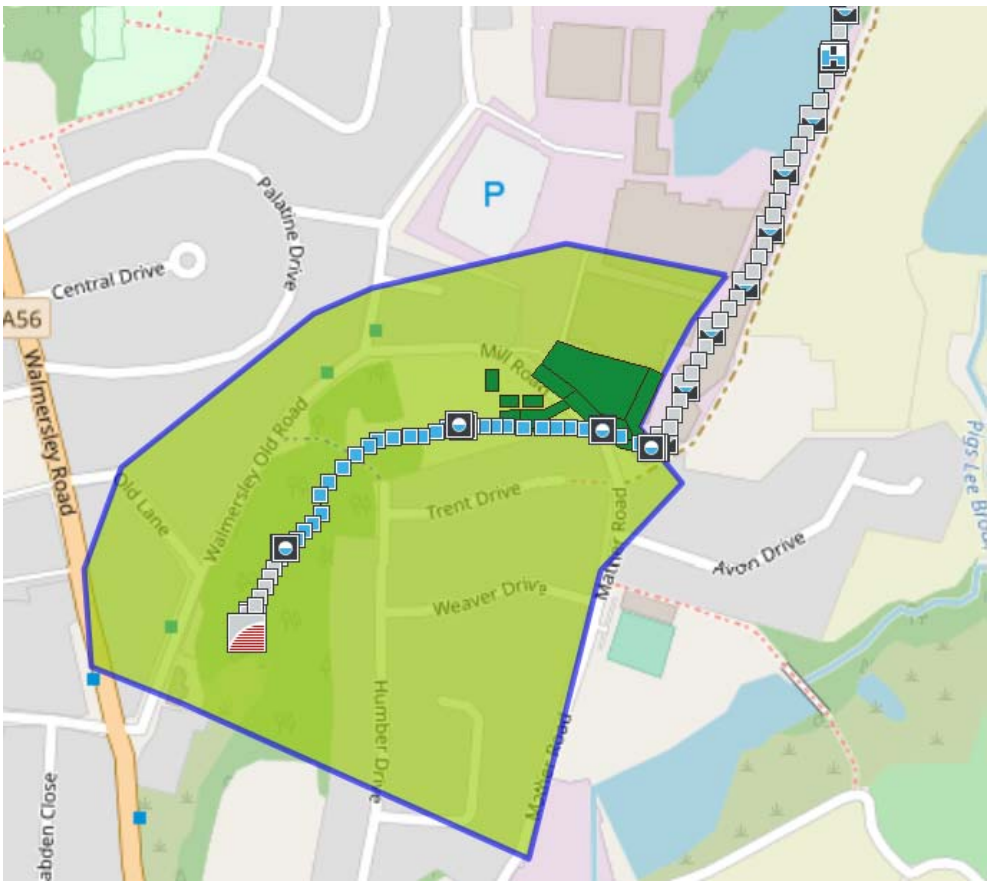


Figure 4.3: Post Development Site Model: Modelled 2D Floodplain Domain

2D Hydraulic Roughness

4.33 A roughness value of 0.033 has been applied in the 2D domain as the floodplain is predominantly hardstanding. Where tree areas are present a 0.12 roughness value has been used. Where buildings are present a 0.2 roughness value has been used.

1D Boundary Conditions

Upstream Boundary Condition

4.34 Flow hydrographs obtained from JBA's hydrological analysis have been used as upstream boundary input flows in the hydraulic model.

4.35 For ease of comparison between the existing and proposed models, the upstream boundary hydrograph duration has been increased by 10 hours at the beginning of the run as described above.

Downstream Boundary Condition

4.36 The boundary condition used in the existing site model has been retained.

Modelled Scenarios – Existing Situation

4.37 The 1D-2D linked model representing the existing site and potential flood risk from Mill Reservoir has been run for the following events:

i) 1:20 year return period
ii) 1:100 year return period
iii) 1:100 year + 35% climate change return period (for 2.75 hour and 5.25 hour storm durations)
iv) 1:100 year + 70% climate change return period
v) 1:1000 year return period

Modelled Scenarios – Post Development Scenario

4.38 The 1D-2D linked model representing the existing site and potential flood risk from Mill Reservoir has been run for the following events:

i) 1:20 year return period
ii) 1:100 year return period
iii) 1:100 year + 35% climate change return period
iv) 1:100 year + 70% climate change return period
v) 50% blockage of culvert trash screen downstream of new proposed open channel
vi) Variation of Mannings 'n' by +20% and -20% (1:100year + 35% return period event)
vii) 1:1000 year return period

5.0 HYDRAULIC MODEL RESULTS

Refer to CEC Plans6155/502(E) [*Proposed Site Layout*], 6155/503(B) [*Existing Hydraulic Model Extent - 3 No. Sheets*] and 6155/505 [*Hydraulic Modelling Study - Mill Reservoir – Existing Cross-sections*] in Appendix 5 and the modelled Longsections – Maximum Stage (Existing & Post Development) in Appendix 6.

Modelled Scenarios – Existing Situation

5.1 The 1D-2D linked model representing the existing site and potential flood risk from Mill Reservoir has been run for the following events:

i) 1:20 year return period
ii) 1:100 year return period
iii) 1:100 year + 35% climate change return period (for 2.75 hour and 5.25 hour storm durations)
iv) 1:100 year + 70% climate change return period
v) 1:1000 year return period

Modelled Scenarios – Existing Situation

5.2 Results have been used to define the floodplain extent associated with each return period, within the development site and surrounding area. The 2D floodplain extent only considers those areas surrounding and downstream of Mill Reservoir. No floodplain extents have been mapped for the 1D section of channel upstream of the M66 culvert.

5.3 Peak water levels and flowrates at critical modelled locations are summarised in Tables 5.1 and 5.2 below.

Table 5.1: Existing Model – Maximum Stage (mAOD)

Model Node Reference	Return Period Event						
	1:20 yr*	1:100 yr*	1:100 yr + 35% CC 2.75 hr storm	1:100 yr + 35% CC 5.25 hr storm	1:100 yr + 70% CC*	1:1000 yr storm*	Comment
PLB053 U/S of M66 culvert	155.629	156.281	156.804	156.898	157.447	157.570	
PLB369 Mill Reservoir	149.305	149.494	149.538	149.563	149.618	149.633	2D flooding occurs for all events except 1:20 yr event
PLB1014 End of model	116.159	116.287	116.333	116.355	116.403	116.413	

*Scenarios run using 5.25 hr storm duration

Table 5.2: Existing Model – Peak Discharge Rate (m3/s)*

Model Node Reference	Return Period Event						
	1:20 yr*	1:100 yr*	1:100 yr + 35% CC 2.75 hr storm	1:100 yr + 35% CC 5.25 hr storm	1:100 yr + 70% CC*	1:1000 yr storm*	Comment
Start of Model	2.8	4.2	5.67	5.67	7.14	7.5	
PLB053 U/S of M66 culvert	2.66	3.84	4.98	5.14	6.47	6.82	
PLB369 Mill Reservoir	2.15	3.53	4.58	5.01	6.33	6.67	2D flooding occurs for all events except 1:20 yr event
PLB1014 End of model	1.96	3.52	4.32	4.86	6.16	6.49	A proportion of 2D floodflow does not re-enter the 1D model

*Scenarios run using 5.25 hr storm duration

1:20 year Return Event

5.4 The peak water level in the reservoir is 149.31m. No flooding occurs from Mill Reservoir. All flow remains in-bank through the site.

1:100 year Return Event

5.5 The peak water level in the reservoir is 149.49m. A peak flow of 2.11m^3/s overtops Weir 1 and enters Culvert 2 and exits the site via Culvert 3. Flooding occurs from the southern bank of Mill Reservoir, with a peak flow of 1.26m^3/s originating from the reservoir spill over a 2.67 hour duration.

5.6 Floodwaters issue from the southernmost bank of the reservoir once flood levels exceed 149.33m. Floodwaters are conveyed in a southerly direction, heading in either an easterly or westerly direction around existing buildings towards the southern site boundary. Floodwaters flow across Mill Road and down Walmersley Old Road towards PLB Tributary downstream of the site, to the south of the Culvert 3 outlet. Refer to Figure 5.1 below.

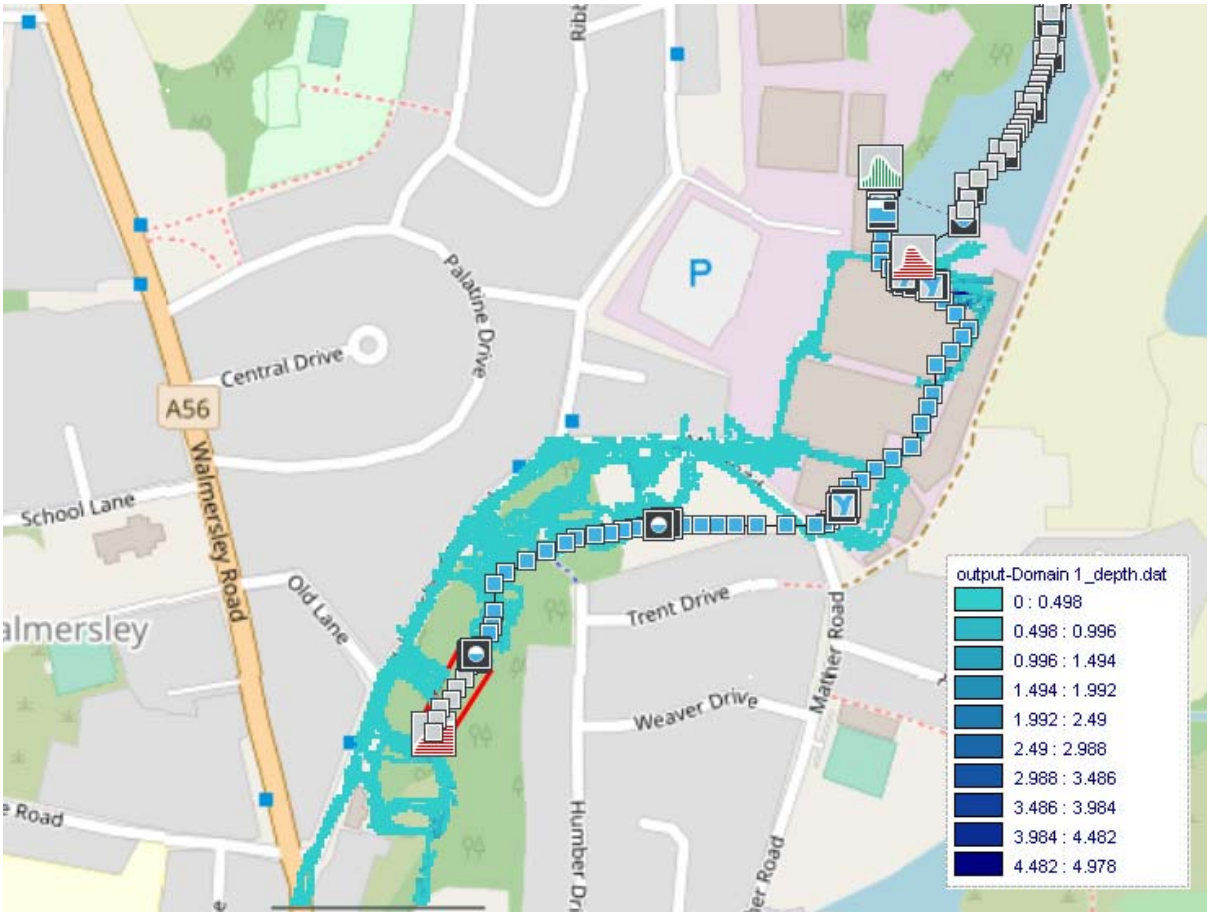


Figure 5.1: Extent of flooding from Mill Reservoir for the 1:100 year event

1:100 year + 35% Return Event (2.75hour storm duration)

5.7 The peak water level in the reservoir is 149.54m. A peak flow of 2.05m^3/s overtops Weir 1 and enters Culvert 2 and exits the site via Culvert 3. Flooding occurs from the southern bank of Mill Reservoir, with a flow peak of 2.38m^3/s originating from the reservoir spill over a 2.92 hour duration.

5.8 Floodwaters issue from the southernmost bank of the reservoir once flood levels exceed 149.33m. Floodwaters are conveyed in a southerly direction heading in either an easterly or westerly direction around existing buildings towards the southern site boundary. Floodwaters flow across Mill Road and down Walmersley Old Road towards PLB Tributary downstream of the site, to the south of the Culvert 3 outlet. Refer to Figure 5.2 below.

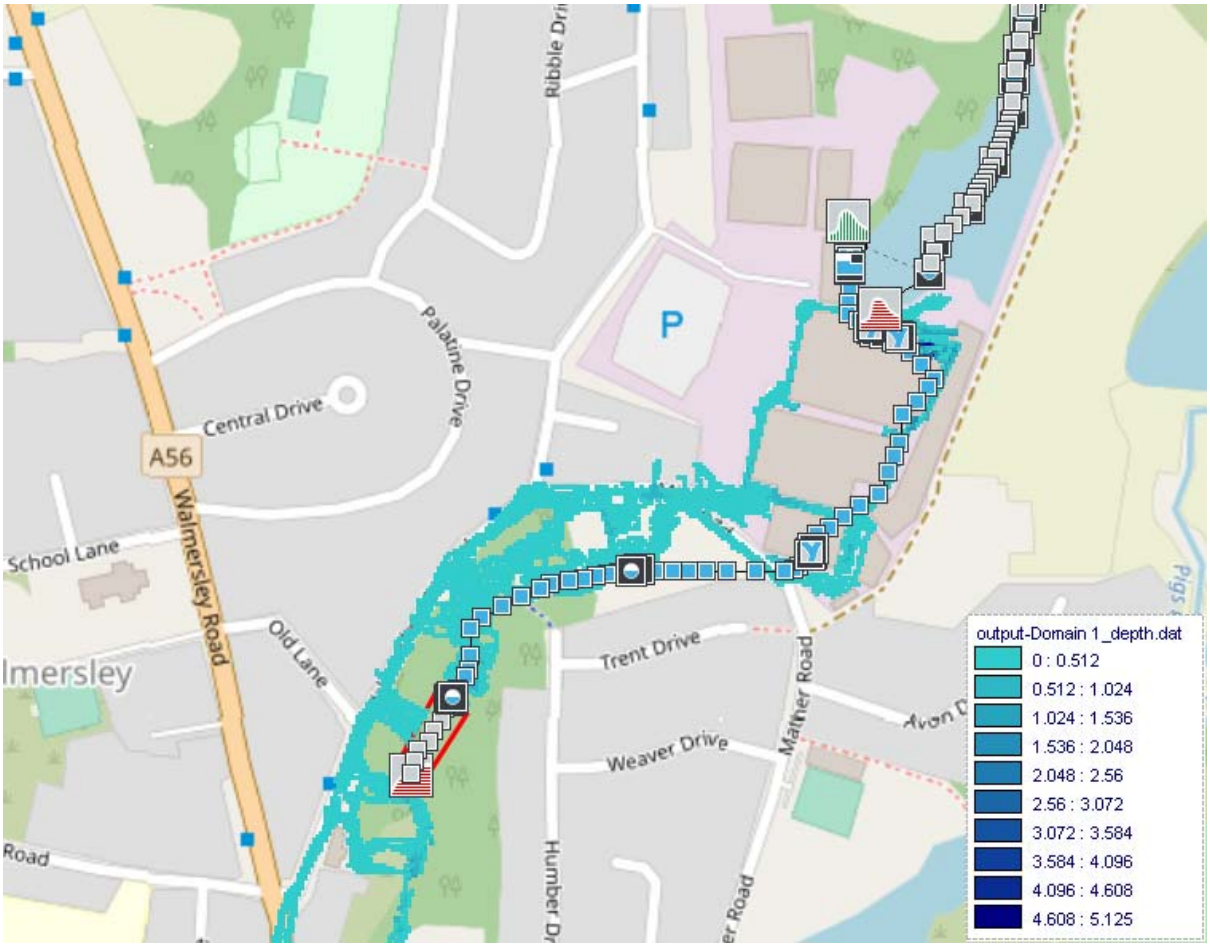


Figure 5.2: Extent of flooding from Mill Reservoir for the 1:100 year + 35% event (2.75 hour storm duration)

1:100 year + 35% CC Return Event (5.25 hour storm duration)

5.9 The peak water level in the reservoir is 149.56m. A peak flow of 2.25m^3/s overtops Weir 1 and enters Culvert 2 and exits the site via Culvert 3. Flooding occurs from the southern bank of Mill Reservoir, with a flow peak of 2.63m^3/s originating from the reservoir spill over a 3.75 hour duration.

5.10 Floodwaters issue from the southernmost bank of the reservoir once flood levels exceed 149.33m. Floodwaters are conveyed in a southerly direction heading in either an easterly or westerly direction around existing buildings towards the southern site boundary. Floodwaters flow across Mill Road and down Walmersley Old Road towards PLB Tributary downstream of the site, to the south of the Culvert 3 outlet. Refer to Figure 5.3 below.

5.11 The reservoir response time is approximately 1 hour. Compared to the 2.75 hour storm, the longer 5.25 hour storm produces a higher peak flowrate and water levels throughout the model (typically some 60 – 80mm higher). As such, the 5.25 hour duration storm has been used to generate hydrographs and all existing and post development modelled scenarios have been based on hydrographs produced for this storm duration. Refer to Appendix 2.

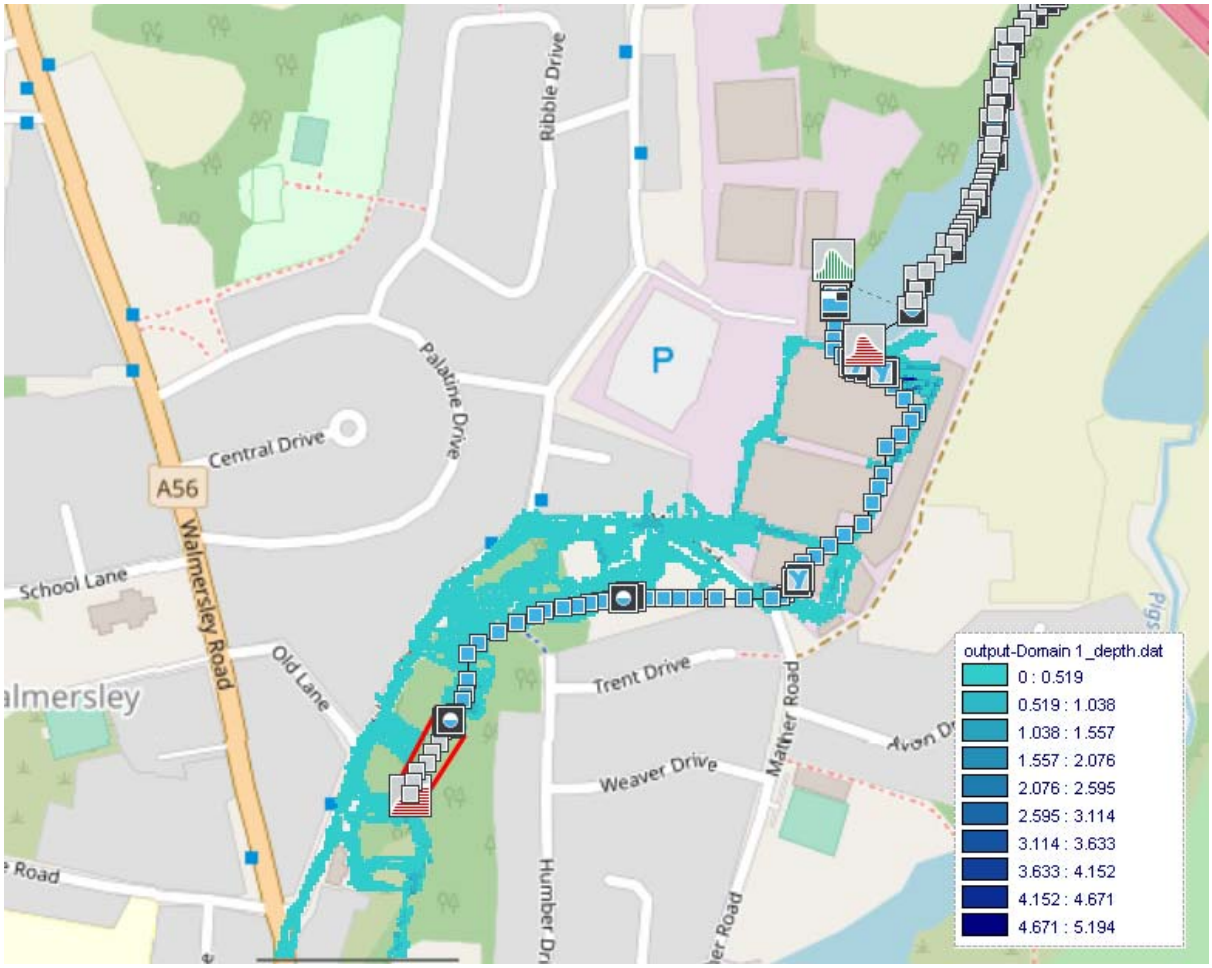


Figure 5.3: Extent of flooding from Mill Reservoir for the 1:100 year + 35% event (5.25 hour storm duration)

1:100 year + 70% CC Return Event

5.12 The peak water level in the reservoir is 149.62m. A peak flow of 2.36m^3/s overtops Weir 1 and enters Culvert 2 and exits the site via Culvert 3. Flooding occurs from the southern bank of Mill Reservoir, with a flow peak of 3.89m^3/s originating from the reservoir spill over a 4.5 hour duration.

5.13 Floodwaters issue from the southernmost bank of the reservoir once flood levels exceed 149.33m. Floodwaters are conveyed in a southerly direction heading in either an easterly or westerly direction around existing buildings towards the southern site boundary. Floodwaters flow across Mill Road and down Walmersley Old Road towards PLB Tributary downstream of the site, to the south of the Culvert 3 outlet. Refer to Figure 5.4 below.

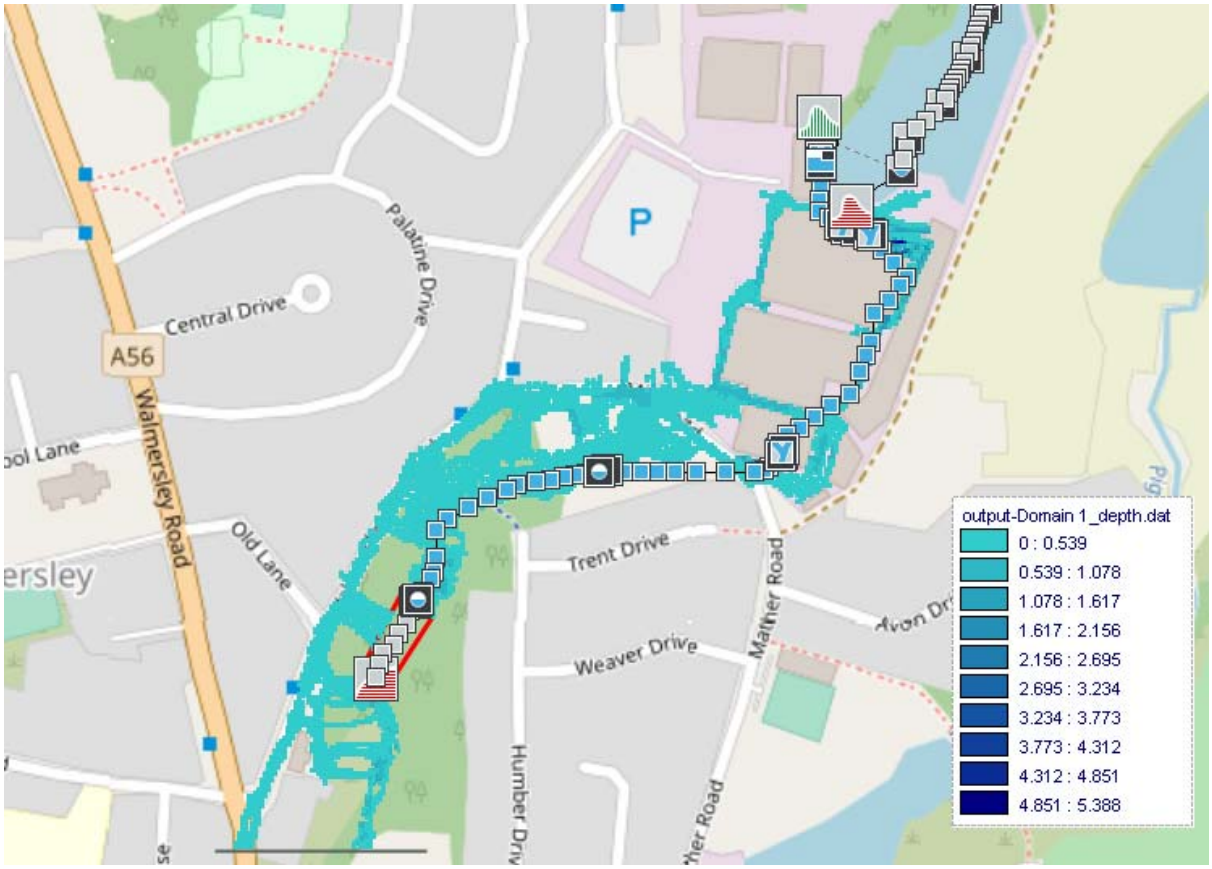


Figure 5.4: Extent of flooding from Mill Reservoir for the 1:100 year + 70% event (5.25 hour storm duration)

1:1000 year Return Event

5.14 The peak water level in the reservoir is 149.63m. A peak flow of 2.39m^3/s overtops Weir 1 and enters Culvert 2 and exits the site via Culvert 3. Flooding occurs from the southern bank of Mill Reservoir, with a flow peak of 4.43m^3/s originating from the reservoir spill over a 4.7 hour duration.

5.15 Floodwaters issue from the southernmost bank of the reservoir once flood levels exceed 149.33m. Floodwaters are conveyed in a southerly direction heading in either an easterly or westerly direction around existing buildings towards the southern site boundary. Floodwaters flow across Mill Road and down Walmersley Old Road towards PLB Tributary downstream of the site, to the south of the Culvert 3 outlet. A branch of flooding is routed in a westerly direction to Walmersley Road via Palatine Drive. Refer to Figure 5.5 below.

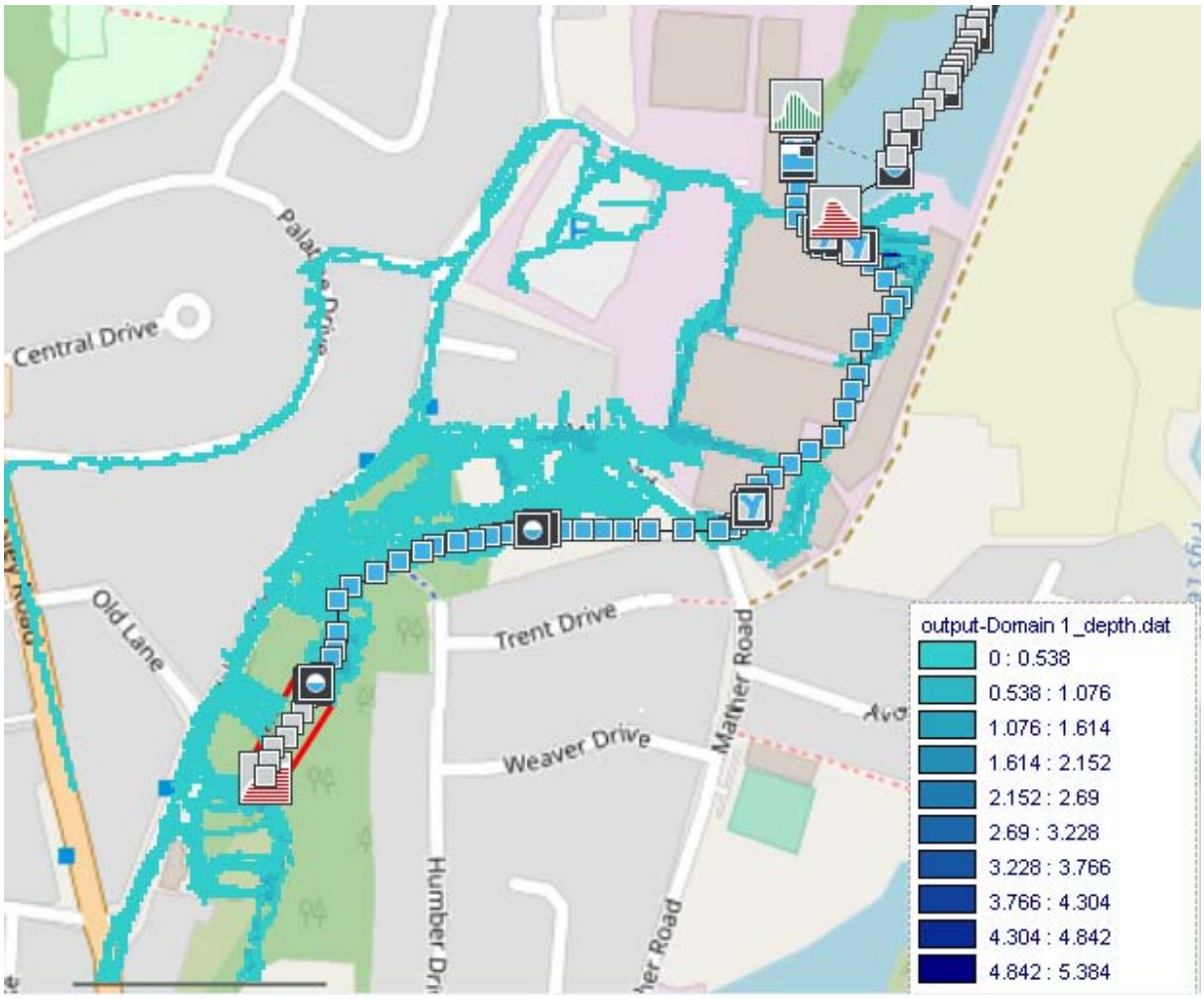


Figure 5.5: Existing Site 2D Floodflow route (1:1000yr)

Modelled Scenarios – Post Development Scenario

5.16 The 1D-2D linked model representing the existing site and potential flood risk from Mill Reservoir has been run for the following events:

i) 1:20 year return period
ii) 1:100 year return period
iii) 1:100 year + 35% climate change return period
iv) 1:100 year + 70% climate change return period
v) 50% blockage of culvert trash screen downstream of new proposed open channel
vi) Variation of Mannings 'n' by +20% and -20% (1:100year + 35% return period event)
vii) 1:1000 year return period

5.17 Peak water levels and flowrates at critical modelled locations are summarised in Tables 5.3 and 5.4 below.

Table 5.3: Proposed Model – Maximum Stage (mAOD)*

Model Node Reference	Return Period Event								
	1:20 yr	1:100 yr	1:100 yr +35% CC	1:100 yr +70% CC	1:100 yr + 35% CC n + 20%	1:100 yr + 35% CC n - 20%	1:100 yr + 35% CC 50% Culvert Blockage	1:1000 yr	Comment
PLB053 U/S of M66 culvert	155.633	156.31	156.940	157.499	156.245	157.999	156.944	157.615	
PLB308 Flood Storage Area	147.830	148.394	149.113	149.511	149.231	148.791	149.119	149.541	FSA top of bank level is 149.70mAOD
PLB641 D/S end of proposed open channel	139.469	139.773	140.060	140.188	139.944	141.242	140.460	140.181	No 2D flooding for any scenario Top of bank set at 140.80mAOD
PLB1014 End of Model	116.224	116.325	116.416	116.472	116.405	116.268	116.349	116.429	

*All scenarios run using 5.25 hr storm duration

Table 5.4: Proposed Model – Maximum Discharge Rate (m3/s)*

Model Node Reference	Return Period Event								
	1:20 yr	1:100 yr	1:100 yr +35% CC	1:100 yr +70% CC	1:100 yr +35% CC n + 20%	1:100 yr +35% CC n - 20%	1:100 yr +35% CC 50% Culvert Blockage	1:1000 yr	Comment
Start of model	2.8	4.2	5.67	7.14	5.67	5.67	5.67	7.5	
PLB053 U/S of M66 culvert	2.66	3.88	5.22	6.60	5.43	4.82	5.23	6.94	
PLB308 Flood Storage Area	2.62	3.79	5.03	6.56	5.35	4.68	5.04	6.90	No 2D flooding for any scenario
PLB641 D/S end of proposed open channel	2.61	3.76	4.97	6.56	5.35	4.62	4.98	7.05	No 2D flooding for any scenario
PLB1014 End of Model	2.61	3.76	4.97	6.56	5.36	4.63	4.98	7.06	

*All scenarios run using 5.25 hr storm duration

1:20 year Return Event

5.18 All flow is contained within channel. No 2D floodflow occurs. The maximum water level within the FSA is 147.83mAOD, well below the proposed top of bank level of 149.7mAOD.

1:100 year Return Event

5.19 All flow is contained within channel. No 2D floodflow occurs. The maximum water level within the FSA is 148.39mAOD, well below the proposed top of bank level of 149.7mAOD.

1:100 year + 35% CC Return Event

5.20 All flow is contained within channel. No 2D floodflow occurs. The maximum water level within the FSA is 149.11mAOD, below the proposed top of bank level of 149.7mAOD.

1:100 year + 70% CC Return Event

5.21 All flow is contained within channel. No 2D floodflow occurs. The maximum water level within the FSA is 149.51mAOD, below the proposed top of bank level of 149.7mAOD. The maximum water level at PLB641 immediately upstream of the culvert is 140.12mAOD, below the top of bank level of 140.90mAOD.

50% Blockage of Culvert Trash Screen Downstream of New Proposed Open Channel (1:100year + 35% CC Return Event)

5.22 A culvert blockage has been modelled using the Trash Screen option in Flood Modeller. The trash screen has been modelled with a 50% blockage to simulate debris accumulation on the trash screen.

5.23 All flow is contained within channel. No 2D floodflow occurs. The maximum water level within the FSA is 149.12mAOD, below the proposed top of bank level of 149.7mAOD. The maximum water level at PLB641 immediately upstream of the culvert blockage is 140.46mAOD, below the top of bank level of 140.90mAOD,

Sensitivity Analysis: Variation of Mannings 'n' by +20% and -20% (1:100year + 35% return period event)

5.24 Sensitivity analysis of Manning's 'n' for the proposed model has been carried out for the 1:100 year + 35% event to represent seasonal changes in vegetation.

Mannings 'n' + 20%

5.25 All flow is contained within channel. No 2D floodflow occurs. The maximum water level within the FSA is 149.23mAOD, below the proposed top of bank level of 149.7mAOD. The maximum water level at PLB641 immediately upstream of the culvert is 139.94mAOD, below the top of bank level of 140.90mAOD,

Mannings 'n' - 20%

5.26 All flow is contained within channel. No 2D floodflow occurs. The maximum water level within the FSA is 148.79mAOD, below the proposed top of bank level of 149.7mAOD. The maximum water level at PLB641 immediately upstream of the culvert is 140.24mAOD, below the top of bank level of 140.90mAOD,

5.27 The sensitivity analysis shows that:

- Increasing Manning's 'n' by 20% increases the peak water level in the FSA by 118mm and does not cause any out of bank flooding in the proposed open channel.
- Reducing Manning's 'n' by 20% decreases the peak water level in the FSA by 322mm and does not cause any out of bank flooding in the proposed open channel.

1:1000 year Return Event

5.28 Flooding occurs at existing Manhole 2 located some 10m west of the site boundary at the southern end of the development. Flood duration is less than 1 hour. The flooding does not impact on any proposed dwellings. The only existing dwelling impacted by the flooding is Mill House. Floodwaters flow along Mill Road and down Walmersley Old Road towards PLB Tributary downstream of the site and also along wooded land before flowing back into the PLB Tributary. Refer to Figure 5.6 below.

5.29 The maximum water level within the FSA is 149.54mAOD, below the proposed top of bank level of 149.7mAOD. The maximum water level at PLB641 immediately upstream of the culvert is 140.18mAOD, below the top of bank level of 140.90mAOD,

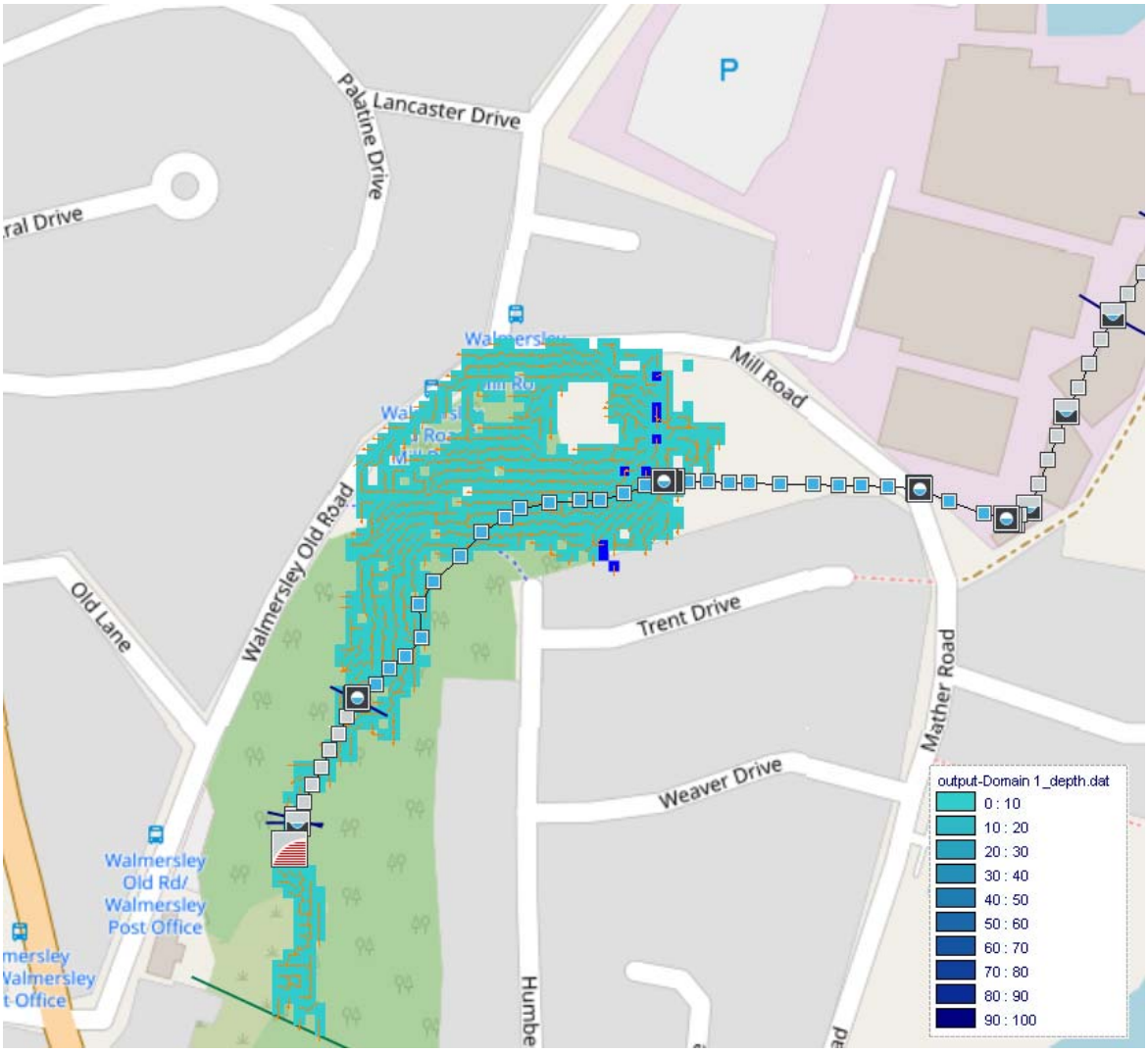


Figure 5.6: Proposed Site 2D Floodflow route (1:1000yr)

Discussion of Results

Existing Site

5.30 Hydraulic modelling found that for the existing site:

- during the 1:20 year event all flows remain in-bank through the site, with no flooding occurring from Mill Reservoir.
- during the 1:100 year, 1:100 year+ 35% CC, 1:100 year + 70% CC and 1:1000 year events, flooding occurred within the existing site spilling from the southern bank of Mill Reservoir. Floodwaters issuing from Mill Reservoir travel southwards through the site and along Walmersley Old Road before partially re-entering the open channel section of PLB tributary some 222m downstream of the development site.
- Mill Reservoir provides some attenuation to flood flows downstream of the development site. The reservoir response time is 1.16 hours for the 2.75 duration storm and 1 hour for the 5.25 hour duration storm.
- Compared to the 2.75 hour storm, the longer 5.25 hour storm produces a higher peak flowrate and water levels throughout the model (typically some 60 – 80mm higher). The 5.25 hour duration storm has been used to generate hydrographs and all existing and post development modelled scenarios have been based on hydrographs produced for this storm duration.

Post Development Site

5.31 Hydraulic modelling found that for the post development site:

- Variation of Manning's 'n' by +/- 20% impacts significantly on modelled water levels.
- Variation of flowrate by +/- 35 impacts significantly on modelled water levels.
- Flows remain in bank through the site during all modelled scenarios except the 1:1000 year event. During the 1:1000 year event flooding occurs at Manhole 2, some 10m west of the site boundary at the southern end of the site. However, flooding is not as extensive in comparison to the existing 1:1000 year flood extent as shown in Figure 5.7 below. Furthermore, the flood duration is less than 1 hour for the proposed scenario compared to some 5.25 hours during the existing flood scenario. There is, therefore, no increase in flood risk as a result of the proposed works.
- The FSA provides some 0.25 hour lag to flow.
- A comparison of modelled water levels at the downstream end of the model shows that the water level in the post development model is some 30 to 60mm higher than in the existing model. This difference in water level is due to a proportion of flood flow that does not re-enter the PLB Tributary in the existing site model but continues southwards past the end of the model.

- The FSA is able to accommodate flow arising from all modelled events with a top of bank set at 149.70mAOD.

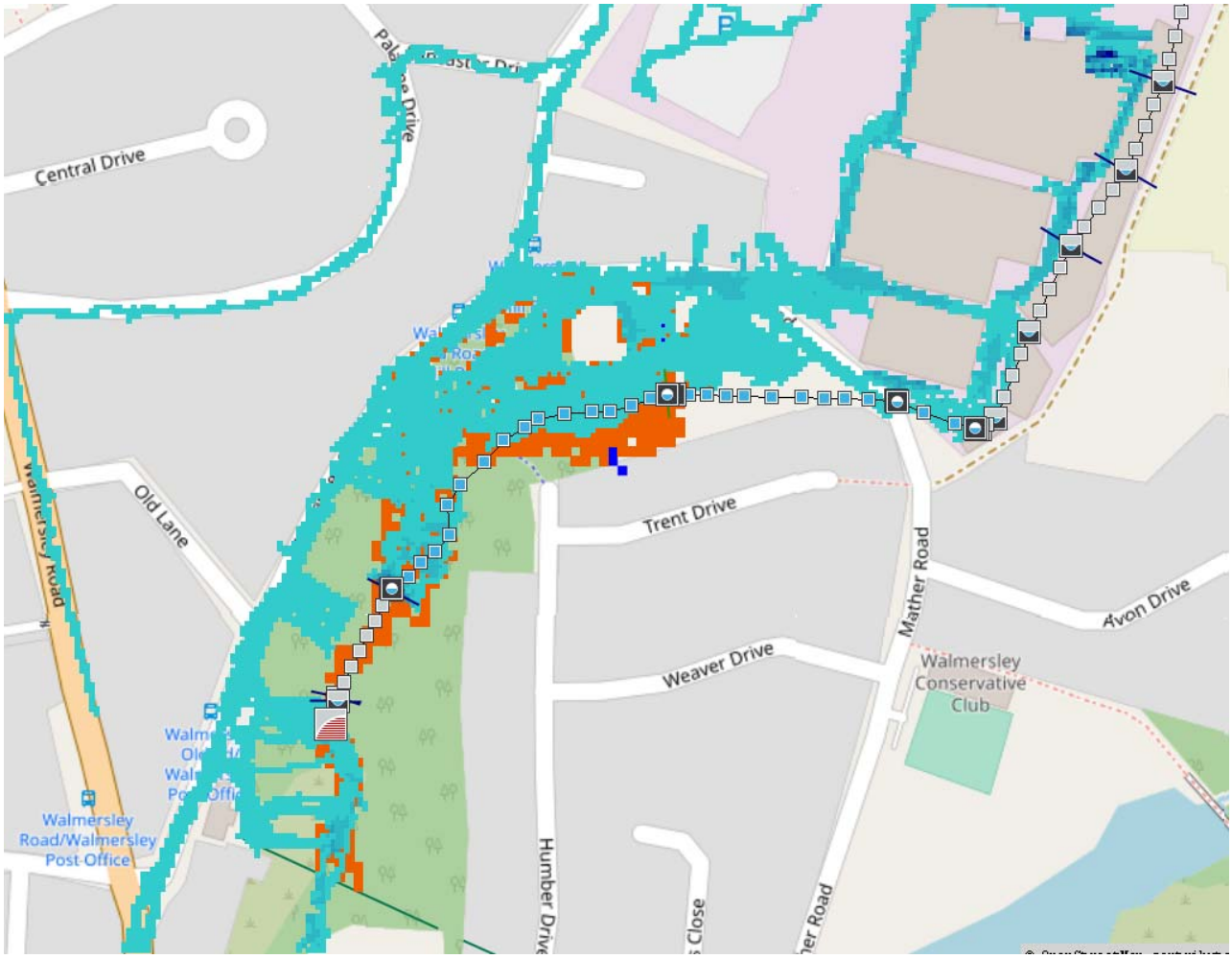


Figure 5.7: Existing (light blue) & Proposed (orange) Site 2D Floodflow route & extent (1:1000yr)

6.0 CONCLUSIONS

6.1 This Study has been prepared by Cole Easdon Consultants Ltd (CEC) on behalf of Barratt Homes Manchester to describe hydraulic modelling work carried out as part of a flood risk study in respect of fluvial flood risk associated with land at the former Tetrosyl Site, Walmersley Old Road, Bury, Greater Manchester.

6.2 The purpose of this study has been to determine flood levels and the extent of fluvial flooding at the site associated with flooding of a tributary of Pigs Lee Brook. Flows arising from storms up to the 1:1000 year event have been considered in this study. The study has also considered the impact of the proposed infilling of Mill Reservoir, incorporation of a Flood Storage Area (FSA) and associated deculverting works of the PLB Tributary to ensure that no flood risk is posed to the development site, or adjacent existing development for all events up to and including the 1:1000 year event.

6.3 Pigs Lee Brook Tributary, Mill Reservoir and the development site have been surveyed in detail along with all online structures present, where accessible. Topographical survey information has been supplemented with LiDAR data where required. This data has been used to build the hydraulic model.

6.4 Appropriate input hydrographs have been used, the ReFH and Statistical methods have been considered in the preparation of upstream boundary conditions for both the existing and proposed scenarios.

Flood Mechanism

6.5 Possible mechanisms of flooding of the site have been identified as rainfall events causing peak flows to exceed the in-bank capacity of Mill Reservoir causing overtopping. The occurrence of flooding at the site will be influenced partly by the amount of flood storage available within Mill Reservoir and the Whitewall Wood reservoirs further upstream within the catchment.

Modelled Scenario – Existing Situation

6.6 The existing model has been run for the 1:20 year, 1:100 year, 1:100 year + 35%, 1:100 year + 70% climate change and 1:1000 year events. Results have been used to define the floodplain extent associate with each return period, within the development site and surrounding area.

6.7 Hydraulic modelling found that for the existing site:

- during the 1:20 year event all flows remain in-bank through the site, with no flooding occurring from Mill Reservoir.
- during the 1:100 year, 1:100 year+ 35% CC, 1:100 year + 70% CC and 1:1000 year events, flooding occurred within the existing site spilling from the southern bank of Mill Reservoir. Floodwaters issuing from Mill Reservoir travel southwards through the site and along Walmersley Old Road before partially re-entering the open channel section of PLB tributary some 222m downstream of the development site.

Modelled Scenario – Post Development Site

6.8 The proposed model has been run for the 1:100 year, 1:100 year + 35% CC, 1:100 year + 70% CC and 1:1000 year events. The modelled results demonstrate that the proposed FSA and deculverting works can accommodate flow from all modelled scenarios without increasing flood risk to the existing downstream development or proposed site development.

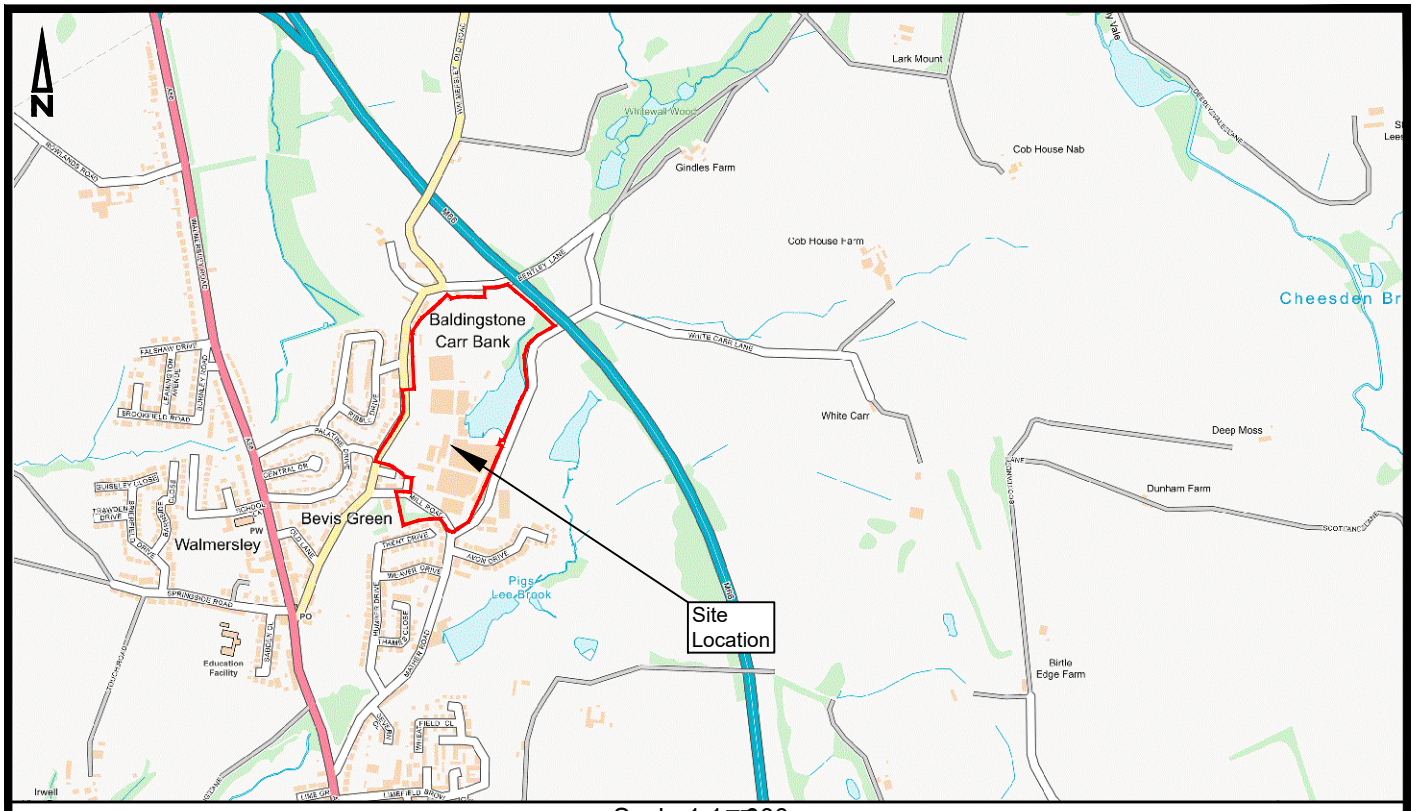
6.9 Proposed hydraulic modelling results indicate:

- that the proposed compensatory flood storage area (FSA) (with a top of bank set at 149.70mAOD) and 300m reach of open channel, which is to largely replace the onsite section of Culvert 3, are able to accommodate all modelled event flows without flooding;
- the proposed open channel and downstream pipework are appropriately sized to convey flows to the section of downstream Culvert 3 to be retained; and
- flood risk is not increased as a result of the proposed works.

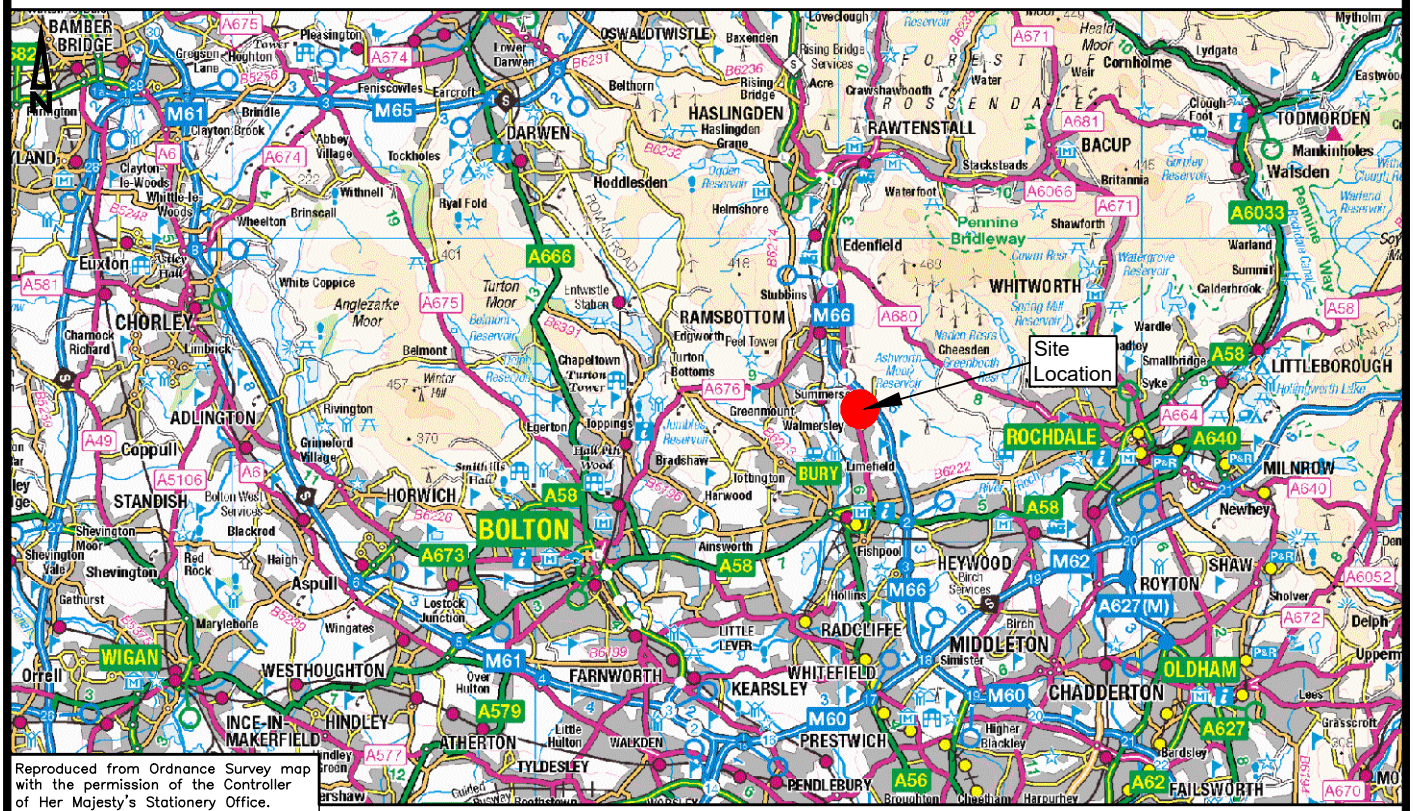
Cole Easdon Consultants Limited
October 2019

Appendix 1

Hydraulic Modelling Study



Scale 1:1□□00



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Former Tetrosyl Site
Walmersley Old Road
Bury

Client:
Barratt Homes (Manchester)

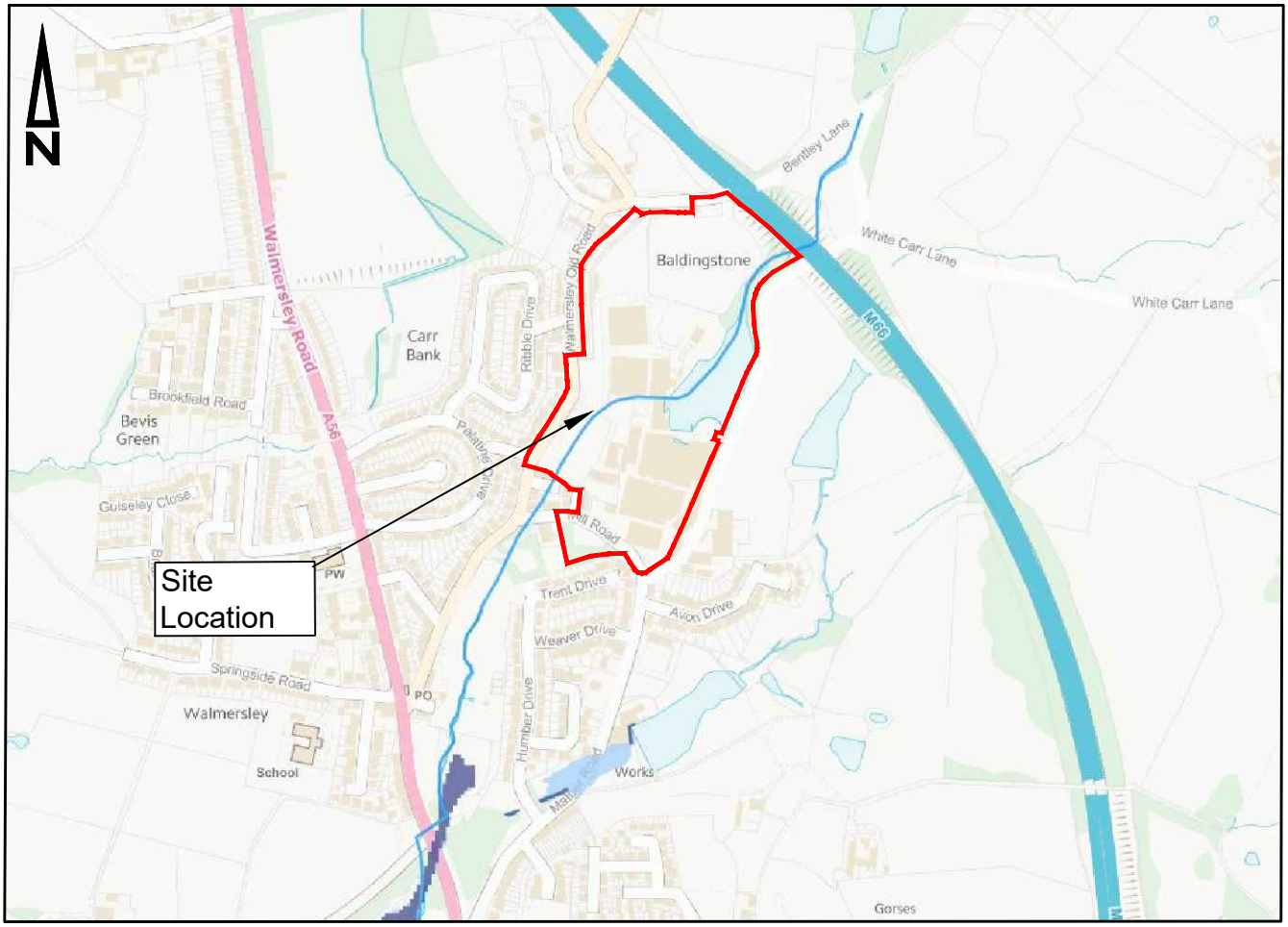
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Drawing Title:
Site Location Plan

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NJ	April 201□	As shown (A□)

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DF	□1□□/□00 Figure 1	



Flood Zone 1
Low Risk

Flood Zone 2
Medium Risk

Flood Zone 3
High Risk

Main Rivers

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EA Flood Zone Map

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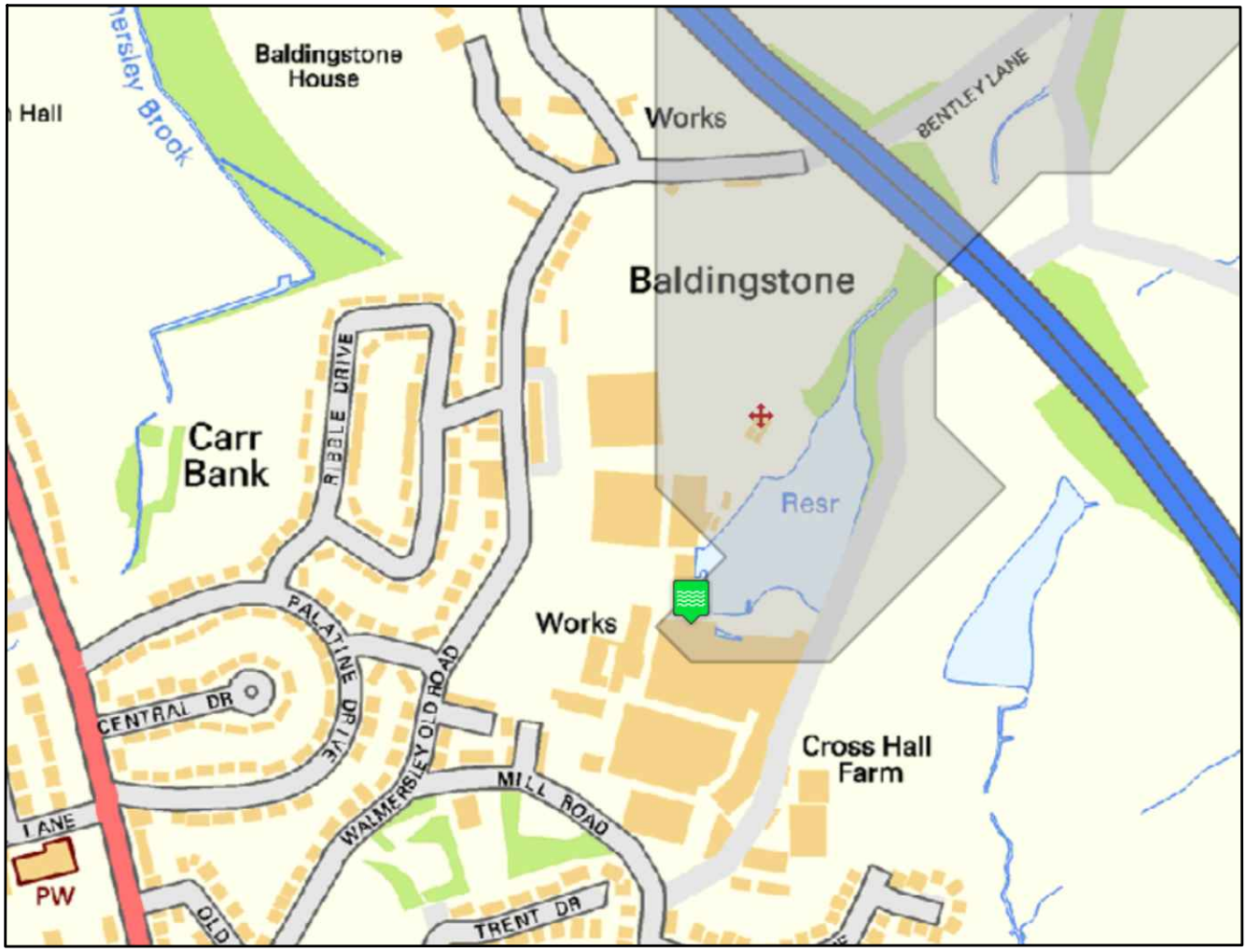
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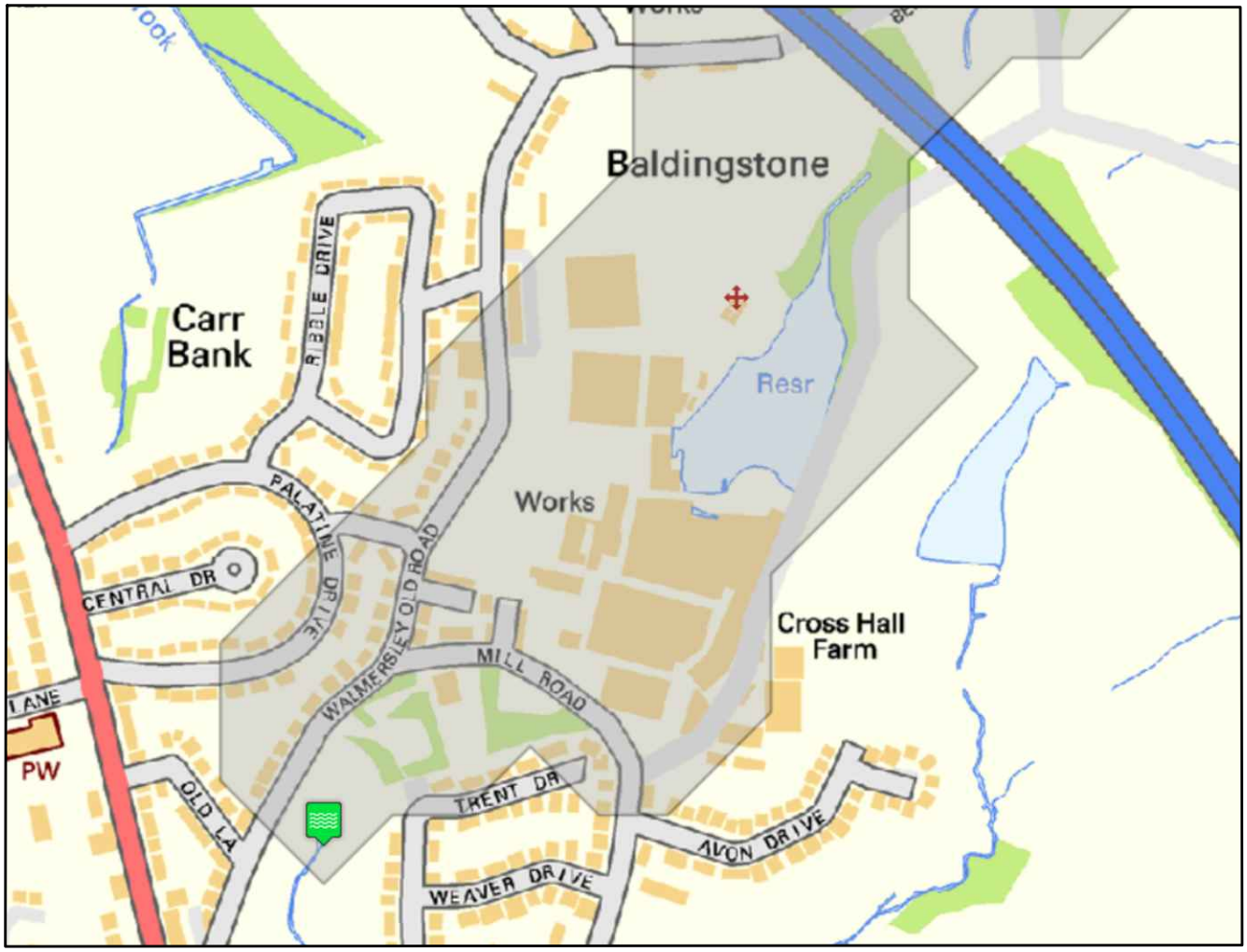
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Drawing Title:
FEH catchment
(outlet from Mill Reservoir)

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Date Drawn: August 2019
Scale: 1:□000 @ A□
Checked By: DF
Drawing No.: □1□□/□00 Figure □
Revision:



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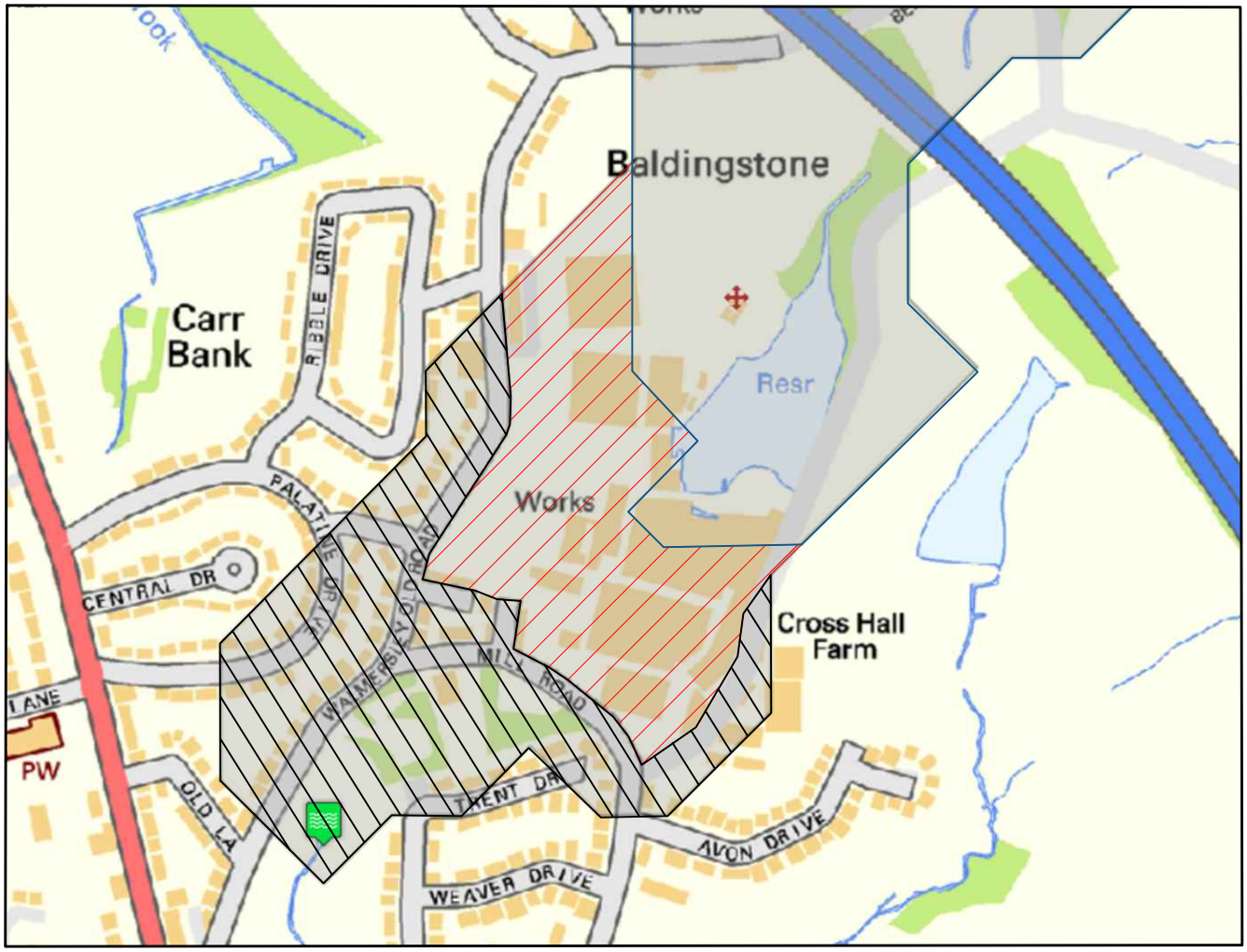
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Drawing Title:
E□tended FEH Catchment
(End o□Hydraulic Model)

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Revision:



Urban catchment served by public sewers

Site catchment served by sewers (4.51ha)

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FEH Catchment Comparison

Drawn By
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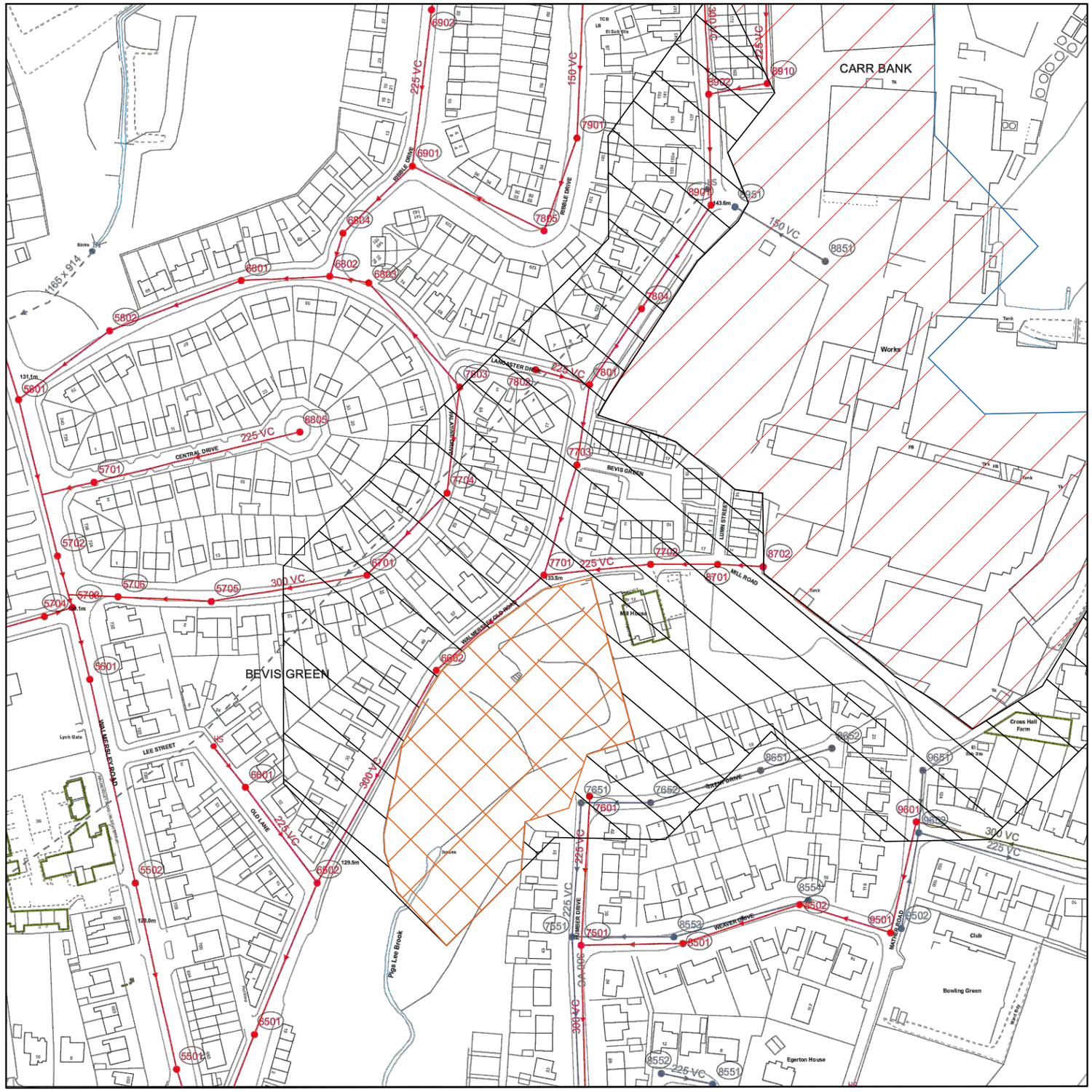
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Key:

FEH Catchment

Urban catchment served by public sewers

Site catchment served by sewers (4.51ha)

(9781m²)

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Drawing Title
Catchment □ Sewers Plan

Drawing Status:

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	X				

□CONSTRUCTION AT CLIENT / CONTRACTOR RISK□□

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DF	□B	DF

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August 2019	1:2000@ A3

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Appendix 2

Hydraulic Modelling Study

Flood estimation report

Introduction

This report template is based on a supporting document to the Environment Agency's flood estimation guidelines. It provides a record of the hydrological context, the method statement, the calculations and decisions made during flood estimation and the results.

Contents

1	**Method statement**	**2**
2	**Locations where flood estimates required**	**7**
3	**Statistical method**	**9**
4	**Revitalised flood hydrograph 2 (ReFH2) method**	**12**
5	**Discussion and summary of results**	**13**
6	**Annex**	**16**

Approval

	Name and qualifications	Date
Method statement prepared by:	Claire French BSc (Hons) MSc (Eng) MCIWEM CWEM CSci CEnv	12/03/2018
Method statement reviewed by:	Jenni Essex BSc MSc PhD CEnv MCIWEM C.WEM	12/03/2018
Calculations prepared by:	Claire French BSc (Hons) MSc (Eng) MCIWEM CWEM CSci CEnv	12/03/2018
Calculations reviewed by:	Jenni Essex BSc MSc PhD CEnv MCIWEM C.WEM	12/03/2018

Revision History

Revision reference	Date issued	Amendments	Issued to
V1.0	12/03/2018	-	Dean Frosoni – Cole Easdon
V2.0	05/07/2019	Further consideration of storm duration	Dean Frosoni – Cole Easdon

Abbreviations

AEP ..... annual exceedance probability
AM ..... Annual Maximum
AREA ..... Catchment area (km^2)
BFI ..... Base Flow Index
BFIHOST ..... Base Flow Index derived using the HOST soil classification
CFMP ..... Catchment Flood Management Plan
CPRE ..... Council for the Protection of Rural England
FARL ..... FEH index of flood attenuation due to reservoirs and lakes
FEH ..... Flood Estimation Handbook
FSR ..... Flood Studies Report
HOST ..... Hydrology of Soil Types
NRFA ..... National River Flow Archive
POT ..... Peaks Over a Threshold
QMED ..... Median Annual Flood (with return period 2 years)
ReFH ..... Revitalised Flood Hydrograph method
SAAR ..... Standard Average Annual Rainfall (mm)
SPR ..... Standard percentage runoff
SPRHOST ..... Standard percentage runoff derived using the HOST soil classification
Tp(0) ..... Time to peak of the instantaneous unit hydrograph
URBAN ..... Flood Studies Report index of fractional urban extent
URBEXT1990 ..... FEH index of fractional urban extent
URBEXT2000 ..... Revised index of urban extent, measured differently from URBEXT1990
WINFAP-FEH ..... Windows Frequency Analysis Package – used for FEH statistical method

1 Method statement

1.1 Requirements for flood estimates

Overview	Flood frequency analysis of an un-named tributary of the Pigs Lee Brook is required to inform an assessment of the flood risk impacts of infilling Mill Reservoir. This reservoir is located off Walmersley Old Road, on the northern outskirts of Bury. Peak flow estimates and hydrographs are needed immediately downstream of the reservoir (at SD 80950 13850), for a range of annual exceedance probabilities (AEPs; Table 1.1a), both with and without the flood attenuation effect of the reservoir included. The hydrographs will form inputs to a hydrodynamic model that is being built by Cole Easdon.

*Table 1.1a. AEPs and corresponding return periods (T) of interest**

AEP (%)	T (years)	AEP (%)	T (years)
50	2	1.3	75
20	5	**1**	**100**
10	10	**1 + 35%**	**100 + 35%****
5	20	**1 + 70%**	**100 + 70%*****
3.3	30	0.1	1000
2	50		

*Peak flow estimates are required for all return periods, while hydrographs are needed only for those highlighted in bold

**Higher central and ***upper end estimates of peak flow increases anticipated by the 2080s for the North West river basin district due to climate change[1].

1.2 The catchment

Description	The un-named tributary of the Pigs Lee Brook rises on the southern edge of Harden Moor, near Nangreaves (Map 1.2a). It flows in a general southward direction, through open farmland and Whitewall Wood, before crossing under Bentley Lane and the M66 motorway (Map 1.2b). The watercourse is designated Main River between Bentley Lane and its confluence with Pigs Lee Brook. Approximately 100 m downstream of the M66 motorway crossing, the tributary enters Mill Reservoir, located on the Tetrosyl[2] site. This reservoir, which dates back to at least the late 1800s[3], is believed to have been constructed to supply water to Lumn cotton mills, the site's original occupier. The outflowing stream, which is culverted initially, continues for approximately 730 m, through the Bevis Green area of Bury, to its confluence with the Pigs Lee Brook. Both watercourses are culverted at this confluence, which is located approximately 45 m to the north-east of the junction of Walmersley Road and Long Lane. The catchment draining to Mill Reservoir has an area of 2.1 km^2. The geology of this catchment is dominated by mudstone, siltstone and sandstone of the Millstone Grit Group, although rocks belonging to the Pennine Lower Coal Measures Formation are present in the centre of the catchment. Above the bedrock, soil types vary from very acid loamy upland soils with a wet peaty surface to freely draining slightly acid loamy soils. The catchment BFIHOST and SPRHOST values are 0.447 and 37.54 respectively, indicating the predominance of impeded drainage conditions. Land cover consists mainly of agricultural land, and the

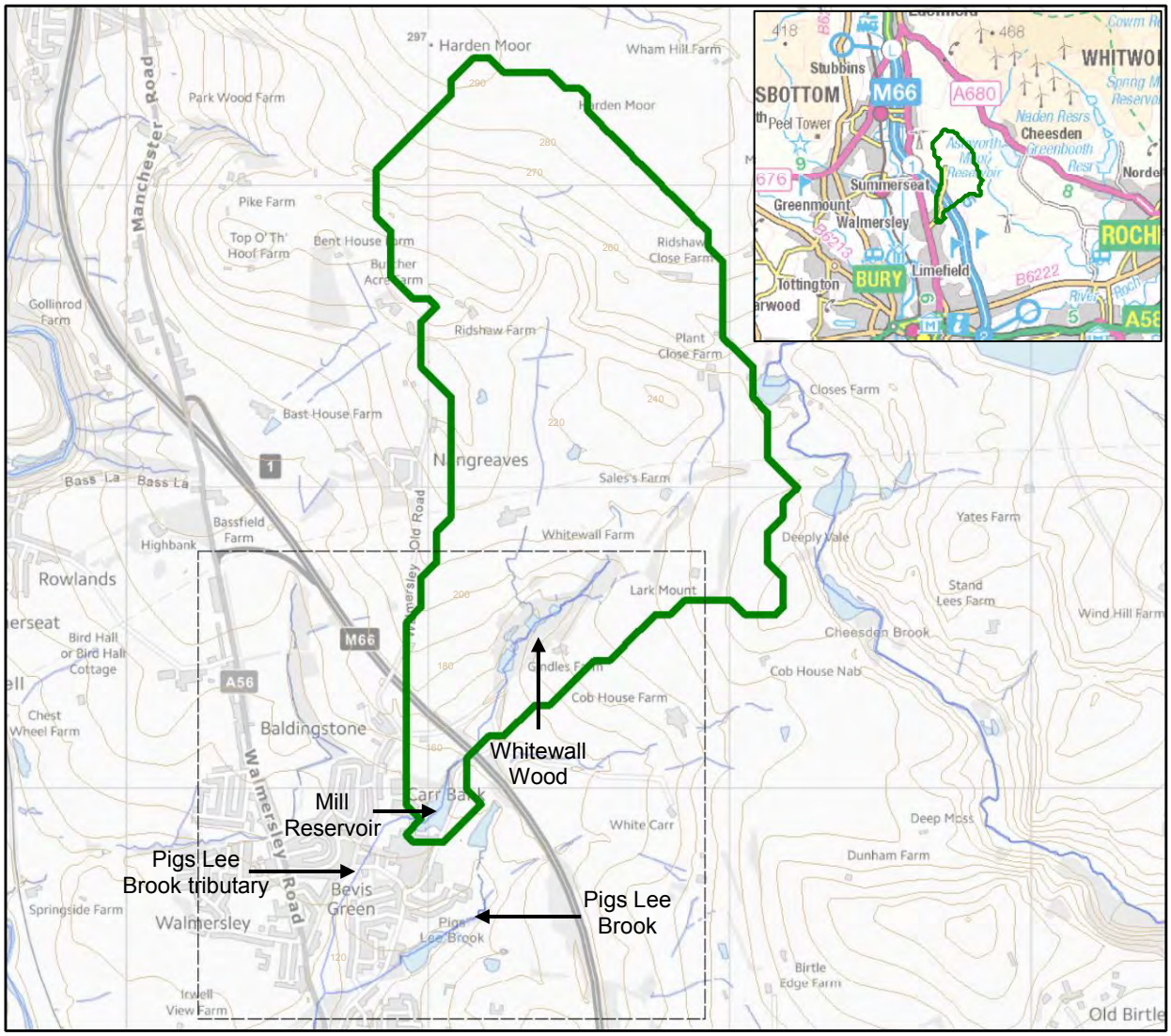
[1] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

[2] A chemical manufacturer, based on the site for around 45 years. Due to pressures placed upon the firm to improve its operations and respond to its market, Tetrosyl is relocating elsewhere, and redevelopment of the site for residential use is planned.

[3] http://maps.nls.uk/geo/explore/#zoom=14&lat=53.6217&lon=-2.2887&layers=1&b=1

	catchment is classified as essentially rural (URBEXT2000 of 0.012). In addition to Mill Reservoir, the catchment contains on-line reservoirs at Whitewall Wood, located approximately 300 m upstream of the M66 motorway crossing. Together, these reservoirs reportedly form part of the water supply system for the Tetrosyl site.[4]

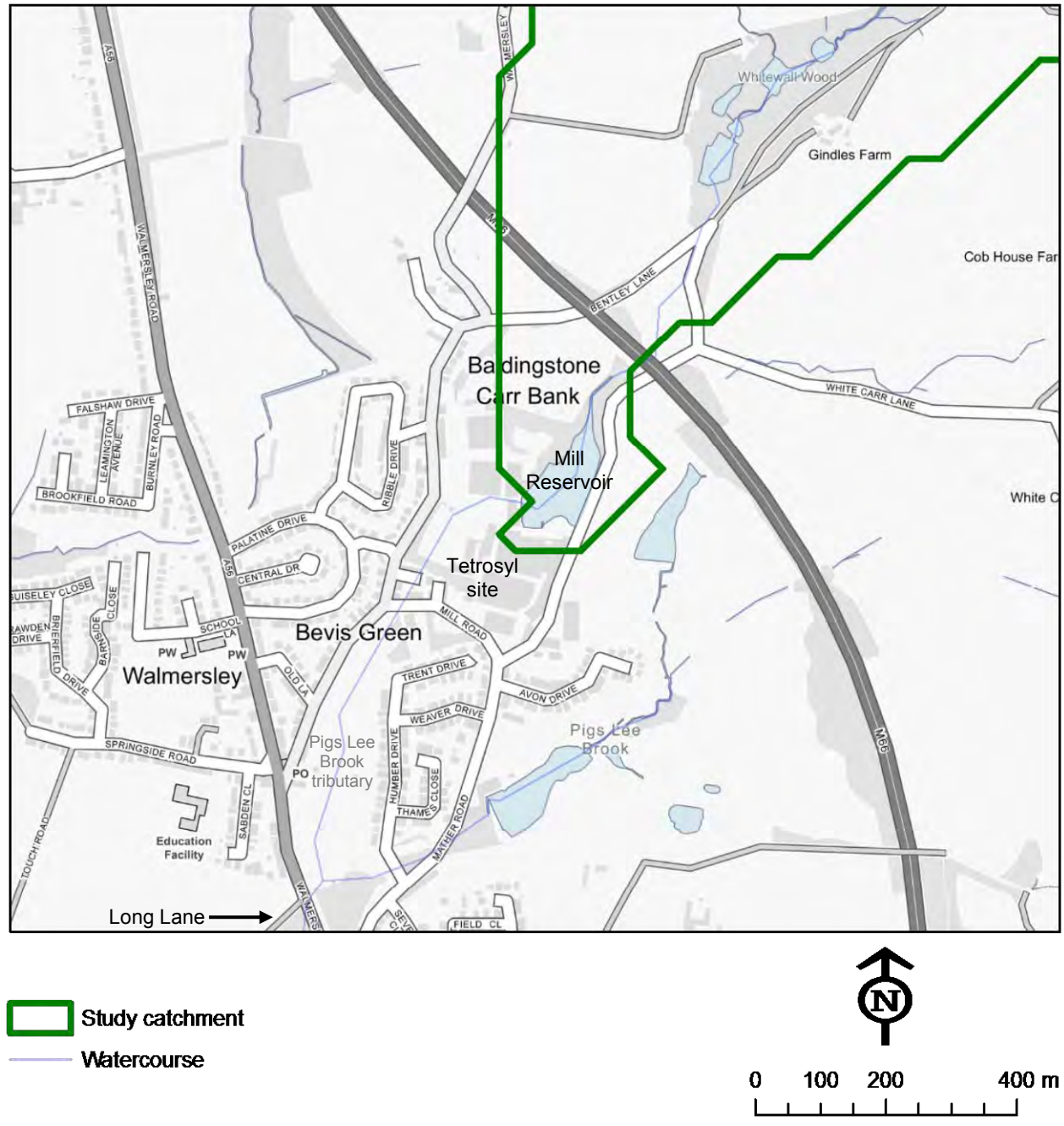
Map 1.2a:



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[4] Information provided by Bury Council to PBA, in relation to PBA's (2011) FRA

Map 1.2b:



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1.3 Source of flood peak data

Source	NRFA peak flows dataset, Version 6, released February 2018. This contains data up to water year 2015-16 for England, Wales and Northern Ireland and 28 gauges in Scotland and up to water year 2005-6 for the remaining gauges in Scotland.

1.4 Gauging stations (flow or level)

(at or very near to the sites of flood estimates)

Water-course	Station name	Gauging authority number	NRFA number	Catchment area (km²)	Type (rated / ultrasonic / level…)	Start of record and end if station closed
There are no gauging stations within the study catchment.						

1.5 Other data available and how it has been obtained

Type of data	Data relevant to this study?	Data available?	Source of data	Details
Check flow gaugings	No	n/a	n/a	n/a
Historic flood data	Yes	Yes	PBA (2011)[5]	As part of an FRA, undertaken by Peter Brett Associates LLP (PBA) in 2011, the Environment Agency, Bury Council, United Utilities and the Highways Agency were contacted regarding historical flooding. All four organisations responded stating that they did not hold any records of flooding in the vicinity of the site.
Flow or river level data for events	Yes	No	n/a	n/a
Rainfall data for events	Yes	No	n/a	n/a
Potential evaporation data	Yes	No	n/a	n/a
Results from previous studies	Yes	Yes	Bury Council's website	FRA prepared by PBA, in 2011, on behalf of Tetrosyl Ltd.[5]
Other data or information	No	n/a	n/a	n/a

1.6 Hydrological understanding of catchment

Outline the conceptual model	Land lying downstream of Mill Reservoir is the main area of interest. The occurrence of flooding here will be influenced partly by the amount of flood storage available within Mill Reservoir and the other reservoirs at Whitewall Wood. PBA (2011) found that Mill Reservoir provides sufficient attenuation to prevent flooding on the Tetrosyl site during a 1 in 20 year return period event.
Any unusual catchment features to take into account?	As mentioned in Section 1.2, the study catchment contains a few on-line reservoirs. These reservoirs produce a significant flood attenuation effect (FARL = 0.858). There are no other unusual catchment features.

1.7 Initial choice of approach

Is FEH appropriate?	FEH flood frequency methods are considered appropriate, since the

[5] Peter Brett Associates LLP (2011) *Tetrosyl Site, Walmersley Old Road, Bury - Flood Risk Assessment*. Project Ref: 23736/001. Document Ref: Rev 1. Prepared on behalf of Tetrosyl Limited.

	study catchment drains an area greater than 0.5 km^2 (the lower limit of applicability of the methods) and is not extremely heavily urbanised (FEH methods are not recommended if UBREXT2000 > 0.6).
Initial choice of method(s) and reasons How will hydrograph shapes be derived if needed? Will the catchment be split into sub-catchments? If so, how?	To allow for the alternative approaches Cole Easdon may take to represent Mill Reservoir in its hydraulic model, both the statistical method and the ReFH2 model have been applied. The statistical method represents the flood attenuation effect due to reservoirs via the catchment descriptor FARL. The ReFH2 model itself does not take account of the flood attenuation effect, but allows subsequent routing of the design flood inflows through one or more reservoirs. Further advice on choosing between these two methods is given in Section 5.2. The ReFH2 model has been used to derive hydrograph shape in both cases. The catchment has not been split into sub-catchments.
Software to be used (with version numbers)	FEH Web Service / WINFAP-FEH v3.0.003[6] / ReFH2.2

[6] WINFAP-FEH v3 © Wallingford HydroSolutions Limited and NERC (CEH) 2009.

2 Locations where flood estimates required

The table below lists the locations of subject sites. The site codes are used in all subsequent tables to save space.

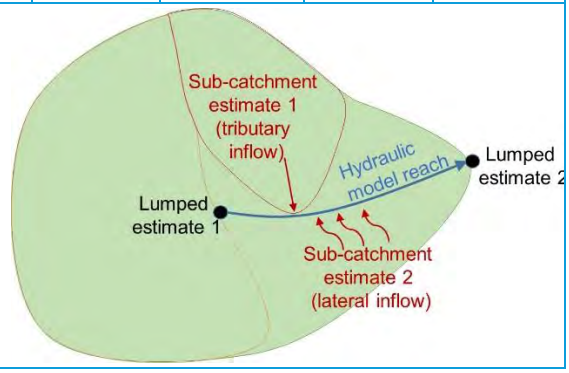
2.1 Summary of subject sites

Site code	Type of estimate L: lumped catchment S: Sub-catchment	Watercourse	Name or description of site	Easting	Northing	AREA on FEH CD-ROM (km^2)	Revised AREA if altered
MillRes	L	Un-named tributary of Pigs Lee Brook	Outfall of Mill Reservoir	380950	413850	2.07	-

Note: Lumped catchments (L) are complete catchments draining to points at which design flows are required.

Sub-catchments (S) are catchments or intervening areas that are being used as inputs to a semi-distributed model of the river system. There is no need to report any design flows for sub-catchments, as they are not relevant: the relevant result is the hydrograph that the sub-catchment is expected to contribute to a design flood event at a point further downstream in the river system. This will be recorded within the hydraulic model output files. However, catchment descriptors and ReFH model parameters should be recorded for sub-catchments so that the results can be reproduced.

The schematic diagram illustrates the distinction between lumped and sub-catchment estimates.



2.2 Important catchment descriptors at each subject site (incorporating any changes made)

Site code	FARL	PROPWET	BFIHOST	DPLBAR (km)	DPSBAR (m/km)	SAAR (mm)	URBEXT 2000	FPEXT
MillRes	0.858* 0.924**	0.57	0.447	1.84	90.5	1249	0.012***	0.0404

Notes:

Values that have been changed from those given by the FEH Web Service or derived manually are highlighted in blue

* Existing conditions (pre-development case), i.e. including the attenuation effect of Mill Reservoir

** Post-development case, i.e. excluding the attenuation effect of Mill Reservoir

*** URBEXT2000 updated to the current year (2018)

2.3 Checking catchment descriptors

Record how catchment boundary was checked and describe any changes	The FEH catchment boundary for the subject site has been checked against OS 10k mapping and OS Terrain 50 data, and found to be representative of the topographic catchment of the Pigs Lee Brook tributary.

Record how other catchment descriptors were checked and describe any changes.	FARL has been calculated manually in accordance with Section 4.3.2 of the FEH Vol. 5, for both existing conditions (i.e. the pre-development case, including the flood attenuation effect of Mill Reservoir) and the post-development case (i.e. excluding the flood attenuation effect of Mill Reservoir). The resulting value for the pre-development case (0.858) is slightly higher than the FEH value (0.837). The manually-derived value has been taken forward, for consistency in approach with the post-development case. SPRHOST and BFIHOST values have been checked against the 1:250 000 Soil Map of England and Wales and are consistent with catchment soil types. Consequently, no changes have been made to the FEH values. A check of the Urban Extent 2000 layer on the FEH Web Service against the underlying OS maps has also been made for the catchment draining to subject site MillRes. The coverage of this layer has been found to be adequate. Consequently, no changes to URBEXT2000 have been made, apart from the update of it to 2018.
Source of URBEXT	URBEXT2000
Method for updating of URBEXT	CPRE formula from 2006 CEH report on URBEXT2000

3 Statistical method

Note: Suffixes _Pre and _Post have been added to the site code to reflect existing conditions (i.e. the pre-development case, including the flood attenuation effect of Mill Reservoir) and the post-development case (i.e. excluding the flood attenuation effect of Mill Reservoir), respectively.

3.1 Overview of estimation of QMED at each subject site

Site code	QMED (rural) from CDs (m^3/s)	Final method	Data transfer					Urban adjust-ment factor UAF	Final estimate of QMED (m^3/s)
			NRFA numbers for donor sites used	Distance between centroids d_{ij} (km)	Moderated QMED adjustment factor, (A/B)[a]	If more than one donor			
						Weight	Weighted ave. adjustment		
MillRes_Pre	1.1	CD	-	-	-	-	-	1	1.1
MillRes_Post	1.4	CD	-	-	-	-	-	1	1.4

Are the values of QMED spatially consistent?	The QMED values appear consistent with the size and characteristics of the catchment.
Method used for urban adjustment for subject and donor sites	WINFAP v4[7]

Parameters used for WINFAP v4 urban adjustment

Impervious fraction for built-up areas, IF	Percentage runoff for impervious surfaces, PR_{imp}	Method for calculating fractional urban cover, URBAN
0.3	70%	From updated URBEXT2000

Notes

Methods: AM – Annual maxima; POT – Peaks over threshold; DT – Data transfer (with urban adjustment); CD – Catchment descriptors alone (with urban adjustment); BCW – Catchment descriptors and bankfull channel width; LF – Low flow statistics.

The QMED adjustment factor A/B for each donor site is given in Table 3.2. This is moderated using the power term, a, which is a function of the distance between the centroids of the subject catchment and the donor catchment. The final estimate of QMED is $(A/B)^a$ times the initial estimate from catchment descriptors.

3.2 Search for donor sites for QMED (if applicable)

Comment on potential donor sites	Since research has shown that data transfer based on geographical distance performs better than one based solely on hydrological similarity (Kjeldsen *et al*, 2008[8]), the NRFA gauging stations (suitable for QMED) located geographically closest to the subject site have been explored as potential donors. However, none are considered suitable: all of the NRFA gauging stations within 50 km of the subject site (based on the distance between catchment centroids) are generally much larger and/or affected by reservoirs to a significantly lesser degree than the subject site. Consequently, no donor has been selected, and QMED has been estimated from catchment descriptors.

[7] Wallingford HydroSolutions (2016). WINFAP 4 Urban adjustment procedures.
[8] Kjeldsen, T. R, Jones D. A. and Bayliss, A.C. (2008) Improving the FEH statistical procedures for flood frequency estimation. Science Report: SC050050. Environment Agency: Bristol.

3.3 Derivation of pooling groups

Note: Pooling group analysis has been undertaken for subject site MillRes, with FARL set to both 0.858 and 0.924 (i.e. the pre- and post-development cases, respectively). The two resulting pooling groups contain the same stations, and L-CV and L-skew values, and, hence, flood growth factors, are identical. Consequently, only the pooling group for the pre-development case is presented below.

Name of group	**Site code from whose descriptors group was derived**	**Subject site treated as gauged?** (enhanced single site analysis)	**Changes made to default pooling group, with reasons**	**Weighted average L-moments,** L-CV and L-skew, (before urban adjustment)
MR_PG	MillRes	No	The default pooling group contains 16 stations and 500 station years. The WINFAP-FEH software reports that the pooling group is heterogeneous (H2 = 2.0933) and a review of the pooling group is desirable. The following stations have been removed from the pooling group: **76011 (Coal Burn @ Coalburn)** - Artificial forest drainage, with a stream density about 60 times greater than the natural stream network; observed base flow index notably less than BFIHOST. **49006 (Camel @ Camelford)** – Fairly short record (10 years) and very flat growth curve. **49005 (Bollingey Stream @ Bolingey Cocks Bridge)** - Short record, only six years long. Less than the recommended eight years for pooling. **26802 (Gypsey Race @ Kirby Grindalythe)** - Much more permeable than the subject site (BFIHOST = 0.959). **27073 (Brompton Beck @ Snainton Ings)** – Again, much more permeable than the subject site (BFIHOST = 0.887). The following stations have been added: 27010 (Hodge Beck @ Bransdale Weir); 49003 (de Lank @ de Lank); and, 27032 (Hebden Beck @ Hebden). The modified pooling group contains 14 stations and 534 station years. The pooling group is acceptably homogeneous (H2 = 0.4720).	L-CV: 0.224; L-skew: 0.260
Note: Pooling groups were derived using the procedures from Science Report SC050050 (2008).				

3.4 Derivation of flood growth curves at subject sites

Site code	Method (SS, P, ESS, J)	If P, ESS or J, name of pooling group	Distribution used and reason for choice	Note any urban adjustment or permeable adjustment*	Parameters of distribution (location, scale and shape after adjustments)	Growth factor for 100-year return period
MillRes	P	MR_PG	GL – acceptable fit and recommended in the FEH for describing flood growth in the UK	Urban adjustment made using WINFAP 4 Urban Adjustment Procedures[7]	Location 1.000; Scale 0.218; Shape -0.262	2.95

Notes

Methods: SS – Single site; P – Pooled; ESS – Enhanced single site; J – Joint analysis

A pooling group (or ESS analysis) derived at one gauge can be applied to estimate growth curves at a number of ungauged sites. Each site may have a different urban adjustment, and therefore different growth curve parameters.

Growth curves were derived using the procedures from Science Report SC050050 (2008).

*Permeable adjustment not required in this case, since no permeable stations have been used in the analysis.

3.5 Flood estimates from the statistical method

Site code	Flood peak (m^3/s) for the following return periods (in years)										
	2	5	10	20	30	50	75	100	100 +35%	100 +70%	1000
MillRes_Pre	1.1	1.5	1.8	2.2	2.4	2.7	3.0	3.3	4.4	5.6	5.8
MillRes_Post	1.4	2.0	2.4	2.8	3.1	3.5	3.9	4.2	5.7	7.2	7.5

These results suggest that infilling Mill Reservoir could increase peak flows downstream by approximately 30 per cent.

4 Revitalised flood hydrograph 2 (ReFH2) method

4.1 Parameters for ReFH2 model

Site code	Method	Tp (hours)	C_{max} (mm)	IF Impervious fraction for built-up areas	PR_{imp} % runoff for impermeable surfaces	BL (hours)	BR
MillRes	CD	1.23	319.2	0.3	70	28.15	1.32
Brief description of any flood event analysis carried out (further details should be given in the annex)				There are no data available for undertaking parameter optimisation.			
Methods: OPT: Optimisation, BR: Baseflow recession fitting, CD: Catchment descriptors, DT: Data transfer (give details)							

4.2 Design events for ReFH2 method

Site code	Season of design event (summer or winter)	Storm duration (hours)	Storm area for ARF (if not catchment area)	Source of design rainfall statistics (FEH99 or FEH13)
MillRes	Winter*	2.75 hours*	-	FEH13
*A storm duration of 2.75 hours is recommended by the ReFH2 software for this catchment. A winter design event has been selected given the essentially rural nature of the catchment.				
Are the storm durations likely to be changed in the next stage of the study, e.g. by optimisation within a hydraulic model?		Hydraulic model runs, undertaken by Cole Easdon, indicate that the existing Mill Reservoir delays the flood hydrograph by approximately 1 hour during a 100-year event. This reservoir lag time (RLAG) reduces to 0.25 hours with the proposed partial infilling of the reservoir. A longer storm duration of 5.25 hours will, therefore, also be tested. This duration has been derived using equation 8.1 of the FEH Vol. 4, with the ReFH2-recommended duration of 2.75 hours extended by adding the response time of the existing reservoir (1.16 hours) to the catchment response time (Tp = 1.23 hours).		

4.3 Flood estimates from the ReFH2 method, based on a storm duration of 2.75 hours

Note: These estimates do not take account of the reservoirs present within the catchment of the Pigs Lee Brook tributary.

Site code	Flood peak (m^3/s) for the following return periods (in years)										
	2	5	10	20	30	50	75	100	100 +35%	100 +70%	1000
MillRes	1.3	1.8	2.3	2.7	3.0	3.3	3.6	3.9	5.2	6.6	6.6

5 Discussion and summary of results

5.1 Comparison of results from different methods

This table compares peak flows from the ReFH2 model with those from the FEH Statistical method for the post-development case.

Site code	Ratio of ReFH peak flow to FEH statistical peak		Comments
	2 year	100 year	
MillRes	0.90	0.92	The flow estimates given by the ReFH2 model are lower than those from the statistical method, even though ReFH2 does not take account of the reservoirs at Whitewall Wood whereas the statistical method does.

5.2 Final choice of method

Choice of method and reasons	To allow for the alternative approaches Cole Easdon may take to represent Mill Reservoir in its hydraulic model, two sets of flow estimates have been derived herein, as follows: • Set 1 are based on the statistical method. This method represents the flood attenuation effect due to reservoirs via the catchment descriptor FARL. Hydrographs from the ReFH2 model have then been scaled to fit the statistical peaks. This set of flow estimates should be used if Cole Easdon's model does not include Mill Reservoir, and the hydrographs are entered immediately downstream of the reservoir. • Set 2 are based solely on the ReFH2 model, which does not represent the flood attenuation effect due to reservoirs. This set of flow estimates should be adopted if Cole Easdon's hydraulic model does include Mill Reservoir and the hydrographs are entered upstream of the reservoir for routing through it. (Once the initial flood routing exercise has been undertaken, the storm duration should be adjusted for the lag effect of the reservoir(s), and the model inflow hydrographs updated accordingly.) It is important to bear in mind that, unless the hydraulic model extends upstream of Whitewall Wood, this approach will not take account of the attenuation effect of the other reservoirs within the catchment. As highlighted in Section 5.1, the flows given by the statistical method for the post-development case are higher than those given by the ReFH2 model (no attenuation). A sense check of the hydraulic modelling results should, therefore, be made, to ensure that the model does not predict more frequent flooding downstream of Mill Reservoir for the pre-development case than is consistent with the flood history of the Pigs Lee Brook tributary (bearing in mind there are no records of past flooding on the Tetrosyl site). **Additional note:** Since this flood estimation report was first prepared, Cole Easdon has routed the Set 1 MillRes_Post flows through a hydraulic model of Mill Reservoir (using the ReFH2 hydrographs scaled to the statistical peaks). This is a more conservative approach than using the Set 2 ReFH2 peak flows for flood routing and has been approved by the Environment Agency. The sensitivity of model output to storm duration, reflecting reservoir lag time, will be tested.

5.3 Assumptions, limitations and uncertainty

List the main assumptions made (specific to this study)	• Motorway runoff generated outside of the catchment is not discharged into the Pigs Lee Brook tributary. • The FARL values reliably capture the affect that Mill Reservoir,

	together with the reservoirs at Whitewall Wood, have on the flood response of the Pigs Lee Brook tributary. • Mill Reservoir is kept permanently full. Reliance on the QMED equation is, therefore, reasonable, even though the FARL value based on existing conditions is less than 0.9.
Discuss any particular limitations	• The set 1 QMED estimates are based solely on catchment descriptors. • There are significant uncertainties associated with applying the statistical method to events rarer than the 200 year event, due to the typically short length of river gauge records. Consequently, the set 1 flow estimates for the 1000 year event should be treated with caution. • There are no flow records available for calibration and verification of the hydrological models.
Give what information you can on uncertainty in the results	There is no method provided in the FEH for establishing uncertainty in design flows that have been estimated for an ungauged catchment using a pooled growth curve. The uncertainty in this common situation will depend on many factors, for example, how unusual the study catchment is relative to the pooling group, and the uncertainty in flow measurement at the pooled gauging stations. A UK average measure of uncertainty is presented in a technical guidance report[9], generated by an Environment Agency-funded R&D project into the FEH, local data and uncertainty. This report indicates that the 95% confidence limits for a 1% AEP flood estimate for a rural catchment (representative of the Pigs Lee Brook tributary), without donor adjustment, are 0.45 to 2.23 times the best estimate.
Comment on the suitability of the results for future studies	The results presented in this document should be considered in the context of current study aims and objectives. And, future analysts should satisfy themselves that no new data can be obtained that could be used to refine the estimates.
Give any other comments on the study	To increase confidence in the flow frequency estimates, it is recommended that flow monitoring is undertaken on the Pigs Lee Brook tributary. Even a short period of record would go some way to improving the estimate of QMED.

5.4 Checks

Are the results consistent, for example at confluences?	It is not possible to comment on spatial consistency, since flows have been estimated at a single point.
What do the results imply regarding the return periods of floods during the period of record?	There are no historical records of flooding available.
What is the range of 100-year growth factors? Is this realistic?	The 100 year growth factor given by the statistical method (set 1) is 2.95 and lies within the typical range. The ReFH2 model (set 2) gives a similar 100 year growth factor (3.0).
What is the range of ratios for 1000-year flow over 100-year flow?	The ratio of the final 1000 year to 100 year peak flow estimates is 1.79 for set 1 and 1.70 for set 2.
How do the results compare with those of other studies? Explain any differences and conclude which results should be preferred.	The set 1 flow estimates for the pre-development case are fairly similar to those derived by PBA (2011) using the statistical method (see Figure 5.4a). It is worth noting, however, that PBA's flows are for a slightly larger (8 per cent) catchment area, draining to a point located approximately 635 m downstream of subject site MillRes (at NGR SD 80650 13400). Also, PBA's flood growth curve, which gives a 100 year growth factor of 2.84, is slightly flatter than that generated

[9] Environment Agency (2017) *Using local data to reduce uncertainty in flood frequency estimation*

	for the current study. It is important to bear in mind that PBA's estimates are based on an older version of the peak flows dataset, containing fewer water years, and Kjeldsen's (2010) urban adjustment method.
Are the results compatible with the longer-term flood history?	The hydraulic model should be used to carry out a sense check of the flow frequency estimates generated for this study.

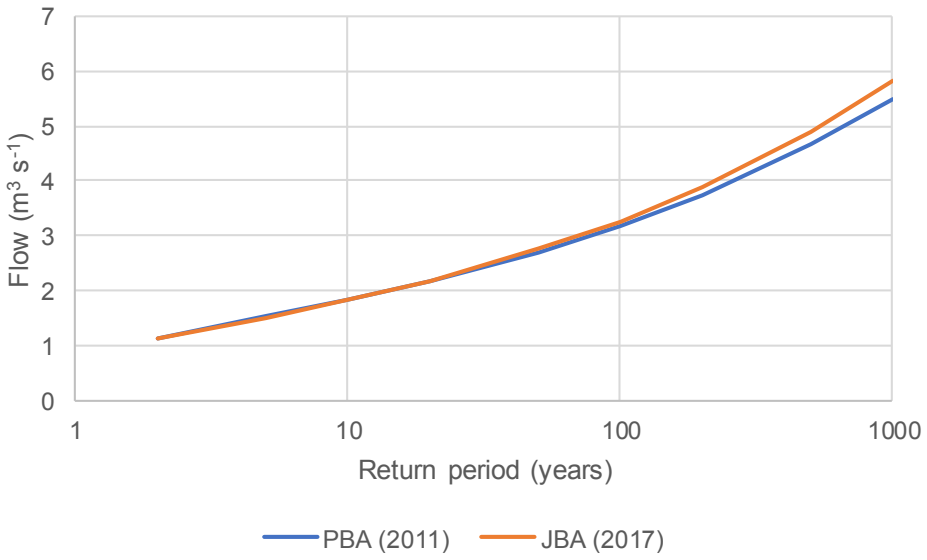


Figure 5.4a. Comparison of flow frequency curves

5.5 Final results

Set 1:

Site code	Flood peak (m^3/s) for the following return periods (in years)										
	2	5	10	20	30	50	75	100	100 +35%	100 +70%	1000
MillRes_Pre	1.1	1.5	1.8	2.2	2.4	2.7	3.0	3.3	4.4	5.6	5.8
MillRes_Post	1.4	2.0	2.4	2.8	3.1	3.5	3.9	4.2	5.7	7.2	7.5

Set 2:

Site code	Flood peak (m^3/s) for the following return periods (in years)										
	2	5	10	20	30	50	75	100	100 +35%	100 +70%	1000
MillRes	1.3	1.8	2.3	2.7	3.0	3.3	3.6	3.9	5.2	6.6	6.6

If flood hydrographs are needed for the next stage of the study, where are they provided? (e.g. give filename of spreadsheet, hydraulic model, or reference to table below)	2.75-hour duration: *2018s0142_Hydrographs.xlsx;* 5.25-hour duration: *2018s0142_Hydrographs v2.0.xlsx*

6 Annex

Station	Distance	Years of data	QMED AM	L-CV	L-SKEW	Discordancy
45816 (Haddeo @ Upton)	1.923	23	3.456	0.307	0.418	1.166
28033 (Dove @ Hollinsclough)	2.119	37	4.200	0.237	0.418	0.827
27051 (Crimple @ Burn Bridge)	2.262	44	4.539	0.223	0.156	0.818
91802 (Allt Leachdach @ Intake)	2.314	34	6.350	0.153	0.257	1.164
54022 (Severn @ Plynlimon Flume)	2.592	38	14.988	0.156	0.171	1.213
71003 (Croasdale Beck @ Croasdale Flume)	2.605	37	10.900	0.212	0.323	0.240
25003 (Trout Beck @ Moor House)	2.676	43	15.164	0.170	0.288	0.655
47022 (Tory Brook @ Newnham Park)	2.686	23	7.123	0.262	0.115	1.953
25011 (Langdon Beck @ Langdon)	2.737	28	15.878	0.238	0.318	1.120
206006 (Annalong @ Recorder)	2.895	48	15.330	0.189	0.052	2.294
25019 (Leven @ Easby)	3.033	38	5.333	0.338	0.391	1.980
27010 (Hodge Beck @ Bransdale Weir)	3.266	41	9.420	0.224	0.293	0.048
49003 (de Lank @ de Lank)	3.446	50	13.985	0.225	0.217	0.259
27032 (Hebden Beck @ Hebden)	3.454	50	3.923	0.207	0.253	0.265
Total		*534*				
Weighted means				*0.224*	*0.260*	

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Time (hh:mm:ss)	Time (hours)	100 yr ($m^3 s^{-1}$)	100 yr + 35% ($m^3 s^{-1}$)	100 yr + 70% ($m^3 s^{-1}$)
00:00:00	0.00	0.14	0.19	0.23
00:15:00	0.25	0.15	0.20	0.25
00:30:00	0.50	0.19	0.25	0.32
00:45:00	0.75	0.27	0.37	0.46
01:00:00	1.00	0.44	0.60	0.75
01:15:00	1.25	0.75	1.01	1.27
01:30:00	1.50	1.25	1.69	2.12
01:45:00	1.75	1.93	2.60	3.28
02:00:00	2.00	2.68	3.62	4.56
02:15:00	2.25	3.40	4.59	5.78
02:30:00	2.50	3.95	5.34	6.72
02:45:00	2.75	4.22	5.70	7.17
03:00:00	3.00	4.18	5.64	7.11
03:15:00	3.25	3.92	5.30	6.67
03:30:00	3.50	3.54	4.79	6.03
03:45:00	3.75	3.12	4.21	5.31
04:00:00	4.00	2.71	3.66	4.61
04:15:00	4.25	2.35	3.17	3.99
04:30:00	4.50	2.03	2.74	3.45
04:45:00	4.75	1.74	2.35	2.96
05:00:00	5.00	1.48	1.99	2.51
05:15:00	5.25	1.23	1.66	2.09
05:30:00	5.50	1.01	1.36	1.71
05:45:00	5.75	0.82	1.11	1.40
06:00:00	6.00	0.69	0.93	1.17
06:15:00	6.25	0.60	0.81	1.03
06:30:00	6.50	0.55	0.75	0.94
06:45:00	6.75	0.53	0.71	0.90
07:00:00	7.00	0.51	0.69	0.87
07:15:00	7.25	0.51	0.68	0.86
07:30:00	7.50	0.50	0.68	0.85
07:45:00	7.75	0.50	0.67	0.84
08:00:00	8.00	0.49	0.66	0.84
08:15:00	8.25	0.49	0.66	0.83
08:30:00	8.50	0.48	0.65	0.82
08:45:00	8.75	0.48	0.65	0.81
09:00:00	9.00	0.48	0.64	0.81
09:15:00	9.25	0.47	0.64	0.80
09:30:00	9.50	0.47	0.63	0.79
09:45:00	9.75	0.46	0.62	0.79
10:00:00	10.00	0.46	0.62	0.78
10:15:00	10.25	0.45	0.61	0.77
10:30:00	10.50	0.45	0.61	0.77
10:45:00	10.75	0.45	0.60	0.76
11:00:00	11.00	0.44	0.60	0.75
11:15:00	11.25	0.44	0.59	0.75
11:30:00	11.50	0.43	0.59	0.74
11:45:00	11.75	0.43	0.58	0.73
12:00:00	12.00	0.43	0.58	0.73
12:15:00	12.25	0.42	0.57	0.72
12:30:00	12.50	0.42	0.57	0.71
12:45:00	12.75	0.42	0.56	0.71
13:00:00	13.00	0.41	0.56	0.70
13:15:00	13.25	0.41	0.55	0.69
13:30:00	13.50	0.40	0.55	0.69
13:45:00	13.75	0.40	0.54	0.68
14:00:00	14.00	0.40	0.54	0.68
14:15:00	14.25	0.39	0.53	0.67
14:30:00	14.50	0.39	0.53	0.66
14:45:00	14.75	0.39	0.52	0.66
15:00:00	15.00	0.38	0.52	0.65
15:15:00	15.25	0.38	0.51	0.65
15:30:00	15.50	0.38	0.51	0.64
15:45:00	15.75	0.37	0.50	0.64
16:00:00	16.00	0.37	0.50	0.63
16:15:00	16.25	0.37	0.50	0.62
16:30:00	16.50	0.36	0.49	0.62
16:45:00	16.75	0.36	0.49	0.61
17:00:00	17.00	0.36	0.48	0.61
17:15:00	17.25	0.35	0.48	0.60
17:30:00	17.50	0.35	0.47	0.60
17:45:00	17.75	0.35	0.47	0.59
18:00:00	18.00	0.35	0.47	0.59
18:15:00	18.25	0.34	0.46	0.58
18:30:00	18.50	0.34	0.46	0.58
18:45:00	18.75	0.34	0.45	0.57
19:00:00	19.00	0.33	0.45	0.57
19:15:00	19.25	0.33	0.45	0.56
19:30:00	19.50	0.33	0.44	0.56
19:45:00	19.75	0.32	0.44	0.55
20:00:00	20.00	0.32	0.43	0.55
20:15:00	20.25	0.32	0.43	0.54
20:30:00	20.50	0.32	0.43	0.54
20:45:00	20.75	0.31	0.42	0.53
21:00:00	21.00	0.31	0.42	0.53
21:15:00	21.25	0.31	0.42	0.52
21:30:00	21.50	0.30	0.41	0.52
21:45:00	21.75	0.30	0.41	0.51
22:00:00	22.00	0.30	0.40	0.51
22:15:00	22.25	0.30	0.40	0.50
22:30:00	22.50	0.29	0.40	0.50
22:45:00	22.75	0.29	0.39	0.50
23:00:00	23.00	0.29	0.39	0.49
23:15:00	23.25	0.29	0.39	0.49
23:30:00	23.50	0.28	0.38	0.48
23:45:00	23.75	0.28	0.38	0.48
24:00:00	24.00	0.28	0.38	0.47
24:15:00	24.25	0.28	0.37	0.47
24:30:00	24.50	0.27	0.37	0.47
24:45:00	24.75	0.27	0.37	0.46
25:00:00	25.00	0.27	0.36	0.46
25:15:00	25.25	0.27	0.36	0.45
25:30:00	25.50	0.26	0.36	0.45
25:45:00	25.75	0.26	0.35	0.45
26:00:00	26.00	0.26	0.35	0.44
26:15:00	26.25	0.26	0.35	0.44
26:30:00	26.50	0.26	0.34	0.43
26:45:00	26.75	0.25	0.34	0.43
27:00:00	27.00	0.25	0.34	0.43
27:15:00	27.25	0.25	0.34	0.42
27:30:00	27.50	0.25	0.33	0.42
27:45:00	27.75	0.24	0.33	0.41
28:00:00	28.00	0.24	0.33	0.41
28:15:00	28.25	0.24	0.32	0.41
28:30:00	28.50	0.24	0.32	0.40
28:45:00	28.75	0.24	0.32	0.40
29:00:00	29.00	0.23	0.32	0.40
29:15:00	29.25	0.23	0.31	0.39
29:30:00	29.50	0.23	0.31	0.39
29:45:00	29.75	0.23	0.31	0.39
30:00:00	30.00	0.23	0.30	0.38
30:15:00	30.25	0.22	0.30	0.38
30:30:00	30.50	0.22	0.30	0.38
30:45:00	30.75	0.22	0.30	0.37
31:00:00	31.00	0.22	0.29	0.37
31:15:00	31.25	0.22	0.29	0.37
31:30:00	31.50	0.21	0.29	0.36
31:45:00	31.75	0.21	0.29	0.36
32:00:00	32.00	0.21	0.28	0.36
32:15:00	32.25	0.21	0.28	0.35
32:30:00	32.50	0.21	0.28	0.35
32:45:00	32.75	0.20	0.28	0.35
33:00:00	33.00	0.20	0.27	0.34

Notes on derivation:

The 100 year hydrograph has been generated using a catchment descriptor-based ReFH2 model,
and, then, scaled to fit the 100 year statistical peak based on the post-development case, i.e. excluding the attenuation effect of the Client's reservoir

33:15:00	33.25	0.20	0.27	0.34
33:30:00	33.50	0.20	0.27	0.34
33:45:00	33.75	0.20	0.27	0.34
34:00:00	34.00	0.20	0.26	0.33
34:15:00	34.25	0.19	0.26	0.33
34:30:00	34.50	0.19	0.26	0.33
34:45:00	34.75	0.19	0.26	0.32
35:00:00	35.00	0.19	0.25	0.32
35:15:00	35.25	0.19	0.25	0.32
35:30:00	35.50	0.19	0.25	0.32
35:45:00	35.75	0.18	0.25	0.31
36:00:00	36.00	0.18	0.25	0.31
36:15:00	36.25	0.18	0.24	0.31
36:30:00	36.50	0.18	0.24	0.30
36:45:00	36.75	0.18	0.24	0.30
37:00:00	37.00	0.18	0.24	0.30
37:15:00	37.25	0.17	0.24	0.30
37:30:00	37.50	0.17	0.23	0.29
37:45:00	37.75	0.17	0.23	0.29
38:00:00	38.00	0.17	0.23	0.29
38:15:00	38.25	0.17	0.23	0.29
38:30:00	38.50	0.17	0.22	0.28
38:45:00	38.75	0.17	0.22	0.28
39:00:00	39.00	0.16	0.22	0.28
39:15:00	39.25	0.16	0.22	0.28
39:30:00	39.50	0.16	0.22	0.27
39:45:00	39.75	0.16	0.22	0.27
40:00:00	40.00	0.16	0.21	0.27
40:15:00	40.25	0.16	0.21	0.27
40:30:00	40.50	0.16	0.21	0.26
40:45:00	40.75	0.15	0.21	0.26
41:00:00	41.00	0.15	0.21	0.26
41:15:00	41.25	0.15	0.20	0.26
41:30:00	41.50	0.15	0.20	0.25
41:45:00	41.75	0.15	0.20	0.25
42:00:00	42.00	0.15	0.20	0.25
42:15:00	42.25	0.15	0.20	0.25
42:30:00	42.50	0.14	0.20	0.25
42:45:00	42.75	0.14	0.19	0.24
43:00:00	43.00	0.14	0.19	0.24
43:15:00	43.25	0.14	0.19	0.24
43:30:00	43.50	0.14	0.19	0.24
43:45:00	43.75	0.14	0.19	0.23

Time (hh:mm:ss)	Time (hours)	2-yr (m^3/s)	5-yr (m^3/s)	10-yr (m^3/s)	20-yr (m^3/s)	30-yr (m^3/s)	50-yr (m^3/s)	75-yr (m^3/s)	100-yr (m^3/s)	100-yr + 35% (m^3/s)	100-yr + 70% (m^3/s)	1000-yr (m^3/s)
00:00:00	0.00	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.18	0.23	0.14
00:15:00	0.25	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.19	0.24	0.15
00:30:00	0.50	0.13	0.14	0.14	0.14	0.15	0.15	0.16	0.16	0.21	0.27	0.18
00:45:00	0.75	0.14	0.16	0.16	0.17	0.18	0.18	0.19	0.20	0.26	0.33	0.24
01:00:00	1.00	0.17	0.19	0.20	0.21	0.22	0.23	0.25	0.26	0.35	0.44	0.34
01:15:00	1.25	0.20	0.23	0.25	0.27	0.29	0.31	0.33	0.35	0.47	0.59	0.49
01:30:00	1.50	0.24	0.29	0.33	0.36	0.38	0.41	0.45	0.47	0.63	0.80	0.70
01:45:00	1.75	0.29	0.37	0.42	0.46	0.50	0.54	0.59	0.62	0.84	1.06	0.96
02:00:00	2.00	0.36	0.47	0.54	0.60	0.65	0.71	0.78	0.83	1.11	1.40	1.30
02:15:00	2.25	0.45	0.60	0.69	0.78	0.84	0.93	1.02	1.08	1.46	1.84	1.74
02:30:00	2.50	0.56	0.76	0.88	1.00	1.09	1.21	1.33	1.42	1.92	2.42	2.33
02:45:00	2.75	0.70	0.96	1.13	1.29	1.42	1.58	1.74	1.86	2.51	3.16	3.10
03:00:00	3.00	0.87	1.21	1.42	1.64	1.80	2.01	2.22	2.38	3.21	4.05	4.03
03:15:00	3.25	1.04	1.46	1.73	2.00	2.20	2.47	2.73	2.93	3.96	4.99	5.04
03:30:00	3.50	1.20	1.69	2.02	2.34	2.58	2.89	3.21	3.45	4.66	5.87	6.00
03:45:00	3.75	1.32	1.87	2.24	2.60	2.87	3.24	3.60	3.87	5.22	6.58	6.80
04:00:00	4.00	1.39	1.98	2.37	2.76	3.05	3.44	3.83	4.12	5.57	7.01	7.31
04:15:00	4.25	1.40	2.00	2.40	2.80	3.10	3.50	3.90	4.20	5.67	7.14	7.50
04:30:00	4.50	1.37	1.96	2.35	2.74	3.04	3.44	3.83	4.13	5.57	7.02	7.41
04:45:00	4.75	1.30	1.86	2.24	2.62	2.90	3.28	3.66	3.95	5.33	6.71	7.12
05:00:00	5.00	1.22	1.74	2.10	2.45	2.72	3.07	3.43	3.70	5.00	6.29	6.69
05:15:00	5.25	1.12	1.61	1.93	2.26	2.51	2.84	3.17	3.42	4.62	5.81	6.20
05:30:00	5.50	1.03	1.47	1.76	2.06	2.29	2.59	2.89	3.12	4.21	5.30	5.66
05:45:00	5.75	0.93	1.32	1.59	1.85	2.06	2.33	2.60	2.80	3.78	4.76	5.09
06:00:00	6.00	0.82	1.17	1.41	1.64	1.82	2.06	2.30	2.48	3.35	4.21	4.50
06:15:00	6.25	0.72	1.02	1.23	1.43	1.59	1.79	2.00	2.16	2.91	3.67	3.91
06:30:00	6.50	0.63	0.88	1.05	1.23	1.36	1.53	1.71	1.84	2.49	3.13	3.34
06:45:00	6.75	0.54	0.75	0.90	1.04	1.15	1.30	1.45	1.56	2.10	2.65	2.81
07:00:00	7.00	0.47	0.65	0.77	0.89	0.98	1.10	1.22	1.32	1.78	2.24	2.36
07:15:00	7.25	0.41	0.56	0.66	0.76	0.84	0.94	1.05	1.12	1.52	1.91	2.00
07:30:00	7.50	0.36	0.49	0.58	0.67	0.73	0.82	0.91	0.98	1.32	1.66	1.71
07:45:00	7.75	0.33	0.44	0.52	0.59	0.65	0.73	0.81	0.87	1.17	1.47	1.50
08:00:00	8.00	0.31	0.41	0.47	0.54	0.59	0.66	0.73	0.78	1.06	1.33	1.34
08:15:00	8.25	0.29	0.38	0.44	0.50	0.55	0.61	0.67	0.72	0.97	1.23	1.22
08:30:00	8.50	0.27	0.36	0.42	0.47	0.52	0.57	0.63	0.68	0.91	1.15	1.13
08:45:00	8.75	0.26	0.34	0.40	0.45	0.49	0.54	0.60	0.64	0.87	1.09	1.06
09:00:00	9.00	0.25	0.33	0.38	0.43	0.47	0.53	0.58	0.62	0.83	1.05	1.02
09:15:00	9.25	0.25	0.33	0.37	0.42	0.46	0.51	0.56	0.60	0.81	1.02	0.99
09:30:00	9.50	0.24	0.32	0.37	0.42	0.45	0.50	0.55	0.59	0.80	1.00	0.97
09:45:00	9.75	0.24	0.32	0.36	0.41	0.45	0.50	0.55	0.58	0.79	0.99	0.96
10:00:00	10.00	0.24	0.31	0.36	0.41	0.44	0.49	0.54	0.58	0.78	0.98	0.95
10:15:00	10.25	0.24	0.31	0.36	0.40	0.44	0.49	0.54	0.57	0.77	0.97	0.94
10:30:00	10.50	0.24	0.31	0.36	0.40	0.44	0.48	0.53	0.57	0.77	0.97	0.93
10:45:00	10.75	0.23	0.31	0.35	0.40	0.43	0.48	0.53	0.56	0.76	0.96	0.92
11:00:00	11.00	0.23	0.30	0.35	0.39	0.43	0.48	0.52	0.56	0.75	0.95	0.91
11:15:00	11.25	0.23	0.30	0.35	0.39	0.43	0.47	0.52	0.55	0.75	0.94	0.91
11:30:00	11.50	0.23	0.30	0.34	0.39	0.42	0.47	0.51	0.55	0.74	0.93	0.90
11:45:00	11.75	0.23	0.30	0.34	0.38	0.42	0.46	0.51	0.54	0.73	0.92	0.89
12:00:00	12.00	0.22	0.29	0.34	0.38	0.41	0.46	0.50	0.54	0.73	0.92	0.88
12:15:00	12.25	0.22	0.29	0.33	0.38	0.41	0.45	0.50	0.53	0.72	0.91	0.88
12:30:00	12.50	0.22	0.29	0.33	0.37	0.41	0.45	0.50	0.53	0.71	0.90	0.87
12:45:00	12.75	0.22	0.28	0.33	0.37	0.40	0.45	0.49	0.52	0.71	0.89	0.86
13:00:00	13.00	0.22	0.28	0.32	0.37	0.40	0.44	0.49	0.52	0.70	0.88	0.85
13:15:00	13.25	0.21	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.70	0.88	0.84
13:30:00	13.50	0.21	0.28	0.32	0.36	0.39	0.44	0.48	0.51	0.69	0.87	0.84
13:45:00	13.75	0.21	0.27	0.32	0.36	0.39	0.43	0.47	0.51	0.68	0.86	0.83
14:00:00	14.00	0.21	0.27	0.31	0.35	0.39	0.43	0.47	0.50	0.68	0.85	0.82
14:15:00	14.25	0.21	0.27	0.31	0.35	0.38	0.42	0.47	0.50	0.67	0.85	0.82
14:30:00	14.50	0.20	0.27	0.31	0.35	0.38	0.42	0.46	0.49	0.67	0.84	0.81
14:45:00	14.75	0.20	0.27	0.31	0.34	0.38	0.42	0.46	0.49	0.66	0.83	0.80
15:00:00	15.00	0.20	0.26	0.30	0.34	0.37	0.41	0.45	0.48	0.65	0.82	0.79
15:15:00	15.25	0.20	0.26	0.30	0.34	0.37	0.41	0.45	0.48	0.65	0.82	0.79
15:30:00	15.50	0.20	0.26	0.30	0.34	0.37	0.41	0.45	0.48	0.64	0.81	0.78
15:45:00	15.75	0.20	0.26	0.29	0.33	0.36	0.40	0.44	0.47	0.64	0.80	0.77
16:00:00	16.00	0.19	0.25	0.29	0.33	0.36	0.40	0.44	0.47	0.63	0.79	0.77
16:15:00	16.25	0.19	0.25	0.29	0.33	0.36	0.39	0.43	0.46	0.63	0.79	0.76
16:30:00	16.50	0.19	0.25	0.29	0.32	0.35	0.39	0.43	0.46	0.62	0.78	0.75
16:45:00	16.75	0.19	0.25	0.28	0.32	0.35	0.39	0.43	0.45	0.61	0.77	0.75
17:00:00	17.00	0.19	0.24	0.28	0.32	0.35	0.38	0.42	0.45	0.61	0.77	0.74
17:15:00	17.25	0.19	0.24	0.28	0.32	0.34	0.38	0.42	0.45	0.60	0.76	0.73
17:30:00	17.50	0.18	0.24	0.28	0.31	0.34	0.38	0.42	0.44	0.60	0.75	0.73
17:45:00	17.75	0.18	0.24	0.27	0.31	0.34	0.37	0.41	0.44	0.59	0.75	0.72
18:00:00	18.00	0.18	0.24	0.27	0.31	0.33	0.37	0.41	0.44	0.59	0.74	0.71
18:15:00	18.25	0.18	0.23	0.27	0.30	0.33	0.37	0.40	0.43	0.58	0.73	0.71
18:30:00	18.50	0.18	0.23	0.27	0.30	0.33	0.36	0.40	0.43	0.58	0.73	0.70
18:45:00	18.75	0.18	0.23	0.26	0.30	0.33	0.36	0.40	0.42	0.57	0.72	0.69
19:00:00	19.00	0.17	0.23	0.26	0.30	0.32	0.36	0.39	0.42	0.57	0.71	0.69
19:15:00	19.25	0.17	0.23	0.26	0.29	0.32	0.35	0.39	0.42	0.56	0.71	0.68
19:30:00	19.50	0.17	0.22	0.26	0.29	0.32	0.35	0.39	0.41	0.56	0.70	0.68
19:45:00	19.75	0.17	0.22	0.26	0.29	0.31	0.35	0.38	0.41	0.55	0.70	0.67
20:00:00	20.00	0.17	0.22	0.25	0.29	0.31	0.35	0.38	0.41	0.55	0.69	0.66
20:15:00	20.25	0.17	0.22	0.25	0.28	0.31	0.34	0.38	0.40	0.54	0.68	0.66
20:30:00	20.50	0.17	0.22	0.25	0.28	0.31	0.34	0.37	0.40	0.54	0.68	0.65
20:45:00	20.75	0.16	0.21	0.25	0.28	0.30	0.34	0.37	0.39	0.53	0.67	0.65
21:00:00	21.00	0.16	0.21	0.24	0.28	0.30	0.33	0.37	0.39	0.53	0.67	0.64
21:15:00	21.25	0.16	0.21	0.24	0.27	0.30	0.33	0.36	0.39	0.52	0.66	0.64
21:30:00	21.50	0.16	0.21	0.24	0.27	0.30	0.33	0.36	0.38	0.52	0.65	0.63
21:45:00	21.75	0.16	0.21	0.24	0.27	0.29	0.32	0.36	0.38	0.51	0.65	0.62
22:00:00	22.00	0.16	0.21	0.24	0.27	0.29	0.32	0.35	0.38	0.51	0.64	0.62
22:15:00	22.25	0.16	0.20	0.23	0.26	0.29	0.32	0.35	0.37	0.51	0.64	0.61
22:30:00	22.50	0.15	0.20	0.23	0.26	0.29	0.32	0.35	0.37	0.50	0.63	0.61
22:45:00	22.75	0.15	0.20	0.23	0.26	0.28	0.31	0.34	0.37	0.50	0.63	0.60
23:00:00	23.00	0.15	0.20	0.23	0.26	0.28	0.31	0.34	0.36	0.49	0.62	0.60
23:15:00	23.25	0.15	0.20	0.23	0.25	0.28	0.31	0.34	0.36	0.49	0.61	0.59
23:30:00	23.50	0.15	0.19	0.22	0.25	0.28	0.30	0.34	0.36	0.48	0.61	0.59
23:45:00	23.75	0.15	0.19	0.22	0.25	0.27	0.30	0.33	0.35	0.48	0.60	0.58
24:00:00	24.00	0.15	0.19	0.22	0.25	0.27	0.30	0.33	0.35	0.47	0.60	0.58
24:15:00	24.25	0.14	0.19	0.22	0.25	0.27	0.30	0.33	0.35	0.47	0.59	0.57
24:30:00	24.50	0.14	0.19	0.22	0.24	0.27	0.29	0.32	0.35	0.47	0.59	0.57
24:45:00	24.75	0.14	0.19	0.21	0.24	0.26	0.29	0.32	0.34	0.46	0.58	0.56
25:00:00	25.00	0.14	0.18	0.21	0.24	0.26	0.29	0.32	0.34	0.46	0.58	0.56
25:15:00	25.25	0.14	0.18	0.21	0.24	0.26	0.29	0.32	0.34	0.45	0.57	0.55
25:30:00	25.50	0.14	0.18	0.21	0.24	0.26	0.28	0.31	0.33	0.45	0.57	0.55
25:45:00	25.75	0.14	0.18	0.21	0.23	0.25	0.28	0.31	0.33	0.45	0.56	0.54
26:00:00	26.00	0.14	0.18	0.20	0.23	0.25	0.28	0.31	0.33	0.44	0.56	0.54
26:15:00	26.25	0.13	0.18	0.20	0.23	0.25	0.28	0.30	0.32	0.44	0.55	0.53
26:30:00	26.50	0.13	0.17	0.20	0.23	0.25	0.27	0.30	0.32	0.43	0.55	0.53
26:45:00	26.75	0.13	0.17	0.20	0.23	0.25	0.27	0.30	0.32	0.43	0.54	0.52
27:00:00	27.00	0.13	0.17	0.20	0.22	0.24	0.27	0.30	0.32	0.43	0.54	0.52

27:15:00	27.25	0.13	0.17	0.20	0.22	0.24	0.27	0.29	0.31	0.42	0.53	0.51
27:30:00	27.50	0.13	0.17	0.19	0.22	0.24	0.26	0.29	0.31	0.42	0.53	0.51
27:45:00	27.75	0.13	0.17	0.19	0.22	0.24	0.26	0.29	0.31	0.42	0.52	0.50
28:00:00	28.00	0.13	0.17	0.19	0.22	0.23	0.26	0.29	0.31	0.41	0.52	0.50
28:15:00	28.25	0.13	0.16	0.19	0.21	0.23	0.26	0.28	0.30	0.41	0.51	0.50
28:30:00	28.50		0.16	0.19	0.21	0.23	0.26	0.28	0.30	0.40	0.51	0.49
28:45:00	28.75		0.16	0.19	0.21	0.23	0.25	0.28	0.30	0.40	0.51	0.49
29:00:00	29.00		0.16	0.18	0.21	0.23	0.25	0.28	0.29	0.40	0.50	0.48
29:15:00	29.25		0.16	0.18	0.21	0.22	0.25	0.27	0.29	0.39	0.50	0.48
29:30:00	29.50		0.16	0.18	0.20	0.22	0.25	0.27	0.29	0.39	0.49	0.47
29:45:00	29.75		0.16	0.18	0.20	0.22	0.24	0.27	0.29	0.39	0.49	0.47
30:00:00	30.00		0.15	0.18	0.20	0.22	0.24	0.27	0.28	0.38	0.48	0.47
30:15:00	30.25		0.15	0.18	0.20	0.22	0.24	0.26	0.28	0.38	0.48	0.46
30:30:00	30.50		0.15	0.17	0.20	0.21	0.24	0.26	0.28	0.38	0.47	0.46
30:45:00	30.75		0.15	0.17	0.20	0.21	0.24	0.26	0.28	0.37	0.47	0.45
31:00:00	31.00		0.15	0.17	0.19	0.21	0.23	0.26	0.27	0.37	0.47	0.45
31:15:00	31.25		0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.37	0.46	0.45
31:30:00	31.50		0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.36	0.46	0.44
31:45:00	31.75		0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.36	0.45	0.44
32:00:00	32.00		0.14	0.17	0.19	0.20	0.23	0.25	0.26	0.36	0.45	0.43
32:15:00	32.25		0.14	0.16	0.19	0.20	0.22	0.25	0.26	0.35	0.45	0.43
32:30:00	32.50		0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.35	0.44	0.43
32:45:00	32.75		0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.35	0.44	0.42
33:00:00	33.00		0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.34	0.43	0.42
33:15:00	33.25		0.14	0.16	0.18	0.19	0.22	0.24	0.25	0.34	0.43	0.42
33:30:00	33.50		0.14	0.16	0.18	0.19	0.21	0.24	0.25	0.34	0.43	0.41
33:45:00	33.75		0.14	0.16	0.18	0.19	0.21	0.23	0.25	0.34	0.42	0.41
34:00:00	34.00		0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.33	0.42	0.40
34:15:00	34.25		0.13	0.15	0.17	0.19	0.21	0.23	0.24	0.33	0.42	0.40
34:30:00	34.50		0.13	0.15	0.17	0.19	0.21	0.23	0.24	0.33	0.41	0.40
34:45:00	34.75		0.13	0.15	0.17	0.18	0.20	0.22	0.24	0.32	0.41	0.39
35:00:00	35.00			0.15	0.17	0.18	0.20	0.22	0.24	0.32	0.40	0.39
35:15:00	35.25			0.15	0.17	0.18	0.20	0.22	0.24	0.32	0.40	0.39
35:30:00	35.50			0.15	0.16	0.18	0.20	0.22	0.23	0.32	0.40	0.38
35:45:00	35.75			0.14	0.16	0.18	0.20	0.22	0.23	0.31	0.39	0.38
36:00:00	36.00			0.14	0.16	0.18	0.20	0.22	0.23	0.31	0.39	0.38
36:15:00	36.25			0.14	0.16	0.17	0.19	0.21	0.23	0.31	0.39	0.37
36:30:00	36.50			0.14	0.16	0.17	0.19	0.21	0.23	0.30	0.38	0.37
36:45:00	36.75			0.14	0.16	0.17	0.19	0.21	0.22	0.30	0.38	0.37
37:00:00	37.00			0.14	0.16	0.17	0.19	0.21	0.22	0.30	0.38	0.36
37:15:00	37.25			0.14	0.16	0.17	0.19	0.21	0.22	0.30	0.37	0.36
37:30:00	37.50			0.14	0.15	0.17	0.19	0.20	0.22	0.29	0.37	0.36
37:45:00	37.75			0.13	0.15	0.17	0.18	0.20	0.22	0.29	0.37	0.35
38:00:00	38.00			0.13	0.15	0.16	0.18	0.20	0.21	0.29	0.36	0.35
38:15:00	38.25			0.13	0.15	0.16	0.18	0.20	0.21	0.29	0.36	0.35
38:30:00	38.50			0.13	0.15	0.16	0.18	0.20	0.21	0.28	0.36	0.34
38:45:00	38.75			0.13	0.15	0.16	0.18	0.20	0.21	0.28	0.35	0.34
39:00:00	39.00				0.15	0.16	0.18	0.19	0.21	0.28	0.35	0.34
39:15:00	39.25				0.14	0.16	0.17	0.19	0.20	0.28	0.35	0.34
39:30:00	39.50				0.14	0.16	0.17	0.19	0.20	0.27	0.34	0.33
39:45:00	39.75				0.14	0.15	0.17	0.19	0.20	0.27	0.34	0.33
40:00:00	40.00				0.14	0.15	0.17	0.19	0.20	0.27	0.34	0.33
40:15:00	40.25				0.14	0.15	0.17	0.18	0.20	0.27	0.34	0.32
40:30:00	40.50				0.14	0.15	0.17	0.18	0.20	0.26	0.33	0.32
40:45:00	40.75				0.14	0.15	0.17	0.18	0.19	0.26	0.33	0.32
41:00:00	41.00				0.14	0.15	0.16	0.18	0.19	0.26	0.33	0.32
41:15:00	41.25				0.13	0.15	0.16	0.18	0.19	0.26	0.32	0.31
41:30:00	41.50				0.13	0.15	0.16	0.18	0.19	0.25	0.32	0.31
41:45:00	41.75				0.13	0.14	0.16	0.18	0.19	0.25	0.32	0.31
42:00:00	42.00				0.13	0.14	0.16	0.17	0.19	0.25	0.32	0.30
42:15:00	42.25				0.13	0.14	0.16	0.17	0.18	0.25	0.31	0.30
42:30:00	42.50					0.14	0.16	0.17	0.18	0.25	0.31	0.30
42:45:00	42.75					0.14	0.15	0.17	0.18	0.24	0.31	0.30
43:00:00	43.00					0.14	0.15	0.17	0.18	0.24	0.30	0.29
43:15:00	43.25					0.14	0.15	0.17	0.18	0.24	0.30	0.29
43:30:00	43.50					0.14	0.15	0.16	0.18	0.24	0.30	0.29
43:45:00	43.75					0.13	0.15	0.16	0.17	0.24	0.30	0.29
44:00:00	44.00					0.13	0.15	0.16	0.17	0.23	0.29	0.28
44:15:00	44.25					0.13	0.15	0.16	0.17	0.23	0.29	0.28
44:30:00	44.50					0.13	0.14	0.16	0.17	0.23	0.29	0.28
44:45:00	44.75						0.14	0.16	0.17	0.23	0.29	0.28
45:00:00	45.00						0.14	0.16	0.17	0.23	0.28	0.27
45:15:00	45.25						0.14	0.15	0.17	0.22	0.28	0.27
45:30:00	45.50						0.14	0.15	0.16	0.22	0.28	0.27
45:45:00	45.75						0.14	0.15	0.16	0.22	0.28	0.27
46:00:00	46.00						0.14	0.15	0.16	0.22	0.27	0.26
46:15:00	46.25						0.14	0.15	0.16	0.22	0.27	0.26
46:30:00	46.50						0.13	0.15	0.16	0.21	0.27	0.26
46:45:00	46.75						0.13	0.15	0.16	0.21	0.27	0.26
47:00:00	47.00						0.13	0.15	0.16	0.21	0.26	0.25
47:15:00	47.25						0.13	0.14	0.15	0.21	0.26	0.25
47:30:00	47.50							0.14	0.15	0.21	0.26	0.25
47:45:00	47.75							0.14	0.15	0.20	0.26	0.25
48:00:00	48.00							0.14	0.15	0.20	0.25	0.25
48:15:00	48.25							0.14	0.15	0.20	0.25	0.24
48:30:00	48.50							0.14	0.15	0.20	0.25	0.24
48:45:00	48.75							0.14	0.15	0.20	0.25	0.24
49:00:00	49.00							0.14	0.14	0.20	0.25	0.24
49:15:00	49.25							0.13	0.14	0.19	0.24	0.24
49:30:00	49.50								0.14	0.19	0.24	0.23
49:45:00	49.75								0.14	0.19	0.24	0.23
50:00:00	50.00								0.14	0.19	0.24	0.23
50:15:00	50.25								0.14	0.19	0.24	0.23
50:30:00	50.50								0.14	0.19	0.23	0.22
50:45:00	50.75								0.14	0.18	0.23	0.22
51:00:00	51.00											0.22
51:15:00	51.25											0.22
51:30:00	51.50											0.22
51:45:00	51.75											0.22
52:00:00	52.00											0.21
52:15:00	52.25											0.21
52:30:00	52.50											0.21
52:45:00	52.75											0.21
53:00:00	53.00											0.21
53:15:00	53.25											0.20
53:30:00	53.50											0.20
53:45:00	53.75											0.20
54:00:00	54.00											0.20
54:15:00	54.25											0.20
54:30:00	54.50											0.20
54:45:00	54.75											0.19

55:00:00	55.00											0.19
55:15:00	55.25											0.19
55:30:00	55.50											0.19
55:45:00	55.75											0.19
56:00:00	56.00											0.18
56:15:00	56.25											0.18
56:30:00	56.50											0.18
56:45:00	56.75											0.18
57:00:00	57.00											0.18
57:15:00	57.25											0.18
57:30:00	57.50											0.18
57:45:00	57.75											0.17
58:00:00	58.00											0.17
58:15:00	58.25											0.17
58:30:00	58.50											0.17
58:45:00	58.75											0.17
59:00:00	59.00											0.17
59:15:00	59.25											0.16
59:30:00	59.50											0.16
59:45:00	59.75											0.16
60:00:00	60.00											0.16
60:15:00	60.25											0.16
60:30:00	60.50											0.16
60:45:00	60.75											0.16
61:00:00	61.00											0.15
61:15:00	61.25											0.15
61:30:00	61.50											0.15
61:45:00	61.75											0.15
62:00:00	62.00											0.15
62:15:00	62.25											0.15
62:30:00	62.50											0.15
62:45:00	62.75											0.15
63:00:00	63.00											0.14
63:15:00	63.25											0.14
63:30:00	63.50											0.14

Appendix 3

Hydraulic Modelling Study

Cole Easdon Consultants
160 Aztec West
Almondsbury
Bristol
BS32 4TU

Our ref: SO/2018/118439/01-L01
Your ref: 180717/JW05

Date: 06 August 2018

Dear Sir/Madam

PRELIMINARY OPINION - PROPOSED RESIDENTIAL DEVELOPMENT. INVOLVES INFILLING OF RESERVOIR.
FORMER TETROSYL SITE, WALMERSLEY OLD ROAD, BURY

Thank you for submitting the above enquiry which we received on 18th July 2018.

We would like to make the following comments.

Flood Risk

The site is shown as Flood Zone 1 on the Environment Agency flood maps but previous applications relating to this site have shown that some areas of the site are actually within flood zone 2 and 3 therefore being of a higher flood risk. A Flood Risk Assessment (FRA) should be prepared to support any future planning application.

Any modelling undertaken to evidence this risk should consider a range of return periods and take the impacts of climate change into account in setting finished floor levels, new climate change allowances have been published on 19th February 2016, see https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances for full details.

The Environment Agency does not have updated flood levels with the revised climate change allowances and as such the flood risk consultant should consider the appropriate mitigation measures to mitigate against fluvial and pluvial flooding. Our general recommendation is that floor levels are at least 600mm above the 1% plus 35% climate change flood level.

Culverted Watercourse

There is a culverted watercourse that runs through the site. The culvert position will have an impact on the area available for development and ultimately the number of units that the site will accommodate. Construction above culverts is not good practice as it restricts future access for maintenance/repair. The culvert will also be a liability for the individual landowners. We would suggest that these high risk areas of the site

accommodate the public open space and the dwellings avoid the high risk area and therefore, follow the sequential approach to development within the site.

Infilling the reservoir
Infilling the reservoir will result in loss of surface water and flood water storage. The FRA will need to demonstrate no increase in flood risk elsewhere and the provision of compensatory flood storage for the infilling of the reservoir proposals may be required.

The effect of this on flood flows downstream will need to be considered in the FRA as the reservoir will provide some balancing effect on flood flows.

This development may require a permit under the Environmental Permitting (England and Wales) Regulations 2016 from the Environment Agency for any proposed works or structures, in, under, over or within eight metres of the top of the bank of Pigs Lee Brook, designated a 'main river'. This was formerly called a Flood Defence Consent. Some activities are also now excluded or exempt. A permit is separate to and in addition to any planning permission granted. Further details and guidance are available on the GOV.UK website: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

The Environment Agency has discretionary powers to carry out maintenance works on the channels of "main river" watercourses to remove blockages and ensure the free flow of water. The responsibility for the repair and condition of Pigs Lee Brook, its channel, banks and adjacent structures, lies ultimately with the riparian owner.

Ecology

We would seek that an appropriate environmental and ecological assessment is undertaken for this large mixed greenspace and brownfield site, and be guided by identified environmental constraints and opportunities, and ensuing in particular the protection of Pigs Lee Brook watercourse, WFD waterbody (Ref: GB112069064620) which is a key ecological receptor of the site. Any decommissioning and decontamination of former industrial site will need to be carefully managed to protect the aquatic environment.

Any ecological assessment should be conducted prior to development of any detailed plans to enable an assessment of level of risk posed by future development. The detailed design, construction, mitigation and compensation measures should be based on the results of a survey carried out at an appropriate time of year by a suitably experienced surveyor using recognised survey methodology.

The survey and risk assessment should:

- identify any rare, declining, protected or otherwise important terrestrial and aquatic flora, fauna or habitats within the site;
- assess the importance of the above features at a local, regional and national level;
- identify the impacts of the scheme on those features;
- demonstrate how the development will avoid adverse impacts
- propose mitigation for any adverse ecological impacts or compensation for loss;
- propose wildlife/ habitat enhancement measures;
- Propose post-project appraisal, management plans and management responsibilities with details of how biodiversity enhancement will be incorporated

Cont/d..

into the development and maintained over the long term.

We would recommend any ecological impact assessment follow IEEM ecological assessment guidelines (https://www.cieem.net/data/files/Website_Downloads/Guidelines_for_Ecological_Impact_Assessment_2015.pdf) particularly in regards ecological impact associated with proposed loss of relatively large and well established reservoir and wetland.

Whilst we welcome the retention of an open channel watercourse and the preferable 'skylighting' of some of the 400m of existing culverted sections of Pigs Lee Brook tributary as part of future development proposals. The design of the new open channel watercourse should be shaped by not just flood modelling and high flows, but also look to provide a high quality riparian corridor that is resilient and ecological valuable in dominant dry weather flows, one that has a wide undeveloped green space corridor that is accessible for both people and wildlife, a riparian design that ensures new development positively integrates with restored river corridor i.e. front facing development, use of above ground Sustainable Urban Drainage as part of site surface water drainage; a riparian channel design that has a preference soft bio-engineering solutions where feasible (http://www.hrwallingford.com/news/supporting-green-river-engineering), and provides commensurate mitigation for loss of reservoir wetland and high quality green infrastructure asset.

We would also recommend any new open channel watercourse be guided by existing good practice design guides such as 'Rivers by design' (http://www.ecrr.org/Portals/27/Publications/131223%20Rivers%20by%20Design.pdf) and current draft Greater Manchester Spatial Framework policies in regards to rivers valleys and green infrastructure (https://www.greatermanchester-ca.gov.uk/downloads/file/371/draft_greater_manchester_spatial_framework_october_2016_-_full_version).

It is understood from previous development plans for redeveloping Tetrosyl site, that a number of protected species have been confirmed present within the site. This will mean Natural England licensing (https://www.gov.uk/guidance/wildlife-licences) would be required, and we would recommend Natural England are consulted in regards to redeveloping the Tetrosyl site.

Our Fisheries Team understand that the existing reservoir was an active fishery. The Agency regulates the removal of fish from inland waters in order to protect fisheries and the environment from the impacts of inappropriate fish transfers, disease transmission and poaching. The applicant will require written permission (consent) from us in regards to the draining of the existing reservoir and:

i. removal of fish from any inland water.
ii. Use any fishing instruments, such as nets, traps or electric equipment.

Contaminated Land

The site is a former industrial area where elevated concentrations of contamination may be present and could adversely impact the water environment now and in the future.

Should the site be brought forward for development then land conditions should be considered. We would expect ground investigation to be undertaken prior to the commencement of any in-filling and onwards development.

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Model Procedures and good practice:

Due to the former land use(s), soil and /or groundwater contamination may exist at the site and the associated risks to controlled waters should be addressed by:

1. Following the risk management framework provide in CLR11, Model procedures for the management of land contamination
    - https://www.gov.uk/government/publications/managing-land-contamination
2. Referring to the Environment Agency guiding principles for land contamination and the land contamination sections in the Environment Agency's Groundwater Protection: Principles and Practice
    - https://www.gov.uk/government/publications/managing-and-reducing-land-contamination
    - https://www.gov.uk/government/collections/groundwater-protection
3. Further information may be found on the land contamination technical guidance pages on the direct.gov website
    - https://www.gov.uk/government/collections/land-contamination-technical-guidance

All investigations of land potentially affected by contamination should be carried out by or under the direction of a suitably qualified competent person and in accordance with BS 10175 (2001) Code of practice for the investigation of potentially contaminated sites. The competent person would normally be expected to be chartered member of an appropriate body (such as the Institution of Civil Engineers, Geological Society of London, Royal Institution of Chartered Surveyors, Institution of Environmental Management) and also have relevant experience of investigating contaminated sites. The Specialist in Land Condition (SilC) qualification administered by the Institution of Environmental Management provides an accredited status for those responsible for signing off LCR's. For further information see - www.silc.org.uk
we are keen to work with the developer in resolving any problems or issues that may occur so that any further possible delays are minimise or avoided.

Waste Management

Depending on the material proposed to be used to fill the reservoir, the proposed development may require a Waste Management Licence in accordance with the requirements of the Environmental Protection Act 1990. Further information can be obtained from www.gov.uk

Should you wish to discuss the above comments in further detail or would like a meeting we can do this as part of our cost recovery service which is £100+VAT per hour, per person.

Yours faithfully

Ms Sylvia Whittingham
Planning Advisor

Direct dial 02030250159
Direct e-mail Sylvia.whittingham@environment-agency.gov.uk

End

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

Your Ref: SGARTH/WALMERSLEYRD
Our Ref: 13/ 999160
Date: 19/02/2014

Barratt Manchester

4 Brindley Road, City Park
Manchester

M16 9HQ

FAO: Steve Garth

Dear Sirs

Location: Walmersley Od Road Bury

I acknowledge with thanks your request dated 18/02/14 for information on the location of our services.

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

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

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

Yours Faithfully,

S McManus.

Sue McManus
Operations Manager
Property Searches

TERMS AND CONDITIONS - WASTERWATER & WATER DISTRIBUTION PLANS

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

TERMS AND CONDITIONS:

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

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

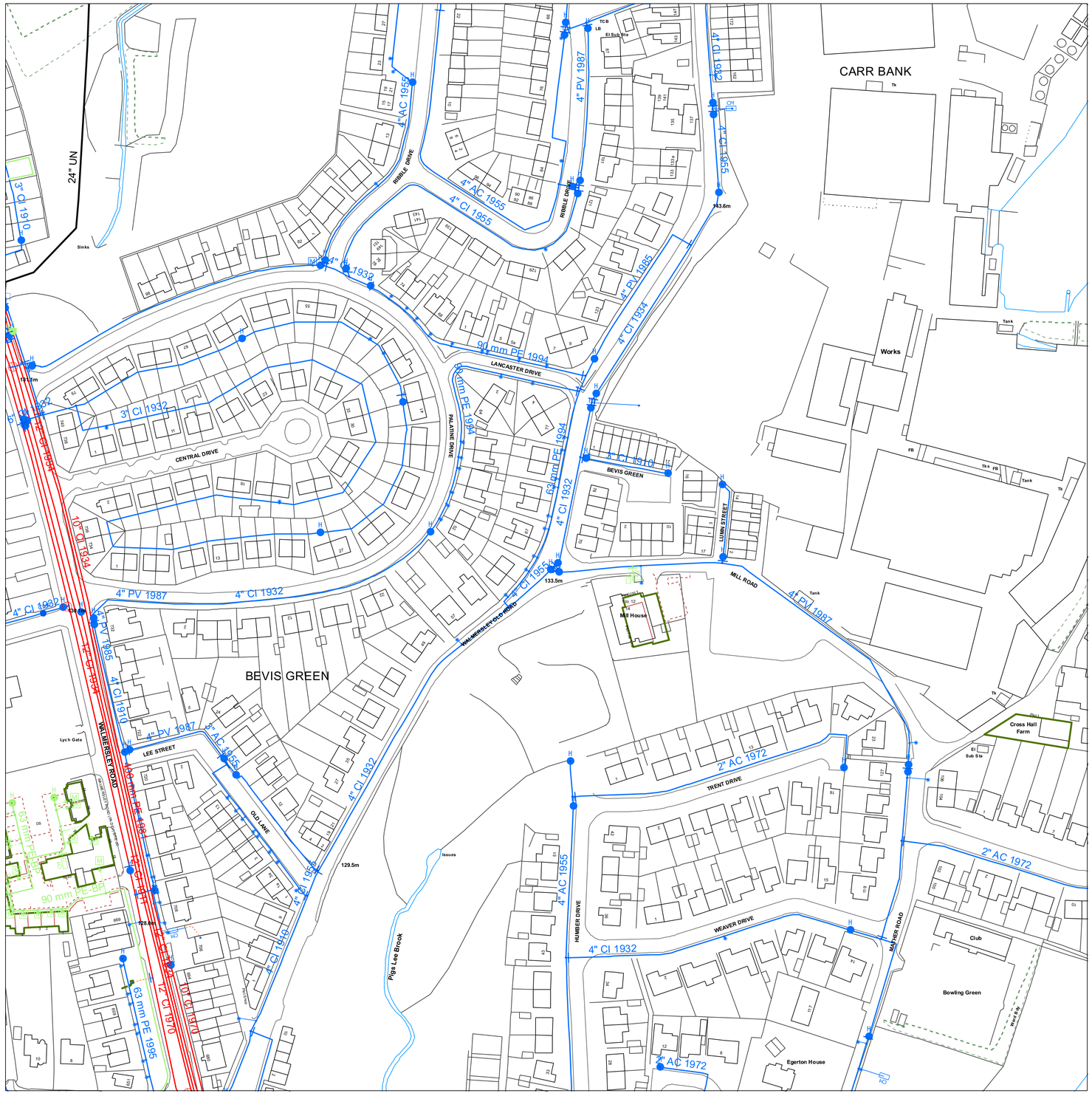
3. In particular, the position and depth of any UUW apparatus shown on the Map are approximate only. UUW strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUW apparatus. The exact location, positions and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

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

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

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

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



OS Sheet No: SD8013NE

Scale: 1: 1250 Date: 19/02/2014

Printed By: Nicola Morris

LEGEND

PIPE WORK

Live	Proposed	
		Trunk Main - PressurisedMain
		Raw Water Aqueduct - PressurisedMain
		Raw Water Aqueduct - GravityMain
		LDTM Raw Water Distribution - PressurisedMain
		LDTM Raw Water Distribution - GravityMain
		LDTM Treated Water Distribution - PressurisedMain
		LDTM Treated Water Distribution - GravityMain
		Private Pipe - LateralLine
		Distribution Main - PressurisedMain
		Comms Pipe - LateralLine
		Concessionary Service - LateralLine

ABANDONED PIPE

- Trunk Main
- Raw Water Aqueduct
- LDTM Raw Water Distribution
- LDTM Treated Water Distribution
- Private Pipe
- Distribution Main
- Comms Pipe
- Concessionary Service

NODES/ FURNITURE

Live	Proposed	
		End Cap
		CC Valve
		AC Valve
		Air Valve
		Sluice Valve
		Non Return Valve
		Pressure Management Valve
		Change of Characteristic
		Anode
		Chlorination Point
		De Chlorination Point
		Bore Hole
Inlet	Inlet	Inlet Point
		Bulk Supply Point
FH	FH	Fire Hydrant
H	H	Hydrant
PFH	PFH	Private Fire Hydrant
		Pump
		Site Termination
		Service Start
		Service End
PM	PM	Process Meter
		Stop Tap
		Monitor Location
SP	SP	Strainer Point
AP	AP	Access Point
HB	HB	Hatch Box
IP	IP	IP Point
RM		Route Marker
SPT	SPT	Sampling Station
LB	LB	Logger Box

PROPERTY TYPES

Live	Proposed	
		Condition Report
PB	PB	Pipe Bridges
BRT	BRT	Tunnels (non carrier)
		Pumping Station
		Water Treatment Works
		Private Treatment Works
VH	VH	Valve House
		Water Tower
SR	SR	Service Reservoir
SUP RES	SUP RES	Supply Reservoir
Inlet AP	Inlet AP	Abstraction Point
M	M	Domestic meter
CM	CM	Commercial meter
T	T	Telemetry Outstation

MATERIAL TYPES

AC	ASBESTOS CEMENT	OT	OTHERS
CI	CAST IRON	PB	LEAD
CU	COPPER	PV	uPVC
CO	CONCRETE	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
GI	GALVANISED IRON	UN	UNKNOWN
GR	GREY IRON	PE	POLYETHYLENE

LINING TYPES

CL	CEMENT LINING	ERL	EPOXY RESIN
TB	TAR OR BITUMEN		

INSERTION TYPES

DD	DIE DRAWN	MO	MOLING
DR	DIRECTIONAL DRILLING	PI	PIPELINE
		SL	SLIP LINED

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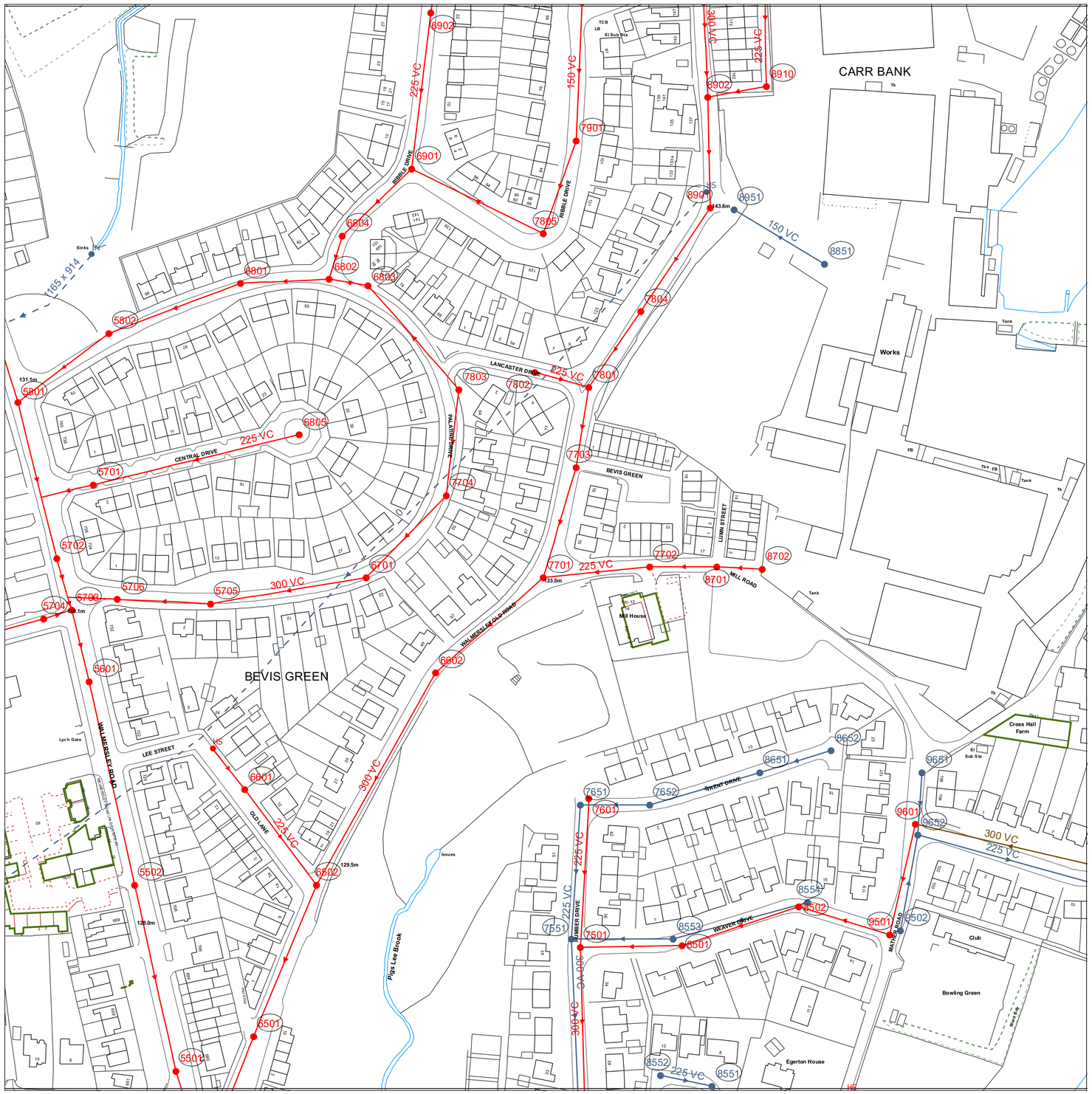
OS Sheet No: SD8013NE

Scale: 1: 1250

Date: 19/02/2014

United Utilities

WATER MAIN RECORDS



Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
5501	127.18	CO	124.06	300		CI	VC	43.97	0
5502	128.5	CO	124.8	300		CI	VC	88.07	0
5601	129.77	CO	126.58	300		CI	VC	96.32	0
5701	130.99	CO	0	225		CI	VC	24.74	7
5702	130.51	CO	127.65	300		CI	VC	18.68	0
5703	130.34	CO	127.23	300		CI	VC	33.96	0
5704	130.34	CO	127.39	300		CI	VC	13.8	0
5705	131.17	CO	129.72	300		CI	VC	43.05	0
5706		CO							
5801	131.05	CO							
5802	131.61	CO							
6501	127.8	CO	124.57	300		CI	VC	62.39	0
6502	129.61	CO							
6601	130.59	CO	128.05	225		CI	VC	55	0
6602	131.96	CO	129.52	300		CI	VC	112.38	0
6701	133.23	CO	132.08	300		CI	VC	72.59	0
6801	134.93	CO	133.53	300		CI	VC	65.19	0
6802	136.22	CO	134.92	225		CI	VC	41.05	0
6803	136.83	CO	135.33	225		CI	VC	18.25	0
6804	137.06	CO	135.45	225		CI	VC	20.88	0
6805	133.73	CO	131.98	225		CI	VC	97.74	0
6901	139.41	CO	137.45	225		CI	VC	44.55	0
6902	141.74	CO							
7501	132.96	CO	130.48	300		CI	VC	69.03	0
7551	133.05	SW	131.07	300		CI	VC	72.06	0
7601	134.66	CO	132.69	225		CI	VC	69.12	0
7651	134.54	SW	132.13	225		CI	VC	62.13	0
7652	135.67	SW	133.82	225		CI	VC	32	0
7701	134.01	CO	130.95	300		CI	VC	66.6	0
7702	135.24	CO	132.68	225		CI	VC	49.25	0
7703	136.13	CO	133.03	300		CI	VC	53.16	0
7704	135.15	CO	133.93	225		CI	VC	53.04	0
7801	138.21	CO	135.54	300		CI	VC	37.48	0
7802	137.7	CO	135.97	225		CI	VC	25.96	0
7803		CO	0	225		CI	VC	49.37	40
7804	140.85	CO	138.16	300		CI	VC	42.44	0
7805	141.41	CO	139.09	225		CI	VC	67.98	0
7901	143.62	CO							
8501	134.49	CO	131.88	300		CI	VC	47.01	0
8502	137.4	CO	133.45	300		CI	VC	56.92	0
8551		SW							
8552	131.25	SW	129.5	225		CI	VC	24.52	0
8553	134.42	SW	132.32	300		CI	VC	47	0
8554	137.09	SW	133.15	300		CI	VC	64.29	0
8651	138	SW	136.03	225		CI	VC	53.16	0
8652	139.16	SW	137.45	225		CI	VC	34.48	0
8701	135.65	CO							
8702	135.89	CO	133.14	225		CI	VC	21.02	0
8851	146.1	SW	144.57	150		CI	VC	48.88	0
8901	143.72	CO	141.03	300		CI	VC	57.69	0
8902	146.17	CO	143.45	300		CI	VC	51.01	0
8910		CO							
8951	143.91	SW							
9501	138.83	CO	134.83	300		CI	VC	43.97	0
9502	138.62	SW	137.62	225		CI	VC	44.72	0
9601	140.2	CO	135.2	300		CI	VC	52.39	0
9651	140.61	SW	139.01	225		CI	VC	29.07	0
9652	140.12	SW	136.22	225		CI	VC	87.09	0
5602		CO	0	225		CI	VC	24.21	9
8903		CO							
8904		SW	0					485.31	
5707		CO							
5708		CO							
5803		SW	1165	914	EG			86.94	

OS Sheet No: SD8013NE

Scale: 1: 1250 Date: 19/02/2014

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WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

Manhole
Manhole, Side Entry
MainSewer, Public
MainSewer, Private
MainSewer, S104
Rising Main, Public
Rising Main, Private
Rising Main, S104
Highway Drain, Private

Foul Surface Combined

WW Site Termination
Air Valve
Cascade
Non Return Valve
Extent of Survey
Flow Meter
Gulley
Hatch Box
Head of System
Hydrobrake / Vortex
Inlet
Inspection Chamber
Bifurcation
Catchpit
Contaminated Surface Water
WW Pumping Station
Sludge Pumping Station
Sewer Overflow
T Junction/Saddle
LampHole
OilInterceptor
PenStock
Pump
RoddingEye
Soakaway
Summit
Valve
Valve Chamber
Washout Chamber
DropShaft
WW Treatment Works
Septic Tank
Vent Column
Network Storage Tank
Orifice Plate
Vortex Chamber
Penstock Chamber
Blind Manhole

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

Foul Surface Combined Overflow

Screen Chamber
Discharge Point
Outfall
Control Kiosk
Unspecified

LEGEND

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

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OS Sheet No: SD8013NE

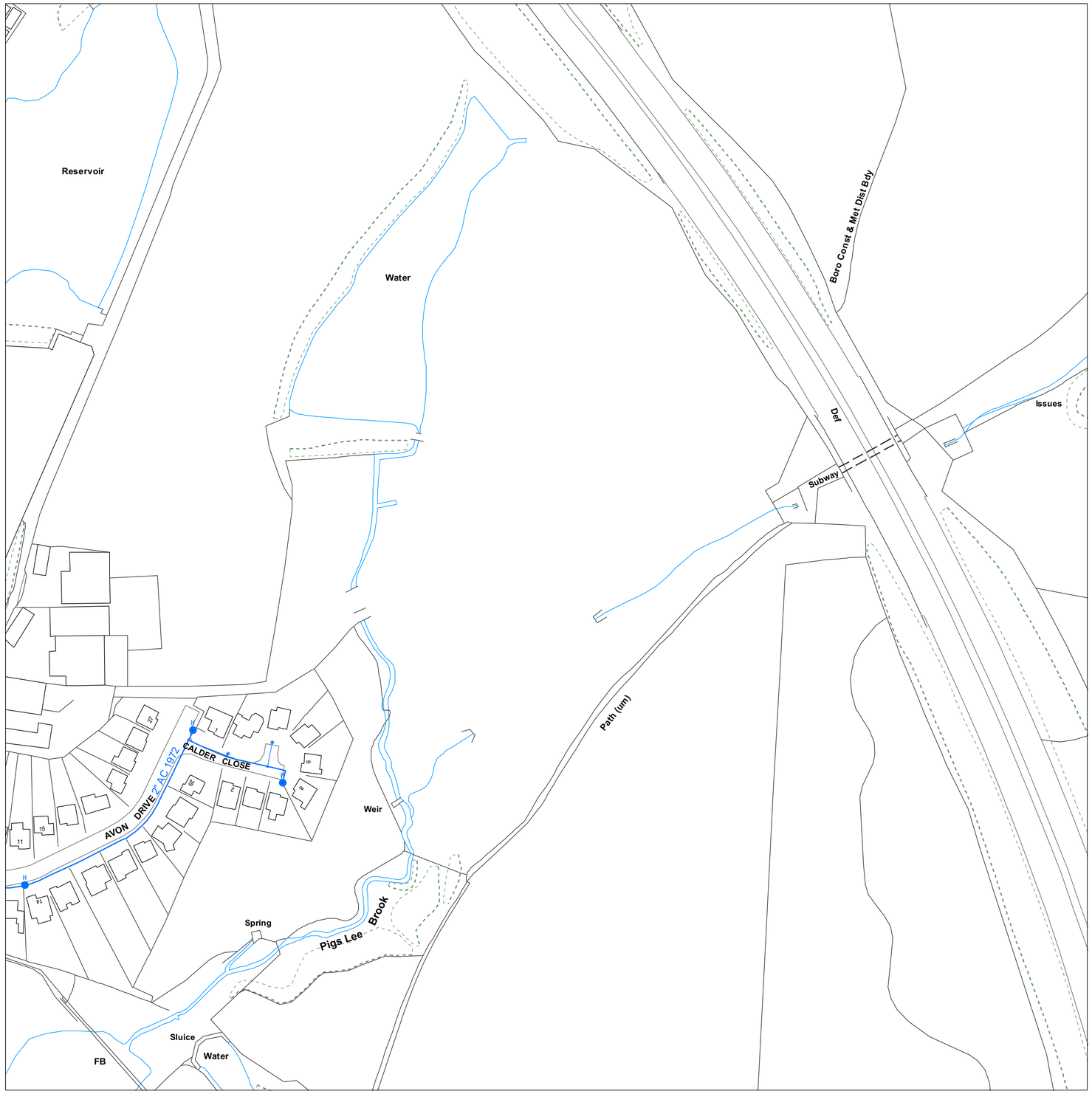
Scale: 1: 1250 Date: 19/02/2014

64 Nodes

Sheet 1 of 1

United Utilities

SEWER RECORDS



OS Sheet No: SD8113NW

Scale: 1: 1250 Date: 19/02/2014

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LEGEND

PIPE WORK

Live	Proposed	
		Trunk Main - PressurisedMain
		Raw Water Aqueduct - PressurisedMain
		Raw Water Aqueduct - GravityMain
		LDTM Raw Water Distribution - PressurisedMain
		LDTM Raw Water Distribution - GravityMain
		LDTM Treated Water Distribution - PressurisedMain
		LDTM Treated Water Distribution - GravityMain
		Private Pipe - LateralLine
		Distribution Main - PressurisedMain
		Comms Pipe - LateralLine
		Concessionary Service - LateralLine

ABANDONED PIPE

- Trunk Main
- Raw Water Aqueduct
- LDTM Raw Water Distribution
- LDTM Treated Water Distribution
- Private Pipe
- Distribution Main
- Comms Pipe
- Concessionary Service

NODES/ FURNITURE

Live	Proposed	
		End Cap
		CC Valve
		AC Valve
		Air Valve
		Sluice Valve
		Non Return Valve
		Pressure Management Valve
		Change of Characteristic
		Anode
		Chlorination Point
		De Chlorination Point
		Bore Hole
Inlet	Inlet	Inlet Point
		Bulk Supply Point
FH	FH	Fire Hydrant
H	H	Hydrant
PFH	PFH	Private Fire Hydrant
		Pump
		Site Termination
		Service Start
		Service End
PM	PM	Process Meter
		Stop Tap
		Monitor Location
SP	SP	Strainer Point
AP	AP	Access Point
HB	HB	Hatch Box
IP	IP	IP Point
RM		Route Marker
SPT	SPT	Sampling Station
LB	LB	Logger Box

PROPERTY TYPES

Live	Proposed	
		Condition Report
PB	PB	Pipe Bridges
BRT	BRT	Tunnels (non carrier)
		Pumping Station
		Water Treatment Works
		Private Treatment Works
VH	VH	Valve House
		Water Tower
SR	SR	Service Reservoir
SUP RES	SUP RES	Supply Reservoir
Inlet AP	Inlet AP	Abstraction Point
M	M	Domestic meter
CM	CM	Commercial meter
T	T	Telemetry Outstation

MATERIAL TYPES

AC	ASBESTOS CEMENT	OT	OTHERS
CI	CAST IRON	PB	LEAD
CU	COPPER	PV	uPVC
CO	CONCRETE	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
GI	GALVANISED IRON	UN	UNKNOWN
GR	GREY IRON	PE	POLYETHYLENE

LINING TYPES

CL	CEMENT LINING	ERL	EPOXY RESIN
TB	TAR OR BITUMEN		

INSERTION TYPES

DD	DIE DRAWN	MO	MOLING
DR	DIRECTIONAL DRILLING	PI	PIPELINE
		SL	SLIP LINED

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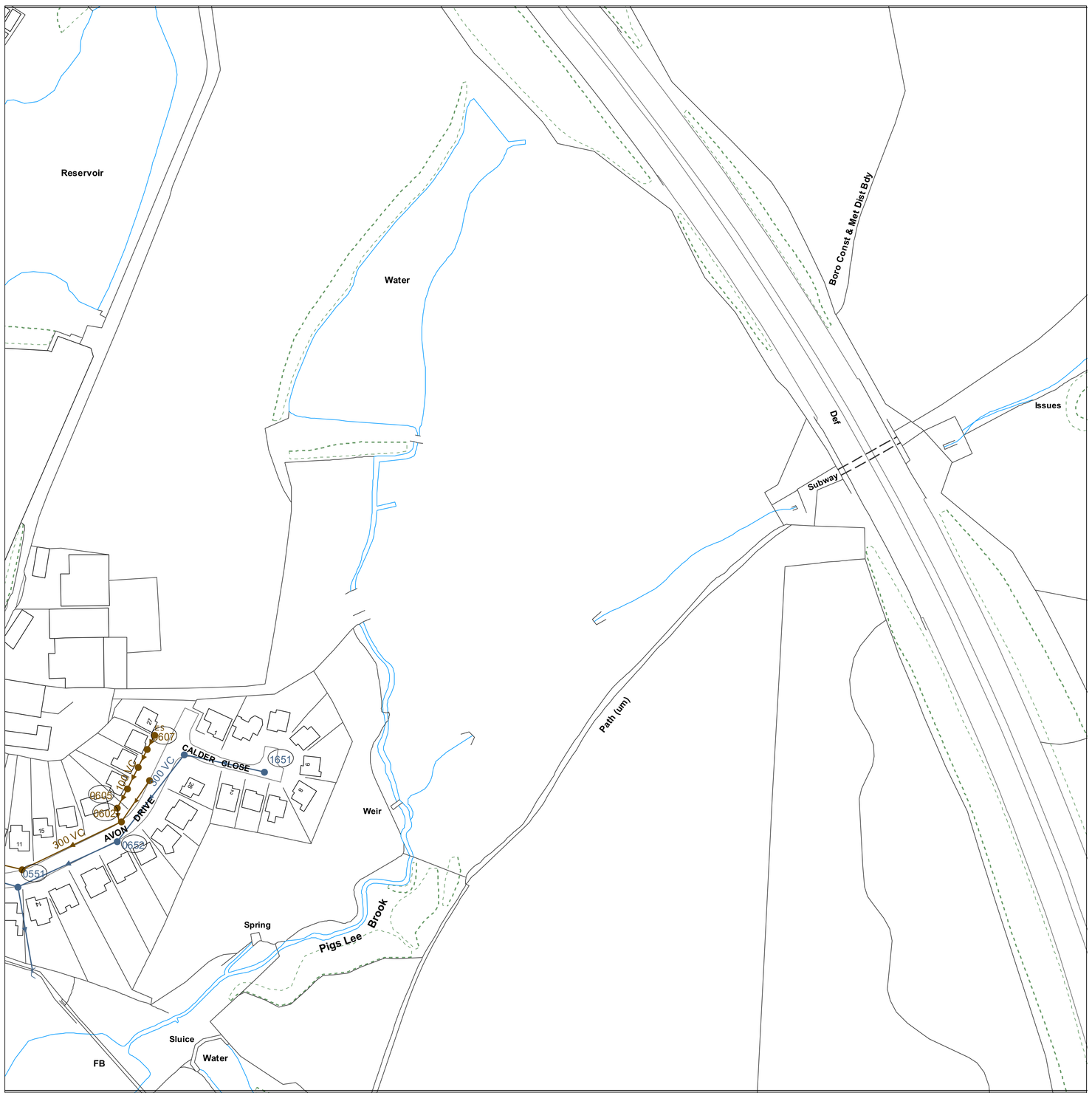
OS Sheet No: SD8113NW

Scale: 1: 1250

Date: 19/02/2014

United Utilities

WATER MAIN RECORDS



Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
0551	138.59	SW							
0601	139.98	FO	136.93	300		CI	VC	23.02	0
0602	138.37	FO							
0603	138.84	FO							
0605		FO							
0607		FO		100		CI	VC	9.39	
0608		FO							
0609		FO		100		CI	VC	10.14	
0651	140.39	SW	136.52	300		CI	VC	50.61	0
0652	138.48	SW							
1651	138.57	SW	136.99	300		CI	VC	37.85	0
0606		FO							

Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad

OS Sheet No: SD8113NW

Scale: 1: 1250 Date: 19/02/2014

Printed By: Nicola Morris

WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

Manhole
Manhole, Side Entry
MainSewer, Public
MainSewer, Private
MainSewer, S104
Rising Main, Public
Rising Main, Private
Rising Main, S104
Highway Drain, Private

Foul Surface Combined

WW Site Termination
Air Valve
Cascade
Non Return Valve
Extent of Survey
Flow Meter
Gulley
Hatch Box
Head of System
Hydrobrake / Vortex
Inlet
Inspection Chamber
Bifurcation
Catchpit
Contaminated Surface Water
WW Pumping Station
Sludge Pumping Station
Sewer Overflow
T Junction/Saddle
LampHole
OilInterceptor
PenStock
Pump
RoddingEye
Soakaway
Summit
Valve
Valve Chamber
Washout Chamber
DropShaft
WW Treatment Works
Septic Tank
Vent Column
Network Storage Tank
Orifice Plate
Vortex Chamber
Penstock Chamber
Blind Manhole
Foul Surface Combined Overflow
Screen Chamber
Discharge Point
Outfall

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

Control Kiosk
Unspecified

LEGEND

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

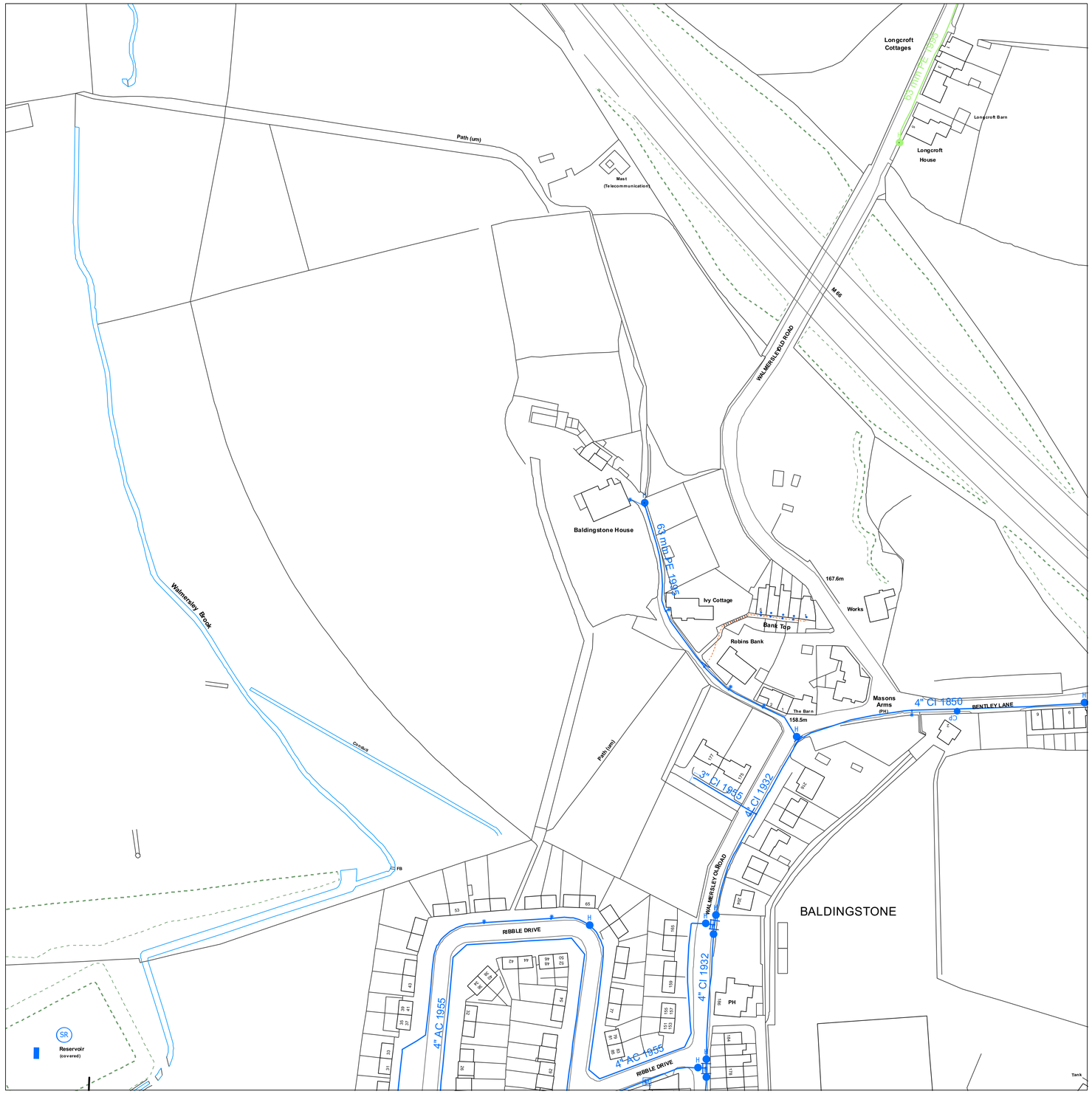
AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
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CSU	Concrete Segment Unbolted	PP	Polypropylene
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PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

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OS Sheet No: SD8113NW
Scale: 1: 1250 Date: 19/02/2014
12 Nodes
Sheet 1 of 1

United Utilities

SEWER RECORDS



OS Sheet No: SD8014SE

Scale: 1: 1250 Date: 19/02/2014

Printed By: Nicola Morris

LEGEND

PIPE WORK

Live	Proposed	
		Trunk Main - PressurisedMain
		Raw Water Aqueduct - PressurisedMain
		Raw Water Aqueduct - GravityMain
		LDTM Raw Water Distribution - PressurisedMain
		LDTM Raw Water Distribution - GravityMain
		LDTM Treated Water Distribution - PressurisedMain
		LDTM Treated Water Distribution - GravityMain
		Private Pipe - LateralLine
		Distribution Main - PressurisedMain
		Comms Pipe - LateralLine
		Concessionary Service - LateralLine

ABANDONED PIPE

- Trunk Main
- Raw Water Aqueduct
- LDTM Raw Water Distribution
- LDTM Treated Water Distribution
- Private Pipe
- Distribution Main
- Comms Pipe
- Concessionary Service

NODES/ FURNITURE

Live	Proposed	
		End Cap
		CC Valve
		AC Valve
		Air Valve
		Sluice Valve
		Non Return Valve
		Pressure Management Valve
		Change of Characteristic
		Anode
		Chlorination Point
		De Chlorination Point
		Bore Hole
Inlet	Inlet	Inlet Point
		Bulk Supply Point
FH	FH	Fire Hydrant
H	H	Hydrant
PFH	PFH	Private Fire Hydrant
		Pump
		Site Termination
		Service Start
		Service End
PM	PM	Process Meter
		Stop Tap
		Monitor Location
SP	SP	Strainer Point
AP	AP	Access Point
HB	HB	Hatch Box
IP	IP	IP Point
RM		Route Marker
SPT	SPT	Sampling Station
LB	LB	Logger Box

PROPERTY TYPES

Live	Proposed	
		Condition Report
PB	PB	Pipe Bridges
PT	PT	Tunnels (non carrier)
		Pumping Station
		Water Treatment Works
		Private Treatment Works
VH	VH	Valve House
		Water Tower
SR	SR	Service Reservoir
SUP RES	SUP RES	Supply Reservoir
Inlet AP	Inlet AP	Abstraction Point
M	M	Domestic meter
CM	CM	Commercial meter
T	T	Telemetry Outstation

MATERIAL TYPES

AC	ASBESTOS CEMENT	OT	OTHERS
CI	CAST IRON	PB	LEAD
CU	COPPER	PV	uPVC
CO	CONCRETE	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
GI	GALVANISED IRON	UN	UNKNOWN
GR	GREY IRON	PE	POLYETHYLENE

LINING TYPES

CL	CEMENT LINING	ERL	EPOXY RESIN
TB	TAR OR BITUMEN		

INSERTION TYPES

DD	DIE DRAWN	MO	MOLING
DR	DIRECTIONAL DRILLING	PI	PIPELINE
		SL	SLIP LINED

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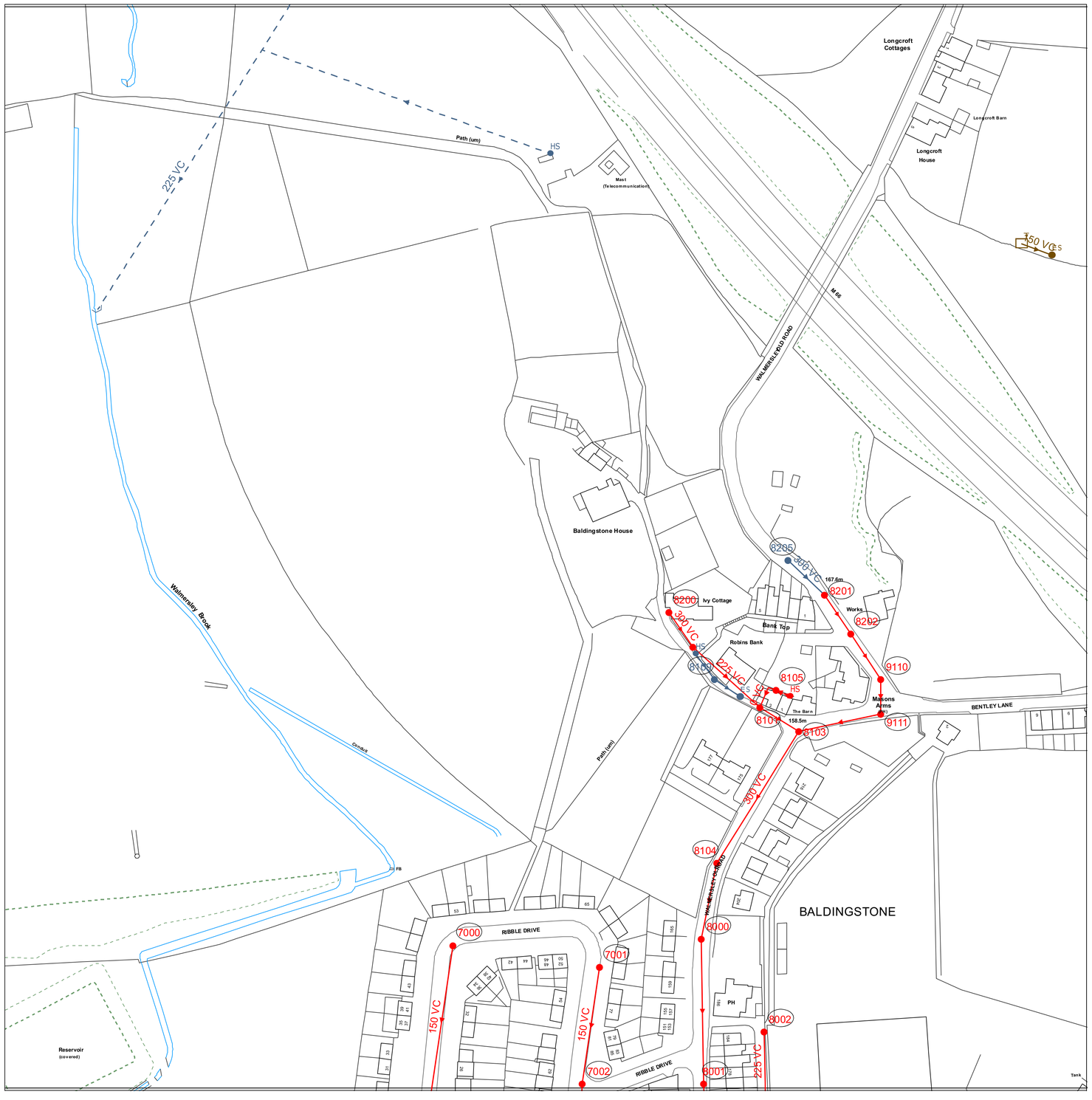
OS Sheet No: SD8014SE

Scale: 1: 1250

Date: 19/02/2014

United Utilities

WATER MAIN RECORDS



Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
7000	145.29	CO	143.75	150		CI	VC	69.72	0
7001	147	CO	145.43	150		CI	VC	54.59	0
7002	145.41	CO							
8000	150.76	CO							
8001	148.28	CO							
8002		CO	0	225		CI	VC	63.01	16
8101	159.07	CO							
8103	158.05	CO							
8104	152.53	CO							
8105		CO		0		CI	VC	13.63	
8109		SW							
8200	163.51	CO	0	300		CI	VC	19.42	22
8201	167.79	CO	165.66	300		CI	VC	21.63	0
8202	165.8	CO							
8203	161.7	CO	159.57	225		CI	VC	41.77	0
8205		SW	0	300		CI	VC	23.35	26
9110	163.28	CO							
9111	161.56	CO							
7401		SW		225			VC	141.4	
8102		CO							
8106		CO							
8206		SW	0	150		CI	VC	15	9
6401		SW							
9301		FO	0	150		CI	VC	14.99	9

Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad

WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

Manhole
Manhole, Side Entry
MainSewer, Public
MainSewer, Private
MainSewer, S104
Rising Main, Public
Rising Main, Private
Rising Main, S104
Highway Drain, Private

Foul Surface Combined

WW Site Termination
Air Valve
Cascade
Non Return Valve
Extent of Survey
Flow Meter
Gulley
Hatch Box
Head of System
Hydrobrake / Vortex
Inlet
Inspection Chamber
Bifurcation
Catchpit
Contaminated Surface Water
WW Pumping Station
Sludge Pumping Station
Sewer Overflow
T Junction/Saddle
LampHole
OilInterceptor
PenStock
Pump
RoddingEye
Soakaway
Summit
Valve
Valve Chamber
Washout Chamber
DropShaft
WW Treatment Works
Septic Tank
Vent Column
Network Storage Tank
Orifice Plate
Vortex Chamber
Penstock Chamber
Blind Manhole
Foul Surface Combined Overflow
Screen Chamber
Discharge Point
Outfall
Control Kiosk
Unspecified

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

LEGEND

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

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OS Sheet No: SD8014SE
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24 Nodes
Sheet 1 of 1

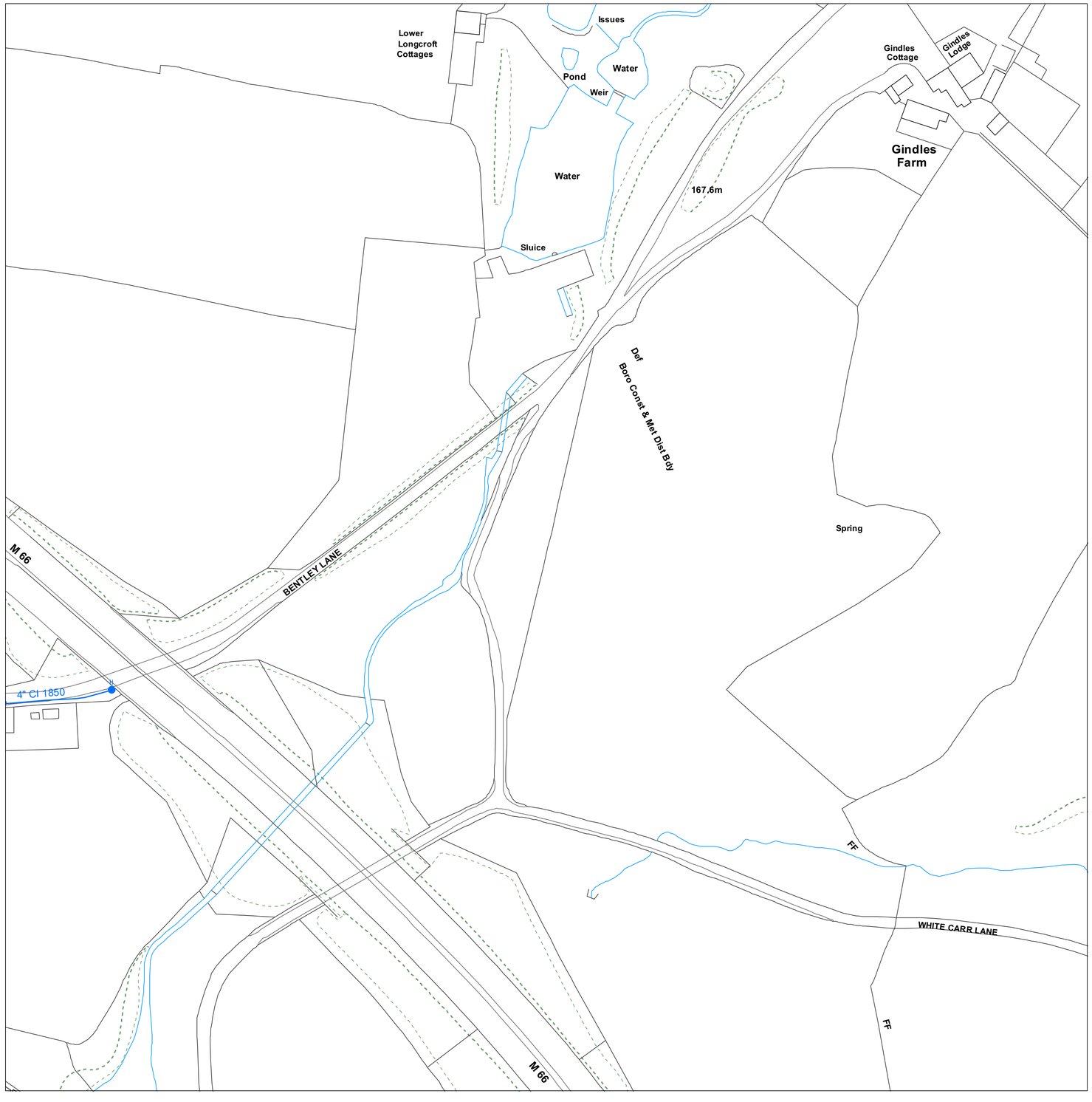
United Utilities

SEWER RECORDS

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OS Sheet No: SD8014SE

Scale: 1: 1250 Date: 19/02/2014



OS Sheet No: SD8114SW

Scale: 1: 1250 Date: 19/02/2014

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LEGEND

PIPE WORK

Live	Proposed	
		Trunk Main - PressurisedMain
		Raw Water Aqueduct - PressurisedMain
		Raw Water Aqueduct - GravityMain
		LDTM Raw Water Distribution - PressurisedMain
		LDTM Raw Water Distribution - GravityMain
		LDTM Treated Water Distribution - PressurisedMain
		LDTM Treated Water Distribution - GravityMain
		Private Pipe - LateralLine
		Distribution Main - PressurisedMain
		Comms Pipe - LateralLine
		Concessionary Service - LateralLine

ABANDONED PIPE

- Trunk Main
- Raw Water Aqueduct
- LDTM Raw Water Distribution
- LDTM Treated Water Distribution
- Private Pipe
- Distribution Main
- Comms Pipe
- Concessionary Service

NODES/ FURNITURE

Live	Proposed	
		End Cap
		CC Valve
		AC Valve
		Air Valve
		Sluice Valve
		Non Return Valve
		Pressure Management Valve
		Change of Characteristic
		Anode
		Chlorination Point
		De Chlorination Point
		Bore Hole
Inlet	Inlet	Inlet Point
		Bulk Supply Point
FH	FH	Fire Hydrant
H	H	Hydrant
PFH	PFH	Private Fire Hydrant
		Pump
		Site Termination
		Service Start
		Service End
PM	PM	Process Meter
		Stop Tap
		Monitor Location
SP	SP	Strainer Point
AP	AP	Access Point
HB	HB	Hatch Box
IP	IP	IP Point
RM		Route Marker
SPT	SPT	Sampling Station
LB	LB	Logger Box

PROPERTY TYPES

Live	Proposed	
		Condition Report
PB	PB	Pipe Bridges
PT	PT	Tunnels (non carrier)
		Pumping Station
		Water Treatment Works
		Private Treatment Works
VH	VH	Valve House
		Water Tower
SR	SR	Service Reservoir
SUP RES	SUP RES	Supply Reservoir
Inlet AP	Inlet AP	Abstraction Point
M	M	Domestic meter
CM	CM	Commercial meter
T	T	Telemetry Outstation

MATERIAL TYPES

AC	ASBESTOS CEMENT	OT	OTHERS
CI	CAST IRON	PB	LEAD
CU	COPPER	PV	uPVC
CO	CONCRETE	SI	SPUN IRON
DI	DUCTILE IRON	ST	STEEL
GI	GALVANISED IRON	UN	UNKNOWN
GR	GREY IRON	PE	POLYETHYLENE

LINING TYPES

CL	CEMENT LINING	ERL	EPOXY RESIN
TB	TAR OR BITUMEN		

INSERTION TYPES

DD	DIE DRAWN	MO	MOLING
DR	DIRECTIONAL DRILLING	PI	PIPELINE
		SL	SLIP LINED

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OS Sheet No: SD8114SW

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Date: 19/02/2014

United Utilities

WATER MAIN RECORDS

Conditions and information regarding water distribution apparatus

These general conditions and precautions apply to the water distribution system of United Utilities.

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

1. United Utilities provides approximate locations of its water mains or apparatus according to its records. These records are not necessarily accurate or complete nor do they normally show the positions of private service pipes from the mains to properties. Where service pipes are shown, a blue broken line indicates their approximate position. No person or company shall be relieved from liability for any damage caused by reason of the actual positions and/or depths being different from those indicated.

2. Special requirements relative to our apparatus may be indicated. United Utilities employees will visit any site at reasonable notice to assist in the location of its underground water apparatus and advise any precautions that may be required to obviate any damage. To arrange a visit or for further information regarding new supplies, connections, diversions, costing, future proposals for construction of company apparatus or any notification required under these General Conditions, please telephone us on **0845 746 2200** or write to United Utilities, PO Box 453, Warrington, WA5 3QN.

3. In order to achieve safe working conditions adjacent to any water apparatus the following should be observed;

(a) All water apparatus should be located by hand digging prior to the use of mechanical excavation.

(b) During construction work where heavy plant may have to cross the line of a water main, and the main is not under a carriageway of adequate standard of construction, crossing points should be suitably reinforced with sleepers, steel plates or a specially constructed reinforced concrete raft as necessary. These crossing points should be clearly indicated and crossing the line of the water main at other places should be prevented. United Utilities employees will advise on the type of reinforcement necessary. This is particularly important on agricultural or open land, where tilling or erosion may have significantly reduced the original cover.

(c) No explosive should be used within 32 metres of any United Utilities apparatus without prior consultation with United Utilities.

(d) Where it is proposed to carry out piling within 15 metres of any water main United Utilities should be consulted so that the affected main may be surveyed.

4. During any excavation, it is important that measures should be taken to ensure continued support for any water main:

(a) Where excavation of trenches adjacent to any water main is likely to affect its support, the main must be supported to the satisfaction of United Utilities.

(b) Where a trench is excavated crossing or parallel to the line of a water main, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the main. In special cases it may be necessary to provide permanent support to a main which has been exposed over the length of the excavation before back-filling and reinstatement is carried out. No back-filled concrete should contact the main.

5. No other apparatus should be laid over and along the line of a water main irrespective of clearance. A minimum clearance of 450 millimetres should be allowed between any plant being installed and an existing main, to facilitate maintenance and repair, whether the adjacent plant is parallel to or crossing the main. No manhole, chamber, or other obstruction should be built over or around a water main.

6. Where a water main is coated with special wrapping and the wrapping is damaged, even to a minor extent, United Utilities must be notified, and the excavation must be left open for ready access so that repairs can be made. In case of any material damage to the main itself causing leakage, or weakening of the mechanical strength of the pipe, the person or body responsible should immediately notify United Utilities in order that the necessary remedial work can be carried out. The full cost of the necessary remedial work will be charged to the person or body responsible for the damage.

7. If you propose to change existing levels over water mains you will need to inform us. We will need specific locations to be identified together with precise details as to the scale of the proposed changes to existing ground levels. Changes to existing levels may require the diversion of our apparatus at your cost. However, in certain circumstances we may wish to leave our apparatus where it is. On these occasions you will usually be required to protect our apparatus by means of a concrete raft and either raise or lower any surface boxes affected.

8. Under no circumstances should our surface boxes be either buried or left in a situation where they are raised above finished ground levels. You should re-use and re-set any surface boxes affected by your works into the new surface so that they align over the water apparatus below. You will be responsible for the cost of repairing any damage to our apparatus as a result of your works.

9. Where proposals involve resurfacing, you must notify United Utilities if your excavation will be greater than 750mm in the highway and 300mm in a footpath, verge or other location.

10. For information regarding easements, deeds, grants, licences or wayleaves, please write to United Utilities Property Solutions, Coniston Buildings, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3UU (**Tel 01925 731 365**).

Tree planting restrictions over water mains

a) Poplar and willow trees have extensive root systems and should not be planted within 10 metres of any water main.

b) The following trees and those of a similar size, whether they are deciduous or evergreen, should not be be planted within six metres of any water main:
• Ash, beech, birch, elm, horse chestnut, lime, oak, sycamore;
• Apple trees and pear trees;
• Most conifers.

c) United Utilities requires access to the route of its mains at all times to inspect for leaks and carry out surveys.
We recommend that no shrubs or bushes which might obstruct or interfere with our access should be planted within one metre of the centre line of any water main.

d) There may be instances when both United Utilities and the landowner will wish to plant shrubs or bushes close to the water main for screening or other purposes. The following shallow rooting shrubs would be suitable for this purpose:
• Blackthorn, broom, cotoneaster, elder;
• Hazel, laurel, privet, quickthorn, snowberry;
• Most ornamental flowering shrubs.

e) In areas where soft fruit is grown, blackcurrant, raspberries and gooseberries may be planted close to the main, provided that a path is left clear for inspection access and surveys. United Utilities can give additional advice where required in particular circumstances.

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Lingley Green Avenue, Great Sankey, Warrington WA5 3LP
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helping life flow smoothly

Conditions and information regarding wastewater network

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

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

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

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

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

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

5. Where there is a public sewer along the line of a proposed development/building, arrangements shall be made by the developer at his cost to divert the sewer around the development. Where this is not possible and as a last resort, a “Building Over Agreement” will need to be completed under section 18 of the Building Act 1984. The developer shall design building foundations to ensure that no additional loading is transferred to the sewer and submit such details both to the Local Authority’s Building Control Officer and to United Utilities for approval/acceptance. United Utilities on a rechargeable basis would normally undertake all aspects of design work associated with the diversion of any part of the operational wastewater network. For further advice please call asset protection on **01925 678 306**

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

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

8. Your attention is drawn also to the following:

• Private drains or sewers which may be within the site. On 1 October 2011 all privately owned sewers and lateral drains which communicate with (that is drain to) an existing public sewer as at 1 July 2011 will become the responsibility of the sewerage undertaker. This includes private sewers upstream of pumping stations that have yet to transfer, but excludes lengths of sewer or drain that are the subject of an on-going appeal or which have been excluded from transfer as a result of an appeal or which are on or under land opted-out by a Crown body. The transfer specifically excludes sewers and lateral drains owned by a railway undertaker. Sewers upstream of such assets, however, are transferred. Such assets may not be recorded on the public sewer record currently as it was not a requirement to keep records of previously private sewers and drains.

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

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

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

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

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

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

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

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

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

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

11. For information regarding easements, deeds, grants or wayleaves please write to United Utilities Property Solutions, Coniston Buildings, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3UU (**Tel: 01925 731 365**).

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CCTV Culvert Survey

Pig Lee Tributary,
Off Walmersley Old Road,
Bury

Job No: SALE1308031

25th October 2012

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

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Executive Summary

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CCTV SURVEY – EXECUTIVE SUMMARY

Client:	Environment Agency	NFCDD Ref:	01313PIGT0101B02
Site Address:	Pig Lee Trib, Off Walmersley Old Road, Bury	Contact:	Mark Whittaker
Date of Report:	25th October 2012	Job No:	SALE1308031

Objective

A CCTV survey was undertaken by Aquajet (GB) Ltd using Man assisted CCTV techniques. This was conducted on behalf of the Environment Agency.

The purpose of the survey was to determine the route of the culvert and to visually ascertain the condition of the culvert/headwalls.

Location and Description

Pedestrian and vehicle access to the culvert is gained via Tetrosyl for the Inlet (ladders are required), and opposite 27 Walmersley Old Road for the Outlet.

The culvert flows in a North Easterly direction from the Inlet, the direction then changes to Southerly and continues to MH01. The direction then changes to Westerly and continues to MH01 where just after it changes again to South Westerly and continues to flow to the Outlet which is situated opposite 27 Walmersley Old Road.

The Inlet headwall is of concrete and brick construction and appears to be in good condition.
The Outlet headwall is of masonry construction but is covered in moss so we are therefore unable to comment on the condition.

The following information should be viewed in conjunction with the CCTV report.

The culvert is made up of the following:

1. Outlet upstream to MH01 – Date of Survey: 17-09-12 - Weather: Dry - Flow Level: Low

- The culvert is 1200mm circular brick construction.
- There is infiltration gushing at 15.9m.
- There is infiltration dripping at 15.9m and 26.9m.
- There is medium encrustation at various points in the length.
- There is medium scale from a connection at 120.2m.
- The survey was completed at 158.8m.

Observations & Anomalies

Service defects have been recorded on this length. We were unable to obtain GPS for the Outlet due to trees. The complete frame of MH01 had to be removed to survey as the cover had seized.

2. MH01 upstream to MH02 – Date of Survey: 17-09-12 - Weather: Dry - Flow Level: Low

- The culvert is 2500mm x 1300mm rectangular masonry in regular courses construction.
- The culvert changes to a 2220mm x 1300mm arched masonry randomly coursed construction at 2.0m.
- There are missing bricks approximately every 1.0m starting at 2.0m through to 95.3m.
- The invert steps up twice at 82.7m.
- The dimensions of the culvert change to 2600mm x 1600mm at 83.7m.
- The invert steps up at 95.3m.
- The survey was abandoned as communication was lost due to step up of invert at 95.3m.

CCTV SURVEY – EXECUTIVE SUMMARY

Client:	Environment Agency	NFCDD Ref:	01313PIGT0101B02
Site Address:	Pig Lee Trib, Off Walmersley Old Road, Bury	Contact:	Mark Whittaker
Date of Report:	25th October 2012	Job No:	SALE1308031

Observations & Anomalies

Service and structural defects have been recorded on this length. The complete frame of MH01 had to be removed to survey as the cover had seized. We were unable to obtain GPS for MH02.

3. MH02 downstream to MH01 – Date of Survey: 18-09-12 - Weather: Showers - Flow Level: Low

- The culvert is 1700mm x 2800mm rectangular masonry randomly coursed construction.
- There is a metal corrugated soffit at 0.0m.
- There are missing bricks at 2.0m.
- There is a connection with an intrusion of 30mm at 2.0m.
- The culvert changes to an arched 1800mm x 280mm construction at 2.0m.
- The invert steps down twice at 2.0m.
- The invert steps down at 6.9m.
- The dimensions of the culvert change to 2600mm x 1600mm at 10.8m.
- The invert steps down at 27.3m.
- The survey was abandoned as due to the overlap being completed at 27.3m.

Observations & Anomalies

Structural and constructional defects have been recorded on this length. The complete frame of MH01 had to be removed to survey as the cover had seized. We were unable to gain GPS for MH02.

4. MH02 upstream to Inlet – Date of Survey: 18-09-12 - Weather: Showers - Flow Level: Low

- The culvert is 1100mm x 900mm rectangular masonry in regular courses construction.
- There is a flagged soffit at 2.0m.
- There is a small chamber with metal bars visible at 8.3m.
- The culvert changes to a 1000mm x 1100mm masonry randomly coursed construction at 9.1m.
- The dimensions of the culvert change to 1070mm x 900mm at 22.1m.
- The width at 10 o'clock – 2 o'clock is 600mm at 22.1m.
- There is a blind chamber at 34.7m.
- There is an exiting blind chamber at 37.8m.
- There are intruding connections at various points in the length.
- There is a blind chamber at 54.7m.
- The dimensions of the culvert change to 100mm x 900mm at 54.7m.
- The dimensions of the culvert change to 1300mm x 1000mm at 56.7m.
- The material of the culvert changes to brick on the right hand side of the wall at 56.7.
- Benching starts on the right hand side at 56.7m and finishes at 100.8m.
- The culvert changes to a 100mm x 1100mm masonry randomly coursed construction at 60.5m.
- The dimensions of the culvert change to 1750mm x 1100mm at 62.5m.
- There are services across the culvert at 63.2m, 65.5m and 93.4m.
- There is brick 9 o'clock – 3 o'clock at 66.3m.
- There is infiltration gushing at 88.5m and 94.2m.
- The dimensions of the culvert change to 1250mm x 1500mm at 100.8m.
- The brick at 10 o'clock – 2 o'clock stops at 100.8m.
- There are metal brackets attached to the soffit at 104.9m, 107.6m and 136.3m.
- There is a beam across the soffit at 114.4m.

CCTV SURVEY – EXECUTIVE SUMMARY

Client:	Environment Agency	NFCDD Ref:	01313PIGT0101B02
Site Address:	Pig Lee Trib, Off Walmersley Old Road, Bury	Contact:	Mark Whittaker
Date of Report:	25th October 2012	Job No:	SALE1308031

- The culvert changes to a 1500mm x 1500mm square culvert at 117.8m.
- There is medium encrustation at 153.2m.
- There is infiltration running at 153.2m.
- The survey was completed at 163.7m.

Observations & Anomalies

Service and constructional defects have been recorded on this length. We were unable to gain access to the Inlet as ladders are required. We were unable to obtain GPS at MH02 or the Inlet.

Recommendations

Our survey has highlighted debris, encrustation and scale which need removed using high pressure water removal. Our survey has also highlighted gushing and running infiltrations and also missing bricks which will all require remedial works. There were a number of dripping infiltrations which will require monitoring over the next twelve months. Our survey has also highlighted a number of intruding connections, however as the do not impede the flow no works will be required.

Health & Safety

We were unable to gain access to the Inlet and the Outlet is covered in moss so we are unable to comment on the condition of the headwalls.

Remaining Life

Culvert – Visually assessed in excess as between 3 and 5 years, subject to our recommendations.

Note:

This report is compiled from information provided by our trained and certified CCTV operators.

Thank you for using Aquajet (GB) Ltd

Executive Summary produced by J. Warren

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Area Plan

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Grade Defect Report

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Grade Defect Report

Aquajet (GB) Ltd, Retford, Nottinghamshire, DN22 6HG, Tel: 01777 701335, Fax: 01777 701344 // E.A, SALE1308031,Pig Lee Trib.mdb

	Place	Road	start MH	Flow	end MH	Position	Observation	grade
1	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Start of Survey	0
2	BURY	OFF MILL ROAD	MH02	u/s	INLET	0	Start of Survey	0
3	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	0	Start of Survey	0
4	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	Start of Survey	0
5	BURY	OFF MILL ROAD	MH02	u/s	INLET	0	Manhole Remark: MH02	0
6	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Manhole Remark: MH01	0
7	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	Manhole Remark: MH02	0
8	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	0	Manhole Remark: OUTLET	0
9	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	0	Water level, 10 % height/diameter	0
10	BURY	OFF MILL ROAD	MH02	u/s	INLET	0	Water level, 15 % height/diameter	0
11	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	Water level, 10 % height/diameter	0
12	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Water level, 05 % height/diameter	0
13	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	General Observation, Remark: METAL CORRAGATED SOFFIT	0
14	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	2	General Condition photograph	0
15	BURY	OFF MILL ROAD	MH02	u/s	INLET	2	General Condition photograph	0
16	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	General Condition photograph	0
17	BURY	OFF MILL ROAD	MH02	d/s	MH01	0	General Condition photograph	0
18	BURY	OFF MILL ROAD	MH02	u/s	INLET	2	General Observation, Remark: FLAGGED SOFFIT	0
19	BURY	OFF MILL ROAD	MH02	u/s	INLET	7.3	General Condition photograph	0
20	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Dimension of sewer changes, new dimension dia 2220 mm, Remark: X 1300MM	0
21	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Sewer shape changes at this point, Remark: ARCHED	0
22	BURY	OFF MILL ROAD	MH02	u/s	INLET	8.3	General Observation, Remark: SMALL CHAMBER ON LEFT METAL BARS VISIBLE	0
23	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	14.1	General Condition photograph	0
24	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Sewer shape changes at this point, Remark: ARCHED	0
25	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Sewer Material changes at this point, Masonry - rand. coursed	0
26	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	Line of Sewer deviates right, Remark: SHARP	0
27	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	Dimension of sewer changes, new dimension dia 1000 mm, Remark: X 1100MM	0
28	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Dimension of sewer changes, new dimension dia 1800 mm, Remark: X 2800MM	0
29	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	Sewer Material changes at this point, Masonry - rand. coursed	0
30	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	22.5	Line of Sewer deviates left, Remark: SHARP	0
31	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	General Observation, Remark: INVERT STEPS DOWN X 2	0
32	BURY	OFF MILL ROAD	MH02	u/s	INLET	9.1	General Condition photograph	0
33	BURY	OFF MILL ROAD	MH02	d/s	MH01	6.9	General Observation, Remark: INVERT STEPS DOWN 1.0M APPROX	0
34	BURY	OFF MILL ROAD	MH01	u/s	MH02	16.2	General Condition photograph	0
35	BURY	OFF MILL ROAD	MH02	d/s	MH01	9.9	Connection, at 03 o´clock, dia 450 mm, Remark: X 300MM	0
36	BURY	OFF MILL ROAD	MH01	u/s	MH02	16.2	General Observation, Remark: TIMBER ACROSS CULVERT 10 - 02 O'CLOCK	0
37	BURY	OFF MILL ROAD	MH02	u/s	INLET	20	General Condition photograph	0
38	BURY	OFF MILL ROAD	MH01	u/s	MH02	22.7	Connection, at 02 o´clock, dia 225 mm	0
39	BURY	OFF MILL ROAD	MH02	d/s	MH01	10.8	Line of Sewer deviates right, Remark: GRADUAL	0
40	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	Connection, at 11 o´clock, dia 100 mm	0

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	Place	Road	start MH	Flow	end MH	Position	Observation	grade
41	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	Dimension of sewer changes, new dimension dia 1070 mm, Remark: X 900MM	0
42	BURY	OFF MILL ROAD	MH02	d/s	MH01	10.8	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	0
43	BURY	OFF MILL ROAD	MH01	u/s	MH02	26.7	Connection, at 08 o´clock, dia 225 mm, Remark: X 225MM LIVE	0
44	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	32.3	Line of Sewer deviates left, Remark: QUITE SHARP	0
45	BURY	OFF MILL ROAD	MH02	d/s	MH01	10.8	General Condition photograph	0
46	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	32.3	General Condition photograph	0
47	BURY	OFF MILL ROAD	MH01	u/s	MH02	26.7	General Condition photograph	0
48	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	General Observation, Remark: 10 - 02 O'CLOCK WIDTH 600MM	0
49	BURY	OFF MILL ROAD	MH02	u/s	INLET	22.1	General Condition photograph	0
50	BURY	OFF MILL ROAD	MH02	d/s	MH01	15	Connection, at 09 o´clock, dia 225 mm	0
51	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	39.5	Line of Sewer deviates right, Remark: QUITE SHARP	0
52	BURY	OFF MILL ROAD	MH01	u/s	MH02	31.8	General Condition photograph	0
53	BURY	OFF MILL ROAD	MH02	u/s	INLET	26.8	Connection, at 11 o´clock, dia 100 mm	0
54	BURY	OFF MILL ROAD	MH02	d/s	MH01	17.5	Connection, at 03 o´clock, dia 225 mm, Remark: X 225MM	0
55	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	39.5	General Condition photograph	0
56	BURY	OFF MILL ROAD	MH01	u/s	MH02	44.7	General Condition photograph	0
57	BURY	OFF MILL ROAD	MH02	u/s	INLET	26.8	General Condition photograph	0
58	BURY	OFF MILL ROAD	MH01	u/s	MH02	52.1	Connection, at 10 o´clock, dia 150 mm	0
59	BURY	OFF MILL ROAD	MH02	d/s	MH01	20	General Condition photograph	0
60	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	44.3	Line of Sewer deviates right, Remark: SHARP	0
61	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	44.3	General Condition photograph	0
62	BURY	OFF MILL ROAD	MH02	u/s	INLET	34.7	General Observation, Remark: BLIND CHAMBER	0
63	BURY	OFF MILL ROAD	MH02	d/s	MH01	20	Line of Sewer deviates right, Remark: GRADUAL	0
64	BURY	OFF MILL ROAD	MH01	u/s	MH02	61.7	General Condition photograph	0
65	BURY	OFF MILL ROAD	MH01	u/s	MH02	69.9	Connection, at 12 o´clock, dia 225 mm, Remark: LIVE	0
66	BURY	OFF MILL ROAD	MH02	d/s	MH01	26.9	Connection, at 02 o´clock, dia 500 mm, Remark: X 300MM	0
67	BURY	OFF MILL ROAD	MH01	u/s	MH02	69.9	Line of Sewer deviates right, Remark: SLIGHT	0
68	BURY	OFF MILL ROAD	MH02	d/s	MH01	27.3	General Observation, Remark: INVERT STEPS DOWN	0
69	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	52.3	General Condition photograph	0
70	BURY	OFF MILL ROAD	MH02	u/s	INLET	37.8	General Observation, Remark: EXITING BLIND CHAMBER	0
71	BURY	OFF MILL ROAD	MH02	u/s	INLET	37.8	General Condition photograph	0
72	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	70.1	General Condition photograph	0
73	BURY	OFF MILL ROAD	MH02	d/s	MH01	27.3	Survey abandoned, Remark: OVERLAP COMPLETED	0
74	BURY	OFF MILL ROAD	MH01	u/s	MH02	73.8	Connection, at 09 o´clock, dia 100 mm	0
75	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	83	General Condition photograph	0
76	BURY	OFF MILL ROAD	MH01	u/s	MH02	80.5	General Condition photograph	0
77	BURY	OFF MILL ROAD	MH01	u/s	MH02	82.7	Connection, at 04 o´clock, dia 600 mm, Remark: X 450MM	0
78	BURY	OFF MILL ROAD	MH02	u/s	INLET	48.6	General Condition photograph	0
79	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	95.4	General Condition photograph	0
80	BURY	OFF MILL ROAD	MH01	u/s	MH02	82.7	General Observation, Remark: INVERT STEPS UP TWICE	0

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	Place	Road	start MH	Flow	end MH	Position	Observation	grade
81	BURY	OFF MILL ROAD	MH02	u/s	INLET	54.7	General Observation, Remark: BLIND CHAMBER	0
82	BURY	OFF MILL ROAD	MH01	u/s	MH02	83.7	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	0
83	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	103	Line of Sewer deviates right, Remark: SHARP	0
84	BURY	OFF MILL ROAD	MH01	u/s	MH02	87.8	Line of Sewer deviates right, Remark: QUITE SHARP	0
85	BURY	OFF MILL ROAD	MH02	u/s	INLET	54.7	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 900MM	0
86	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	103	General Condition photograph	0
87	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	Dimension of sewer changes, new dimension dia 1300 mm, Remark: X 1000MM	0
88	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	116	General Condition photograph	0
89	BURY	OFF MILL ROAD	MH01	u/s	MH02	91.3	General Condition photograph	0
90	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	General Observation, Remark: INVERT STEPS UP	0
91	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	120.2	Connection, at 10 o´clock, dia 225 mm	0
92	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	General Condition photograph	0
93	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	Sewer Material changes at this point, Brick, Remark: RIGHTSIDE WALL	0
94	BURY	OFF MILL ROAD	MH02	u/s	INLET	56.7	General Observation, Remark: BENCHING STARTS ON RIGHTSIDE	0
95	BURY	OFF MILL ROAD	MH02	u/s	INLET	60.5	Sewer Material changes at this point, Masonry - rand. coursed, Remark: RIGHTSIDE WALL	0
96	BURY	OFF MILL ROAD	MH02	u/s	INLET	60.5	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 1100MM	0
97	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Survey abandoned, Remark: LOSS OF COMMUNICATION DUE TO STEP UP OF INVERT	0
98	BURY	OFF MILL ROAD	MH02	u/s	INLET	61.8	Line of Sewer deviates left, Remark: SHARP	0
99	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	General Condition photograph	0
100	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	138	General Condition photograph	0
101	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	150.9	General Condition photograph	0
102	BURY	OFF MILL ROAD	MH02	u/s	INLET	62.5	Dimension of sewer changes, new dimension dia 1750 mm, Remark: X 1100MM	0
103	BURY	OFF MILL ROAD	MH02	u/s	INLET	63.2	General Observation, Remark: SERVICE ACROSS CULVERT 11 - 01O'CLOCK	0
104	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	158.8	Manhole Remark: MH01	0
105	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	158.8	Finish Survey	0
106	BURY	OFF MILL ROAD	MH02	u/s	INLET	65.5	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	0
107	BURY	OFF MILL ROAD	MH02	u/s	INLET	66.3	General Observation, Remark: BRICK 09 - 03 O'CLOCK	0
108	BURY	OFF MILL ROAD	MH02	u/s	INLET	70.3	Connection, at 01 o´clock, dia 100 mm	0
109	BURY	OFF MILL ROAD	MH02	u/s	INLET	70.3	General Condition photograph	0
110	BURY	OFF MILL ROAD	MH02	u/s	INLET	82.1	General Condition photograph	0
111	BURY	OFF MILL ROAD	MH02	u/s	INLET	91.1	Connection, at 10 o´clock, dia 150 mm	0
112	BURY	OFF MILL ROAD	MH02	u/s	INLET	91.1	General Condition photograph	0
113	BURY	OFF MILL ROAD	MH02	u/s	INLET	93.4	Connection, at 10 o´clock, dia 100 mm	0
114	BURY	OFF MILL ROAD	MH02	u/s	INLET	93.4	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	0
115	BURY	OFF MILL ROAD	MH02	u/s	INLET	94.2	General Condition photograph	0
116	BURY	OFF MILL ROAD	MH02	u/s	INLET	96.5	Connection, at 08 o´clock, dia 150 mm, Remark: LIVE	0
117	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.7	Line of Sewer deviates left, Remark: QUITE SHARP	0
118	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	General Observation, Remark: BENCHING ON RIGHT STOPS	0
119	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	Dimension of sewer changes, new dimension dia 1250 mm, Remark: X 1500MM	0
120	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	General Condition photograph	0

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	Place	Road	start MH	Flow	end MH	Position	Observation	grade
121	BURY	OFF MILL ROAD	MH02	u/s	INLET	100.8	General Observation, Remark: BRICK STOPS 10 - 02 O'CLOCK	0
122	BURY	OFF MILL ROAD	MH02	u/s	INLET	104.1	Connection, at 11 o´clock, dia 150 mm	0
123	BURY	OFF MILL ROAD	MH02	u/s	INLET	104.9	General Observation, Remark: 2 X METAL BRACKETS ATTATCHED TO SOFFIT	0
124	BURY	OFF MILL ROAD	MH02	u/s	INLET	107.6	General Observation, Remark: METAL BRACKET ATTATCHED TO SOFFIT	0
125	BURY	OFF MILL ROAD	MH02	u/s	INLET	112.2	Line of Sewer deviates left, Remark: SHARP	0
126	BURY	OFF MILL ROAD	MH02	u/s	INLET	112.2	General Condition photograph	0
127	BURY	OFF MILL ROAD	MH02	u/s	INLET	114.4	General Observation, Remark: BEAM ACROSS SOFFIT	0
128	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	Line of Sewer deviates right, Remark: SHARP	0
129	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	General Condition photograph	0
130	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	Dimension of sewer changes, new dimension dia 1500 mm, Remark: X 1500MM	0
131	BURY	OFF MILL ROAD	MH02	u/s	INLET	117.8	Sewer shape changes at this point, Remark: SQUARE	0
132	BURY	OFF MILL ROAD	MH02	u/s	INLET	130	General Condition photograph	0
133	BURY	OFF MILL ROAD	MH02	u/s	INLET	136.3	General Observation, Remark:3 X METAL BEAMS ACROSS SOFFIT	0
134	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.1	Connection, at 12 o´clock, dia 150 mm	0
135	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.5	Water level, 20 % height/diameter	0
136	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.5	General Condition photograph	0
137	BURY	OFF MILL ROAD	MH02	u/s	INLET	150.4	Line of Sewer deviates left, Remark: SHARP	0
138	BURY	OFF MILL ROAD	MH02	u/s	INLET	150.4	General Condition photograph	0
139	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.3	General Condition photograph	0
140	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.7	Manhole Remark: INLET	0
141	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.7	Finish Survey	0
142	BURY	OFF MILL ROAD	MH01	u/s	MH02	0	Light Scale from 07 to 05 o´clock, Start, Remark: CLOCKS VARY	1
143	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	2	Light Scale from 03 to 05 o´clock, Start, Remark: CLOCKS VARY	1
144	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	2	Light Scale from 07 to 09 o´clock, Start, Remark: CLOCKS VARY	1
145	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Light Scale from 07 to 05 o´clock, Finish, Remark: CLOCKS VARY	1
146	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	Light Scale from 03 to 05 o´clock, Finish, Remark: CLOCKS VARY	1
147	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	Light Scale from 07 to 09 o´clock, Finish, Remark: CLOCKS VARY	1
148	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	124.3	Light Scale from 07 to 05 o´clock, Start, Remark: CLOCKS VARY	1
149	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	158.8	Light Scale from 07 to 05 o´clock, Finish, Remark: CLOCKS VARY	1
150	BURY	OFF MILL ROAD	MH02	u/s	INLET	120.4	Debris, 10 % cross-sectional area loss, Start, Remark: RUBBLE	1
151	BURY	OFF MILL ROAD	MH02	u/s	INLET	141.5	Debris, 20 % cross-sectional area loss, Changed, Remark: RUBBLE	1
152	BURY	OFF MILL ROAD	MH02	u/s	INLET	146.6	Debris, 25 % cross-sectional area loss, Remark: ROCKS ON LEFT	1
153	BURY	OFF MILL ROAD	MH02	u/s	INLET	146.6	Debris, 15 % cross-sectional area loss, Changed, Remark: RUBBLE	1
154	BURY	OFF MILL ROAD	MH02	u/s	INLET	156.6	Debris, 25 % cross-sectional area loss, Remark: ROCK	1
155	BURY	OFF MILL ROAD	MH02	u/s	INLET	163.7	Debris, 15 % cross-sectional area loss, Finish, Remark: RUBBLE	1
156	BURY	OFF MILL ROAD	MH02	u/s	INLET	34.7	Obstruction, 50 % height/diameter loss, Remark: SERVICE ACROSS CULVERT	2
157	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	15.9	Infiltration Dripping at 12 o´clock	3
158	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	26.9	Infiltration Dripping at 12 o´clock	3
159	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Connection, at 11 o´clock, dia 150 mm, intrusion 30 mm	4
160	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	22.5	Encrustation medium, from 03 to 05 o´clock, 15% cross-sectional area loss	4

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	Place	Road	start MH	Flow	end MH	Position	Observation	grade
161	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	26.9	Encrustation medium, from 10 to 12 o´clock, 10% cross-sectional area loss	4
162	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	52.3	Encrustation medium, from 11 to 12 o´clock, 10% cross-sectional area loss	4
163	BURY	OFF MILL ROAD	MH02	u/s	INLET	40.8	Connection, at 11 o´clock, dia 150 mm, intrusion 80 mm	4
164	BURY	OFF MILL ROAD	MH02	u/s	INLET	41.3	Connection, at 11 o´clock, dia 100 mm, intrusion 50 mm	4
165	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	86.7	Encrustation medium, from 07 to 09 o´clock, 10% cross-sectional area loss	4
166	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	120.2	Medium Scale from 07 to 10 o´clock, 10% cross-sectional area loss, Remark: FROM CONN	4
167	BURY	OFF MILL ROAD	MH02	u/s	INLET	62	Connection, at 01 o´clock, dia 225 mm, intrusion 50 mm	4
168	BURY	OFF MILL ROAD	MH02	u/s	INLET	62.5	Connection, at 10 o´clock, dia 225 mm, intrusion 40 mm	4
169	BURY	OFF MILL ROAD	MH02	u/s	INLET	66.3	Connection, at 02 o´clock, dia 100 mm, intrusion 500 mm	4
170	BURY	OFF MILL ROAD	MH02	u/s	INLET	74	Connection, at 10 o´clock, dia 225 mm, intrusion 60 mm	4
171	BURY	OFF MILL ROAD	MH02	u/s	INLET	77.2	Connection, at 01 o´clock, dia 150 mm, intrusion 60 mm	4
172	BURY	OFF MILL ROAD	MH02	u/s	INLET	78.1	Connection, at 10 o´clock, dia 150 mm, intrusion 40 mm	4
173	BURY	OFF MILL ROAD	MH02	u/s	INLET	82.1	Connection, at 11 o´clock, dia 100 mm, intrusion 60 mm	4
174	BURY	OFF MILL ROAD	MH02	u/s	INLET	85	Connection, at 10 o´clock, dia 150 mm, intrusion 50 mm, Remark: LIVE	4
175	BURY	OFF MILL ROAD	MH02	u/s	INLET	92.4	Connection, at 03 o´clock, dia 150 mm, intrusion 80 mm, Remark: LIVE	4
176	BURY	OFF MILL ROAD	MH02	u/s	INLET	93.4	Infiltration Running from 07 to 10 o´clock	4
177	BURY	OFF MILL ROAD	MH02	u/s	INLET	99.5	Connection, at 09 o´clock, dia 150 mm, intrusion 30 mm	4
178	BURY	OFF MILL ROAD	MH02	u/s	INLET	101.8	Connection, at 01 o´clock, dia 100 mm, intrusion 30 mm, Remark: LIVE	4
179	BURY	OFF MILL ROAD	MH02	u/s	INLET	110.9	Connection, at 03 o´clock, dia 150 mm, intrusion 30 mm	4
180	BURY	OFF MILL ROAD	MH02	u/s	INLET	146.1	Connection, at 11 o´clock, dia 100 mm, intrusion 350 mm	4
181	BURY	OFF MILL ROAD	MH02	u/s	INLET	151.4	Connection, at 02 o´clock, dia 100 mm, intrusion 300 mm	4
182	BURY	OFF MILL ROAD	MH02	u/s	INLET	151.4	Connection, at 03 o´clock, dia 400 mm, intrusion 200 mm	4
183	BURY	OFF MILL ROAD	MH02	u/s	INLET	153.2	Encrustation medium, from 04 to 05 o´clock, 10% cross-sectional area loss	4
184	BURY	OFF MILL ROAD	MH02	u/s	INLET	153.2	Infiltration Running from 04 to 05 o´clock	4
185	BURY	OFF MILL ROAD	MH02	d/s	MH01	2	Missing bricks at 09 o´clock	5
186	BURY	OFF WALMERSLEY OLD ROAD	OUTLET	u/s	MH01	15.9	Infiltration Gushing at 12 o´clock	5
187	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Missing bricks at 02 o´clock, Start, Remark: EVERY 1.0M APPROX	5
188	BURY	OFF MILL ROAD	MH01	u/s	MH02	2	Missing bricks at 10 o´clock, Start, Remark: EVERY 1.0M APPROX	5
189	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Missing bricks at 02 o´clock, Finish, Remark: EVERY 1.0M APPROX	5
190	BURY	OFF MILL ROAD	MH01	u/s	MH02	95.3	Missing bricks at 10 o´clock, Finish, Remark: EVERY 1.0M APPROX	5
191	BURY	OFF MILL ROAD	MH02	u/s	INLET	88.5	Infiltration Gushing at 07 o´clock	5
192	BURY	OFF MILL ROAD	MH02	u/s	INLET	94.2	Infiltration Gushing at 10 o´clock	5
193	BURY	OFF MILL ROAD	MH02	u/s	INLET	98.6	Infiltration Gushing at 08 o´clock	5

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

WinCan Report (3rd Edition)

The WinCan Report is printed on 100% recycled paper

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Retford
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Project-information

Project name:	Contract number:	Contact:	Date:
Environment Agency	**1308031**	**Mark Whittaker**	**31/12/2005**

Client	**Environment Agency**
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Site	**NFCDD: 01313PIGT0101B02**
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Inspection report

Date:	Job N°:	Weather:	Operator:	section number:	PLR:
17.09.2012	**1308031**	**Dry**	**G.Smith**	**1**	**MH01 X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	

Road:	**OFF WALMERSLEY OLD ROAD**	Division:		start MH:	**OUTLET**
Place:	**BURY**	District:	**NW**	end MH:	**MH01**
Location:	**Difficult access**	Tape No.:	**AQSER**	Total length:	**158.8 m**

Purpose:	**Asset condition**	Shape/Size:	**Circular 1200**
Use:	**Watercourse**	Material:	**Brick** Pipe length:
Catchment:		Lining:	
		Category:	

Comment: **01313PIGT0101B02**

Location details: **Pig Lee Trib**

Depth: 1.60



1:527 position		code	observation	MPEG	photo	grade
OUTLET						
0.00		ST	Start of Survey	00:00:00		(Misc) 0
0.00		MH	Manhole Remark: OUTLET	00:00:00		(Constr) 0
0.00		WL	Water level, 10 % height/diameter	00:00:00		(Serv) 0
2.00		GP	General Condition photograph	00:00:28	4_4a	(Misc) 0
2.00	**S1**	ESL	Light Scale from 03 to 05 o´clock, Start, Remark: CLOCKS VARY	00:00:34	5_5a	(Serv) 1
2.00	**S2**	ESL	Light Scale from 07 to 09 o´clock, Start, Remark: CLOCKS VARY	00:00:34	6_6a	(Serv) 1
14.10		GP	General Condition photograph	00:01:48	7_7a	(Misc) 0
15.90		IG	Infiltration Gushing at 12 o´clock	00:02:11	8_8a	(Serv) 5
15.90		ID	Infiltration Dripping at 12 o´clock	00:02:15	9_9a	(Serv) 3
22.50		LL	Line of Sewer deviates left, Remark: SHARP	00:02:56		(Serv) 0
22.50		EM	Encrustation medium, from 03 to 05 o´clock, 15% cross-sectional area loss	00:02:57	11_11a	(Serv) 4
26.90		EM	Encrustation medium, from 10 to 12 o´clock, 10% cross-sectional area loss	00:03:36	12_12a	(Serv) 4
26.90		ID	Infiltration Dripping at 12 o´clock	00:03:39	13_13a	(Serv) 3
32.30		LL	Line of Sewer deviates left, Remark: QUITE SHARP	00:04:18		(Serv) 0
32.30		GP	General Condition photograph	00:04:21	15_15a	(Misc) 0
39.50		LR	Line of Sewer deviates right, Remark: QUITE SHARP	00:05:05		(Serv) 0
39.50		GP	General Condition photograph	00:05:05	17_17a	(Misc) 0
44.30		LR	Line of Sewer deviates right, Remark: SHARP	00:05:45		(Serv) 0
44.30		GP	General Condition photograph	00:05:45	19_19a, b	(Misc) 0
52.30		EM	Encrustation medium, from 11 to 12 o´clock, 10% cross-sectional area loss	00:06:42	20_20a	(Serv) 4
52.30		GP	General Condition photograph	00:06:52	21_21a	(Misc) 0
70.10		GP	General Condition photograph	00:08:44	22_22a	(Misc) 0

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Inspection report

Date:	Job nr.:	Weather:	Operator:	section number:	PLR:
17.09.2012	**1308031**	**Dry**	**G.Smith**	**1**	**MH01 X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	



1:527 position		code	observation	MPEG	photo	grade
83.00		GP	General Condition photograph	00:10:13	23_23a	(Misc) 0
86.70		EM	Encrustation medium, from 07 to 09 o´clock, 10% cross-sectional area loss	00:11:08	24_24a	(Serv) 4
95.40		GP	General Condition photograph	00:12:14	25_25a	(Misc) 0
103.00		LR	Line of Sewer deviates right, Remark: SHARP	00:13:18		(Serv) 0
103.00		GP	General Condition photograph	00:13:18	27_27a	(Misc) 0
116.00		GP	General Condition photograph	00:14:39	28_28a	(Misc) 0
120.20		CN	Connection, at 10 o´clock, dia 225 mm	00:15:22		(Constr) 0
120.20		ESM	Medium Scale from 07 to 10 o´clock, 10% cross-sectional area loss, Remark: FROM CONNECTION	00:15:22	30_30a	(Serv) 4
124.30	F1	ESL	Light Scale from 03 to 05 o´clock, Finish, Remark: CLOCKS VARY	00:16:09		(Serv) 1
124.30	F2	ESL	Light Scale from 07 to 09 o´clock, Finish, Remark: CLOCKS VARY	00:16:09		(Serv) 1
124.30	S3	ESL	Light Scale from 07 to 05 o´clock, Start, Remark: CLOCKS VARY	00:16:09		(Serv) 1
124.30		GP	General Condition photograph	00:16:10	34_34a	(Misc) 0
138.00		GP	General Condition photograph	00:17:50	35_35a	(Misc) 0
150.90		GP	General Condition photograph	00:19:29	36_36a	(Misc) 0
158.80	F3	ESL	Light Scale from 07 to 05 o´clock, Finish, Remark: CLOCKS VARY	00:21:00		(Serv) 1
158.80		MH	Manhole Remark: MH01	00:21:00	38_38a, b	(Constr) 0
158.80		FH	Finish Survey	00:21:27		(Misc) 0

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

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Inspection report

Date:	Job N°:	Weather:	Operator:	section number:	PLR:
17/09/2012	**1308031**	**Dry**	**G.Smith**	**2**	**MH02 X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	

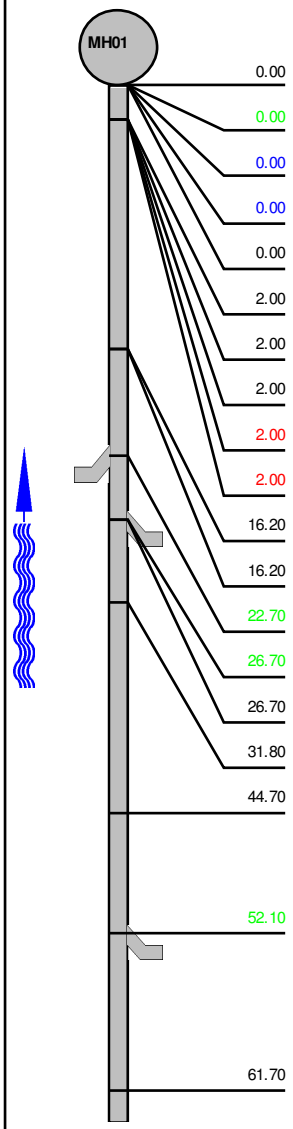
Road:	**OFF MILL ROAD**	Division:		start MH:	**MH01**
Place:	**BURY**	District:	**NW**	end MH:	**MH02**
Location:	**Difficult access**	Tape No.:	**AQSER**	Total length:	**122.6 m**

Purpose:	**Asset condition**	Shape/Size:	**Rectangular 2500/1300**	
Use:	**Watercourse**	Material:	**Masonry - in reg. courses**	Pipe length:
Catchment:		Lining:		
		Category:		

Comment: **01313PIGT0101B02**

Location details: **Pig Lee Trib**

Depth: 13.36



1:465 position		code	observation	MPEG	photo	grade
0.00		ST	Start of Survey	00:00:00		(Misc) 0
0.00		MH	Manhole Remark: MH01	00:00:00		(Constr) 0
0.00		WL	Water level, 05 % height/diameter	00:00:00		(Serv) 0
0.00	**S1**	ESL	Light Scale from 07 to 05 o´clock, Start, Remark: CLOCKS VARY	00:00:00		(Serv) 1
0.00		GP	General Condition photograph	00:00:24	76_5a	(Misc) 0
2.00		DC	Dimension of sewer changes, new dimension dia 2220 mm, Remark: X 1300MM	00:00:55		(Misc) 0
2.00		SC	Sewer shape changes at this point, Remark: ARCHED	00:01:03		(Misc) 0
2.00		MC	Sewer Material changes at this point, Masonry - rand. coursed	00:01:04		(Misc) 0
2.00	**S2**	MB	Missing bricks at 02 o´clock, Start, Remark: EVERY 1.0M APPROX	00:01:05	80_9a	(Struct) 5
2.00	**S3**	MB	Missing bricks at 10 o´clock, Start, Remark: EVERY 1.0M APPROX	00:01:05	81_10a	(Struct) 5
16.20		GP	General Condition photograph	00:02:07	82_11a	(Misc) 0
16.20		GO	General Observation, Remark: TIMBER ACROSS CULVERT 10 - 02 O'CLOCK	00:02:20	83_12a	(Misc) 0
22.70		CN	Connection, at 02 o´clock, dia 225 mm	00:02:52		(Constr) 0
26.70		CN	Connection, at 08 o´clock, dia 225 mm, Remark: X 225MM LIVE	00:03:13		(Constr) 0
26.70		GP	General Condition photograph	00:03:19	86_15a	(Misc) 0
31.80		GP	General Condition photograph	00:03:49	87_16a	(Misc) 0
44.70		GP	General Condition photograph	00:04:41	88_17a	(Misc) 0
52.10		CN	Connection, at 10 o´clock, dia 150 mm	00:05:38		(Constr) 0
61.70		GP	General Condition photograph	00:06:20	90_19a	(Misc) 0

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Inspection report

Date:	Job nr.:	Weather:	Operator:	section number:	PLR:
17/09/2012	**1308031**	**Dry**	**G.Smith**	**2**	**MH02 X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	



1:465 position		code	observation	MPEG	photo	grade
69.90		CN	Connection, at 12 o´clock, dia 225 mm, Remark: LIVE	00:06:56		(Constr) 0
69.90		LR	Line of Sewer deviates right, Remark: SLIGHT	00:06:56		(Serv) 0
73.80		CN	Connection, at 09 o´clock, dia 100 mm	00:07:19		(Constr) 0
80.50		GP	General Condition photograph	00:07:56	94_23a	(Misc) 0
82.70		CN	Connection, at 04 o´clock, dia 600 mm, Remark: X 450MM	00:08:33		(Constr) 0
82.70		GO	General Observation, Remark: INVERT STEPS UP TWICE	00:08:47	96_25a, b	(Misc) 0
83.70		DC	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	00:08:00		(Misc) 0
87.80		LR	Line of Sewer deviates right, Remark: QUITE SHARP	00:10:26	2_27a	(Serv) 0
91.30		GP	General Condition photograph	00:11:06	2_28a	(Misc) 0
95.30		GO	General Observation, Remark: INVERT STEPS UP	00:11:44		(Misc) 0
95.30	F1	ESL	Light Scale from 07 to 05 o´clock, Finish, Remark: CLOCKS VARY	00:11:45		(Serv) 1
95.30	F2	MB	Missing bricks at 02 o´clock, Finish, Remark: EVERY 1.0M APPROX	00:11:47		(Struct) 5
95.30	F3	MB	Missing bricks at 10 o´clock, Finish, Remark: EVERY 1.0M APPROX	00:11:47		(Struct) 5
95.30		SA	Survey abandoned, Remark: LOSS OF COMMUNICATION DUE TO STEP UP OF INVERT	00:11:55	2_33a	(Misc) 0

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

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Inspection report

Date:	Job N°:	Weather:	Operator:	section number:	PLR:
18/09/2012	**1308031**	**Showers**	**G.Smith**	**3**	**MH02 X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	

Road:	**OFF MILL ROAD**	Division:		start MH:	**MH02**
Place:	**BURY**	District:	**NW**	end MH:	**MH01**
Location:	**Warehouse**	Tape No.:	**AQSER**	Total length:	**122.6 m**

Purpose:	**Asset condition**	Shape/Size:	**Rectangular 1700/2800**	
Use:	**Watercourse**	Material:	**Masonry - rand. coursed**	Pipe length:
Catchment:		Lining:		
		Category:		

Comment: **01313PIGT0101B02**

Location details: **Pig Lee Trib**

Depth: 2.22



1:200 position		code	observation	MPEG	photo	grade
0.00		ST	Start of Survey	00:00:00		(Misc) 0
0.00		MH	Manhole Remark: MH02	00:00:00		(Constr) 0
0.00		WL	Water level, 10 % height/diameter	00:00:00		(Serv) 0
0.00		GO	General Observation, Remark: METAL CORRAGATED SOFFIT	00:00:24	108_4a	(Misc) 0
0.00		GP	General Condition photograph	00:00:35	109_5a	(Misc) 0
2.00		MB	Missing bricks at 09 o´clock	00:01:08	110_6a	(Struct) 5
2.00		CNI	Connection, at 11 o´clock, dia 150 mm, intrusion 30 mm	00:01:20	111_7a	(Constr) 4
2.00		SC	Sewer shape changes at this point, Remark: ARCHED	00:01:44		(Misc) 0
2.00		DC	Dimension of sewer changes, new dimension dia 1800 mm, Remark: X 2800MM	00:01:45	113_9a	(Misc) 0
2.00		GO	General Observation, Remark: INVERT STEPS DOWN X 2	00:01:57	114_10a	(Misc) 0
6.90		GO	General Observation, Remark: INVERT STEPS DOWN 1.0M APPROX	00:03:39	115_11a	(Misc) 0
9.90		CN	Connection, at 03 o´clock, dia 450 mm, Remark: X 300MM	00:04:11		(Constr) 0
10.80	S1	LR	Line of Sewer deviates right, Remark: GRADUAL	00:04:46		(Serv) 0
10.80		DC	Dimension of sewer changes, new dimension dia 2600 mm, Remark: X 1600MM	00:04:46		(Misc) 0
10.80		GP	General Condition photograph	00:04:54	119_15a	(Misc) 0
15.00		CN	Connection, at 09 o´clock, dia 225 mm	00:05:32		(Constr) 0
17.50		CN	Connection, at 03 o´clock, dia 225 mm, Remark: X 225MM	00:05:51		(Constr) 0
20.00		GP	General Condition photograph	00:06:19	122_18a	(Misc) 0
20.00	F1	LR	Line of Sewer deviates right, Remark: GRADUAL	00:06:22		(Serv) 0
26.90		CN	Connection, at 02 o´clock, dia 500 mm, Remark: X 300MM	00:07:04		(Constr) 0
27.30		GO	General Observation, Remark: INVERT STEPS DOWN	00:07:25		(Misc) 0
27.30		SA	Survey abandoned, Remark: OVERLAP COMPLETED	00:07:31	126_22a	(Misc) 0

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

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Inspection report

Date:	Job N°:	Weather:	Operator:	section number:	PLR:
18/09/2012	**1308031**	**Showers**	**G.Smith**	**4**	**INLET X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	

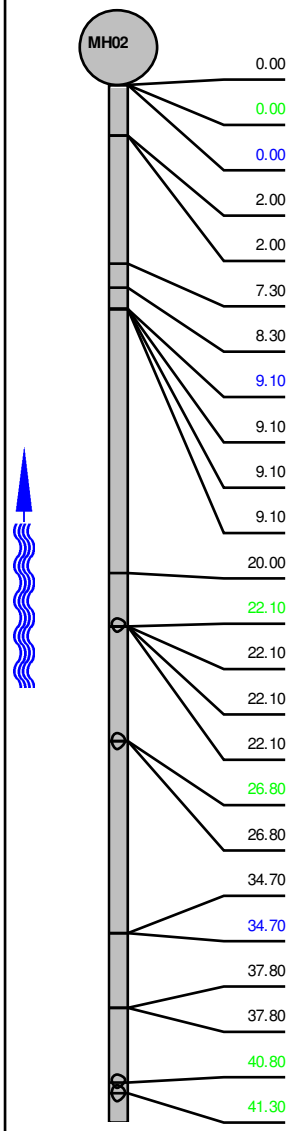
Road:	**OFF MILL ROAD**	Division:		start MH:	**MH02**
Place:	**BURY**	District:	**NW**	end MH:	**INLET**
Location:	**Warehouse**	Tape No.:	**AQSER**	Total length:	**163.7 m**

Purpose:	**Asset condition**	Shape/Size:	**Rectangular 1100/900**	
Use:	**Watercourse**	Material:	**Masonry - in reg. courses**	Pipe length:
Catchment:		Lining:		
		Category:		

Comment: **01313PIGT0101B02**

Location details: **Pig Lee Trib**

Depth: 2.22



1:310 position	code	observation	MPEG	photo	grade
0.00	ST	Start of Survey	00:00:00		(Misc) 0
0.00	MH	Manhole Remark: MH02	00:00:00		(Constr) 0
0.00	WL	Water level, 15 % height/diameter	00:00:00		(Serv) 0
2.00	GP	General Condition photograph	00:00:21	130_4a	(Misc) 0
2.00	GO	General Observation, Remark: FLAGGED SOFFIT	00:00:30	131_5a	(Misc) 0
7.30	GP	General Condition photograph	00:01:16	132_6a	(Misc) 0
8.30	GO	General Observation, Remark: SMALL CHAMBER ON LEFT METAL BARS VISIBLE	00:02:09	133_7a	(Misc) 0
9.10	LR	Line of Sewer deviates right, Remark: SHARP	00:02:47		(Serv) 0
9.10	DC	Dimension of sewer changes, new dimension dia 1000 mm, Remark: X 1100MM	00:02:48		(Misc) 0
9.10	MC	Sewer Material changes at this point, Masonry - rand. coursed	00:02:49		(Misc) 0
9.10	GP	General Condition photograph	00:02:50	137_11a	(Misc) 0
20.00	GP	General Condition photograph	00:03:43	138_12a	(Misc) 0
22.10	CN	Connection, at 11 o´clock, dia 100 mm	00:04:08		(Constr) 0
22.10	DC	Dimension of sewer changes, new dimension dia 1070 mm, Remark: X 900MM	00:04:16		(Misc) 0
22.10	GO	General Observation, Remark: 10 - 02 O'CLOCK WIDTH 600MM	00:04:25		(Misc) 0
22.10	GP	General Condition photograph	00:04:27	142_16a	(Misc) 0
26.80	CN	Connection, at 11 o´clock, dia 100 mm	00:04:58		(Constr) 0
26.80	GP	General Condition photograph	00:05:13	144_18a	(Misc) 0
34.70	GO	General Observation, Remark: BLIND CHAMBER	00:05:55	145_19a	(Misc) 0
34.70	OB	Obstruction, 50 % height/diameter loss, Remark: SERVICE ACROSS CULVERT	00:06:04	146_20a	(Serv) 2
37.80	GO	General Observation, Remark: EXITING BLIND CHAMBER	00:06:40		(Misc) 0
37.80	GP	General Condition photograph	00:06:41	148_22a	(Misc) 0
40.80	CNI	Connection, at 11 o´clock, dia 150 mm, intrusion 80 mm	00:07:09	149_23a	(Constr) 4
41.30	CNI	Connection, at 11 o´clock, dia 100 mm, intrusion 50 mm	00:07:19	150_24a	(Constr) 4

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Inspection report

Date:	Job nr.:	Weather:	Operator:	section number:	PLR:
18/09/2012	**1308031**	**Showers**	**G.Smith**	**4**	**INLET X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	



1:310 position	code	observation	MPEG	photo	grade
48.60	GP	General Condition photograph	00:08:10	151_25a	(Misc) 0
54.70	GO	General Observation, Remark: BLIND CHAMBER	00:09:12	152_26a	(Misc) 0
54.70	DC	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 900MM	00:09:35		(Misc) 0
56.70	DC	Dimension of sewer changes, new dimension dia 1300 mm, Remark: X 1000MM	00:11:10		(Misc) 0
56.70	GP	General Condition photograph	00:11:12	4_29a	(Misc) 0
56.70	MC	Sewer Material changes at this point, Brick, Remark: RIGHTSIDE WALL	00:11:21	4_30a	(Misc) 0
56.70	GO	General Observation, Remark: BENCHING STARTS ON RIGHTSIDE	00:11:21		(Misc) 0
60.50	MC	Sewer Material changes at this point, Masonry - rand. coursed, Remark: RIGHTSIDE WALL	00:11:59	4_32a	(Misc) 0
60.50	DC	Dimension of sewer changes, new dimension dia 100 mm, Remark: X 1100MM	00:11:59		(Misc) 0
61.80	LL	Line of Sewer deviates left, Remark: SHARP	00:12:26	4_34a	(Serv) 0
62.00	CNI	Connection, at 01 o´clock, dia 225 mm, intrusion 50 mm	00:12:47	4_35a	(Constr) 4
62.50	CNI	Connection, at 10 o´clock, dia 225 mm, intrusion 40 mm	00:13:12	4_36a	(Constr) 4
62.50	DC	Dimension of sewer changes, new dimension dia 1750 mm, Remark: X 1100MM	00:13:12		(Misc) 0
63.20	GO	General Observation, Remark: SERVICE ACROSS CULVERT 11 - 01O'CLOCK	00:13:26	4_38a	(Misc) 0
65.50	GO	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	00:13:50	4_39a	(Misc) 0
66.30	CNI	Connection, at 02 o´clock, dia 100 mm, intrusion 500 mm	00:14:05	4_40a	(Constr) 4
66.30	GO	General Observation, Remark: BRICK 09 - 03 O'CLOCK	00:14:18	4_41a	(Misc) 0
70.30	CN	Connection, at 01 o´clock, dia 100 mm	00:14:44		(Constr) 0
70.30	GP	General Condition photograph	00:14:56	4_43a	(Misc) 0
74.00	CNI	Connection, at 10 o´clock, dia 225 mm, intrusion 60 mm	00:15:16	4_44a	(Constr) 4
77.20	CNI	Connection, at 01 o´clock, dia 150 mm, intrusion 60 mm	00:16:02	4_45a	(Constr) 4
78.10	CNI	Connection, at 10 o´clock, dia 150 mm, intrusion 40 mm	00:16:31	4_46a	(Constr) 4
82.10	CNI	Connection, at 11 o´clock, dia 100 mm, intrusion 60 mm	00:16:55	4_47a	(Constr) 4
82.10	GP	General Condition photograph	00:17:02	4_48a	(Misc) 0
85.00	CNI	Connection, at 10 o´clock, dia 150 mm, intrusion 50 mm, Remark: LIVE	00:17:21	4_49a	(Constr) 4
88.50	IG	Infiltration Gushing at 07 o´clock	00:17:45	4_50a	(Serv) 5
91.10	CN	Connection, at 10 o´clock, dia 150 mm	00:18:12		(Constr) 0
91.10	GP	General Condition photograph	00:18:16	4_52a	(Misc) 0
92.40	CNI	Connection, at 03 o´clock, dia 150 mm, intrusion 80 mm, Remark: LIVE	00:18:31	4_53a	(Constr) 4

Aquajet (GB) Ltd
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Inspection report

Date:	Job nr.:	Weather:	Operator:	section number:	PLR:
18/09/2012	**1308031**	**Showers**	**G.Smith**	**4**	**INLET X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	



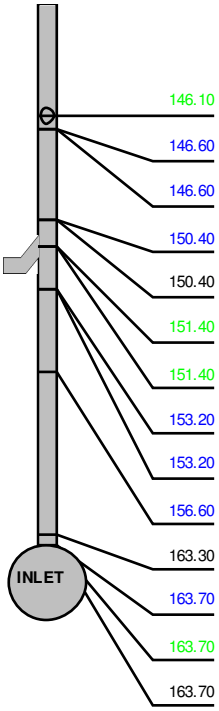
1:310 position	code	observation	MPEG	photo	grade
93.40	CN	Connection, at 10 o´clock, dia 100 mm	00:18:54		(Constr) 0
93.40	IR	Infiltration Running from 07 to 10 o´clock	00:18:55	4_55a	(Serv) 4
93.40	GO	General Observation, Remark: SERVICE ACROSS CULVERT 10 - 02 O'CLOCK	00:19:11	4_56a	(Misc) 0
94.20	IG	Infiltration Gushing at 10 o´clock	00:19:35	4_57a	(Serv) 5
94.20	GP	General Condition photograph	00:19:47	4_58a	(Misc) 0
96.50	CN	Connection, at 08 o´clock, dia 150 mm, Remark: LIVE	00:20:04		(Constr) 0
98.60	IG	Infiltration Gushing at 08 o´clock	00:20:36	4_60a	(Serv) 5
99.50	CNI	Connection, at 09 o´clock, dia 150 mm, intrusion 30 mm	00:20:56	4_61a	(Constr) 4
100.70	LL	Line of Sewer deviates left, Remark: QUITE SHARP	00:21:14		(Serv) 0
100.80	GO	General Observation, Remark: BENCHING ON RIGHT STOPS	00:21:16		(Misc) 0
100.80	DC	Dimension of sewer changes, new dimension dia 1250 mm, Remark: X 1500MM	00:21:17		(Misc) 0
100.80	GP	General Condition photograph	00:21:17	4_65a	(Misc) 0
100.80	GO	General Observation, Remark: BRICK STOPS 10 - 02 O'CLOCK	00:21:24		(Misc) 0
101.80	CNI	Connection, at 01 o´clock, dia 100 mm, intrusion 30 mm, Remark: LIVE	00:21:57	4_67a	(Constr) 4
104.10	CN	Connection, at 11 o´clock, dia 150 mm	00:22:26		(Constr) 0
104.90	GO	General Observation, Remark: 2 X METAL BRACKETS ATTATCHED TO SOFFIT	00:22:53	4_69a, b	(Misc) 0
107.60	GO	General Observation, Remark: METAL BRACKET ATTATCHED TO SOFFIT	00:23:33	4_70a	(Misc) 0
110.90	CNI	Connection, at 03 o´clock, dia 150 mm, intrusion 30 mm	00:23:58	4_71a	(Constr) 4
112.20	LL	Line of Sewer deviates left, Remark: SHARP	00:24:17		(Serv) 0
112.20	GP	General Condition photograph	00:24:20	4_73a	(Misc) 0
114.40	GO	General Observation, Remark: BEAM ACROSS SOFFIT	00:24:43	4_74a	(Misc) 0
117.80	LR	Line of Sewer deviates right, Remark: SHARP	00:25:30		(Serv) 0
117.80	GP	General Condition photograph	00:25:30	4_76a	(Misc) 0
117.80	DC	Dimension of sewer changes, new dimension dia 1500 mm, Remark: X 1500MM	00:25:36		(Misc) 0
117.80	SC	Sewer shape changes at this point, Remark: SQUARE	00:25:36		(Misc) 0
120.40 **S1**	DE	Debris, 10 % cross-sectional area loss, Start, Remark: RUBBLE	00:26:06	4_79a	(Serv) 1
130.00	GP	General Condition photograph	00:27:18	4_80a	(Misc) 0
136.30	GO	General Observation, Remark:3 X METAL BEAMS ACROSS SOFFIT	00:27:53	4_81a	(Misc) 0
141.10	CN	Connection, at 12 o´clock, dia 150 mm	00:28:47		(Constr) 0
141.50 **C1**	DE	Debris, 20 % cross-sectional area loss, Changed, Remark: RUBBLE	00:29:04	4_83a	(Serv) 1
141.50	WL	Water level, 20 % height/diameter	00:29:04		(Serv) 0
141.50	GP	General Condition photograph	00:29:10	4_85a	(Misc) 0

Aquajet (GB) Ltd
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Inspection report

Date:	Job nr.:	Weather:	Operator:	section number:	PLR:
18/09/2012	**1308031**	**Showers**	**G.Smith**	**4**	**INLET X**
Present:	Vehicle:	Camera:	Preset:	Cleaned:	Grade:
	FX08ERY	**Camera assist**		**No**	





1:310 position		code	observation	MPEG	photo	grade
146.10		CNI	Connection, at 11 o´clock, dia 100 mm, intrusion 350 mm	00:30:25	4_86a	(Constr) 4
146.60		DE	Debris, 25 % cross-sectional area loss, Remark: ROCKS ON LEFT	00:30:41	4_87a	(Serv) 1
146.60	C1	DE	Debris, 15 % cross-sectional area loss, Changed, Remark: RUBBLE	00:30:44		(Serv) 1
150.40		LL	Line of Sewer deviates left, Remark: SHARP	00:31:07		(Serv) 0
150.40		GP	General Condition photograph	00:31:09	4_90a	(Misc) 0
151.40		CNI	Connection, at 02 o´clock, dia 100 mm, intrusion 300 mm	00:31:54	4_91a	(Constr) 4
151.40		CNI	Connection, at 03 o´clock, dia 400 mm, intrusion 200 mm	00:31:54	4_92a	(Constr) 4
153.20		EM	Encrustation medium, from 04 to 05 o´clock, 10% cross-sectional area loss	00:32:21	4_93a	(Serv) 4
153.20		IR	Infiltration Running from 04 to 05 o´clock	00:32:24	4_94a	(Serv) 4
156.60		DE	Debris, 25 % cross-sectional area loss, Remark: ROCK	00:32:58	4_95a	(Serv) 1
163.30		GP	General Condition photograph	00:34:48	4_96a	(Misc) 0
163.70	F1	DE	Debris, 15 % cross-sectional area loss, Finish, Remark: RUBBLE	00:35:54		(Serv) 1
163.70		MH	Manhole Remark: INLET	00:35:56	4_98a	(Constr) 0
163.70		FH	Finish Survey	00:36:02		(Misc) 0

U.T.G.A TO INLET LADDERS REQUIRED

Structural Defects	Constructional Features
Service Defects	Miscellaneous Features

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Metre Report

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Σ ∅

Project name:	Contract number:	Contact:	Date:
Environment Agency	**1308031**	**Mark Whittaker**	**31/12/2005**

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
1	OUTLET	MH01	17.09.2012	OFF WALMERSLEY OLD ROAD	AQSER	Brick	158.8	158.8

Profile: CIRCULAR 1200 = 158.8 m (158.8 m)

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
4	MH02	INLET	18/09/2012	OFF MILL ROAD	AQSER	Masonry - in reg.courses	163.7	163.7

Profile: RECTANGULAR 1100/900 = 163.7 m (163.7 m)

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
3	MH02	MH01	18/09/2012	OFF MILL ROAD	AQSER	Masonry - rand.coursed	122.6	**27.3**

Profile: RECTANGULAR 1700/2800 = 122.6 m (27.3 m)

No.	start MH	end MH	Date	Road	Tape No.	Material	m	(m)
2	MH01	MH02	17/09/2012	OFF MILL ROAD	AQSER	Masonry - in reg.courses	122.6	**95.3**

Profile: RECTANGULAR 2500/1300 = 122.6 m (95.3 m)

all sections = 567.7 m (445.1 m)

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

SRM Scoring Report

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Service / Operational Defects (SRM 4)

Project name:	Contract number:	Contact:	Date:
Environment Agency	**1308031**	**Mark Whittaker**	**31/12/2005**

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Cat.	Peak Score	Grade	Mean Score	Total Score
1	MH01 X	U	W	C 1200	17.09.2012	BR	158.8	158.8	5	-	3	3	1.8	288
2	MH02 X	U	W	R 2500/1300	17/09/2012	MAC	122.6	95.3	1	-	1	2	1.0	95
3	MH02 X	D	W	R 1700/2800	18/09/2012	MAR	122.6	27.3	-	-	5	4	0.2	5
4	INLET X	U	W	R 1100/900	18/09/2012	MAC	163.7	163.7	5	-	20	5	1.4	236

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Structural Defects (SRM 4)

Project name:	Contract number:	Contact:	Date:
Environment Agency	**1308031**	**Mark Whittaker**	**31/12/2005**

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Cat.	Peak Score	Grade	Mean Score	Total Score
1	MH01 X	U	W	C 1200	17.09.2012	BR	158.8	158.8	-	-	0	1	0	0
2	MH02 X	U	W	R 2500/1300	17/09/2012	MAC	122.6	95.3	5	-	0	1	0	0
3	MH02 X	D	W	R 1700/2800	18/09/2012	MAR	122.6	27.3	5	-	0	1	0	0
4	INLET X	U	W	R 1100/900	18/09/2012	MAC	163.7	163.7	-	-	0	1	0	0

Site Coding Report

Pages 83 - 89

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Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	MH01 X

Date	Time	Location - Road name	Location - Place name
170912		OFF WALMERSLEY OLD ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
OUTLET	1.60			MH01			

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	1200		C	BR			158.8	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	1	X	Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0000		0.0		ST				
0000		0.0		MH				OUTLET
0000		0.0		WL			10	
0002	4_4a	2.0		GP				
0003	5_5a	2.0	S1	ESL		03 - 05		CLOCKS VARY
0003	6_6a	2.0	S2	ESL		07 - 09		CLOCKS VARY
0014	7_7a	14.1		GP				
0021	8_8a	15.9		IG		12		
0021	9_9a	15.9		ID		12		
0025		22.5		LL				SHARP
0025	11_11a	22.5		EM		03 - 05	15	
0033	12_12a	26.9		EM		10 - 12	10	
0033	13_13a	26.9		ID		12		
0041		32.3		LL				QUITE SHARP
0042	15_15a	32.3		GP				
0050		39.5		LR				QUITE SHARP
0050	17_17a	39.5		GP				
0054		44.3		LR				SHARP
0054	19_19a	44.3		GP				
0064	20_20a	52.3		EM		11 - 12	10	
0065	21_21a	52.3		GP				
0084	22_22a	70.1		GP				
0101	23_23a	83.0		GP				
0110	24_24a	86.7		EM		07 - 09	10	
0121	25_25a	95.4		GP				
0131		103.0		LR				SHARP
0131	27_27a	103.0		GP				
0143	28_28a	116.0		GP				
0152		120.2		CN	225	10		
0152	30_30a	120.2		ESM		07 - 10	10	FROM CONNECTION
0160		124.3	F1	ESL		03 - 05		CLOCKS VARY
0160		124.3	F2	ESL		07 - 09		CLOCKS VARY
0160		124.3	S3	ESL		07 - 05		CLOCKS VARY

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	MH01 X

Date	Time	Location - Road name	Location - Place name
170912		OFF WALMERSLEY OLD ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
OUTLET	1.60			MH01			

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	1200		C	BR			158.8	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	1	X	Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0161	34_34a	124.3		GP				
0175	35_35a	138.0		GP				
0192	36_36a	150.9		GP				
0210		158.8	F3	ESL		07 - 05		CLOCKS VARY
0210	38_38a	158.8		MH				MH01
0212		158.8		FH				

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	MH02 X

Date	Time	Location - Road name	Location - Place name
170912		OFF MILL ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
MH01	13.36			MH02	02.22		

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	2500	1300	R	MAC			122.6	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	1	X	Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0000		0.0		ST				
0000		0.0		MH				MH01
0000		0.0		WL			10	
0000		0.0	S1	ESL		07 - 05		CLOCKS VARY
0002	76_5a	0.0		GP				
0005		2.0		DC			200	X 1300MM
0010		2.0		SC				ARCHED
0010		2.0		MC				Masonry - rand. coursed
0010	80_9a	2.0	S2	MB		02		EVERY 1.0M APPROX
0010	81_10a	2.0	S3	MB		10		EVERY 1.0M APPROX
0020	82_11a	16.2		GP				
0022	83_12a	16.2		GO				TIMBER ACROSS CULVERT 10 - 02 O'CLOCK
0025		22.7		CN	225	02		
0031		26.7		CN	225	08		X 225MM LIVE
0031	86_15a	26.7		GP				
0034	87_16a	31.8		GP				
0044	88_17a	44.7		GP				
0053		52.1		CN	150	10		
0062	90_19a	61.7		GP				
0065		69.9		CN	225	12		LIVE
0065		69.9		LR				SLIGHT
0071		73.8		CN	100	09		
0075	94_23a	80.5		GP				
0083		82.7		CN	600	04		X 450MM
0084	96_25a	82.7		GO				INVERT STEPS UP TWICE
0080		83.7		DC			600	X 1600MM
0102	2_27a	87.8		LR				QUITE SHARP
0110	2_28a	91.3		GP				
0114		95.3		GO				INVERT STEPS UP
0114		95.3	F1	ESL		07 - 05		CLOCKS VARY
0114		95.3	F2	MB		02		EVERY 1.0M APPROX
0114		95.3	F3	MB		10		EVERY 1.0M APPROX
0115	2_33a	95.3		SA				LOSS OF COMMUNICATION DUE TO STEP UP OF INVERT

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	MH02 X

Date	Time	Location - Road name	Location - Place name
180912		OFF MILL ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
MH02	2.22			MH01	13.36		

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	D	1700	2800	R	MAR			122.6	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	4		Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0000		0.0		ST				
0000		0.0		MH				MH02
0000		0.0		WL			10	
0002	108_4a	0.0		GO				METAL CORRAGATED SOFFIT
0003	109_5a	0.0		GP				
0010	110_6a	2.0		MB		09		
0012	111_7a	2.0		CNI	150	11	0030	
0014		2.0		SC				ARCHED
0014	113_9a	2.0		DC			800	X 2800MM
0015	114_10	2.0		GO				INVERT STEPS DOWN X 2
0033	115_11	6.9		GO				INVERT STEPS DOWN 1.0M APPROX
0041	a	9.9		CN	450	03		X 300MM
0044		10.8	S1	LR				GRADUAL
0044		10.8		DC			600	X 1600MM
0045	119_15	10.8		GP				
0053	a	15.0		CN	225	09		
0055		17.5		CN	225	03		X 225MM
0061	122_18	20.0		GP				
0062	a	20.0	F1	LR				GRADUAL
0070		26.9		CN	500	02		X 300MM
0072		27.3		GO				INVERT STEPS DOWN
0073	126_22	27.3		SA				OVERLAP COMPLETED
	a							

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	INLET X

Date	Time	Location - Road name	Location - Place name
180912		OFF MILL ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
MH02	2.22			INLET			

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	1100	900	R	MAC			163.7	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	4		Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0000		0.0		ST				
0000		0.0		MH				MH02
0000		0.0		WL			10	
0002	130_4a	2.0		GP				
0003	131_5a	2.0		GO				FLAGGED SOFFIT
0011	132_6a	7.3		GP				
0020	133_7a	8.3		GO				SMALL CHAMBER ON LEFT METAL BARS VISIBLE
0024		9.1		LR				SHARP
0024		9.1		DC			1000	X 1100MM
0024		9.1		MC				Masonry - rand. coursed
0025	137_11	9.1		GP				
0034	138_12	20.0		GP				
0040	a	22.1		CN	100	11		
0041		22.1		DC			1000	X 900MM
0042		22.1		GO				10 - 02 O'CLOCK WIDTH 600MM
0042	142_16	22.1		GP				
0045	a	26.8		CN	100	11		
0051	144_18	26.8		GP				
0055	145_19	34.7		GO				BLIND CHAMBER
0060	146_20	34.7		OB			50	SERVICE ACROSS CULVERT
0064	a	37.8		GO				EXITING BLIND CHAMBER
0064	148_22	37.8		GP				
0070	149_23	40.8		CNI	150	11	0080	
0071	150_24	41.3		CNI	100	11	0050	
0081	151_25	48.6		GP				
0091	152_26	54.7		GO				BLIND CHAMBER
0093	a	54.7		DC			100	X 900MM
0111		56.7		DC			1300	X 1000MM
0111	4_29a	56.7		GP				
0112	4_30a	56.7		MC				Brick, RIGHTSIDE WALL
0112		56.7		GO				BENCHING STARTS ON RIGHTSIDE
0115	4_32a	60.5		MC				Masonry - rand. coursed, RIGHTSIDE WALL
0115		60.5		DC			100	X 1100MM

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	INLET X

Date	Time	Location - Road name	Location - Place name
180912		OFF MILL ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
MH02	2.22			INLET			

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	1100	900	R	MAC			163.7	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	4		Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0122	4_34a	61.8		LL				SHARP
0124	4_35a	62.0		CNI	225	01	0050	
0131	4_36a	62.5		CNI	225	10	0040	
0131		62.5		DC			700	X 1100MM
0132	4_38a	63.2		GO				SERVICE ACROSS CULVERT 11 - 01O'CLOCK
0135	4_39a	65.5		GO				SERVICE ACROSS CULVERT 10 - 02 O'CLOCK
0140	4_40a	66.3		CNI	100	02	0500	
0141	4_41a	66.3		GO				BRICK 09 - 03 O'CLOCK
0144		70.3		CN	100	01		
0145	4_43a	70.3		GP				
0151	4_44a	74.0		CNI	225	10	0060	
0160	4_45a	77.2		CNI	150	01	0060	
0163	4_46a	78.1		CNI	150	10	0040	
0165	4_47a	82.1		CNI	100	11	0060	
0170	4_48a	82.1		GP				
0172	4_49a	85.0		CNI	150	10	0050	LIVE
0174	4_50a	88.5		IG		07		
0181		91.1		CN	150	10		
0181	4_52a	91.1		GP				
0183	4_53a	92.4		CNI	150	03	0080	LIVE
0185		93.4		CN	100	10		
0185	4_55a	93.4		IR		07 - 10		
0191	4_56a	93.4		GO				SERVICE ACROSS CULVERT 10 - 02 O'CLOCK
0193	4_57a	94.2		IG		10		
0194	4_58a	94.2		GP				
0200		96.5		CN	150	08		LIVE
0203	4_60a	98.6		IG		08		
0205	4_61a	99.5		CNI	150	09	0030	
0211		100.7		LL				QUITE SHARP
0211		100.8		GO				BENCHING ON RIGHT STOPS
0211		100.8		DC			1100	X 1500MM
0211	4_65a	100.8		GP				
0212		100.8		GO				BRICK STOPS 10 - 02 O'CLOCK

Surveyed by (Operator)	Contract no.	Job no.	Catchment (Drainage area)	Div.	District	Pipe length reference
G.Smith	1308031	1308031			NW	INLET X

Date	Time	Location - Road name	Location - Place name
180912		OFF MILL ROAD	BURY

Start manhole no.	Depth	Cover level	Invert level	Finish manhole no.	Depth	Cover level	Invert level
MH02	2.22			INLET			

Use	Direction	Size (dia)	x Size	Shape	Material	Lining	Pipe length	Total length	Year laid
W	U	1100	900	R	MAC			163.7	

Video recording

Index no.	Cleaned	Flow Control	Comments - general
AQSER			01313PIGT0101B02

Purpose	Cat.	Pre-cleaning	Weather	Loc. code	Further location details
F		N	4		Pig Lee Trib

Video no.	Photo no.	Distance (m)	Cont. def.	Letters Code	Numbers Diameter / Dimension	Clock at /to	Intrusion % mm	Remarks
0215	4_67a	101.8		CNI	100	01	0030	LIVE
0222		104.1		CN	150	11		
0225	4_69a	104.9		GO				2 X METAL BRACKETS ATTATCHED TO SOFFIT
0233	4_70a	107.6		GO				METAL BRACKET ATTATCHED TO SOFFIT
0235	4_71a	110.9		CNI	150	03	0030	
0241		112.2		LL				SHARP
0242	4_73a	112.2		GP				
0244	4_74a	114.4		GO				BEAM ACROSS SOFFIT
0253		117.8		LR				SHARP
0253	4_76a	117.8		GP				
0253		117.8		DC			1300	X 1500MM
0253		117.8		SC				SQUARE
0260	4_79a	120.4	S1	DE			10	RUBBLE
0271	4_80a	130.0		GP				
0275	4_81a	136.3		GO				3 X METAL BEAMS ACROSS SOFFIT
0284		141.1		CN	150	12		
0290	4_83a	141.5	C1	DE			20	RUBBLE
0290		141.5		WL			20	
0291	4_85a	141.5		GP				
0302	4_86a	146.1		CNI	100	11	0350	
0304	4_87a	146.6		DE			25	ROCKS ON LEFT
0304		146.6	C1	DE			15	RUBBLE
0310		150.4		LL				SHARP
0310	4_90a	150.4		GP				
0315	4_91a	151.4		CNI	100	02	0300	
0315	4_92a	151.4		CNI	400	03	0200	
0322	4_93a	153.2		EM		04 - 05	10	
0322	4_94a	153.2		IR		04 - 05		
0325	4_95a	156.6		DE			25	ROCK
0344	4_96a	163.3		GP				
0355		163.7	F1	DE			15	RUBBLE
0355	4_98a	163.7		MH				INLET
0360		163.7		FH				

Pig Lee Trib, Off Walmersley Old Road, Bury
SALE1308031

Manhole Surveys

Printed on 100% recycled paper

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	No GPS
MAINTAINER (DELETE AS APPROPRIATE)	E.A.

SURVEY RECORD FOR MANHOLE OR INLET/ OUTLET STRUCTURE

STC25 GRID REFERENCE: Inlet

LOCATION: Pig Lee Trib B02, In Tetrosyl

YEAR	STATUS	FUNCTION	NODE TYPE	SURVEY DATE
Z	PU	W	IN	18-09-12

COVER	SHAPE		HINGED		LOCK		DUTY		SIZE (MM)		TOXIC ATMOSPHERE: N
SHAFT	SIDE ENTRY		REGULAT COURCES		DEPTH				SIZE (MM)		EVIDENCE OF VERMIN: N
CHAMBER	SOFFIT		STEPS		LADDERS		LNDGS		SIZE (MM)		CONSTRUCT CODE: MAC

DEPTH OF FLOW (MM)	DEPTH OF SILT (MM)	HEIGHT OF SURCH (MM)	COVER LEVEL (M)

		UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	BROOK							
	B								
	C								
	D								
	E								
	F								

			COND CRITY						
Outgoing Pipes	X	MH01							
	Y								

CONDITION (Y/N) (Y IF ATTENTION REQUIRED)	COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER	

NOTES:

Unable to gain access to Inlet, ladders required. Unable to gain access for GPS.

WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)			
ID	TYPE	SUBTYPE	MATERIAL

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	No GPS
MAINTAINER (DELETE AS APPROPRIATE)	E.A.

ENVIRONMENT AGENCY

SURVEY RECORD FOR MANHOLE OR INLET/ OUTLET STRUCTURE

STC25 GRID REFERENCE: MH02

LOCATION: Pig Lee Trib B02, Warehouse in Tetrosyl

YEAR	Z	STATUS	PU	FUNCTION	W	NODE TYPE	MH	SURVEY DATE	18-09-12				
COVER	SHAPE	S	HINGED	N	LOCK	N	DUTY	H	SIZE (MM)	660 x 660	TOXIC ATMOSPHERE	N	
SHAFT	SIDE ENTRY		REGULAT COURCES	0	DEPTH	0.52	SIZE (MM)	610 x 610	EVIDENCE OF VERMIN	N			
CHAMBER	SOFFIT		STEPS	0	LADDERS		LNDGS		SIZE (MM)	3500 x 2800	CONSTRUCT CODE	MAC	

DEPTH OF FLOW (MM)	0	DEPTH OF SILT (MM)	150	HEIGHT OF SURCH (MM)		COVER LEVEL (M)	
---	---	---	---	---	---	---	---

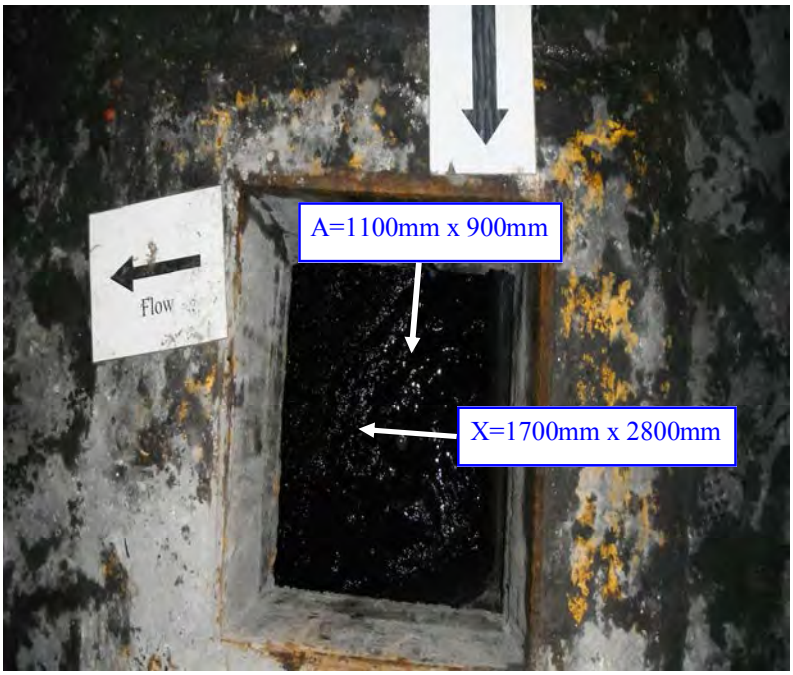
		UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	INLET	R	1100 x 900		MAC		2.19	
	B								
	C								
	D								
	E								
	F								
Outgoing Pipes	X	MH01	R	1700 x 2800		MAC		2.22	
	Y								

CONDITION (Y/N) (Y IF ATTENTION REQUIRED)	COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER	

NOTES:

WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)			
ID	TYPE	SUBTYPE	MATERIAL

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	SD8081913693
MAINTAINER (DELETE AS APPROPRIATE)	E.A.

SURVEY RECORD FOR MANHOLE OR INLET/ OUTLET STRUCTURE

STC25 GRID REFERENCE: MH01, (E:380819.08, N:413693.51)

LOCATION: Pig Lee Trib B02, Field R/O 11 Trent Drive

YEAR	Z	STATUS	PU	FUNCTION	W	NODE TYPE	MH	SURVEY DATE	18-09-12						
COVER	SHAPE	S	HINGED	N	LOCK	N	DUTY	H	SIZE (MM)	650 x 650	TOXIC ATMOSPHERE	N			
SHAFT	SIDE ENTRY		REGULAT COURCES	0	DEPTH	11.31	SIZE (MM)	700 x 500	EVIDENCE OF VERMIN	N					
CHAMBER	SOFFIT		STEPS	40	LADDERS		LNDGS		SIZE (MM)	1930 x 1400	CONSTRUCT CODE	BR			
DEPTH OF FLOW (MM)	100	DEPTH OF SILT (MM)	0	HEIGHT OF SURCH (MM)		COVER LEVEL (M)	135.76								

		UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	MH02	R	2500 x 1300		MAC		13.06	122.70
	B	UNKNOWN	C	300		VC		3.81	131.95
	C								
	D								
	E								
	F								

Outgoing Pipes	X	OUTLET	C	1200		BR		13.36	122.40
	Y								

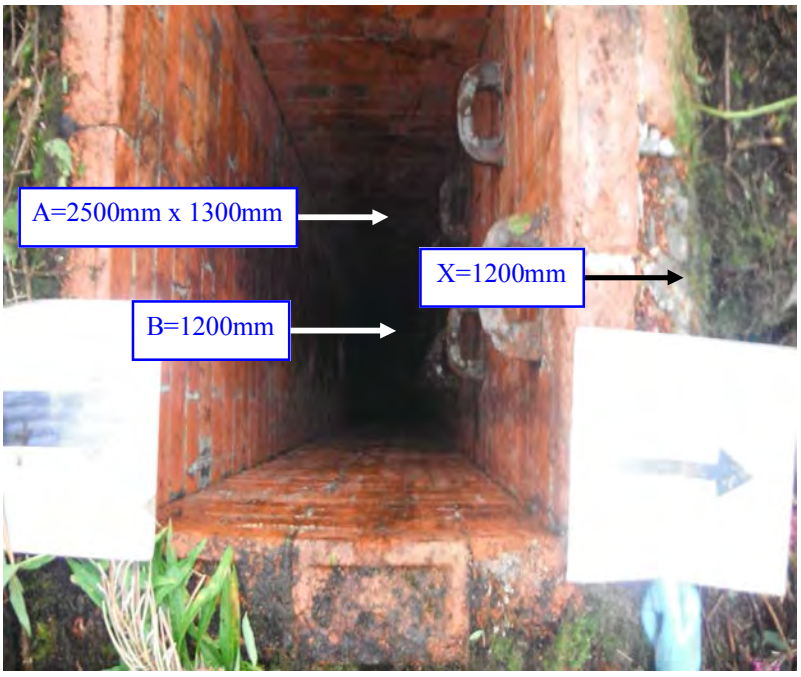
CONDITION (Y/N) (Y IF ATTENTION REQUIRED)	COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER	

NOTES:

Cover seized on MH01 the complete frame was removed to enable access into culvert.

WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)

ID	TYPE	SUBTYPE	MATERIAL

NFCDD REFERENCE	01313PIGT0101B02
NATIONAL GRID REFERENCE	No GPS
MAINTAINER (DELETE AS APPROPRIATE)	E.A.

SURVEY RECORD FOR MANHOLE OR INLET/ OUTLET STRUCTURE

STC25 GRID REFERENCE: Outlet

LOCATION: Pig Lee Trib B02, Banking opp 27 Walmersley Old Road

YEAR	STATUS	FUNCTION	NODE TYPE	SURVEY DATE
Z	PU	W	OUT	17-09-12

COVER	SHAPE		HINGED		LOCK		DUTY		SIZE (MM)		TOXIC ATMOSPHERE: N
SHAFT	SIDE ENTRY		REGULAT COURCES		DEPTH				SIZE (MM)		EVIDENCE OF VERMIN: N
CHAMBER	SOFFIT		STEPS		LADDERS		LNDGS		SIZE (MM)		CONSTRUCT CODE: BR

DEPTH OF FLOW (MM)	DEPTH OF SILT (MM)	HEIGHT OF SURCH (MM)	COVER LEVEL (M)
100	0		

		UPSTREAM REFERENCE	PIPE SHAPE	PIPE SIZE DIAM (MM)	BECKDROP DIAM (MM)	PIPE MATERIAL	LINING MATERIAL	DEPTH FROM COVER (M)	INVERT LEVEL (M)
Incoming Pipes	A	MH01	C	1200				1.60	
	B								
	C								
	D								
	E								
	F								

					COND	CRITY			
Outgoing Pipes	X	BROOK							
	Y								

CONDITION (Y/N) (Y IF ATTENTION REQUIRED)	COVER		IRON/ LADDERS		SHAFT		CHAMBER		BENCHING		OTHER	

NOTES:

Unable to gain GPS signal due to deep valley and trees.

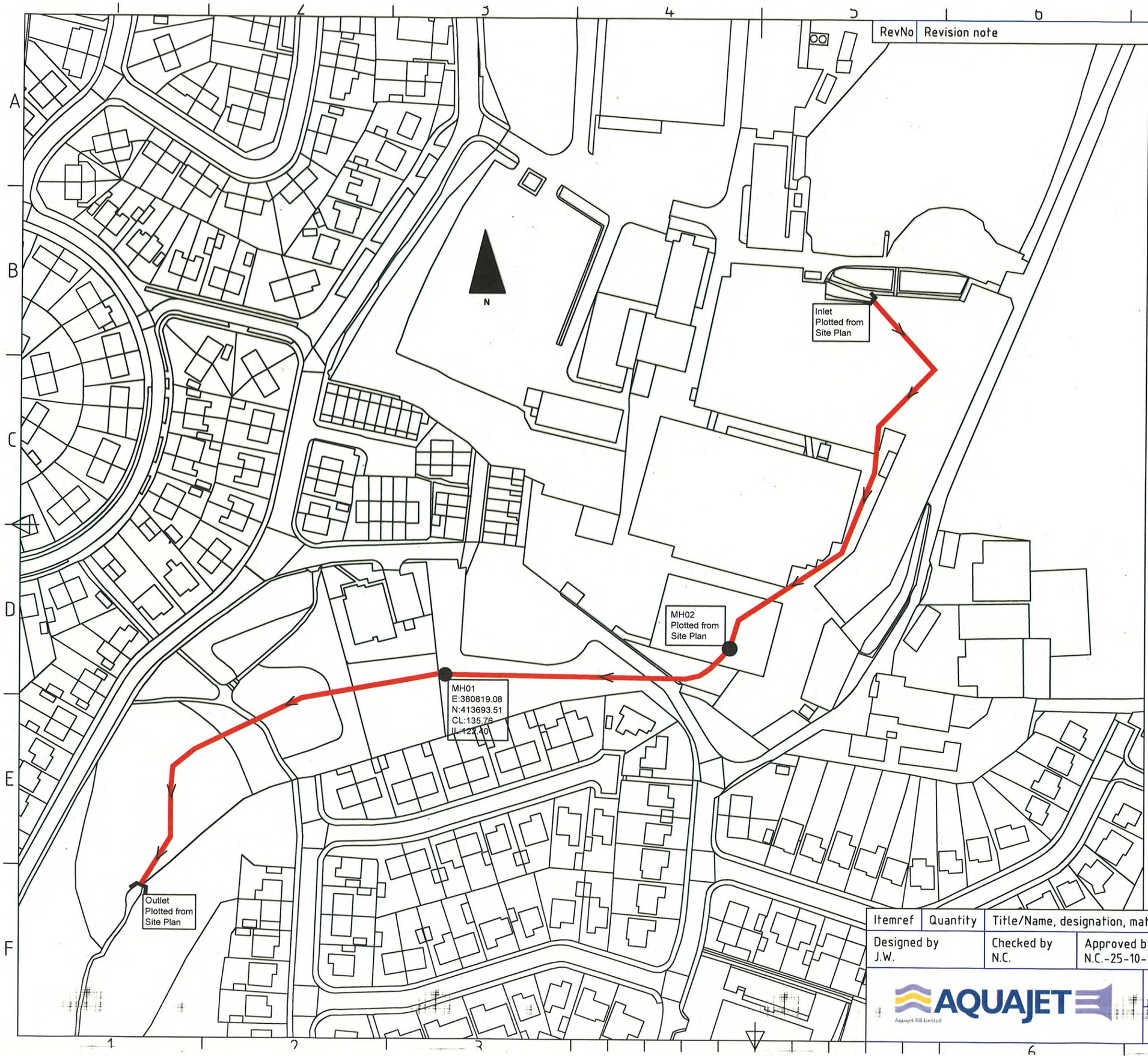
WEATHER: Dry.

SKETCH



ELEMENT (MIN OF 2)			
ID	TYPE	SUBTYPE	MATERIAL

RevNo	Revision note	Date	Signature	Checked



Environment Agency

Aquajet (GB) Ltd

Surveyed

Inlet: Plotted from Site Plan
MH01: SD8081913696
MH02: Plotted from Site Plan
Outlet: Plotted from Site Plan

Itemref	Quantity	Title/Name, designation, material, dimension etc			Article No./Reference	
Designed by J.W.		Checked by N.C.	Approved by - date N.C.-25-10-12	File name SALE1308031	Date 25-12-12	Scale 1.1250
AQUAJET Aquajet GB Limited		01313PIGT0101B02				
		Pig Lee Trib, Bury			Edition 0	Sheet 1/1

CCTV SURVEY – EXECUTIVE SUMMARY

IWJS Ltd Manchester Depot
Unit 10 Huntsman Drive
North Bank Industrial Estate, Irlam
Manchester M44 5EG

Client:	Environment Agency	NFCDD Ref:	0131PIGT0101 B02
Site Address:	Pig Lee Brook, Walmersley, Bury	Contact:	Gareth Hamlett
Date of Report:	5th March	Job No:	EA052014065

Objective

A CCTV survey was undertaken by IWJS Ltd using CCTV remote techniques. This was conducted on behalf of the Environment Agency.

The purpose of the survey was to determine the route of the culvert and to visually ascertain the condition of the culvert/headwalls.

Location and Description

Pedestrian and vehicle access is gained off Walmersley Old Rd to the inlet.

The culvert flows in a southerly direction from Inlet to outlet.

The following information should be viewed in conjunction with the Grade Defect & CCTV reports.

The Culvert is made up of the following:

1. **Outlet upstream to Inlet**

- The Culvert is a 1200 x 2400mm randomly coursed rectangular masonry pipe.
- Culvert starts to gradually deviate right from 4.4m to 11.9m
- Culvert deviates right sharply at 20.3m
- Survey was abandoned at 21.2m due to 85% obstruction.

Observations and anomalies

Structural & service defects have been recorded on this length.

On completion of the survey a total of 21.2m of drainage runs were CCTV surveyed including 2 asset structures.

As a result of the structural survey there were 3 grade 4-5 defects identified.

Health & Safety

There are no issues to report

Note:

This report is compiled from information provided by our trained and certified CCTV operators.

Thank you for using IWJS Ltd

Executive Summary produced by S.Allsey

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Huntsman Drive
Irlam
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Fax:
Email: paul.crane@iwjsgroup.co.uk

Table of contents

Project Name:	Project number:	Date:	Contact:	
EA 052014065, Pig Lee Bro	0131PIGT0101 B02	27/02/2015	Gareth Hamlett	

Profile Report 1

SRMReport : 2

Inspection: 1

Project Information 4

Section: 1, INLET --- OUTLET 5

Place :

IWJS
Huntsman Drive
Irlam
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Email: paul.crane@iwjsgroup.co.uk

∑∅ / Main sections

Project name :	Project number :	Contact :	Date :
EA 052014065, Pig Lee Brook B02	**0131PIGT0101 B02**	**Gareth Hamlett**	**27/02/2015**

Nr.	US MH	DS MH	Date	Road	Tape No.	Material	m	(m)
1	INLET	OUTLET	27/02/2015	off Walmersley Old Road		Masonry - in regular courses	45.00	**21.20**

Pipe size: RECTANGULAR 1200/2400 = 45 m (21.2 m)

All sections = 45 m (21.2 m)

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Service / Operational Defects (SRM 4)

Project name :	Project Number :	Contact :	Date :
EA 052014065, Pig Lee Brook B02	**0131PIGT0101 B02**	**Gareth Hamlett**	**27/02/2015**

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Peak Score	Grade	Mean Score	Total Score
1	INLETX	U	W	R 1200/2400	27/02/2015	MAC	45.00	21.20	-	10	5	1.08	23

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Structural Defects (SRM 4)

Project name :	Project Number :	Contact :	Date :
EA 052014065, Pig Lee Brook B02	**0131PIGT0101 B02**	**Gareth Hamlett**	**27/02/2015**

No.	PLR	Dir.	Use	Shape / Size	Date	Mat.	Total Length	Insp. Length	Peak HWG	Peak Score	Grade	Mean Score	Total Score
1	INLETX	U	W	R 1200/2400	27/02/2015	MAC	45.00	21.20	-	0	1	0	0

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Project-information

Project name :	Project Number :	Contact :	Date :
EA 052014065, Pig Lee Brook B02	**0131PIGT0101 B02**	**Gareth Hamlett**	**27/02/2015**

Client:	**Environment Agency**
Contact Name:	**Gareth Hamlett**
Department:	
Road:	**Dodd Way**
Town:	**Bamber Bridge, PR5 8BX**
County:	**Lancashire**
Telephone:	**01772 714105**
Fax:	
Mobile:	
E-mail:	

Site:	**Pig Lee Brook**
Contact Name:	**Gareth Hamlett**
Department:	
Road:	**Walmersley Old Rd**
Town:	**Walmersley, Bury**
County:	**Lancashire**
Telephone:	
Fax:	
Mobile:	
E-mail:	

Contractor	**IWJS**
Contact Name:	**Paul Crane**
Department:	**Contracts Manager**
Road:	**Huntsman Drive**
Town:	**Irlam**
County:	**Manchester**
Telephone:	**0161 776 0499**
Fax:	
Mobile:	
E-mail:	**paul.crane@iwjsgroup.co.uk**

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Inspection report

Date :	Job number :	Weather :	Operator :	Section number :	PLR SUFFIX:
27/02/2015		**no rain or snow**	**G.Smith**	**1**	**X**
Weather	Vehicle :	Camera :	Preset :	Cleaned :	Operator :
no rain or snow	**GU62DLF**	**Camera assist**		**no**	**G.Smith**

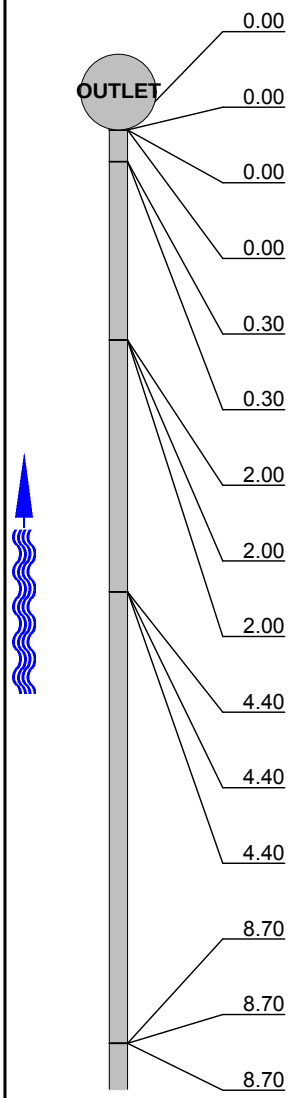
Place :	**Walmersley**	Location details:		U/S MH :	**INLET**
Road :	**off Walmersley Old Road**	Catchment:		U/S Depth :	**1.61**
Location	**Difficult access**	Tape number :		D/S MH :	**OUTLET**
Inspection Direction	**OUTLET (U/S) INLET**	Pipe Length		D/S Depth :	

Use:	**Culverted watercourse**	Pipe shape :	**Rectangular**
Year laid :	**Z**	Pipe size :	**1200 mm**
Purpose :	**Routine inspection of condition**	Pipe material :	**Masonry - in regular courses**
Total length :	**45.00 m**	Lining :	

Comment : **INLET and the Outlet are in Tetrosyl**

1:72 **Position** **Observation**

Building on top of the Outlet



Position		Observation
0.00		Start node type, manhole, reference number : OUTLET
0.00		Water level, 30% of the vertical dimension
0.00		General photograph taken at this point
0.00		General remark
0.30	**S01**	General remark, Start
0.30		Dimension changes, 1290mm high, 2400mm wide
2.00		Dimension changes, 1050mm high, 2400mm wide
2.00		General remark
2.00		General photograph taken at this point
4.40		Water level, 05% of the vertical dimension
4.40	**S02**	Line deviates right, Start
4.40		General photograph taken at this point
8.70		General remark
8.70		Dimension changes, 1500mm high, 2400mm wide
8.70		General photograph taken at this point



0 m



0 m



0.3 m



2 m



4.4 m

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Inspection Report

Date :	Job number :	Weather :	Operator :	Section number :	PLR :
27/02/2015		**no rain or snow**	**G.Smith**	**1**	**X**
Weather	Vehicle :	Camera :	Preset :	Cleaned :	Grade:
no rain or snow	**GU62DLF**	**Camera assist**		**no**	

1:72	Position		Observation
	11.90		General remark
	11.90		Material changes, masonry - randomly coursed
	11.90		Water level, 10% of the vertical dimension
	11.90	**F02**	Line deviates right, End
	11.90	**S03**	General remark, Start
	11.90		General photograph taken at this point
	14.80		Settled deposits, other, 20% cross-sectional area loss
	15.90		Connection other than junction, at 4 o'clock, diameter 150mm
	15.90		General remark
	17.30		General remark
	17.80		General photograph taken at this point
	19.20		Connection intruding, at 5 o'clock, diameter 150mm, intrusion 20%
	20.30		Connection intruding, at 5 o'clock, diameter 150mm, intrusion 05%
	20.30		Line deviates right
	20.30		Settled deposits, other, 20% cross-sectional area loss
	20.80		General remark

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Inspection Report

Date :	Job number :	Weather :	Operator :	Section number :	PLR :
27/02/2015		**no rain or snow**	**G.Smith**	**1**	**X**
Weather	Vehicle :	Camera :	Preset :	Cleaned :	Grade:
no rain or snow	**GU62DLF**	**Camera assist**		**no**	

1:72	Position		Observation
	21.20		Other obstacles, other object in invert, from 1 to 6 o'clock, 85% cross-sectional area loss
	21.20	**F03**	General remark, End
	21.20	**F01**	General remark, End
	21.20		Survey abandoned

STR no def	STR peak	STR mean	STR total	STR grade	SER no def	SER peak	SER mean	SER total	SER grade
0	**0**	**0**	**0**	**1**	**5**	**10**	**1.08**	**23**	**5**

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Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
Walmersley	**off Walmersley Old Road**	**27/02/2015**	**1**	**X**

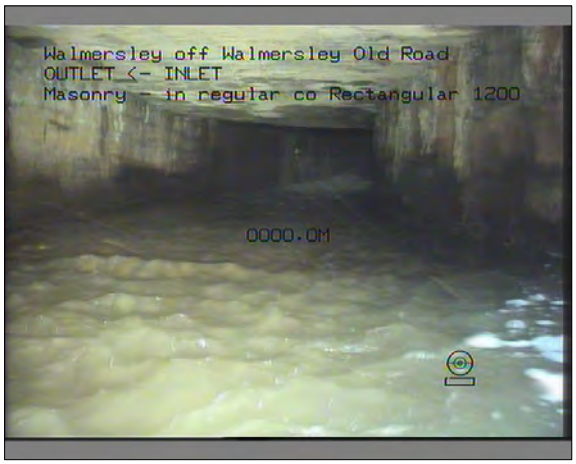


Photo: 001.JPG
0m, General photograph taken at this point



Photo: 002.JPG
0m, General remark

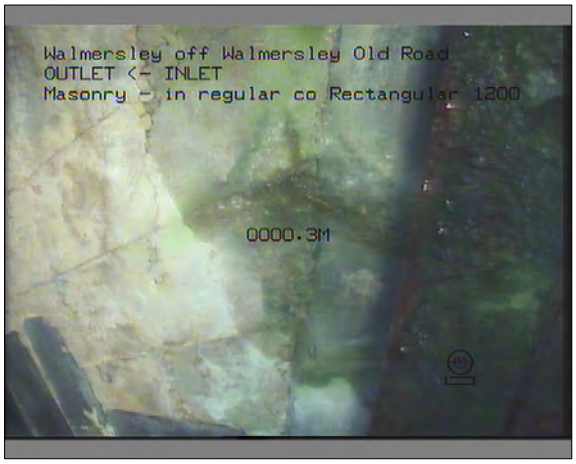


Photo: 003.JPG
0.3m, General remark, Start

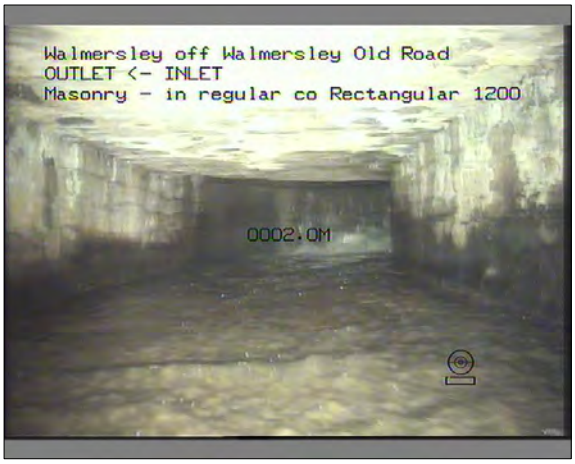


Photo: 004.JPG
2m, General photograph taken at this point

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Huntsman Drive
Irlam
Tel: 0161 776 0499
Fax:
Email: paul.crane@iwjsgroup.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
Walmersley	**off Walmersley Old Road**	**27/02/2015**	**1**	**X**

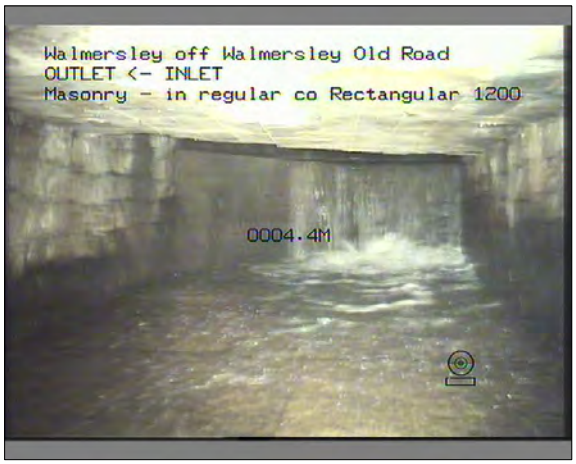


Photo: 005.JPG
4.4m, General photograph taken at this point



Photo: 006.JPG
8.7m, General remark

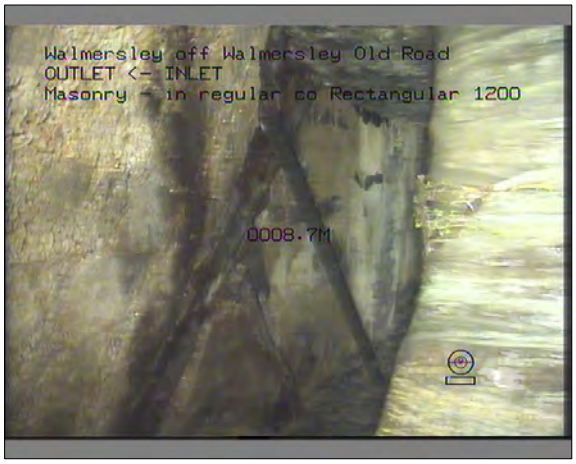


Photo: 007.JPG
8.7m, General photograph taken at this point



Photo: 008.JPG
11.9m, General remark

IWJS
Huntsman Drive
Irlam
Tel: 0161 776 0499
Fax:
Email: paul.crane@iwjsgroup.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
Walmersley	**off Walmersley Old Road**	**27/02/2015**	**1**	**X**



Photo: 009.JPG
11.9m, General remark, Start

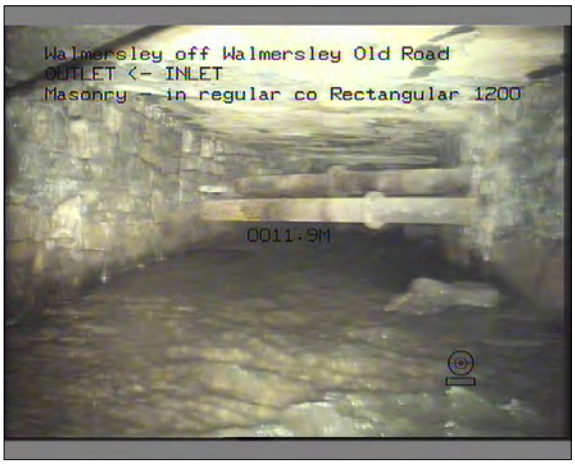


Photo: 010.JPG
11.9m, General photograph taken at this point



Photo: 011.JPG
14.8m, Settled deposits, other, 20% cross-sectional area loss

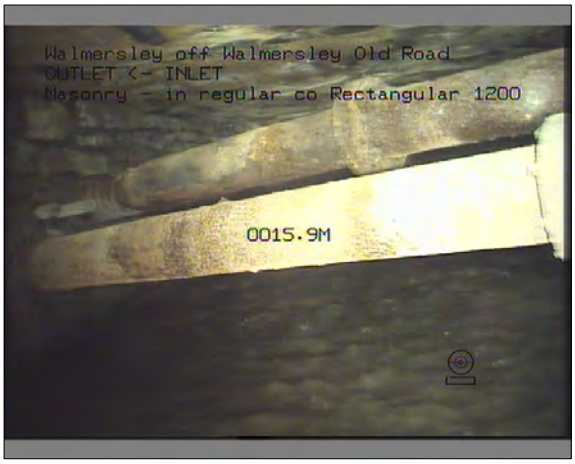


Photo: 012.JPG
15.9m, General remark

IWJS
Huntsman Drive
Irlam
Tel: 0161 776 0499
Fax:
Email: paul.crane@iwjsgroup.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
Walmersley	**off Walmersley Old Road**	**27/02/2015**	**1**	**X**



Photo: 013.JPG
17.3m, General remark

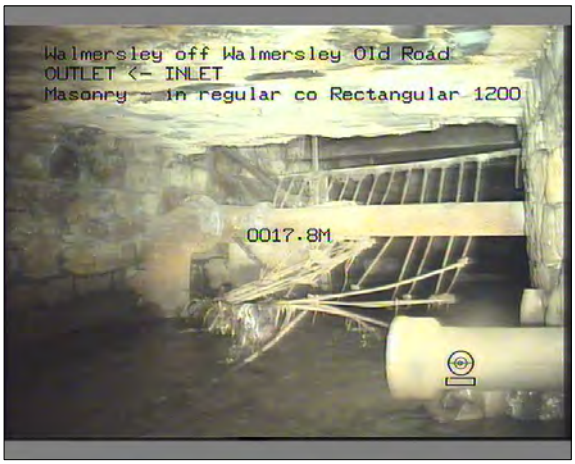


Photo: 014.JPG
17.8m, General photograph taken at this point



Photo: 015.JPG
19.2m, Connection intruding, at 5 o'clock, diameter 150mm, intrusion 20%



Photo: 016.JPG
20.3m, Connection intruding, at 5 o'clock, diameter 150mm, intrusion 05%

IWJS
Huntsman Drive
Irlam
Tel: 0161 776 0499
Fax:
Email: paul.crane@iwjsgroup.co.uk

Inspection pictures

Place :	Road :	Date :	Section number :	PLR Suffix :
Walmersley	**off Walmersley Old Road**	**27/02/2015**	**1**	**X**



Photo: 017.JPG
20.3m, Settled deposits, other, 20% cross-sectional area loss



Photo: 018.JPG
21.2m, Other obstacles, other object in invert, from 1 to 6 o'clock, 85% cross-sectional area loss

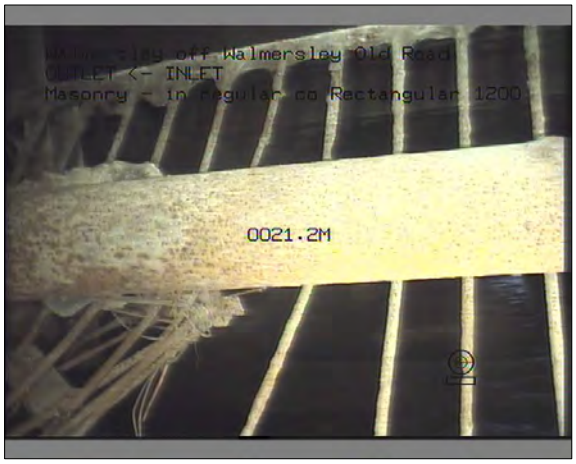


Photo: 019.JPG
21.2m, Survey abandoned

Pig Lee Brook

	No.	Upstream MH	Downstream MH	Observation	Grade
1	1	INLET	OUTLET	Other obstacles, other object in invert, from 1 to 6 o'	5
2	1	INLET	OUTLET	Settled deposits, other, 20% cross-sectional area lo	4
3	1	INLET	OUTLET	Settled deposits, other, 20% cross-sectional area lo	4
4	1	INLET	OUTLET	Connection intruding, at 5 o'clock, diameter 150mm	3
5	1	INLET	OUTLET	Dimension changes, 1500mm high, 2400mm wide	0
6	1	INLET	OUTLET	General remark	0
7	1	INLET	OUTLET	General photograph taken at this point	0
8	1	INLET	OUTLET	Line deviates right, Start	0
9	1	INLET	OUTLET	Water level, 05% of the vertical dimension	0
10	1	INLET	OUTLET	General photograph taken at this point	0
11	1	INLET	OUTLET	General photograph taken at this point	0
12	1	INLET	OUTLET	Dimension changes, 1050mm high, 2400mm wide	0
13	1	INLET	OUTLET	Line deviates right, End	0
14	1	INLET	OUTLET	Dimension changes, 1290mm high, 2400mm wide	0
15	1	INLET	OUTLET	General remark, Start	0
16	1	INLET	OUTLET	General remark	0
17	1	INLET	OUTLET	General photograph taken at this point	0
18	1	INLET	OUTLET	Water level, 30% of the vertical dimension	0
19	1	INLET	OUTLET	General remark	0
20	1	INLET	OUTLET	General remark	0
21	1	INLET	OUTLET	General remark, End	0
22	1	INLET	OUTLET	General remark, End	0
23	1	INLET	OUTLET	General remark	0
24	1	INLET	OUTLET	Line deviates right	0
25	1	INLET	OUTLET	Material changes, masonry - randomly coursed	0
26	1	INLET	OUTLET	General remark	0
27	1	INLET	OUTLET	General remark	0
28	1	INLET	OUTLET	Connection other than junction, at 4 o'clock, diamet	0
29	1	INLET	OUTLET	General photograph taken at this point	0
30	1	INLET	OUTLET	General remark, Start	0
31	1	INLET	OUTLET	Survey abandoned	0
32	1	INLET	OUTLET	Water level, 10% of the vertical dimension	0
33	1	INLET	OUTLET	Start node type, manhole, reference number : OUT	0
34	1	INLET	OUTLET	General photograph taken at this point	0
35	1	INLET	OUTLET	Connection intruding, at 5 o'clock, diameter 150mm	

RevNo	Revision note	Date	Signature	Checked

Environment Agency

IWJS Group

Surveyed

Not Surveyed

INLET MH: **No GPS**

Outlet MH: **No GPS**

CARR BANK

Reservoir

Inlet
NO GPS

Outlet
NO GPS

Tank

Works

PH

DRIVE

LUMN STREET

MILL ROAD

FB

Tks

Tk

143.6m

Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference

Designed by	Checked by	Approved by - date	File name	Date	Scale
SA	DT	DT - 06-03-2015	EA052014065	06-03-2015	1-1250

IWJS

Pig Lee Brook B02

0131PIGT0101 B02	Edition 0	Sheet 1/1

Appendix 4

Hydraulic Modelling Study



Full Planting Schedule

Shrub

Name	Abb	Height	Form	Girth	Root	Cntr	Ctrs	Qty
Corylus avellana	Cor ave	40-60cm			B		0.333	179
Corylus avellana	Cor ave	40-60cm			B		1.500	188
Corylus avellana	Cor ave	40-60cm			B		1.500	136
Hedera helix	Hed hel	40-60cm			C	2L	1.000	885
Ilex aquifolium	Il aq	60-80cm			C	2L	0.333	89
Prunus spinosa	Prns sp	60-80cm			B		0.333	179
Prunus spinosa	Prns sp	60-80cm			B		1.500	188
Rosa canina	Ro ca	60-80cm			B		0.333	89
Ruscus aculeatus	Rus acu	30-40cm			C	3L	0.600	690
Sambucus nigra	Smb nig	60-80cm			B		0.333	89
Viburnum opulus	Vib op	60-80cm			B		0.333	89
Viburnum opulus	Vib op	60-80cm			B		1.500	281
								3089

Tree

Name	Abb	Height	Form	Girth	Root	Cntr	Ctrs	Qty
Acer campestre	Ace cam	60-80cm	Whip		B		0.333	89
Acer campestre	Ace cam	60-80cm	Whip		B		1.500	188
Alnus glutinosa	Aln gl	60-80cm			B		1.500	281
Betula pubescens	Be pb	60-80cm	Transplant - seed raised		B		1.500	93
Crataegus monogyna	Crtg mn	60-80cm	Seedling		B		0.333	893
Quercus robur	Qr ro	60-80cm	Transplant - seed raised		B		1.500	93
Salix caprea	Slx cp	60-80cm			B		1.500	188
Salix fragilis	Slx fr	60-80cm	Transplant - cutting raised		B		1.500	188
Sorbus aucuparia	Sor auc	60-80cm	Transplant - seed raised		B		1.500	127
Sorbus aucuparia	Sor Auc	60-80cm	Transplant - seed raised		B		1.500	61
								2291
								5291

Proposed native hedge planting in double-staggered rows, including 80mm depth no-fines bark mulch, tubular guards and stakes. Finished level to be 10mm below adjacent paving/turf (296m length).

Areas to be seeded with amenity grade seed mix, or existing grassed areas, made good (5226m²).

Areas to be seeded with species-rich grass seed mix, such as Emorsgate Mix EM8, or similar and approved (4930m²).

Areas to be seeded with species-rich wetland grass seed mix, such as Emorsgate Mix EG8 (9530m²).

Existing native planting, to be retained and enhanced in any gaps greater than 5m width.

Areas of native woodland groundcover planting 1m centres on embankment (1765m²).

Proposed new native buffer planting at 1.5m centres, including tubular guards and stakes (4620m²).

Areas of existing unimproved grassland, to be retained.

PDP

Client
Barratt Homes Manchester/David Wilson Homes

Project
Former Tetrosyl Site, Walmersley

Drawing title
Outline Landscape Masterplan

Scale
1:500 @ A0

Drawn by
PDP

Date
Sept 2015

Drawing No.
c-1339-01 Revision B

Legend (Topographical)

Fence - C/A Closed board, C/S Corrugated iron, C/W Chainlink, CL Chlpastatic, C/P Conc. panel, H/R Hand rail, S/P Steel Palisade; I/R Iron railings, O/B Open board, P/R Post & rail, P/W Post & wire, W/M Wire mesh, C/P Chestnut Paling

Overhead cable; Gate; Tree

50.00 Spot level

Bollard, Litter bin, Bus stop, BT Chamber IC, Concrete Paving Slabs, Cable Television cover, Drain, Electrical IC, Flag pole, Earth Rod, Floodlight, Cattle grid, Cable post, Grid, Gully, Stop valve, Hydrant, Inspection Cover, Junction box; Kerb outlet, Letter box, Lamp post, Meter cover, Mile post, Name plate, Parking meter, Post, Shielding eye, Road sign, Rain water pipe, Soil pipe, Stop valve, Soil and vent pipe, Traffic light, Telephone call box, Traffic light, Telegraph pole; Vent pipe, Water meter, Water outlet, Unable to Lift

Level prefix descriptions: A. Arch level, Bed level, Cover level, Eaves level, Invert level, Ridge level, Roof/Ridge level, Soffit level, Top of walling level, Threshold level, Top of wall level, Water level

Levels defining edge of carriageway are observed at channel (bottom of kerb).

North

WALMERSLEY OLD ROAD

BENTLEY LANE

New Allotment (Dec)

Car Park

TREES/BUSHES

DENSE TREES/BUSHES

ROUGH GRASS

ROUGH GROUND

GREENHOUSE

DENSE TREES/SHRUBS

CONTAINERS

UNMADE TRACK TO ALLOTMENTS

THE HARK TO DANDLER P.H.

EXISTING BUILDING

CONC

TARMAC

TANK

GRASS

CONC RAMP

CONTROL BUILDING

TARMAC CAR PARK

TECHNICAL CENTRE

GATE HOUSE

PORTACABIN

SATCHOUSE

ROUGH GROUND/VEGETATION

DENSE VEGETATION

ROUGH GRASS/VEGETATION

Building

CROSSHALL FARM

Container

WALMERSLEY OLD ROAD

ROYD GREEN

LANCASTER DRIVE

TIGHT DRIVE

AVON DRIVE

STATION COORDINATES			
STN	EASTING	EASTING	LEVEL
SDL1	380820.450	413906.634	143.644
SDL2	380797.454	413836.824	139.864
SDL3	380826.935	413974.133	147.004
SDL4	380842.462	413737.838	139.783
SDL5	380759.770	413743.648	134.248
WB1	380909.084	413886.897	138.597
N7	380838.366	413963.561	146.305
N8	380816.583	414035.899	149.403
N9	380824.334	414104.027	152.396
N10	380863.089	414169.382	156.240
N10A	380914.859	414173.387	161.805
N10B	381001.273	414183.744	162.753
SR1	380974.709	413677.777	142.963
SR2	380960.632	413706.146	143.842
SR3	381002.011	413725.310	143.887
SR4	381013.745	413760.892	144.413
SR5	381045.130	413814.742	148.235
SR6	381086.909	413864.560	153.837
SR7	381103.639	414058.255	167.138

SURVEY GRID AND LEVELS ARE BASED ON THE ORIGINAL SITE SURVEY CARRIED OUT BY OTHERS, DRAWING No 12D018/001. THIS DRAWING HAS BEEN PRODUCED BY A COMBINATION OF OS DIGITAL SUPERPLAN AND STANDARD TOPOGRAPHICAL DIGITAL SURVEYING. CARE SHOULD BE TAKEN WHEN MEASURING FROM ONE SYSTEM TO ANOTHER. THE OS INFORMATION IS FOR GUIDANCE ONLY. ONLY MANHOLES FOUND DURING THE SITE SURVEY ARE INDICATED ON THIS PLAN. FURTHER INVESTIGATION MAY BE REQUIRED TO DETERMINE THE FULL EXTENT OF THE SITE DRAINAGE.

ISSUE	REVISION	DATE

Project: TETROSYL, WALMERSLEY OLD ROAD, BURY.

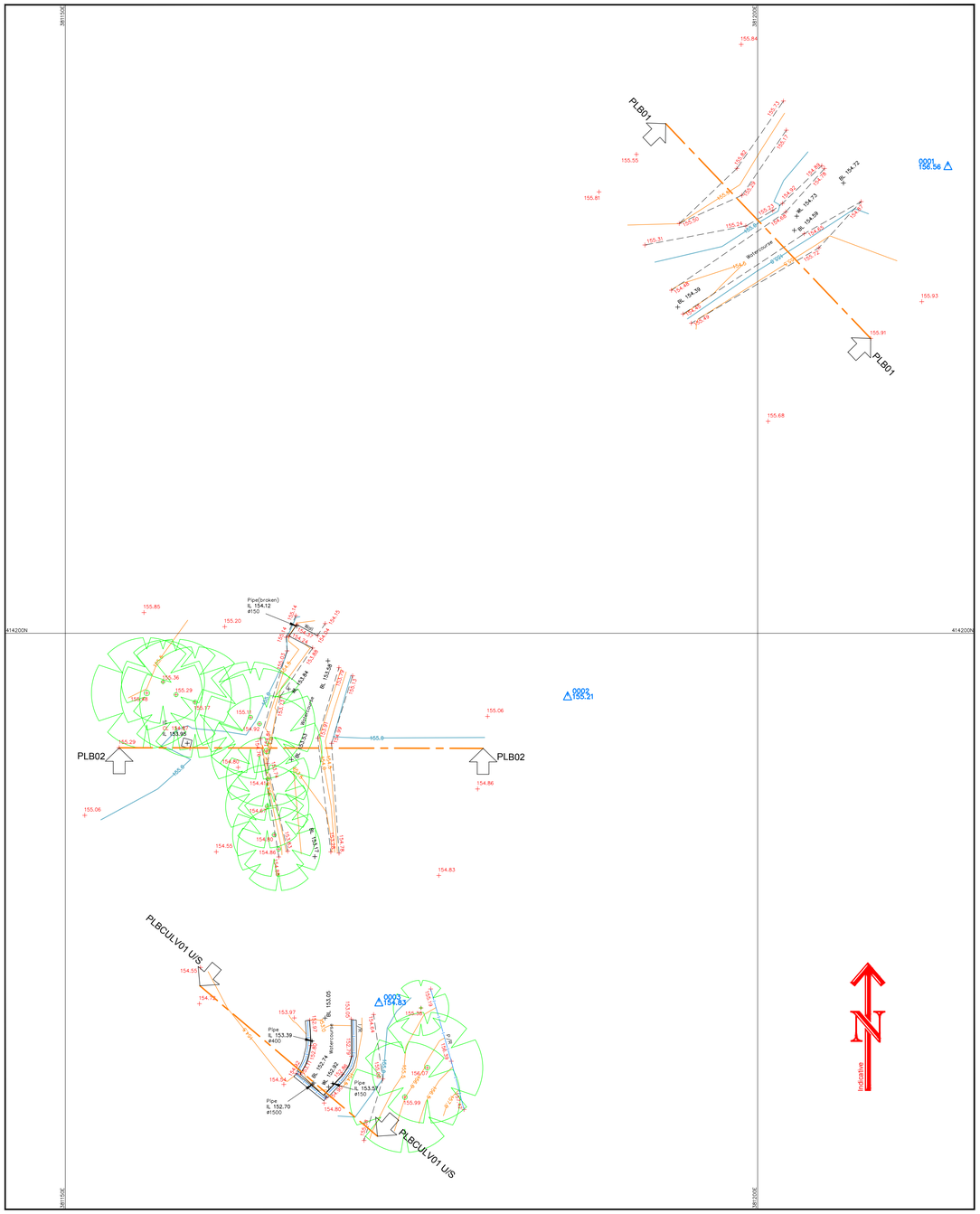
Drawing title: EXTENSION TO TOPO SURVEY.

Scales: 1:500 Date: 12.03.15.

Drawing number: SDL 2140/1. Rev. – Drawn by: BJ

CLIENT: BARRATT HOMES MANCHESTER. CITY PARK, 4 BRINDLEY ROAD, MANCHESTER. M16 9HQ. TEL: 0161 872 0161.

Survey & Design Limited
28 RAILWAY ROAD, LEIGH, LANCS, WN7 4AU
Tel: 01942 673136, Fax: 01942 607054
Email: bryn@surveyanddesign.co.uk
LAND SURVEYING ○ DESIGN CONSULTANTS
CIVIL ○ ARCHITECTURAL ○ PLANNING



PLB01

Vt Scale 1:200
Hz Scale 1:200

Datum 152.00m

WL 154.73

Level	155.63	155.74	155.31	155.24	154.64	154.56	154.61	155.68	155.91
Chainage	0.00	5.89	7.40	8.87	10.29	11.73	12.35	13.70	21.44

PLB02

Vt Scale 1:200
Hz Scale 1:200

Datum 151.00m

WL 153.84

Level	155.29	154.77	153.79	153.63	153.85	154.98	154.97
Chainage	0.00	10.30	10.92	12.75	14.42	15.36	26.28

PLBCULV01 U/S

Vt Scale 1:200
Hz Scale 1:200

Datum 150.00m

154.91

WL 152.92

IL 152.70

Level	155.66	155.30	154.40	154.38	153.04	154.64
Chainage	0.00	0.92	4.70	4.84	7.18	18.81

Topographical Survey Legend

B	Bollard	h	Height	RWP	Rain Water Pipe	Level Prefix Descriptions	
BS	Bus Stop	Hyd	Hydrant	SP	Soil Pipe	AL	Arch Level
BT	Telecommunications IC	IC	Inspection Cover	SPS	Stone Paving Slabs	BL	Bed Level
CPS	Concrete Paving Slabs	JB	Junction Box	ST	Stop Tap	CL	Cover Level
CTV	Cable Television Cover	KO	Kerb Outlet	Stay	Cable Stay	EL	Eaves Level
DP	Downpipe	LB	Letter Box	SV	Stop Valve	FL	Floor Level
DR	Drain	LP	Lamp Post	TCB	Telephone Call Box	IL	Invert Level
Elec	Electrical IC	Mkr	Utility Marker	TL	Traffic Light	OL	Overhead Cable Level
EP	Elec. Pole	MP	Mile Post	TP	Telegraph Pole	PL	Parapet Level
ER	Earth Rod	NP	Name Plate	TPS	Tactile Paving Slabs	RL	Roofridge Level
FP	Flagpole	P	Post	VP	Vent Pipe	SL	Soffit Level
FT	Floodlight	PM	Parking Meter	WM	Water Meter	Spr	Arch Springing Level
G	Gully	RE	Rodding Eye	WO	Water Outlet	TF	Top Of Fence Level
GP	Gate Post	RS	Road Sign	UTL	Unable To Lift	TW	Top Of Wall Level
GV	Gas Valve	RTW	Retaining Wall			Thr	Threshold Level
						WL	Water Level

Fence Annotation

B/W	Barbed Wire		Fence
C/B	Closed Boarded		Safety Barrier
C/I	Corrugated Iron		Gate
C/L	Chain Link		Stile
C/P	Concrete Panel		Hedge
H/R	Hand Rail		Limit of Foliage & Tree Canopy
I/R	Iron Railings		
O/B	Open Boarded		
P/C	Post & Chain		
P/R	Post & Rail		
P/W	Post & Wire		
W/M	Wire Mesh		

Spot Level 50.00

Survey Control Station SSL1 50.00 (coordinated point)

Tree MT Multi Trunk

Levels defining edge of carriageway are observed at channel (bottom of kerb). Unless otherwise stated.

Survey Station Coordinates

Stn	Easting	Northing	Level
0001	381213.74	414233.78	156.56
0002	381186.27	414195.48	155.21
0003	381172.64	414173.37	154.83
0004	381228.42	414163.07	161.41
0005	381214.12	414127.29	158.89
0006	381120.81	414072.82	157.65
0007	381096.40	414085.03	151.64
0008	380659.11	413616.23	130.59
0009	380664.06	413638.74	131.29
0010	380679.55	413640.40	131.64
0011	380682.47	413601.42	121.63

Please note:

Any discrepancy found between an Ordnance Survey benchmark and an OSGB15 computed orthometric height is likely to be due to bench mark subsidence or uplift and, assuming precise GPS survey has been carefully carried out, the orthometric height given by OSGB15 should be considered correct in preference to archive benchmark heights. OSGB15 converts GPS ellipsoid heights to orthometric heights above mean sea level.

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Tel. 01625 523444
Fax 01625 526815
mail@survsys.co.uk
www.survsys.co.uk

Levels are related to **OSGB15**
Value **n/a**
Tied to OS datum by GPS, see note.

Coordinates are related to **National Grid** (GPS)

Scale **1:200**

0 2 4 6 8 10 12 14 16 18 metres

The accuracy of this survey is commensurate with the drawing scale specified within the title block. Copyright in this drawing remains with Survey Systems Ltd. Do not scale from this drawing, work to figured dimensions. Check all dimensions on-site. In the event of any discrepancy, please refer query to Survey Systems Ltd.

Client Barratt Homes Manchester

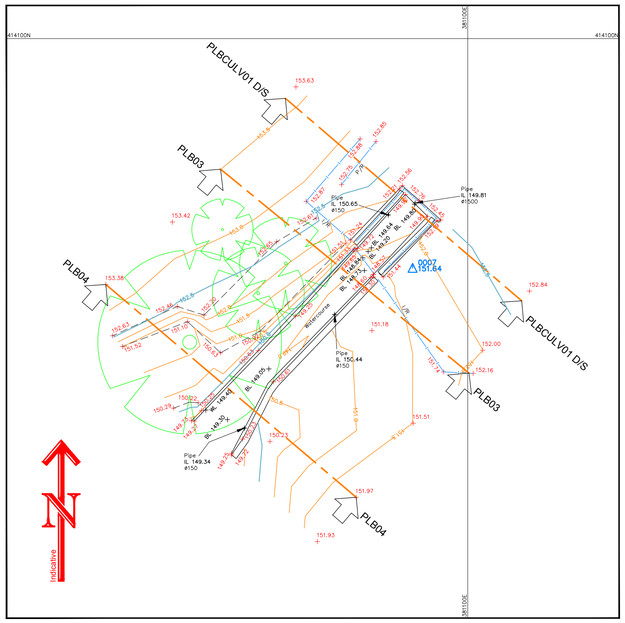
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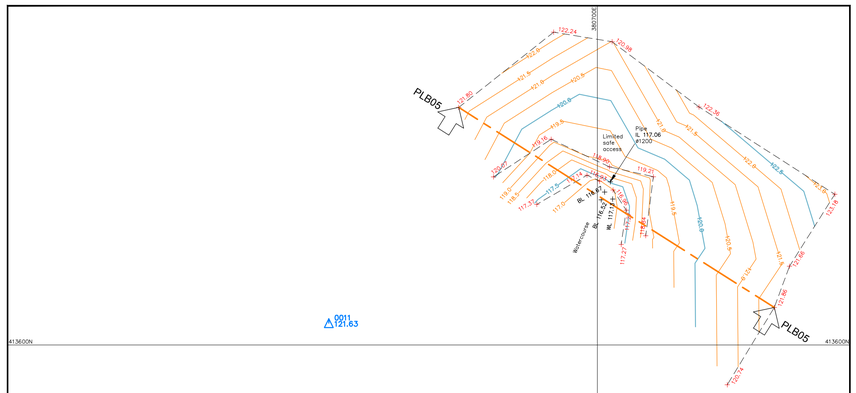
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Tetrosyl Ltd ÅBevis Green Walmersley Old RdÅBL9 6RE

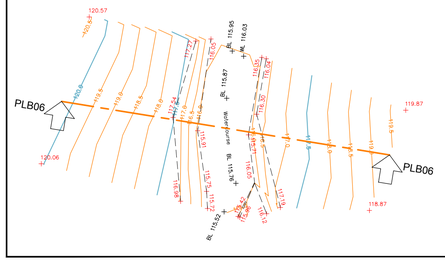
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Date	February 2018	Checked	AL
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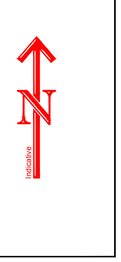
SURVEYsystems

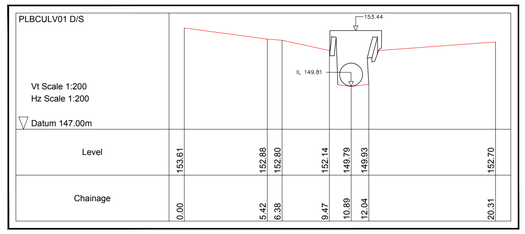
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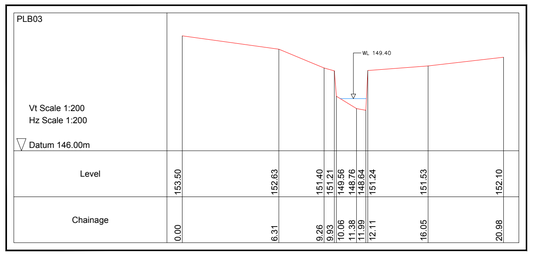


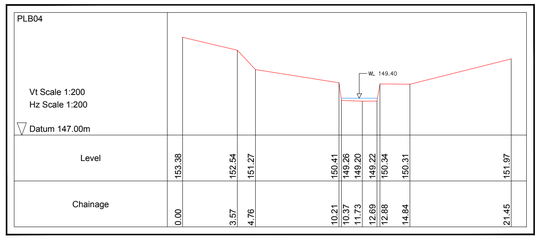


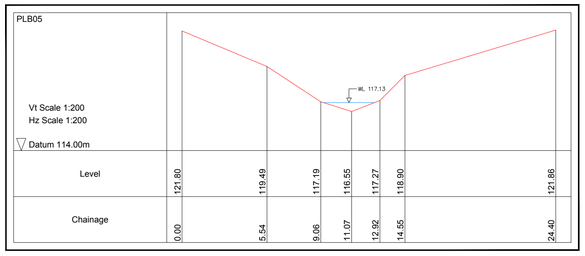


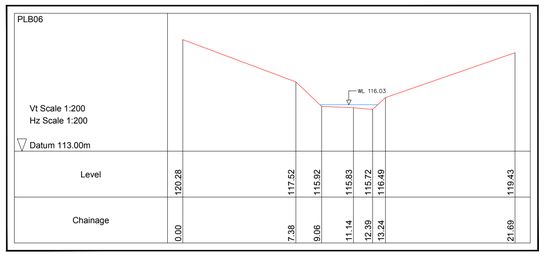












Topographical Survey Legend

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DP	Downpipe	LB	Letter Box	SV	Stop Valve	FL	Floor Level
DR	Drain	LP	Lamp Post	TCB	Telephone Call Box	IL	Invert Level
Elec	Electrical IC	Mkr	Utility Marker	TL	Traffic Light	OL	Overhead Cable Level
EP	Elec. Pole	MP	Mile Post	TP	Telegraph Pole	PL	Parapet Level
ER	Earth Rod	NP	Name Plate	TPS	Tactile Paving Slabs	RL	Roofridge Level
FP	Flagpole	P	Post	VP	Vent Pipe	SL	Soffit Level
FT	Floodlight	PM	Parking Meter	WM	Water Meter	Spr	Arch Springing Level
G	Gully	RE	Rodding Eye	WO	Water Outlet	TF	Top Of Fence Level
GP	Gate Post	RS	Road Sign	UTL	Unable To Lift	TW	Top Of Wall Level
GV	Gas Valve	RTW	Retaining Wall			Thr	Threshold Level
						WL	Water Level

Fence Annotation

B/W	Barbed Wire		Fence
C/B	Closed Boarded		Safety Barrier
C/I	Corrugated Iron		Gate
C/L	Chain Link		Stile
C/P	Concrete Panel		Hedge
H/R	Hand Rail		Limit of Foliage & Tree Canopy
I/R	Iron Railings		
O/B	Open Boarded		
P/C	Post & Chain		
P/R	Post & Rail		
P/W	Post & Wire		
W/M	Wire Mesh		

Spot Level 50.00

Survey Control Station SSL1 50.00 (coordinated point)

Tree MT Multi Trunk

Levels defining edge of carriageway are observed at channel (bottom of kerb). Unless otherwise stated.

Survey Station Coordinates

Stn	Easting	Northing	Level
0001	381213.74	414233.78	156.56
0002	381186.27	414195.48	155.21
0003	381172.64	414173.37	154.83
0004	381228.42	414163.07	161.41
0005	381214.12	414127.29	158.89
0006	381120.81	414072.82	157.65
0007	381096.40	414085.03	151.64
0008	380659.11	413616.23	130.59
0009	380664.06	413638.74	131.29
0010	380679.55	413640.40	131.64
0011	380682.47	413601.42	121.63

Please note:

Any discrepancy found between an Ordnance Survey benchmark and an OSGB15 computed orthometric height is likely to be due to bench mark subsidence or uplift and, assuming precise GPS survey has been carefully carried out, the orthometric height given by OSGB15 should be considered correct in preference to archive benchmark heights. OSGB15 converts GPS ellipsoid heights to orthometric heights above mean sea level.

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Levels are related to **OSGB15**
Value **n/a**
Tied to OS datum by GPS, see note.

Coordinates are related to **National Grid** (GPS)

Scale **1:200**

0 2 4 6 8 10 12 14 16 18 metres

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Client Barratt Homes Manchester


Title

Topographical & Sectional Survey
Tetrosyl Ltd ÅBevis Green Walmersley Old RdÅBL9 6RE

Surveyed AL AF
Drawn ME dlp
Date February 2018
Checked AL
File name 18583_2D
Revision No.
Sheet size A1
Drawing No. **SSL:18583:200:2:2**

SURVEYsystems

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WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

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ENGINEERING LAYOUT NOTES

1. All adoptable drainage works have been designed and are to be constructed in accordance with 'Sewers for Adoption, 6th Edition', and United Utilities 'Guidelines for Sewer for adoption 6th Edition'. Where specification conflicts, UU guidelines shall take presidence.

United Utilities Standard details to be used are:

STND/19/001A Manhole Type 1
STND/19/002A Manhole Type 2 and Invert Access Detail
STND/19/003A Shallow Manhole Detail for Small Diameter Pipes (Type 4)
STND/19/004A Shallow Surface Water Manhole Detail – Restricted Headroom (less than 2.0m) – For Pipe Sizes 450Dia and Above
STND/19/005A Flow Control Manhole Detail
STND/19/007A External Backdrop Detail
STND/19/008A Pipe Bedding Detail
STND/19/010A Variable Manhole – Guidance Notes
STND/19/011A Headwall Type 1 and Typical Outlet Grille Detail
STND/19/012A Typical Outfall Details Type 2 & Type 3

2. All clay pipe work shall be Extra Strength Clayware to BS 295 and BS 65 (SW pipes only).

3. All precast concrete pipework shall be to Class 120 in accordance with BS5911 Part 1, BS EN 1916 and bear the BS kitemark.

4. All adoptable drainage to be bedded in Class S granular surround unless otherwise stated.

5. All Concrete manholes and Soakaways rings, Concrete cover slabs and Con to be manufactured to BS EN 1917 and BS 5911:Part 3.

6. Rising Mains to be Black Polyethylene Pipes complying to BS EN 13244–2. Polyethylene fittings, including fusion joints, and electro-fusion fittings shall comply with BS EN 13244–2.

7. All levels relate to Ordnance Datum. Contractor to ensure that this drawing is read in conjuction with the site specific Topographical Survey provided by Barratt Manchester and the Benchmark information provided.

8. This drawing is to be read in accordance with all other relevant drawings.

9. The contractor shall be responsible for ensuring that any existing invert levels indicated on the drawings are correct before work commences.

10. All proposed connections to the sewer shall be 150ø unless stated otherwise.

11. All private house drainage shall be 100ø and all drag-out connections shall be 150ø at a minimum gradient of 1:80 unless otherwise stated and laid in accordance with Part H of the the Building Regulations.

12. Runoff from private surfaces shall not discharge across the highway. Gullies or channels shall be provided as appropriate to prevent this.

13. Pram crossings shall be provided at the inner tangent points of all junctions.

14. Pipes shall be protected from concentrated loading by construction traffic during the construction period when insufficient cover to the pipe may make them vulnerable to damage.

15. Insitu CBR tests of the road formation level are to be carried out to determine the depth of pavement construction required. This is to be approved by the adopting authority prior to construction of the road pavements.

16. Groundworker to ensure that plot drainage be within the curtilage of the plot they serve where possible and inspection covers kept within hardstandings where possible.

17. Contractor to provide United Utilities with sufficient notice prior to commencement of Sewer works on their Inspections telephone number. Tel 0845 602 0406.

18. Contractor to obtain all necessary Highway opening notices from the relevant Local Authority, obtain approval to work on United Utilities Sewerage System, obtain approval to method statement from the Environment Agency for any works affecting a watercourse.

ENGINEERING KEY

S1 Adoptable S.W. Sewer & Manhole	F1 Adoptable F.W. Sewer & Manhole
(10.25) S. Water Drag-Out and Invert	10.25 Foul Drag-Out and Invert
Adoptable Road Gully	Yard Gully
Street Name Plate	Drainage Channel

FLOW CONTROL DETAILS

UPSTREAM MH	OUTPUT	DETAILS
S3[illegible]	13[illegible]l/s	Crown Water 3[illegible]mm [illegible]R3 Vorte[illegible] Flow Control
S[illegible]	[illegible]l/s	Crown Water 331mm [illegible]R[illegible]F Vorte[illegible] Flow Control
S[illegible]	93l/s	Crown Water 3[illegible]9mm [illegible]R[illegible]F Vorte[illegible] Flow Control

REV	DESCRIPTION	DATE	DRAWN
G	Planning layout rev G inserted, plots 265,266 lifted to suit Cole Easdon's river modelling requirements. Drainage CLs & ILs amended at the end of Road7/ Road7TH to tie in with lifted road levels.	18.10.19	DK
F	Planning layout rev F inserted, plots 10–21 amended slightly to suit.	10.09.19	DK
E	Fully amended road & sewer design added to suit latest planning layout rev E.	09.08.19	DK
D	FFLs amended to suit cut & fill rev A.	02.07.19	DK
C	FFLs amended to latest planning layout PL02 rev B.	04.01.19	LB
B	FFLs amended to latest planning layout rev J. Drainage design removed.	10.01.18	DK
A	Full road & sewer design added.	06.11.17	DK

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Job: Tetrosyl Bury			
Title: Engineering Layout			
Design By: DK	Date: 02.04.15	Drawing Number: 456/ED/02	Rev: G
C.A.D By: DK	Scale: 1:500		

Appendix 5

Hydraulic Modelling Study

Proposed Surface Water Drainage Strategy

Surface water runoff from the development site will be managed on site for storms up to the 1:100 year + 40% climate change event without flooding. Post development runoff will be discharged via the use of attenuation SuDS and will be restricted to the equivalent QBAR runoff rate of 93l/s. This will provide significant betterment over the existing unattenuated brownfield runoff rate.

Preliminary calculations indicate that some 1638m^2 if storage is required to attenuate flows from the 1:100 year + 40% climate change event. SuDS will comprise 672m^3 of online storage within oversize pipes for storms up to the 1:30 year runoff event and 966m^3 of offline storage provided in below ground crates, for storms greater than the 1:100 year event up to the 1:100 year + 40% climate change event, subject to detailed design. Outflow from the proposed surface water drainage network will be controlled using a HydroBrake or similar.

Proposed Foul Water Drainage Strategy

Post development foul flows will discharge by gravity from the site to the existing public combined sewer at the junction of Mill Road and Walmersley Old Road.

PLB Tributary

Proposed Compensatory Flood Storage Area

1m wide low flow channel

PLB308

Proposed orifice flow control

Crest level of weir to be set AOD

PLB352

PLB387

PLB427

PLB468

Proposed deculverted route of PLB Tributary

PLB508

PLB548

PLB588

PLB628

PLB641

2.7m wide culvert

Outlet manhole (MH3)
CL:141.000
IL:138.375

Proposed surface water connection to existing culverted section of PLB Tributary
CL:138.500
IL:128.47 (Estimated)

Proposed foul water connection location to public combined sewer

WALMERSLEY OLD ROAD

MILL ROAD

BENTLEY LANE

RIBBLE DRIVE

MILL LANE

EXISTING RTW TO BE RETAINED

Notes:

1. All levels are in metres above ordnance datum
2. All dimensions are in millimetres unless stated otherwise
3. Sewer records provided by United Utilities□February 201□
□. Topographical survey undertaken by Survey □ Design Limited□March 201□
□. Proposed layout provided by Barratt Homes Manchester. Drawing Re□ □□□/ED/02 Rev G

Rev.			Revision Details
E	Designed	DF	Layout Updated
	Drawn	ZB	Cross sections ameneded
	Checked	DF	
	Date	03.10.19	
D	Designed	DF	Layout Updated
	Drawn	NJ	
	Checked	DF	
	Date	24.07.19	
C	Designed	DF	Updates to FSA
	Drawn	ZB	Addition of watercourse cross section loctions
	Checked	DF	
	Date	18.04.19	
B	Designed	JP	Update FSA footprint, remove ecology pond
	Drawn	JP	
	Checked	DF	
	Date	15.02.19	
A	Designed	JP	Change to proposed compensatory FSA, permeable water area and addition of notes
	Drawn	ZB	
	Checked	DF	
	Date	29.11.18	

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Client
Barratt Homes (Manchester)

Job Title
Proposed Residential Development
Former Tetrosyl Site
Walmersley Old Road
Bury

Drawing Title
Proposed Site Layout

Drawing Status:

FOR COMMENT	FOR PLANNING	FOR TENDER	FOR APPROVAL	FOR CONSTRUCTION	AS BUILT
	X				
□CONSTRUCTION AT CLIENT / CONTRACTOR RISK□□					

Designed by:	Drawn by:	Checked by:
JP	JP	DF

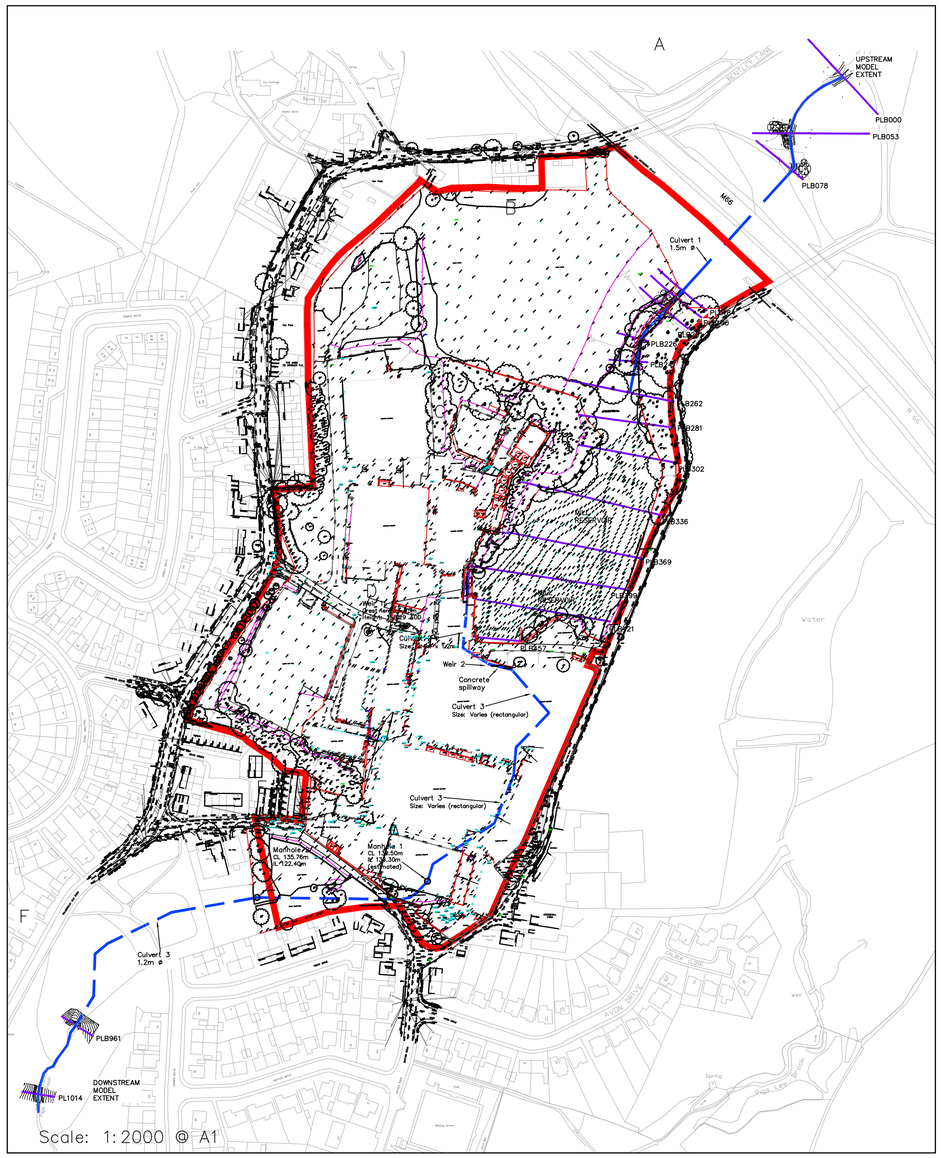
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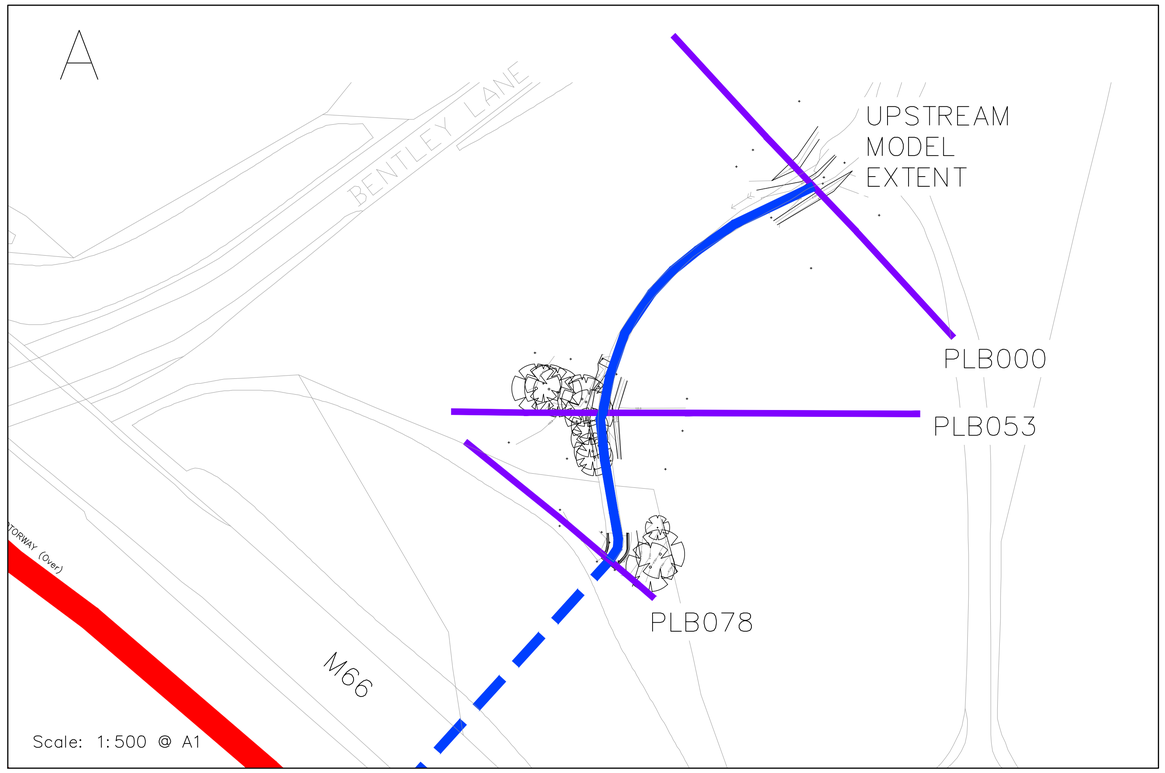
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Rev. E

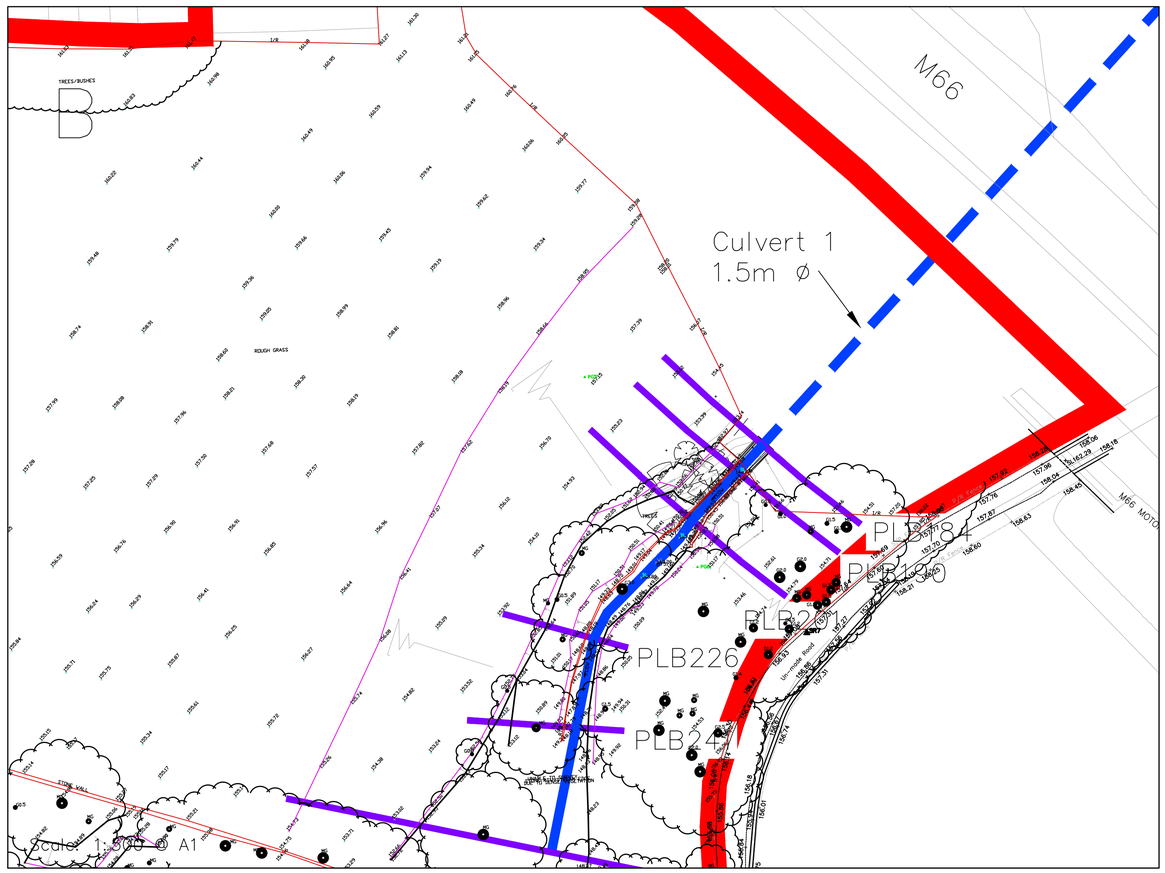
Key

- Site boundary (10.□□ha)
- E□isting watercourse
- E□isting culverted watercourse
- E□isting public □oul sewer
- E□isting public sur□ace water sewer
- E□isting public combined sewer
- Design e□ceedance □ow route
- Proposed open watercourse
- Proposed sur□ace water pipework
- E□isting reservoir to be removed
- □1□□.20 E□isting Level
- □FL:1□9.20 Finished Level

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Key

- Site boundary
- Cross sections
- Centreline of culvert of tributary of Pigs Lee Brook
- Centreline of tributary of Pigs Lee Brook
- PLB078 Model cross-section numbers

Notes

1. All levels in meters above ordnance datum.
2. Topographical survey provided by Survey & Design Ltd, March 2015.
3. Cross-section data provided by Survey and Design Ltd, March 2018.
4. LiDAR Contours not shown

No.	By	Date	Revision Details
B	ZB	11.10.2019	Proposed model X-section locations removed
A	ZB	23.08.2019	Weir 1 text amended

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Client
Barratt Homes Manchester

Job Title
Hydraulic Modelling Study
Former Tetrosyl Site
Walmersley Old Road
Bury
Greater Manchester

Drawing Title
E□isting Hydraulic Model E□tent

Sheet 1 o□3

Drawing Status:

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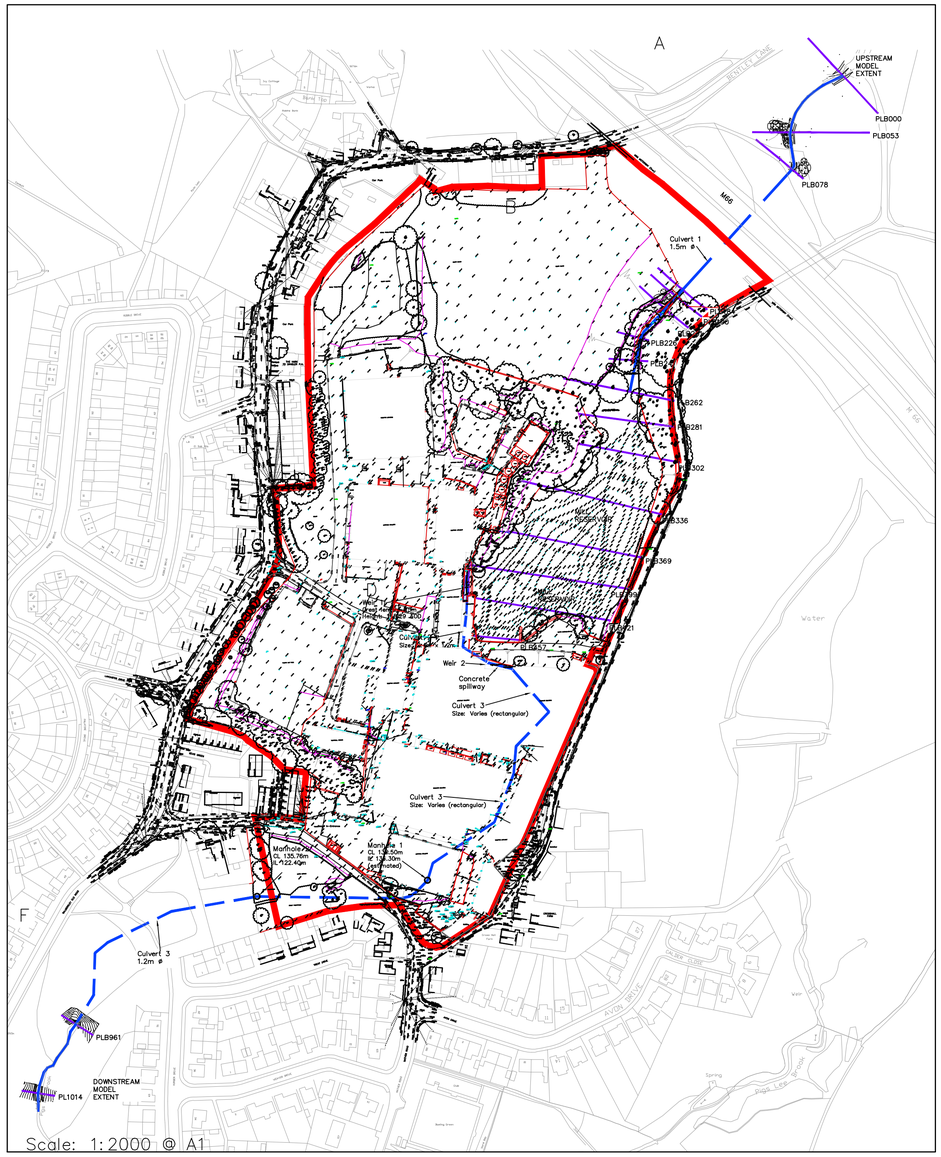
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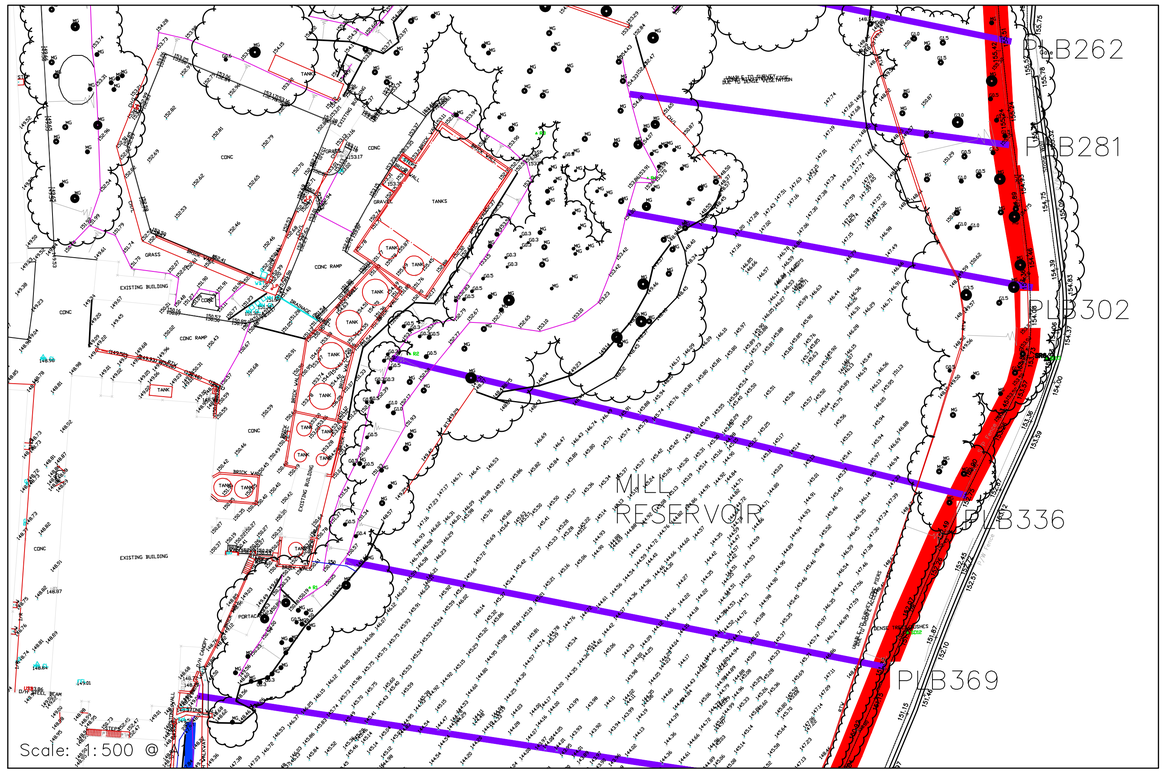
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JP	JP	DF

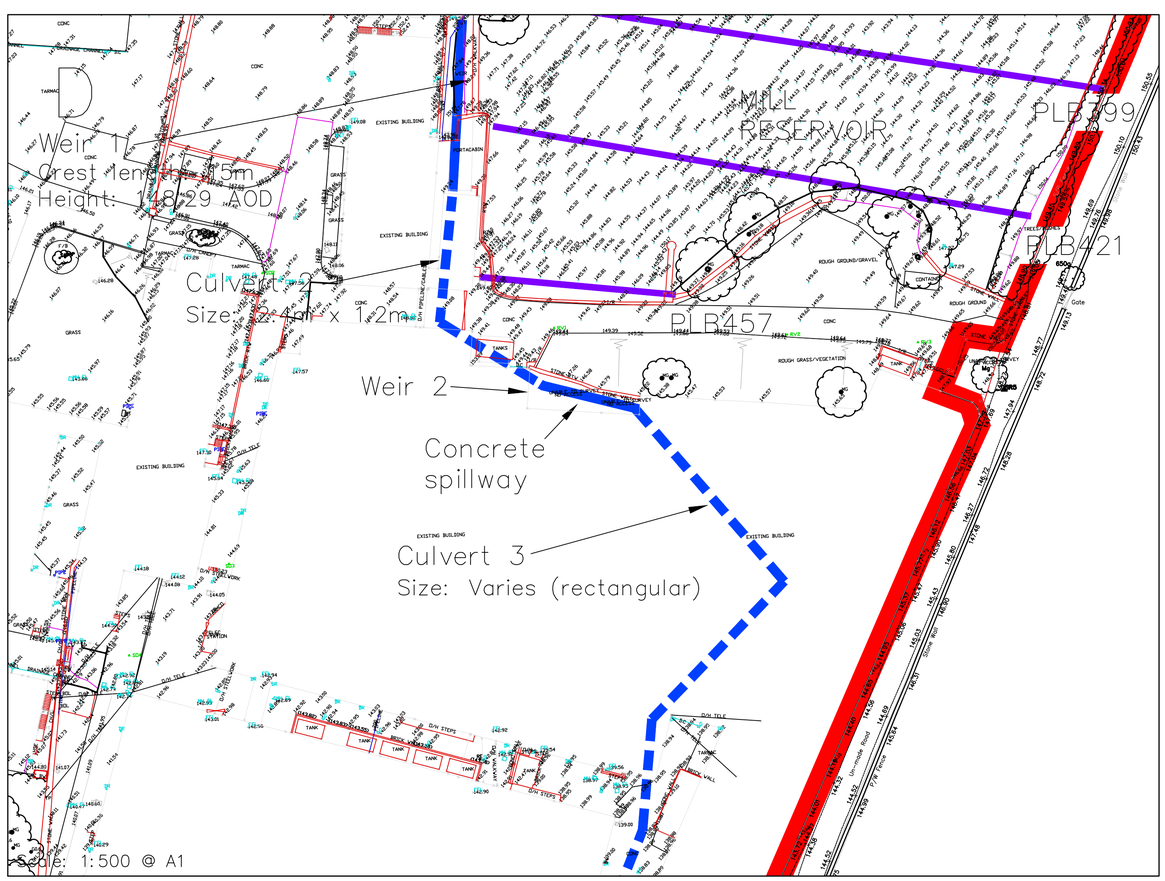
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Key

- Site boundary
- Cross sections
- Centreline of culvert of tributary of Pigs Lee Brook
- Centreline of tributary of Pigs Lee Brook
- PLB078 Model cross-section numbers

Notes

1. All levels in meters above ordnance datum.
2. Topographical survey provided by Survey & Design Ltd, March 2015.
3. Cross-section data provided by Survey and Design Ltd, March 2018.
4. LiDAR Contours not shown

No.	By	Date	Revision Details
B	ZB	11.10.2019	Proposed model X-section locations removed
A	ZB	23.08.2019	Weir 1 text amended

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Client
Barratt Homes Manchester

Job Title
Hydraulic Modelling Study
Former Tetrosyl Site
Walmersley Old Road
Bury
Greater Manchester

Drawing Title
E□isting Hydraulic Model E□tent
Sheet 2 o□3

Drawing Status:

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	X				

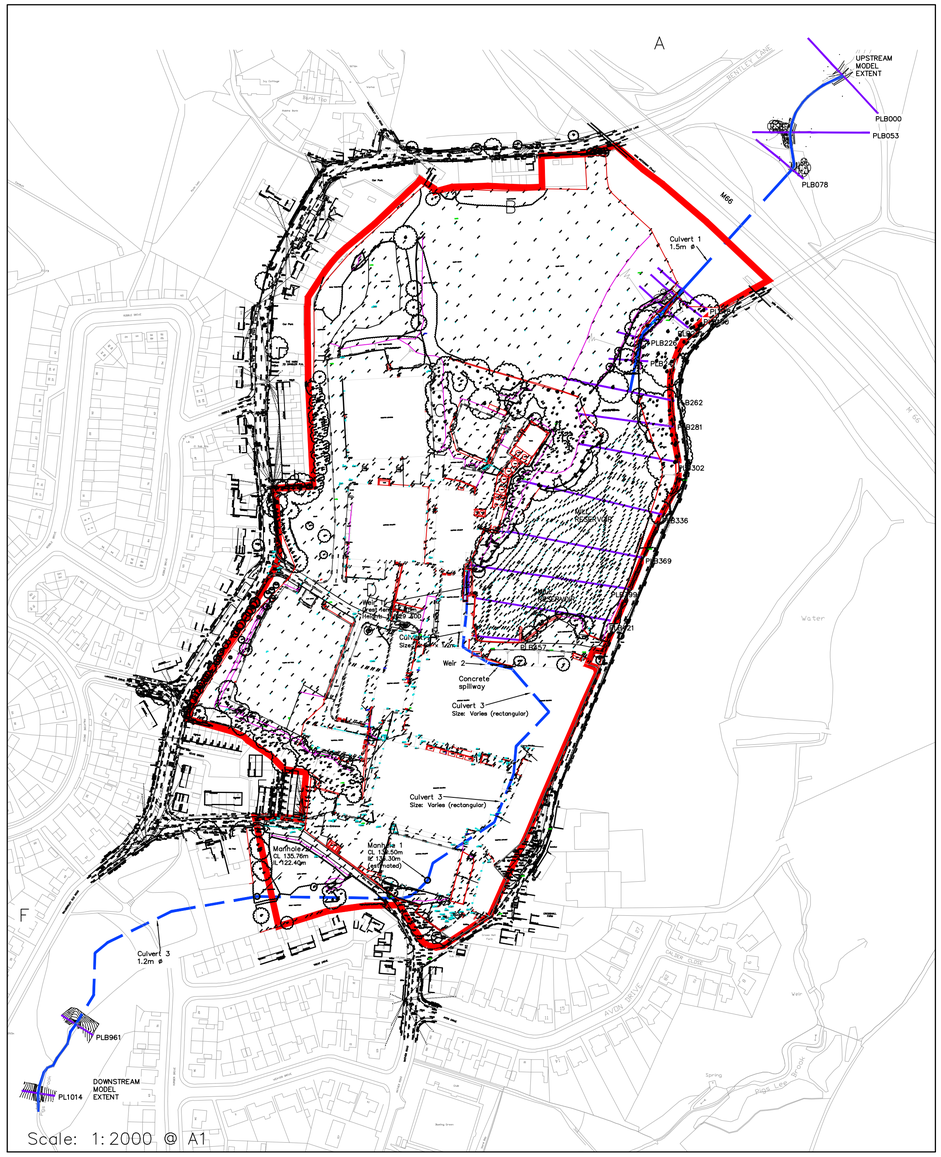
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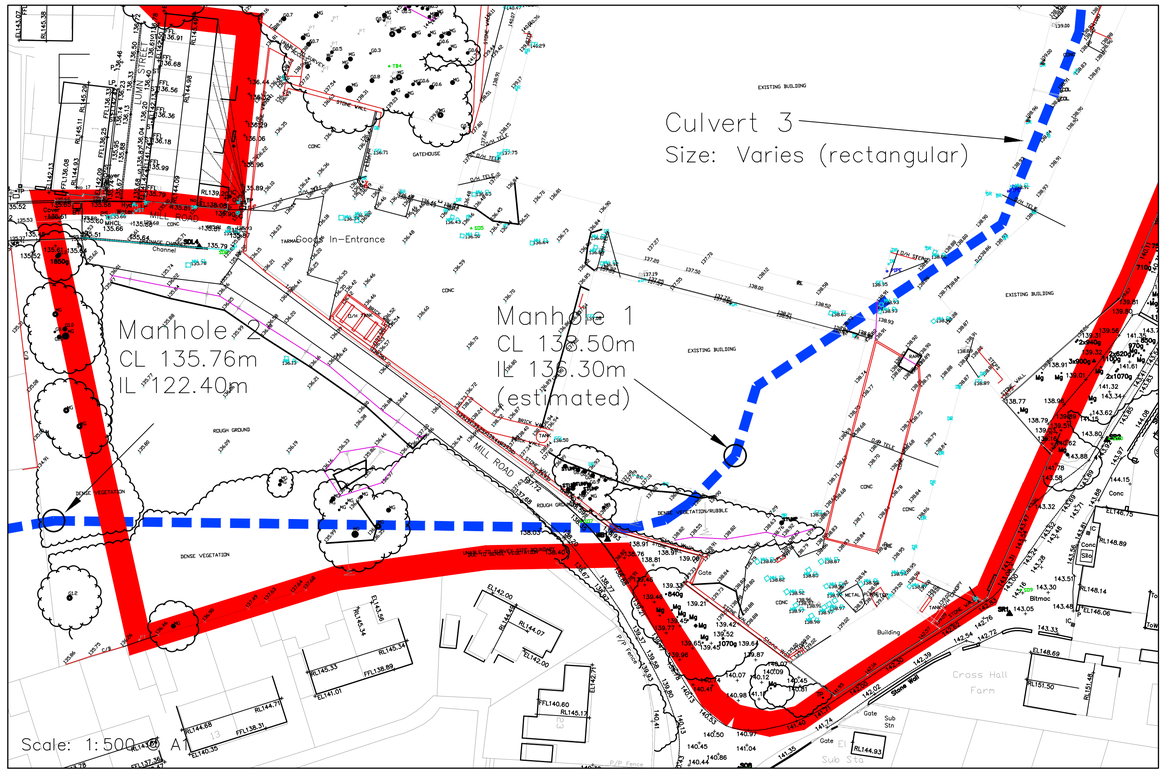
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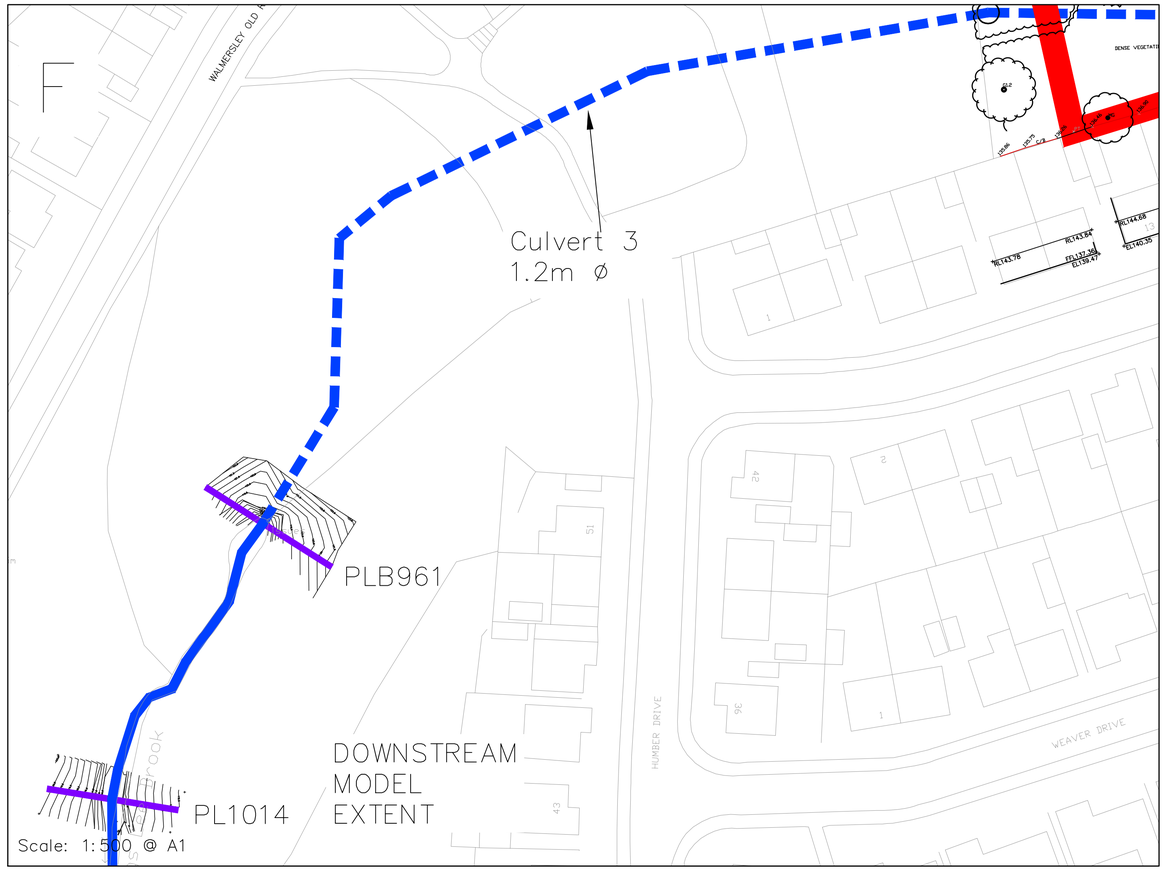
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Key

- Site boundary
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- Centreline of culvert of tributary of Pigs Lee Brook
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Notes

1. All levels in meters above ordnance datum.
2. Topographical survey provided by Survey & Design Ltd, March 2015.
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4. LiDAR Contours not shown

No.	By	Date	Revision Details
B	ZB	11.10.2019	Proposed model X-section locations removed
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Drawing Title
E□sting Hydraulic Model E□tent

Sheet 3 o□3

Drawing Status:

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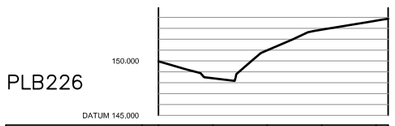
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Rev. B

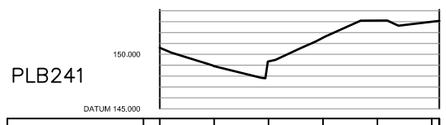
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PLB226



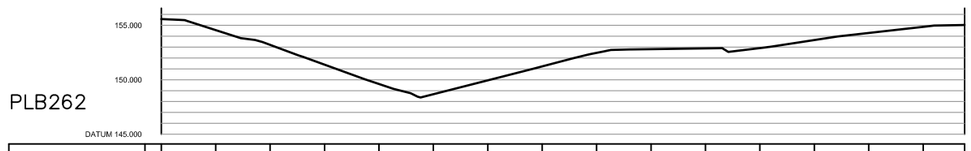
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PLB241



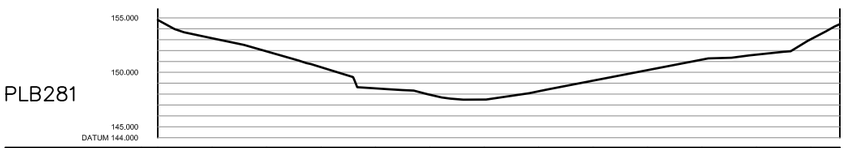
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PLB262



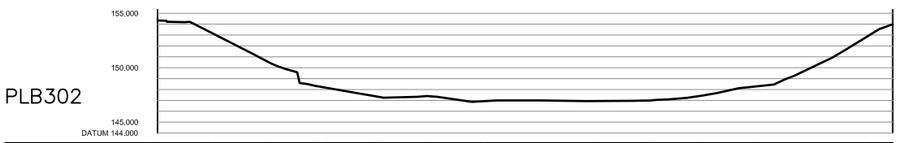
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6155 SURVEY LEVEL	155.572	154.559	153.209	151.380	149.614	148.670	149.948	151.232	152.474	152.814	152.897	152.913	153.652	154.302	154.861	155.037

PLB281



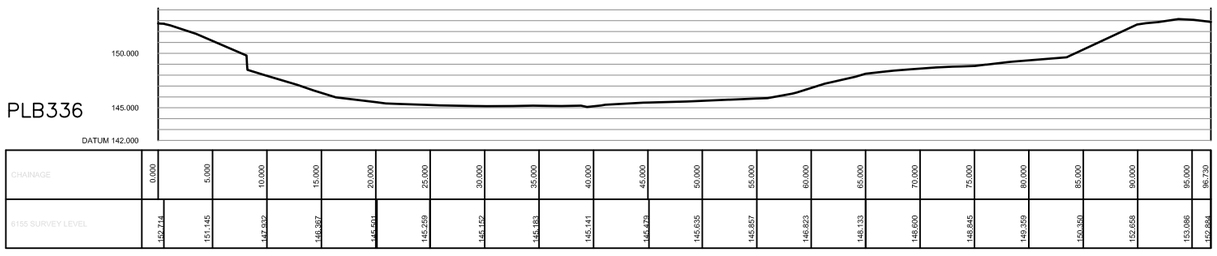
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6155 SURVEY LEVEL	154.794	153.192	151.929	150.473	148.526	147.662	147.499	148.061	149.241	150.207	151.173	151.622	151.040	154.427

PLB302



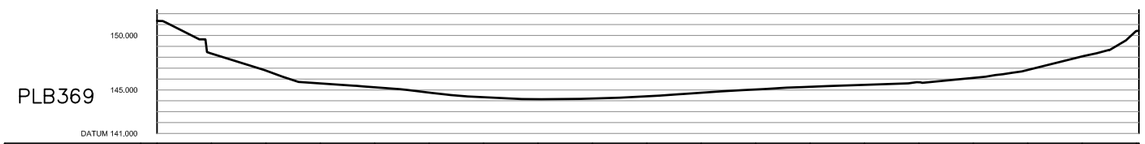
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6155 SURVEY LEVEL	154.398	153.187	150.618	148.251	147.390	147.379	148.927	148.986	148.939	148.982	147.456	148.262	149.980	152.744	153.979

PLB336



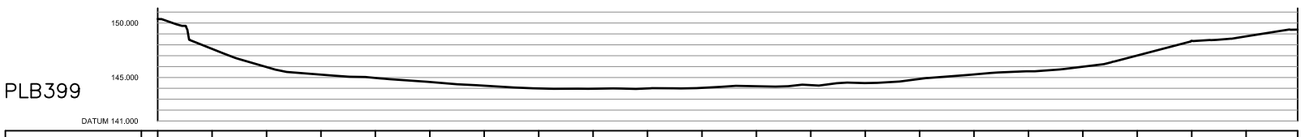
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6155 SURVEY LEVEL	152.714	151.145	147.092	146.367	145.501	145.259	145.152	145.183	145.141	145.429	145.035	145.857	146.823	148.133	148.600	148.845	149.359	150.350	152.058	153.086	152.894

PLB369



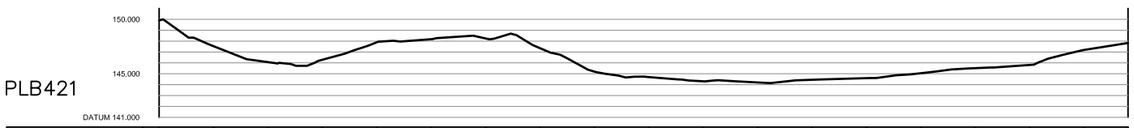
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6155 SURVEY LEVEL	151.340	148.341	146.778	145.598	145.245	144.716	144.330	144.197	144.221	144.405	144.739	145.035	145.287	145.464	145.706	146.109	146.839	148.102	148.102	148.102

PLB399



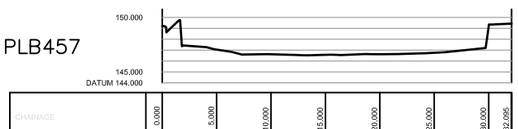
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6155 SURVEY LEVEL	150.367	147.623	145.958	145.259	144.955	144.749	144.237	143.993	143.993	144.010	144.045	144.196	144.295	144.483	144.862	145.273	145.569	145.990	147.013	148.369	148.760	148.369

PLB421



CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000	70.000	75.000	80.000	85.000	89.912
6155 SURVEY LEVEL	149.993	147.532	146.968	146.292	147.394	148.181	148.237	147.244	145.196	144.095	144.305	144.200	144.448	144.593	145.057	145.517	145.808	147.189	147.627

PLB457



CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	32.095
6155 SURVEY LEVEL	149.225	147.064	146.618	146.569	146.637	146.770	149.381	149.433

Notes

1. All levels in meters above ordnance datum.
2. All sections are viewed downstream.

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Client
Barratt Homes (Manchester)

Job Title
Proposed Development
Tetrosyl Site
Walmersley Old Road
Bury

Drawing Title
Hydraulic Modelling Study
Mill Reservoir - Existing Cross-sections

Drawing Status:

FOR COMMENT	FOR PLANNING	FOR TENDER	FOR APPROVAL	FOR CONSTRUCTION	AS BUILT

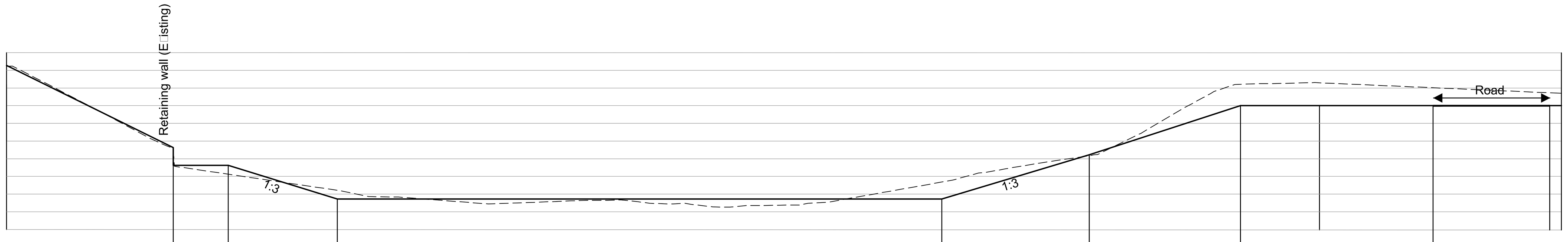
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Designed by:	Drawn by:	Checked by:
JP	JP	DF

Date	Scale
August 2018	NTS @ A2

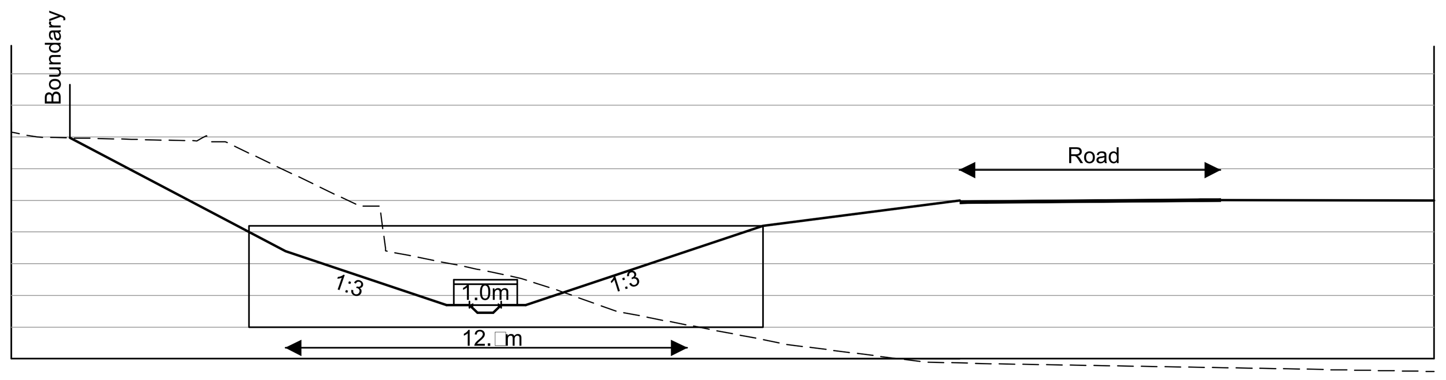
Drg. No.	Rev.
6155/505	

PLB308



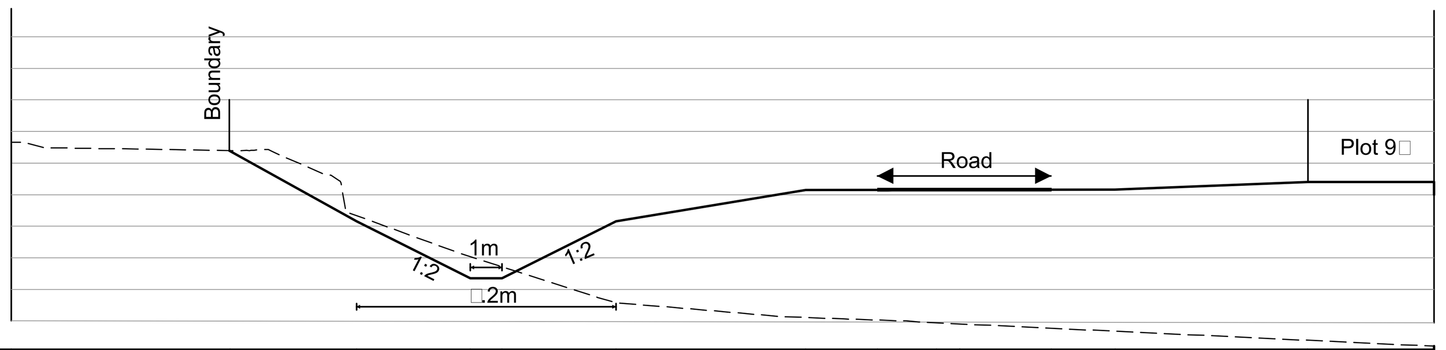
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PROPOSED LEVEL	1□□.2□	1□□.□0	1□□.□0	1□□.□0	1□□.□0	1□9.20	1□2.00	1□2.00	1□2.00	1□2.00	1□2.00
E□ISTING LEVEL	1□□.22□	1□□.□03	1□□.9□3	1□□.□□2	1□□.2□□	1□□.1□3	1□□.9□2	1□3.21□	1□3.31□	1□2.□00	

PLB352



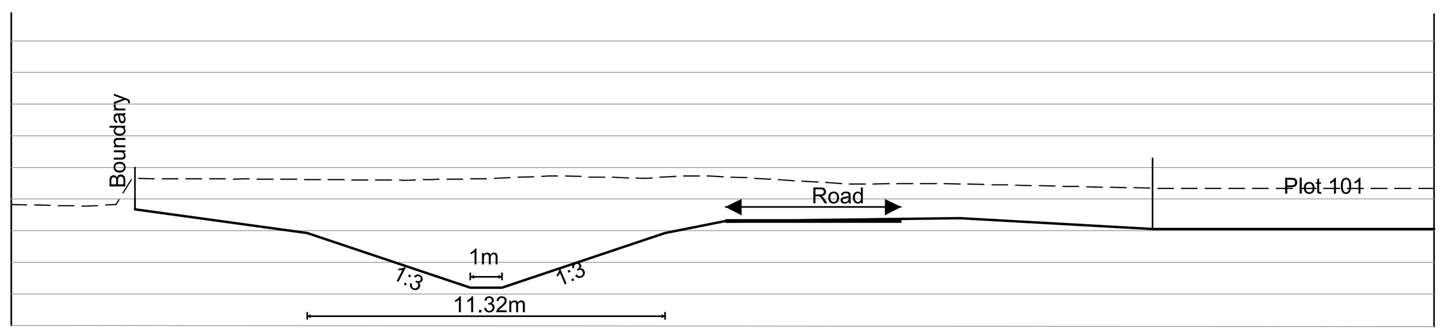
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PROPOSED LEVEL	1□2.10	1□□.□0	1□□.□□	1□□.□□	1□□.□0	1□9.3□	1□0.000	1□9.9□9	1□9.9□9	1□0.23□	
E□ISTING LEVEL	1□2.1□3	1□0.309	1□□.333	1□□.□39	1□□.90	1□□.90	1□□.□□0				

PLB387



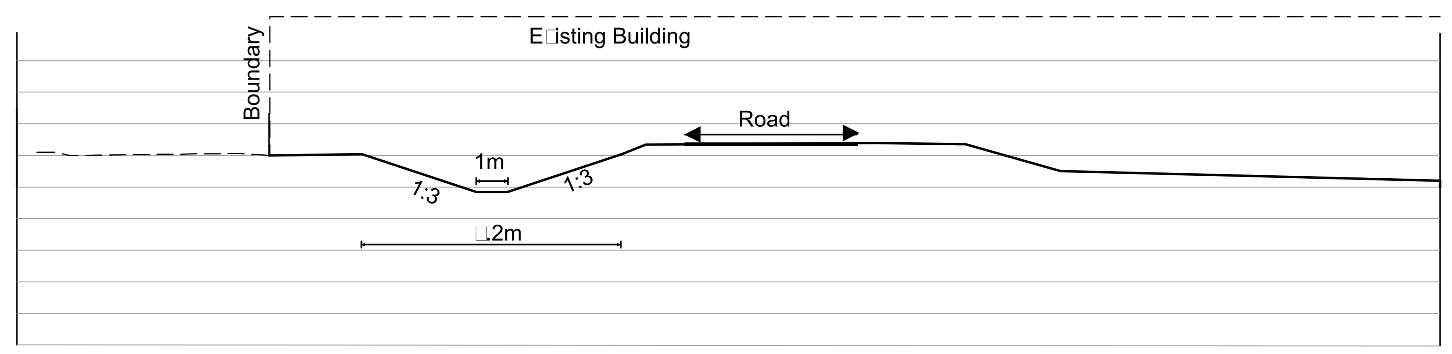
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PROPOSED LEVEL	1□0.□0	1□□.1□	1□□.3□	1□□.3□	1□□.1□	1□9.1□0	1□9.1□1	1□9.1□0	1□9.1□1	1□9.1□1	1□9.□0	1□9.□0	
E□ISTING LEVEL	1□0.□□□	1□9.□1□	1□□.□0□	1□□.909	1□□.300	1□□.110	1□□.110						

PLB427



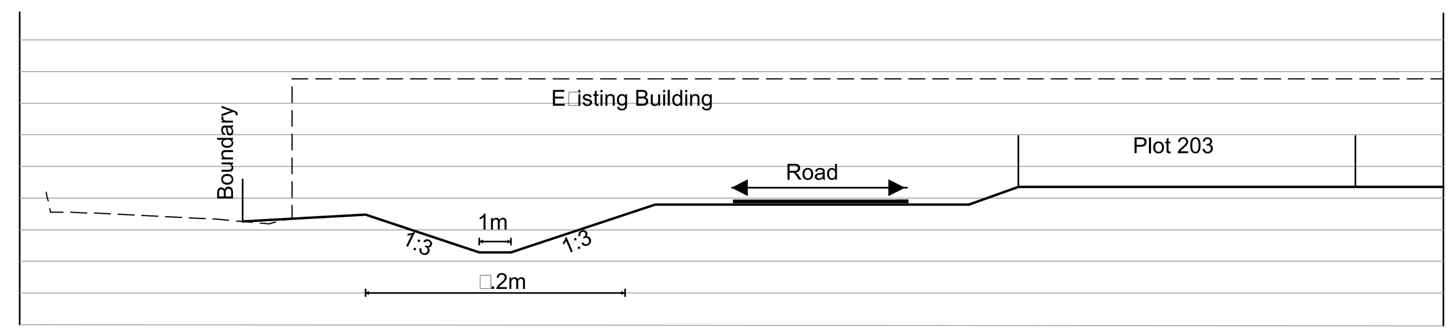
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PROPOSED LEVEL	1□□.□□□	1□□.92	1□□.20	1□□.20	1□□.92	1□□.220	1□□.220	1□□.220	1□□.220	1□□.0□	1□□.0□	
E□ISTING LEVEL	1□□.□2□	1□9.□13	1□9.□□2	1□9.□90	1□9.3□	1□9.3□						

PLB468



CHAINAGE	0.000	□.92□	10.92□	1□.□2□	1□.□2□	19.12□	21.12□	2□.□□0	30.000	33.000	□□.00
PROPOSED LEVEL	1□□.00	1□□.0□	1□□.□□	1□□.□□	1□□.0□	1□□.3□	1□□.30□	1□□.30□	1□□.□00	1□□.200	
E□ISTING LEVEL	1□□.103	1□□.00□	(139.00)	(139.00)							

PLB508



CHAINAGE	0.000	□.000	10.92□	1□.□2□	1□.□2□	19.12□	21.12□	22.□□1	2□.0□1	30.000	31.□□□	□2.211	□□.000
PROPOSED LEVEL	1□□.2□3	1□□.□□	1□3.2□	1□3.2□	1□□.□□	1□□.□0	1□□.90	1□□.90	1□□.□0	1□□.3□	1□□.3□	1□□.3□	
E□ISTING LEVEL	1□□.1□□	1□□.2□3	(13□.9□)	(139.00)									

Notes

1. All levels in meters above ordnance datum.
2. All sections are viewed downstream.
3. Refer to Drawing 6155/502 for section locations

Key

——— Proposed ground profile

– – – – Existing ground profile

No.	By	Date	Revision Details
A	SS	30.09.19	Existing ground profile added

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Client
Barratt Homes (Manchester)

Job Title
Proposed Development
Tetrosyl Site
Walmersley Old Road
Bury

Drawing Title
Deculverted Watercourse
Proposed Cross□sections
Page 1 o□2

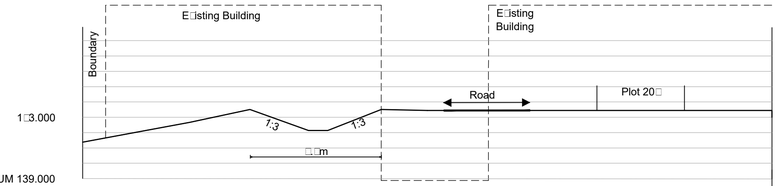
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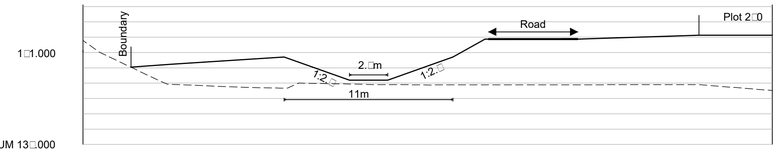
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Drawn by: □B
Checked by: DF
Date: April 2019
Scale: 1:200@A1
Drg. No. □1□□/□0□/01
Rev. A

PLB548



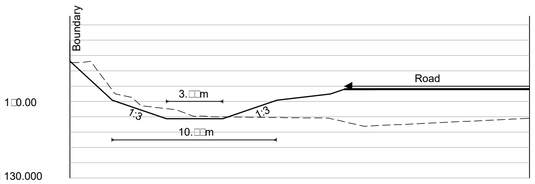
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PLB588



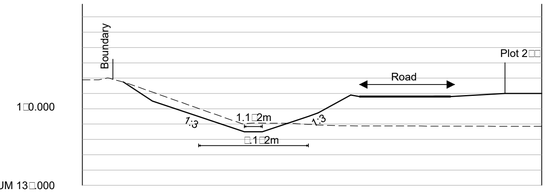
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PROPOSED LEVEL	1□1.1□	1□0.00	1□0.□0	139.20	139.20	1□0.□0	1□1.□□□	1□1.□□□	1□2.3□0	1□2.3□0
E□ISTING LEVEL	1□1.□□3	1□0.00	13□.□□□		13□.9□		13□.93	13□.900	13□.900	13□.20

PLB628



CHAINAGE	0.000	2.□□0	□.290	9.9□0	13.□00	1□.002	1□.939	30.000
PROPOSED LEVEL	1□2.□33	1□0.0□	13.□□	13.□□	1□0.0□	1□.0□0	1□.0□0	1□0.□0
E□ISTING LEVEL	1□2.□33			139.00□		13.□90□	13.□3□0	13.□900

PLB641



CHAINAGE	0.000	2.000	□.□□0	□.□00	10.□□0	11.□□2	1□.□□2	1□.□32	1□.100	2□.0□0	2□.□00	30.000
PROPOSED LEVEL		1□1.910	1□0.□0	139.□00	13□.□0	13□.□0	139.□0	1□0.90	1□0.□0	1□0.□0	1□1.00	1□1.00
E□ISTING LEVEL	1□1.□90	1□1.910			139.1□3		13□.□□□					13.□900

Notes

1. All levels in meters above ordnance datum.
2. All sections are viewed downstream.
3. Refer to Drawing 6155/502 for section locations

Key

——— Proposed ground profile

– – – – Existing ground profile

No.	By	Date	Revision Details
A	SS	30.09.19	Existing ground profile added

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Client
Barratt Homes (Manchester)

Job Title
Proposed Development
Tetrosyl Site
Walmersley Old Road
Bury

Drawing Title
Deculverted Watercourse
Proposed Cross□sections
Page 2 o□2

Drawing Status:

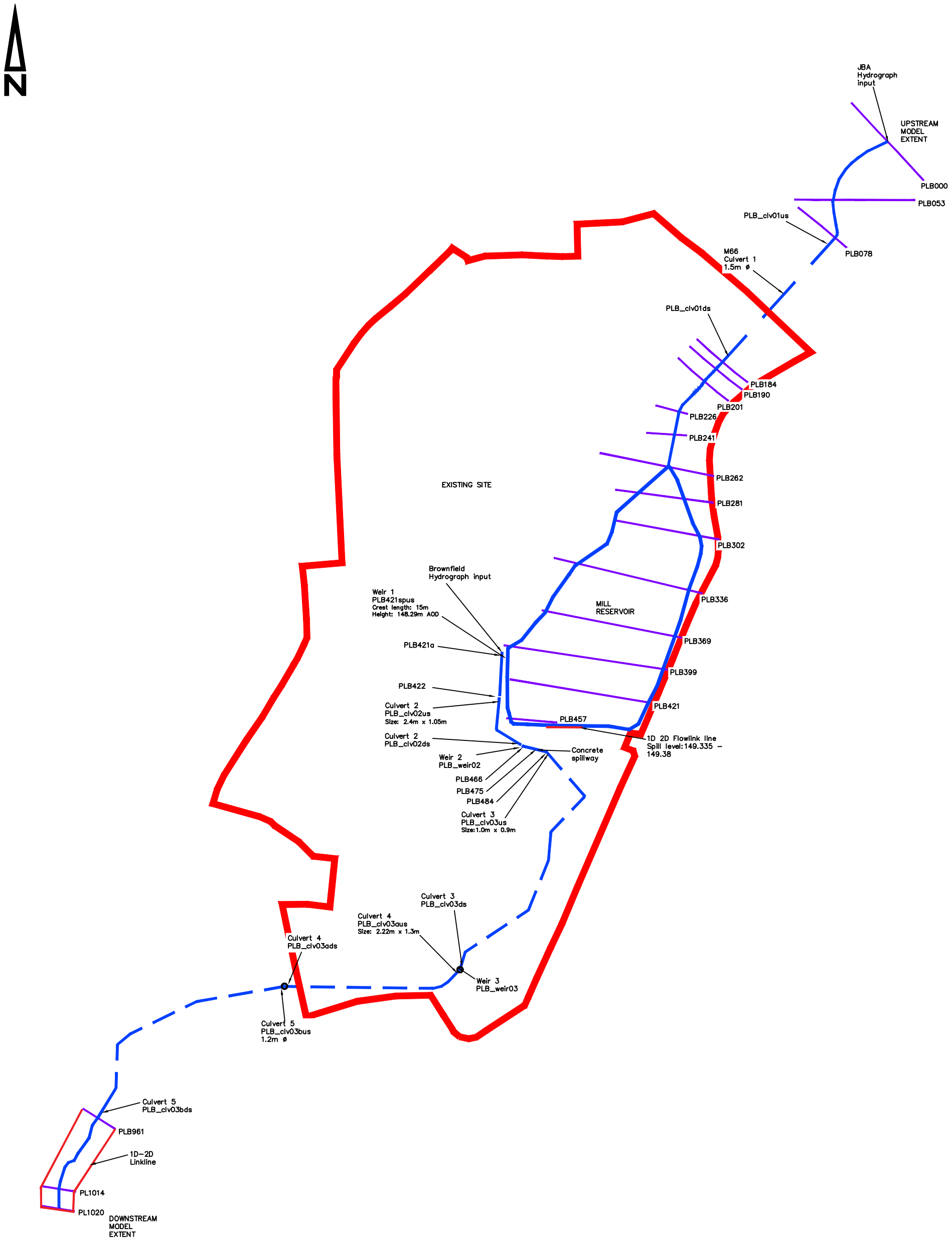
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DF	□B	DF

Date	Scale
April 2019	1:200@A1

Org. No.	Rev.
□1□□/□0□/02	A



No.	By	Date	Revision Details

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Job Title:
Proposed Development
Former Tetrosyl Site
Walmersley Old Road
Bury

Drawing Title:
Schematic Plan:
E□isting Model

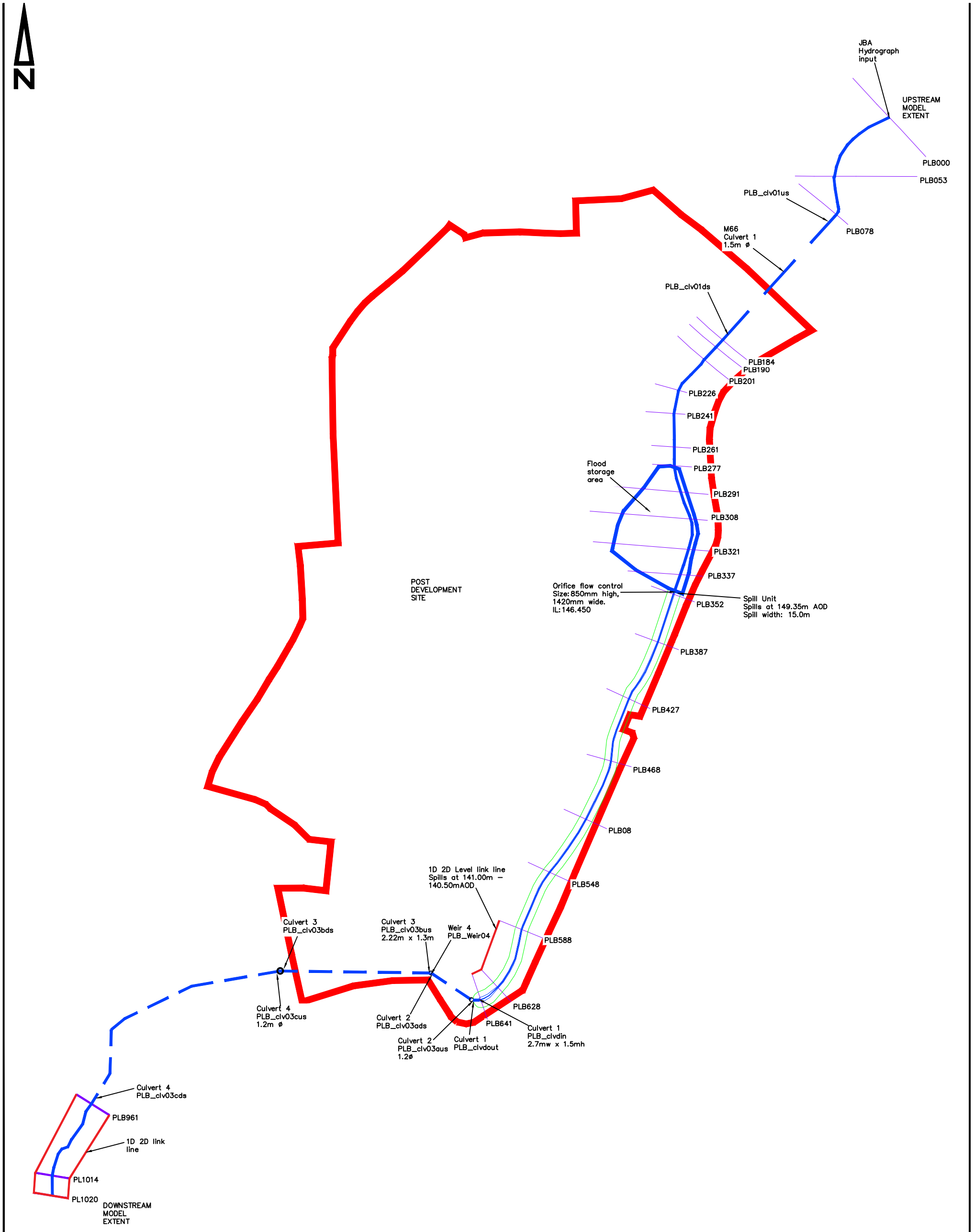
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FOR TENDER	
FOR APPROVAL	
FOR CONSTRUCTION	
AS BUILT	

CONSTRUCTION AT CLIENT AND/OR CONTRACTOR RISK

Client:
Barratt Homes (Manchester)

Drawn By	Date Drawn	Scale
NJ	August 2019	NTS @ A3

Checked By	Drawing No.	Revision
DF	□1□□/□11	



No.	By	Date	Revision Details
B	NJ	24.10.19	Culvert Size Amended
A	ZB	11.10.19	Spill level amended

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Job Title:

Proposed Development
Former Tetrosyl Site
Walmersley Old Road
Bury

Drawing Title:

Schematic Plan:
Post Development Model

Drawing Status:	
FOR COMMENT	
FOR PLANNING	X
FOR TENDER	
FOR APPROVAL	
FOR CONSTRUCTION	

CONSTRUCTION AT CLIENT AND/OR CONTRACTOR RISK

Client:

Barratt Homes (Manchester)

Drawn By	Date Drawn	Scale
NJ	August 2019	NTS @ A3

Checked By	Drawing No.	Revision

Appendix 6

Hydraulic Modelling Study

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Add Flow / Climate Change (%)	0
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.262	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	140.000	7.000	20.0	4.510	1.00	0.0	0.600	o	825	Pipe/Conduit	
1.001	140.000	7.000	20.0	0.000	0.00	0.0	0.600	o	900	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	1.35	148.600	4.510	0.0	0.0	0.0	6.66	3557.8	610.7
1.001	50.00	1.68	142.000	4.510	0.0	0.0	0.0	7.02	4467.9	610.7

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	149.600	1.000	Junction	0	1.000	148.600	825				
S2	143.000	1.400	Open Manhole	1800	1.001	142.000	900	1.000	141.600	825	
	140.000	5.000	Open Manhole	0		OUTFALL		1.001	135.000	900	

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.001		140.000	135.000	0.000	0	0

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.267
Return Period (years)		100	Cv (Summer) 0.750
Region	England and Wales		Cv (Winter) 0.840
M5-60 (mm)	19.000		

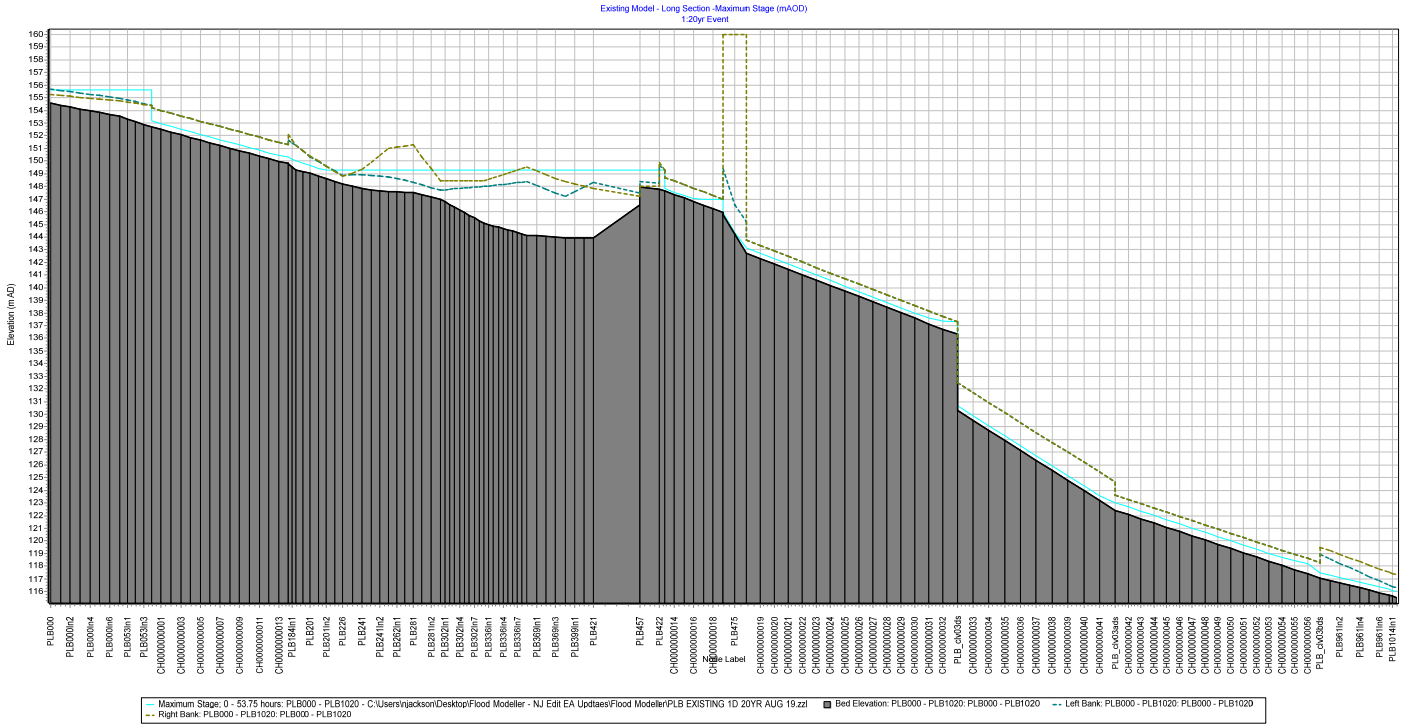
Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

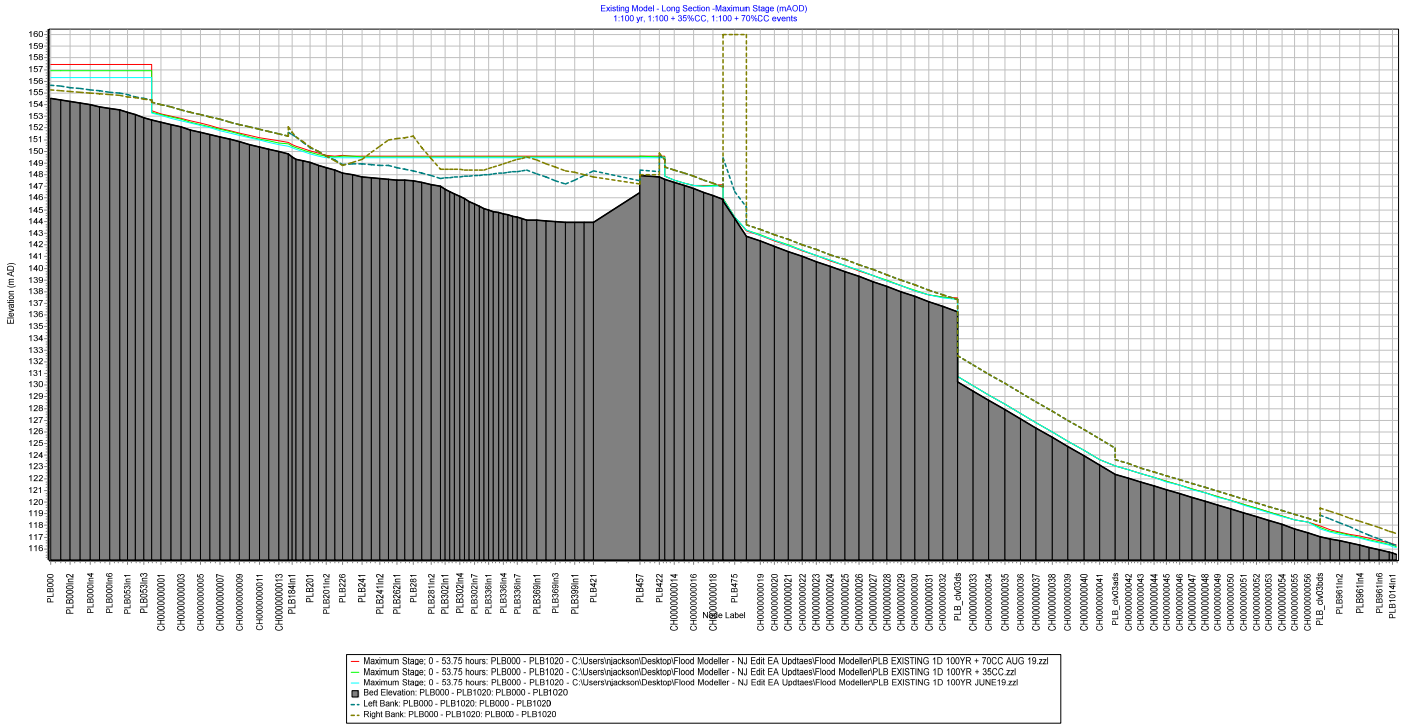
Profile(s)	Summer and Winter
Duration(s) (mins)	600
Sensitivity flows(s) (%)	0, +40

PN	US/MH Name	Storm	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	S1	600 Summer	+40%					148.784	-0.641
1.001	S2	600 Summer	+40%					142.188	-0.712

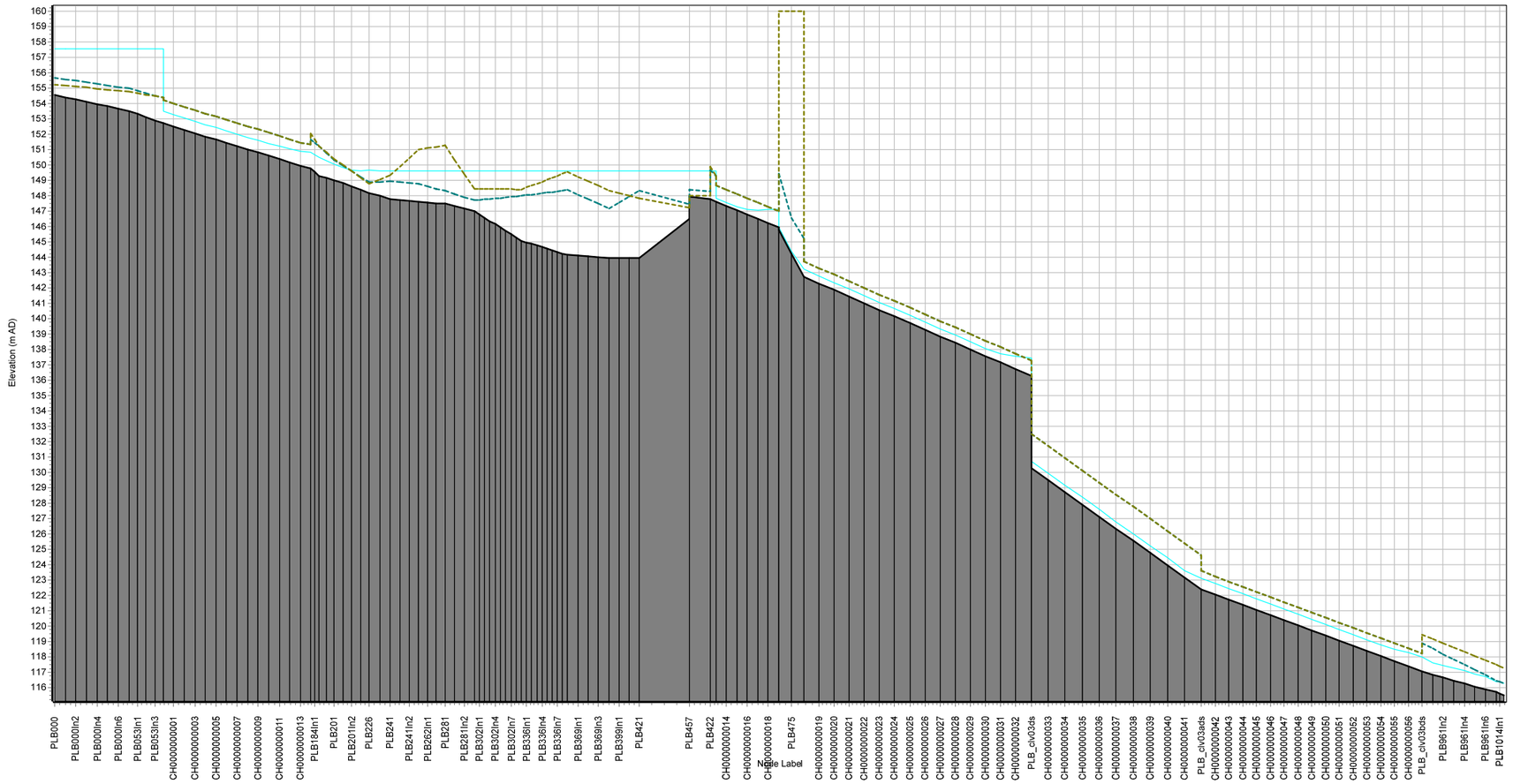
PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.000	0.11		405.6	OK*	
1.001	S2	0.000	0.10		405.6	OK	

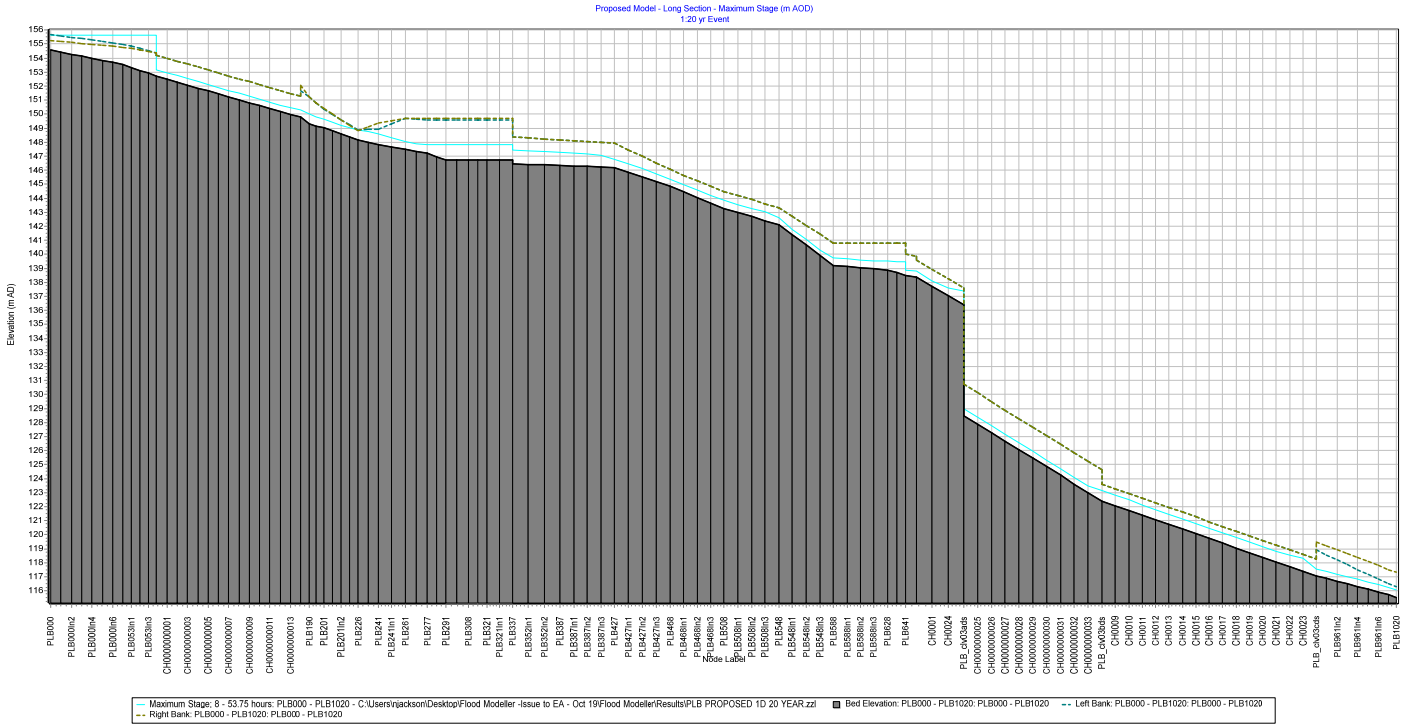
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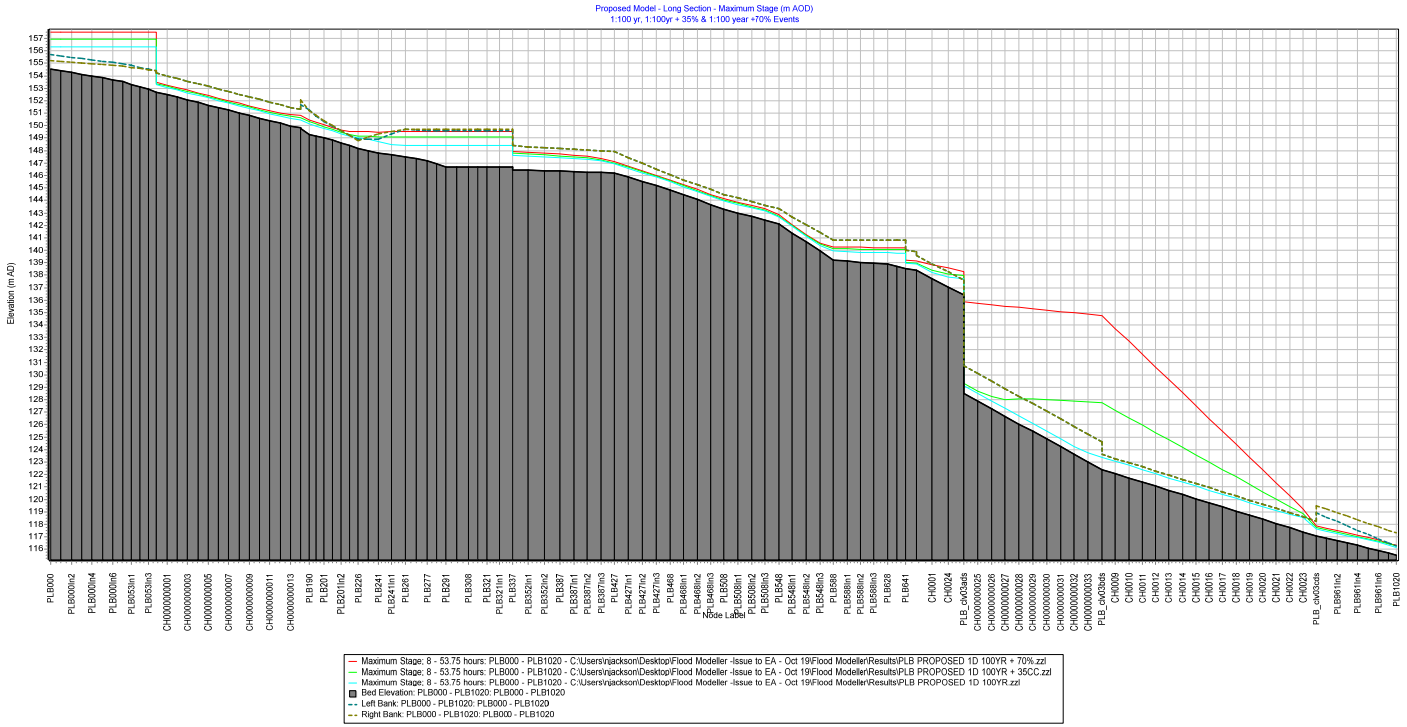

Existing Model - Long Section -Maximum Stage (mAOD)
1:20yr Event
Elevation (mAD)
Node Label
Maximum Stage: 0 - 53.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller - NJ Edit EA Updtaes\Flood Modeller\PLB EXISTING 1D 20YR AUG 19.zzl
Bed Elevation: PLB000 - PLB1020: PLB000 - PLB1020
Left Bank: PLB000 - PLB1020: PLB000 - PLB1020
Right Bank: PLB000 - PLB1020: PLB000 - PLB1020

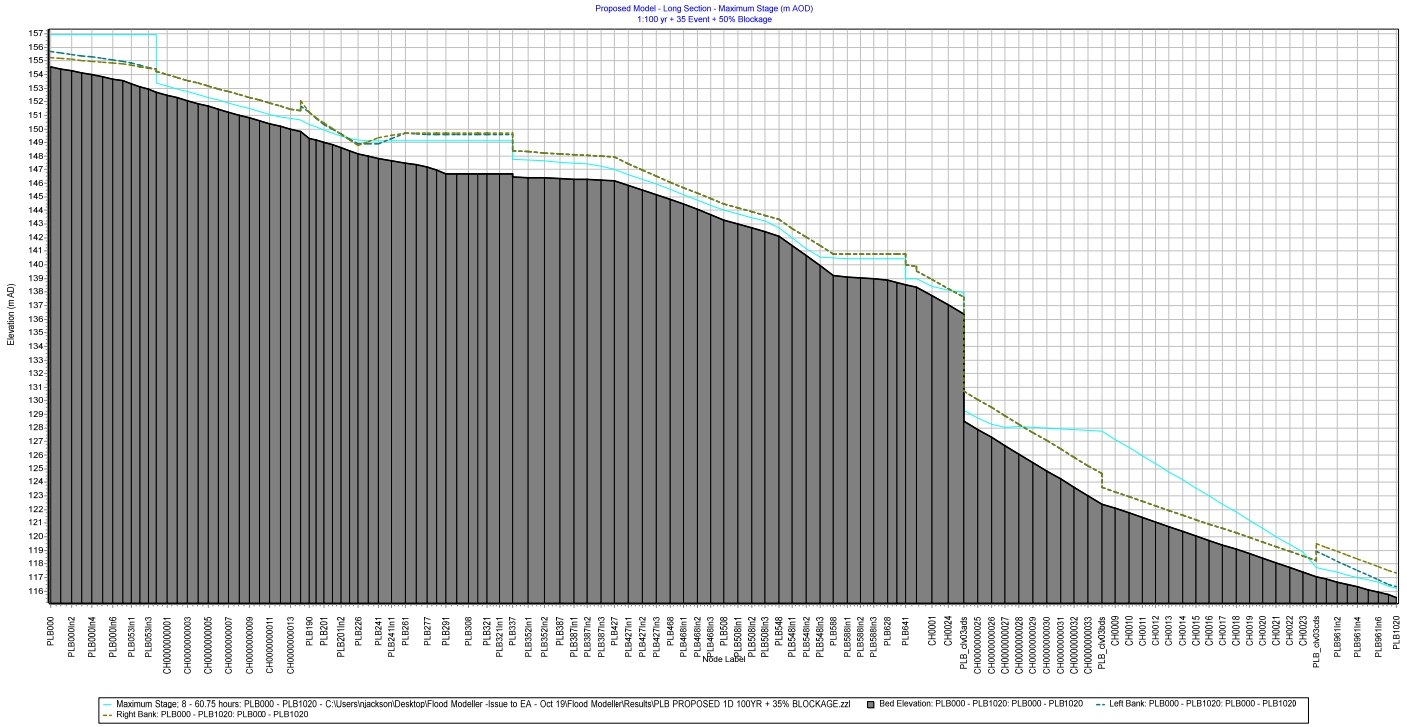

Existing Model - Long Section -Maximum Stage (mAOD)
1:100 yr, 1:100 + 35%CC, 1:100 + 70%CC events
Elevation (m AD)
Node Label
Maximum Stage: 0 - 53.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller - NJ Edit EA Updtaes\Flood Modeller\PLB EXISTING 1D 100YR + 70CC AUG 19.zzl
Maximum Stage: 0 - 53.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller - NJ Edit EA Updtaes\Flood Modeller\PLB EXISTING 1D 100YR + 35CC.zzl
Maximum Stage: 0 - 53.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller - NJ Edit EA Updtaes\Flood Modeller\PLB EXISTING 1D 100YR JUNE19.zzl
Bed Elevation: PLB000 - PLB1020: PLB000 - PLB1020
Left Bank: PLB000 - PLB1020: PLB000 - PLB1020
Right Bank: PLB000 - PLB1020: PLB000 - PLB1020

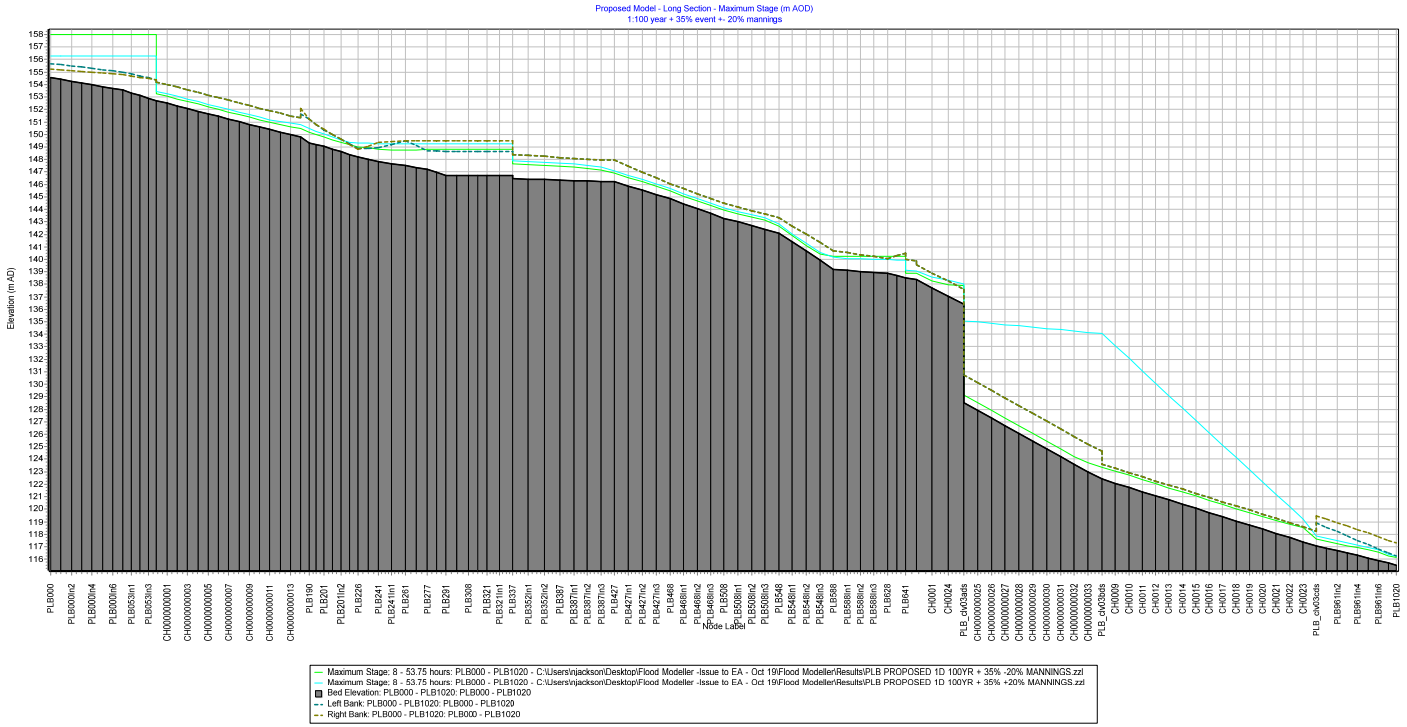
Existing Model - Long Section - Maximum Stage (mAOD)
1:1000 yr Event

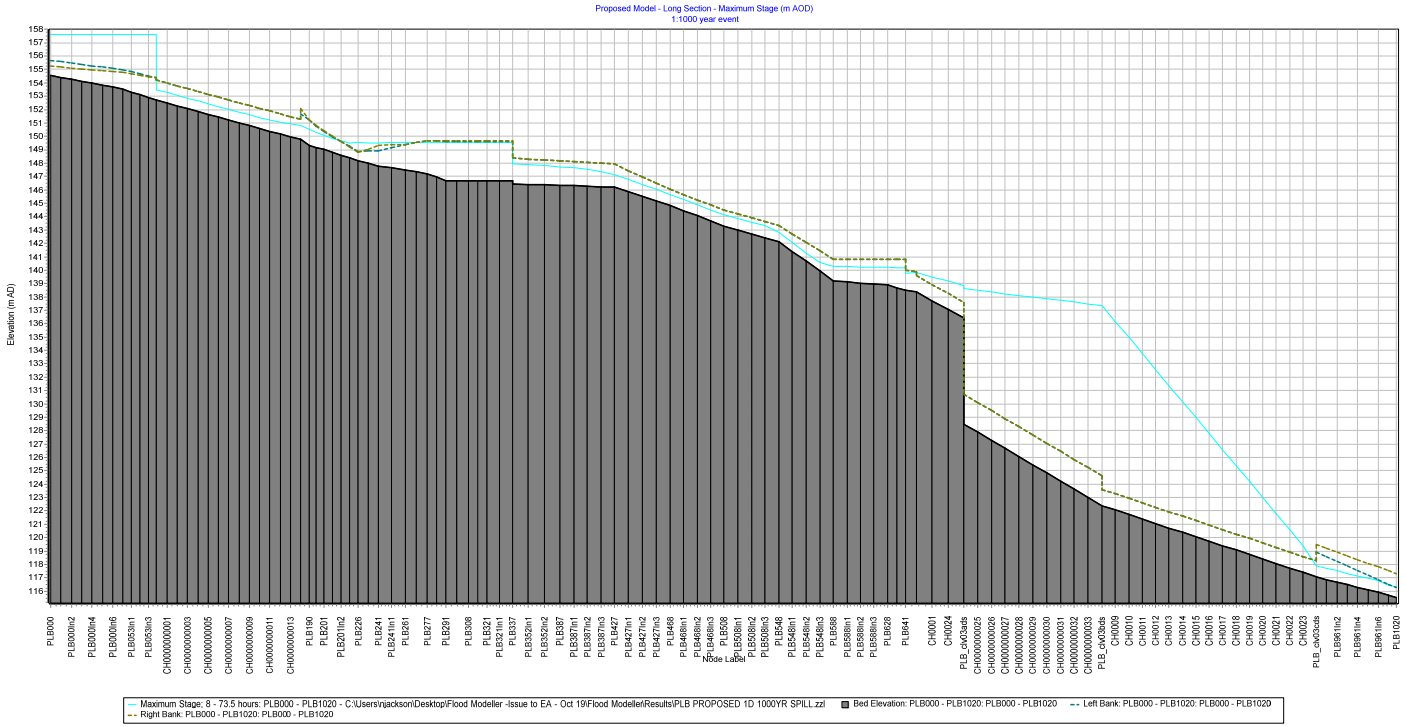



Proposed Model - Long Section - Maximum Stage (m AOD)
1:20 yr Event
Elevation (m AD)
Node Label
Maximum Stage: 8 - 53.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller -Issue to EA - Oct 19\Flood Modeller\Results\PLB PROPOSED 1D 20 YEAR.zzl
Bed Elevation: PLB000 - PLB1020: PLB000 - PLB1020
Left Bank: PLB000 - PLB1020: PLB000 - PLB1020
Right Bank: PLB000 - PLB1020: PLB000 - PLB1020


Proposed Model - Long Section - Maximum Stage (m AOD)
1:100 yr, 1:100yr + 35% & 1:100 year +70% Events
Elevation (m AOD)
Node Label
Maximum Stage: 8 - 53.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller -Issue to EA - Oct 19\Flood Modeller\Results\PLB PROPOSED 1D 100YR + 70%.zzl
Maximum Stage: 8 - 53.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller -Issue to EA - Oct 19\Flood Modeller\Results\PLB PROPOSED 1D 100YR + 35CC.zzl
Maximum Stage: 8 - 53.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller -Issue to EA - Oct 19\Flood Modeller\Results\PLB PROPOSED 1D 100YR.zzl
Bed Elevation: PLB000 - PLB1020: PLB000 - PLB1020
Left Bank: PLB000 - PLB1020: PLB000 - PLB1020
Right Bank: PLB000 - PLB1020: PLB000 - PLB1020


Proposed Model - Long Section - Maximum Stage (m AOD)
1:100 yr + 35 Event + 50% Blockage
Elevation (m AD)
Node Label
Maximum Stage: 8 - 60.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller -Issue to EA - Oct 19\Flood Modeller\Results\PLB PROPOSED 1D 100YR + 35% BLOCKAGE.zzl
Bed Elevation: PLB000 - PLB1020: PLB000 - PLB1020
Left Bank: PLB000 - PLB1020: PLB000 - PLB1020
Right Bank: PLB000 - PLB1020: PLB000 - PLB1020


Proposed Model - Long Section - Maximum Stage (m AOD)
1:100 year + 35% event +- 20% mannings
Elevation (m AD)
Node Label
Maximum Stage: 8 - 53.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller -Issue to EA - Oct 19\Flood Modeller\Results\PLB PROPOSED 1D 100YR + 35% -20% MANNINGS.zzl
Maximum Stage: 8 - 53.75 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller -Issue to EA - Oct 19\Flood Modeller\Results\PLB PROPOSED 1D 100YR + 35% +20% MANNINGS.zzl
Bed Elevation: PLB000 - PLB1020: PLB000 - PLB1020
Left Bank: PLB000 - PLB1020: PLB000 - PLB1020
Right Bank: PLB000 - PLB1020: PLB000 - PLB1020


Proposed Model - Long Section - Maximum Stage (m AOD)
1:1000 year event
Elevation (m AD)
Node Label
Maximum Stage: 8 - 73.5 hours: PLB000 - PLB1020 - C:\Users\njackson\Desktop\Flood Modeller -Issue to EA - Oct 19\Flood Modeller\Results\PLB PROPOSED 1D 1000YR SPILL.zzl
Bed Elevation: PLB000 - PLB1020: PLB000 - PLB1020
Left Bank: PLB000 - PLB1020: PLB000 - PLB1020
Right Bank: PLB000 - PLB1020: PLB000 - PLB1020